

FABACEAE (LEGUMINOSAE)

豆科 dou ke

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Trees, shrubs, or herbs, sometimes climbing or decumbent, very often bearing root-nodules that harbor nitrogen-fixing bacteria. Leaves alternate or rarely opposite, pinnate or bipinnate, less often palmately compound or 3-foliolate, seldom 1-foliolate or simple, or modified into narrow phyllodes; petiole present or absent; stipules and stipels present or absent, sometimes stipules developed into spines. Flowers bisexual, rarely unisexual, actinomorphic (Mimosoideae), \pm zygomorphic (Caesalpinioideae) to very zygomorphic (Papilionoideae), mostly in racemes, corymbs, spikes, heads, or panicles. Sepals (3–)5(or 6), free or connate into a tube, sometimes bilabiate, rarely reduced or obsolete. Petals (0–)5(or 6), usually isomerous with sepals, seldom fewer or none, imbricate or valvate, distinct and often highly differentiated into papilionaceous corolla: upper petal (standard) outermost, 2 lateral petals (wings) \pm parallel with each other, lower 2 innermost petals usually connate by their lower margins and forming a keel. Stamens mostly 10, sometimes fewer or more numerous, distinct or often connate by their filaments to form a closed or open sheath, monadelphous or diadelphous, anther 2-locular, opening lengthwise or by pores, uniform or dimorphic and then alternately basifixed and dorsifixed; pollen simple or compound. Gynoecium nearly always of a solitary carpel (rarely 2 or more distinct carpels); ovary superior, 1-locular or sometimes transversely, rarely longitudinally septate; ovules 1 to numerous, inserted on adaxial suture. Legumes dehiscent by one or both sutures, or indehiscent, sometimes winged, sometimes jointed and breaking up into 1-seeded segments. Seeds without or with very scanty endosperm, sometimes strophiolate.

About 650 genera and ca. 18,000 species: distributed worldwide, woody genera mostly in the S Hemisphere and the tropics, herbaceous genera mostly in temperate regions, very numerous in Mediterranean-climate areas; 29 tribes (three or four introduced), 167 genera (one endemic, 32 or 33 introduced), and 1,673 species (690 endemic, 131–134 introduced) in China.

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Systematic list of tribes and genera

In general, the tribes recognized here and their delimitations follow Lewis, G. P. et al. (eds.). 2005. Legumes of the World. Richmond, U.K.: Royal Botanic Gardens, Kew.

● Indicates endemic genus

- | | | | |
|---------------------------------|------------------------------------|--------------------------------|--------------------------------|
| 1. Cercideae (p. 5) | 42. <i>Sophora</i> | 19. Phaseoleae (p. 196) | 129. <i>Christia</i> |
| 1. <i>Cercis</i> | 43. <i>Cladrastis</i> | 79. <i>Canavalia</i> | 130. <i>Alysicarpus</i> |
| 2. <i>Bauhinia</i> | 44. ● <i>Salweenia</i> | 80. <i>Galactia</i> | 131. <i>Campylotropis</i> |
| 2. Detarieae (p. 22) | 45. <i>Maackia</i> | 81. <i>Ophrestia</i> | 132. <i>Lespedeza</i> |
| 3. <i>Lysidice</i> | 9. Euchresteae (p. 98) | 82. <i>Clitoria</i> | 133. <i>Kummerowia</i> |
| 4. <i>Saraca</i> | 46. <i>Euchresta</i> | 83. <i>Centrosema</i> | 21. Psoraleae (p. 312) |
| 5. <i>Afzelia</i> | 10. Thermopsidae (p. 100) | 84. <i>Apios</i> | 134. <i>Cullen</i> |
| 6. <i>Hymenaea</i> | 47. <i>Ammopiptanthus</i> | 85. <i>Cochlianthus</i> | 22. Sesbanieae (p. 313) |
| 7. <i>Sindora</i> | 48. <i>Piptanthus</i> | 86. <i>Shuteria</i> | 135. <i>Sesbania</i> |
| 8. <i>Tamarindus</i> | 49. <i>Thermopsis</i> | 87. <i>Mastersia</i> | 23. Loteae (p. 316) |
| 3. Cassieae (p. 27) | 11. Crotalarieae (p. 105) | 88. <i>Mucuna</i> | 136. <i>Lotus</i> |
| 9. <i>Zenia</i> | 50. <i>Crotalaria</i> | 89. <i>Spatholobus</i> | 24. Robinieae (p. 320) |
| 10. <i>Cassia</i> | 51. <i>Lotononis</i> | 90. <i>Butea</i> | 137. <i>Robinia</i> |
| 11. <i>Senna</i> | 52. <i>Rothia</i> | 91. <i>Rhynchosia</i> | 25. Galegeae (p. 322) |
| 12. <i>Chamaecrista</i> | 12. Genisteae (p. 119) | 92. <i>Eriosema</i> | 138. <i>Phyllobium</i> |
| 4. Caesalpinieae (p. 35) | Cultivated only. | 93. <i>Dunbaria</i> | 139. <i>Astragalus</i> |
| 13. <i>Ceratonia</i> | 13. Amorpheae (p. 120) | 94. <i>Cajanus</i> | 140. <i>Oxytropis</i> |
| 14. <i>Gymnocladus</i> | 53. <i>Amorpha</i> | 95. <i>Flemingia</i> | 141. <i>Chesneya</i> |
| 15. <i>Gleditsia</i> | 14. Dalbergieae (p. 121) | 96. <i>Erythrina</i> | 142. <i>Chesniella</i> |
| 16. <i>Acrocarpus</i> | 54. <i>Dalbergia</i> | 97. <i>Dysolobium</i> | 143. <i>Colutea</i> |
| 17. <i>Peltophorum</i> | 55. <i>Pterocarpus</i> | 98. <i>Psophocarpus</i> | 144. <i>Sphaerophysa</i> |
| 18. <i>Delonix</i> | 15. Aeschynomeneae (p. 131) | 99. <i>Calopogonium</i> | 145. <i>Eremosparton</i> |
| 19. <i>Caesalpinia</i> | 56. <i>Aeschynomene</i> | 100. <i>Pachyrhizus</i> | 146. <i>Gueldenstaedtia</i> |
| 20. <i>Pterolobium</i> | 57. <i>Arachis</i> | 101. <i>Teyleria</i> | 147. <i>Tibetia</i> |
| 21. <i>Haematoxylum</i> | 58. <i>Geissaspis</i> | 102. <i>Dumasia</i> | 148. <i>Glycyrrhiza</i> |
| 22. <i>Parkinsonia</i> | 59. <i>Ormocarpum</i> | 103. <i>Pueraria</i> | 26. Hedysareae (p. 512) |
| 23. <i>Erythrophleum</i> | 60. <i>Smithia</i> | 104. <i>Nogra</i> | 149. <i>Corethrodedendron</i> |
| 5. Mimoseae (p. 50) | 61. <i>Stylosanthes</i> | 105. <i>Sinodolichos</i> | 150. <i>Hedysarum</i> |
| 24. <i>Parkia</i> | 62. <i>Zornia</i> | 106. <i>Amphicarpaea</i> | 151. <i>Onobrychis</i> |
| 25. <i>Adenanthera</i> | 16. Indigofereae (p. 137) | 107. <i>Teramnus</i> | 152. <i>Eversmannia</i> |
| 26. <i>Entada</i> | 63. <i>Indigofera</i> | 108. <i>Glycine</i> | 153. <i>Alhagi</i> |
| 27. <i>Neptunia</i> | 64. <i>Cyamopsis</i> | 109. <i>Phylacium</i> | 154. <i>Calophaca</i> |
| 28. <i>Leucaena</i> | 17. Millettieae (p. 165) | 110. <i>Lablab</i> | 155. <i>Caragana</i> |
| 29. <i>Mimosa</i> | 65. <i>Derris</i> | 111. <i>Dolichos</i> | 156. <i>Halimodendron</i> |
| 30. <i>Desmanthus</i> | 66. <i>Paraderris</i> | 112. <i>Macrotyloma</i> | 27. Cicereae (p. 546) |
| 6. Acacieae (p. 55) | 67. <i>Aganope</i> | 113. <i>Vigna</i> | 157. <i>Cicer</i> |
| 31. <i>Acacia</i> | 68. <i>Antheroporum</i> | 114. <i>Macroptilium</i> | 28. Trifolieae (p. 547) |
| 7. Ingeae (p. 60) | 69. <i>Afgekia</i> | 115. <i>Phaseolus</i> | 158. <i>Ononis</i> |
| 32. <i>Calliandra</i> | 70. <i>Sarcodum</i> | 20. Desmodieae (p. 262) | 159. <i>Trifolium</i> |
| 33. <i>Pithecellobium</i> | 71. <i>Fordia</i> | 116. <i>Trifidacanthus</i> | 160. <i>Parochetus</i> |
| 34. <i>Falcataria</i> | 72. <i>Millettia</i> | 117. <i>Dendrolobium</i> | 161. <i>Melilotus</i> |
| 35. <i>Albizia</i> | 73. <i>Callerya</i> | 118. <i>Phyllodium</i> | 162. <i>Medicago</i> |
| 36. <i>Enterolobium</i> | 74. <i>Pongamia</i> | 119. <i>Aphyllodium</i> | 163. <i>Trigonella</i> |
| 37. <i>Archidendron</i> | 75. <i>Wisteria</i> | 120. <i>Ohwia</i> | 29. Fabeae (p. 560) |
| 38. <i>Samanea</i> | 76. <i>Craspedolobium</i> | 121. <i>Desmodium</i> | 164. <i>Vicia</i> |
| 8. Sophoreae (p. 72) | 77. <i>Tephrosia</i> | 122. <i>Hylodesmum</i> | 165. <i>Lathyrus</i> |
| 39. <i>Bowringia</i> | 18. Abreae (p. 194) | 123. <i>Codoriocalyx</i> | 166. <i>Lens</i> |
| 40. <i>Ormosia</i> | 78. <i>Abrus</i> | 124. <i>Pycnospora</i> | 167. <i>Pisum</i> |
| 41. <i>Amodendron</i> | | 125. <i>Tadehagi</i> | |
| | | 126. <i>Mecopus</i> | |
| | | 127. <i>Uraria</i> | |
| | | 128. <i>Urariopsis</i> | |

Wu Te-lin, Chen Pang-yu, Wei Chao-fen, Chen Te-chao, Hu Chia-chi, Cheng Hsi-chang & Li Lin-chu. 1988. Leguminosae (1). *In*: Chen Te-chao, ed., *Fl. Reipubl. Popularis Sin.* 39: 1–233; Chen Techao, Chen Pangyu, Fang Yunyi, Zheng Chaozong, Chang Rohwei, Ding Chensen, Li Jiaolan, Ma Chiyun & Wei Zhi. 1994. Leguminosae (2). *In*: Wei Zhi, ed., *Fl. Reipubl. Popularis Sin.* 40: 1–362; Yang Yenchin, Huang Puhua, Fu Peiyun, Li Jiyun, Chen Youan, Lee Shukang, Chang Benneng, Wei Yuetsung, Huang Deai, Wei Chaofen, Wu Telin & Wei Siqu. 1995. Leguminosae (3). *In*: Lee Shukang, ed., *Fl. Reipubl. Popularis Sin.* 41: 1–405; Fu Kuntsun, Chang Chenwan, He Shanbow, Ho Yechi, Ding Chensen, Liou Yingxen & Li Peichun. 1993. Leguminosae (4). *In*: Fu Kuntsun, ed., *Fl. Reipubl. Popularis Sin.* 42(1): 1–384; Zhang Zhenwan, Xu Langran, Wei Zhi, Wei Siqu, Huang Yizhi, Xia Zhendai, Cui Hongbin, Li Peiqiong, Li Jiaolan, Yang Chunyu, Wen Hequn & Huang Deai. 1998. Leguminosae (5). *In*: Cui Hongbin, ed., *Fl. Reipubl. Popularis Sin.* 42(2): 1–467.

Key to tribes

- 1a. Flowers actinomorphic, petals valvate in bud, free or united; anthers sometimes with a deciduous gland at apex (subfam. Mimosoideae).
 - 2a. Stamens 10 or fewer 5. Mimoseae (p. 50)
 - 2b. Stamens numerous, usually more than 10.
 - 3a. Filaments free or only connate at base 6. Acacieae (p. 55)
 - 3b. Filaments connate into a tube 7. Ingeae (p. 60)
- 1b. Flowers ± zygomorphic, petals imbricate in bud.
 - 4a. Flowers slightly zygomorphic; corolla not papilionaceous, uppermost petal overlapped on each side by adjacent lateral petals (when these present); stamens with usually free filaments (subfam. Caesalpinioideae).
 - 5a. Leaves simple, entire or 2-lobed, sometimes divided and 2-foliolate, palmately nerved 1. Cercideae (p. 5)
 - 5b. Leaves once pinnate or bipinnate, pinnately nerved.
 - 6a. Leaves usually bipinnate, if once pinnate (*Ceratonia*) then petals absent, leaflets 2–4 pairs 4. Caesalpinieae (p. 35)
 - 6b. Leaves once pinnate.
 - 7a. Anthers dorsifixed, opening by lateral slits 2. Detarieae (p. 22)
 - 7b. Anthers basifixed, rarely dorsifixed, opening by apical pores or lateral slits 3. Cassieae (p. 27)
 - 4b. Flowers strongly zygomorphic (very rarely actinomorphic); corolla papilionaceous, standard outside wings, keel basally connate; stamens diadelphous (9+1) or monadelphous, rarely free (subfam. Papilionoideae [Faboideae]).
 - 8a. Filaments all free or connate only at base, anthers uniform.
 - 9a. Leaves imparipinnate (simple leaf only in *Bowringia callicarpa* and *Ormosia simplicifolia*); stipules small or absent, stipels present or absent; calyx usually subequally 5-dentate; trees, shrubs, or vines, rarely herbs 8. Sophoreae (p. 72)
 - 9b. Leaves palmately 3-foliolate (rarely 1-foliolate in *Ammopiptanthus mongolicus*); stipules usually united with petioles or amplexicaul, stipels absent; calyx usually deeply 5-lobed; shrubs or herbs 10. Thermopsidae (p. 100)
 - 8b. Filaments partly or almost wholly united to one another, either monadelphous in a closed tube, or diadelphous, in latter case vexillary (adaxial) filament often free or partly free from remainder, anthers uniform or dimorphic.
 - 10a. Anthers dimorphic, alternately dorsifixed and basifixed, either all equal or alternately longer and shorter.
 - 11a. Upper part of filaments swollen or expanded; perennial shrublets, often spiny and glandular 28. Trifolieae (*Ononis*; p. 547)
 - 11b. Upper part of filaments neither swollen nor expanded.
 - 12a. Legumes transversely septate and breaking up into 1-seeded joints (sometimes fruit reduced to 1 joint or maturing underground, subtorulose, but not jointed) 15. Aeschynomeneae (p. 131)
 - 12b. Legumes not transversely septate, or if so then not breaking up into separate joints.
 - 13a. Filaments all connate into a closed tube 12. Genisteae (p. 119)
 - 13b. Filaments connate into a sheath split above or vexillary filament free, remainder connate.
 - 14a. Climbing plants; legumes thick, often clothed with stinging hairs 19. Phaseoleae (*Mucuna*; p. 196)
 - 14b. Erect plants; legumes turgid or inflated.
 - 15a. Leaves imparipinnate; leaflets (3–)5–17 25. Galegeae (*Glycyrrhiza*; p. 322)
 - 15b. Leaves digitately 3-foliolate, sometimes simple or 1-foliolate 11. Crotalariaeae (p. 105)
 - 10b. Anthers uniform in size and shape or nearly so, or 5 sterile (*Terammus*), not alternately basifixed and dorsifixed, also not alternately longer and shorter.
 - 16a. Free upper part of all or half of filaments dilated or expanded upward.
 - 17a. Leaves with white glandular hairs on both sides 27. Cicereae (p. 546)
 - 17b. Leaves without white glandular hairs on both sides.

- 18a. Stipules glandlike; leaflets 5–17(–25), entire, nerves not running into margin 23. Loteae (p. 316)
- 18b. Stipules not glandlike; leaflets 3, usually toothed, lateral nerves extended to teeth or margin 28. Trifolieae (p. 547)
- 16b. Free upper part of filaments ± filiform, not dilated upward.
- 19a. Legumes breaking up into 1-seeded segments when ripe.
- 20a. Leaves with stipels 20. Desmodieae (p. 262)
- 20b. Leaves without stipels.
- 21a. Keel petals often obliquely truncate at apex; wings short or very small, rarely equaling keel petals 26. Hedysareae (p. 512)
- 21b. Keel petals obtuse or beaked, incurved; wings often transversely plicate 15. Aeschynomeneae (p. 131)
- 19b. Legumes not breaking up into separate segments when mature; seeds 1 to several.
- 22a. Plants with indumentum composed mainly of T-shaped hairs.
- 23a. Legumes with septa between seeds, but not jointed; anthers tipped by a gland or apiculate 16. Indigofereae (p. 137)
- 23b. Legumes without septa between seeds; anthers not tipped by a gland or apiculate 25. Galegeae (*Astragalus*; p. 322)
- 22b. Plants glabrous or without indumentum composed of T-shaped hairs.
- 24a. Stamens monadelphous and filaments partly connate into a single ± closed tube, sometimes adaxial filament free at base but connate higher up with remainder.
- 25a. Legumes indehiscent, suborbicular or circinate, 1- or 2-seeded; annual or perennial herbs 26. Hedysareae (*Onobrychis*; p. 512)
- 25b. Legumes dehiscent, not suborbicular.
- 26a. Trees, lianas, or shrubs, sometimes climbing; stipules not sagittate or absent 17. Millettieae (p. 165)
- 26b. Herbs; stipules sagittate 25. Galegeae (*Galega*; p. 322)
- 24b. Stamens diadelphous, mostly vexillary filament free or partly adnate to remainder, or if monadelphous then free at upper part or top.
- 27a. Leaves pinnately or digitately 3-foliolate, sometimes 1-foliolate (*Tadehagi*, *Alysicarpus*) or primitively simple (*Indigofera*).
- 28a. Leaves gland-dotted or pellucid punctate below.
- 29a. Legumes dehiscent, 1- to several seeded; leaves 3-foliolate or simple (*Flemingia*) 19. Phaseoleae (Cajaninae; p. 196)
- 29b. Legumes indehiscent, 1-seeded; leaves simple 21. Psoraleae (p. 312)
- 28b. Leaves neither gland-dotted nor pellucid punctate below.
- 30a. Legumes drupelike, fragile 9. Euchresteeae (p. 98)
- 30b. Legumes not drupelike and fragile, plano-compressed.
- 31a. Leaves ± toothed 28. Trifolieae (p. 547)
- 31b. Leaves entire.
- 32a. Legumes jointed 20. Desmodieae (p. 262)
- 32b. Legumes not jointed 19. Phaseoleae (p. 196)
- 27b. Leaves pinnate; leaflets generally numerous, rarely (1 or) 2 pairs.
- 33a. Leaves gland-dotted; corolla with keel 13. Amorpheae (p. 120)
- 33b. Leaves not gland-dotted; corolla regular.
- 34a. Legumes indehiscent; stipels absent; leaves imparipinnate 14. Dalbergieae (p. 121)
- 34b. Legumes dehiscent, sometimes only so at apex.
- 35a. Rachis of leaves ending in a tendril or bristle.
- 36a. Stamens 10; flowers solitary, fasciculate or racemose in leaf axils; claw of standard free from staminal sheath 29. Fabeae (p. 560)
- 36b. Stamens 9; flowers in terminal or subterminal racemes; claw of standard ± adnate to staminal sheath 18. Abreae (p. 194)
- 35b. Rachis of leaves not ending in a tendril or bristle.
- 37a. Legumes inflated and bladderlike, sometimes dehiscent only at apex 25. Galegeae (p. 322)
- 37b. Legumes compressed.
- 38a. Flowers in terminal or leaf-opposed racemes, rarely axillary 17. Millettieae (p. 165)
- 38b. Flowers solitary, fasciculate, or in axillary racemes.
- 39a. Leaves imparipinnate; leaflets 2–12 pairs 24. Robinieae (p. 320)
- 39b. Leaves paripinnate; leaflets 10–30 pairs 22. Sesbanieae (p. 313)

1. Tribe CERCIDEAE

紫荆族 *zi jing zu*

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen, Supee Saksuwan Larsen, Michael A. Vincent

Leaves alternate, simple, entire or 2-lobed, sometimes parted to base, divided and 2-foliolate. Flowers usually bisexual, rarely unisexual (polygamous or plants dioecious), slightly or conspicuously zygomorphic. Calyx entire, 5-toothed, spathaceous or valvately 2–5-lobed. Petals usually (2–)5(or 6), subequal to greatly unequal, free. Perfect stamens 10 or 2–9 reduced to staminodes; anthers dorsifixed, opening lengthwise or by apical pores. Ovary stipe free or adnate to receptacle; ovules 1 to numerous. Legumes flattened or turgid.

About five genera and 320–350 species: four genera represented in tropical regions, one in temperate parts of the N Hemisphere; two genera and 52 species (28 endemic, two introduced) in China.

The concept of the genus *Bauhinia* as presented here is adopted in the broadest sense.

- 1a. Legume narrowly winged along ventral suture; perfect stamens 10; flowers purplish red or pink 1. *Cercis*
- 1b. Legume without wings; perfect stamens usually 3 or 5, if 10 then flowers white, light yellow, or green 2. *Bauhinia*

1. CERCIS Linnaeus, Sp. Pl. 1: 374. 1753.

紫荆属 *zi jing shu*

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Supee Saksuwan Larsen, Michael A. Vincent

Shrubs or trees. Leaves alternate, simple, entire, veins palmate, base cordate to truncate or cuneate, apex acute to attenuate or emarginate; stipules caducous, small, scalelike or membranous. Flowers zygomorphic, bisexual, purplish red, pink, or white, in solitary racemes or subumbellate clusters on branches of current year or older branches or trunks, flowering before or as leaves expand; bracts scalelike, often imbricate, aggregated at base of racemes; bracteoles minute or absent. Calyx shortly campanulate, slightly oblique, apex unequally 5-toothed; teeth broadly triangular. Petals 5, appearing papilionaceous, but with standard smallest and inside other petals. Stamens 10, free, included; filaments often hairy in lower part; anthers dorsifixed, opening lengthwise. Ovary shortly stipitate; ovules 2–10; style filiform; stigma capitate. Legumes compressed, narrowly oblong to broadly linear, usually narrowly winged along ventral suture, indehiscent or dehiscent, both ends acuminate or obtuse. Seeds 2 to many, compressed, suborbicular, without endosperm.

Eleven species: four confined to North America, one in E and S Europe, one in C Asia; five species (all endemic) in China.

Cercis siliquastrum Linnaeus and *C. canadensis* Linnaeus are sometimes cultivated in China.

- 1a. Flowers in subumbellate clusters, without peduncles or with short peduncles to 1 mm.
 - 2a. Legume thin, usually indehiscent, winged, with small curved beak; leaves papery, thinner, abaxially glabrous or puberulent on veins 4. *C. chinensis*
 - 2b. Legume thick and hard, dehiscent, valves not winged, twisting upon dehiscence, with thick straight beak; leaves subleathery, thicker, often comose-pubescent on axils of veins at base 5. *C. chingii*
- 1b. Flowers in racemes with conspicuous peduncles.
 - 3a. Leaves rhombic-ovate, asymmetric on two sides, base obtusely triangular, both surfaces often glaucous 1. *C. chuniana*
 - 3b. Leaves broadly ovate, ovate-orbicular, or cordate, symmetric, base cordate or subtruncate, abaxially hairy or glabrous, not glaucous.
 - 4a. Racemes longer, rachis 2–10 cm; leaves abaxially puberulent, densely hairy on veins; legume basally attenuate, dorsal and ventral sutures equal in length 2. *C. racemosa*
 - 4b. Racemes short, rachis less than 2 cm; leaves glabrous or sparsely pubescent in axils of veins; legume basally rounded and obtuse, dorsal and ventral sutures unequal 3. *C. glabra*

1. *Cercis chuniana* F. P. Metcalf, Lingnan Sci. J. 19: 551. 1940.

广西紫荆 *guang xi zi jing*

Cercis likiangensis Chun ex Y. Chen.

Trees, 6–27 m tall. Trunk to 20 cm d.b.h., bark grayish. Young branchlets reddish, becoming brownish red when dry; lenticels numerous, dense, small. Petiole 0.9–1.3 cm, slender, both ends slightly inflated; leaf blade rhombic-ovate, 5–9 × 3–5 cm, papery, both surfaces often glaucous especially adaxially, abaxially sparsely puberulent on axils of veins at base, base

obtusely triangular, asymmetric, apex long acuminate. Racemes 3–5 cm, 7–15-flowered. Flower 1–1.3 mm; pedicel 0.8–1 cm, slender. Calyx broadly campanulate, 5–6 mm; teeth 5, shallow. Petals rose-pink to whitish pink; filaments hairy only at very base, otherwise glabrous. Legume purplish red, becoming reddish brown when dry, very compressed, narrowly oblong, 6–9 × 1.3–1.7 cm, both ends acute, apex with sharp, small beak 2–3 mm; wing narrow, less than 1 mm wide; stipe 4–5 mm; fruiting pedicel 1–1.5 cm. Seeds 2–5, blackish brown, compressed, broadly ovoid-orbicular, ca. 6 × 5 mm, smooth. Fl. unknown, fr. Sep–Nov.

• Mountain valleys, open or dense forests, by streams; 600–1900 m. Fujian, N Guangdong, NE Guangxi, SE Guizhou, SE Hunan, S Jiangxi, ?Zhejiang.

2. *Cercis racemosa* Oliver, Hooker's Icon. Pl. 19: t. 1894. 1889.

垂丝紫荆 *chui si zi jing*

Trees, 8–15 m tall. Trunk to 27 cm d.b.h., bark dark gray-brown. Young branchlets dark brown to black, rusty pubescent, lenticels scattered. Petiole 2–3.5 cm, moderately stout, glabrous or pubescent; leaf blade broadly ovate-orbicular, 6–12.5 × 6.5–10.5 cm, abaxially puberulent especially on principal veins, adaxially glabrous, principal veins 5, raised abaxially, reticulate veins conspicuous on both surfaces, base truncate or shallowly cordate, apex acute, slightly attenuate. Racemes solitary, pendulous, 2–10 cm, 6–20-flowered; peduncle and rachis hairy. Flowers 1–1.2 cm; pedicel 0.8–1 cm, slender. Calyx ca. 5 mm. Petals rose-red; standard tinged with deep reddish spots. Stamens included; filaments hairy at base. Legume slightly curved, compressed, oblong, 5–10 × 1.2–1.8 cm, wing 2–2.5 mm wide, dorsal and ventral sutures subequal in length, basally attenuate, apex acute, with a beak 5–7 mm; stipe 3.5–4 mm; fruiting pedicel 1.3–1.5 cm. Seeds 2–9, compressed. Fl. May, fr. Oct.

• Dense forests, mountain slopes, roadsides, beside villages; 1000–1900 m. W Guizhou, W Hubei, Hunan, Shaanxi, E Sichuan, NE Yunnan.

3. *Cercis glabra* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 393. 1910.

湖北紫荆 *hu bei zi jing*

Cercis funiushanensis S. Y. Wang & T. B. Chao; *C. pubescens* S. Y. Wang; *C. yunnanensis* H. H. Hu & W. C. Cheng.

Trees, 6–20 m tall. Trunk to 30 cm d.b.h. or more. Bark and branchlets grayish black. Petiole 2–4.5 cm; leaf blade often purplish red when young, greenish when mature, cordate or triangular-orbicular, 5–12(–20) × 4.5–11.5(–18) cm, thickly papery to subleathery, adaxially shiny, glabrous or comose-pubescent in vein axils, principal veins (5–)7, base shallowly to deeply cordate, rarely truncate, apex obtuse or acute. Raceme short; rachis 5–10 mm, 4–12-flowered. Flowers light purplish red or pink, 1.3–1.5 cm; pedicel 1–2.3 cm, slender. Legume purplish red, broadly linear, (7–)9–15 × 1.2–1.5 cm, wing 2–2.3 mm, sutures unequal (rarely equal), dorsal suture slightly longer, base rounded to acuminate, apex acuminate; stipe 2–3 mm. Seeds 1–8, compressed, suborbicular, 6–7 × 5–6 mm. Fl. Mar–Apr, fr. Sep–Nov.

• Open or dense forests, mountain slopes, along valleys near roads, on rocks; 600–1900 m. Anhui, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang.

Plants called "*Cercis gigantea* Cheng et Keng f." (in Wei & He,

Fl. Zhejiang, 3: 279. 1993) may represent a distinct species, but too little material was available to be certain. This needs further study. The name was not validly published because no Latin description or diagnosis was provided and no type was indicated (*Vienna Code*, Art. 36.1, 37.1).

4. *Cercis chinensis* Bunge, Enum. Pl. China Bor. 21. 1833.

紫荆 *zi jing*

Cercis chinensis f. *alba* S. C. Hsu; *C. chinensis* f. *pubescens* C. F. Wei; *C. chinensis* f. *rosea* P. S. Hsu; *C. pauciflora* H. L. Li.

Shrubs, 2–5(–8) m tall. Bark and branchlets grayish white. Leaf blade greenish when young with only petiole slightly purple, suborbicular or triangular-orbicular, 5–10 cm, ca. as long as wide or slightly longer than wide, papery, both surfaces usually glabrous, or abaxially puberulent on veins, base shallowly to deeply cordate, margin membranous, transparent when fresh, apex acute. Flowers purplish red, pink, or white, 1–1.3 cm, 2–10-clustered on old branches or especially on trunk; pedicel 3–9 mm; keel tinged with deep purple stripes. Ovary glabrous to densely puberulent; ovules 5–8. Legume greenish, becoming stramineous at maturity, compressed, narrowly oblong, 4–8 × 1–1.2 cm, dorsal and ventral suture equal or subequal, wing 1.5–2 mm, base long attenuate, apex acute or shortly acuminate, with slender and curved beak; stipe 2–4 mm. Seeds 2–6, blackish brown, shiny, broadly oblong, 5–6 × ca. 4 mm. Fl. Mar–Apr, fr. Aug–Oct. $2n = 14^*$.

• Dense forests or limestone areas, commonly cultivated. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.

5. *Cercis chingii* Chun, J. Arnold Arbor. 8: 20. 1927.

黄山紫荆 *huang shan zi jing*

Shrubs, 2–6 m tall. Bark light gray, smooth. Branchlets grayish white at first, blackish brown when dry, with numerous, dense, small lenticels, brownish puberulent when young, glabrescent with age. Petiole 1.5–3 cm, slightly thickened at both ends; leaf blade brownish when dry, ovate-orbicular or reniform, 5–11 × 5–12 cm, subleathery, abaxially puberulent on principal veins and in axils of veins at base, principal veins 5, raised abaxially, base cordate or truncate, apex acute with a 5–8 mm mucro or rounded without mucro. Flower clusters borne on old branches, light purplish red, becoming whitish. Calyx 5.5–6 mm. Petals ca. 1 cm. Legumes 7–8.5 × ca. 1.3 cm, thickly leathery, valves twisting upon dehiscence, wing absent, stipe absent; beak robust, ca. 8 × 2 mm, hard. Seeds 3–6, embedded in thick, slightly white (brown when dry), spongy pulp. Fl. Feb–Mar, fr. Sep–Oct. $2n = 14^*$.

• Sparse forests, shrubby areas, roadsides, cultivated in gardens; low elevations. Anhui, N Guangdong, Zhejiang.

2. BAUHINIA Linnaeus, Sp. Pl. 1: 374. 1753.

羊蹄甲属 *yang ti jia shu*

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen, Supee Saksuwan Larsen

Bauhinia sect. *Lasiobema* Korthals; *Lasiobema* (Korthals) Miquel; *Phanera* Loureiro; *Piliostigma* Hochstetter.

Trees, shrubs, or lianas, hermaphroditic, monoecious, andromonoecious, or androdioecious. Leaves simple, bilobed or entire, rarely 2-foliolate with a shared upper pulvinus; primary veins 3–15, midvein ending with a free, small point; stipules caducous. Inflorescences solitary flowers, or many flowers in racemes, panicles, or corymbs; bracts and bracteoles usually small and caducous. Hypanthium cupular, campanulate, or tubular. Calyx closed or open with 5 short or linear teeth at apex in bud, at anthesis spatulate, or regularly or irregularly split into 2–5 lobes. Petals 5, subequal to strongly differentiated, subsessile or prominently clawed, white, yellowish orange, pink, or purplish red. Stamens 2, 3, 5, or 10; anthers dorsifixed, longitudinally dehiscent. Staminodes present or not. Ovary 1- to many ovuled, sessile or with stalk; stigma small or prominent, variously shaped. Fruit flat, elliptic, oblong, obovoid, or linear, woody or thinly valved, dehiscent or indehiscent. Seeds few to many; endosperm present or not.

About 300 species: pantropical; 47 species (23 endemic, two introduced) in China.

The key is based on flowering material as there are too many species for which the mature legumes are not known. *Bauhinia tianlinensis* is known only from fruiting material so could not be included in the key. Legumes of China (Zhu et al., 37, 40, 42, 43, 47. 2007) listed a further five species not included in this manuscript: *B. clemensiorum* Merrill from Guangxi; *B. galpinii* N. E. Brown cultivated in Hong Kong; *B. godefroyi* Gagnepain from Yunnan; *B. lakhonensis* Gagnepain from Guangxi; and *B. strychnoidea* Prain ex King from Yunnan.

- 1a. Calyx spatulate, splitting along one side or into 2 unequal lobes; trees or shrubs without tendrils; flowers with 5 or 10 fertile stamens (or with female flowers lacking anthers) (*B. purpurea* with 3 fertile stamens).
- 2a. Petals 0.7–1.2 cm.
- 3a. Flowers bisexual with 10 unequal fertile stamens and well-developed ovary; petals yellowish; legume 12–20-seeded 8. *B. racemosa*
- 3b. Flowers unisexual, lacking either functional ovary or fertile anthers; petals white or greenish white; legume 2–10-seeded.
- 4a. Inflorescence leaf-opposed, 10–15-flowered; stamens ca. 10 mm; legume 6–10-seeded 6. *B. viridescens*
- 4b. Inflorescence terminal, to 50-flowered, sometimes much condensed; stamens 5–6 mm; legume 2–7-seeded 7. *B. brachycarpa*
- 2b. Petals 3–8 cm.
- 5a. Fertile stamens 10; petals white; leaf blade ovate-cordate to cordate.
- 6a. Leaf blade 3–7 × 4–8 cm, papery, abaxially tomentose 9. *B. tomentosa*
- 6b. Leaf blade 6–11(–16) × 8–12.5 cm, subleathery, abaxially pubescent.
- 7a. Young shoots glabrous; leaf bifid to 1/3–2/5; legume sharply ridged near suture 1. *B. acuminata*
- 7b. Young shoots brownish pubescent or hirsute; leaf bifid to 1/4; legume not ridged near suture 3. *B. hirsuta*
- 5b. Fertile stamens 3 or 5; petals pink, purple, or white with pink spots, occasionally all white; leaf blade orbicular, suborbicular, or broadly ovate.
- 8a. Fertile stamens 3, staminodes 5 or 6; leaf bifid to 1/3–1/2, lobes slightly acute or rarely rounded at apex 4. *B. purpurea*
- 8b. Fertile stamens 5, staminodes 1–5, sometimes absent; leaf bilobed to 1/4–1/3, lobes rounded or narrowly rounded.
- 9a. Petals purplish, 5–8 cm; sterile hybrid not forming fruit 2. *B. ×blakeana*
- 9b. Petals white, often with pink or purple spots, 4–5 cm; legume linear, 15–25 × 1.5–2 cm 5. *B. variegata*
- 1b. Calyx with 4 or 5 ± equal lobes; lianas usually with tendrils (*B. bohniana* an erect shrub 1–2 m high); flowers with 2 or 3 fertile stamens.
- 10a. Leaves 2-foliolate, primary veins 3–5 per lobe.
- 11a. Shoots hairy; leaf lobes acuminate; receptacle ca. 5 mm 37. *B. carcinophylla*
- 11b. Shoots glabrous; leaf lobes obtuse; receptacle 7–12 mm.
- 12a. Tendrils solitary; receptacle 10–12 mm; petals white, broadly obovate, ca. 9 mm 42. *B. didyma*
- 12b. Tendrils paired; receptacle 7–8 mm; petals pinkish with dark red stripes, spatulate, ca. 17 mm 24. *B. yunnanensis*
- 10b. Leaves entire or bifid for up to 1/2 length.
- 13a. Leaves entire to shallowly bifid for up to 1/6 length, primary veins 3–9.
- 14a. Petals orange or reddish, 25–30 mm 23. *B. coccinea*
- 14b. Petals white or greenish white (color not recorded for *B. cercidifolia* or *B. wuzhengyii*), 2.5–10 mm.
- 15a. Leaf blade abaxially glabrous or nearly so.
- 16a. Leaf blade 1.5–4 cm; inflorescence a simple raceme, 5–9 cm 20. *B. venustula*
- 16b. Leaf blade 4.6–10 cm; inflorescence a panicle, or if unbranched then more than 10 cm.
- 17a. Leaf blade with primary veins 3–5, base attenuate or rounded; petals 4–10 mm; tendrils rare or apparently absent.
- 18a. Petals 4–5 mm; leaf base rounded 27. *B. paucinervata*
- 18b. Petals 7–10 mm; leaf base attenuate 31. *B. wuzhengyii*

- 17b. Leaf blade with primary veins usually 7–9, base shallowly cordate to truncate; petals 2.5–3 mm; tendrils usually present.
- 19a. Fertile stamens 3; petiole 2–4 cm; leaf blade 4–8 cm wide, papery; pedicel 3–4 mm 13. *B. scandens*
- 19b. Fertile stamens 2; petiole 4.5–5 cm; leaf blade 9–11 cm wide, leathery; pedicel ca. 18 mm 15. *B. cercidifolia*
- 15b. Leaf blade abaxially pubescent.
- 20a. Inflorescence 7–25 cm, pedicels 3.5–15 mm; petals 3.5–6 mm; staminodes 2.
- 21a. Pedicel 3.5–4 mm 19. *B. lingyuenensis*
- 21b. Pedicel 10–15 mm.
- 22a. Leaf blade ovate or cordate; petals spatulate 17. *B. championii*
- 22b. Leaf blade suborbicular; petals obovate or oblong 10. *B. longistipes*
- 20b. Inflorescence 3.5–8 cm, pedicels 15–22 mm; petals 6–10 mm; staminodes 7: 2 longer and free, others joined at base (not recorded for *B. apertilobata*).
- 23a. Flower bud ellipsoid with protruding apex; receptacle broadly funnelliform; petals spatulate 16. *B. apertilobata*
- 23b. Flower bud ovoid; receptacle cylindrical or elongate; petals subrhombic, broadly obovate, or elliptic.
- 24a. Leaf blade 5–8 × 4–6.5 cm; receptacle 8–9 mm; petals unequal, 3 rhombic, 2 elliptic, claw 3–4 mm 44. *B. quimmanensis*
- 24b. Leaf blade 3–4 × 2–3 cm; receptacle ca. 15 mm; petals subrhombic, broadly obovate, or elliptic, claw 6–8 mm 46. *B. ovatifolia*
- 13b. Leaves bifid for more than 1/5 length, primary veins 7–13.
- 25a. Erect shrubs, tendrils absent; petals pink 25. *B. bohniana*
- 25b. Lianas, tendrils present; petals white or light yellowish, rarely with pink veins or reddish base, or red or golden yellow (sometimes pale pink in *B. hainanensis*).
- 26a. Ovary glabrous.
- 27a. Leaf blade bifid for more than 1/2 length.
- 28a. Inflorescence ca. 5 cm; bracts and bracteoles ca. 3 mm; petals white with pink veins; legume 10–25 cm 41. *B. corymbosa*
- 28b. Inflorescence 10–30 cm; bracts and bracteoles 5–9 mm, brushlike in young inflorescences; petals yellow or whitish yellow; legume 5–8 cm.
- 29a. Flower buds ovoid; staminodes 2; floral disk annular 11. *B. comosa*
- 29b. Flower buds conical; staminodes 4; floral disk U-shaped 12. *B. esquirolii*
- 27b. Leaf blade bifid for 1/5–1/2 length.
- 30a. Fertile stamen filament 25–30 mm; receptacle 3–5 mm; leaf blade 8–18 cm.
- 31a. Pedicel 1–1.5 cm; calyx lobes not reflexed, one free, others in 2 adnate parts, ca. 6 mm; staminodes 2 28. *B. hainanensis*
- 31b. Pedicel 2–2.8 cm; calyx lobes reflexed at anthesis, ovate, ca. 10 mm; staminodes 5–7 21. *B. chalcophylla*
- 30b. Fertile stamen filament 8–12 mm; receptacle 7–15(–30) mm; leaf blade 4–6(–9) cm.
- 32a. Shoots glabrous; calyx lobes 5; legume 12–15 cm 45. *B. damiaoshanensis*
- 32b. Shoots reddish pubescent when young; calyx lobes 2 or 3; legume 18–25 cm 40. *B. glauca*
- 26b. Ovary hairy, at least on sutures.
- 33a. Leaf blade abaxially glabrous.
- 34a. Stems glabrous; leaf blade with yellowish margin 29. *B. japonica*
- 34b. Stems hairy at least when young; leaf blade uniformly green.
- 35a. Leaf blade 10–15 cm wide, bifid for up to 1/5 length; pedicel ca. 1.5 cm 30. *B. wallichii*
- 35b. Leaf blade 5–10 cm wide, bifid for at least 1/2 length; pedicel 4–5 cm 36. *B. erythropoda*
- 33b. Leaf blade abaxially hairy at least on veins.
- 36a. Leaf blade 9–18(–20) cm wide, abaxially tomentose when young.
- 37a. Leaf blade abaxially thickly golden tomentose, primary veins 15–17; inflorescence conical; pedicel 0.9–1 cm 33. *B. hypochrysa*
- 37b. Leaf blade abaxially rusty or yellow-brown tomentose, primary veins 9–13; inflorescence ± flat-topped to rounded; pedicel 2–5 cm.

- 38a. Petiole 8–11 cm; bracts persistent 39. *B. ornata*
 38b. Petiole 1.2–7 cm; bracts caducous.
 39a. Leaf blade 12–18(–23) cm 35. *B. aurea*
 39b. Leaf blade 9–12.5 cm 34. *B. rubrovillosa*
 36b. Leaf blade 3.5–9(–12) cm wide, abaxially pubescent when young.
 40a. Petals red or golden yellow 26. *B. khasiana*
 40b. Petals white, sometimes reddish at base or tinged yellow or green.
 41a. Petals 4–6 mm.
 42a. Leaf blade bifid to 1/6–1/5 of length; bracts 6–9 mm;
 lower pedicels to 20 mm 43. *B. touranensis*
 42b. Leaf blade bifid to 1/3–1/2 of length; bracts 3–4 mm;
 lower pedicels 3–5 mm.
 43a. Flower bud ca. 2 mm; leaf blade and legume valves
 leathery 14. *B. delavayi*
 43b. Flower bud ca. 5 mm; leaf blade papery; legume
 valves woody 18. *B. hypoglaucula*
 41b. Petals 15–30 mm.
 44a. Calyx lobes 2 or 3; petals to 15 mm, apex acute 38. *B. calciphila*
 44b. Calyx lobes 5; petals 20–30 mm, apex emarginate.
 45a. Inflorescence conical; pedicel 0.7–3 cm; calyx
 lobes not reflexed 32. *B. pyrrhoclada*
 45b. Inflorescence ± flat-topped; pedicel 4–5 cm; calyx
 lobes reflexed.
 46a. Calyx lobes ca. 12 mm; filaments 15–17 mm,
 lower part pubescent 36. *B. erythropoda*
 46b. Calyx lobes 25–30 mm; filaments ca. 35 mm,
 glabrous 22. *B. nervosa*

1. *Bauhinia acuminata* Linnaeus, Sp. Pl. 1: 376. 1753.

白花羊蹄甲 bai hua yang ti jia

Shrubs or small trees, to 3 m tall. Young branches zigzag, glabrous. Petiole 2.5–4 cm, pubescent; leaf blade ovate-cordate to cordate, 9–12 × 8–12.5 cm, subleathery, abaxially grayish pubescent, adaxially glabrous, primary veins 9–11, secondary and higher order veins protruding, base cordate, apex bifid to 1/3–2/5, lobes acuminate or slightly acute at apex or rarely rounded. Inflorescence a raceme, with few (3–15) flowers, axillary, appearing cymose; peduncle short, pubescent as inflorescence axis; bracts and bracteoles linear, pubescent. Flower buds ca. 2.5 cm, acutely tapering and ending in 5 linear calyx teeth ca. 3 mm. Hypanthium tubular. Calyx spathe open on one side, shortly 5-toothed. Petals white, obovate-elliptic, 3.5–5 × ca. 2 cm, sessile. Fertile stamens 10 in 2 whorls, subequal, 1.5–2.5 cm, pubescent on lower 1/3; anthers yellow, oblong. Ovary prominently stalked, pubescent or almost glabrous; style 15–20 mm; stigma peltate, ca. 3 mm in diam. Legume straight or slightly curved, linear-oblongate, compressed, 6–12 × ca. 1.5 cm, with stalk ca. 1 cm, apex acuminate, beaked; valves leathery, glabrous, sharply ridged near suture. Seeds 5–12, compressed, 8–10 mm in diam. Fl. Apr–Jun, fr. Jun–Aug.

Guangdong, Guangxi, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia (Peninsular), Philippines, Sri Lanka, Thailand, Vietnam].

2. *Bauhinia ×blakeana* Dunn, J. Bot. 46: 325. 1908.

红花羊蹄甲 hong hua yang ti jia

Trees. Branches numerous; branchlets slender, pubescent. Petiole 3.5–4 cm, brownish pubescent; leaf blade orbicular or suborbicular, 8.5–13 × 9–14 cm, leathery, abaxially puberulent,

adaxially glabrous, primary veins 11–13, base cordate or truncate, apex bilobed to 1/4–1/3, lobes rounded or narrowly rounded. Inflorescence racemose, terminal or axillary, or several racemes together forming a panicle, pubescent; bracts and bracteoles triangular, ca. 3 mm. Floral buds fusiform. Hypanthium tubular. Calyx spathe ca. 2.5 cm, with greenish or light reddish ridges. Petals purplish, lanceolate, 5–8 × 2.5–3 cm, shortly clawed. Fertile stamens 5, with 3 longer. Staminodes 2–5, threadlike. Ovary prominently stalked, pubescent. Legume not produced. Fl. Nov–Mar.

Frequent in Fujian, Guangdong, Guangxi, Taiwan, and Yunnan [widely cultivated].

This is a hybrid between *Bauhinia purpurea* and *B. variegata*. First collected from a garden in Hong Kong, it is now widely cultivated in the tropics as an ornamental tree.

3. *Bauhinia hirsuta* Weinmann in Hornschuch, Syll. Pl. Nov. 2: 9. 1825.

粗毛羊蹄甲 cu mao yang ti jia

Bauhinia acuminata Linnaeus var. *hirsuta* (Weinmann) Craib.

Shrubs, to 3 m tall. Young branches brownish pubescent or hirsute. Stipules linear or spinelike, ca. 1 cm; petiole 2–5 cm, ridged; leaf blade broadly ovate or cordate, 6–11(–16) × 6–11 cm, subleathery, abaxially pubescent, adaxially glabrous, primary veins 9, base shallowly cordate, apex bifid to 1/4, lobes obtuse at apex. Inflorescence a short raceme, few (2–5) flowered, axillary or terminal; bracts and bracteoles linear, 3–6 mm, pubescent. Flower buds narrowly fusiform, pubescent, acuminate at apex, tapering into 5 linear, pubescent teeth 2–5

mm. Hypanthium tubular. Calyx spathe open on one side. Petals white, ovate-oblong, 3–3.5 × ca. 1.5 cm, subsessile. Fertile stamens 10 in 2 whorls, subequal, to 2 cm, pubescent at base; anthers yellow, oblong. Ovary stalked, pubescent only near base and on margin; style to 2 cm, glabrous; stigma peltate, small. Legume straight or slightly curved, linear-oblancoolate, 6–9 × ca. 1.5 cm, compressed, beaked; valves leathery, glabrous, without ridges on suture. Seeds 3–10, compressed, ca. 8 mm in diam. Fl. Apr, fr. Jun–Aug.

Yunnan [from SE Asia and Peninsular Malaysia to Indonesia (Java)].

4. *Bauhinia purpurea* Linnaeus, Sp. Pl. 1: 375. 1753.

羊蹄甲 yang ti jia

Trees or erect shrubs, 7–10 m tall. Bark grayish to dark brownish, thick, smooth; branches puberulent when young, later glabrous. Petiole 3–4 cm; leaf blade suborbicular, 10–15 × 9–14 cm, stiffly papery, abaxially almost glabrous, adaxially glabrous, primary veins 9–11, secondary and higher order veins protruding, base shallowly cordate, apex bifid to 1/3–1/2, lobes slightly acute or rarely rounded at apex. Inflorescence a raceme with few flowers, or a panicle with up to 20 flowers, axillary or terminal. Flower buds fusiform, 4- or 5-ridged, with an obtuse apex. Pedicel 7–12 mm. Calyx open as a spathe into 2 lobes, one with 2 teeth and other 3-toothed. Petals light pink, oblanceolate, 4–5 cm, clawed. Fertile stamens 3; filaments ca. as long as petals. Staminodes 5 or 6, 6–10 mm. Ovary stalked, velvety; style curved; stigma slightly enlarged, peltate. Legume linear, flat, 12–25 × 2–2.5 cm; valves woody. Seeds compressed, suborbicular, 12–15 mm in diam. Fl. Sep–Nov, fr. next Feb–Mar. $2n = 28$.

Widely cultivated as ornamental trees. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [probably only native from Nepal through continental monsoon Asia (Cambodia, Laos, Myanmar, Thailand, Vietnam)].

5. *Bauhinia variegata* Linnaeus, Sp. Pl. 1: 375. 1753.

洋紫荆 yang zi jing

Trees, deciduous, to 15 m tall. Bark dark brownish, nearly smooth; branches gray puberulent when young, later glabrous. Petiole 2.5–3.5 cm; leaf blade suborbicular or broadly ovate, 5–9 × 7–11 cm, subleathery, abaxially almost glabrous, adaxially glabrous, primary veins 9–13, secondary and higher order veins protruding, base shallowly to deeply cordate, apex bifid to 1/3, lobes rounded at apex. Inflorescence a raceme, few flowered, sometimes corymblike, axillary or terminal. Flower buds fusiform, smooth, subsessile. Calyx open as a spathe into 2 lobes. Petals white, or with pink or purplish spots, obovate or oblanceolate, 4–5 cm, clawed. Fertile stamens 5; filaments ca. as long as petals, slender. Staminodes 1–5 and small, or ?absent. Ovary stalked, puberulent; style curved; stigma small. Legume linear, flat, 15–25 × 1.5–2 cm; valves woody. Seeds 10–15, compressed, suborbicular, ca. 10 mm in diam. Fl. Feb–May, fr. Mar–Jul. $2n = 28$.

Tropical forests, also cultivated; 1000–1500 m. Native in S Yunnan (Xishuangbanna); widely cultivated in S China [Cambodia, Laos, Myanmar, Thailand, Vietnam; widely cultivated in the tropics and subtropics].

- 1a. Petals with colored spots 5a. var. *variegata*
1b. Petals white 5b. var. *candida*

5a. *Bauhinia variegata* var. *variegata*

洋紫荆(原变种) yang zi jing (yuan bian zhong)

Bauhinia variegata var. *chinensis* Candolle; *Phanera variegata* (Linnaeus) Benth.

Petals with colored spots. Staminodes 1–5.

Tropical forests, also cultivated; 1000–1500 m. Native in S Yunnan (Xishuangbanna); widely cultivated in S China [Cambodia, Laos, Myanmar, Thailand, Vietnam; widely cultivated in the tropics and subtropics].

5b. *Bauhinia variegata* var. *candida* (Aiton) Voigt, Hort. Suburb. Calcutt. 253. 1845.

白花洋紫荆 bai hua yang zi jing

Bauhinia candida Aiton, Hort. Kew. 2: 49. 1789; *B. variegata* var. *alboflava* de Wit.

Petals white. Staminodes ?absent. $2n = 28^*$.

• Tropical forests, also cultivated. Native in S Yunnan (Xishuangbanna); widely cultivated in S China.

Two of us (Larsens) note that the absence of staminodes needs to be checked on Chinese materials as this is not the case for the species in SE Asia.

6. *Bauhinia viridescens* Desvaux, Ann. Sci. Nat. (Paris) 9: 429. 1826.

绿花羊蹄甲 lü hua yang ti jia

Bauhinia laui Merrill; *B. polycarpa* Wallich ex Benth.; *B. viridescens* var. *laui* (Merrill) T. C. Chen.

Shrubs or small trees, to 3 m tall, dioecious. Young branches pubescent; older branches whitish. Stipules narrowly triangular and tapering, ca. 2 mm; petiole 2–3.5 cm; leaf blade suborbicular, 5–9 × 6–10 cm, papery, abaxially pubescent, adaxially glabrous, primary veins 7–9, base truncate or shallowly cordate, apex bifid to 1/2, lobes obtuse at apex. Inflorescence a raceme, 4–8 cm, 10–15-flowered, opposite with leaves; bracts 2–3 mm, pubescent. Flower buds narrowly fusiform, 6–10 mm. Hypanthium turbinate, short. Calyx spathe open on one side. Petals greenish white, obovate-lanceolate, 7–12 mm, shortly clawed. Male flower: fertile stamens 10 in 2 whorls, subequal, ca. 10 mm; anthers oblong, 1–2 mm. Female flower: reduced stamens present; ovary shortly stalked, 6–8 mm; style short; stigma peltate, small. Legume straight or slightly curved, linear, compressed, 5–7 × 0.7–1 cm, beaked; valves leathery, glabrous. Seeds 6–10, green, ellipsoid, slightly compressed, ca. 3 mm in diam. Fl. Mar–Jul, fr. May–Jan.

Open forests; low elevations. Hainan, Yunnan [Cambodia, Laos, Malaysia, Myanmar, Vietnam].

7. *Bauhinia brachycarpa* Wallich ex Benth. in Miquel, Pl. Jungh. 261. 1852.

鞍叶羊蹄甲 an ye yang ti jia

Bauhinia altefissa H. Léveillé, p.p.; *B. bonatiana* Pampanini; *B. brachycarpa* var. *cavaleriei* (H. Léveillé) T. C. Chen; *B. brachycarpa* var. *densiflora* (Franchet) K. Larsen & S. S. Larsen; *B. brachycarpa* var. *microphylla* (Oliver ex Craib) K. Larsen & S. S. Larsen; *B. cavaleriei* H. Léveillé; *B. densiflora* Franchet; *B. enigmatica* Prain; *B. faberi* Oliver; *B. faberi* var. *megaphylla* Tang & Wang; *B. faberi* var. *microphylla* Oliver ex Craib.

Shrubs, erect or spreading, or small trees, to 5 m tall, dioecious or androdioecious. Branches slender, puberulent when young, glabrous later. Stipules caducous, linear; petiole 1–6 cm; leaf blade suborbicular, 0.8–12 × 1–10 cm, papery or membranous, abaxially puberulent, adaxially glabrous or puberulent, primary veins 5–13, base truncate or shallowly cordate, apex bifid to ca. 1/2, lobes rounded at apex. Inflorescence a raceme, to 50-flowered, sometimes much condensed, terminal; bracts caducous, linear. Flower buds ellipsoid, puberulent. Hypanthium turbinate, short. Calyx open as a spathe into 2 lobes. Petals white, obovate to oblanceolate, 7–8 mm, shortly clawed. Male flowers: fertile stamens 10 in 2 whorls; filaments 5–6 mm; reduced ovary small. Female flowers: reduced stamens 10; ovary hairy, shortly stalked; style stout; stigma peltate. Legume elliptic to oblanceolate, compressed, leathery, puberulent or nearly glabrous, dehiscent. Seeds 2–7, suborbicular, compressed. Fl. May–Jul, fr. Aug–Oct.

Open forests, dry mountain slopes; sea level to 3200 m. Chongqing, Gansu, Guangxi, Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan [Laos, Myanmar, Thailand].

This is a polymorphic species, widely distributed in W China from Xishuangbanna in the south to Gansu in the north. At lower elevations and latitudes, as a small tree in open forests, its leaves can be much larger, but in habitats at higher elevations and latitudes, especially on slopes in dry river valleys, it is a small shrub no more than 30 cm tall, with leaves not exceeding 1 cm in diam.

8. *Bauhinia racemosa* Lamarck, Encycl. 1: 390. 1785.

总状花羊蹄甲 zong zhuang hua yang ti jia

Bauhinia parviflora Vahl; *Piliostigma racemosum* (Lamarck) Benth.

Trees, deciduous, small, to 15 m tall. Bark blackish, rough; branches spreading or pendulous, zigzag, slender, glabrous. Stipules caducous; petiole 0.8–1.2 cm; leaf blade broadly orbicular, 1.5–4 × 2.2–6 cm, 7–9-veined, leathery, abaxially pubescent or glabrous, adaxially glabrous, base cordate, apex bifid to ca. 1/3, lobes rounded at apex. Inflorescence a lateral or terminal raceme, ca. 20-flowered; peduncle short; bracts and bracteoles linear. Flower buds obovoid, puberulent, apex protruding. Hypanthium turbinate, short. Calyx split spathaceously at anthesis. Petals yellowish, subequal, oblanceolate, 8–10 mm, subsessile. Fertile stamens 10, unequal; filaments 6–7 mm; anthers small, ca. 3 mm. Ovary stalked, glabrous; stigma subsessile, peltate, small. Legume linear-cylindric, 15–20 × 1.8–2.2 cm; valves woody, glabrous. Seeds 12–20, dark brownish, ellipsoid, 8–10 mm in diam. Fl. Apr–May, fr. Jun–Aug. $2n = 28$.

Dry river valleys. Yunnan [Cambodia, NE India, Myanmar, Thailand, Vietnam].

9. *Bauhinia tomentosa* Linnaeus, Sp. Pl. 1: 375. 1753.

黄花羊蹄甲 huang hua yang ti jia

Shrubs, erect, to 4 m tall. Young branches puberulent. Stipules linear, ca. 1 cm; petiole 1.5–3 cm, slender; leaf blade suborbicular, 3–7 × 4–8 cm, papery, abaxially tomentose, adaxially glabrous, base cordate, 7–9-veined, apex bifid to ca. 1/2, lobes rounded at apex. Inflorescence a lateral raceme, 1–3-flowered; pedicel short; bracts and bracteoles linear, 4–7 mm. Flower buds fusiform, ca. 2 cm, puberulent. Hypanthium turbinate, ca. 5 mm. Calyx split spathaceously at anthesis. Petals light yellowish, subequal, broadly obovate, 4–5.5 × 3–4 cm, subsessile. Fertile stamens 10, unequal; filaments 1–2 cm, puberulent at base. Ovary stalked, tomentose; style slender, glabrous; stigma peltate, small. Legume flat, linear, 7–15 × 1.2–1.5 cm, sutures not ridged; valves leathery, velutinous. Seeds brownish, suborbicular, compressed, 6–8 mm in diam. Fl. and fr. almost year-round. $2n = 28$.

Widely cultivated as ornamental plants in China. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [origin in tropical Asia, probably indigenous to India; cultivated elsewhere].

10. *Bauhinia longistipes* T. C. Chen, Guihaia 8: 43. 1988.

长柄羊蹄甲 chang bing yang ti jia

Lianas, woody. Stems canaliculate or angulate, brownish puberulent; tendrils compressed when young, later cylindrical. Stipules caducous; petiole 1.5–2 cm; leaf blade suborbicular, 3.5–4.5 × 3–5 cm, papery, abaxially pubescent when young, later glabrous, adaxially glabrous, primary veins 7, base truncate or cordate, apex bifid to only 1/6, lobes obtuse or rounded at apex. Inflorescence an elongated raceme, 10–20 cm, more than 50-flowered, axillary, or a terminal panicle of 2 or 3 racemes; bracts linear, ca. 5 mm; bracts and bracteoles brush-like in young inflorescences. Flower buds ellipsoid, ca. 3 mm, apex open with 5 teeth. Hypanthium cupular. Flowers small, 3 or 4 whorls per inflorescence node; pedicel 10–15 mm, slender, pubescent. Calyx lobes 5, triangular-lanceolate, 2–2.5 mm, outside pubescent. Petals subequal, obovate or oblong, 3.5–4 × 1.5–2.8 mm including a claw 1–1.5 mm, outside from middle to apex hairy. Fertile stamens 3; filaments 6–7 mm, glabrous. Staminodes 2. Floral disk annular, with lobes, fleshy, swollen. Ovary glabrous, with a slender stalk, oblique; style ca. as long as ovary stalk; stigma capitate, small. Legume unknown. Fl. Aug.

• Riverbanks; ca. 1300 m. Yunnan.

11. *Bauhinia comosa* Craib, Bull. Misc. Inform. Kew 1913: 352. 1913.

川滇羊蹄甲 chuan dian yang ti jia

Bauhinia henryi Harms (1921), not Craib (1913); *B. mairei* Harms; *B. saxatilis* Craib; *Lasiobema comosa* (Craib) A. Schmitz.

Lianas, woody. Branches brownish puberulent; tendrils solitary or in pairs. Stipules caducous; petiole 2–3 cm; leaf blade broadly ovate or suborbicular, 3–6 × 2.8–6.5 cm, rigidly papery, abaxially glabrous or puberulent when young, adaxially

glabrous, primary veins 7–9, base cordate or truncate, apex bifid to more than 1/2, lobes obtuse or rounded at apex. Inflorescence an elongated raceme, 10–20 cm, many flowered, terminal; bracts and bracteoles linear, 5–8 mm, brushlike in young inflorescences. Pedicel 8–13 mm. Flower buds ovoid, apex open with 5 teeth. Hypanthium cupular, 2–3 mm. Calyx lobes 5, reflexed at anthesis, broadly lanceolate, ca. 5 mm, outside pubescent. Petals yellow or whitish yellow, subequal, obovate or oblong, ca. 7 mm, outside hairy along midvein, shortly clawed or subsessile, apex acute, obtuse, or rounded. Fertile stamens 3; filaments 6–7 mm, glabrous. Staminodes 2, much reduced. Floral disk annular, fleshy, swollen. Ovary stalked, glabrous, oblique; style ca. as long as ovary stalk; stigma capitate, small. Legume linear-oblong, ca. 7 × 2 cm; valves woody, glabrous. Seeds ellipsoid, compressed, ca. 10 × 7–8 mm. Fl. Aug–Sep, fr. Nov–Dec.

- Rocky hills, disturbed habitats on slopes. Sichuan, Yunnan.

12. *Bauhinia esquirolii* Gagnepain, Notul. Syst. (Paris) 2: 171. 1912.

元江羊蹄甲 yuan jiang yang ti jia

Lasiobema esquirolii (Gagnepain) de Wit.

Lianas, woody. Branches cylindrical, puberulent; tendrils in pairs. Stipules caducous; petiole 1.5–2 cm, stout; leaf blade broadly ovate or orbicular, 4–7 × 4–6.5 cm, papery, abaxially yellowish white puberulent, adaxially puberulent when young, later glabrous, primary veins usually 9, base shallowly or deeply cordate, apex bifid to more than 1/2, lobes triangular with obtuse apices. Inflorescence an elongated raceme, 10–30 cm, many flowered, terminal; bracts and bracteoles linear, 7–9 mm, brushlike in young inflorescences; rachis angulate. Pedicel ca. 15 mm. Flower buds conical, acute, apex open with 5 teeth. Receptacle tapering to pedicel; calyx lobes 5, lanceolate, 5–6 mm, outside pubescent, tapering to apex, joined from middle. Petals yellow or whitish yellow, subequal, oblanceolate, ca. 7 mm, outside hairy, cucullate, clawed, apex acute. Fertile stamens 3; filaments 6–7 mm, glabrous; anthers oblong. Staminodes 4, much reduced to less than 1 mm. Floral disk fleshy, swollen, U-shaped. Ovary stalked, oblique, glabrous; style ca. as long as ovary stalk, stout; stigma small, truncate. Legume linear-oblong, 5–8 × 1.5–1.7 cm; valves woody, light brownish when dried. Seeds 2–5, suborbicular, compressed, ca. 9 mm in diam. Fl. Sep–Nov, fr. Nov–Dec.

- Open forests on hills. Guizhou, Yunnan.

13. *Bauhinia scandens* Linnaeus, Sp. Pl. 1: 374. 1753.

攀缘羊蹄甲 pan yuan yang ti jia

Bauhinia anguina Roxburgh; *B. anguina* var. *horsfieldii* Watt ex Prain; *B. horsfieldii* (Miquel) J. F. Macbride; *B. japonica* Maximowicz var. *subrhombicarpa* (Merrill) Hiroe; *B. scandens* var. *horsfieldii* (Watt ex Prain) K. Larsen & S. S. Larsen; *B. subrhombicarpa* Merrill; *Lasiobema anguina* (Roxburgh) Korthals ex Miquel; *L. horsfieldii* Miquel; *L. scandens* (Linnaeus) de Wit; *L. scandens* var. *horsfieldii* (Watt ex Prain) de Wit.

Lianas, large, woody. Branches cylindrical when young, ap-

planate when old, forming “monkey ladders,” puberulent, later glabrous; tendrils in pairs, puberulent. Stipules caducous; petiole 2–4 cm, slender; leaf blade ovate to broadly ovate, 5–9 × 4–8 cm, papery, both surfaces glabrous, primary veins usually 7–9, base shallowly cordate to truncate, entire on flowering branches, apex bifid to more than 1/2 in sterile or juvenile branches, lobes with obtuse or acuminate apices. Inflorescence an elongated raceme, 10–15 cm, many flowered, or several joined in a panicle 15–25 cm, terminal, puberulent; bracts and bracteoles linear. Pedicel 3–4 mm, slender. Flower buds ovoid, 1.8–2 mm in diam., apex open. Calyx lobes 5, triangular, outside pubescent. Petals white, subequal, obovate to oblanceolate, ca. 3 mm, shortly clawed. Fertile stamens 3; filaments glabrous. Staminodes 2. Floral disk fleshy, swollen. Ovary shortly stalked, oblique, glabrous; style stout; stigma small. Legume rhombic to oblong, 1.8–3 × 1–1.6 cm, indehiscent or tardily dehiscent; valves thin, reticulate veined. Seeds 1 or 2(–4), ellipsoid to obovoid-orbicular, ca. 8 mm in diam. Fl. Oct, fr. Dec.

Disturbed forests in valleys, among shrubs in coastal habitats. Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

14. *Bauhinia delavayi* Franchet, Pl. Delavay. 192. 1890.

薄荚羊蹄甲 bao jia yang ti jia

Lasiobema delavayi (Franchet) A. Schmitz.

Lianas, woody. Branches slender; young branches angulate, puberulent; tendrils in pairs, slightly compressed, brownish or grayish pubescent. Stipules caducous; petiole 2–4.5 cm, puberulent; leaf blade suborbicular, 5–8 × 4–8 cm, subleathery, abaxially throughout puberulent when young, only veins puberulent when old, adaxially glabrous, primary veins 7–9, base shallowly or deeply cordate, broadly bifid to 1/3–2/5; lobes ovate, with acute, acuminate, or obtuse apices. Inflorescence an axillary raceme or terminal panicle composed of 2 or 3 racemes 6–20 cm, many flowered; bracts and bracteoles linear, 2–4 mm, brushlike in young inflorescences; inflorescence rachis, pedicels, and calyx grayish or brownish pubescent. Pedicel 3–4 mm. Flower buds ellipsoid, ca. 2 mm. Calyx mouth 5-toothed; receptacle ca. 3 mm; calyx lobes 5, persistent, triangular. Petals white, subequal, broadly elliptic, ca. 5 mm, cucullate, tapering into a short claw. Fertile stamens 3; filaments ca. 5 mm; anthers oblong. Staminodes 2 or 3, ca. 1.5 mm. Floral disk fleshy, swollen, lobed. Ovary shortly stalked, oblique, puberulent, becoming glabrous; style incurved, stout; stigma small, truncate. Legume subelliptic or oblong, compressed, 2–7 × 1.5–2 cm; valves leathery, thin. Seeds 2–5, suborbicular, compressed. Fl. Sep–Nov, fr. Nov–Dec.

- Open forests, disturbed hillsides. Yunnan.

15. *Bauhinia cercidifolia* D. X. Zhang, Nordic J. Bot. 13: 399. 1993.

紫荆叶羊蹄甲 zi jing ye yang ti jia

Lianas, with tendrils. Branches angulate, puberulent when young, glabrous when older. Stipules caducous; petiole 4.5–5 cm, puberulent; leaf blade broadly ovate, 8–10 × 9–11 cm, leathery, base cordate, both surfaces glabrous, primary veins 7–

9, veins convex on both surfaces, apex entire or emarginate. Inflorescence a panicle with lax racemes, puberulent; bracts subulate, ca. 2.5 mm; bracteoles similar but smaller, inserted at middle of pedicel. Pedicel ca. 1.8 cm. Flower buds subovoid, ca. 2.5 mm in diam. Hypanthium short. Calyx not closed at tip; calyx segments 5, elliptic, apex acute. Petals subequal, subobovate, ca. 2.5 × 2 mm, not clawed, both surfaces pubescent. Fertile stamens 2. Staminodes small. Legume unknown. Fl. Jun.

- Open habitats on karst hills. Guangxi (Long'an).

16. *Bauhinia apertilobata* Merrill & F. P. Metcalf, *Lingnan Sci. J.* 16: 83. 1937.

阔裂叶羊蹄甲 kuo lie ye yang ti jia

Bauhinia championii (Benth) Benth var. *apertilobata* (Merrill & F. P. Metcalf) Hiroe.

Lianas, woody, with tendrils. Young branches, petioles, and inflorescences pubescent. Stipules caducous; leaf blade ovate, broadly elliptic, or suborbicular, 5–10 × 4–9 cm, papery, abaxially brownish puberulent, losing most of pubescence upon maturing, adaxially subglabrous or thinly puberulent, primary veins 7–9, base rounded, truncate, or cordate, shallowly bifid with very broadly divergent lobes; leaves on flowering branches only slightly bifid or nearly truncate. Inflorescence 1 or 2 racemes, terminal or axillary, 4–8 × 4–7 cm; bracts linear, 4–7 mm; bracteoles small, inserted at middle of pedicels. Pedicel 1.8–2.2 cm. Flower buds ellipsoid, with a protruding apex, apex closed. Receptacle broadly funnelform; calyx lobes 5, lanceolate, reflexed upon anthesis. Petals whitish or greenish white, subequal, spatulate, 7–10 mm, shortly clawed. Fertile stamens 3; filaments 6–9 mm, glabrous. Ovary hairy on sutures, shortly stalked; style short; stigma small. Legume thin, compressed, 2–7 × 1.5–2 cm; valves thin, glabrous. Seeds compressed, suborbicular. Fl. May–Jul, fr. Aug–Nov.

- Valleys, hillsides, open forests, thickets; 300–600 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi.

17. *Bauhinia championii* (Benth) Benth, *Fl. Hongk.* 99. 1861 [*"championii"*].

龙须藤 long xu teng

Phanera championii Benth, *Hooker's J. Bot. Kew Gard. Misc.* 4: 78. 1852 [*"championii"*]; *Bauhinia championii* var. *acutifolia* L. Chen; *B. championii* var. *yingtakensis* (Merrill & F. P. Metcalf) T. C. Chen; *B. huanensis* Handel-Mazzetti; *B. yingtakensis* Merrill & F. P. Metcalf; *Lasiobema championii* (Benth) de Wit; *L. huanensis* (Handel-Mazzetti) de Wit.

Lianas, with tendrils. Young branches and inflorescences puberulent. Stipules caducous; petiole 1–2.5 cm, slender; leaf blade ovate or cordate, 3–10 × 2.5–9 cm, papery to leathery, abaxially pubescent when young, pubescent or glabrous when old, adaxially glabrous, primary veins 5–9, base truncate to cordate; leaves on flowering branches entire with apex acute, obtuse, or emarginate, while those on sterile branches or juvenile branches usually deeply bilobed; lobes acute, acuminate, or obtuse at apex. Inflorescence a solitary raceme or several racemes joined in a panicle, terminal or axillary, 7–25 cm; bracts and bracteoles small. Pedicel 10–15 mm, slender. Flower buds ellipsoid, 2.5–3 mm; open flowers ca. 8 mm in diam. Receptacle

funnelform, ca. 2 mm; calyx lobes 5, lanceolate, ca. 3 mm. Petals white, spatulate, 4–6 mm, outside pubescent along midvein, clawed. Fertile stamens 3; filaments ca. 6 mm, glabrous. Staminodes 2. Ovary shortly stalked, hairy on sutures; style short; stigma small. Legume obovoid-oblong, compressed, 7–12 × 2.5–3 cm, glabrous; valves leathery. Seeds 2–5, orbicular, compressed, ca. 12 mm in diam. Fl. Jun–Oct, fr. Jul–Dec. *2n* = 28*.

- Open or dense forests, thickets; low to middle elevations. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang [Vietnam].

18. *Bauhinia hypoglauca* Tang & F. T. Wang ex T. C. Chen, *Guihaia* 8: 44. 1988.

滇南羊蹄甲 dian nan yang ti jia

Lianas, woody, with compressed tendrils. Stems and branches with small, protruding pits; young branches and inflorescence puberulent. Stipules caducous; petiole 1.5–4.5 cm, slender; leaf blade broadly ovate or ovate, 4.5–7 × 3.5–7 cm, papery, abaxially shiny brownish pubescent when young, grayish pubescent when old, adaxially glabrous, primary veins 7–9, veins convex on both surfaces, base truncate to shallowly cordate, apex bifid to 1/3–1/2; lobes widely divergent, apex acuminate. Inflorescence a raceme or several racemes joined in a panicle, terminal or axillary, 7–15 cm, many flowered, brownish pubescent; bracts 3–4 mm; bracteoles ca. 1.5 mm. Pedicel 3–5 mm, stout, pubescent. Flower buds ellipsoid, ca. 5 mm, tapering at both ends. Receptacle funnelform; calyx lobes 5, erect at anthesis, lanceolate. Petals white, elliptic or obovate, ca. 4.5 × 2.5–3 mm, outside with golden hairs on midvein, claw 1.5–2 mm. Fertile stamens 3; filaments ca. 5 mm, glabrous. Staminodes 2 or 3. Floral disk not swollen. Ovary stalked, oblique, hairy on sutures and at base; style glabrous; stigma small. Legume oblong, compressed, ca. 6 × 2 cm, glabrous when mature; valves woody, smooth. Seeds 2, blackish, broadly elliptic, compressed, ca. 10 × 8 mm. Fl. Sep–Oct, fr. Oct–Dec.

- Open forests and disturbed habitats on karst hills; ca. 1300 m. Yunnan.

19. *Bauhinia lingyuenensis* T. C. Chen, *Guihaia* 8: 45. 1988.

凌云羊蹄甲 ling yun yang ti jia

Lianas, woody, with compressed, glabrous tendrils. Stems and branches black when dry, cylindrical, covered with small pits; young branches canaliculate, brownish red puberulent. Stipules caducous; petiole ca. 2 cm, glabrous; leaf blade adaxially shiny, ovate, broadly ovate, or suborbicular, 5–7 × 4–7 cm, subleathery, abaxially brownish pubescent when young, subglabrous when old, adaxially glabrous, primary veins 7–9, veins dense, convex on both surfaces, base cordate, entire, or emarginate; lobes rounded or obtuse. Inflorescence a raceme or 5–9 racemes joined in a panicle, terminal or axillary, 9–15 cm, many flowered, brownish pubescent; peduncle short; bracts linear, 2.5–4 mm; bracteoles linear, inserted at middle of pedicel. Pedicel 3.5–4 mm, pubescent. Flower buds broadly ellipsoid. Receptacle funnelform, short; calyx lobes 5, ovate-triangular, ca. 2 × 1.5 mm, glabrous upon anthesis, reflexed. Petals white, ovate-oblong, elliptic, or broadly elliptic, 3–4 × 2.2–3 mm, margin wrinkled, claws 2–2.5 mm. Fertile stamens 3;

filaments glabrous. Stamines 2. Ovary stalked, oblique, hairy on sutures and stalk; style glabrous; stigma small. Legume unknown. Fl. Jul.

- Open forests on karst hills. Guangxi.

20. *Bauhinia venustula* T. C. Chen, *Guihaia* 8: 45. 1988.

小巧羊蹄甲 xiao qiao yang ti jia

Lianas, woody. Tendrils solitary or in pairs; stems slender, with dense, small, light brownish pits. Stipules caducous; petiole 0.6–2 cm, slender, glabrous; leaf blade adaxially shiny, broadly ovate or suborbicular, 1.5–4 × 1.4–4 cm, subleathery, abaxially subglabrous, adaxially glabrous, primary veins 5–7, veins thin and dense, convex on both surfaces, base truncate to shallowly cordate, entire, emarginate, or shallowly bifid (to less than 1/6); lobes obtuse at apex. Inflorescence a raceme, terminal or lateral, 5–9 cm; flowers densely arranged; bracts lanceolate, ca. 1.8 mm; bracteoles inserted below middle of pedicels, ca. 0.8 mm. Pedicel short, 4–6 mm, pubescent. Flower buds not known. Receptacle funnelliform; calyx lobes 5, erect at anthesis, ovate, ca. 2 mm, pubescent, acute. Petals white, obovate or oblong, ca. 2.5 mm, outside with hairs on midvein, with prominent claw ca. 1.5 mm. Fertile stamens 3. Stamines 2 or 3. Ovary stalked, oblique, hairy on sutures and at base; style glabrous; stigma small. Legume oblong, compressed, glabrous when mature; valves leathery, smooth. Fl. Oct, fr. Dec.

- Open forests on hills. Guangxi.

21. *Bauhinia chalcophylla* L. Chen, *J. Arnold Arbor.* 19: 130. 1938.

多花羊蹄甲 duo hua yang ti jia

Bauhinia euryantha L. Chen.

Lianas, woody. Young branches angulate, densely pubescent with brownish hairs; tendrils solitary or in pairs, pubescent. Stipules caducous, triangular-crescent-shaped; petiole 2–5.5 cm, pubescent; leaf blade broadly ovate or suborbicular, 8–11.5 × 6–11 cm, subleathery, abaxially brownish pubescent, adaxially thinly pubescent, primary veins 9–11, veins slightly convex abaxially, base cordate, apex bifid to 1/4–1/3; lobes acute, acuminate, or obtuse, margin slightly sinuous. Inflorescences racemose-corymbose, usually 3, terminal, many flowered; bracts and bracteoles linear, 3–4 mm, pubescent; bracteoles inserted at middle of pedicels. Pedicel 2–2.8 cm, densely pubescent. Receptacle cylindrical, ca. 5 mm; calyx lobes reflexed at anthesis, ovate, ca. 10 × 3–5 mm, outside brownish pubescent. Petals white or light yellowish, spatulate, abaxially pubescent with rusty hairs on midvein, clawed, margin crisped. Fertile stamens 3; filaments to 3 cm, slender, glabrous; anthers red. Stamines 5–7, 4–7 mm. Ovary stalked, glabrous; style 10–15 mm, slender, glabrous; stigma capitate. Legume oblong, compressed, ca. 15 × 4 cm; valves woody. Seeds 5–7, elliptic, compressed. Fl. Jun–Jul, fr. Jul–Sep.

- Open forests along rivers and streams; 800–1000 m. Yunnan.

22. *Bauhinia nervosa* (Wallich ex Benth) Baker in J. D. Hooker, *Fl. Brit. India* 2: 283. 1876.

棒花羊蹄甲 bang hua yang ti jia

Phanera nervosa Wallich ex Benth in Miquel, *Pl. Jungh.* 262. 1852; *Bauhinia claviflora* L. Chen.

Climbers, robust, with tendrils. Branches brownish pubescent, later subglabrous. Stipules ovate-auriculate; petiole 1.5–3 cm; leaf blade suborbicular, 6–8 × 7–9 cm, subleathery, abaxially thinly pubescent, adaxially glabrous, veins 11–13, base shallowly cordate, apex bifid to ca. 1/3, lobes rounded at apex. Inflorescence racemose-corymbose, rusty pubescent; bracts lanceolate, cucullate, 1.3–1.8 cm; bracteoles similar to bracts but smaller, inserted at middle of pedicel. Pedicel 4–5 cm. Flower buds to 4.5 cm. Receptacle tubular, ca. 2 cm; calyx lobes reflexed, swollen, linear-lanceolate, 2.5–3 × ca. 0.4 cm, outside pubescent, apex acute. Petals white and reddish at base, subleathery, broadly obovate, ca. 3 × 2.2 cm, veins convex, apex emarginate, claw to 2 cm. Fertile stamens 3; filaments strong, ca. 3.5 cm, glabrous; anthers oblong, loosely hairy. Stamines 2; filaments ca. 1.5 cm, slender. Ovary stalked, pubescent; style stout; stigma broadly disciform. Legume unknown. Fl. Sep.

Open forests; 1500–1600 m. Yunnan [India, Myanmar, Thailand].

23. *Bauhinia coccinea* (Loureiro) Candolle subsp. **tonkinensis** (Gagnepain) K. Larsen & S. S. Larsen, *Fl. Cambodge, Laos & Vietnam* 18: 201. 1980.

绯红羊蹄甲 fei hong yang ti jia

Bauhinia ferruginea Roxburgh var. *tonkinensis* Gagnepain in Lecomte, *Fl. Indo-Chine* 2: 126. 1913.

Lianas, woody. Branches robust, rusty pubescent when young, subglabrous when old; tendrils glabrous. Stipules suborbicular, 4–5 mm in diam.; petiole 1.5–3 cm, slender; leaf blade oblong, 5.5–8 × 3–5 cm, leathery, mature leaves adaxially shiny, glabrous on both surfaces, primary veins 9, convex abaxially, impressed adaxially, base truncate or rarely cordate, emarginate or bifid to 1/6; lobes obtuse or rounded at apex. Inflorescence racemose-corymbose, 9–12 cm, rusty pubescent; bracts lanceolate, cucullate, 10–12 × 6–7 mm. Pedicel 25–30 mm, densely pubescent. Flower buds ellipsoid, 15–18 mm, rusty pubescent. Receptacle cylindrical, 10–15 mm, angulate, base slightly swollen; calyx lobes reflexed at anthesis, linear-lanceolate, 18–20 × 3–4 mm, outside rusty tomentose, inside glabrous. Petals orange or reddish, elliptic or obovate, 25–30 mm, outside rusty tomentose, inside less so, base tapering into claw ca. 1 cm. Fertile stamens 3; filaments exceeding petals. Ovary densely rusty tomentose; stalk 5–7 mm, stout; style 10–12 mm, pubescent; stigma peltate, large, ca. 3 mm in diam. Legume unknown. Fl. Feb–Apr.

Open forests in valleys; 800–1300 m. Yunnan [Vietnam].

Bauhinia coccinea subsp. *coccinea* (*Phanera coccinea* Loureiro) occurs in Cambodia and Laos.

24. *Bauhinia yunnanensis* Franchet, *Pl. Delavay.* 190. 1890.

云南羊蹄甲 yun nan yang ti jia

Bauhinia altefissa H. Léveillé, p.p.; *B. diptera* Collett & Hemsley (1890), not Blume ex Miquel (1850); *Lasiobema yunnanensis* (Franchet) A. Schmitz.

Lianas, woody, slender, glabrous. Branches angulate or cylindrical; tendrils in pairs, subglabrous. Leaves 2-foliolate; stip-

ules caducous; petiole 1.5–2.5 cm; leaf blade broadly elliptic, membranous or papery, both surfaces glabrous, primary veins 3 or 4 per lobe, base deeply or shallowly cordate, apex bifid to upper pulvinus with a free mucro; lobes obliquely ovate, 2–4.5 × 1–2.5 cm, apex obtuse or rounded. Inflorescence a raceme, terminal or opposite to leaves, 8–18 cm, 10–20-flowered; bracts caducous; bracteoles inserted at middle of pedicel. Pedicel 2–3 cm. Flower buds narrowly ellipsoid. Receptacle cylindrical, 7–8 mm; calyx lobes split into 2 parts upon anthesis, cucullate, elliptic-ovate, with teeth at apex. Petals pinkish, with dark red stripes on veins, spatulate, ca. 17 mm, subglabrous, clawed. Fertile stamens 3; filaments curved, pinkish; anthers ovoid. Staminodes 7, much reduced. Ovary glabrous, prominently stalked; style slender; stigma capitate. Legume linear-oblong, 8–15 × 1.5–2 cm, apex beaked; valves leathery. Seeds broadly elliptic-oblong, compressed, 7–9 mm; testa blackish, shiny. Fl. Aug, fr. Oct.

Thickets on hills; 400–2000 m. Guizhou, Sichuan, Yunnan [Myanmar, N Thailand].

25. *Bauhinia bohniana* L. Chen, J. Arnold Arbor. 19: 129. 1938.

丽江羊蹄甲 li jiang yang ti jia

Shrubs, erect, 1–2 m tall. Young branches densely grayish brown pubescent, glabrous when old. Stipules caducous; petiole pubescent; leaf blade broadly orbicular, 5–7 × 6–8 cm, subleathery, abaxially rusty pubescent on young leaves, becoming less pubescent when old, adaxially grayish pubescent, primary veins 9–11, veins convex abaxially, base deeply cordate to almost truncate, apex bifid to 1/4; lobes with obtuse or rounded apices. Inflorescence corymbose-racemose, terminal or lateral, 6–7 cm in diam., rusty pubescent; bracts and bracteoles caducous, lanceolate. Pedicel 15–20 mm, pubescent. Flower buds upper part subovoid, constricted from middle downward. Receptacle funnelform, ca. 5 mm; calyx lobes 5, lanceolate, outside pubescent. Corolla pink, ca. 3.5 cm in diam.; petals broadly obovate, 10–12 mm in diam., outside golden hairy at middle, claw ca. 10 mm, pubescent. Fertile stamens 3; filaments to 3 cm, glabrous; anthers oblong, ca. 4 mm. Staminodes 6 or 7, ca. 2 cm, slender. Ovary stalked, golden tomentose on suture; stalk ca. 12 mm, pubescent; stigma small. Legume strap-shaped, compressed, 15–20 × 2.5–3 cm, apex beaked, sutures swollen; valves leathery, glabrous. Seeds subcordiform, compressed, ca. 12 × 9 mm; testa blackish, shiny. Fl. Apr–Aug, fr. May–Oct.

• Thickets on sunny hillsides; 1700–2000 m. Yunnan.

26. *Bauhinia khasiana* Baker in J. D. Hooker, Fl. Brit. India 2: 281. 1876.

牛蹄麻 niu ti ma

Lianas, woody, with tendrils. Branches cylindrical; young branches pubescent, later glabrous. Petiole 2.5–5(–7) cm; leaf blade broadly ovate to orbicular, 7–12(–15) × 6–9.5(–12) cm, papery-leathery or leathery, abaxially glabrous, pubescent on veins, puberulent, or rusty pubescent, adaxially glabrous, veins 7–9, convex on both surfaces, base broadly cordate or almost truncate, apex bilobed to 1/5–1/4; lobes crossing to cover each other, with acute apices. Inflorescence corymbose, or consisting

of several corymbs, terminal, 10–15 × 10–15 cm, rusty pubescent; bracts caducous; bracteoles linear, ca. 1 mm, inserted on lower part of pedicel. Pedicels 3–3.5 cm. Flower buds broadly ovoid or subglobose. Receptacle cylindrical, ca. 5 mm; calyx lobes 4 or 5, reflexed at anthesis, ca. 7 mm, abaxially rusty pubescent. Petals red or golden yellowish, broadly spatulate, abaxially rusty pubescent, claw 2–4 mm. Fertile stamens 3; filaments glabrous. Staminodes 3. Ovary long stalked, glabrous but rusty pubescent on sutures; stigma peltate. Legume dehiscent, oblong-lanceolate, compressed, 15–20 × 4–10 cm, leathery, glabrous. Seeds 4 or 5, oblong, ca. 2 × 2 cm. Fl. Jul–Aug, fr. Sep–Dec.

Mixed forests. Hainan, Yunnan [India, Laos, N Thailand, Vietnam].

- 1a. Leaves abaxially rusty hairy, and densely pubescent on petioles; petals golden yellowish 26c. var. *tomentella*
- 1b. Leaves abaxially glabrous, puberulent, or pubescent on veins; petals red.
 - 2a. Leaves 7–12 × 6–9.5 cm, papery-leathery, veins 7–9, base broadly cordate or truncate 26a. var. *khasiana*
 - 2b. Leaves ca. 15 × 12 cm, leathery, veins 7, base cordate 26b. var. *gigalobia*

26a. *Bauhinia khasiana* var. *khasiana*

牛蹄麻(原变种) niu ti ma (yuan bian zhong)

Bauhinia dioscoreifolia L. Chen; *B. howii* Merrill & Chun; *B. pierrei* Gagnepain; *B. polystachya* Gagnepain.

Leaf blade 7–12 × 6–9.5 cm, papery-leathery, abaxially glabrous or pubescent on veins, veins 7–9, base broadly cordate or truncate. Petals red.

Mixed forests. Hainan [India, Laos, N Thailand, Vietnam].

26b. *Bauhinia khasiana* var. *gigalobia* D. X. Zhang, Nordic J. Bot. 13: 401. 1993.

巨荚牛蹄麻 ju jia niu ti ma

Petiole ca. 7 cm; leaf blade ca. 15 × 12 cm, leathery, abaxially puberulent, adaxially glabrous, veins 7, base cordate. Petals red. Legume dark brown, ca. 20 × 8–10 cm.

• Open forests; ca. 2000 m. Yunnan (Hekou).

26c. *Bauhinia khasiana* var. *tomentella* T. C. Chen, Guihaia 8: 46. 1988.

毛叶牛蹄麻 mao ye niu ti ma

Leaves pubescent with rusty hairs abaxially, and densely pubescent on petioles. Petals golden yellowish. Fl. Jul.

• Yunnan (Hekou).

27. *Bauhinia paucinervata* T. C. Chen, Guihaia 8: 46. 1988.

少脉羊蹄甲 shao mai yang ti jia

Lianas, woody. Young branches and petioles brownish pubescent, later glabrous; tendrils rare. Stipules caducous; petiole 0.8–3 cm, slender, grayish pubescent at first, later glabrous; leaf blade shiny on both surfaces, ovate to elliptic, 4.6–10 ×

2.5–5 cm, leathery, both surfaces glabrous, primary veins 3–5, veins convex on both surfaces, base rounded, margin entire, apex acuminate. Inflorescence racemose-corymbose, several joined together in a panicle, 9–10 × 5–7 cm, terminal or axillary, many flowered, grayish brown pubescent; bracts lanceolate, 2.5–3 mm, outside pubescent, acuminate; bracteoles linear, 1–1.5 mm, inserted above middle of pedicels. Pedicel 8–15 mm, slender, pubescent. Flower buds broadly ellipsoid, ca. 4 × 3 mm. Receptacle cylindrical, ca. 3 mm; calyx lobes 5, not reflexed, lanceolate, 3 free, other 2 adnate, ca. 2.5 mm, outside pubescent. Petals white, obovate, 4–5 × 2.5–3 mm with a claw ca. 1 mm, abaxially yellowish brown hairy at middle, glabrous along margin, margin crisped. Fertile stamens 3; filaments 5–7 mm, glabrous. Staminodes 7. Floral disk not developed. Ovary shortly stalked, oblique, glabrous; style shorter than stalk, slender, glabrous; stigma capitate, small. Legume oblong to strap-shaped, compressed, 9–11 × 3–3.5 cm; valves hard woody, brownish when dry. Seeds 3 or 4, ellipsoid, compressed, 12–18 × 9–14 mm. Fl. Jun–Aug, fr. Oct.

- Thickets on karst hills; 300–600 m. Guangxi.

28. *Bauhinia hainanensis* Merrill & Chun ex L. Chen, J. Arnold Arbor. 19: 132. 1938.

海南羊蹄甲 hai nan yang ti jia

Bauhinia megacarpa L. Chen.

Lianas, woody. Young branches and inflorescences rusty pubescent; tendrils strong, solitary, pubescent. Stipules caducous; petiole 3–8 cm, rusty pubescent; leaf blade suborbicular to ovate-orbicular, 10–18 × 10–20 cm, subleathery, abaxially thinly rusty pubescent, densely pubescent on veins, adaxially glabrous except near petiole, primary veins 11–13, veins dense, base deeply cordate, apex bifid to 2/5–1/2 on flowering branches, lobes obtuse or rounded at apex. Inflorescence a corymbose panicle, ca. 13 cm, terminal or axillary; bracts lanceolate; bracteoles opposite, linear, inserted at middle of pedicels. Pedicel 10–15 mm, rusty pubescent. Flower buds ellipsoid. Receptacle funnelform, ca. 3 mm; calyx lobes 5, not reflexed, broadly ovate, 1 free, others in 2 adnate parts, ca. 6 mm, outside pubescent. Petals pinkish or white, broadly obovate, 8–9 mm with a claw ca. 1 mm, abaxially rusty hairy, shortly clawed, margin crisped. Fertile stamens 3; filaments ca. 25 mm, glabrous. Staminodes 2, ca. 7 mm. Floral disk fleshy. Ovary stalked, glabrous; style slender, glabrous; stigma capitate, small. Legume oblong, compressed, ca. 22 × 6 cm; valves hard woody, glabrous. Seeds 5–10, obovoid, compressed, ca. 20 mm. Fl. Dec, fr. next Apr.

- Open forests; low elevations. Hainan, Yunnan.

29. *Bauhinia japonica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 18: 401. 1873.

日本羊蹄甲 ri ben yang ti jia

Bauhinia kwangtungensis Merrill; *Lasiobema japonica* (Maximowicz) de Wit.

Lianas, woody, with tendrils, glabrous throughout except for inflorescences and immature fruit. Branches cylindrical; twigs angulate. Stipules caducous; petiole 3–4 cm; leaf blade shiny on both surfaces, with a yellowish margin, suborbicular, 4–9 × 4–9

cm, papery, both surfaces glabrous, primary veins 7–13, veins dense, base deeply cordate, apex bifid to 1/3–1/2 on flowering branches, lobes obtuse at apex. Inflorescence a raceme, 10–23 cm, many flowered, terminal, rusty pubescent; bracts narrowly lanceolate, ca. 3.5 mm, acuminate; bracteoles linear, ca. 1 mm. Pedicel 10–20 mm, slender. Flower buds obovoid, 4–5 mm, apex truncate with an opening. Receptacle broadly funnelform, 1.5–2 mm; calyx lobes 5, broadly ovate-triangular, ca. 2 × 3 mm. Petals greenish, obovate-oblong, ca. 10 × 4.5 mm with a claw ca. 2.5 mm, abaxially silky hairy. Fertile stamens 3; filaments ca. 11 mm, glabrous. Staminodes 2. Ovary rusty silky hairy, with a stout stalk; style short; stigma small. Legume oblong, strap-shaped, swollen, 4–7 × 2–2.8 cm, pubescent when young, subglabrous when old; valves leathery, glabrous. Seeds 1–5, black, shiny, ensiform, ca. 10 × 7 mm. Fl. Jan–May, fr. Jun–Sep.

Open forests near coastal regions; low elevations. Guangdong, Hainan [Japan].

30. *Bauhinia wallichii* J. F. Macbride, Contr. Gray Herb., n.s., 59: 23. 1919.

圆叶羊蹄甲 yuan ye yang ti jia

Phanera macrostachya Benth.

Lianas, with tendrils. Young branches glabrescent. Stipules caducous; petiole 3.5–4.5 cm, glabrescent; leaf blade suborbicular, 10–15 cm in diam., both surfaces glabrous, veins 9–11, base cordate, apex bifid to 1/5, lobes with acuminate or obtuse apices. Inflorescence a raceme or panicle; bracts lanceolate, ca. 3.5 mm, acuminate. Pedicel ca. 1.5 cm. Flower buds obovoid, ca. 1 cm, densely pubescent with rusty hairs. Receptacle bell-shaped; calyx lobes 5, ca. 4 mm, obtuse. Petals subequal, 6–12 mm with a claw 2–4 mm. Fertile stamens 3; filaments ca. 2 cm, glabrous. Staminodes 7. Ovary shortly stalked, ca. 1 cm, densely pubescent; style ca. 1 cm, glabrous; stigma small. Legume unknown.

Forest margins. Known in China from a single collection from Yunnan (Mengla) [NE India, Myanmar, Thailand, N Vietnam].

31. *Bauhinia wuzhengyii* S. S. Larsen, Novon 9: 526. 1999.

征镒羊蹄甲 zheng yi yang ti jia

Lianas, tendrils not seen. Branches glabrous. Stipules not seen; petiole 2.3–3 cm; leaf blade elliptic, 9–10.3 × 4.8–5.3 cm, subleathery, veins 3, base attenuate, margin entire, apex acuminate. Inflorescence terminal, racemose, elongate, grayish pubescent; bracts 4–5 mm, setaceous; bracteoles similar but smaller, subopposite, inserted below middle of pedicel. Pedicel 2.5–3 cm, finely grayish pubescent. Flower buds ellipsoid, 9–10 × 5–6 mm. Hypanthium obliquely campanulate, enlarged adaxially, ca. 4 mm, ca. 2 × length of abaxial portion. Calyx campanulate, open in bud, upper half split into 5 lobes; lobes 3–4 cm, apex acute. Petals subequal, 7–10 mm with a claw 2–3 mm, densely brownish pubescent on both sides except posterior one glabrous inside. Fertile stamens 3; filaments ca. 10 mm, glabrous; anthers 1.5–2 mm, glabrous, dehiscing longitudinally. Staminodes 5–7. Pistil with thick stipe, free, 2–3 mm, brownish pubescent; ovary ca. 9 mm; style very short, glabrous; stigma sessile, ± punctate. Legume unknown.

- Thin forests on mountain slopes; ca. 500 m. Yunnan (Malipo).

32. *Bauhinia pyrrhoclada* Drake, J. Bot. (Morot) 5: 218. 1891.

红毛羊蹄甲 hong mao yang ti jia

Phanera pyrrhoclada (Drake) de Wit.

Lianas, woody. Young branches, inflorescences, petioles, and abaxial leaf surfaces rusty pubescent; tendrils pubescent. Stipules sickleform, caducous; petiole 2.5–3.5 cm; leaf blade ovate-orbicular, 6–8.5 × 6–8.5 cm, subleathery, abaxially thickly rusty pubescent, later losing most of its pubescence and color, adaxially glabrous except on primary veins, primary veins 9–11, base cordate, apex bifid to 1/2 on flowering branches, lobes obtuse at apex. Inflorescence a raceme, pyramidal, flowers dense; peduncle prominent, terminal; bracts and bracteoles linear-lanceolate, ca. 11 × 2.5–3 mm, pubescent. Pedicel 7–30 mm, stout, rusty pubescent. Flower buds ovoid, 10–12 mm, pubescent, apex obtuse. Receptacle funnellform, 5–7 mm; calyx lobes 5, not reflexed, lanceolate, velutinous, acuminate. Petals white, obovate-elliptic, ca. 20 × 10 mm with a claw ca. 5 mm, abaxially rusty hairy, margin crisped. Fertile stamens 3; filaments ca. 20 mm, hairy at base. Staminodes 2 or 3. Ovary subsessile, hairy; style 6–7 mm, lower part hairy; stigma peltate. Legume oblanceolate-oblong, compressed, 10–18 × 4–4.6 cm; valves hard woody, velutinous. Fl. Jun, fr. Aug–Sep.

Open habitats. Hainan, Yunnan [N Vietnam].

33. *Bauhinia hypochrysa* T. C. Chen, Guihaia 8: 47. 1988.

绸缎藤 chou duan teng

Lianas, woody, throughout golden or shiny brown tomentose except for adaxial surfaces of young leaves and petals; tendrils in pairs. Stipules caducous; petiole 5.5–6.5 cm; leaf blade orbicular, 9–11.5 cm in diam., leathery, abaxially thickly golden tomentose, adaxially glabrous except near veins, primary veins 15–17, convex abaxially, base deeply cordate, apex bifid to 1/2 on flowering branches, lobes acute or obtuse at apex. Inflorescence a raceme, 9–12 cm with a peduncle ca. 2 cm, pyramidal, terminal; bracts and bracteoles linear, 8–10 mm; bracteoles opposite, inserted on pedicel near receptacle. Pedicel robust, 9–10 mm. Flower buds ellipsoid, 13–15 mm. Receptacle cupular, 5–6 mm; calyx lobes 5, not reflexed, lanceolate, 12–14 mm. Petals yellow, subequal, obovate and elliptic, 12–18 × 8–13 mm with a prominent claw 6–10 mm, margin crisped, abaxially rusty hairy, adaxially glabrous. Fertile stamens 3; filaments ca. 25 mm, glabrous except near base; anthers oblong, ca. 4 mm. Staminodes 6, unequal, glabrous or hairy near base. Ovary shortly stalked, densely rusty tomentose; style slender, glabrous; stigma small. Legume oblong or oblong-strap-shaped, compressed, 10–15 × 4–4.5 cm; valves hard woody, densely silvery tomentose. Seeds 2 or 3, broadly ellipsoid, compressed, ca. 20 × 15 mm. Fl. May, fr. Oct.

- Open forests on karst hills. Guangxi.

34. *Bauhinia rubrovillosa* K. Larsen & S. S. Larsen, Fl. Cambodge, Laos & Vietnam 18: 204. 1980.

红背叶羊蹄甲 hong bei ye yang ti jia

Bauhinia mirabilis Gagnepain (1952), not Merrill (1929).

Lianas, woody, with tendrils. Branches robust; young branches angulate; new growth densely rusty hirsute. Stipules caducous, ca. 10 mm; petiole robust, 1.2–6 cm, rusty tomentose; leaf blade orbicular or broadly orbicular, 9–12.5 × 10.5–16 cm, leathery, abaxially thickly rusty tomentose and pubescent, more so on veins, adaxially glabrous except near veins, primary veins 11–13, base deeply cordate, apex bifid to 1/3–1/2 on flowering branches, lobes obtuse or rarely acute at apex. Inflorescence a corymbose raceme, terminal or lateral, rusty tomentose; bracts narrowly triangular, 5–8 mm, outside tomentose; bracteoles similar but narrower, inserted on pedicel above middle. Pedicel 4–5 cm. Flower buds ovoid, 10–15 mm. Receptacle cupular, 7–9 mm; calyx lobes 5, ovate, ca. 13 mm, outside pubescent, obtuse. Petals white, subequal, obovate-suborbicular, ca. 15 × 10 mm, abaxially rusty hairy, adaxially glabrous, claw ca. 5 mm. Fertile stamens 3; filaments ca. 25 mm, glabrous; anthers ellipsoid, ca. 4 mm. Staminodes 2, much reduced. Ovary shortly stalked, 20–25 mm, densely tomentose; style 10–15 mm, glabrous; stigma capitate. Legume strap-shaped, compressed, dehiscent, 10–40 × 4.5–7.5 cm; valves hard woody, densely rusty tomentose. Seeds orbicular, compressed, 20–25 mm in diam.

Dense forests in rocky hill valleys; 400–500 m. Guangxi [Laos, Vietnam].

35. *Bauhinia aurea* H. Léveillé, Bull. Soc. Bot. France 54: 368. 1907.

火索藤 huo suo teng

Lianas, woody, robust. Branches densely brown tomentose; young branches angulate; tendrils tomentose first, later glabrous. Stipules caducous; petiole 4–7 cm, densely tomentose; leaf blade suborbicular, 12–18(–23) × 10–16(–20) cm, thickly papery, abaxially yellow-brown tomentose, more so on veins, adaxially glabrous or subglabrous except near veins, primary veins 9–13, base deeply or shallowly cordate, apex bifid to 1/3–1/2 on flowering branches, lobes obtuse or rarely acute at apex. Inflorescence a corymbose raceme, terminal or lateral, with ca. 12 flowers, capitate before flowers open while buds are clustered together, densely brown tomentose; bracts caducous, lanceolate; bracteoles linear. Pedicel 2–5 cm. Flower buds ellipsoid. Receptacle cupular, short; calyx lobes 5, reflexed at anthesis, lanceolate. Petals white, subequal, spatulate, 12–22 mm, abaxially tomentose at middle, adaxially glabrous, clawed, margin crisped. Fertile stamens 3; filaments ca. 25 mm, glabrous; anthers oblong, ca. 5 mm. Staminodes 2–5. Ovary shortly stalked, densely rusty tomentose; style upper part glabrous; stigma disciform, large. Legume strap-shaped, compressed, dehiscent, 16–30 × 4–7 cm; valves hard woody, densely rusty tomentose. Seeds 6–11, ellipsoid, compressed, ca. 20 mm in diam. Fl. Apr–May, fr. Jul–Dec.

- Thickets on hill slopes and in valleys. Guangxi, Guizhou, Sichuan, Yunnan.

36. *Bauhinia erythropoda* Hayata, Icon. Pl. Formosan. 3: 83. 1913.

锈荚藤 xiu jia teng

Lianas, with tendrils. Young branches densely pubescent

with brownish hairs, later glabrous; tendrils pubescent when young. Petiole 3–8 cm, rusty or brownish pubescent; leaf blade cordate or suborbicular, 5–10 × 4–9 cm, papery, abaxially pubescent on veins, or glabrous or nearly so, adaxially glabrous, smooth and shiny, veins 9–11, primary and secondary veins slightly convex on both surfaces, base cordate, apex bifid to 1/2 or more, lobes apiculate or acuminate at apex. Inflorescence racemose-corymbose, terminal, rusty pubescent; bracts and bracteoles linear. Pedicel 4–5 cm, slender, pubescent. Flowers fragrant. Receptacle cylindrical, 5–10 mm, slender; calyx lobes reflexed at anthesis, oblong-lanceolate, ca. 12 mm, acuminate. Petals white, broadly obovate, together with (3–4 mm) claw 2–2.5 × 1.2–1.8 cm, abaxially pubescent with rusty hairs on lower part and claw, margin crisped, emarginate. Fertile stamens 3; filaments 15–17 mm, pubescent on lower part. Ovary sessile, densely pubescent with rusty hairs; style slender, glabrous except at base; stigma peltate. Legume oblanceolate, compressed, to 30 × 5 cm, tomentose. Fl. Mar–Apr, fr. Jun–Jul.

• Open forests, disturbed forests, along streams, thickets. Guangxi, Hainan, S Yunnan.

- 1a. Leaves abaxially pubescent on veins
or almost glabrous 36a. var. *erythropoda*
1b. Leaves glabrous 36b. var. *guangxiensis*

36a. *Bauhinia erythropoda* var. *erythropoda*

锈荚藤(原变种) xiu jia teng (yuan bian zhong)

Bauhinia moningeriae Merrill.

Leaves abaxially pubescent on veins or almost glabrous.

• Open forests, along streams. Guangxi, Hainan, S Yunnan.

36b. *Bauhinia erythropoda* var. *guangxiensis* D. X. Zhang & T. C. Chen, *Nordic J. Bot.* 18: 145. 1998.

广西锈荚藤 guang xi xiu jia teng

Leaves glabrous.

• Disturbed forests, thickets. Guangxi.

37. *Bauhinia carcinophylla* Merrill, *J. Arnold Arbor.* 23: 171. 1942.

蟹钳叶羊蹄甲 xie qian ye yang ti jia

Lianas, with tendrils. Young branches brownish puberulent, later glabrous; tendrils pubescent when young. Leaves 2-foliolate or shortly united; petiole 3–6 cm, rusty or brownish pubescent; leaf blade adaxially shiny, 5–10 × 2.5–5 cm, papery, abaxially pubescent on veins, or almost glabrous, adaxially glabrous, smooth, veins 4 or 5 per lobe, base cordate; lobes sub-oblong to sublanceolate, acuminate. Inflorescence racemose-corymbose, terminal or lateral, axis rusty pubescent; bracts and bracteoles lanceolate. Pedicel ca. 1 cm, pubescent. Flowers fragrant. Receptacle cylindrical, ca. 5 mm; calyx lobes reflexed at anthesis, oblong-elliptic, ca. 10 mm, outside pubescent, inside glabrous, acuminate. Petals white, obovate to oblong-obovate, ca. 18 mm. Fertile stamens 3; filaments ca. 12 mm, pubescent near base, glabrous above; anthers oblong, ca. 5 mm. Ovary shortly stalked, ca. 8 mm, densely rusty tomentose; style ca. 15 mm, slender, glabrous except at base; stigma peltate. Legume unknown.

Thickets in open habitats. Guangxi, Yunnan [N Vietnam].

38. *Bauhinia calciphila* D. X. Zhang & T. C. Chen, *Nordic J. Bot.* 18: 141. 1998.

石山羊蹄甲 shi shan yang ti jia

Lianas, with tendrils, pubescent throughout. Stipules caducous; petiole 0.8–1.5 cm, stout, pubescent; leaf blade suborbicular, ca. 5 cm in diam., both surfaces pubescent, veins 9–13, base cordate, apex bifid to 1/3, with acute lobes. Inflorescence axis to 3.5 cm; bracts lanceolate, ca. 5 mm; bracteoles linear-lanceolate, ca. 4 mm, inserted beneath hypanthium. Hypanthium tubular, 6–8 mm. Calyx segments 2 or 3. Petals subequal, elliptic, including claw to 1.5 cm, outside densely hirsute, inside sparsely so, clawed, with acute apices. Fertile stamens 3; filaments pubescent in lower part. Staminodes 2–4. Ovary and style hairy; stigma peltate. Legume unknown. Fl. Apr.

• Limestone hilltops. Guangxi (Tianyang).

This species is known only from the type locality.

39. *Bauhinia ornata* Kurz, *J. Asiat. Soc. Bengal*, Pt. 2, *Nat. Hist.* 42: 72. 1873.

缅甸羊蹄甲 mian dian yang ti jia

Lianas, woody, robust, with tendrils. Young branches shiny, rusty hairy. Stipules caducous; petiole 8–11 cm, rusty tomentose; leaf blade cordate-orbicular or cordate-ovate, 18–21 × 16–18 cm, papery, abaxially rusty tomentose, later glabrous, adaxially glabrous, primary veins 9–11, base deeply cordate, apex bifid to 1/3–1/2 on flowering branches, lobes acute or obtuse-acuminate at apex. Inflorescence a corymbose raceme, terminal or lateral, many flowered, densely brown tomentose; bracts persistent, lanceolate, 3–5 mm, pubescent; bracteoles oblong-lanceolate, inserted at middle of pedicel. Pedicel 2.5–5 cm, slender. Flower buds upper part pyriform. Receptacle cupular, short; calyx lobes 5, ovate, 6–7 mm, in 2 parts during anthesis, reflexed upon anthesis. Petals white, subequal, obovate, 15–25 × 10–15 mm, abaxially thinly pubescent, adaxially glabrous, shortly clawed, margin crisped. Fertile stamens 3; filaments ca. 30 mm, upper part glabrous; anthers oblong. Ovary subsessile, densely brown tomentose; style slender, glabrous; stigma capitate, small. Legume strap-shaped, compressed, dehiscent, 18–30 × 4–6 cm; valves thick, hard woody, glabrous. Seeds 3 or 4, subcircular, compressed, ca. 27 mm in diam.

Mountain forests, open thickets; 100–800 m. Guangdong, Guangxi, Hainan, Yunnan [NE India, Laos, Myanmar, N Thailand, N Vietnam].

This is a polymorphic species. *Bauhinia ornata* var. *ornata* occurs in Myanmar.

- 1a. Leaves almost glabrous on both
surfaces 39a. var. *balansae*
1b. Leaves abaxially pubescent 39b. var. *kerrii*

39a. *Bauhinia ornata* var. *balansae* (Gagnepain) K. Larsen & S. S. Larsen, *Fl. Cambodge, Laos & Vietnam* 18: 209. 1980.

光叶羊蹄甲 guang ye yang ti jia

Bauhinia balansae Gagnepain, *Notul. Syst. (Paris)* 2: 168. 1912; *B. petelotii* Merrill.

Leaves almost glabrous on both surfaces.

Yunnan [N Vietnam].

39b. *Bauhinia ornata* var. *kerrii* (Gagnepain) K. Larsen & S. S. Larsen, Fl. Cambodge, Laos & Vietnam 18: 208. 1980.

褐毛羊蹄甲 he mao yang ti jia

Bauhinia kerrii Gagnepain, Notul. Syst. (Paris) 2: 173. 1912; *B. austrosinensis* Tang & Wang; *B. eberhardtii* Gagnepain; *B. inflexilobata* Merrill; *B. kerrii* var. *grandiflora* Craib; *B. ornata* var. *austrosinensis* (Tang & Wang) T. C. Chen; *B. ornata* var. *contigua* T. C. Chen; *B. ornata* var. *subumbellata* (Pierre ex Gagnepain) K. Larsen & S. S. Larsen; *B. rufa* (Benth) Baker (1878), not Steudel (1840); *B. subumbellata* Pierre ex Gagnepain.

Leaves very variable, papery, abaxially pubescent, primary veins mostly marginal. Mature fruit brown tomentose.

Mountain forests, open thickets; 100–800 m. Guangdong, Guangxi, Hainan, Yunnan [NE India, Laos, Myanmar, N Thailand, N Vietnam].

40. *Bauhinia glauca* (Wallich ex Benth) Benth, Fl. Hongk. 99. 1861.

粉叶羊蹄甲 fen ye yang ti jia

Climbers, with tendrils. Young branches reddish pubescent, later glabrous. Stipules linear, ca. 4 mm; petiole sparsely pubescent, (1–)2–4 cm; leaf blade ovate to orbicular, often broader than long, 4–6(–9) cm in diam., abaxially sparsely pubescent, adaxially glabrous, 7–11-veined, base truncate to cordate, apex bifid to 1/5–1/2, tip of lobes rounded. Flowers in short dense corymbs; bracts linear, ca. 5 mm; bracteoles similar, inserted near middle of pedicel. Pedicel slender, 10–20 mm. Flower buds ovoid, glabrous to hairy. Receptacle striate, tubular, 7–15(–30) mm, subglabrous. Calyx splitting into 2 or 3 reflexed segments. Petals white, subequal, broadly obovate, 8–12 mm including claw 2–3 mm. Fertile stamens 3; filaments glabrous, ca. as long as petals; anthers red, ellipsoid, ca. 2 mm. Staminodes 7, 2 in between stamens, ca. 3 mm, 5 short, subulate, connate at base. Ovary ca. 8 mm, glabrous, shortly stalked; style very short; stigma obliquely peltate. Legume flat, 18–25 × 3–5 cm, thinly valved, indehiscent. Seeds flat, ovoid, 5–8 mm.

Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia (Peninsular), Myanmar, Thailand, Vietnam].

- 1a. Petiole 2–4 cm, leaves relatively small, primary veins 7–11, apex bifid to 1/3–1/2; inflorescence relatively small; flower buds glabrous to sparsely hairy; receptacle 7–15 mm 40a. subsp. *glauca*
 1b. Petiole 1–2(–3) cm, leaves relatively large, 7–9 cm, primary veins 9–11, apex bifid to only 1/5; inflorescence relatively large; flower buds hairy; receptacle 25–30 mm (longer than pedicel) 40b. subsp. *tenuiflora*

40a. *Bauhinia glauca* subsp. *glauca*

粉叶羊蹄甲(原亚种) fen ye yang ti jia (yuan ya zhong)

Phanera glauca Wallich ex Benth in Miquel, Pl. Jungh. 265. 1852; *Bauhinia viridiflora* Blume ex Miquel.

Petiole 2–4 cm; leaves relatively small, primary veins 7–11, apex bifid to 1/3–1/2. Inflorescence relatively small. Flower buds glabrous to sparsely hairy. Receptacle 7–15 mm.

Hong Kong [India, Indonesia, Malaysia (Peninsular), Myanmar, Thailand].

40b. *Bauhinia glauca* subsp. *tenuiflora* (Watt ex C. B. Clarke) K. Larsen & S. S. Larsen, Nat. Hist. Bull. Siam Soc. 25(1–2): 10. 1973.

薄叶羊蹄甲 bao ye yang ti jia

Bauhinia tenuiflora Watt ex C. B. Clarke, J. Linn. Soc., Bot. 25: 18. 1889; *B. caterviflora* L. Chen; *B. glauca* subsp. *caterviflora* (L. Chen) T. C. Chen; *B. glauca* subsp. *hupehana* (Craib) T. C. Chen; *B. glauca* subsp. *pernervosa* (L. Chen) T. C. Chen; *B. hupehana* Craib; *B. hupehana* var. *grandis* Craib; *B. pernervosa* L. Chen; *B. polysperma* Pierre ex Gagnepain; *Phanera tenuiflora* (Watt ex C. B. Clarke) de Wit.

Petiole 1–2(–3) cm; leaves relatively large, 7–9 cm, primary veins 9–11, apex bifid to only 1/5. Inflorescence relatively large. Flower buds hairy. Receptacle 25–30 mm (longer than pedicel).

Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Yunnan [Cambodia, Laos, Myanmar, Vietnam].

41. *Bauhinia corymbosa* Roxburgh ex Candolle, Mém. Légum. 487. 1825.

首冠藤 shou guan teng

Lianas, woody, with tendrils. Young branches, inflorescences, and one side of tendrils rusty hirsutulous; twigs slender, glabrous; tendrils solitary or in pairs. Stipules caducous, small; petiole 1–2 cm, slender; leaf blade suborbicular, 2–4 × 2–5 cm, papery, abaxially rusty pubescent on veins and near base, adaxially glabrous, veins 7, base cordate to truncate, apex bifid to 3/4 or more on flowering branches, lobes rounded at apex. Inflorescence corymbose-racemose or elongated racemose, terminal on lateral branches, ca. 5 cm, many flowered; peduncle short; bracts and bracteoles linear, ca. 3 mm. Pedicel slender. Flower buds ovoid, rusty pubescent, acute. Receptacle cylindrical, 18–25 mm, slender; calyx lobes 5, reflexed, lanceolate, ca. 6 mm, outside pubescent. Petals white, with pink stripes, broadly spatulate or suborbicular, 8–11 × 6–8 mm, abaxially hairy at middle, shortly clawed, margin crisped, apex rounded. Fertile stamens 3; filaments pinkish, ca. 10 mm, glabrous. Staminodes 2–5. Floral disk not fleshy. Ovary stalked, glabrous; style stout; stigma peltate. Legume straight or curved, strap-shaped or oblong, compressed, 10–25 × 1.5–2.5 cm, tardily dehiscent, glabrous; valves slightly thickened. Seeds oblong, ca. 8 × 4–6 mm. Fl. Apr–Aug, fr. Jun–Dec.

Open forests in valleys, sunny slopes. ?Fujian, Guangdong, Guangxi, Hainan [Vietnam].

- 1a. Raceme corymbose 41a. var. *corymbosa*
 1b. Raceme elongated, not corymbose 41b. var. *longipes*

41a. *Bauhinia corymbosa* var. *corymbosa*

首冠藤(原变种) shou guan teng (yuan bian zhong)

Phanera corymbosa (Roxburgh ex Candolle) Benth.

Raceme corymbose.

Open forests in valleys and on sunny slopes. Guangdong, Guangxi, Hainan [Vietnam].

41b. *Bauhinia corymbosa* var. *longipes* Hosokawa, Trans. Nat. Hist. Soc. Formosa 32: 196. 1942.

长序首冠藤 chang xu shou guan teng

Raceme elongated, not corymbose.

• Hainan (Lingshui).

42. *Bauhinia didyma* L. Chen, J. Arnold Arbor. 19: 131. 1938.

孪叶羊蹄甲 luan ye yang ti jia

Lianas, woody, with tendrils; whole plant glabrous except for pedicel base and leaf buds. Twigs slightly zigzag, slender; tendrils solitary, slender. Leaves 2-foliolate; stipules caducous; petiole 1–2 cm, slender, glabrous; leaf blade 12–24 × 9–16 mm, membranous, abaxially thinly pubescent on axils of primary veins, adaxially glabrous, veins 3 per lobe, veins dense, salient on both surfaces, base truncate; lobes obliquely obovate, apex obtuse or rounded. Inflorescence corymbose-racemose, terminal on lateral branches, many flowered; peduncle more than 1 cm; bracts and bracteoles linear, 1.5–4 mm. Pedicel 1–3 cm, slender. Flower buds ellipsoid, ca. 5 mm. Receptacle cylindrical, 10–12 mm; calyx lobes 5, reflexed, broadly ovate or lanceolate. Petals white, broadly obovate, ca. 9 × 6 mm, abaxially hairy near base, shortly clawed. Fertile stamens 3; filaments ca. 1 cm, glabrous. Staminodes 3–5. Ovary shortly stalked, glabrous; style short; stigma disciform. Legume strap-shaped, compressed, ca. 10 × 2.5 cm, tardily dehiscent, glabrous, sutures slightly thickened. Seeds ellipsoid, compressed, ca. 6 × 4 mm; testa brown. Fl. Aug–Dec, fr. Sep–Feb.

• Open forests, thickets; 100–500 m. Guangdong, Guangxi.

43. *Bauhinia touranensis* Gagnepain, Notul. Syst. (Paris) 2: 181. 1912.

囊托羊蹄甲 nang tuo yang ti jia

Bauhinia genuflexa Craib; *B. henryi* Craib; *B. rocheri* H. Léveillé.

Lianas, woody, with tendrils. Tendrils compressed, slender, pubescent on one side. Stipules caducous; petiole 1–2 cm, glabrous; leaf blade suborbicular, 3.5–6 × 4–6.5 cm, papery, abaxially thinly pubescent at first, pubescent only on veins and axils of primary veins in mature leaves, adaxially glabrous, veins 7–9, base cordate, apex bifid to 1/6–1/5, lobes obtuse or rounded at apex. Inflorescence 3 or 4 corymbose racemes, terminal on lateral branches, 6–9 cm, rusty pubescent; peduncle 1.5–4 cm, with a tendril at base; bracts and bracteoles threadlike, 6–9 mm, acuminate. Pedicel slender, lowest ones to 20

mm, rusty pubescent. Flower buds ellipsoid to globose, rusty hirsute. Receptacle cylindrical, 6–10 mm, base strongly enlarged on one side and appearing bladderlike, curved at straight angles with pedicels, pubescent; calyx lobes 5, ovate, 3–5 mm, acuminate. Petals greenish or yellowish white, suborbicular, ovate, or obovate, ca. 6 mm, abaxially hairy at middle, prominently clawed. Fertile stamens 3; filaments glabrous. Staminodes 7. Ovary stalked, 4–5 mm, pubescent on sutures and stalk; style short; stigma capitate. Legume strap-shaped, compressed, 12–16 × 3–3.5 cm, indehiscent, glabrous, sutures slightly thickened. Seeds ellipsoid, compressed, ca. 8 × 6 mm; testa brown. Fl. Mar–Jun, fr. Aug–Oct.

Open forests and thickets in valleys and on slopes; 500–1200 m. Guangxi, Guizhou, Yunnan [Laos, Myanmar, Vietnam].

44. *Bauhinia quinnanensis* T. C. Chen, Guihaia 8: 48. 1988.

黔南羊蹄甲 qian nan yang ti jia

Lianas, woody, with tendrils. Tendrils opposite leaves, pubescent. Stipules caducous; petiole 1–2 cm, pubescent; leaf blade broadly ovate to suborbicular, 5–8 × 4–6.5 cm, papery, abaxially rusty pubescent, adaxially glabrous, veins 9, base shallowly cordate or nearly truncate, entire or apex emarginate. Inflorescence 1 or 2 corymbose racemes, terminal, 3.5–6 × 3.5–6 cm, 8–20-flowered, rusty pubescent; peduncle short, 5–12 mm; bracts threadlike, 5–7 mm; bracteoles linear, 4–6 mm, inserted at middle of pedicel. Pedicel 15–22 mm, rusty pubescent. Flower buds ovoid, rusty hirsute. Receptacle cylindrical, 8–9 mm, base slightly swollen on one side, pubescent; calyx lobes 5, reflexed, lanceolate, 5–6 × ca. 2 mm, outside rusty pubescent. Petals white, 3 rhombic, 2 elliptic, 6–8 × 4–7 mm including claw 3–4 mm, abaxially pubescent at middle, base cuneate, margin smooth. Fertile stamens 3; filaments 9–11 mm, glabrous. Staminodes 7, 2 free ones longer, others joined at base. Ovary stalked, glabrous; style short; stigma capitate. Legume strap-shaped, much compressed, to 28 × 4–4.5 cm, indehiscent, glabrous, reticulate veined, sutures slightly salient. Seeds ellipsoid, compressed, ca. 8 × 6 mm; testa brown. Fl. May, fr. Aug.

• Thickets on mountain slopes; 1000–1300 m. Guizhou.

45. *Bauhinia damiaoshanensis* T. C. Chen, Guihaia 8: 49. 1988.

大苗山羊蹄甲 da miao shan yang ti jia

Lianas, woody, with tendrils. Twigs slender, glabrous; tendrils solitary, pubescent on one surface. Stipules caducous, lanceolate, small; petiole 1–3 cm, slender; leaf blade broadly orbicular, 2–5 × 2.5–6 cm, papery, abaxially pubescent on veins and near base, adaxially glabrous, veins 7, base cordate, apex bifid to 1/4–1/3 on flowering branches, lobes obtuse at apex. Inflorescence corymbose-racemose, terminal on lateral branches, 5–14 cm with a peduncle 1–4.5 cm; bracts linear-lanceolate, 4–7 mm; bracteoles linear, ca. 4 mm, inserted at middle of pedicel. Pedicel slender. Flower buds ovoid, rusty hirsute. Receptacle 6–9 mm, slender, base swollen on one side and curved at anthesis; calyx lobes 5, reflexed, lanceolate, 4–5 mm, outside pubescent. Petals white, broadly obovate or ovate, spatulate, 8–8.5 mm including a prominent claw 3–4 mm, base cuneate, margin

crisped, apex rounded. Fertile stamens 3; filaments ca. 9 mm, glabrous. Staminodes 2–7. Floral disk not fleshy. Ovary shortly stalked, oblique, glabrous; style stout; stigma peltate. Legume strap-shaped or oblong, compressed, 12–15 × 3–3.5 cm, indehiscent, glabrous, reticulate veined, sutures slightly swollen, apex beaked. Seeds 15–18, oblong. Fl. Jun, fr. Jul–Oct.

- Open forests. Guangxi.

46. *Bauhinia ovatifolia* T. C. Chen, Guihaia 8: 50. 1988.

卵叶羊蹄甲 luan ye yang ti jia

Lianas, woody, with tendrils. Young branches, petioles, and inflorescences rusty pubescent, later subglabrous. Stipules caducous; petiole 8–17 mm; leaf blade ovate, 3–4 × 2–3 cm, papery, abaxially pubescent on veins and near base, adaxially glabrous, veins 7, base rounded, margin entire or emarginate. Inflorescence corymbose-racemose, terminal on lateral branches, 5–7 cm; peduncle short, 5–6 mm. Pedicel 15–20 mm, slender. Flower buds ovoid, ca. 6 mm, apex acute. Receptacle elongate, ca. 15 mm, striped; calyx lobes 5, reflexed, lanceolate, 6–7 mm, adnate from middle downward, upper part rusty pubescent outside. Petals white, subrhombic, broadly obovate, or

elliptic, abaxially brown crinite from middle downward, claw prominent and 6–8 mm, base cuneate, margin crisped, apex rounded. Fertile stamens 3; filaments 11–12 mm, glabrous. Staminodes 7, largest 2 free, ca. 5 mm, others much smaller, joined in a digitate structure. Ovary shortly stalked, glabrous; style ca. as long as ovary, stout; stigma capitate. Legume oblong, 20–25 × 4–4.5 cm, glabrous, indehiscent. Seeds numerous, oblong. Fl. Dec, fr. next Apr–Jun.

- Open habitats on hill slopes; ca. 700 m. Guangxi, Yunnan.

47. *Bauhinia tianlinensis* T. C. Chen & D. X. Zhang, Nordic J. Bot. 18: 141. 1998.

田林羊蹄甲 tian lin yang ti jia

Lianas, with tendrils. Branches and tendrils pubescent. Stipules caducous; petiole 1–2 cm, pubescent; leaf blade ovate, 5–8 × 4.5–5.5 cm, abaxially pubescent, veins 7–9, base ± cordate, apex bifid to 1/4 with acute to rounded lobes. Inflorescence and flowers not seen. Legume oblong-strap-shaped, 20–30 × 5–6 cm, pubescent, indehiscent. Seeds many, oblong-ellipsoid, 6–10 × 3–5 mm.

- Disturbed open habitats on karst hills. Guangxi (Tianlin).

2. Tribe DETARIEAE

甘豆族 gan dou zu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou, Kai Larsen, Supee Saksuwan Larsen

Leaves pinnate, sometimes only with 1 pair of leaflets or a single leaflet. Bracteoles caducous, imbricate or valvate, persistent. Flowers bisexual, actinomorphic to conspicuously zygomorphic. Receptacle shallowly cup-shaped or tubular. Sepals usually 4 or 5, often enclosing petals when flowers in bud. Petals absent to 5. Perfect stamens 2–10 or numerous; anthers basifixed or dorsifixed, opening by lateral slits, sometimes with staminodes. Ovary stipitate or sessile; stipe free or adnate to receptacle.

About 80 genera and 730–770 species: distributed in tropical regions; six genera (three introduced) and ten species (two endemic, five introduced) in China.

- 1a. Bracteoles sepaloid or petaloid, enclosing flower bud before flowering; stalk of ovary adnate to hypanthium 8. *Tamarindus*
- 1b. Bracteoles not sepaloid or petaloid, imbricate, often caducous; ovary inserted at center and free from hypanthium.
 - 2a. Petals absent; calyx lobes petaloid 4. *Saraca*
 - 2b. Petals present.
 - 3a. Petals 3 or 5.
 - 4a. Flowers purplish red or pink; perfect stamens 2; leaves abruptly pinnate; leaflets 3–5 pairs 3. *Lysidice*
 - 4b. Flowers white; perfect stamens 10; leaves with 1 pair of leaflets 6. *Hymenaea*
 - 3b. Petal 1, rarely 2.
 - 5a. Petals with long claw, exceeding above sepals; legume oblong; seeds with horny aril at base 5. *Azelia*
 - 5b. Petals not clawed, enclosed in uppermost calyx lobe; legume orbicular or elliptic; seeds with fleshy aril at base 7. *Sindora*

3. LYSIDICE Hance, J. Bot. 5: 298. 1867.

仪花属 yi hua shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou

Shrubs or trees. Leaves abruptly pinnate; leaflets 3–5 pairs, opposite, base slightly oblique, asymmetric on two sides; petiolules short; stipules caducous or late deciduous, small, subulate or narrowly triangular. Panicles terminal. Flowers showy, purplish red or pink, with large, red or white bracts at base; bracteoles small, in pairs inserted at apex or near apex on pedicels. Calyx tubular, 4-lobed; lobes imbricate, reflexed after anthesis. Petals 5: 3 at back large, obovate, long clawed; 2 in front small, reduced, scalelike or subulate. Perfect stamens 2, free or slightly connate at base; filaments elongated, reflexed in bud; anthers elliptic, opening lengthwise; staminodes 3–8, unequal in length, subulate, without anthers or with 1–3 orbicular, small, abortive anthers. Ovary compressed, oblong, stalked, stalk adnate to calyx tube, 6–14-ovuled; style filiform, long; stigma capitate, small. Legume compressed, oblong or obovoid-oblong, thickly leathery or woody, with stipe, 2-valved, valves flat or slightly curling or spirally twisted. Seeds shiny, compressed, oblong, obliquely broadly elliptic to suborbicular, margin not thickened or conspicuously thickened into a narrowly edged ring; cotyledons flat; embryo small.

About two species: S and SW China, Vietnam; two species (one endemic) in China.

- 1a. Bracts and bracteoles pink; calyx tube 1.2–1.5 cm, longer than lobes; seeds marginally not thickened, testa thin, inside without gelatin; shrubs or small trees 1. *L. rhodostegia*
- 1b. Bracts and bracteoles white; calyx tube 3–9 mm, shorter than lobes; seeds marginally conspicuously thickened into a narrowly edged ring, testa thicker, inside with a layer of spongy gelatin; trees 2. *L. brevicalyx*

1. *Lysidice rhodostegia* Hance, J. Bot. 5: 299. 1867.

仪花 yi hua

Shrubs or small trees, 2–5 m tall, rarely more than 10 m tall. Petiolules short, 2–3 mm; leaflets oblong or ovate-lanceolate, 5–16 × 2–6.5 cm, papery, lateral veins subparallel, slender, evident on both surfaces, base rounded, apex caudate-acuminate. Panicles 20–40 cm; rachis, bracts, and bracteoles sparsely puberulent; bracts and bracteoles pink, ovate-oblong or elliptic, bracts 1.2–2.8 × 0.5–1.4 cm, bracteoles small, 2–5 mm. Calyx tube 1.2–1.5 cm, much longer than lobes (8–10 mm); lobes dark purplish red, oblong. Petals purplish red, broadly obovate, ca. 1.2 cm including claw, apex rounded, emarginate. Anthers ca. 4 mm; staminodes usually 4, subulate. Ovary hairy,

6–9-ovuled; style slender, hairy. Legume obovoid-oblong, 12–20 cm, sutures unequal in length, ventral suture longer and curved, dehiscent; valves often spirally twisted. Seeds 2–7, brownish red, oblong, 2.2–2.5 × 1.2–1.5 cm, margin not thickened; testa thinner and fragile, surface slightly wrinkled, inside without gelatin. Fl. Jun–Aug, fr. Sep–Nov. $2n = 24^*$.

Mountain slopes, jungles, among bushes, near roads, along valleys by streams; below 500 m. Guangdong, Guangxi (Longzhou), Guizhou, Yunnan [Vietnam; introduced in tropical Africa, the Caribbean, Central America, and United States (Florida)].

The roots, stems, and leaves are somewhat toxic. They are used medicinally to relieve pain from rheumatism and arthritis and for detumescence.

2. *Lysidice brevicalyx* C. F. Wei, Guihaia 3: 12. 1983.短萼仪花 *duan e yi hua*

Trees, 10–20 m tall. Trunk 20–30 cm d.b.h. Leaflets oblong, obovate-oblong, or ovate-lanceolate, 6–12 × 2–5.5 cm, subleathery, base cuneate or obtuse, apex obtuse or caudate-acuminate. Panicle spreading, 13–20 cm; bracts and bracteoles white, broadly ovate, ovate-oblong, or oblong, bracts 1.5–3.1 cm, bracteoles 0.5–1.5 cm. Calyx tube short, 3–9 mm; lobes oblong to broadly oblong, longer than calyx tube. Petals purple, obovate, 1.6–1.9 cm including claw, apex subtruncate, emarginate. Anthers 3–4 mm; margin of cells purplish red; stami-

nodes 8, or 5 or 6, unequal in length. Ovary villous along sutures, 9–14-ovuled. Legume oblong or obovoid-oblong, 15–26 × 3.5–5 cm, base rounded, dorsal and ventral sutures equal or subequal in length, dehiscent; valves flat or slightly twisted. Seeds 7–10, chestnut-brown or grayish green, shiny, oblong or obliquely broadly oblong to subglobose, 2–2.8 × 1.5–2.2 cm, margin thickened into a narrowly edged ring; testa crustaceous, inside with a layer of white spongy gelatin, ferruginous red when dry. Fl. Apr–May, fr. Aug–Sep. $2n = 24^*$.

• Sparse or dense forests, along valleys, by streams; 500–1000 m. Guangdong, Guangxi, Guizhou, Yunnan.

4. SARACA Linnaeus, Syst. Nat., ed. 12, 2: 469; Mant. Pl. 1: 13, 98. 1767.无忧花属 *wu you hua shu*Chen Dezhaoh (陈德昭 *Chen Te-chao*), Zhang Dianxiang (张奠湘); Ding Hou

Trees. Leaves abruptly pinnate, with few pairs of leaflets, leathery; stipules 2, usually united to a conical sheath, caducous; petiole robust, with glandular nodes. Corymbose panicles axillary or terminal; involucre caducous; bract 1, deciduous or persistent, smaller or larger than bracteoles, hairy or glabrous; bracteoles 2, usually persistent, subopposite, colored. Flowers bisexual or unisexual, yellowish to deep red, with short pedicels. Calyx tubular; tube elongated, slightly inflated in upper part, with a disk at apex; lobes 4, rarely 5 or 6, petaloid, ovate-oblong, slightly unequal in size, imbricate. Petals absent. Stamens 4–10, all perfect or 1 or 2 reduced, inserted in disk on throat of calyx tube; filaments free, elongated, often reflexed in bud; anthers oblong or suborbicular, dorsifixed, cells opening lengthwise. Ovary compressed, oblong, hairy or glabrous, shortly stalked, stalk adnate to calyx tube; ovules few to more than 10; style filiform; stigma terminal, capitate. Legume compressed, oblong, slightly curved and oblique, leathery to rather woody, 2-valved. Seeds 1–8, compressed, elliptic to ovoid; testa thin, crustaceous; radicle small, straight.

About 20 species: tropical Asia; two species in China.

- 1a. Perfect stamens 4; bracts and bracteoles small, equal in size, not longer than 5 mm, persistent; pedicels articulate 1. *S. griffithiana*
 1b. Stamens 8–10 including 1 or 2 reduced; bracts and bracteoles larger, usually longer than 1 cm, bracts much larger than bracteoles, deciduous or nearly persistent; pedicels not articulate 2. *S. dives*

1. *Saraca griffithiana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 491. 1897.

云南无忧花 *yun nan wu you hua*

Trees, to 18 m tall. Petiolules robust, compressed, 4–6 mm; leaflets 4–6 pairs, oblong or obovate-oblong, 23–36 × 6.5–10 cm, papery, midvein robust, raised on both surfaces, lateral veins 11 or 12 pairs, base rounded or cuneate, apex rounded. Inflorescence axillary, with crowded, short branches, forming nearly a sphere ca. 13 cm in diam. at anthesis; peduncles and rachis yellowish green puberulent; bracts and bracteoles persistent, ovate, equal in size, ca. 3 mm, ciliate, bracts spreading, bracteoles straight, enclosing pedicels. Flowers numerous, crowded, with long pedicels, articulate between calyx and apex of pedicels. Calyx tube shorter than pedicels, 1.5–1.8 cm; lobes ovate, ca. 1 cm, apex obtuse or slightly acute. Perfect stamens 4, ca. 3 mm; anthers subovoid, small, 1.5–1.8 mm. Ovary compressed, ca. 7 mm, thin, densely yellowish green puberulent; style ca. 2.8 cm; stigma small. Fruit not seen.

Dense or sparse forests, mountain slopes, along valleys, by streams; 300–1200 m. W Yunnan (Yingjiang) [Myanmar].

2. *Saraca dives* Pierre, Fl. Forest. Cochinch. t. 386B. 1899.

中国无忧花 *zhong guo wu you hua**Saraca chinensis* Merrill & Chun.

Trees, 5–20 m tall. Trunk ca. 25 cm d.b.h. Petiolules 7–12 mm; leaflets 5 or 6 pairs, slightly purplish red when young, pendulous, narrowly elliptic, ovate-lanceolate, or narrowly obovate, 15–35 × 5–12 cm, subleathery, lateral veins 8–11 pairs, lowest pair often smaller, base cuneate, apex acuminate, acute, or obtuse. Inflorescence axillary, larger; rachis hairy or glabrous; involucre caducous, broadly ovate, large, hairy; bracts caducous or late deciduous, ovate, lanceolate, or oblong, 1.5–5 × 0.6–2 cm, lowest one largest, gradually smaller upward, hairy or glabrous; bracteoles equal to bracts in shape but much smaller. Flowers bisexual or unisexual, yellow, base of calyx lobes, disk, stamens, and style becoming red; pedicels shorter than calyx tube, not articulate. Calyx tube 1.5–3 cm; lobes 4(–6), oblong, ciliate. Stamens 8–10 including 1 or 2 often reduced to subulate; filaments exerted; anthers oblong, 3–4 mm. Ovary slightly curved, glabrous or hairy along sutures and stalk. Legume brownish, compressed, 22–30 × 5–7 cm, valves twisted. Seeds 5–9, unequal in shape, shallowly depressed sulcate at middle of both surfaces. Fl. Apr–May, fr. Jul–Oct.

Dense or sparse forests, riversides, along valleys, by streams; 200–1000 m. Guangdong, SE and SW Guangxi, SE Yunnan [Laos, Vietnam].

This is a fine parasitifer plant, which can be used for breeding lac insects. The bark is used medicinally for relieving rheumatism and menorrhagia. The flowers are large and showy, and the trees are often cultivated ornamentally.

5. AFZELIA Smith, Trans. Linn. Soc. London 4: 221. 1798, nom. cons.,
not J. F. Gmelin (1792).

缅茄属 mian qie shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou

Pahudia Miquel.

Trees. Leaves abruptly pinnate; stipules caducous, minute; leaflets in few pairs. Panicles terminal; bracts and bracteoles deciduous or ± persistent, ovate, slightly thick, not colored. Flowers bisexual, pedicellate. Calyx tubular, with a disk in throat; lobes 4, slightly unequal in size, leathery, imbricate. Petal 1, suborbicular or reniform, clawed, others rudimentary or absent. Stamens 7 or 8; filaments elongated, base partly united or free; anthers ovoid or oblong, opening lengthwise; staminodes 2, very small. Ovary stalked, stalk adnate to calyx tube; ovules few to numerous; style filiform; stigma subcapitate, small. Legume slightly compressed, oblong or obliquely oblong, woody, thick, 2-valved, transversely septate between seeds. Seeds ovoid or oblong, with horny, hard, arilloid funicle at base, without endosperm; cotyledons fleshy, ± flat; embryo straight.

About 14 species: tropical Asia and Africa; one species (introduced) in China.

1. Afzelia xylocarpa (Kurz) Craib, Bull. Misc. Inform. Kew 1912: 267. 1912.

缅茄 mian qie

Pahudia xylocarpa Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 45: 290. 1877; *Afzelia cochinchinensis* (Pierre) J. Léonard; *P. cochinchinensis* Pierre.

Trees, 15–25 m tall, sometimes to 40 m tall. Trunk ca. 90 cm d.b.h. Bark brown. Petiolules short, less than 5 mm; leaflets 3–5 pairs, opposite, ovate or broadly elliptic to suborbicular, 4–14 × 3.5–6 cm, papery, base rounded and slightly oblique, apex rounded or emarginate. Inflorescence densely grayish yellow-green or grayish white puberulent; bracts and bracteoles per-

sistent, ovate or triangular-ovate, equal in size, ca. 6 mm. Calyx tube 1–1.3 cm; lobes elliptic, 1–1.5 cm, apex rounded. Petal pale purple, obovate to suborbicular; claw white villous. Stamens 7, united at base; filaments exerted, 3–3.5 cm, pubescent in lower part. Ovary narrowly oblong, hairy; style elongated and exerted. Legume blackish brown, compressed, oblong, 11–17 × 7–8.5 cm, hard. Seeds 2–5, deep brownish red, shiny, slightly compressed, ovoid or suborbicular, ca. 2 cm. Fl. Apr–May, fr. Nov–Dec.

Cultivated. Guangdong (Maoming, Xuwen), Guangxi (Hepu, Nanning), Hainan, Yunnan (Shiping, Xishuangbanna) [native to Cambodia, Laos, Myanmar, Thailand, and Vietnam].

The seeds are used for carving; the plant is also used medicinally for relieving toothaches and eye diseases.

6. HYMENAEA Linnaeus, Sp. Pl. 2: 1192. 1753.

李叶豆属 luan ye dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen, Supee Saksuwan Larsen

Trachylobium Hayne.

Trees. Leaves with 1 pair of leaflets; stipules caducous; leaflets paired, thickly leathery, entire, often translucent glandular punctate, with short petiolules or subsessile. Flowers white, in terminal panicles or corymbose panicles; bracts and bracteoles caducous, ovate or orbicular, concave. Calyx tubular, solid in lower part, expanded and campanulate or turbinate in upper part; lobes 4, thickly leathery, imbricate. Petals 3 or 5, clawed or sessile, subequal in size or lower 2 small and squamose. Stamens 10, all perfect, free; filaments glabrous or hairy at base; anthers oblong, dorsifixed, cells opening lengthwise. Ovary shortly stalked, stalk adnate to calyx tube, glabrous or hairy, few ovuled; style filiform; stigma terminal, small. Legume drupelike, obliquely obovoid or oblong, thickly leathery or woody, rough and tuberculate, not dehiscent. Seeds few, of various shapes; testa hard, bony, without endosperm and aril; cotyledons thickened, fleshy; radicle short, straight.

About 26 species: tropical America and Africa; two species (both introduced) in China.

- 1a. Petals narrowly ovate, sessile or subsessile, subequal in size; legume rough, without tubercles on surface; petiolules obscure 1. *H. courbaril*
1b. Petals suborbicular, clawed, unequal (2 petals smaller, squamose) or subequal in size; legume tuberculate on surface; petiolules conspicuous, ca. 3 mm 2. *H. verrucosa*

1. Hymenaea courbaril Linnaeus, Sp. Pl. 2: 1192. 1753.

李叶豆 luan ye dou

Trees, evergreen, 5–10 m tall. Branchlets grayish green, with numerous brown, small lenticels and adpressed puberu-

lent. Leaves alternate; petiolules obscure; leaflets ovate or ovate-oblong, slightly incurved, 5–10 × 2.5–4 cm, abaxially adpressed shortly pubescent on veins, adaxially glabrous or sparsely puberulent, base obliquely rounded, asymmetric, apex acute. Inflorescences corymbose panicles. Flowers large, 2.5–3

cm; pedicels articulate, adpressed densely puberulent. Calyx tube 1.3–1.5 cm, expanded and campanulate in upper part; lobes broadly ovate or suborbicular, ca. as long as calyx tube, outside densely adpressed puberulent, inside densely silky at middle part. Petals 5, ovate or narrowly ovate, subequal in size, ca. as long as calyx lobes, clawed or subsessile. Stamens exserted; filaments 2.5–3 cm. Ovary compressed, glabrous; style elongated, curved in upper part; stigma capitate. Legume reddish brown, oblong or obovoid-oblong, 5–10.5 × 2.5–5 cm, woody, rough and not tuberculate; stipe short, ca. 5 mm. Fl. Aug–Oct, fr. next May–Jun.

Cultivated. Guangdong, Taiwan [native to Central America and Mexico].

The wood is hard and is used for shipbuilding and making furniture. It also yields a gum-resin (copal). The pulp is edible.

2. *Hymenaea verrucosa* Gaertner, Fruct. Sem. Pl. 2: 306. 1791.

疣果李叶豆 you guo luan ye dou

Trachylobium verrucosum (Gaertner) Oliver.

Trees, 6–24 m tall. Branchlets grayish white. Petiolules ca. 3 mm; leaflets ovate-oblong, asymmetric, 5–8(–12) × 2.5–5 cm, both surfaces glabrous, base obliquely rounded, apex acute. Inflorescences panicles; bracts and bracteoles deciduous, ovate or orbicular. Flowers small. Calyx tube expanded and turbinate in upper part; lobes 7–11 mm, outside densely adpressed puberulent, inside densely white silky. Petals unequal in size, uppermost inner 3 larger, suborbicular, clawed, other 2 small, scaly, or sometimes 5 subequal and all clawed. Ovary shortly stalked, densely strigose at base. Legume blackish brown, slightly compressed, obovoid, 3–4.2 cm, tuberculate. Fl. Sep–Nov, fr. next May–Jun.

Cultivated. Taiwan [native to Madagascar; cultivated in Indonesia (Java), Pacific islands (Hawaii), Singapore, and Sri Lanka].

7. *SINDORA* Miquel, Fl. Ned. Ind., Suppl. 1: 287. 1861.

油楠属 you nan shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou

Trees. Leaves abruptly pinnate; stipules leaflike; leaflets 2–10 pairs, leathery. Flowers bisexual, in terminal panicles or racemes; bracts and bracteoles caducous, ovate. Calyx tube very short, with disk at base; lobes 4, valvate or margin narrowly imbricate, ± with soft bristles. Petal 1, rarely 2. Stamens 10: 9 shortly united into an oblique tube, upper stamen free and reduced to an antherless, slightly short staminode; anthers oblong, dorsifixed, opening lengthwise. Ovary 2–5-ovuled, shortly stalked; style filiform, circinate; stigma small. Legume compressed, usually orbicular or oblong, ± oblique, large, dehiscent, often shortly prickly on surface of valves, rarely without prickles. Seeds 1 or 2, black, shiny, with a large fleshy aril at base.

Between 18 and 20 species: WC Africa (Gabon) and mostly in SE Asia; two species (one endemic, one introduced) in China.

- 1a. Calyx lobes outside with soft bristles; legume with dispersed, hard, straight prickles 1. *S. glabra*
 1b. Calyx lobes without bristles; legume smooth, without prickles 2. *S. tonkinensis*

1. *Sindora glabra* Merrill ex de Wit, Bull. Jard. Bot. Buitenzorg, sér. 3, 18: 46. 1949.

油楠 you nan

Trees, 8–20 m tall. Trunk 30–60 cm d.b.h. Leaves 10–20 cm; petiolules ca. 5 mm; leaflets 2–4 pairs, opposite, elliptic-oblong, rarely ovate, 5–10 × 2.5–5 cm, lateral veins slender, together with reticulate veinlets obscure, base rounded, slightly oblique, apex obtusely acute or shortly acuminate. Panicles in axils of apical leaves, 15–20 cm, densely yellowish pubescent; bracts ovate, leaflike, 5–7 mm. Pedicels 2–4 mm, with 1 or 2 bracteoles from middle upward; bracteoles linear-lanceolate, 5–6 mm; bracts, pedicels, and bracteoles densely yellowish pubescent. Calyx lobes yellowish pubescent on both surfaces, dimorphic, uppermost one broadly ovate, ca. 5.5 × 5 mm, back arcuate, with 21–23 soft bristles, other 3 elliptic-lanceolate, with 6–10 soft bristles. Petal 1, enclosed in uppermost calyx lobe, oblong-orbicular, ca. 5 × 2–6 mm, outside densely pubescent, inside glabrous, base subtruncate, obscurely clawed, margin ciliate, apex rounded. Fertile stamens 9, staminal tube ca. 2 mm, both sides adpressed brown strigose, especially inside; anthers subequal in size, 2–3 mm, apex emarginate, sometimes cuspidate. Ovary ca. 3 mm, densely strigose, 4- or 5-ovuled; stalk ca. 0.8 mm; style convolute, glabrous. Legume orbicular or elliptic,

5–8 × ca. 5 cm, with dispersed, hard, straight prickles; valves often shedding glue when cut. Seed solitary, blackish, spheroidal, ca. 1.8 cm in diam. Fl. Apr–May, fr. Jun–Aug.

• Mixed forests, mountain slopes, riverbanks; near sea level to 800 m. Fujian, Guangdong, Hainan, Yunnan.

The wood has good qualities and is used for building houses and making furniture.

2. *Sindora tonkinensis* A. Chevalier ex K. Larsen & S. S. Larsen, Fl. Cambodge, Laos & Vietnam 18: 122. 1980.

东京油楠 dong jing you nan

Trees, to 15 m tall. Branches glabrous. Leaves 10–20 cm, glabrous; stipules caducous; petiolules ca. 5 mm; leaflets 4 or 5 pairs, ovate, narrowly ovate, or elliptic-lanceolate, 6–12 × 3.5–6 cm, glabrous, asymmetric, upper side narrower than lower side, base rounded or broadly cuneate, margin entire, apex acuminate or shortly acuminate. Panicles in axils of apical leaves, 15–20(–30) cm, together with bracteoles, calyx, petal, and ovary densely yellowish pubescent; bracts triangular, 5–10 mm. Pedicels 2–4 mm, with 1 or 2 bracteoles from middle upward; bracteoles elliptic-lanceolate, ca. 5 mm. Calyx lobes 4, outside with bristles, inside densely yellowish hirsute. Petal thick, ca. 8

mm. Filaments filiform, 1–1.5 cm, densely yellowish pubescent at base; anthers 3–4 mm. Ovary shortly stalked, without prickles; style convolute, 1–1.5 cm, glabrous. Legume suborbicular or elliptic, 7–10 × 4–6 cm, apex beaked, smooth,

without prickles. Seeds 2–5, blackish, spheroidal. Fl. May–Jun, fr. Aug–Sep.

Cultivated. Guangdong (Guangzhou) [native to ?Cambodia and Vietnam].

8. TAMARINDUS Linnaeus, Sp. Pl. 1: 34. 1753.

酸豆属 suan dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen

Trees. Leaves abruptly pinnate, alternate; stipules caducous, small; leaflets 10 to numerous paired. Racemes or racemes arranged in panicles at ends of shoots; bracts and bracteoles often caducous, colored, ovate-oblong. Calyx tube narrowly turbinate; segments 4, imbricate. Petals: only upper 3 developed, subequal in length, lower 2 reduced, scalelike, concealed at base of staminal tube. Perfect stamens 3, connate into an ascending, curved tube or sheath from middle downward; filaments short; anthers dorsifixed; staminodes few, minute, at apex of sheath. Ovary stalked, stalk adnate to calyx tube; ovules numerous; style elongated; stigma capitate. Legume narrowly terete, indehiscent; epicarp thin, crustaceous; mesocarp thick and pulpy; endocarp membranous, septate between seeds. Seeds compressed, obliquely oblong or obliquely ovoid-orbicular; cotyledons thick, fleshy; embryo erect.

One species: native to Africa, widely introduced and cultivated in the tropics including China.

1. *Tamarindus indica* Linnaeus, Sp. Pl. 1: 34. 1753.

酸豆 suan dou

Trees, 10–15(–25) m tall. Trunk 30–50(–90) cm d.b.h. Bark dark ashy, irregularly longitudinally splitting. Leaflets oblong, small, 1.3–2.8 cm × 5–9 mm, glabrous, base obliquely rounded, apex rounded or emarginate. Flowers few, yellowish tinged with purplish red stripes; peduncles and pedicels yellowish green puberulent; bracteoles 2, ca. 1 cm, enclosing flower bud before anthesis. Calyx tube ca. 7 mm; lobes lanceolate-oblong, ca. 1.2 cm, reflexed after anthesis. Petals obovate, subequal to calyx lobes, margin repand, curled. Stamens 1.2–1.5

cm, pubescent near base, free parts of filaments ca. 7 mm; anthers elliptic, ca. 2.5 mm. Ovary slightly incurved, terete, ca. 8 mm, hairy. Legume brownish, straight or arcuate, terete-oblong, turgid, 5–14 cm, often irregularly constricted. Seeds 3–14, brownish, shiny. Fl. May–Aug, fr. Dec–May. $2n = 24, 26, 28^*$.

Cultivated. Fujian, Guangdong, Guangxi, ?Hainan, Yunnan (Jinsha Jiang valley) [native to Africa; widely cultivated in the tropics].

The pulp of the fruit and the seed oil are edible. The fruit can be used medicinally for relieving fever and constipation and as an antiscorbutic. The hard, heavy wood is used for building houses and making farm tools and furniture. The trunk is robust, with wind-resistant strength, and is suitable for planting on seashores.

3. Tribe CASSIEAE

决明族 jue ming zu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen

Leaves paripinnate or imparipinnate, rarely bipinnate. Flowers bisexual, polygamous, or plants dioecious, actinomorphic or zygomorphic. Receptacle cup-shaped. Sepals 4 or 5, rarely 3 or 6, imbricate. Petals usually 5, sometimes 3, rarely absent. Stamens various in number, sometimes with staminodes; anthers basifixed, rarely dorsifixed, opening by apical pores or by lateral short slits. Ovary or ovary stipe inserted at base of receptacle, free; ovules 2 to numerous, rarely solitary.

About 21 genera and 730–740 species: mainly distributed in the tropics and subtropics; four genera and 21 species (15 introduced) in China.

- 1a. Leaves imparipinnate; leaflets alternate 9. *Zenia*
1b. Leaves abruptly pinnate; leaflets opposite.
2a. Petioles and rachis of leaves without glands; stamens 10, filaments of 3 abaxial antisealous stamens sigmoidally curved, usually longer than anthers; legume indehiscent 10. *Cassia*
2b. Petioles and rachis of leaves with or without glands; stamens 10 or 5 fertile, filaments straight; legume dehiscent or indehiscent.
3a. Bracteoles absent; petals subequal; legume either indehiscent or inertly dehiscent through 1 or both sutures, if latter, not coiling, or valves breaking up into 1-seeded joints 11. *Senna*
3b. Bracteoles present; petals unequal; legume elastically dehiscent, valves coiling 12. *Chamaecrista*

9. ZENIA Chun, Sunyatsenia 6: 195. 1946.

任豆属 ren dou shu

Trees, deciduous. Buds with few perules. Leaves imparipinnate, not stipulate; leaflets alternate, entire, not stipellate. Flowers bisexual, ± actinomorphic, reddish, in terminal panicles. Sepals 5, imbricate. Petals 5, imbricate, slightly unequal. Perfect stamens 4, 5th one reduced to a filiform staminode, rarely 5, inserted on margin of disk. Disk small, sinuate-lobate. Ovary compressed, few (7–9) ovuled, shortly stalked; style subulate, short, slightly curved; stigma small. Legume compressed, membranous, indehiscent, reticulate veined, broadly winged along upper (adaxial) suture. Seeds few, compressed, orbicular, with long funicle.

One species: S China, Vietnam.

1. *Zenia insignis* Chun, Sunyatsenia 6: 196. 1946.

任豆 ren dou

Trees, 15–20 m tall. Trunk to 100 cm d.b.h. Branchlets blackish brown, with scattered, yellowish white, small lenticels. Bark rough, exfoliating in strips. Buds elliptic-fusiform, with few scales, yellowish pubescent at first, glabrescent. Leaves 25–40 cm; petiole short, 3–5 cm; rachis and petiole ± yellowish puberulent; petiolules 2–3 mm; leaflets oblong-lanceolate, 6–9 × 2–3 cm, thinly leathery, abaxially grayish white strigose, adaxially glabrous, base rounded, margin entire, apex shortly acuminate or acute. Panicles terminal; peduncles and pedicels yellow or brown strigose. Flowers red, ca. 1.4 cm; bracts cadu-

cous, narrowly ovate, small. Sepals oblong, slightly unequal in size, 10–12 × 5–6 mm, thickly membranous, outside strigose, inside glabrous, apex rounded. Petals slightly larger than sepals, ca. 1.2 cm, uppermost one obovate, ca. 8 mm wide, others elliptic-oblong or obovate-oblong, 5–6 mm wide. Filaments ca. 3 mm, puberulent; anthers ca. 6 × 1 mm. Ovary 7–9-ovuled, margin adpressed pilose; stalk ca. 4 mm. Legume reddish brown, oblong or elliptic-oblong, usually ca. 19 cm, sometimes to 15 × 2.5–3.5 cm; wing 5–6 mm wide. Seeds brownish black, shiny, 4–9 × ca. 7 mm, smooth; funicle filiform, ca. 4 mm. Fl. May, fr. Jun–Aug. $2n = 28^*$.

Dense or sparse forests, mountain slopes; 200–1000 m. Guangdong, Guangxi, Yunnan [Vietnam].

10. CASSIA Linnaeus, Sp. Pl. 1: 376. 1753, nom. cons.

决明属 jue ming shu

Trees or large shrubs. Leaves spirally arranged, often distichous, abruptly pinnate; rachis and petioles without glands; leaflets opposite, without stipels. Flowers in terminal panicles on main shoots or racemes on short side shoots; pedicels with 2 bracteoles at or shortly above base. Calyx 5-merous; sepals reflexed at anthesis. Corolla zygomorphic; petals 5. Stamens 10; filaments of 3 abaxial antesealous stamens sigmoidally curved, usually longer than their anthers, dehiscent by slits; remaining 7 filaments straight and short, with anthers mostly dehiscent by basal pores. Legume elongate, cylindrical or compressed, indehiscent. Seeds numerous, 1- or 2-seriate; funicle filiform.

About 30 species: tropical regions; two species (one introduced) in China.

Because of insufficient materials for comparison, *Cassia lancangensis* Y. Y. Qian (Acta Bot. Austro Sin. 6: 23. 1990) could not be treated here.

- 1a. Inflorescence 20–40(–60) cm; leaves with 3 or 4 pairs of leaflets; legume 2–2.5 cm in diam. 1. *C. fistula*
1b. Inflorescence shorter than 15 cm; leaves with 5–12 pairs of leaflets; legume less than 1.5 cm in diam. 2. *C. javanica*

1. *Cassia fistula* Linnaeus, Sp. Pl. 1: 377. 1753.腊肠树 *la chang shu*

Trees, deciduous, to 15 m tall. Leaves 30–40 cm, with 3 or 4 pairs of leaflets; leaflets adaxially shiny, broadly ovate or ovate-oblong, 8–13 × 4–8 cm, leathery, both surfaces puberulent when young, glabrous when mature, base broadly cuneate, apex acute. Racemes axillary, 20–40(–60) cm, lax, pendent, many flowered; flowers 3.5–4 cm in diam. Pedicels 3–5 cm, slender. Sepals narrowly ovate, 1–1.5 cm, reflexed at anthesis. Petals golden yellow, broadly ovate, subequal, 2.5–3.5 cm, shortly clawed. Stamens 10, 3 long with curved filaments 3–4 cm, anthers ca. 5 mm, exceeding petals, 4 short with straight filaments 6–10 mm, reduced stamens with minute anthers. Ovary stalked, strigulose; stigma small. Legume pendulous, blackish brown, terete, sausage-shaped, indehiscent, 30–60 cm, 2–2.5 cm in diam. Seeds numerous, separated by papery septa, glossy brown, elliptic, flattened. $2n = 28$.

Cultivated in S and SW China [native to India; cultivated throughout the tropics].

This is a common ornamental tree in the southern region. The bark contains tannin, a source of red dye. The fruit pulp and seeds are used medicinally as a laxative. The wood is hard and durable and is used for props, bridges, and farm tools.

2. *Cassia javanica* Linnaeus, Sp. Pl. 1: 379. 1753.爪哇决明 *zhao wa jue ming*

Trees, deciduous, usually more than 10 m tall, sometimes to 30 m. Leaves 15–40 cm; leaflets 5–12 pairs, 2–8 × 1.2–3.3 cm, both surfaces pilose or abaxially pilose, adaxially sparsely puberulent, base slightly asymmetric, apex acute, obtuse, or shortly acuminate. Inflorescences lateral on short side branches or terminal on young leafy shoots. Sepals ovate or broadly lanceolate. Petals deep yellow or pink, 2.5–4.5 × 1–2 cm. Stamens 10, among them 3 abaxial antepetalous with filaments longer than other 7. Ovary pubescent. Legume terete, 30–50 × 0.2–1.5 cm, with annular nodes.

Forests, mountain slopes, also cultivated. Native in Guangxi and Yunnan; cultivated in S China [India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam; widely cultivated in the tropics].

This is a very polymorphic species with a wide distribution from N India through the Indochinese Peninsula and the Malesian region to New Guinea. Altogether, seven subspecies are recognized, two of them in China. Outside of China, *Cassia javanica* subsp. *javanica* was described from Java, is widely distributed from Indonesia to the Philippines, and is widely cultivated as an ornamental throughout SE Asia. The other four subspecies are subsp. *bartonii* (F. M. Bailey) K. Larsen (New Guinea); subsp. *microcalyx* (H. S. Irwin & Barneby) K. Larsen (Indonesia: Kalimantan and Sumatra); subsp. *pubiflora* (Merrill) K. Lar-

sen (Philippines); and subsp. *renigera* (Wallich ex Benth) K. Larsen (Myanmar).

- 1a. Inflorescences lateral on short side branches; leaflets 2–5 cm; legume 1–1.5 cm in diam.; petals deep yellow; branchlets thinly canescent 2a. subsp. *nodosa*
 1b. Inflorescences terminal on leafy shoots; leaflets 5–8 cm; legume ca. 0.2 cm in diam.; petals pink 2b. subsp. *agnes*

2a. *Cassia javanica* subsp. *nodosa* (Buchanan-Hamilton ex Roxburgh) K. Larsen & S. S. Larsen, Nat. Hist. Bull. Siam Soc. 25(3–4): 205. 1975.

节荚决明 *jie jia jue ming*

Cassia nodosa Buchanan-Hamilton ex Roxburgh, Fl. Ind. 2: 336. 1824.

Trees, deciduous. Branchlets pendulous, slender, thinly canescent. Leaves 15–30 cm; leaflets 5–12 pairs, 2–5 × 1.2–2 cm, subleathery, abaxially pilose, adaxially sparsely puberulent, base slightly asymmetric, apex acute or obtuse. Racemes lateral on short side branches; inflorescence axis slender. Sepals green (in living specimens), ovate. Petals deep yellow, ovate, 2.5–3 × 1–1.5 cm. Stamens 10, among them 3 abaxial antepetalous with longer filaments than other 7. Ovary linear, whitish pubescent. Legume blackish brown, terete, 30–45 × 1–1.5 cm, with conspicuous annular nodes. $2n = 24, 28$.

Cultivated in S China [Indonesia (Java), Malaysia (Peninsular), Thailand; cultivated in the neotropics].

2b. *Cassia javanica* subsp. *agnes* (de Wit) K. Larsen, Nordic J. Bot. 13: 403. 1993.

神黄豆 *shen huang dou*

Cassia javanica var. *agnes* de Wit, Webbia 11: 220. 1956; *C. agnes* (de Wit) Brenan.

Trees, usually more than 10 m tall, sometimes to 30 m. Leaves 25–40 cm; petiole 3–6 cm; leaflets 6–10 pairs, elliptic or oblong-elliptic, 5–8 × 2.5–3.3 cm, both surfaces pilose, base slightly asymmetric, apex shortly acuminate. Panicles 6–9 cm, terminal on young leafy shoots, composed of 6–10 racemes; bracts broadly lanceolate, 5–8 mm. Sepals broadly lanceolate, 8–10 mm. Petals pink, slightly unequal in size, 3–4.5 × 1.4–2 cm. Stamens 10, among them 3 abaxial antepetalous with filaments 3–3.5 cm, inflated in middle, 4 of medium size, filaments ca. 1/2 as long as former, not inflated at middle, other 3 smaller. Ovary long, slender, slightly pubescent. Legume terete, 30–50 × ca. 0.2 cm, with annular nodes. Seeds numerous. $2n = 28^*$.

Forests, mountain slopes. Guangxi, Yunnan [Laos, Thailand, Vietnam].

11. SENNA Miller, Gard. Dict. Abr., ed. 4. 1754.番泻决明属 *fan xie jue ming shu*

Herbs, shrubs, or small trees. Leaves abruptly pinnate; leaflets opposite; rachis and petiole with or without glands. Flowers in axillary or terminal racemes; bracteoles absent. Sepals 5. Petals 5, subequal, usually yellow. Stamens 10; filaments of all stamens straight, sometimes 10 fertile, subequal, sometimes 3 adaxial stamens staminodes, (6 or)7 fertile; anther thecae not ciliate along

suture. Legume either indehiscent or inertly dehiscent through 1 or both sutures, in last case not coiling, sometimes valves breaking up into 1-seeded joints. Seeds numerous, funicle filiform.

About 260 species: pantropical; 15 species (13 introduced) in China.

- 1a. Petiole and rachis of leaves without glands.
- 2a. Petiole and rachis of leaves with 2 longitudinal ribs, narrowly winged; legume with a membranous wing at middle downward to base of each valve 1. *S. alata*
- 2b. Petiole and rachis of leaves without wings.
- 3a. Leaflets abaxially densely yellowish brown velutinous; legume narrowly cylindrical 4. *S. spectabilis*
- 3b. Leaflets abaxially glabrous and farina-white; legume flattened.
- 4a. Leaflets 6–10 pairs; stipules linear, caducous 2. *S. siamea*
- 4b. Leaflets 8–16 pairs; stipules ovate-cordate, tardily deciduous 3. *S. didymobotrya*
- 1b. Petiole and rachis of leaves with glands.
- 5a. Glands on petiole only.
- 6a. Gland on upper part of petiole, blackish brown, discoid, sessile; leaflets 8–28 pairs 8. *S. nomame*
- 6b. Leaf with a solitary gland above base of petiole; leaflets 3–10 pairs.
- 7a. Young branchlets, petiole, and rachis of leaves densely yellowish brown villous; leaflets villous on both surfaces; legume densely hirsute on surfaces of valves 5. *S. hirsuta*
- 7b. Plants glabrous or subglabrous throughout; legume glabrous.
- 8a. Petiolar gland sessile, globose or ovoid, at basal joint; legume flattened, 10–13 cm 6. *S. occidentalis*
- 8b. Petiolar gland narrow, clavate to subulate, above basal joint; legume terete, 5–10 cm, with light-colored suture 7. *S. sophera*
- 5b. Glands only present on rachis between leaflets.
- 9a. Leaflets 2 pairs, obliquely ovate, very unequally sided, 4–16.5 × 2–7 cm, larger half facing leaf base 9. *S. fruticosa*
- 9b. Leaflets 3 to more pairs, smaller than above.
- 10a. Leaflets 10–26(–50) pairs, a conical or narrowly ovoid gland between lowermost pair of leaflets (often early caducous) 10. *S. multijuga*
- 10b. Leaflets 3–9 pairs.
- 11a. Fertile stamens 10.
- 12a. Leaflets 4–6 pairs; leaves 15–30 cm; stipe of legume 10–20 mm 11. *S. sulfurea*
- 12b. Leaflets 6–9 pairs; leaves 10–15 cm; stipe of legume 5–7 mm 12. *S. surattensis*
- 11b. Fertile stamens 7.
- 13a. Rachis of leaves with a gland between lowest pair of leaflets 15. *S. bicapsularis*
- 13b. Rachis of leaves with a gland between each pair of leaflets.
- 14a. Legume terete, 6–10 × ca. 1 cm; leaflets ovate to ovate-elliptic, apex acute to acuminate 13. *S. septemtrionalis*
- 14b. Legume linear, terete, 10–15 × ca. 0.5 cm; leaflets obovate, apex broadly rounded 14. *S. tora*

1. *Senna alata* (Linnaeus) Roxburgh, Fl. Ind., ed. 1832, 2: 349. 1832.

翅荚决明 *chi jia jue ming*

Cassia alata Linnaeus, Sp. Pl. 1: 378. 1753.

Shrubs, 1.5–3(–5) m tall. Branches greenish, thick, pubescent. Leaves 30–60 cm; stipules persistent, triangular, 6–10(–15) mm; petiole and rachis with 2 longitudinal ribs and narrow wings; petiolar glands absent; petiolules very short or leaflets sessile; leaflets 6–12(–20) pairs, oblong or obovate-oblong, 6–15 × 3.5–7.5 cm, thinly leathery, glabrous, base obliquely truncate, apex obtusely rounded and cuspidate. Racemes axillary, dense, many flowered, or sometimes several racemes forming a terminal panicle, 10–50 cm; peduncles 7–14 cm; bracts caducous, strobilaceous, oblong to broadly ovate, 2–3 × 1–2 cm, at first enveloping flowers. Flowers ca. 2.5 cm in diam. Sepals orange-yellow, oblong, unequal. Petals bright yellow, tinged with conspicuous purple veins, ovate-orbicular, 16–24 × 10–15 mm, shortly clawed. Stamens 10, fertile stamens 7, opening with apical pores, lower 2 with stout filaments ca. 4

mm and larger anthers, 4 with filaments ca. 2 mm and smaller anthers, reduced stamens 3 or 4. Ovary puberulent, sessile; ovules many. Legume winged, sharply tetragonal, 10–20 × 1.5–2 cm, glabrous, with a broad, membranous wing down middle of each valve; wings 4–8 mm wide, papery, crenulate. Seeds 50–60, compressed, deltoid. $2n = 24, 28$.

Sparse forests, dry slopes. Guangdong, ?Hainan, S Yunnan [native to tropical America; widely introduced in the tropics elsewhere].

This plant is used as a laxative.

2. *Senna siamea* (Lamarck) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 98. 1982.

铁刀木 *tie dao mu*

Cassia siamea Lamarck, Encycl. 1: 648. 1785.

Trees, 10–15 m tall. Bark gray, subsmooth; young branches ribbed, sparsely puberulent. Leaves 20–30 cm; stipules caducous, linear, tiny; rachis and petiole without glands, puberulent; leaflets 6–10(–15) pairs, oblong or ovate-oblong, 3–7 × 1.5–2.5 cm, leathery, abaxially finely pubescent, adaxially

smooth and glabrous, base rounded, apex obtusely rounded, often emarginate, mucronate. Racemes in axils of apical leaves, often several forming a large terminal panicle on a robust peduncle 5–7 cm; bracts linear, 5–6 mm. Sepals suborbicular, unequal in size, outer smaller, inner larger, ca. 9 mm, outside hairy. Petals yellow, broadly obovate, 1.2–1.5 cm, shortly clawed. Stamens 10, among them 7 fertile, anthers opening by apical pores, 2 with filaments ca. 10 mm and anthers 6–7 mm, 4 or 5 with filaments 2–3 mm and anthers 5–6 mm, staminodes ca. 3 mm. Ovary sessile, densely white pubescent. Legume flattened, 15–30 × 1–1.5 cm, suture thick, riblike, pubescent, purplish brown when mature. Seeds 10–30, light brown, ovoid, 2–2.5 × 5–6 mm. $2n = 28$.

Cultivated in S China [native to Myanmar and Thailand, and probably also to Cambodia, Laos, and Vietnam; widely cultivated in the tropics].

This tree is planted as an ornamental in parks and gardens and is used as a wayside tree. The hard, durable wood is used for furniture.

3. *Senna didymobotrya* (Fresenius) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 467. 1982.

长穗决明 chang sui jue ming

Cassia didymobotrya Fresenius, Flora 22: 53. 1839.

Shrubs, 2.5–3 m tall. Young branches and leaves puberulent, glabrescent when old. Leaves to 35(–50) cm; stipules tardily deciduous, ovate-cordate, 6–17 mm, acuminate; petiole and rachis without glands, puberulent; petiolules very short; leaflets 8–16 pairs, abaxially farina-white, ovate-oblong or lanceolate-oblong, 3–5.5 × 1–2 cm, base rounded and oblique, apex obtuse or subacute, mucronate. Racemes in axils of leaves in upper part of branches, 10–35 cm, sometimes several arranged in a terminal leafy panicle; bracts caducous, imbricate, broadly ovate, apex subacute or acuminate. Sepals oblong-obovate. Petals yellow, oblong or obovate, shortly clawed. Stamens 10, among them functionally 2 extra large, curved, ca. 12 mm. Ovary densely yellowish or pallid pilosulose. Legume compressed, ligulate-oblong, 8–10 × 1.6–1.8 cm, leathery, bicarinate by sutures, apex with a long and slender awn, stipe 1–1.2 cm; fruiting pedicel ca. 1 cm. Seeds 9–16, obovoid-oblong, compressed. $2n = 28$.

Cultivated in Hainan, ?Yunnan [native to tropical Africa; now naturalized in India and Sri Lanka].

4. *Senna spectabilis* (Candolle) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 600. 1982.

美丽决明 mei li jue ming

Cassia spectabilis Candolle, Cat. Pl. Horti Monsp. 90. 1813.

Trees, evergreen, small, 5–7(–10) m tall, with long, spreading branches. Young branches, petioles, and rachises of leaves densely yellowish brown velutinous. Leaves 12–30 cm; rachis and petiole without glands; leaflets 8–15(–19) pairs, elliptic or oblong-lanceolate, 3–7 × 1–2 cm (lowermost pair usually much smaller and early caducous), abaxially densely yellowish brown velutinous, adaxially glabrous or puberulent, base subrounded and slightly oblique, apex acute, cuspidate.

Flowers in terminal panicles or axillary racemes; peduncles and pedicels densely yellowish brown velutinous; bracts caducous, ovate, 4–5 mm. Sepals 5, orange-yellow, unequal: 2 outer smaller, ovate, 5–7 mm, pubescent; 3 inner larger, suborbicular, 8–11 mm in diam. Petals yellow, darkly brownish yellow veined, unequal in size, broadly to narrowly obovate, shortly clawed. Stamens 10, 7 of them fertile, anthers opening by apical pores, staminodes 3, smaller. Ovary linear, ca. 3 cm, recurved; style and stigma inconspicuous. Legume pendulous, black, narrowly cylindrical, slightly compressed, 25–35 × 1–1.5 cm, slightly contracted between seeds, annulate-septate, glabrous. Seeds 50–70, suborbicular, ca. 5 mm in diam.

Cultivated in Guangdong, S Yunnan [native to tropical America; cultivated throughout the tropics].

This is a rapidly growing tree, which is usually cultivated ornamentally; the flowers are fragrant.

5. *Senna hirsuta* (Linnaeus) H. S. Irwin & Barneby, Phytologia 44: 499. 1979.

毛荚决明 mao jia jue ming

Cassia hirsuta Linnaeus, Sp. Pl. 1: 378. 1753.

Herbs or shrubs, 0.6–2.5 m tall. Young branches, petioles, and rachises of leaves densely yellowish brown villous. Leaves 10–20 cm; petiole 3–6 cm, with a sessile, blackish brown, ovoid-oblong gland near insertion; rachis 7–10 cm, without glands; leaflets 3–7 pairs, ovate-oblong or oblong-lanceolate, 3–9 × 1.5–3.5 cm, papery, both surfaces villous, base subrounded, apex acuminate. Racemes axillary or several in axils of apical leaves forming a leafy panicle; peduncles and pedicels villous; bracts early caducous, subulate, hairy. Sepals 5, unequal in size, densely villous, 2 outer small, ovate to obovate, ca. 5 mm, 3 inner puberulent, similar but larger, 7–8 mm. Petals yellow, obovate, 1.4–1.8 cm, glabrous. Stamens 10, 6 or 7 of them fertile, unequal in length, anthers opening by apical pores, staminodes 3 or 4. Ovary hirsute, subsessile; style short, glabrous; stigma small. Legume long, slender, flat, 10–20 × ca. 0.5 cm, densely hirsute on surfaces of valves. Seeds numerous, flat, obovoid, 3–4 mm. $2n = 14, 28$.

Cultivated in Guangdong, Yunnan [native to tropical America; introduced in the tropics elsewhere].

6. *Senna occidentalis* (Linnaeus) Link, Handb. 2: 140. 1831.

望江南 wang jiang nan

Cassia occidentalis Linnaeus, Sp. Pl. 1: 377. 1753.

Subshrubs or shrubs, erect, 0.8–1.5 m tall, glabrous, few branched. Branches herbaceous, ribbed; roots blackish. Leaves ca. 20 cm; stipules caducous, triangular to lanceolate, 1–2 cm, membranous; petiole 3–4 cm, with a large, brown, ovoid gland near base; petiolule 1–2 mm, with a rotten smell when kneaded; leaflets 3–5(or 6) pairs, ovate to ovate-oblong, 4–10 × 2–3.5 cm, membranous, base rounded, apex acuminate. Corymbose racemes few flowered, axillary or terminal, ca. 5 cm; bracts caducous, linear-lanceolate. Flowers ca. 2 cm. Sepals unequal, outer ones suborbicular, ca. 6 mm in diam., inner ones ovate, 8–9 mm. Petals yellow, purplish veined, 2 outer slightly larger, shortly clawed. Fertile stamens 7, anthers opening by apical

pores, reduced stamens 3, without anthers or with tiny anthers. Ovary tomentose; style glabrous. Legume brown, with pale thick margins, strap-shaped, falcate, flattened, 10–13 × ca. 1 cm, with septa between seeds. Seeds 30–40, flat, orbicular, 3–4 mm in diam. $2n = 24, 26^*, 28^*, 56^*$.

Among shrubs on riverbanks, wilderness tracts, hills, sparse forests, wastelands near villages. S regions of China [native to tropical America; widely introduced in the tropics and subtropics elsewhere].

7. *Senna sophera* (Linnaeus) Roxburgh, Fl. Ind., ed. 1832, 2: 347. 1832.

槐叶决明 huai ye jue ming

Cassia sophera Linnaeus, Sp. Pl. 1: 379. 1753; *Senna occidentalis* (Linnaeus) Link var. *sophera* (Linnaeus) X. Y. Zhu.

Shrubs, 1–2(–3) m tall, glabrous. Leaves 7–18(–21) cm; petiole 3–5 cm, with a subulate or narrow clavate gland 5–10 mm above petiole joint; petiolules ca. 2 mm; leaflets 4–10 pairs, lanceolate or elliptic-lanceolate, 1.7–4.2 × 0.7–2 cm, base rounded, apex acute to shortly acuminate. Corymbs axillary, few flowered; peduncles 1–2 cm; bracts ovate, ca. 5 mm; pedicels 1–1.5 cm. Sepals ovate-orbicular, ca. 5 mm. Petals yellow, obovate, shortly clawed. Stamens 10, 6 or 7 fertile, 2 longer; anthers opening by apical pores; staminodes 3 or 4, ca. 2 mm. Ovary finely pubescent. Legume straight, 5–10 × 0.5–1 cm, flattened and slightly thick at first, subcylindric, ± swollen when ripe. Seeds 30–40, ovoid, compressed. $2n = 28$.

Mountain slopes, roadsides. C and S China [native to tropical Asia; widely introduced in the tropics and subtropics elsewhere].

The young leaves and legumes are edible. The seeds are used medicinally for fever reduction.

8. *Senna nomame* (Makino) T. C. Chen, **comb. nov.**

豆茶决明 dou cha jue ming

Basionym: *Cassia mimosoides* Linnaeus var. *nomame* Makino, J. Jap. Bot. 1(5): 17. 1917; *C. nomame* (Makino) Kitagawa; *Chamaecrista nomame* (Makino) H. Ohashi, nom. superfl.

Herbs, annual, 30–60 cm tall, slightly hairy, branched or not. Leaves 4–8 cm, with a blackish brown, discoid, sessile gland in upper part of petioles; leaflets 8–28 pairs, ligulate-lanceolate, 5–9 mm, slightly asymmetric. Flowers inserted in axils of leaves, with pedicels, solitary or 2 to several in short racemes. Sepals 5, free, outside sparsely pubescent. Petals 5, yellow. Stamens 4, sometimes 5. Ovary densely puberulent. Legume compressed, dehiscent, 3–8 × ca. 0.5 cm, hairy, 6–12-seeded. Seeds compressed, subrhomboid, smooth.

Mountain slopes, open grassy fields. Anhui, Hebei, Heilongjiang, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

9. *Senna fruticosa* (Miller) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 121. 1982.

大叶决明 da ye jue ming

Cassia fruticosa Miller, Gard. Dict., ed. 8, *Cassia* no. 10. 1768.

Shrubs or small trees, ca. 3 m tall. Branches grayish white, glabrous. Leaves 12–18 cm, with an oblong, convex gland on rachis between lower pair of leaflets; stipules early caducous, linear, 3–4 mm; petiolules 3–4 mm; leaflets 2 pairs, obliquely oblong-ovate, 4–16.5 × 2–7 cm, membranous, both surfaces pubescent when young, abaxially puberulent when old, base obliquely cuneate, very unequally sided, midvein near upper side, apex acute to acuminate. Racemes short, densely flowered, to 6 cm, in axils of apical leaves, several racemes forming a leafy panicle; bracts early caducous, narrowly lanceolate. Sepals yellowish green, often tinged with red, oblong-obovate, outside puberulent. Petals orange-yellow, broadly obovate to orbicular, 2–2.5 cm, both sides pubescent. Fertile stamens 6 or 7, opening by apical pores, upper 3 stamens usually absent. Ovary linear, densely appressed whitish pubescent. Legume pendulous on a short stout stipe, terete, 15–25 × 1–1.5 cm, slightly annulate, with a beak ca. 1 cm on top. Seeds 80–100, dark brown, compressed, ovoid, 5–6 mm, embedded in a foetid, black pulp. $2n = 28$.

Cultivated in Guangdong [native to tropical America].

10. *Senna multijuga* (Richard) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 492. 1982.

密叶决明 mi ye jue ming

Cassia multijuga Richard, Actes Soc. Hist. Nat. Paris 1: 108. 1782.

Shrubs, small trees, or trees, 7–20(–40) m tall. Young parts generally puberulent; branchlets reddish brown when dry. Leaves 12–20 cm; stipules early caducous, linear; rachis and petiole puberulent, with a long, ovoid gland on rachis between lowest pair of leaflets (often early caducous); leaflets 10–26(–50) pairs, linear-oblong or oblong, 1.2–4 × 0.6–0.8 cm, both surfaces puberulent or adaxially glabrous, apex obtusely rounded, mucronate, slightly oblique. Racemes several, arranged in a terminal, leafy panicle 10–20(–40) cm; peduncle and pedicels puberulent. Flowers 2.5–4 cm in diam.; bracts ovate, ca. 2 mm, tomentose. Sepals greenish yellow when mature, slightly unequal, 5–6 mm. Petals yellow, ovate-oblong, 1–2(–3) cm, glabrous. Fertile stamens 7, 3 larger, with filament ca. 10 mm and anthers 6–7 mm, staminodes 3, tiny. Ovary linear, glabrous. Legume dark brown, flat, broadly linear, obtuse. Seeds 30–60, flattened, ca. 6 mm.

Cultivated in Guangdong (Guangzhou) [native to tropical America; widely cultivated in the tropics].

11. *Senna sulfurea* (Colladon) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 78. 1982.

粉叶决明 fen ye jue ming

Cassia sulfurea Colladon, Hist. Nat. Méd. Casses, 84. 1816; *C. glauca* Lamarck; *C. surattensis* N. L. Burman subsp. *glauca* (Lamarck) K. Larsen & S. S. Larsen; *Senna surattensis* (N. L. Burman) H. S. Irwin & Barneby subsp. *glauca* (Lamarck) X. Y. Zhu.

Shrubs, large, or small trees. Young shoots pilose, later glabrescent. Leaves 15–30 cm, with a clavate gland 1–2 mm on rachis between each of lowest 2 pairs of leaflets; stipules cadu-

cous, linear; petiole 3.5–6.5 cm; petiolules ca. 3 mm; leaflets 4–6 pairs, usually 5 pairs, abaxially farina-white, adaxially greenish, ovate or elliptic, 3.5–10 × 2.5–4 cm, base broadly cuneate or subrounded, apex obtusely rounded or inconspicuously emarginate. Racemes in axils of leaves in upper part of branches; peduncles 3–10 cm; rachis 1–6 cm; bracts ovate, 3–8 mm, apex acute, finally reflexed. Pedicels 1–3 cm. Sepals green to reddish brown, unequal, outer 2 suborbicular, ca. 3 mm in diam., inner 3 obovate, 6–9 mm. Petals bright yellow (drying orange or pinkish brown), ovate or obovate, 1.5–2.5 cm, 5-veined, clawed. Stamens 10, all fertile, with short, thick filaments, lowest 2 with longer filaments; anthers subequal, opening by short, apical slits. Ovary hairy; style glabrous. Legume glossy, flat, straight, strap-shaped, dehiscent, 12–20 × 1.2–1.8 cm, with long, slender beak on top, valves papery. Seeds 20–30, oblong-elliptic, ca. 7 × 4 mm.

Cultivated in Fujian, Guangdong, ?Guizhou, Yunnan [native to India, Laos, Malaysia (Peninsular), Sri Lanka, Thailand, Vietnam; Australia, Pacific islands (Polynesia); now naturalized in the neotropics].

12. *Senna surattensis* (N. L. Burman) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 81. 1982.

黄槐决明 huang huai jue ming

Cassia surattensis N. L. Burman, Fl. Indica, 97. 1768.

Shrubs or small trees, 5–7 m tall. Bark grayish brown, smooth; young branches, petioles, and rachises of leaves puberulent. Leaves 10–15 cm, with 2 or 3 clavate, long glands 1–2 mm on rachis between lowest 2 or 3 pairs of leaflets and in upper part of petiole; stipules subsistent, linear, 5–10 mm; leaflets 6–9 pairs, abaxially farina-white, ovate to ovate-oblong, 2–5 × 1–1.7 cm, abaxially sparsely pubescent, adaxially glabrous, base rounded, apex rounded, slightly emarginate. Racemes in axils of apical leaves, 3–6 cm, 10–15-flowered; peduncles 2.5–5 cm; bracts ovate-oblong, 5–8 mm, outside puberulent, finally reflexed. Pedicels 1–2 cm. Sepals unequal, 2 outer suborbicular, ca. 3 mm in diam., 3 inner obovate, to 7 mm. Petals bright yellow to deep yellow, subequal, ovate to obovate, 1.5–2 cm, with long claw 1–1.5 mm. Stamens 10, all fertile, with short, thick filaments, lowest 2 filaments longer; anthers oblong, subequal, 5–7 mm, opening by apical slits. Ovary puberulent; style glabrous. Legume flat, strap-shaped, dehiscent, 7–10 × 0.8–1.5 cm, long slender beaked, valves papery. Seeds 10–25, glossy, flattened. $2n = 48, 56$.

Cultivated in Fujian, Guangdong, Guangxi, ?Hainan, Taiwan, ?Yunnan, ?Zhejiang [native to India; widely introduced and cultivated elsewhere].

13. *Senna septemtrionalis* (Viviani) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 365. 1982.

光叶决明 guang ye jue ming

Cassia septemtrionalis Viviani, Elench. Pl. 14. 1802; *C. laevigata* Willdenow.

Shrubs or small trees, 1–4 m tall. Young branches green, smooth, glabrous. Leaves ca. 15 cm; rachis 6–12 cm, with a clavate or conical gland between all except upper pair of leaflets; stipules early caducous, linear; leaflets 3 or 4 pairs, abaxially

ially farina-white, ovate to ovate-lanceolate, 5–11 × 2–3.5 cm, both surfaces glabrous, base cuneate or narrowly cuneate, sometimes oblique, apex acute to acuminate. Racemes axillary or terminal, 4–10-flowered, 5–10 cm including peduncle 2.5–5 cm; bracts caducous, linear-lanceolate, 2–5 mm. Pedicels 1.5–2.5 cm. Sepals yellowish green, ovate-elliptic, unequal, inner 8–10 mm, outer shorter. Petals bright yellow, ovate-orbicular, 1–1.5(–2) cm, shortly clawed. Fertile stamens 7, unequal, anthers opening by apical pores; 3 staminodes with anthers flat, suborbicular, non-functional. Ovary glabrous; style linear. Legume terete, 6–10 × ca. 1 cm, slightly subquadrangular when fully mature, valves subleathery, tardily dehiscent. Seeds 50–70, olive-colored, glossy, obovoid, flat, 5–6 mm.

Cultivated in Guangdong, Guangxi [native to tropical America; widely cultivated in the tropics].

14. *Senna tora* (Linnaeus) Roxburgh, Fl. Ind., ed. 1832, 2: 340. 1832.

决明 jue ming

Cassia tora Linnaeus, Sp. Pl. 1: 376. 1753.

Herbs, suffrutescent, annual, erect, 1–2 m tall. Leaves 4–8 cm; stipules caducous, linear, 10–15 mm; petiole without glands; rachis with a club-shaped gland between leaflets; petiolules 1.5–2 mm; leaflets 3 pairs, obovate or obovate-oblong, 2–6 × 1.5–2.5 cm, membranous, abaxially pubescent, adaxially sparsely pubescent, base cuneate to rounded and oblique, apex rounded, cuspidate. Racemes axillary, short, 1- or 2(or 3)-flowered; peduncles 6–10 mm; bracts linear, acute. Pedicels 1–1.5 cm. Sepals ovate or ovate-oblong, 5–8 mm, membranous, outside pubescent. Petals yellow, unequal, obovate, lower 2 slightly longer, 12–15 × 5–7 mm, shortly clawed. Fertile stamens 7, nearly equal, filaments 1.5–2 mm, anthers opening by apical pores, ca. 4 mm, 3 larger, 4 smaller, staminodes absent. Ovary sessile, densely white pubescent; style glabrous. Legume terete, subtetragonous, slender, 10–15 × 0.3–0.5 cm, both ends acuminate, valves membranous. Seeds 20–30, glossy, rhomboid, ca. 5 × 3 mm, with an areole. $2n = 26^*, 28^*, 56^*$.

Mountain slopes, wastelands, riverbank sand. Widespread to S of the Chang Jiang [native to tropical America; widely cultivated in the tropics and subtropics].

The seeds known as “jue ming zi” (决明子) are used medicinally as a diuretic and purgative.

In addition, X. Y. Zhu et al. (Legumes China, 32. 2007) recorded *Senna obtusifolia* (Linnaeus) H. S. Irwin & Barneby as widely cultivated in China (as *S. tora* var. *obtusifolia* (Linnaeus) X. Y. Zhu).

15. *Senna bicapsularis* (Linnaeus) Roxburgh, Fl. Ind., ed. 1832, 2: 342. 1832.

双荚决明 shuang jia jue ming

Cassia bicapsularis Linnaeus, Sp. Pl. 1: 376. 1753.

Shrubs, erect, to 3 m tall, much branched. Crown spreading, with pendent or sometimes climbing twigs. Leaves 7–12 cm, with 3 or 4 pairs of leaflets; stipules caducous, narrowly lanceolate, subulate, 1–3 mm; petiole 2.5–4 cm, slender;

rachis with a blackish brown, clavate to ovoid gland between lowest pair of leaflets; leaflets obovate or obovate-oblong, 1.5–4 × 1–2.5 cm, membranous, glabrous, base obliquely cuneate, apex obtusely rounded. Racemes lax, in axils of apical leaves, 5–15 cm, slender; bracts early caducous. Sepals yellowish to reddish brown, ovate, 5–10 mm. Petals yellow, obovate, 1.1–1.5 cm, very shortly clawed. Stamens 10, 7 fertile: 3 lower with unequal filaments 2–10 mm, anthers large, curved, ca. 1 mm; 4

short with filaments ca. 1 mm and anthers 4–5 mm; 3 staminal nodes with minute anthers. Ovary with glabrous stalk and style. Legume brown, terete, straight or slightly curved, 9–17 × 1–1.5 cm, tardily dehiscent, valves membranous. Seeds 50–60, olive-green, ovoid, flattened, 5–7 mm.

Cultivated in Guangdong, Guangxi, Hainan [native to tropical America; widely cultivated in the tropics].

12. CHAMAECRISTA Moench, Methodus, 272. 1794.

山扁豆属 shan bian dou shu

Herbs or suffrutescent herbs, rarely small trees. Leaves abruptly pinnate; leaflets opposite; foliar glands usually present, disk- or cup-shaped, rarely flat. Flowers yellow or red. Sepals 5. Petals 5, unequal. Stamens 10 to 5 fertile, filaments straight, anther thecae ciliate along suture, dehiscent terminally by slit or pore. Legume elastically dehiscent, valves coiling. Seeds with either smooth or pitted testa, usually exareolate.

About 270 species: mostly (ca. 240) indigenous to America, with only a few (ca. 30) in tropical Asia; three species (one introduced) in China.

- 1a. Petiolar gland distinctly stipitate 1. *C. pumila*
 1b. Petiolar gland sessile, discoid, raised or slightly flat.
 2a. Rachis of leaves not canaliculate; leaflets 20–50 pairs, 3–4 mm; ovary with short, stiff, appressed hairs;
 legume with scattered, appressed hairs 2. *C. mimosoides*
 2b. Rachis of leaves canaliculate; leaflets 10–25 pairs, 8–13 mm; ovary woolly with long and short, thin
 hairs; legume with long and short, non-appressed hairs 3. *C. leschenaultiana*

1. *Chamaecrista pumila* (Lamarck) V. Singh, J. Econ. Taxon. Bot. 16: 600. 1992.

柄腺山扁豆 bing xian shan bian dou

Cassia pumila Lamarck, Encycl. 1: 651. 1785.

Subshrubs or diffuse herbs, perennial, woody at base, 25–75 cm tall, with many branches. Branches, petioles, and rachises of leaves pilose. Leaves 3–6 cm, with a stipitate gland on top of petiole and on rachis between lowest pair of leaflets; stipules linear-subulate, 6–8 mm, acuminate; leaflets 12–20 pairs, sessile, unequally sided, linear-falcate, 8–12 × ca. 2 mm, midrib near upper margin of blade, apex mucronate. Flowers axillary, solitary or most often 2 or 3 together in a very short raceme; bracts and bracteoles similar to stipules but shorter. Sepals ovate-oblong, 4–6 mm, apex acute. Petals bright yellow, unequal, oblong-obovate, shorter than or ca. as long as sepals, shortly clawed. Stamens 5, subequal; anthers oblong, opening by apical pores enlarging to short slits. Ovary sessile, appressed tomentose; stigma peltate, small. Legume flat, straight, strap-shaped, 3–5 × ca. 0.5 cm, pilose. Seeds 10–20, subrhomboid, ca. 3 mm, flat, smooth. $2n = 32$.

Mountain slopes, open fields, among shrubs, grasslands. Guangdong, Hainan, Yunnan [India, Laos, Malaysia, Myanmar, Vietnam; Australia].

2. *Chamaecrista mimosoides* (Linnaeus) Greene, Pittonia 4: 27. 1897.

山扁豆 shan bian dou

Cassia mimosoides Linnaeus, Sp. Pl. 1: 379. 1753.

Herbs, suffrutescent, annual or perennial, with woody base, 30–60 cm tall, or low shrubs to 1 m tall, with many slender, puberulent branches. Leaves 4–8 cm, with an orbicular, dis-

coid, sessile gland in upper part of petiole, below lowest pair of leaflets; stipules persistent, linear-subulate, 4–7 mm, with conspicuous longitudinal veins; rachis not canaliculate, sparsely pubescent; leaflets sessile, 20–50(–80) pairs, reddish brown when dry, linear-falcate, 3–4 × ca. 1 mm, midvein near upper margin of blade, very unequally sided, base obliquely truncate, apex acute, mucronate. Flowers supra-axillary, mostly solitary, sometimes 2 or 3 together in a very short raceme; bracts and bracteoles similar to stipules but latter smaller. Sepals lanceolate, 4–8 mm, apex acute. Petals bright yellow, unequal, obovate to orbicular, equal to or slightly longer than sepals, shortly clawed. Stamens 10, alternately 5 shorter and 5 longer; anthers opening by apical pores. Ovary with stiff, appressed hairs; stigma flat. Legume flat, falcate, 2.5–5 × ca. 0.5 cm. Seeds 10–20, flat, smooth. $2n = 16$.

Slopes, wastelands, among bushes, grasslands. S China [native to tropical America; widely introduced in the tropics and subtropics].

This is a drought-enduring and barren-resistant plant, grown for improving the soil. The roots are used medicinally for treating dysentery.

3. *Chamaecrista leschenaultiana* (Candolle) O. Degener, Fl. Hawaiiensis Fam. 169b. 1934.

大叶山扁豆 da ye shan bian dou

Cassia leschenaultiana Candolle, Mém. Soc. Phys. Genève 2: 132. 1824 [*“leschenaultiana”*].

Herbs, suffrutescent, annual or perennial, 30–100(–150) cm tall. Stems erect or decumbent; young branches densely yellowish pubescent. Leaves 3–8 cm, with a slightly raised, orbicular-discoid gland just below lowest pair of leaflets in upper part of petiole; stipules persistent, linear-subulate, 7–9 mm; rachis canaliculate, pubescent; leaflets sessile, 10–25 pairs, linear-falcate, 8–13(–15) × 2–3 mm, very unequally sided, with mid-

vein close to upper border of blade. Flowers axillary or in few-flowered, short, axillary or supra-axillary racemes; bracts and bracteoles like stipules but smaller. Sepals ligulate-lanceolate, ca. 1 cm, outside sparsely yellowish pubescent. Petals orange-yellow, slightly longer than or equal to sepals. Stamens 10, sometimes 1–3 reduced. Ovary densely whitish pubescent; stigma flat, ciliate. Legume flat, strap-shaped, 2.5–5 × ca. 0.5 cm,

with long and short, non-appressed hairs to nearly glabrous. Seeds 8–16, flat, smooth.

Mountains, among shrubs, near roads, grassy slopes. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Sichuan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Thailand, Vietnam].

4. Tribe CAESALPINIEAE

云实族 yun shi zu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou, Kai Larsen, Supee Saksuwan Larsen

Leaves bipinnate or rarely pinnate. Flowers bisexual or unisexual, actinomorphic or zygomorphic. Receptacle discoid. Sepals (3–)5(or 6), inserted on margin of receptacle, often unequal, lowest larger, on outside, hooded or navicular. Petals usually 5, rarely 4, slightly unequal. Stamens (4–)10(–20), free, subequal; anthers basifixed or dorsifixed, opening by lateral slits. Ovary or ovary stipe inserted at base of receptacle; ovules 2 to numerous, rarely 1.

About 55 genera and 420–450 species: distributed in the tropics and subtropics; 11 genera (four introduced) and 37 species (ten endemic, eight introduced) in China.

- 1a. Leaves pinnate; petals absent 13. *Ceratonia*
- 1b. Leaves usually bipinnate; petals present.
 - 2a. Flowers polygamous or dioecious; deciduous trees.
 - 3a. Plants unarmed; flowers larger, in terminal panicles; legume turgid 14. *Gymnocladus*
 - 3b. Plants often armed with branched spines; flowers smaller, in axillary spicate racemes; legume flat 15. *Gleditsia*
 - 2b. Flowers bisexual; trees or climbers.
 - 4a. Plants unarmed; trees.
 - 5a. Flowers more than 7 cm in diam., showy 18. *Delonix*
 - 5b. Flowers not more than 3 cm in diam.
 - 6a. Stamens 5; flowers scarlet; legume narrowly winged along ventral suture 16. *Acrocarpus*
 - 6b. Stamens 10; flowers yellow or yellowish green; legume not as above.
 - 7a. Legume with broad wings on both sutures; flowers more than 15 mm in diam.; stamens slightly shorter than petals 17. *Peltophorum*
 - 7b. Legume without wings; flowers less than 5 mm in diam.; stamens ca. 2 × as long as petals 23. *Erythrophleum*
 - 4b. Plants usually armed with prickles; climbers or trees.
 - 8a. Flowers irregular, zygomorphic; ovules 2 or more.
 - 9a. Legume ovate, oblong, or lanceolate, smooth or spiny, leathery or woody; albumen absent 19. *Caesalpinia*
 - 9b. Legume linear, torulose, thinly leathery; seeds with endosperm 22. *Parkinsonia*
 - 8b. Flowers subregular; ovules 1.
 - 10a. Ovary sessile; legume winged, indehiscent 20. *Pterolobium*
 - 10b. Ovary shortly stalked; legume not winged, splitting along middle of valves (cultivated) 21. *Haematoxylum*

13. CERATONIA Linnaeus, Sp. Pl. 2: 1026. 1753.

长角豆属 chang jiao dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen, Supee Saksuwan Larsen

Ceratia Adanson.

Trees, evergreen, small or medium-sized, with a dense crown. Leaves abruptly pinnate; stipules small or absent; leaflets 2–4 pairs. Flowers small, polygamous or plants dioecious, in short, solitary or fasciculate racemes. Inflorescence lateral on current-year branchlets; bracts and bracteoles caducous, scalelike, minute. Calyx tube turbinate; lobes 5, deciduous, toothlike, short, imbricate. Petals absent. Stamens 5; filaments filiform; anthers ovoid, versatile. Disk within stamens, horizontally spreading. Ovary shortly stalked, at middle of disk; ovules numerous; style very short; stigma peltate. Legume compressed, elongated, thickly leathery, indehiscent, between seeds by pulpy areas continuous with endocarp. Seeds numerous.

One species: native to the Mediterranean region, introduced and cultivated elsewhere including China.

1. *Ceratonia siliqua* Linnaeus, Sp. Pl. 2: 1026. 1753.

长角豆 chang jiao dou

Trees, 15–16 m tall. Leaves 8–17 cm; leaflets 2–4 pairs, shiny, obovate or suborbicular, 3.5–5.5 × 3–3.5 cm, leathery, glabrous, lateral veins conspicuously raised, base cuneate or broadly cuneate, margin entire, apex rounded, emarginate, or

conspicuously cordate depressed. Raceme with rachis densely yellowish brown pubescent. Flowers reddish. Legume curved, 10–25 × ca. 2.5 cm. Fl. Nov.

Cultivated in Guangdong (Guangzhou) [native to the E Mediterranean; widely cultivated and naturalized].

The dried legumes are rich in sugar; the seeds contain a useful gum, tragacanth.

14. GYMNOCLADUS Lamarck, Encycl. 1: 733. 1785, nom. cons.

肥皂荚属 fei zao jia shu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen

Trees, deciduous, unarmed. Branches robust. Leaves abruptly bipinnate; stipules caducous, small. Inflorescences racemes or corymbose panicles, terminal. Flowers whitish, actinomorphic, polygamous or plants dioecious. Receptacle discoid. Sepals 5, subequal, narrow. Petals 4 or 5, slightly longer than sepals, oblong, imbricate, innermost one sometimes absent. Stamens 10, free, shorter than corolla, alternately shorter and longer; filaments thick, slightly villous; anthers dorsifixed, opening by lateral slits. Ovary in male flowers reduced or absent, in female or bisexual flowers sessile, 7- or 8-ovuled; style straight, slightly thick and compressed; stigma oblique. Legume sessile, turgid, subterete, 2-valved, full of pulp inside between seeds. Seeds large; testa leathery; radicle erect, short.

Three or four species: North America and S Asia; one species (endemic) in China.

1. *Gymnocladus chinensis* Baillon, Bull. Mens. Soc. Linn. Paris 1: 34. 1875.

肥皂荚 fei zao jia

Gymnocladus guangxiensis P. C. Huang & Q. W. Yao.

Trees, 5–12 m tall. Bark grayish brown, with conspicuous whitish lenticels. Branchlets of current year ferruginous or whitish puberulent, glabrescent. Leaves 20–25 cm, without stipules; rachis sulcate, puberulent; pinnae opposite, subopposite, or alternate, 5–10 pairs; leaflets alternate, 8–12 pairs, subsessile, with subulate stipules; blades oblong, 2.5–5 × 1–1.5 cm, both surfaces silky pubescent, both ends rounded, base slightly oblique, apex sometimes emarginate. Racemes puberulent.

Flowers polygamous, pendulous, whitish or tinged with purple, long pedicellate. Bracts small or absent. Receptacle deeply concave, 5–6 mm, puberulent. Sepals subulate, slightly shorter than receptacle. Petals oblong, slightly longer than sepals, hairy, apex obtuse. Filaments pubescent. Ovary sessile, glabrous, 4-ovuled; style short, thick; stigma capitate. Legume oblong, 7–10 × 3–4 cm, compressed or turgid, glabrous, apex shortly beaked. Seeds 2–4, blackish, subglobose, slightly compressed, ca. 2 cm in diam., glabrous. Fr. Aug. $2n = 28^*$.

• Slopes, mountain sides, mixed forests, sides of rocks, near villages, beside houses; 100–1500 m. Anhui, Fujian, Guangdong, Guangxi, ?Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, ?Yunnan, Zhejiang.

15. GLEDITSIA Linnaeus, Sp. Pl. 2: 1056. 1753.

皂荚属 zao jia shu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen

Trees or shrubs, deciduous. Trunk and branches usually with stout, simple or branched spines. Leaves alternate, often clustered, simply paripinnate and bipinnate often on same plant; stipules caducous, small; rachis of leaves and pinnae sulcate; leaflets numerous, subopposite or alternate, base oblique or subsymmetrical, margin serrulate or crenate, rarely entire. Inflorescences axillary, rarely terminal, spikes or racemes, rarely panicles. Flowers polygamous or plants dioecious, light green or greenish white. Receptacle campanulate, outside pubescent. Calyx 3–5-lobed; lobes subequal. Petals 3–5, slightly unequal, ca. as long as or slightly longer than calyx lobes. Stamens 6–10, exerted, slightly flat, broad, with crisped hairs from middle downward; anthers dorsifixed. Ovary sessile or shortly stalked; ovules 1 to numerous; style short; stigma terminal. Legume ovoid or elliptic, flat or subterete.

About 16 species: C and SE Asia, North and South America; six species (three endemic, one introduced) in China.

Gleditsia medogensis C. C. Ni (Acta Phytotax. Sin. 25: 231. 1987), described from SE Xizang (Médog), could not be treated here because no material was seen by the present authors. Judging from the protologue, it may be conspecific with the variable *G. japonica*.

- 1a. Leaflets 6–24 mm, margin entire, upper leaflets smaller than those in lower part; legume 3–6 cm, with 1–3 seeds 1. *G. microphylla*
- 1b. Leaflets more than 25 mm, margin irregularly serrate; legume more than 6 cm, with numerous seeds.
- 2a. Legume densely yellowish green velutinous 6. *G. japonica*
- 2b. Legume glabrous or puberulent.
- 3a. Leaflets obliquely oblong or rhombic-lanceolate, midvein conspicuous at base; calyx lobes and petals 5; stamens 10; ovary densely silky.
- 4a. Leaves pinnate or bipinnate; leaflets with reticulate veinlets adaxially obscure; racemes often comprising panicles; legume 6–12 cm, swollen opposite seeds 2. *G. australis*
- 4b. Leaves pinnate; leaflets with reticulate veinlets conspicuously raised; racemes simple; legume 13.5–26 cm, not swollen opposite seeds 3. *G. fera*
- 3b. Leaflets ovate, ovate-lanceolate, or oblong, midvein at middle or slightly oblique; calyx lobes and petals 3 or 4; stamens 6–8(or 9); ovary not silky.
- 5a. Leaflets 11–18 pairs, elliptic-lanceolate, apex acute; ovary hoary 4. *G. triacanthos*

- 5b. Leaflets 3–10 pairs, ovate or elliptic, apex obtuse or emarginate; ovary glabrous or only sutures and base pubescent.
- 6a. Spines terete; leaflets with reticulate veinlets adaxially conspicuously raised, margin densely finely serrate; ovary pubescent at base and along sutures; legume thick, not twisted, straight, or curved 5. *G. sinensis*
- 6b. Spines flat at least at base; leaflets with reticulate veinlets obscure, margin entire or sparsely shallowly crenate; ovary glabrous; legume flat, irregularly twisted or curved, falcate 6. *G. japonica*

1. *Gleditsia microphylla* D. A. Gordon ex Isely, Mem. New York Bot. Gard. 25: 214. 1975.

野皂荚 ye zao jia

Shrubs or small trees, 2–4 m tall. Branches grayish white to light brown; young branchlets puberulent, glabrescent when old. Spines not robust, long needlelike, 1.5–6.5 cm, with few, short branches. Leaves pinnate or bipinnate (pinnae 2–4 pairs), 7–16 cm; petiolules short, ca. 1 mm, puberulent; leaflets 5–12 pairs, obliquely ovate to oblong, 6–24 × 3–10 mm, thinly leathery, upper leaflets much smaller than lower ones, abaxially puberulent, adaxially glabrous, veins obscure on both surfaces, base oblique, broadly cuneate, margin entire, apex rounded. Flowers polygamous, greenish white, subsessile, fascicled, in spikes or terminal panicles. Inflorescence 5–12 cm, puberulent; bracts 3, lowest lanceolate, ca. 1.5 mm, upper 2 ovate, ca. 1 mm, pubescent. Male flowers: ca. 5 mm in diam.; receptacle ca. 1.5 mm.; sepals 3 or 4, lanceolate, 2.5–3 mm; petals 3 or 4, ovate-oblong, ca. 3 mm, as calyx lobes puberulent outside, villous inside; stamens 6–8. Bisexual flowers: ca. 4 mm in diam.; calyx lobes 4, triangular-lanceolate, 1.5–2 mm, both sides puberulent; petals 4, ovate-oblong, ca. 2 mm, outside puberulent, inside villous; stamens 4, opposite to sepals; ovary long stalked, glabrous, 1–3-ovuled. Legume reddish brown to deep brown, obliquely elliptic or obliquely oblong, flat, thin, 3–6 × 1–2 cm, glabrous, with slender beak at apex; stipe 1–2 cm. Seeds 1–3, brownish, compressed, ovoid or oblong, 7–10 × 6–7 mm, smooth. Fl. Jun–Jul, fr. Jul–Oct.

• Sunny slopes, roadsides; 100–1300 m. Anhui, ?Guizhou, Hebei, Henan, Jiangsu, Shaanxi, Shandong, Shanxi.

2. *Gleditsia australis* Hemsley, J. Linn. Soc., Bot. 23: 208. 1887.

小果皂荚 xiao guo zao jia

Gleditsia microcarpa F. P. Metcalf.

Trees, 3–20 m tall. Branches brownish gray, with robust spines. Spines brownish purple, conical, 3–5 cm, branched. Leaves pinnate or bipinnate (pinnae 2–6 pairs), 10–18 cm; petiolules ca. 1 mm; leaflets 5–9 pairs, adaxially shiny, obliquely elliptic to rhombic-oblong, 2.5–4 × 1–2 cm, papery to thinly leathery, abaxially glabrous, adaxially slightly puberulent on veins, reticulate veinlets slightly lax, obscure, base obliquely acute or obliquely cuneate, margin obtusely serrate or subentire, apex rounded, often emarginate. Flowers polygamous, pale green or greenish white; pedicels 1–2.5 mm. Male flowers: 4–5 mm in diam., several fascicled or in cymules, cymules in dense racemes again, several racemes comprising a panicle to 28 cm, puberulent, axillary or terminal; sepals 5, lanceolate, ca. as long as receptacle, outside densely puberulent; petals 5, elliptic, ca. 2 mm, outside densely puberulent, inside pubescent. Bisexual

flowers: 7–9 mm in diam.; inflorescence as male inflorescence, with scattered flowers; calyx tube ca. 2 mm, glabrous; calyx lobes 5 or 6, lanceolate, ca. 3 mm, outside puberulent, inside as petals densely light brown crisped pubescent; petals 5 or 6, elliptic, outside velutinous. Stamens 5, not exerted. Ovary sessile, densely light brown silky. Legume subsessile, brownish black when dry, compressed, strap-shaped, (4–)6–12 × 1–2.5 cm, straight or slightly curved, valve leathery, conspicuously swollen opposite seeds, apex mucronate. Seeds 5–12, deep brown to brownish black, slightly compressed, elliptic to oblong, 7–11 × 4–5 mm, smooth. Fl. Jun–Oct, fr. Nov–Apr.

Gentle slopes, mountain valleys, forests, near roads, by streams, sunny places. Guangdong, Guangxi [Vietnam].

3. *Gleditsia fera* (Loureiro) Merrill, Philipp. J. Sci., C, 13: 141. 1918.

华南皂荚 hua nan zao jia

Mimosa fera Loureiro, Fl. Cochinch. 2: 652. 1790; *Gleditsia formosana* Hayata; *G. thorelii* Gagnepain.

Trees, 3–24 m tall. Branches grayish brown. Spines robust, branched, terete at base, to 13 cm. Leaves pinnate, 11–18 cm; rachis sulcate, glabrous or pilose; petiolules ca. 1 mm; leaflets 5–9 pairs, adaxially deep brown, shiny, obliquely elliptic to rhombic-oblong, 2–7(–12) × 1–3(–5) cm, papery to thinly leathery, abaxially glabrous, adaxially glabrous or sometimes pubescent on midvein, midvein inclined to one side at base of blade, reticulate veinlets crowded, slender, conspicuously raised, base obliquely cuneate or rounded and oblique, margin crenate, sometimes shallowly, obtusely serrate, apex rounded and emarginate. Flowers several in cymules, polygamous, greenish white, cymules in axillary or terminal racemes 7–16 cm. Male flowers: 6–7 mm in diam.; receptacle ca. 2.5 mm; sepals 5, triangular-lanceolate, 2.5–3 mm, outside densely puberulent; petals 5, oblong, both sides puberulent; stamens 10; rudimentary pistil linear-terete, 4–5 mm, villous. Bisexual flowers: 8–10 mm in diam.; calyx and petals similar to those of male flowers, but calyx with a villous ring inside at base; stamens 5 or 6; anthers acute at apex; ovary densely brownish yellow silky, many ovuled. Legume compressed, 13.5–26(–41) × 2.5–3(–6.5) cm, straight or slightly curved, occasionally twisted, valves leathery, densely brownish yellow puberulent when young, glabrescent and becoming deep brown to blackish brown when old, apex with beak 2–5 mm; stipe 5–10 mm. Seeds numerous, brown to blackish brown, compressed or lenticular, ovoid to oblong, 8–11(–14) × 5–6(–11) mm, smooth. Fl. Apr–May, fr. Jun–Dec.

• Gentle slopes, mountain valleys, forests, beside villages, near roads, sunny places, occasionally cultivated; 300–1000 m. Fujian, Guangdong, Guangxi, ?Guizhou, ?Hainan, Hunan, Jiangxi, Taiwan, ?Yunnan.

The records of *Gleditsia rolfei* S. Vidal from Taiwan (Fl. Taiwan 3: 293. 1977; ed. 2, 3: 182. 1993) are referable to *G. fera*.

The fruit contains saponin that can be used as soap and as an insecticide.

4. *Gleditsia triacanthos* Linnaeus, Sp. Pl. 2: 1056. 1753.

美国皂荚 mei guo zao jia

Trees or small trees, to 45 m tall. Bark grayish black, 1–2 cm thick, with deep cracks and narrow, long ridges. Branchlets deep brown, rough, slightly sulcate, with small, orbicular lenticels. Spines deep brown, slightly flat, robust, often branched, 2.5–10 cm, rarely branchlets unarmed. Leaves pinnate or bipinnate (pinnae 4–14 pairs), 11–22 cm; petiolules ca. 1 mm, pubescent; leaflets 11–18 pairs, abaxially yellowish green, adaxially dark green, shiny, elliptic-lanceolate, 1.5–3.5 cm × 4–8 mm, papery, abaxially puberulent on midvein, adaxially glabrous, base cuneate or slightly rounded and oblique, margin sparsely undulate-dentate, apex acute, sometimes slightly obtuse. Flowers yellowish green. Pedicels 1–2 mm. Male flowers: 6–7 mm in diam., solitary or several clustered in racemes; inflorescences terminal or often several fascicled in axils of leaves, 5–13 cm, puberulent; receptacle ca. 2 mm; sepals 2 or 3, lanceolate, 2–2.5 mm; petals 3 or 4, ovate or ovate-lanceolate, ca. 2.5 mm, as sepals puberulent on both surfaces; stamens 6–9. Female flowers: in slender, few-flowered racemes, racemes solitary and ca. as long as male inflorescence; ovary hoary. Legume compressed, strap-shaped, 30–50 cm, falcately curved or irregularly twisted, valves thin and rough, dark brown, pilose. Seeds numerous, compressed, ovoid or elliptic, ca. 8 mm, divided by thick pulp. Fl. Apr–Jun, fr. Oct–Dec. $2n = 28$.

Along streams on moist sites, fertile soils. Cultivated in Hong Kong and Shanghai [native to the Americas].

This species is cultivated in temperate regions as an ornamental and used as a wayside tree and hedge. The wood is durable and used for buildings and for props.

5. *Gleditsia sinensis* Lamarck, Encycl. 2: 465. 1788.

皂荚 zao jia

Gleditsia horrida Willdenow; *G. macracantha* Desfontaines; *G. officinalis* Hemsley.

Trees or small trees, to 30 m tall. Branches grayish to deep brown. Spines robust, terete, conical, to 16 cm, often branched. Leaves pinnate, 10–18(–26) cm; petiolules 1–2(–5) mm, puberulent; leaflets (2 or) 3–9 pairs, ovate-lanceolate to oblong, 2–8.5(–12.5) × 1–4(–6) cm, papery, abaxially slightly pubescent on midvein, adaxially puberulent, reticulate veinlets conspicuously raised on both surfaces, base rounded or cuneate, sometimes slightly oblique, margin serrate, apex acute or acuminate, tip rounded, mucronate. Flowers polygamous, yellowish white, in axillary or terminal, puberulent racemes 5–14 cm. Male flowers: 9–10 mm in diam.; pedicels 2–8(–10) mm; receptacle deep brown, 2.5–3 mm, outside pubescent; sepals 4, triangular-lanceolate, ca. 3 mm, both sides pubescent; petals 4, oblong, 4–5 mm, puberulent; stamens (6–)8; rudimentary pistil ca. 2.5 mm. Bisexual flowers: 10–12 mm in diam.; pedicels 2–5 mm; sepals and petals similar to those of male flowers but longer;

stamens 8; ovary hairy at base and on sutures; ovules numerous; stigma 2-lobed. Legume brown or reddish brown, curved, strap-shaped, 12–37 × 2–4 cm, straight or twisted, with slightly thick pulp, swollen on both surfaces, some legumes shorter and smaller, ± terete, 5–13 × 1–1.5 cm, without seeds; stipe 1–3.5 cm; valves leathery, often farinose. Seeds numerous, brown, shiny, oblong or elliptic, 11–13 × 8–9 mm. Fl. Mar–May, fr. May–Dec. $2n = 28^*$.

• Mountain slopes, forests, valleys, near roads; 200–2500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, ?Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang.

Specimens from Sichuan called “zhu ya zao,” named as *Gleditsia officinalis*, with curved, small fruit without seeds, are an abnormal type and are referable to this species.

6. *Gleditsia japonica* Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 54. 1867.

山皂荚 shan zao jia

Trees or small trees, to 25 m tall. Branchlets purplish brown or grayish green when bark falls off, slightly ribbed, with scattered whitish lenticels, smooth and glabrous. Spines purplish brown to brownish black, slightly flat, robust, 2–15.5 cm, often branched. Leaves pinnate or bipinnate (pinnae 2–6 pairs), 11–25 cm; petiolules very short; leaflets 3–10 pairs, adaxially sometimes shiny, ovate-oblong or ovate-lanceolate to oblong, 2–7(–9) × 1–3(–4) cm (leaflets of bipinnate leaves obviously smaller), papery to thickly papery, abaxially puberulent on midvein and at base, glabrescent when old, adaxially puberulent or glabrous, slightly scabrous, reticulate veinlets obscure, base broadly cuneate or rounded, slightly oblique, margin entire or repand-crenate, apex rounded, sometimes emarginate. Flowers yellowish green, in axillary or terminal, puberulent spikes. Male inflorescence 8–20 cm; female inflorescence 5–16 cm. Male flowers: 5–6 mm in diam.; receptacle deep brown, ca. 1.5 mm, outside densely brown puberulent; sepals 3 or 4, triangular-lanceolate, ca. 2 mm, both surfaces pubescent; petals 4, elliptic, ca. 2 mm, pubescent; stamens 6–8(or 9). Female flowers: 5–8(–9) mm in diam.; receptacle ca. 2 mm; sepals and petals 4 or 5, similar to those of male flowers in shape, ca. 3 mm, both surfaces densely pubescent; staminodes 4–8; ovary glabrous; ovules numerous; style short, incurved; stigma inflated, 2-lobed. Legume brown or brownish black, compressed, strap-shaped, 20–54 × 2–7 cm, irregularly twisted or falcate, apex with beak 5–15 mm; stipe 1.5–3.5(–5) cm; valves leathery, often bullate, glabrous or velutinous, shiny. Seeds numerous, deep brown, elliptic, 9–10 × 5–7 mm, smooth. $2n = 28^*$.

Sunny slopes, valleys, streamsides, near roads, forests; 100–2500 m. Anhui, Guizhou, Hebei, Henan, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Yunnan, Zhejiang [Japan, Korea].

- 1a. Legume densely yellowish green velutinous 6b. var. *velutina*
- 1b. Legume glabrous.
 - 2a. Legume 20–35 × 2–4 cm, female flowers 5–6 mm in diam. 6a. var. *japonica*
 - 2b. Legume 30–54 × 4.5–7 cm; female flowers 7–8(–9) in diam. 6c. var. *delavayi*

6a. *Gleditsia japonica* var. *japonica*

山皂荚(原变种) shan zao jia (yuan bian zhong)

Fagara horrida Thunberg; *Gleditsia melanacantha* Tang & F. T. Wang.

Female flowers 5–6 mm in diam. Legume 20–35 × 2–4 cm, glabrous.

Sunny slopes, valleys, streamsides, near roads; 100–1000 m. Anhui, Hebei, Henan, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Zhejiang [Japan, Korea].

This species is commonly cultivated in China. The heartwood has a beautiful pink color; the wood is durable and can be used for props, carpentry work, and building. The seeds are used medicinally, and the young leaves are edible.

6b. *Gleditsia japonica* var. *velutina* L. C. Li, Acta Phytotax. Sin. 20: 228. 1982.

绒毛皂荚 rong mao zao jia

Gleditsia horrida Willdenow subsp. *velutina* (L. C. Li) Paclt; *G. vestita* Chun & F. C. How ex B. G. Li.

Legume densely yellowish green velutinous.

• Mountain slopes, open forests, near roads; ca. 1000 m. Hunan (Hengshan).

6c. *Gleditsia japonica* var. *delavayi* (Franchet) L. C. Li, Acta Phytotax. Sin. 20: 228. 1982.

滇皂荚 dian zao jia

Gleditsia delavayi Franchet, Pl. Delavay. 189. 1890; *G. horrida* subsp. *delavayi* (Franchet) Paclt.

Female flowers 7–8(–9) mm in diam. Legume 30–54 × 4.5–7 cm, glabrous.

• Mountain slopes in forests, beside villages, near roads; 1200–2500 m. Guizhou, Yunnan.

This taxon is occasionally cultivated.

16. ACROCARPUS Wight ex Arnott, Mag. Zool. Bot. 2: 547. 1838.

顶果木属 ding guo mu shu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou

Trees, buttressed, to 50 m tall or more, unarmed. Leaves alternate, abruptly bipinnate; pinnae opposite; leaflets opposite, petiolulate. Inflorescences racemes, solitary in axils of leaves, or 2 or 3 at apices of short branches; bracts and bracteoles caducous, small. Flowers hermaphroditic. Receptacle campanulate. Sepals 5, subequal, imbricate. Petals 5, equal in size, ca. 2 × as long as sepals. Stamens 5; filaments straight and much more exerted from corolla; anthers dorsifixed, opening by lateral slits. Ovary stalked; ovules numerous; style incurved, short; stigma terminal, small. Legume long stipitate, compressed, strap-shaped, narrowly winged along ventral suture. Seeds numerous, flat, obovoid, with endosperm.

About two species: S and SE Asia; one species in China.

1. *Acrocarpus fraxinifolius* Arnott, Mag. Zool. Bot. 2: 547. 1838.

顶果木 ding guo mu

Acrocarpus fraxinifolius var. *guangxiensis* S. L. Mo & Y. Wei.

Trees, large, to 30 m tall before tree forks. Leaves 30–40 cm, lower leaves with 3–8 pairs of pinnae, leaves at apices of branches pinnate; rachis of leaves and of pinnae yellowish brown puberulent, glabrescent; leaflets 4–8 pairs, ovate or ovate-oblong, 7–13 × 4–7 cm, subleathery, lateral veins 8–12 pairs, base slightly oblique, broadly cuneate or rounded, margin

entire, apex acuminate or acute. Racemes axillary, 20–25 cm, densely flowered; rachis pubescent at apex. Flowers erect at first, drooping later, scarlet, large. Pedicels 6–8 mm, pubescent. Petals lanceolate, ca. 2 × as long as and alternate with sepals, as receptacles and sepals yellowish brown puberulent. Stamens alternate with petals; filaments long, ca. 2 × as long as and much more exerted from corolla. Ovary long stalked, compressed. Legume purplish brown, flat, 8–15 × 1–2 cm, narrowly winged along ventral suture; wing 3–5 mm wide. Seeds 14–18, light brown. $2n = 24^*$.

Sparse forests; 1000–1200 m. Guangxi, Yunnan [Bangladesh, Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand; introduced in tropical Africa (Tanzania, Uganda)].

17. PELTOPHORUM (Vogel) Bentham, J. Bot. (Hooker) 2: 75. 1840, nom. cons.

盾柱木属 dun zhu mu shu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou

Caesalpinia sect. *Peltophorum* Vogel, Linnaea 11: 406. 1837.

Trees, deciduous, unarmed. Leaves abruptly bipinnate; pinnae opposite; leaflets numerous, sessile. Inflorescences panicles or racemes, axillary or terminal; bracts caducous or persistent, small; bracteoles absent. Flowers hermaphroditic, yellow; receptacle short. Sepals 5, subequal. Petals 5, as sepals imbricate. Stamens 10, free; filaments slightly exerted, with pilose tuft at bases; anthers oblong, dorsifixed. Ovary sessile, free from receptacle, 2- or more ovuled; style filiform, long, or discoid; stigma broadly peltate, capitate, or discoid, large. Legume compressed, lanceolate-oblong, rarely elongated, indehiscent, veined at middle, with broad wing on each suture. Seeds 2–8, compressed, without endosperm.

About 12 species: tropical regions; two species (one introduced) in China.

- 1a. Pedicels nearly as long as flower buds; stipules entire; flowers in panicles; stigma 3-lobed; legume veined on whole valve when mature 1. *P. pterocarpum*
 1b. Pedicels ca. 2 × as long as flower buds; stipules lobed; flowers in racemes; stigma entire; legume not veined at middle of valve when mature 2. *P. tonkinense*

1. *Peltophorum pterocarpum* (Candolle) Backer ex K. Heyne, Nutt. Pl. Ned.-Ind., ed. 2, 2: 755. 1927.

盾柱木 *dun zhu mu*

Inga pterocarpa Candolle, Prodr. 2: 441. 1825; *Caesalpinia ferruginea* Decaisne; *C. inermis* Roxburgh; *Peltophorum ferrugineum* (Decaisne) Benth; *P. inerme* (Roxburgh) Naves ex Fernández-Villar; *P. roxburghii* (G. Don) O. Degener; *Poinciana roxburghii* G. Don.

Trees, 4–15 m tall. Young shoots, petioles, and inflorescences ferruginous hairy; old branches with yellowish, small lenticels. Leaves 30–42 cm; petiole robust; rachis 25–35 cm; pinnae 7–15 pairs, opposite, 8–12 cm; leaflets (7–)10–21 pairs, crowded together, oblong-obovate, 1.2–1.7 cm × 5–7 mm, leathery, abaxially pale green, adaxially deep green, base oblique, margin entire, apex rounded, mucronate. Panicles terminal or axillary, densely ferruginous puberulent; bracts caducous, 5–8 mm. Pedicels ca. 5 mm, ca. as long as flower buds, 5–7 mm from one another. Flower buds globose, 5–8 mm in diam. Sepals ovate, 5–8 × 4–7 mm, outside ferruginous tomentose. Petals obovate, 1.5–1.7 cm × 8–10 mm, densely ferruginous pubescent at middle of both surfaces, long clawed. Filaments ca. 1.2 cm, hirsute at base; anthers ca. 3 mm, sagittate at base. Ovary stalked, hairy, 3- or 4-ovuled; style filiform, much longer than ovary, smooth; stigma discoid, 3-lobed. Legume winged, compressed, fusiform, narrowed to both ends, longitudinally veined at middle part; wings 4–5 mm wide. Seeds 2–4. $2n = 26$.

Cultivated in Guangdong (Guangzhou), Guangxi, Yunnan [Bhutan (cultivated), India, Indonesia, Malaysia, Sri Lanka, Thailand, Vietnam; Australia, N Oceania; introduced in E Africa and many other tropical countries].

2. *Peltophorum tonkinense* (Pierre) Gagnepain in Lecomte, Fl. Indo-Chine 2: 192. 1913.

银珠 *yin zhu*

Baryxylum tonkinense Pierre, Fl. Forest. Cochinch. t. 391C. 1899; *Peltophorum dasyrhachis* (Miquel) Kurz ex Baker var. *tonkinense* (Pierre) K. Larsen & S. S. Larsen.

Trees, 12–20 m tall. Young parts and inflorescences densely ferruginous hairy, glabrescent; old branches with small ferruginous lenticels. Leaves 15–35 cm; rachis 8–25 cm; petiole robust, 3–15 cm; pinnae 6–13 pairs, opposite as leaflets; rachis 4–9 cm, sulcate, inflated at base; leaflets 5–14 pairs, abaxially pale green, adaxially deep green, oblong, 1.5–2 × 0.6–1 cm, adaxially smooth, ferruginous hairy on midvein at first, glabrescent, base attenuate, oblique, apex rounded, emarginate, or mucronate. Racemes subterminal, 8–10 cm. Flowers fragrant, yellowish, large. Pedicels 1–1.5 cm, ferruginous hairy. Receptacle discoid. Sepals subequal, oblong, 8–9 mm, lowest one narrower. Petals obovate-orbicular, ca. 1.5 cm, clawed, margin undulate, ferruginous villous on midvein on both surfaces. Filaments ca. 1 cm, inflated at base, densely ferruginous hairy; anthers oblong, ca. 3.5 mm. Ovary with short stalk, compressed, ferruginous hairy, 2- or 3-ovuled; style filiform, 2–3 × as long as ovary; stigma capitate. Legume reddish brown, fusiform, 8–13 cm, 2.5–3 cm at middle part, thinly leathery, asymmetric at both ends, acuminate, hairy at first, smooth and glabrous when old, winged on both sides; wings 5–7 mm wide. Seeds 3 or 4, yellowish when mature, compressed, obliquely obovoid, ca. 14 × 6 mm. Fl. Mar–Jul, fr. Apr–Oct.

Sparse forests, mountain slopes; 300–400 m. Fujian, Hainan [Cambodia, Laos, Vietnam].

18. *DELONIX* Rafinesque, Fl. Tellur. 2: 92. 1837.

凤凰木属 *feng huang mu shu*

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen, Supee Saksuwan Larsen

Trees, unarmed. Leaves large, abruptly bipinnate, stipulate; pinnae many pairs; leaflets numerous, small. Inflorescences corymbose racemes, terminal. Flowers bisexual, white, orange, or red, large, showy. Bracts caducous, small. Receptacle discoid or turbinate. Sepals 5, obovate, subequal, valvate. Petals 5, alternating with sepals, orbicular, margin crispate, clawed. Stamens 10, free, declined. Ovary sessile; ovules numerous; style filiform; stigma truncate. Legume pendulous, compressed, strap-shaped, 2-valved; valves thickly woody, hard. Seeds transverse, oblong.

Two or three species: from E Africa and Madagascar to tropical Asia; one species (introduced) in China.

1. *Delonix regia* (Bojer) Rafinesque, Fl. Tellur. 2: 92. 1837.

凤凰木 *feng huang mu*

Poinciana regia Bojer, Bot. Mag. 56: t. 2884. 1829.

Trees, deciduous, large, to 20 m tall. Bark grayish brown, rough; crown hemispherical. Branches numerous, spreading;

branchlets puberulent, with conspicuous lenticels. Leaves 20–60 cm; stipules in lower part conspicuously pinnatipartite, in upper part setiform; petiole 7–12 cm, glabrous to puberulent, sulcate, inflated at base; petiolules short; pinnae opposite, 15–20 pairs, 5–10 cm; leaflets 25 pairs, crowded, opposite, oblong, 4–8 × 3–4 mm, midvein conspicuous, both surfaces silky, base oblique, margin entire, apex obtuse. Corymbose racemes termi-

nal or axillary. Flowers bright red to orange-red, 7–10 cm in diam.; pedicels 4–10 cm. Receptacle discoid or shortly turbinate. Sepals reddish inside, margin greenish yellow. Petals reflexed after anthesis, red, tinged with yellow and white spotted, spatulate, 5–7 × 3.7–4 cm; claw long, ca. 2 mm, slender. Stamens curved upward, red, unequal in length, 3–6 cm; filaments thick, woolly in lower part; anthers red, ca. 5 mm. Ovary ca. 1.3 cm; stigma small. Legume dark reddish brown, blackish brown when mature, slightly curved, 30–60 × 3.5–5 cm, apex with

persistent style. Seeds 20–40, yellowish tinged with brown spots, ca. 15 × 7 mm, smooth, hard. Fl. Jun–Jul, fr. Aug–Oct.

Cultivated in Fujian, Guangdong, Guangxi, Taiwan, Yunnan [native to Madagascar; often cultivated in the tropics].

This species is widely cultivated in botanical gardens and city parks in S China as an ornamental tree. The resin is soluble in water. The wood is light, soft, and springy, with a special grain, and is used for craft materials.

19. CAESALPINIA Linnaeus, Sp. Pl. 1: 380. 1753.

云实属 yun shi shu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou

Guilandina Linnaeus; *Mezonevron* Desfontaines.

Trees, shrubs, or climbers, usually with prickles. Leaves alternate, bipinnate; leaflets alternate or opposite, small or large. Inflorescences racemes or panicles, axillary or terminal. Flowers yellow or orange-yellow, medium-large or large. Receptacle concave. Sepals separate, imbricate, lowest one larger. Petals 5, often clawed, spreading, 4 usually orbicular, sometimes oblong, uppermost smaller, different in color, shape, and pubescence from others. Stamens 10, in 2 whorls; filaments thickened and hairy at bases; anthers ovoid or elliptic, dorsifixed and versatile. Ovary 1–7-ovuled; style terete; stigma truncate or hollow at center. Legume compressed or swollen, ovoid, oblong, or lanceolate, sometimes falcate, winged or not, smooth or spiny, leathery or woody, rarely fleshy, dehiscent or indehiscent. Seeds ovoid or globose; albumen absent.

About 100 species: pantropical distribution; 20 species (six endemic, two introduced) in China.

Key based on flowering specimens

- 1a. Leaflets 2 pairs per pinna.
 - 2a. Leaflets glabrous 18. *C. yunnanensis*
 - 2b. Leaflets abaxially hairy over whole surface or only on midvein.
 - 3a. Leaflets elliptic, 4.5–8 cm wide, apex rounded, rarely obtuse 19. *C. elliptifolia*
 - 3b. Leaflets ovate-lanceolate, 2.5–3.5 cm wide, apex acuminate, acute, or obtuse 6. *C. sinensis*
- 1b. Leaflets 3–30 pairs per pinna.
 - 4a. Pedicels 4.5–7 cm; filaments 5–6 cm 12. *C. pulcherrima*
 - 4b. Pedicels less than 4 cm; filaments less than 2 cm.
 - 5a. Leaflets 4–15 × 2.5–7 cm.
 - 6a. Leaflets with apex obtuse-rounded, or very obtuse, abaxially puberulent 5. *C. magnifoliolata*
 - 6b. Leaflets with apex acuminate, abaxially glabrous 15. *C. cucullata*
 - 5b. Leaflets usually much smaller.
 - 7a. Stipules large, leaflike, lobed, lobes up to 2 cm, leaflets pubescent on both surfaces 1. *C. bonduca*
 - 7b. Stipules much smaller, not lobed, or absent.
 - 8a. Leaflets leathery.
 - 9a. Pinnae 8–16 pairs; leaflets usually ovate-lanceolate, 1.2–2.5 cm × 6–12 mm, abaxially sparsely velutinous, apex acute 8. *C. vernalis*
 - 9b. Pinnae 2 or 3(or 4) pairs; leaflets ovate or elliptic, 3–6 × 1.5–3 cm, glabrous, apex obtuse-rounded 7. *C. crista*
 - 8b. Leaflets papery or membranous.
 - 10a. Leaflets abaxially farinose-brown when dry 9. *C. caesia*
 - 10b. Leaflets not as above.
 - 11a. Leaflets 3 or 4 pairs per pinna, slightly rhombic 20. *C. rhombifolia*
 - 11b. Leaflets more pairs per pinna, usually oblong, rarely linear.
 - 12a. Leaflets linear 14. *C. tortuosa*
 - 12b. Leaflets usually oblong.
 - 13a. Pedicels 3–4 cm 11. *C. decapetala*
 - 13b. Pedicels much shorter, 1.2–2 cm.
 - 14a. Leaflets pilose, ferruginous hairy, or pubescent on both surfaces.
 - 15a. Leaflets 15–20 pairs per pinna 4. *C. millettii*
 - 15b. Leaflets 5–9 pairs per pinna.

- 16a. Leaflets 5 or 6 pairs per pinna, 15–20 × ca. 10 mm; ovary 5–7-ovuled 17. *C. hymenocarpa*
 16b. Leaflets 7–9 pairs per pinna, 6–9 × ca. 3 mm; ovary 2–4-ovuled 13. *C. digyna*
 14b. Leaflets not as above.
 17a. Leaflets less than 1 cm, abaxially and marginally with bristles; ovary 1- or 2-ovuled 3. *C. mimosoides*
 17b. Leaflets 1–4 cm, without bristles; ovary 3–8-ovuled.
 18a. Leaflets with apex shortly acuminate; petals white, tinged with purple spots, ca. 18 mm 2. *C. minax*
 18b. Leaflets with apex retuse or obtuse-rounded; petals yellow, 8–9 mm.
 19a. Leaflets papery; upper petal with apex entire 10. *C. sappan*
 19b. Leaflets membranous; upper petal with apex 2-lobed 16. *C. enneaphylla*

Key based on fruiting specimens

- 1a. Legume winged, wings 5–10 mm wide (*C. subg. Mezonevron* (Desfontaines) J. E. Vidal ex Herendeen & Zarucchi).
 2a. Leaflets usually more than 4 cm; pinnae usually 2–5 pairs; petals smooth, glabrous, inner one broad and short, shortly clawed; legume samara-like, oblong, zygomorphic, 1-seeded at central part 15. *C. cucullata*
 2b. Leaflets usually not more than 2.5 cm; pinnae usually 6–10 pairs; petals hairy, inner one with long claw; legume 3–7-seeded.
 3a. Leaflets glabrous; seeds swollen-ridged at middle; legume conspicuously swollen opposite each seed 16. *C. enneaphylla*
 3b. Leaflets hairy, especially densely so abaxially; legume and seeds not as above 17. *C. hymenocarpa*
 1b. Legume wingless or narrowly winged; wing less than 5 mm wide (*C. subg. Caesalpinia*).
 4a. Legume fleshy, indehiscent.
 5a. Rachis of leaves 17–23 cm; pinnae 3–6 cm; leaflets adaxially hairy, not shiny 13. *C. digyna*
 5b. Rachis of leaves 30–40 cm; pinnae 5–16 cm; leaflets adaxially glabrous or shortly hairy, shiny 14. *C. tortuosa*
 4b. Legume not fleshy.
 6a. Legume spiny or bristly.
 7a. Legume obovoid, falcate, 4–5 × ca. 1 cm, much longer than wide, setose, 1- or 2-seeded 3. *C. mimosoides*
 7b. Legume oblong, 5–13 × 4–5 cm, densely spiny, 2–8-seeded.
 8a. Stipules large, leaflike, parted or lobed; bracts subulate; petals yellow; legume 5–7 × 4–5 cm, ca. as long as wide; seeds subglobose 1. *C. bonduc*
 8b. Stipules subulate; bracts elliptic; petals whitish, tinged with red spots; legume 7.5–13 × 4–4.5 cm; seeds terete 2. *C. minax*
 6b. Legume without spines and setae.
 9a. Legume ovoid, elliptic, ± oblong, or lanceolate-oblong.
 10a. Leaflets abaxially farinose-brown when dry; legume ventral sutures narrowly winged, apex without beak 9. *C. caesia*
 10b. Leaflets abaxially not farinose-brown; legume ventral sutures narrowly winged or not winged, apex with or without beak.
 11a. Legume oblong-ligulate or oblanceolate-oblong, 6–9-seeded or more; pedicels 3.5–7 cm.
 12a. Climbers with copious prickles; legume oblong-ligulate, 2.5–3 cm wide, narrowly winged along ventral suture, dehiscent 11. *C. decapetala*
 12b. Small trees, without or with scattered, sparse prickles; legume oblanceolate-oblong, 1.5–2 cm wide, not winged along ventral suture, indehiscent 12. *C. pulcherrima*
 11b. Legume suboblong, oblong to elliptic, or oblong-obovoid, 1–4-seeded; pedicels to ca. 2 cm.
 13a. Leaflets 10–17 pairs per pinna, papery, 10–20 × 5–7 mm; legume woody 10. *C. sappan*
 13b. Leaflets 2 pairs per pinna, leathery, 60–130 × 25–80 mm; legume leathery.
 14a. Leaflets 2.5–3 cm wide, glabrous, apex acuminate; legume dehiscent 18. *C. yunnanensis*
 14b. Leaflets 4.5–8 cm wide, abaxially brown hairy, apex rounded or obtuse; legume indehiscent 19. *C. elliptifolia*
 9b. Legume compressed, suborbicular, ± obliquely broadly ovoid, or obliquely oblong.
 15a. Leaflets 7–13 mm; legume leathery, winged along ventral suture 4. *C. millettii*
 15b. Leaflets 15–150 mm; legume woody or leathery, winged or not winged along ventral suture.

- 16a. Leaflets 6–10 pairs, ovate-lanceolate, apex acuminate, abaxially glaucous; legume without reticulate veins 8. *C. vernalis*
- 16b. Leaflets 2–6 pairs, elliptic, ovate, oblong, or broadly ovate; legume with conspicuous reticulate veins.
- 17a. Legume woody; leaflets to 15 cm 5. *C. magnifoliolata*
- 17b. Legume leathery; leaflets not more than 9 cm.
- 18a. Apices of leaflets acuminate; legume with wings ca. 3 mm wide, along ventral sutures 6. *C. sinensis*
- 18b. Apices of leaflets obtuse-rounded, sometimes emarginate, rarely acute; legume not winged or wings obscure.
- 19a. Leaflets 4–6 pairs per pinna, ovate or elliptic, 3–6 × 1.5–3 cm 7. *C. crista*
- 19b. Leaflets 3 or 4 pairs per pinna, slightly rhombic, 1.5–2 × 0.8–1.2 cm 20. *C. rhombifolia*

1. *Caesalpinia bonduc* (Linnaeus) Roxburgh, Fl. Ind., ed. 1832, 2: 362. 1832.

刺果苏木 *ci guo su mu*

Guilandina bonduc Linnaeus, Sp. Pl. 1: 381. 1753; *G. bonducella* Linnaeus; *Caesalpinia bonducella* (Linnaeus) Fleming.

Climbers, prickly, yellowish pubescent throughout. Prickles straight or somewhat recurved. Leaves 30–45 cm; rachis with recurved prickles; pinnae 6–9 pairs, opposite; stipules deciduous, large, leaflike, usually lobed, lobes to 2 cm; leaflets 6–12 pairs, oblong, 1.5–4 × 1.2–2 cm, membranous, both surfaces pubescent, base oblique, apex rounded to acute, mucronate. Racemes axillary, long pedunculate, densely flowered in upper part and sparsely so in lower part; bracts caducous at anthesis, reflexed, subulate, 6–8 mm, pubescent. Pedicels 3–5 mm. Sepals 5, ca. 8 mm, both sides ferruginous hairy. Petals yellowish; standard tinged with red spots, oblanceolate, clawed. Filaments short, hairy in basal part. Ovary hairy. Legume oblong, 5–7 × 4–5 cm, leathery, apex rounded and with beak, swollen, with dense, slender spines 5–10 mm. Seeds 2 or 3, grayish, shiny, ovoid to globose. Fl. Feb, Jul–Oct, fr. Oct–May.

Thickets, roadsides, near seashores; near sea level to 200 m. Guangdong, Guangxi, Hainan, Taiwan [pantropical].

2. *Caesalpinia minax* Hance, J. Bot. 22: 365. 1884.

喙荚云实 *hui jia yun shi*

Caesalpinia morsei Dunn.

Climbers, prickly, puberulent throughout. Leaves to 45 cm; stipules subulate, hard; pinnae 5–8 pairs; leaflets 6–12 pairs, elliptic or oblong, 2–4 × 1.1–1.7 cm, puberulent on midvein, base rounded and slightly oblique, apex obtuse-rounded or acute. Racemes or panicles terminal; bracts ovate-lanceolate, apex shortly acuminate. Pedicels ca. 1.5 cm. Sepals 5, ca. 1.3 cm, densely yellowish velutinous. Petals whitish, tinged with purple spots, obovate, ca. 1.8 × 1.2 cm, abaxially and marginally hairy, contiguous at base, apex obtuse-rounded. Stamens 10, slightly shorter than petals, densely pubescent in lower part. Ovary with dense, small spines, 7- or 8-ovuled; style slightly longer than stamens, glabrous. Legume oblong, 7.5–13 × 4–4.5 cm, densely spiny, apex obtuse-rounded, with beak 5–25 mm. Seeds 4–8, elliptic, slightly concave on one side, ca. 1.8 × 1 cm, with cyclic veins. Fl. Mar–May, Jul, Sep, Nov, fr. Apr–Dec.

Mountain valleys, by streams, among bushes; below 100–1500 m. Fujian (cultivated), Guangdong, Guangxi, Guizhou, Sichuan, Taiwan, Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

3. *Caesalpinia mimosoides* Lamarck, Encycl. 1: 462. 1785.

含羞云实 *han xiu yun shi*

Climbers, woody. Branchlets densely ferruginous glandular hairy, with recurved prickles. Leaves 22–36 cm; pinnae opposite, 13–23 pairs, ca. 3.5 cm; leaflets opposite, 7–14 pairs, oblong, ca. 9 × 4 mm, abaxially and marginally with bristles. Racemes terminal, lax. Flowers large, more than 50 per inflorescence; pedicels unequal in length, 1.5–2 cm in upper part and 3–3.5 cm in lower part of inflorescence. Sepals 5, ca. 10 × 8 mm. Petals bright yellow, suborbicular, upper one smaller, ca. 8 mm wide, others larger, ca. 1.7 × 1.3 cm. Stamens 10; filaments ca. 1.8 cm, densely cottony in lower part. Ovary ca. 5 mm, densely hairy, 1- or 2-ovuled; style 1.4–1.5 cm, pilose; stigma truncate. Legume obovoid, falcate, 4–5 × ca. 2.5 cm, setose, dehiscent. Seeds 1 or 2, oblong. Fl. Nov–Dec, fr. Feb–Mar.

Among bushes, near roads; 600–700 m. Yunnan (Xishuangbanna) [Bangladesh, India, Laos, Myanmar, Thailand, Vietnam].

4. *Caesalpinia milletii* Hooker & Arnott, Bot. Beechey Voy. 182. 1833.

小叶云实 *xiao ye yun shi*

Pterolobium subvestitum Hance.

Climbers, prickly, ferruginous puberulent throughout. Leaves 19–20 cm; rachis with recurved prickles in pairs; pinnae 7–12 pairs; leaflets 15–20 pairs, alternate, oblong, 7–13 × 4–5 mm, both surfaces ferruginous hairy, much denser abaxially, base obliquely truncate, apex obtuse-rounded. Panicles axillary, to 30 cm. Flowers numerous, compact in upper part, sparse in lower part of inflorescence; pedicels ca. 1.5 cm, sparsely puberulent. Sepals 5, lowest one ca. 8 mm, others ca. 5 mm. Petals yellowish, suborbicular, ca. 8 mm wide, upper one smaller, ca. 4 mm wide, clawed. Stamens ca. 1 cm; filaments pilose in lower part. Pistil slightly longer than stamens, ca. 1.3 cm; ovary and lower part of style pubescent; stigma truncate, hairy. Legume obovoid, adaxial suture straight, narrowly winged, puberulent; valves leathery, unarmed, dehiscent along dorsal suture when mature. Seed solitary, brownish red, shiny, reniform, ca. 11 × 6 mm, with cyclic veins. Fl. Aug–Sep, fr. Apr, Sep–Dec.

• Among bushes, foothills, by streams; 200–800 m. Guangdong, Guangxi, S Hunan, S Jiangxi.

5. *Caesalpinia magnifoliolata* F. P. Metcalf, *Lingnan Sci. J.* 19: 553. 1940.

大叶云实 da ye yun shi

Climbers, prickly. Branchlets ferruginous puberulent. Leaves with pinnae 2 or 3 pairs; petioles and petiolules puberulent; leaflets 4–6 pairs, adaxially shiny, oblong, 4–15 × 2.5–7 cm, leathery, abaxially puberulent, adaxially glabrous, both ends obtuse-rounded or apex very obtuse. Racemes axillary or panicles terminal. Flowers yellow; pedicels 9–10 mm. Sepals 5, ca. 5 × 3 mm. Petals ca. 10 × 5 mm, shortly clawed. Stamens 10; filaments ca. 1 cm, puberulent in lower part. Ovary subsessile, 2- or 3-ovuled, glabrous; style ca. 1 cm; stigma truncate. Legume compressed, suborbicular, 3.5–4 × ca. 3.5 cm, dorsal suture extending to both sides and forming a carinate narrow wing; valves brown, woody, with robust reticulate veins. Seed solitary, brownish black, compressed, suborbicular, ca. 2 cm in diam. Fl. Feb, Apr, Jul, fr. May–Jun, Aug, Oct–Nov.

• Forests, among bushes; 400–1800 m. Guangdong, Guangxi, S Guizhou, S Yunnan.

6. *Caesalpinia sinensis* (Hemsley) J. E. Vidal, *Bull. Mus. Natl. Hist. Nat., Sér. 3, Bot.* 27: 90. 1976, nom. cons., not *C. chinensis* Roxburgh (1832).

鸡嘴勒 ji zui le

Mezonevron sinense Hemsley, *J. Linn. Soc., Bot.* 23: 204. 1887; *Caesalpinia parvifolia* Steudel; *C. stenoptera* Merrill; *C. tsoongii* Merrill; *M. sinense* var. *parvifolium* Hemsley.

Climbers. Stems and branchlets with scattered, robust, recurved prickles. Young shoots ± ferruginous pubescent, glabrescent or subglabrous when old. Leaves bipinnate; rachis with recurved prickles; petiolules short; pinnae 2 or 3 pairs, ca. 30 cm; leaflets 2 pairs, adaxially light green to olive-green, slightly shiny, oblong to ovate, 6–9 × 2.5–3.5 cm, leathery, abaxially hairy on midvein, adaxially glabrous, lateral veins ca. 20 pairs, conspicuous, base rounded or oblique, apex acuminate, acute, or obtuse. Panicles axillary or terminal. Pedicels ca. 5 mm. Sepals 5, ca. 4 × 3 mm. Petals 5, yellow, ca. 7 mm, with claw ca. 3 mm. Stamens 10; filaments ca. 1 cm, ferruginous pubescent in lower part. Pistil longer than stamens; ovary subsessile, pubescent or subglabrous, 1- or 2(–4)-ovuled. Legume chestnut-brown, compressed, suborbicular, ca. 4.5 × 3.5 cm, leathery, conspicuously reticulate, ventral suture slightly curved, narrowly winged, wing ca. 3 mm wide, apex with beak ca. 3 mm. Seed solitary, compressed, suborbicular, ca. 2 cm in diam. Fl. Mar–May, fr. Mar–Apr, Jul–Oct.

Forests, among bushes; 100–900 m. Guangdong, Guangxi, Guizhou, Hubei, Yunnan [Laos, Myanmar, N Vietnam].

7. *Caesalpinia crista* Linnaeus, *Sp. Pl.* 1: 380. 1753.

华南云实 hua nan yun shi

Caesalpinia kwangtungensis Merrill; *C. nuga* (Linnaeus) Aiton; *C. szechuenensis* Craib; *Guilandina nuga* Linnaeus.

Climbers, woody, to 10 m tall. Bark blackish, with few recurved prickles. Leaves 20–30 cm; rachis with blackish recurved prickles; pinnae 2 or 3(or 4) pairs, opposite; leaflets 4–6 pairs, opposite, with short petiolules, adaxially shiny, ovate or elliptic, 3–6 × 1.5–3 cm, leathery, both surfaces glabrous, base broadly cuneate or obtuse, apex obtuse-rounded, sometimes emarginate, rarely acute. Racemes 10–20 cm, arranged in terminal, lax, large panicles. Flowers fragrant; pedicels 5–15 mm, slender. Sepals 5, lanceolate, ca. 6 mm, glabrous. Petals unequal: 4 yellow, ovate, glabrous, slightly conspicuously shortly clawed; upper one tinged with red stripes, attenuate to claw, inside hairy at central part. Stamens slightly extended; filaments inflated and hairy at base. Ovary hairy, 2-ovuled. Legume obliquely ovoid, 3–4 × 2–3 cm, swollen, leathery, reticulate, apex beaked. Seed solitary, compressed. Fl. Apr–Jul, fr. Jul–Dec. $2n = 24$.

Mountain slopes, forests; 400–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Sichuan, Taiwan, Yunnan [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Polynesia].

8. *Caesalpinia vernalis* Champion ex Bentham, Hooker's *J. Bot. Kew Gard. Misc.* 4: 77. 1852.

春云实 chun yun shi

Climbers, prickly, ferruginous velutinous throughout. Leaves with 25–30 cm, pubescent, prickly rachis; pinnae 8–16 pairs, 5–8 cm; petiolules 1.5–2 mm; leaflets 6–10 pairs, abaxially glaucous, adaxially deep green and shiny, ovate-lanceolate, ovate, or elliptic, 1.2–2.5 cm × 6–12 mm, leathery, abaxially sparsely ferruginous velutinous, adaxially glabrous, base rounded, apex acute. Panicles in axils of upper leaves or terminal, with abundant flowers. Pedicels 7–9 mm. Sepals obovate-oblong, ciliate, lower one larger than others, ca. 1 cm. Petals yellow, upper one smaller, revolute, with red stripes. Stamens apically descending, lower part of filaments pubescent. Ovary with short stalk, puberulent, 2-ovuled; style thick; stigma obliquely truncate. Legume blackish purple, obliquely oblong, 4–6 × 2.5–3.5 cm, woody, wrinkled, without reticulate veins, apex beaked. Seeds 2, shiny, axe-shaped, ca. 1.7 × 2 cm, truncate and slightly concave on one end. Fl. Apr, fr. Dec.

• Moist sandy soils, beside rocks along valleys, thickets; ca. 600 m. S Fujian, Guangdong, S Zhejiang.

9. *Caesalpinia caesia* Handel-Mazzetti, *Oesterr. Bot. Z.* 85: 215. 1936.

粉叶苏木 fen ye su mu

Caesalpinia hypoglauca Chun & F. C. How.

Climbers. Branchlets with sparse recurved prickles, puberulent. Leaves 15–20 cm; pinnae 5–8 pairs; rachis of leaves and pinnae pilose; leaflets 8–12 pairs, opposite, dispersed, subsessile, abaxially farinose-brown when dry, adaxially brown, shiny, oblong, 8–15 × 4–6 mm, papery, both surfaces glabrous, base obliquely truncate, apex truncate or obtuse-rounded, emarginate. Panicles axillary, 10–15 cm, brown puberulent. Pedicels 4–7 mm, jointed at apex. Flowers ca. 8 mm in diam. at anthesis. Sepals 5, glabrous, lowest one cucullate-lanceolate, ca. 6 mm, apex obtuse, other 4 ovate-oblong, slightly shorter, 3.5–4 mm.

Petals obovate-oblong, 3.5–4 mm, pubescent, shortly clawed. Stamens 10; filaments ferruginous pilose at base. Ovary elliptic, glabrous, 2-ovuled. Legume blackish when dry, ovoid or elliptic, ca. 5×2.3 –3 cm, thin, swollen at maturity, concave, ventral suture narrowly winged, 1-seeded. Fl. Jul–Sep, fr. Aug.

- Sparse forests along rivers; 200–1000 m. Guangxi, Hainan.

10. *Caesalpinia sappan* Linnaeus, Sp. Pl. 1: 381. 1753.

苏木 su mu

Trees, small, to 6 m tall, \pm puberulent except on old branches and legumes. Branches with dense, conspicuous lenticels. Leaves 30–45 cm; pinnae 7–13 pairs, opposite, 8–12 cm; leaflets 10–17 pairs, closely spaced, sessile, oblong to oblong-rhombic, 1–2 cm \times 5–7 mm, papery, both surfaces glabrous or sparsely hairy, lateral veins slender, conspicuous on both surfaces, contiguous near margin, base oblique, inserted at oblique angles to rachis of pinnae, apex retuse or rounded. Panicles terminal or axillary, ca. as long as leaves; bracts caducous, lanceolate, large. Pedicels ca. 1.5 cm, puberulent. Receptacle shallowly campanulate. Sepals 5, slightly unequal, lower one larger than others, cucullate. Petals yellow, broadly obovate, ca. 9 mm, uppermost one entire at apex, tinged pink at base, clawed. Stamens slightly exerted; filaments densely pubescent at lower part. Ovary grayish velutinous, stalked, 3–6-ovuled; style slender, hairy; stigma truncate. Legume reddish brown, shiny, slightly compressed, suboblong to oblong-obovoid, ca. 7×3.5 –4 cm, woody, attenuate to base, apex obliquely truncate, upper margin with a sharp beak. Seeds 3 or 4, light brown, slightly compressed, oblong. Fl. May–Oct, fr. Jul–Mar. $2n = 24$.

Cultivated in Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [native origin unknown; Cambodia, India, Laos, Malaysia, Myanmar, Sri Lanka, Vietnam; Africa, America].

The heartwood contains a red dye and is used medicinally to relieve pain.

11. *Caesalpinia decapetala* (Roth) Alston in Trimen, Handb. Fl. Ceylon 6(Suppl.): 89. 1931.

云实 yun shi

Reichardia decapetala Roth, Nov. Pl. Sp. 212. 1821; *Caesalpinia decapetala* var. *japonica* (Siebold & Zuccarini) H. Ohashi; *C. decapetala* var. *pubescens* (Tang & F. T. Wang) P. C. Huang; *C. japonica* Siebold & Zuccarini; *C. sepiaria* Roxburgh; *C. sepiaria* var. *japonica* (Siebold & Zuccarini) Gagne-pain; *C. sepiaria* var. *pubescens* Tang & F. T. Wang.

Climbers, with copious prickles. Bark dull red. Branches, rachis of leaves, and inflorescence with recurved prickles and pubescent. Leaves 20–30 cm; pinnae 3–10 pairs, opposite, with prickles in pairs at base; stipules obliquely ovate, apex acuminate, caducous; leaflets 8–12 pairs, oblong, 1–2.5 cm \times 6–12 mm, membranous, both surfaces puberulent, glabrescent when old, both ends obtuse-rounded. Racemes terminal, 15–30 cm, with abundant flowers; rachis densely prickly. Pedicels 3–4 cm, hairy, jointed at apex so flowers easily fall off. Sepals 5, oblong, puberulent. Petals reflexed at anthesis, yellow, orbicular or obovate, 1–1.2 cm, membranous, base shortly clawed. Stamens subequal to petals in length; filaments compressed at base, lanate in

lower part. Ovary glabrous. Legume chestnut-brown, shiny, oblong-ligulate, 6–12 \times 2.5–3 cm, fragile-leathery, glabrous, dehiscent and thickened to a narrow wing along ventral suture when ripe, apex prolonged into a sharp beak. Seeds 6–9, brown, elliptic, ca. 11 \times 6 mm. Fl. and fr. Apr–Oct. $2n = 22^*$, 24^* .

Among bushes on mountain slopes, ravines, plains, hills, by riversides; near sea level to 1800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Japan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam].

The roots, stems, and legumes are used medicinally for relieving pain.

12. *Caesalpinia pulcherrima* (Linnaeus) Swartz, Observ. Bot. 166. 1791.

金凤花 jin feng hua

Poinciana pulcherrima Linnaeus, Sp. Pl. 1: 380. 1753.

Shrubs or small trees. Branches green or farinose-green, smooth, with scattered, sparse prickles. Leaves 12–26 cm; pinnae 4–8 pairs, opposite, 6–12 cm; petiolules short; leaflets 7–11 pairs, oblong or obovate, 1–2 cm \times 4–8 mm, base oblique, apex emarginate, sometimes acute. Racemes subcorymbose, terminal or axillary, lax, to 25 cm. Pedicels unequal in length, 4.5–7 cm. Receptacle concave to turbinate, glabrous. Sepals 5, glabrous, lowest one ca. 1.4 cm, others ca. 1 cm. Petals orange-red or yellow, orbicular, 1–2.5 cm, margin wavy, with claw subequal to limb in length. Stamens very far exerted; filaments red, 5–6 cm, thick and hairy in basal part. Ovary glabrous; style orange-yellow, long, 5–6.5 mm. Legume blackish brown when ripe, oblanceolate-oblong, narrow and thin, 6–10 \times 1.5–2 cm, not winged, glabrous, indehiscent, apex rounded, upper suture ending in a sharp beak. Seeds 6–9. Fl. and fr. year-round. $2n = 24, 28$.

Cultivated in Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [native to South America; cultivated throughout the tropics].

This species is a valuable ornamental of tropical regions.

13. *Caesalpinia digyna* Rottler, Neue Schriften Ges. Naturf. Freunde Berlin 4: 200. 1803.

肉荚云实 rou jia yun shi

Climbers, large, with recurved prickles. Bark deep brown. Leaves 12–20 cm; rachis 17–23 cm, with recurved prickles, puberulent or glabrous; pinnae 6–9 pairs, 3–6 cm, with stipuliform prickles in pairs at base; leaflets 7–9 pairs, subsessile, closely spaced, oblong, 6–9 \times ca. 3 mm, papery, both surfaces pilose at first, base obliquely rounded, apex obtuse-rounded. Racemes terminal or axillary, ca. as long as or longer than leaves. Pedicels 1.2–2 cm, slender. Receptacle shallowly cup-shaped, glabrescent. Sepals 5, 6–8 mm. Petals yellow, suborbicular, ca. 1 cm, shortly clawed. Filaments slightly exerted, densely villous in lower part, thickened at base. Ovary glabrous. Legume brown, indehiscent, oblong, 3.5–5 \times 1.6–2 cm, fleshy, smooth. Seeds 2–4. Fl. Apr–Nov, fr. May–Mar.

Among bushes on mountain slopes, seashores; 200–300 m.

Hainan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

14. *Caesalpinia tortuosa* Roxburgh, Fl. Ind., ed. 1832, 2: 365. 1832.

扭果苏木 niu guo su mu

Climbers, erect shrubs, or small trees, to 10 m tall. Branches glabrous, with scattered recurved prickles. Leaves with tomentose rachis 30–40 cm; stipules absent; pinnae 7–20 pairs, 5–16 cm, with prickles in pairs at base; leaflets 12–30 pairs, sessile, linear, ca. 15 × 5 mm, membranous, lateral veins conspicuous, 4–6 pairs, base obliquely truncate, apex obtuse-rounded. Racemes or panicles terminal or axillary, 20–60 cm, pubescent. Pedicels 8–20 mm, not jointed above base. Sepals 5, unequal, lowest one deeply cucullate, ca. 10 × 7 mm, other 4 ca. 6 × 4 mm, usually ciliate. Petals yellowish, often tinged with spots. Stamens 10; filaments 1–1.4 cm, hairy at lower part. Pistil 1–1.6 cm; ovary sessile, pubescent or glabrous, 4- or 5-ovuled; style inclined; stigma truncate, ciliate. Legume blackish when dry, indehiscent, often twisted, 3.5–9 × 2–3.5 cm, base rounded, apex obtuse, shortly beaked, both sutures thickened, often constricted between seeds, exocarp and endocarp adnate, swollen on seeds, transversely cleft when ripe. Seeds 1–5(–7), subglobose, ca. 1 cm in diam. Fl. Jun–Aug, fr. Jul–Aug.

Among bushes on mountain slopes; ca. 1400 m. Guangdong (Guangzhou, cultivated), Yunnan [India, Indonesia, Malaysia, Myanmar].

15. *Caesalpinia cucullata* Roxburgh, Fl. Ind., ed. 1832, 2: 358. 1832.

见血飞 jian xue fei

Mezonevron cucullatum (Roxburgh) Wight & Arnott.

Climbers, 3–5 m tall, with recurved prickles on old stems forming compressed orbicular corky knob. Branches and rachis of leaves with blackish brown recurved prickles. Leaf rachis 20–40 cm; pinnae 2–5 pairs, stalked; stipules absent; leaflets 3–6 pairs, abaxially grayish white, adaxially deep green and shiny, ovate, broadly ovate, or oblong, large, 4–12 × 2.5–5 cm, leathery, base broadly cuneate or obtuse-rounded, apex acuminate. Panicles terminal or racemes lateral, subequal to leaves in length. Flowers zygomorphic; pedicels 6–12 mm, jointed, glabrous. Receptacle deeply discoid or shallowly campanulate. Sepals 5, unequal, lowest one cucullate, others triangular-oblong, withered and falling after anthesis. Petals yellow, uppermost one short and broad, apex 2-lobed forming fishtail-shape, shortly clawed at base, other 4 yellowish tinged red striate, shiny, oblong, glabrous. Stamens 10, exserted, slightly thickened at base, brown pubescent. Ovary compressed, 1(or 2)-ovuled; style slender; stigma small, truncate. Legume reddish brown, shiny, compressed, elliptic-oblong, 8–12 × 2.5–3.5 cm, indehiscent, winged along ventral suture, wing 6–9 mm wide. Seed 1(or 2). Fl. Nov–Feb, fr. Mar–Oct.

Open forests, among bushes on mountain slopes; 500–1200 m. Yunnan [Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

16. *Caesalpinia enneaphylla* Roxburgh, Fl. Ind., ed. 1832, 2: 363. 1832.

九羽见血飞 jiu yu jian xue fei

Mezonevron enneaphyllum (Roxburgh) Wight & Arnott.

Climbers, large. Branches with scattered, blackish brown, recurved prickles. Leaves alternate; rachis 25–30 cm; pinnae 8–10 pairs, stalked, opposite, 6–8 cm, with blackish brown prickles in pairs at base; petiolules short; leaflets 8–12 pairs, opposite, oblong, (10–)15–25 × 5–8 mm, membranous, both ends obtuse-rounded. Panicles terminal or racemes axillary, 10–20 cm, pubescent. Flowers fragrant, papilionaceous, large; pedicels 1–2.5 cm. Receptacle discoid, persistent after anthesis. Sepals 5, glabrous, unequal, lowermost one cucullate. Petals yellow, upper one suborbicular, apex 2-lobed forming fishtail-shape. Stamens 10; filaments slender, thickened and densely yellowish brown villous from middle downward; anthers dull brown. Ovary subsessile, inserted at base of receptacle, glabrous, 3–7-ovuled; style long. Legume reddish brown, subsessile, compressed, broadly lanceolate or elliptic-oblong, 10–14 × 3–3.5 cm, smooth, without prickles, winged along ventral suture, wing 5–6 mm wide. Seeds 3–7, ovoid, with swollen ridge at middle. Fl. Sep–Oct, fr. Oct–Feb.

Among bushes on mountain slopes, at foot of mountains, open forests; ca. 600 m. S and SW Guangxi, Yunnan [Bangladesh, India, Indonesia, Malaysia, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam].

17. *Caesalpinia hymenocarpa* (Wight & Arnott ex Prain) Hattink, Reinwardtia 9: 35. 1974.

膜荚见血飞 mo jia jian xue fei

Mezonevron hymenocarpum Wight & Arnott ex Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 233, 472. 1897.

Climbers. Branches sparsely yellowish pubescent, with scattered, yellowish brown, recurved prickles. Leaves alternate; rachis 20–30 cm; pinnae 8–10 pairs, opposite; rachis of pinnae and leaves yellowish pubescent; petiolules short, with opposite, recurved prickles with stipules scalelike, ca. 0.5 mm; leaflets 5 or 6 pairs, abaxially yellowish green, adaxially deep green, oblong, 1.5–2 × ca. 1 cm, membranous, both surfaces yellowish pubescent, base broadly cuneate, apex obtuse-rounded. Racemes or panicles axillary or terminal, 30–50 cm. Pedicels 1–1.5 cm; bracts yellowish brown, lanceolate, densely yellowish pubescent, apex long acuminate. Receptacle discoid. Sepals 5, outside yellowish pubescent, lowest one cucullate, others oblong. Petals yellow, upper one orbicular, clawed, lateral 2 smaller, lowermost one folded and raised. Stamens 10; filaments thickened at lower part, densely brown villous, unequal, curved; anthers elliptic. Ovary smooth, 5–7-ovuled; style gradually inflated toward lower part; stigma praemorse. Legume compressed, thin, falcate, 10–15 × ca. 2.5 cm when ripe, winged along ventral suture, wing ca. 1 cm wide. Seeds 5–7, compressed, narrowly ovoid. Fl. Sep–Oct, fr. Dec–Feb.

Open forests, humid places; 300–800 m. W Guangxi (Baise), Yunnan [Bangladesh, Cambodia, India (Andaman Islands), Indonesia, Laos, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

18. *Caesalpinia yunnanensis* S. J. Li, D. X. Zhang & Z. Y. Chen, Novon 16: 78. 2006.

云南云实 yun nan yun shi

Lianas. Branchlets with recurved prickles. Stipules absent; leaf rachis ca. 20 cm, with recurved prickles; pinnae 3 pairs, opposite; petiolules 3–4 mm; leaflets 2 pairs per pinna, opposite, adaxially shiny, ovate-lanceolate, 6–9 × 2.5–3 cm, leathery, both surfaces glabrous, base slightly rounded or sometimes broadly cuneate, apex obtuse-acuminate. Flowers not seen. Legume oblong to elliptic, slightly asymmetric or obliquely asymmetric, 4–7 × 2.5–3 cm, leathery, base broadly cuneate, apex obtuse, beaked. Seed solitary, compressed. Fr. Oct.

• Thickets at riversides, sparse woodlands at roadsides; ca. 600 m. Yunnan (Xishuangbanna).

19. *Caesalpinia elliptifolia* S. J. Li, Z. Y. Chen & D. X. Zhang, *Nordic J. Bot.* 22: 349. 2003.

椭圆叶云实 tuo yuan ye yun shi

Lianas, to 15 m; young parts with dense, brown hairs. Branchlets occasionally with scattered, recurved prickles. Stipules absent; leaf rachis 20–30 cm, with recurved prickles; pinnae 1 or 2 pairs; petiolules 2–3 mm; leaflets opposite, 2 pairs per pinna, elliptic, 7–13 × 4.5–8 cm, leathery, abaxially with brown hairs especially on midvein, adaxially glabrous, base rounded, apex rounded, rarely obtuse. Racemes terminal and supra-axillary, aggregated into a panicle, 15–25 cm, all parts densely hairy; bracts caducous, lanceolate, 1–3 mm; pedicels 8–12 mm. Flowers yellow. Sepals oblong, ca. 6 × 2 mm. Petals unequal, 10–15 × 4–5 mm, shortly clawed. Stamens 10; filaments 9–14 mm, woolly from base to just above middle. Ovary subsessile, ca. 2 mm, hairy, 1- or 2-ovuled; style 7–10 mm,

occasionally as short as 2 mm; stigma truncate. Legume compressed, indehiscent, oblong-elliptic, subsymmetrical, ca. 5 × 2.5 cm, without narrow wing, leathery, with robust reticulate veins. Seeds 1 or 2, brownish black, compressed, suborbicular, ca. 1.5 cm in diam. Fl. Apr, fr. May–Jun.

• Beside ditches; ca. 100 m. Guangdong (Fengkai).

20. *Caesalpinia rhombifolia* J. E. Vidal, *Adansonia*, n.s., 15: 394. 1976.

菱叶云实 ling ye yun shi

Climbers, woody. Branches with few prickles. Leaf rachis ca. 15 cm, with prickles; pinnae 4–6 pairs, opposite; rachis 4–5 cm, with one pair of prickles at base; petiolules ca. 1 mm; leaflets 3 or 4 pairs, opposite, slightly rhombic, 1.5–2 × 0.8–1.2 cm, papery, both surfaces glabrous, base broadly cuneate, apex acute, rarely slightly emarginate. Racemes paniculate, terminal or axillary, 10–20 cm; pedicels 6–9 mm, glabrous or nearly so, jointed at apical part. Flower buds glabrous. Flowers yellow. Sepals glabrous, except with margin ciliate. Petals unequal, ca. 7 mm, inside hairy at base; upper one smaller, rounded at apex, contracted and hairy toward middle. Stamens with hairy filaments. Ovary glabrous, 1- or 2-ovuled; style ca. 1 cm. Legume obliquely semicircular, ca. 4 × 2.5 cm, leathery, ca. 1 cm stalked, apex beaked. Seed 1, broadly ellipsoid, ca. 2 × 1 cm. Fl. (not seen in China, based on original description) May–Jul, fr. unknown.

Thickets. S Guangxi (Dongxing) [Vietnam].

20. **PTEROLOBIUM** R. Brown ex Wight & Arnott, *Prodr. Fl. Ind. Orient.* 283. 1834, nom. cons., not Andrzejowski ex C. A. Meyer (1831).

老虎刺属 lao hu ci shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Ding Hou

Cantuffa J. F. Gmelin; *Reichardia* Roth (1821), not Roth (1787), nor Roth (1800).

Shrubs, climbing, tall, or woody climbers. Branches with recurved prickles. Leaves abruptly bipinnate, alternate; pinnae and leaflets numerous; stipules and stipels caducous, small or obscure. Racemes or panicles axillary or terminal; bracts caducous, subulate to linear. Flowers whitish or yellowish, small; bracteoles absent. Receptacle discoid. Sepals 5, imbricate, lowermost navicular, larger, emarginate. Petals 5, spreading, oblong or obovate, slightly unequal, with imbricate sepals. Stamens 10, free, subequal, declined; filaments sometimes villous at bases; anthers uniform, cells opening by lateral slits. Ovary sessile, ovoid, inserted at base of receptacle, free, 1- or 2-ovuled; style short or elongated and clavate at apex; stigma terminal, truncate or concave. Legume sessile, compressed, samaroid, indehiscent, upper part produced into an oblique oblong or falcate, membranous wing. Seed pendulous at apex of locules, without endosperm; cotyledons flat; radicle short, straight.

About ten species: tropical and subtropical Africa, mostly in Asia to Indonesia and the Philippines; two species in China.

- 1a. Flowers scattered; petals unequal; wings of fruit 4–4.5 × 1.8–2 cm, broadest at middle forming curved margin on one side; leaves with pinnae 4–6 pairs; leaflets 1.5–2 × 0.6–1 cm, usually 6–9 pairs, veins conspicuous, abaxially without blackish dots 1. *P. macropterum*
- 1b. Flowers densely fascicled; petals homomorphic; wings of fruit not as above, 3–4 × 1.3–1.5 cm; leaves with pinnae 9–14 pairs; leaflets smaller and numerous, usually 19–30 pairs, veins obscure, abaxially with conspicuous or obscure blackish dots 2. *P. punctatum*

1. *Pterolobium macropterum* Kurz, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 42: 71. 1873.

大翅老虎刺 da chi lao hu ci

Pterolobium indicum A. Richard var. *macropterum* (Kurz) Baker; *P. sinense* J. E. Vidal.

Climbers, woody, tall. Young branchlets striate, sparsely hairy; old branches glabrous, with blackish prickles in pairs at

bases of petioles. Leaf rachis 8–10 cm; pinnae 4–6 pairs, 8–10 cm; rachis of leaves and pinnae densely brownish hispidulous, articulate; leaflets 6–9 pairs, opposite, obliquely oblong, 1.5–2 × 0.6–1 cm, leathery, both surfaces glabrous, base asymmetric, apex rounded, cuspidate, or emarginate. Racemes or panicles terminal or supra-axillary; rachis 10–15 cm, hairy; bracts subulate. Pedicels 5–10 mm. Sepals unequal, thickly leathery, smooth. Petals whitish, outer 4 equal, ca. 5 mm, obovate, innermost one abruptly contracted into a broad claw from middle downward, blade ciliate on margin, apex undulate, auriculate. Stamens equal in length, exerted; filaments ca. 8 mm, inflated and densely hairy from middle downward; anthers oblong, ca. 1 mm. Ovary slightly puberulent, 2-ovuled; style filiform, glabrous; stigma funnel-shaped, ciliate. Legume indehiscent, 6–6.5 cm; wings oblique, 4–4.5 × 1.8–2 cm, part containing seed ovoid. Fr. May, Oct.

Dry thickets, forests, sunny slopes; 400–1600 m. Guangxi, Hainan, Yunnan [Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

2. *Pterolobium punctatum* Hemsley, J. Linn. Soc., Bot. 23: 207. 1887.

老虎刺 lao hu ci

Caesalpinia aestivalis Chun & F. C. How; *Pterolobium indicum* Hance; *P. rosthornii* Harms.

Climbers, woody, or climbing shrubs, 3–10 m tall. Branch-

lets angular, silvery white puberulent and light yellow hairy when young, glabrescent when old, with blackish, recurved, short prickles scattered or in pairs at bases of petioles. Leaf rachis 12–20 cm; petiole 3–5 cm, with paired blackish stipulaceous spines; pinnae 9–14 pairs, long and narrow; rachis of pinnae 5–8 cm, sulcate; petiolules short, articulate; leaflets 19–30 pairs, opposite, narrowly oblong, blades at middle 9–10 × 2–2.5 mm, both surfaces yellowish hairy, abaxially denser, abaxially with conspicuous or obscure blackish dots, veins obscure, base slightly oblique, apex rounded-cuspidate or emarginate. Racemes 8–13 × 1.5–2.5 cm, puberulent, supra-axillary or at apices of branches forming a panicle; bracts setiform, 3–5 mm. Pedicels 2–4 mm, slender, spaced at intervals of 1–2 mm. Flower buds obovoid, ca. 4.5 mm, tomentose. Sepals: lowest one longer, navicular, ca. 4 mm, ciliate; others oblong, ca. 3 mm. Petals equal, slightly longer than calyx, obovate, apex slightly praemorse. Stamens equal in length, exerted; filaments 5–6 mm, pubescent from middle downward; anthers broadly ovoid, ca. 1 mm. Ovary compressed, ciliate on one side, 2-ovuled; style glabrous; stigma funnel-shaped. Legume shiny, 4–6 cm, part containing seed rhomboid, 1.6–2 × 1–1.3 cm, wings straight on one side and curved on other side, 3–4 × 1.3–1.5 cm, with persistent style. Seed solitary, elliptic, ca. 8 mm. Fl. Jun–Aug, Oct, fr. Apr, Sep–Jan.

Sparse forests, sunny slopes, dry rocky hills, near roads, limestone mountains; 300–2000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang [Laos].

21. HAEMATOXYLUM Linnaeus, Sp. Pl. 1: 384. 1753.

采木属 cai mu shu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen, Supee Saksuwan Larsen

Trees or shrubs. Leaves abruptly pinnate or bipinnate by lower pinnae again divided; stipules spinescent, deciduous; stipels absent. Flowers yellow, small, in axillary, short, sparse racemes. Receptacle short. Calyx 5-lobed; lobes unequal. Stamens 10, free; filaments hairy at bases; anthers uniform, opening by lateral slits. Ovary shortly stalked, 2- or 3-ovuled; style filiform; stigma terminal, capitate. Legume compressed, oblong or lanceolate, membranous, splitting along middle of valves. Seeds transversely oblong, without endosperm; radicles straight.

About three species: S Africa, tropical regions of Central and North America including the West Indies and Mexico; cultivated in tropical Asia; one species (introduced) in China.

1. *Haematoxylum campechianum* Linnaeus, Sp. Pl. 1: 384. 1753.

采木 cai mu

Trees, small, to 8 m tall, sometimes with spreading branches and shrubby. Trunk deeply sulcate. Bark light gray. Branchlets slender. Leaves 5–10 cm, shortly petiolate; leaflets 2–4 pairs, abaxially pale green, adaxially shiny, obovate to obcordate, 1–3 cm, papery, with fine veins, base cuneate, apex rounded or deeply emarginate. Racemes 2–5 cm, with several to numerous flowers; peduncles short. Pedicels 4–6 mm, slender.

Calyx 3–4 mm; lobes oblong-lanceolate, apex acute. Petals yellow, narrowly obovate, 5–6 mm, apex obtuse. Stamens ca. as long as petals. Legume lanceolate-oblong, 2–5 × 0.8–1.2 cm; valves thin, with fine veins.

Cultivated in Guangdong (Guangzhou), Taiwan, Yunnan [native to Central America; widely introduced elsewhere].

The heartwood of this species is blood-red. Haematoxylin, extracted from the wood and flowers, is an important dye used for morphological anatomy and pharmacological preparations. It is also used medicinally as an astringent for treating dysentery and diarrhea.

22. PARKINSONIA Linnaeus, Sp. Pl. 1: 375. 1753.

扁轴木属 bian zhou mu shu

Chen Dezhaoh (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen, Supee Saksuwan Larsen

Shrubs or trees, prickly or not. Leaves abruptly bipinnate; rachis very flattened; pinnae usually 2–4, appearing congested at first

sight; stipules small, scaly to spinescent; rachis of pinnae very long and flattened; leaflets reduced, inconspicuous, numerous, opposite or alternate, small. Racemes or cymes axillary; bracts caducous, small. Pedicels long, without bracteoles. Flowers bisexual. Receptacle discoid. Sepals 5, slightly unequal, imbricate or subvalvate, membranous. Petals 5, spreading, slightly unequal, shortly clawed, uppermost broader and long clawed. Stamens 10, free, not exserted; filaments villous at bases; anthers ovoid, versatile, cells opening by lateral slits. Ovary shortly stalked, inserted at bottom of receptacle, glabrous to \pm pubescent, many ovuled; style filiform, glabrous or pubescent; stigma truncate, ciliate or glabrous. Legume linear, torulose, not winged, indehiscent, thinly leathery. Seeds oblong; hilum small, near apex, with endosperm; cotyledons flat, fleshy; radicle straight.

About four species: mostly in dry regions of S Africa, tropical America, and Oceania; one species (introduced) in China.

1. Parkinsonia aculeata Linnaeus, Sp. Pl. 1: 375. 1753.

扁轴木 bian zhou mu

Shrubs or trees, to 6 m tall, prickly, with smooth, green bark. Leaf rachis and stipules becoming spines; pinnae 1–3 pairs, clustered at spinescent, very short rachis of leaves; rachis of pinnae green, to 40 cm; leaflets obovate-elliptic to obovate-

oblong or oblong, 2.5–8.5 \times 1–3.5 mm. Racemes sparsely flowered. Flowers yellow; pedicels 1.5–1.7 cm; bracts lanceolate. Sepals oblong, ca. 6 mm, apex obtuse. Petals spatulate, apex rounded, uppermost longer, ca. 11 \times 6 mm. Filaments villous at base. Legume 7.5–10.5 cm.

Cultivated in Hainan [native to tropical America; widely cultivated in tropical regions of the world].

23. ERYTHROPHLEUM Afzelius ex R. Brown in Denham & Clapperton, Narr. Travels Africa, 235. 1826.

格木属 ge mu shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen

Trees. Leaves alternate, bipinnate; stipules caducous, small; pinnae few pairs, opposite; leaflets alternate, leathery. Flowers small, crowded together in terminal panicles of spicate racemes. Calyx campanulate, with 5 short subequal lobes; tube short. Petals 5, subequal. Stamens 10, free; filaments equal or alternately longer and shorter. Ovary stalked, hairy; ovules numerous; style short; stigma small. Legume compressed, long, thickly leathery, 2-valved dehiscent when ripe, pulpy within between seeds. Seeds transverse, oblong or obovoid, compressed, with endosperm.

About 15 species: tropical Africa, tropical and subtropical E Asia, and N Australia; one species in China.

1. Erythrophleum fordii Oliver, Hooker's Icon. Pl. 15: t. 1409. 1883.

格木 ge mu

Trees, ca. 10 m tall, sometimes to 30 m tall. Young shoots ferruginous puberulent. Leaves glabrous; pinnae usually 3 pairs, opposite or subopposite, 20–30 cm; petiolules 2.5–3 mm; leaflets 8–12, ovate to ovate-elliptic, 5–8 \times 2.5–4 cm, base rounded, oblique, margin entire, apex acuminate. Panicles 15–20 cm; peduncles ferruginous pubescent. Calyx outside pilose; lobes oblong, margin densely pubescent. Petals pale yellowish green,

longer than calyx lobes, oblanceolate, inside and marginally densely pubescent. Stamens ca. 2 \times as long as petals, glabrous. Ovary oblong, densely yellowish white pubescent, 10–12-ovuled. Legume compressed, oblong, 10–18 \times 3.5–4 cm, with reticulate veins. Seeds blackish brown, slightly compressed, oblong, 2–2.5 \times 1.5–2 cm. Fl. May–Jun, fr. Aug–Oct.

Sparse or dense forests, mountain slopes. Fujian, Guangdong, Guangxi, Taiwan, Zhejiang [Vietnam].

The wood is dark brown, hard, and bright, with fine, close grain. A famous hardwood, it is used for ship building and for pillars of houses.

5. Tribe MIMOSEAE

含羞草族 han xiu cao zu

Wu Delin (吴德邻 Wu Te-lin); Ivan C. Nielsen

Leaves bipinnate. Flowers bisexual, polygamous, or andromonoecious (then upper flowers perfect, lower staminate or sterile), numerous in heads, spikes, or racemes, sometimes aggregated into compound inflorescences. Sepals usually 5, valvate or imbricate. Petals as many as sepals, valvate (except *Dinizia*), free to joined. Stamens usually 5–10, exerted, free or ± connate at base, sometimes petaloid in sterile flowers; anthers generally dorsifixed, with or without an apical gland; pollen simple or compound. Ovary sessile to stipitate; ovules 2 to many. Legumes usually compressed, occasionally terete, torulose, spirally twisted, or tetragonal and rarely winged, often curved, indehiscent or dehiscent along one or both margins, sometimes with valves separating from a persistent margin (replum) and breaking into 1-seeded segments. Seeds compressed, sometimes winged, exarillate, usually with a pleurogram.

About 40 genera and 860–880 species: distributed in the tropics and subtropics, less often in temperate regions, most numerous in tropical South America and tropical Africa; seven genera (five introduced) and 12 species (eight introduced) in China.

Dichrostachys cinerea (Linnaeus) Wight & Arnott and *Prosopis juliflora* (Swartz) Candolle are introduced and cultivated in China. However, they are not treated here because they are uncommon and not known to be naturalized.

1a. Climbers or herbs.

2a. Woody climbers, or trailing or scandent shrubs; leaves with pinnae in 2 pairs, tendrils present; legume jointed 26. *Entada*

2b. Perennial herbs; leaves with pinnae in 4–10 pairs, without tendrils; legume not jointed 27. *Neptunia*

1b. Trees, shrubs, or subshrubs.

3a. Tall trees, 6–30 m tall.

4a. Pinnae with leaflets in 28–60 pairs; flowers in club-shaped pendulous head; legume basally attenuate into a long stipe 24. *Parkia*

4b. Pinnae with leaflets in 4–7 pairs; flowers in racemes or panicles; legume basally not attenuate into a long stipe 25. *Adenanthera*

3b. Small trees, shrubs, or subshrubs, 0.5–6 m tall.

5a. Armed plant; legume dehiscent in several segments separating from persistent sutures; leaflets sensitive 29. *Mimosa*

5b. Unarmed plant; legume not dehiscent in several segments separating from persistent sutures; leaflets not sensitive.

6a. Small trees or shrubs, 2–6 m tall; pinnae with leaflets in 5–15 pairs; legume broadly linear 28. *Leucaena*

6b. Subshrubs, up to 2 m tall; pinnae with leaflets in 6–21 pairs; legume linear 30. *Desmanthus*

24. PARKIA R. Brown in Denham & Clapperton, Narr. Travels Africa, 234. 1826.

球花豆属 qiu hua dou shu

Trees, unarmed. Leaves bipinnate, with numerous pinnae and leaflets. Inflorescences solitary and axillary, or several at apices of branches, large and clavate or depressed globose, pedunculate. Flowers very numerous. Fertile flowers (bisexual) at upper part of heads, yellow to red, lower sterile ones (male or neuter) white or red. Calyx cylindrical; teeth 5, very short and imbricate. Petals 5, linear-spatulate, free or connate to middle. Stamens 10, free or connate at base and adnate to corolla; anthers oblong, usually tipped by a gland. Ovary sessile or stipitate; ovules numerous; style filiform; stigma terminal. Petals of lower sterile flowers often free. Staminodes 10, in a long bundle, free distally, filiform. Legume straight or curved, oblong or elongate, compressed, rather woody or fleshy, 2-valved. Seeds transverse, ovoid, thick or compressed; pleurogram if present ± elliptic.

About 35 species: tropical regions of Africa, the Americas, and Asia; two species (both introduced) in China.

1a. Leaflets 5–10 × 1–2 mm, lateral veins inconspicuous 1. *P. timoriana*

1b. Leaflets 10–14 × 3–4.2 mm, lateral veins abaxially prominent 2. *P. leiophylla*

1. *Parkia timoriana* (Candolle) Merrill, Philipp. J. Sci., C, 5: 33. 1910.

球花豆 qiu hua dou

Inga timoriana Candolle, Prodr. 2: 442. 1825; *Parkia roxburghii* G. Don.

Trees, to 30 m tall. Branchlets brown. Leaf rachis more than 30 cm, glabrous or pubescent; petiolar gland elliptic to circular, 2–4 mm; pinnae 20–30(–42) pairs, pinna rachis 9–12

cm; leaflets 50–60 pairs, falcate or slightly sigmoid, linear, 5–10 × 1–2 mm, lateral veins inconspicuous, base truncate, apex acute. Heads 3–4 cm in diam.; peduncles pendent, 20–45 cm. Flowers small. Calyx tubular, ca. 6 mm. Corolla tubular, 10–11 mm, 5-lobed; lobes 1–1.5 mm, villous. Stamens 10; filaments exerted 2–3.5 mm beyond calyx, base adnate to collar. Ovary stipitate. Legume straight, strap-shaped, flat, 20–36 × 3–4.5 cm, glabrous, base attenuate into a stipe 6–15 cm. Seeds 13–21, black, ovoid, ca. 2 cm, hard. Fr. Feb–Apr.

Cultivated in Taiwan [native to tropical Asia].

2. *Parkia leiophylla* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 73. 1873.

大叶球花豆 da ye qiu hua dou

Trees, to 30 m tall. Branchlets brown, pubescent when young. Leaf rachis 30–60 cm; petiolar gland broadly elliptic, 4–6 mm; pinnae (11–)15–20 pairs, pinna rachis 10–15 cm, fulvous pubescent; leaflets sessile, 28–56 pairs, linear-falcate, 10–14 × 3–4.2 mm, rigidly leathery, both surfaces glabrous except ciliate along margin, lateral veins prominent abaxially, base subtrun-

cate, unilaterally slightly auriculate, apex obliquely acute. Heads with peduncles 30–45 cm, several together racemiform. Flowers yellow. Calyx 8–10 mm; lobes orbicular, yellow tomentose. Corolla tubular, 10.5–11.5 mm; lobes ca. 1.5 mm, oblong, acute. Staminal tube 9–9.5 mm; anthers 1–1.5 mm. Ovary stipitate. Legume black, slightly torulose, (15–)30–45 × ca. 3 cm, glabrous, shiny, base attenuate into a stipe 12–22 cm, apex rounded. Seeds obliquely arranged, 6–15. Fl. Mar, fr. Sep–Nov.

Dry evergreen and mixed deciduous forests, thickets, along brooks; 500–600 m. Cultivated in Yunnan (Xishuangbanna) [native to Myanmar and Thailand].

25. ADENANTHERA Linnaeus, Sp. Pl. 1: 384. 1753.

海红豆属 hai hong dou shu

Trees, unarmed. Leaves bipinnate, spirally arranged, without glands; stipules caducous, small; leaflets alternate, in many pairs, small. Inflorescence a raceme or panicle, axillary or terminal. Flowers white or yellowish, bisexual or polygamous, shortly pedicellate. Calyx campanulate, shortly 5-toothed. Petals 5, lanceolate, coherent below middle or soon free. Stamens 10, free, slightly longer than petals; anthers ovoid, with a deciduous gland at apex. Ovary sessile, many ovuled; style filiform. Legume straight, falcate, or slightly twisted, strap-shaped, leathery, septate between seeds, dehiscent along sutures when ripe. Seeds thick; testa scarlet or 2-colored, hard, with pleurogram, mostly enclosed by a thin pulp.

Twelve species: tropical Asia and the Pacific islands; one species in China.

1. *Adenanthera microsperma* Teijsmann & Binnendijk, Natuurk. Tijdschr. Ned.-Indië 27: 58. 1864.

海红豆 hai hong dou

Adenanthera microsperma var. *luteoseminalis* G. A. Fu & Y. K. Yang; *A. pavonina* Linnaeus var. *luteoseminalis* (G. A. Fu & Y. K. Yang) X. Y. Zhu; *A. pavonina* var. *microsperma* (Teijsmann & Binnendijk) I. C. Nielsen.

Trees, deciduous, 5–20 m tall. Branchlets puberulent. Petiole and rachis puberulent; pinnae 3–5 pairs; leaflets 4–7 pairs, with short petiolules, alternate, oblong or ovate, 2.5–3.5 × 1.5–2.5 cm, both surfaces puberulent, both ends rounded-obtuse. Racemes simple, axillary or arranged in panicles at apices of

branchlets, puberulent. Flowers white or yellow, small, fragrant, shortly pedicellate. Calyx less than 1 mm, together with pedicel golden yellow puberulent. Petals oblong, 2.5–3.5 mm, usually glabrous but occasionally puberulent toward apex, slightly connate at base. Stamens 3–4.5 mm; anthers ca. 0.5 mm. Ovary nearly sessile, villous; style filiform; stigma small. Legume narrowly oblong, 10–20 × 1.2–1.4 cm, valves contorted after dehiscence. Seeds scarlet or yellow, suborbicular to ellipsoidal, 5–8 × 4.5–7 mm. Fl. Apr–Jul, fr. Jul–Oct.

Valleys, along streams, forests, cultivated in gardens; sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

26. ENTADA Adanson, Fam. Pl. 2: 318, 554. 1763, nom. cons.

榼藤属 ke teng shu

Climbers, woody, or scandent shrubs, large, usually unarmed. Leaves bipinnate; stipules small, setaceous; petiolar gland absent; terminal pair of pinnae sometimes transformed into a tendril; leaflets opposite, 1 to many pairs. Spikes axillary or supra-axillary, slender, solitary or arranged in a racemelike panicle. Flowers bisexual or polygamous, 5-merous, sessile. Calyx campanulate, shortly dentate. Petals free or slightly united at base. Stamens 10, shortly connate at base and adnate to petals, much exerted; anthers with a deciduous gland at apex; filaments filiform. Ovary subsessile; ovules numerous; style filiform; stigma minute. Legume straight or curved to spirally twisted, plano-compressed, large and long, leathery or woody; valves splitting transversely at maturity into 1-seeded segments; segments falling away from suture, which persists as an empty frame. Seeds globose to orbicular, large; testa brown, thick, without pleurogram (in Asia).

About 30 species: mainly in tropical Africa and the Americas; three species in China.

1a. Shrubs, trailing or scandent, with large fleshy tuber underground; leaflets 8–11 pairs per pinna,

1.1–1.9 × 0.4–0.8 cm 1. *E. parvifolia*

1b. Climbers, very large, without fleshy tuber; leaflets 1–5 pairs per pinna, 2.3–9 × 1.3–4.5 cm.

2a. Leaflets 1 or 2 pairs per pinna; legume with a parchmentlike endocarp 2. *E. phaseoloides*

2b. Leaflets 3 or 4(or 5) pairs per pinna; legume with a woody endocarp 3. *E. rheedii*

1. *Entada parvifolia* Merrill, Philipp. J. Sci., C, 3: 229. 1908.

小叶槭藤 xiao ye ke teng

Entada philippinensis Gagnepain.

Shrubs, scandent, with large, fleshy tuber underground. Stems terete, glabrous. Pinnae 2 pairs, 4.5–7.5 cm; leaflets 8–11 pairs per pinna, obliquely oblong, 1.1–1.9 cm × 4–8 mm, base half cuneate, half rounded, apex rounded to mucronulate or slightly emarginate. Spikes supra-axillary, ca. 15 cm. Flowers bisexual or male. Calyx cup-shaped, to 1 mm. Petals oblong-linear, ca. 3 mm, apex mucronate. Stamens 5.5–7 mm. Ovary ca. 1.5 mm, glabrous. Legume dark brown, oblong, ca. 30 × 5 cm; segments 2.3–3 cm, epicarp rigidly papery, endocarp thinly parchmentlike. Seeds dark brown, irregularly ovoid, ca. 1.8 × 1.6 cm. Fl. and fr. Aug–Nov.

Forests; 100–600 m. Taiwan (Hengchun Peninsula) [Japan (Ryukyu Islands), Philippines].

2. *Entada phaseoloides* (Linnaeus) Merrill, Philipp. J. Sci., C, 9: 86. 1914.

槭藤 ke teng

Lens phaseoloides Linnaeus, Herb. Amboin. 18. 1754; *Entada koshunensis* Hayata & Kanehira; *E. scandens* (Linnaeus) Bentham; *Mimosa scandens* Linnaeus.

Climbers, evergreen, large, woody. Stems often spirally twisted. Branches glabrous. Leaves 10–25 cm; petiole short; pinnae usually 2 pairs; leaflets 1 or 2 pairs, apical pair of pinnae transformed into a tendril, elliptic or narrowly obovate, 3–9 × 1.5–4.5 cm, leathery, base slightly oblique, apex obtuse, emarginate. Spikes 15–25 cm, solitary or arranged in a panicle, villous; bracts pubescent. Flowers slightly fragrant. Calyx campanulate, ca. 2 mm, 5-toothed. Petals 5, green with reddish base, oblong, ca. 4 mm, glabrous, slightly united at base, apex acute.

Stamens white, slightly longer than corolla. Ovary glabrous; style filiform. Legume curved, flat, to 1 m × 8–12 cm, with a parchmentlike endocarp. Seeds dark brown, orbicular, flat, 4–6 cm in diam.; testa brown, brilliant, woody. Fl. Mar–Jun, fr. Aug–Nov. $2n = 28$.

Forests; 200–1300 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Xizang, Yunnan [tropical and subtropical Asia; tropical Australia].

This plant is poisonous; it is used medicinally.

3. *Entada rheedii* Sprengel, Syst. Veg. 2: 325. 1825.

眼镜豆 yan jing dou

Mimosa entada Linnaeus, Sp. Pl. 1: 518. 1753; *Entada formosana* Kanehira; *E. laotica* Gagnepain; *E. monostachya* Candolle; *E. pursaetha* Candolle; *E. pursaetha* subsp. *sino-himalensis* Grierson & D. G. Long; *E. pursaetha* var. *sino-himalensis* (Grierson & D. G. Long) C. Chen & H. Sun.

Climbers, woody. Pinnae 2 pairs, 5–15 cm; leaflets 3 or 4 (or 5) pairs per pinna, opposite, obovate to elliptic-lanceolate, unequally sided, 2.3–7 × 1.3–3.5 cm, papery, abaxially glaucous, base rounded to broadly cuneate, apex acuminate to obtuse, or emarginate. Spikes solitary or fasciculate, axillary, 12–25 cm. Flowers male or bisexual. Calyx green, cup-shaped, 0.8–1 mm. Petals white, narrowly elliptic to lanceolate, 2.8–3 mm. Stamens white, turning yellow, 5–6.5 mm. Ovary glabrous. Legume straight to slightly curved, to 2 m × 7–15 cm; segments 6.5–7.5 cm, epicarp and endocarp woody. Seeds brown, brilliant, suborbicular, flat, 3.5–4 × ca. 1 cm. Fl. Mar–Apr, fr. Aug–Oct.

Forests; 100–900 m. Fujian, Guangdong, Hainan, Taiwan, Xizang, Yunnan [tropical Asia; E Africa, Australia, Indian Ocean islands (Mascarene Islands)].

The bark and seeds contain saponin, which is used as a substitute for soap.

27. NEPTUNIA Loureiro, Fl. Cochinch. 2: 641, 653. 1790.

假含羞草属 jia han xiu cao shu

Herbs, perennial, sometimes prostrate or floating, unarmed. Leaves bipinnate, sensitive to touch; stipules obliquely cordate, membranous; rachis with or without glands; pinnae not glandular; leaflets opposite, several to numerous pairs, small. Heads solitary, ovoid-globose, pedunculate, with bisexual flowers in distal part and sterile flowers with elongate staminodes at base. Calyx campanulate, shortly 5-dentate. Petals 5, free or fused at base. Stamens 10, rarely 5, free; anthers with or without a small gland at apex. Staminodes 10, petaloid and elongate in neuter flowers. Ovary stipitate; ovules numerous; style filiform; stigma concave. Legume deflexed from stipe, oblong, plano-compressed, subseptate between seeds or rarely 1-seeded. Seeds transverse, ovoid, compressed, funicle filiform.

Eleven species: tropical and subtropical regions, especially in Australia and the Americas; one species (introduced) in China.

1. *Neptunia plena* (Linnaeus) Bentham, J. Bot. (Hooker) 4: 355. 1842.

假含羞草 jia han xiu cao

Mimosa plena Linnaeus, Sp. Pl. 1: 519. 1753.

Herbs, perennial, terrestrial or subaquatic. Stems erect or ascending, branched. Stipules persistent, lanceolate, ca. 1 cm, base obliquely cordate; pinnae 4–10 pairs, with a suppressed gland between or just below lowest pair of pinnae; leaflets 9–40

pairs per pinna, linear-oblong, 4–18 × 1.5–3 mm, both surfaces glabrous, base rounded, apex obtuse, acute, or mucronate. Heads ovoid, ca. 2 cm. Calyx campanulate, ca. 1.5 mm, 5-dentate. Petals lanceolate, ca. 3 mm, fused at base. Stamens 10; filaments ca. 6 mm, with stipitate gland at apex. Staminodes petal-like, 8–10 mm. Legume oblong, 5–10 × 1.6–2 cm. Seeds 5–20. Fl. Aug–Oct, fr. Oct–Nov.

Planted or occasionally escaped in wet places; sea level to 100 m. Fujian, Guangdong, Taiwan [native to tropical America].

28. LEUCAENA Benth, J. Bot. (Hooker) 4: 416. 1842, nom. cons.

银合欢属 yin he huan shu

Trees or shrubs, evergreen, unarmed. Leaves bipinnate; stipules deciduous, small, setaceous; petiole often glandular; leaflets opposite, numerous and small, or few and larger, oblique. Heads solitary or fasciculate, axillary, globose, pedunculate; bracts usually 2. Flowers sessile, usually bisexual. Calyx campanulate, 5-toothed. Petals 5, free or nearly so. Stamens 10, free, exserted; anthers apically eglandular. Ovary stipitate; ovules numerous; style filiform. Legume stipitate, broadly linear, plano-compressed, leathery, 2-valved, continuous within. Seeds transverse, ovoid, flat.

About 22 species: native to the Americas, one species introduced and naturalized in the Old World including China.

1. *Leucaena leucocephala* (Lamarck) de Wit, Taxon 10: 54. 1961.

银合欢 yin he huan

Mimosa leucocephala Lamarck, Encycl. 1: 12. 1783; *Acacia glauca* Willdenow (1806), not (Linnaeus) Moench (1794); *Leucaena glauca* Benth; *M. glauca* Linnaeus (1763), not Linnaeus (1753).

Shrubs or small trees, 2–6 m tall. Branchlets pubescent, glabrous when old, with brown lenticels. Stipules caducous, deltoid, very small; pinnae 4–8 pairs, 5–9(–16) cm, rachis pubescent with black glands at location of lowest pinnae; leaflets 5–15 pairs, linear-oblong, 7–13 × 1.5–3 mm, main vein close to upper margin, base cuneate, margin ciliate, apex acute. Heads

usually 1 or 2, axillary, 2–3 cm in diam.; peduncle 2–4 cm; bracts deciduous, pubescent. Flowers white. Calyx ca. 3 mm, outside glabrous at base, puberulent at apex, 5-toothed. Petals narrowly oblanceolate, ca. 5 mm, outside pubescent. Stamens 10, sparsely pubescent, ca. 7 mm. Ovary shortly stipitate, sparsely pubescent; stigma cupular. Legume straight, strap-shaped, flat, 10–18 × 1.4–2 cm, leathery, base attenuate, pedicel to 3 cm, pubescent, beak acute, hard. Seeds 6–25, brown, glossy, narrowly ovoid, flat, 6–9 × 3–4.5 mm. Fl. Apr–Jul, fr. Aug–Oct. $2n = 104^*$.

Cultivated and naturalized in Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [originally from tropical America, widely distributed in tropical and subtropical regions].

This plant is grown for use as green manure and fodder.

29. MIMOSA Linnaeus, Sp. Pl. 1: 516. 1753.

含羞草属 han xiu cao shu

Shrubs or herbs, rarely trees or climbers, usually armed. Stipules not spinescent, usually 2 per pinna, small, caducous. Leaves bipinnate, often sensitive. Heads globose or spikes cylindric, solitary or fasciculate, axillary, pedunculate. Flowers small, bisexual or polygamous, sessile, usually 4-merous. Calyx connate, valvate, campanulate, toothed. Petals connate at base. Stamens 4 or 8, free, exserted; anthers without glands. Ovary many ovuled; style filiform. Legume oblong or linear, usually plano-compressed, membranous or leathery, composed of 1-seeded segments, separating from persistent margins. Seeds elliptic or orbicular, flat.

About 500 species: mostly in tropical America; three species (all introduced) in China.

- 1a. Pinnae 1 or 2 pairs 1. *M. pudica*
 1b. Pinnae 3–10 pairs.
 2a. Tall shrubs or trees; stems terete 2. *M. bimucronata*
 2b. Straggling woody shrubs or semiwoody herbs; stems angulate 3. *M. diplotricha*

1. *Mimosa pudica* Linnaeus, Sp. Pl. 1: 518. 1753.

含羞草 han xiu cao

Herbs, diffuse, shrubby, to 1 m tall. Stems cylindric, branched, with reflexed bristles and scattered, curved prickles. Stipules lanceolate, 5–10 mm, bristly; pinnae and leaflets sensitive; pinnae usually 2 pairs, digitate, 3–8 cm; leaflets 10–20 pairs, linear-lanceolate, 6–15 × 1.5–3 mm, abaxially slightly hispid, adaxially glabrous, margin ciliate, apex acute. Heads solitary or 2, axillary, globose, ca. 1 cm in diam.; peduncle long; bracts linear. Flowers numerous, pink, small. Calyx minute. Corolla campanulate; lobes outside pubescent. Stamens 4, exserted. Ovary shortly stipitate, glabrous; ovules 3 or 4; style filiform; stigma small. Legumes arranged in a star, slightly recurved, flat, oblong, 1–2 cm × ca. 5 mm, consisting of 3–5 1-seeded segments which fall away from persistent, bristly sutures. Seeds light brown, ovoid, ca. 3.5 mm. Fl. Mar–Oct, fr. May–Nov. $2n = 52^*$.

Wilderness tracts, wastelands, or cultivated; sea level to 1500 m. Fujian, Guangdong, Guangxi, Hainan, Jiangsu, Taiwan, Yunnan, Zhejiang [native to tropical America; naturalized in tropical regions of the world].

This plant is grown as an ornamental and used medicinally as a sedative and sleep aid.

2. *Mimosa bimucronata* (Candolle) O. Kuntze, Revis. Gen. Pl. 1: 198. 1891.

光荚含羞草 guang jia han xiu cao

Acacia bimucronata Candolle, Prodr. 2: 469. 1825; *Mimosa sepiaria* Benth.

Shrubs, deciduous, 3–6 m tall. Branchlets unarmed in distal parts, in lower parts armed by recurved prickles to 1 cm, densely yellow tomentose. Pinnae 4–9 pairs, 1.5–8 cm; rachis unarmed, pubescent; leaflets 12–16 pairs, linear, 5–7 × 1–1.5 mm, leathery, glabrous to puberulent with ciliate margin, main

vein near upper side, apex mucronate. Heads globose, forming a spreading panicle with compound, spreading lower branches. Flowers white, scented. Calyx cup-shaped, minute. Petals oblong, 2.5–4 mm, connate at base. Stamens 8; filaments 4–5 mm. Ovary initially glabrous. Legume brown, straight, strap-shaped, 3.5–4.5 × ca. 0.6 cm, unarmed, finely reticulate veined, usually with 4–8 segments. Seeds olivaceous, ovoid, compressed, ca. 4.5 mm. $2n = 26^*$.

Introduced in Guangdong, escaped in thin forests [native to South America (NE Argentina and E Brazil)].

3. *Mimosa diplotricha* C. Wright ex Sauvalle, *Anales Acad. Ci. Med. Habana* 5: 405. 1868.

巴西含羞草 *ba xi han xiu cao*

Subshrubs or perennial herbs. Stems scandent or prostrate, to 5 m, 4-angulate, hirsute, with or without prickles along angles. Leaves 10–15 cm; petiole and rachis with 4 rows of recurved prickles; pinnae (3–)7 or 10 pairs, 2–4.5 cm; leaflets (11–)20–30 pairs per pinna, linear-oblong, 3–5 × 1–2 mm, both surfaces white villous. Heads 1 or 2, axillary, ca. 1 cm in diam. (including filaments); peduncles 5–10 mm. Flowers bisexual. Calyx inconspicuous, ca. 0.4 mm. Corolla narrowly funnel-shaped, ca. 2.5 mm, 4-lobed, outside slightly pubescent. Stamens 8; filaments pale purple-pink. Ovary ca. 1 mm. Legumes in clusters, slightly curved, oblong, 1.5–3.5 × 0.4–0.5 cm, with or without prickly bristles. Seeds yellow-brown, ca. 3.5 mm. $2n = 26^*$.

30. *DESMANTHUS* Willdenow, Sp. Pl. 4: 888, 1044. 1806, nom. cons.

合欢草属 *he huan cao shu*

Acuan Medikus.

Subshrubs [or trees, shrubs, or perennial herbs]. Leaves bipinnate; stipules persistent, setaceous; pinnae [1–]2–6[–15] pairs; leaflets small; petiolar gland often between lower pair. Heads solitary, axillary, ovoid-globose. Flowers all bisexual, or lower male or neuter and sometimes without petals but with short staminodes. Calyx campanulate, shortly dentate. Petals free or nearly so. Stamens [5 or]10, free, exserted; anthers eglandular at apex. Ovary sessile; ovules numerous; style subulate or thickened distally; stigma terminal. Legume straight or falcate, linear, plano-compressed to terete, 2-valved, continuous within or subseptate between seeds. Seeds oriented lengthwise or oblique, ovoid to ellipsoidal, compressed.

About 24 species: mainly in tropical and subtropical regions of the Americas; one species (introduced) in China.

1. *Desmanthus pernambucanus* (Linnaeus) Thellung, *Mém. Soc. Sci. Nat. Math. Cherbourg*, sér. 4, 38: 256. 1912.

合欢草 *he huan cao*

Mimosa pernambucana Linnaeus, Sp. Pl. 1: 519. 1753.

Subshrubs, to 2 m tall. Stem glabrous or slightly puberulent, angulate. Stipules subulate; petiolar gland on lowest pair of pinnae; pinnae 2–6 pairs, 1.2–2.5 cm; leaflets 6–21 pairs per pinna, oblong, 4–6 × ca. 2 mm, ciliate along margin, slightly asymmetric, base truncate, apex acute. Heads axillary, ca. 5 mm in diam., 4–10-flowered; bracteoles ovate, caducous. Flowers

Cultivated or naturalized in Fujian, Guangdong, Hainan, Taiwan, and Yunnan [native to tropical America; introduced throughout the tropics].

This species is planted as a cover crop.

- 1a. Plants with prickles 3a. var. *diplotricha*
1b. Plants without prickles 3b. var. *inermis*

3a. *Mimosa diplotricha* var. *diplotricha*

巴西含羞草(原变种) *ba xi han xiu cao (yuan bian zhong)*

Mimosa invisa Martius (1837), not Martius ex Colla (1834).

Plants with prickles.

Cultivated or naturalized in Guangdong, Hainan, and Yunnan [native to tropical America; introduced throughout the tropics].

3b. *Mimosa diplotricha* var. *inermis* (Adelbert) Veldkamp, *Fl. Males. Bull.* 9: 416. 1987.

无刺巴西含羞草 *wu ci ba xi han xiu cao*

Mimosa invisa Martius var. *inermis* Adelbert, *Reinwardtia* 2: 359. 1953.

Plants without prickles.

Cultivated in Fujian, Guangdong, Hainan, and Yunnan [widely cultivated in tropical regions].

white, upper ones bisexual, lower ones male. Calyx campanulate, ca. 2.5 mm, 5-dentate. Petals 5, narrowly lanceolate, 3–4 mm. Stamens 10, ca. 5 mm, free. Ovary oblong, ca. 2 mm. Legume reddish brown, straight or slightly curved, linear, 4–11 × 0.2–0.4 cm. Seeds dark brown, rectangular, ca. 3 mm.

Naturalized in Guangdong, Taiwan, Yunnan [native to tropical America; widely cultivated in the tropics].

In FRPS (39: 20. 1988), the name *Desmanthus virgatus* (Linnaeus) Willdenow was misapplied to this species.

This species is planted as a cover crop.

6. Tribe ACACIEAE

金合欢族 jin he huan zu

Wu Delin (吴德邻 Wu Te-lin); Ivan C. Nielsen

Trees, shrubs, or lianas, armed or unarmed. Stipules spinescent or not. Leaves bipinnate or modified to phyllodes by dilation of petiole and proximal part of rachis; extrafloral nectaries usually present on petiole and rachis or absent; leaflets opposite (in China), sessile or shortly stalked. Inflorescences consisting of pedunculate heads or spikes borne in axillary clusters or aggregated into terminal panicles. Flowers bisexual, or male and bisexual, tetra- or pentamerous, uniform. Sepals connate, valvate. Petals valvate, rarely absent. Stamens numerous, exerted; filaments free or connate at base; anthers glandular or not. Ovary sessile or stipitate; ovules many or 2 rows; style filiform; stigma capitate, small. Legume extremely variable, dehiscent or indehiscent; endocarp not separated from exocarp, not forming envelope around each seed. Seeds usually elliptic to oblong, \pm flattened, with a hard black-brown testa with plesiochrom, wingless; aril usually absent, but present in some phyllodic species.

One genus recognized here and ca. 1,450 species: distributed in the tropics and subtropics, especially Africa and Australia; 18 species (three endemic, seven introduced) in China.

31. ACACIA Miller, Gard. Dict. Abr., ed. 4, [25]. 1754, nom. cons.

金合欢属 jin he huan shu

Acaciella Britton & Rose; *Racosperma* Martius; *Senegalia* Rafinesque; *Vachellia* Wight & Arnott.

Morphological characters and geographic distribution are the same as those of the tribe.

The genus is treated here sensu lato, including the African, American, Asian, and Australian species.

Acacia senegal (Linnaeus) Willdenow and *A. nilotica* (Linnaeus) Delile were treated in FRPS (39: 28, 30. 1988) but are not treated here because they are only rarely cultivated in China.

1a. Leaves reduced to phyllodes.

2a. Phyllodes 10–20 \times 1.5–6 cm; inflorescence a spike 1. *A. auriculiformis*

2b. Phyllodes 6–10 \times 0.4–1 cm; inflorescence a head 2. *A. confusa*

1b. Leaves bipinnate.

3a. Flowers in racemes or spikes.

4a. Trees armed; pinnae 10–30 pairs 7. *A. catechu*

4b. Shrubs unarmed; pinnae 5–15 pairs.

5a. Racemes 2–5 cm; midveins of leaflets close to upper margin 8. *A. yunnanensis*

5b. Racemes shorter than 2 cm; midveins of leaflets subcentral 5. *A. glauca*

3b. Flowers in heads, then rearranged in panicles.

6a. Trees or shrubs.

7a. Shrubs armed; stipules spinescent 18. *A. farnesiana*

7b. Shrubs unarmed or rarely with sparse prickles.

8a. Leaflets 4–8 mm.

9a. Leaflets glabrous; heads 6–8 mm in diam. 4. *A. decurrens*

9b. Leaflets sparsely pubescent; heads ca. 10 mm in diam. 13. *A. teniana*

8b. Leaflets 2–4 mm.

10a. Legume 7–12 mm wide, glabrous, glaucous 3. *A. dealbata*

10b. Legume 4–5 mm wide, pubescent 6. *A. mearnsii*

6b. Climbers.

11a. Midvein of leaflets starting centrally or subcentrally.

12a. Base of leaflets truncate, leaflets densely puberulent 9. *A. tonkinensis*

12b. Base of leaflets rounded to cuneate, leaflets abaxially glabrous to faintly adpressed
puberulent 10. *A. caesia*

11b. Midvein starting marginally.

13a. Lateral veins of leaflets abaxially not forming a reticulate pattern.

14a. Petiolar gland in lower half of petiole, usually just above basal pulvinus; leaflets
apically sharply acute, often bent forward 16. *A. pennata*

14b. Petiolar gland at or above middle of petiole; leaflets apically obtuse, straight 17. *A. megaladena*

13b. Lateral veins of leaflets abaxially forming a reticulate pattern.

15a. Midvein parallel to upper margin of leaflets 11. *A. vietnamensis*

15b. Midvein not parallel to upper margin of leaflets.

- 16a. Leaflets membranous, with a wrinkled appearance when dried; legume fleshy, with wrinkled surfaces seeming to break into segments 12. *A. concinna*
 16b. Leaflets papery, without a wrinkled appearance when dried; legume papery, smooth, not seeming to break into segments.
 17a. Branchlets glaucous, puberulent to tomentose when young 14. *A. pruinescens*
 17b. Branchlets brownish, glabrous 15. *A. delavayi*

1. *Acacia auriculiformis* A. Cunningham ex Bentham, London J. Bot. 1: 377. 1842.

大叶相思 da ye xiang si

Racosperma auriculiforme (A. Cunningham ex Bentham) Pedley.

Trees, evergreen, to 20 m tall. Bark gray-white, smooth. Branches pendulous; branchlets angular, glabrous, with conspicuous lenticels. Phyllodes falcate-oblong, 10–20 × 1.5–4(–6) cm, conspicuous main veins 3 or 4, both ends attenuate. Spikes 1 to several, fasciculate, axillary or terminal, 3.5–8 cm. Flowers orange-yellow. Calyx 0.5–1 mm, shallowly dentate. Petals oblong, 1.5–2 mm. Filaments 2.5–4 mm. Ovary densely puberulent. Legume contorted when mature, 5–8 × 0.8–1.2 cm, valves woody. Seeds ca. 12, black, ca. 5 × 3.5 mm. $2n = 26^*$.

Cultivated in Fujian, Guangdong, Guangxi, Zhejiang [native to N Australia and New Guinea].

2. *Acacia confusa* Merrill, Philipp. J. Sci., C, 5: 27. 1910.

台湾相思 tai wan xiang si

Acacia confusa var. *inamurae* Hayata; *Racosperma confusum* (Merrill) Pedley.

Trees, evergreen, 6–15 m tall, glabrous. Branches gray or brown, unarmed; branchlets slender, angular. Phyllodes straight or slightly falcate, linear-lanceolate, 6–10 × 0.5–1.3 cm, leathery, both surfaces glabrous, conspicuous longitudinal veins (3–)5(–8), both ends acuminate, apex slightly obtuse, usually with hooked acumen. Heads solitary or 2- or 3-fasciculate, axillary, globose, ca. 0.7 cm in diam.; peduncles 7–13 mm, slender. Flowers golden yellow, fragrant. Calyx 1–1.3 mm. Petals greenish, 1.5–1.9 mm. Stamens numerous, ca. 3.5 mm. Ovary yellow-brown villous; style ca. 4 mm. Legume black-brown, flat, 4–9(–12) × 0.7–1 cm. Seeds broadly elliptic, 5–6 × 3.5–5 mm. Fl. Mar–Oct, fr. Aug–Dec. $2n = 26^*$.

Widely cultivated in Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [native to Philippines].

This tree is grown for its wood and tannins. The seeds are poisonous.

3. *Acacia dealbata* Link, Enum. Hort. Berol. Alt. 2: 445. 1822.

银荆 yin jing

Acacia decurrens Willdenow var. *dealbata* (Link) F. Mueller ex Maiden; *Racosperma dealbatum* (Link) Pedley.

Shrubs or trees, small, ca. 15 m tall, unarmed. Young branchlets slightly angular with ridges gray tomentose, glaucous. Leaves argenteous to greenish or golden when not extended; rachis not angulate; glands at rachis of pinna insertion; pinnae 10–20(–25); leaflets 26–46 pairs, dense, distance be-

tween leaflets not more than width of 1 leaflet, linear, 2.6–3.5 × 0.4–0.5 mm, abaxially or both surfaces gray-white pubescent. Heads 6–7 mm in diam., arranged in axillary racemes or panicles; peduncles ca. 3 mm. Flowers yellowish or orange-yellow. Legume red-brown or black, glaucous, oblong, flat, 3–8 cm × 7–12 mm, glabrous. Seeds elliptic, flat. Fl. Apr, fr. Jul–Aug. $2n = 26$.

Cultivated in Fujian, Guangxi, Guizhou, Sichuan, Taiwan, Yunnan, Zhejiang [native to Australia].

This species is grown for its tannins and as a honey plant.

4. *Acacia decurrens* Willdenow, Sp. Pl. 4: 1072. 1806.

线叶金合欢 xian ye jin he huan

Racosperma decurrens (Willdenow) Pedley.

Trees, unarmed, 7–15 m tall. Branchlets glabrous, conspicuously angulate. Leaf glands on rachis between leaflets; pinnae (3–)7–15 pairs; leaflets widely spaced, 15–45 pairs, linear, 5–10 × 0.3–0.8 mm, main vein close to upper margin. Heads 6–8 mm in diam., arranged in racemes or panicles. Flowers yellow. Calyx shortly ciliate. Petals with conspicuous midvein. Stamens exerted. Legume oblong, flat, 2–10.5 cm × 4–8.5 mm, almost leathery, constricted between seeds. Seeds ovoid. Fl. Jan–Apr, fr. May–Aug. $2n = 26^*$.

Cultivated in Guangdong, Guangxi, Yunnan, Zhejiang [native to Australia].

This plant is grown for its tannins.

5. *Acacia glauca* (Linnaeus) Moench, Methodus, 466. 1794.

灰合欢 hui he huan

Mimosa glauca Linnaeus, Sp. Pl. 1: 520. 1753; *Acacia villosa* (Swartz) Willdenow; *Acaciella villosa* (Swartz) Britton & Rose; *M. villosa* Swartz.

Shrubs, unarmed, 3–8 m tall. Branchlets and petioles pubescent. Stipules deciduous, lanceolate; pinnae 5–8 pairs, 3–6 cm, not glandular; leaflets 10–30 pairs, oblong, 4–8 × 1–3 mm, both surfaces glabrous or abaxially sparsely pubescent, midvein near middle, bilaterally slightly asymmetric, base rounded, margin ciliate, apex obtuse-rounded or very shortly mucronate. Racemes 2–6-fasciculate, axillary, oblong or subglobose, 1–1.5 cm, 20–30-flowered; peduncles 1–1.5 cm. Flowers slightly fragrant; pedicels 1–2 mm. Calyx cup-shaped, ca. 0.5 mm. Corolla 2.5–3 mm, base tubular. Stamens numerous, initially white, turning yellow, 6–7 mm. Legume oblong, compressed, 4.5–6.6 × 1.5–2 cm, membranous, often irregularly constricted, villous. Seeds 3–6. Fl. and fr. Jul–Nov.

Introduced in Fujian, Guangdong [native to the West Indies].

This is a host plant of the lac insect.

6. *Acacia mearnsii* De Wildeman, Pl. Bequaert. 3: 62. 1925.

黑荆 hei jing

Racosperma mearnsii (De Wildeman) Pedley.

Trees, 9–15 m tall. Branchlets angulate, gray-white tomentose. Young leaves golden tomentose, mature leaves gray pubescent; rachis not angulate; pinnae 6–30 pairs, 0.5–5.5 cm, glands at rachis of pinna insertion and elsewhere; leaflets 10–68 pairs, dense, linear, 0.7–6 × 0.4–0.8(–1) mm, margin, abaxial surface, or sometimes both surfaces pubescent. Heads globose, 6–7 mm in diam., arranged in axillary racemes or terminal panicles; peduncles 7–10 mm; rachis yellow, densely tomentose. Flowers yellowish or white. Legume black, oblong, flat, 5–10 cm × 4–5 mm, slightly constricted between seeds, pubescent. Seeds black, shiny, ovoid. Fl. Jun, fr. Aug.

Cultivated in Fujian, Guangdong, Guangxi, Sichuan, Taiwan, Yunnan, Zhejiang [native to Australia].

This species is grown for its tannins and as a honey plant.

7. *Acacia catechu* (Linnaeus f.) Willdenow, Sp. Pl. 4: 1079. 1806.

儿茶 er cha

Mimosa catechu Linnaeus f., Suppl. Pl. 439. 1782; *Acacia catechu* var. *wallichiana* (Candolle) P. C. Huang; *A. wallichiana* Candolle.

Trees, deciduous, small, 6–10 m tall. Bark split into laminar strips. Branchlets pubescent, often with a pair of flat, brown, hooked spines below stipules or without spines. Leaf glands near petiolar base and between several upper leaflets of rachis; rachis villous; pinnae 10–30 pairs; leaflets 20–50 pairs, linear, 2–6 × 1–1.5 mm, ciliate. Spikes 1–4, axillary, 2.5–10 cm. Flowers yellowish or white. Calyx campanulate, 1.2–1.5 cm; teeth deltoid, hairy. Petals lanceolate or oblanceolate, ca. 2.5 cm, sparsely pubescent. Stamens numerous. Ovary ca. 1 mm, glabrous. Legume brown, straight, strap-shaped, 12–15 × 1–1.8 cm, nitid, dehiscent, stalk 3–7 mm, apex rostrate. Seeds 3–10. Fl. Apr–Aug, fr. Sep to following Jan. $2n = 26$.

Native in Yunnan (Lincang, Xishuangbanna); cultivated in Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand; introduced elsewhere].

This plant is used medicinally.

8. *Acacia yunnanensis* Franchet, Pl. Delavay. 193. 1890.

云南相思树 yun nan xiang si shu

Shrubs, 4–5 m tall, pubescent throughout, generally unarmed; old branches with recurved prickles on internodes. Stipules deciduous, oblong; petiole with raised, elliptic gland; pinnae 5–15 pairs, 2–5 cm; leaflets oblong, 4–10 × 1.8–2 mm, midvein close to upper margin, both surfaces sparsely pubescent, base obtuse-rounded, apex acute. Racemes 2–5 cm, 2- or 3-fasciculate or arranged in panicle. Calyx ca. 2.5 mm. Corolla ca. 5 mm; lobes ca. 2 mm, densely golden tomentose. Filaments ca. 1.1 cm. Ovary pubescent, with ca. 1 mm stipe; style ca. 3 mm. Legume oblong, ca. 15 × 2–3 cm, base attenuate, stalklike,

apex long acuminate, slightly constricted between seeds. Seeds brown, flat. Fl. May.

• Thickets; 1700–2200 m. Sichuan, Yunnan.

9. *Acacia tonkinensis* I. C. Nielsen, Adansonia, n.s., 19: 358. 1980.

滇南金合欢 dian nan jin he huan

Climbers, armed with scattered, recurved prickles on internodes. Branchlets hirsute, with light glands. Stipules caducous, filiform, 4–6 mm; petiole 3.2–5.5 cm, with 2 hollow glands above base and at or above middle, ca. 1.5 mm in diam.; leaflets 17–33 pairs, oblong to subfalcate, 5–9.5 × 2–2.5 mm, adaxial surface and margin strigose, main vein starting centrally at base, running eccentrically toward apex, not parallel to upper margin, lateral veins inconspicuous, base fully truncate, apex asymmetrically rounded-truncate, apiculate, bent forward. Heads with bracts projecting beyond flowers in bud. Calyx lobes adnate at base only, oblong, ca. 2 mm. Corolla ca. 2.5 mm; lobes triangular-ovate, ca. 1 mm. Stamens numerous. Ovary puberulent. Legume red-brown, oblong, flat, 1.3–2.4 × 1.2–1.3 cm, papery, margin slightly sinuate, with glandular hairs, dehiscent. Seeds irregularly ellipsoidal, 8–12 × 5–7 mm.

Thin forests; 400–700 m. S Yunnan [Laos, N Vietnam].

10. *Acacia caesia* (Linnaeus) Willdenow, Sp. Pl. 4: 1090. 1806.

尖叶相思 jian ye xiang si

Mimosa caesia Linnaeus, Sp. Pl. 1: 522. 1753; *Acacia caesia* var. *subnuda* (Craib) I. C. Nielsen; *A. intsia* (Linnaeus) Willdenow var. *caesia* (Linnaeus) Wight & Arnott ex Baker; *A. intsia* var. *oxyphylla* Graham ex Baker; *A. oxyphylla* Graham var. *subnuda* Craib.

Climbers, with recurved prickles on internodes. Branchlets and leaf rachis tomentose or glabrous. Stipules filiform, ca. 3 × 1 mm; petiole with gland 0.3–1 cm above base, in lower half of petiole, and glands on rachis between several upper pinnae; pinnae 6–8(–13) pairs, 3.5–9.5 cm; leaflets 8–19 pairs, oblong, (0.6–)1–1.2 cm × (1.1–)4–5 mm, both surfaces glabrous, main vein starting from center of leaf base, close and parallel to upper margin, apex apiculate. Heads less than 1.2 cm in diam., 1–4 arranged in panicles; peduncles tomentose. Flowers yellow. Calyx 1.5–2 mm; lobes ovate, 0.3–0.5 mm, apex acute. Corolla 2–3 mm; lobes ovate-elliptic, (0.5–)1 mm. Ovary 0.8–1 mm, puberulent to velutinous; stipe ca. 1.5 mm. Legume strap-shaped, 10–15 × 2–3 cm, dehiscent, sutures straight or slightly sinuous, base attenuate, stalklike. Seeds 8–12. Fl. Sep, fr. Nov.

Secondary forests; 200–2500 m. Guangdong, Hainan, Sichuan, Taiwan, Yunnan [Bangladesh, Cambodia, India, Laos, Myanmar, Sri Lanka, Thailand, Vietnam].

11. *Acacia vietnamensis* I. C. Nielsen, Adansonia, n.s., 19: 360. 1980.

越南金合欢 yue nan jin he huan

Shrubs, scandent, armed with scattered, recurved thorns. Young branchlets puberulent, with glandular hairs, glabrescent. Leaf petiole 4–5 cm; glands above base of petiole, elliptic, 0.5–1 mm, raised, flat to slightly concave, rachis glands sessile;

leaflets 25–40 pairs, sessile, oblong, 4–6.5 × 1–1.5 mm, midvein starting eccentrically at base, running parallel to upper margin, lateral veins reticulate, base asymmetrically truncate, apex very asymmetrically acute, bent forward. Calyx campanulate, 1.8–2 mm; teeth triangular, ca. 0.5 mm, glandular puberulent. Corolla ca. 2.5 mm, glandular puberulent; lobes elliptic, ca. 1.1 mm. Stamens numerous. Ovary velutinous. Legume (immature) red-brown, oblong, flat, ca. 11 × 2.8 cm, papery, with light glandular hairs. Seeds unknown. Fl. Mar–Jul, fr. Jun–Dec.

Thickets. Guangxi, Guangdong, Guizhou, Hainan, Hunan, Jiangxi, Zhejiang [Laos, Vietnam].

12. *Acacia concinna* (Willdenow) Candolle, Prodr. 2: 464. 1825.

藤金合欢 teng jin he huan

Mimosa concinna Willdenow, Sp. Pl. 4: 1039. 1806; *Acacia sinuata* (Loureiro) Merrill (1935), not Jacques (1860); *M. sinuata* Loureiro.

Climbers, scandent shrubs, or small trees. Branchlets and leaf rachises gray tomentose; prickles abundant, minute, hooked. Stipules deciduous, ovate-cordate, 3–8 × 1.5–6 mm; leaf 10–20 cm; pinnae 6–18 pairs, 8–12 cm; glands near base of petiole and one between uppermost pinnae; leaflets 15–25 pairs, glaucous abaxially, greenish adaxially, linear-oblong, 8–12 × 2–3 mm, membranous, with a wrinkled appearance when dry, both surfaces hirsute or glabrescent, margin ciliate, midvein near upper margin. Heads globose, 9–12 mm in diam., arranged in a panicle; branches tomentose. Flowers white or yellowish, fragrant. Calyx funnel-shaped, ca. 2 mm. Corolla slightly exerted. Ovary glabrous or sericeous, stipitate. Legume brown, strap-shaped, 8–15 × 2–3 cm, fleshy, with wrinkled surfaces, sutures straight or slightly sinuate, seeming to break into segments. Seeds 6–10. Fl. Apr–Jun, fr. Jul–Dec.

Thin forests, thickets; 200–1100 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Yunnan [tropical Asia].

This plant is important for its tannins and is used medicinally.

Because Merrill did not mention any type specimens of *Acacia sinuata* (Loureiro) Merrill, based on *Mimosa sinuata* Loureiro, the name is regarded by us as dubious (see Nielsen, Adansonia, n.s., 19: 349. 1980).

13. *Acacia teniana* Harms, Repert. Spec. Nov. Regni Veg. 17: 133. 1921.

无刺金合欢 wu ci jin he huan

Trees, small, or shrubs, ca. 3 m tall, armed with recurved prickles at internodes. Bark brown or grayish, often split. Young branchlets pubescent, glabrescent. Leaf gland at middle part of petiole, soon deciduous or without gland; pinnae 7–13 pairs, 7–12 cm or longer, pubescent; leaflets 20–40 pairs, obliquely lanceolate or linear-lanceolate, 4–8 mm, sparsely sericeous when young, margin ciliate, midvein oblique, apex acute or slightly acute. Heads ca. 1 cm in diam., 2–6 in axillary or terminal panicles; peduncles 2–4 cm, villous. Flowers puberulent or subglabrous. Calyx ca. 2 mm. Corolla ca. 3 mm. Filaments ca. 5 mm. Ovary glabrous. Legume oblong, 8–10 × 2.5–3 cm. Fl. May–Jun, fr. Jan of following year.

• Forests; 800–1500 m. Sichuan, Yunnan.

14. *Acacia pruinescens* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 45: 296, 298. 1877.

粉被金合欢 fen bei jin he huan

Acacia pruinescens var. *luchunensis* C. Chen & H. Sun.

Climbers, woody, or scandent shrubs. Branchlets with recurved spines, glaucous and pubescent when young. Stipules cordate-hastate, pubescent; petiole with oblong gland above base; pinnae 9–11 pairs, 3.3–9 cm; rachis pubescent, with few recurved spines; leaflets numerous, sessile, linear, 7–11(–16) × 1.8–2.5(–4) mm, glabrous or ciliate, midvein close to upper margin, base truncate, apex obtuse. Heads arranged in axillary panicles to 25 cm; peduncles 1.5–2.2 cm. Flowers yellow. Calyx tubular, 2–3 mm, pubescent, apex truncate. Corolla 3–4 mm; tube glabrous; lobes 0.5–1.5 mm, sparsely pubescent or glabrous. Stamens numerous, with deciduous gland at apex. Ovary apically sparsely pubescent. Legume brownish, oblong, flat, 18–20 × 2.9–3.2 cm, both ends acute, sutures thickened, glabrous. Seeds oblong, 7–10 mm. Fl. Apr, fr. Jun–Oct.

Thin forests; 1200–1600 m. Guangxi, Yunnan [Myanmar, Vietnam].

15. *Acacia delavayi* Franchet, Pl. Delavay. 194. 1890.

光叶金合欢 guang ye jin he huan

Climbers. Branchlets brownish, glabrous, angulate, with short straight or slightly recurved prickles. Leaf petiole short, spinose; pinnae 3–5 pairs, 14–20 cm; leaflets dense, linear, 6–7 mm, less than 2 mm wide, glabrous, base obtuse or auriculate, apex obtuse. Heads solitary or paired, axillary, globose, ca. 1 cm in diam.; peduncles 3–4 cm. Calyx ca. 2 mm; lobes ca. 0.4 mm, apex acute. Corolla 3–3.5 mm; lobes ca. 1 mm, glabrous. Stamens ca. 2 × as long as corolla. Ovary ca. 1 mm, velutinous; stipe ca. 1.5 mm. Legume oblong, very flat, 8–10 × 2–3 cm, subleathery, both ends subrounded or obtuse, dehiscent. Seeds 7–9, gray, oblong-rhombic, flat. Fl. Jul, fr. Sep.

• Mountains, secondary forests; 1500–2200 m. Guizhou, Yunnan.

1a. Base of leaflets obtuse 15a. var. *delavayi*

1b. Base of leaflets auriculate 15b. var. *kunmingensis*

15a. *Acacia delavayi* var. *delavayi*

光叶金合欢(原变种) guang ye jin he huan (yuan bian zhong)

Acacia cavaleriei H. Léveillé.

Base of leaflets obtuse.

• Mountains; 1700–2200 m. Yunnan.

15b. *Acacia delavayi* var. *kunmingensis* C. Chen & H. Sun, Acta Bot. Yunnan. 12: 262. 1990.

昆明金合欢 kun ming jin he huan

Base of leaflets auriculate.

• Secondary forests; ca. 1500 m. Guizhou, Yunnan (Kunming).

16. *Acacia pennata* (Linnaeus) Willdenow, Sp. Pl. 4: 1090. 1806.

羽叶金合欢 yu ye jin he huan

Mimosa pennata Linnaeus, Sp. Pl. 1: 522. 1753.

Climbers, with copious, scattered prickles. Branchlets and leaf rachis ferruginous pubescent. Stipules (ovate-)lanceolate, 3–5 × 1–1.5 cm, cuspidate; petiolar glands subpulvinate, narrowly terete or slightly obconic, 0.3–3 mm in diam., below middle of petiole, usually just above basal pulvinus and several between distal pinnae; pinnae 8–22 pairs; leaflets 30–54 pairs, densely crowded, linear, 5–10 × 0.5–1.5 mm, midvein near upper margin, base truncate, margin ciliate, apex sharply acute, asymmetric, bent forward, often nearly hooked, or apex broadly acute, straight. Heads solitary or 2- or 3-fasciculate, globose, ca. 1 cm in diam., arranged in axillary or terminal panicles; peduncles 1–2 cm, yellow pubescent or reddish glandular hairy. Flowers pedicellate or subsessile. Calyx subcampanulate, 1.5–2.5 mm, 5-toothed. Corolla 2–3.2(–4.2) mm. Ovary puberulent, stipitate. Legume strap-shaped, 9–20 × 2–3.5 cm, glabrous or finely puberulent when young, sutures slightly sinuate. Seeds black, 8–12, narrowly elliptic, 6–10 × 4.5–7 mm, flat. Fl. Mar–Oct, fr. Jul–Apr of following year.

Thin forests, thickets. Fujian, Guangdong, Guangxi, ?Guizhou, Hainan, Yunnan, ?Zhejiang [Bhutan, Cambodia, India, Laos, ?Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

Acacia pennata var. *pennata* occurs in India, Myanmar, Sri Lanka, and Thailand.

- 1a. Leaflets broadly acute, straight at apex 16a. subsp. *kerrii*
 1b. Leaflets sharply acute, asymmetric at apex, bent forward 16b. subsp. *hainanensis*

16a. *Acacia pennata* subsp. *kerrii* I. C. Nielsen, Adansonia, n.s., 19: 353. 1980.

柯氏羽叶金合欢 ke shi yu ye jin he huan

Glands subpulvinate, elliptic, 1–3 mm in diam. Leaflets broadly acute, straight at apex, main vein not parallel to upper margin. Inflorescences yellow pubescent. Corolla 2.5–3.2 mm.

Thin forests, thickets. Yunnan [Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

16b. *Acacia pennata* subsp. *hainanensis* (Hayata) I. C. Nielsen, Adansonia, n.s., 19: 352. 1980.

海南羽叶金合欢 hai nan yu ye jin he huan

Acacia hainanensis Hayata, Icon. Pl. Formosan. 3: 86. 1913.

Glands narrowly terete or slightly obconic, 0.3–0.8 mm in diam. Leaflets sharply acute, bent forward. Inflorescences reddish glandular hairy. Flowers subsessile. Corolla 2–2.5 mm.

Thin forests, thickets. Fujian, Guangdong, Guangxi, Hainan, Yunnan [India, Myanmar, Vietnam].

17. *Acacia megaladena* Desvaux, J. Bot. Agric. 3: 69. 1814.

钝叶金合欢 dun ye jin he huan

Climbers, woody. Young branchlets pubescent and glandular hairy, glabrescent when old. Stipules linear to filiform, 2–3 cm; petiole 2.5–6.5 cm; glands at or above middle, elliptic and raised, rarely flat; pinnae 8–20 pairs, rachis 2–12 cm; leaflets 19–81 pairs, oblong, (2–)3.5–7.5 × 0.8–1.5 mm, both surfaces

glabrous, except ciliate along margin, midvein close to upper margin, base truncate, unequal, apex obtuse, straight. Heads globose, arranged in terminal or axillary panicles. Flowers sessile or subsessile. Calyx 1.7–2.9 mm, glabrous, puberulent, or velutinous, 5-toothed. Corolla light yellow, 2–4.2 mm, glabrous or puberulent; lobes oblong or narrowly obovate, 0.8–1.1 mm. Stamens numerous. Ovary sericeous, shortly stipitate. Legume red-brown, oblong, flat, 9.5–17 × 1.3–3.5 cm, papery, glabrous. Seeds brown, ovoid-ellipsoidal to ellipsoidal, flat, 7–9 × 4.5–5.5 mm. Fl. May–Jun, fr. Sep–Oct.

Thin forests, thickets; 800–1600 m. Guangxi, Yunnan [widely distributed in tropical Asia].

- 1a. Calyx glabrous to faintly puberulent; corolla 2–3.4 mm 17a. var. *megaladena*
 1b. Calyx velutinous; corolla ca. 4.2 mm 17b. var. *garrettii*

17a. *Acacia megaladena* var. *megaladena*

钝叶金合欢(原变种) dun ye jin he huan (yuan bian zhong)

Acacia arrophula D. Don ex Wallich; *A. pennata* (Linnaeus) Willdenow var. *arrophula* (D. Don ex Wallich) Baker.

Calyx glabrous to faintly puberulent. Corolla 2–3.4 mm.

Thin forests, thickets; 800–1600 m. Guangxi, Yunnan [widely distributed in tropical Asia].

17b. *Acacia megaladena* var. *garrettii* I. C. Nielsen, Adansonia, n.s., 19: 351. 1980.

盘腺金合欢 pan xian jin he huan

Calyx velutinous. Corolla ca. 4.2 mm.

Thin forests, thickets; ca. 1600 m. Guangxi, Yunnan [Thailand].

18. *Acacia farnesiana* (Linnaeus) Willdenow, Sp. Pl. 4: 1083. 1806.

金合欢 jin he huan

Mimosa farnesiana Linnaeus, Sp. Pl. 1: 521. 1753; *Vachellia farnesiana* (Linnaeus) Wight & Arnott.

Shrubs or small trees, 2–4 m tall. Bark brown, rough. Branches numerous; branchlets zigzag, with small lenticels. Leaves 2–7 cm; stipules spinelike, spines 1–2 cm, shorter on short branchlets; leaf rachis villous, glandular; pinnae 4–8 pairs, axillary, 1.5–3.5 cm in diam.; leaflets 10–20 pairs, linear-oblong, 2–6 × 1–1.5 mm, glabrous. Heads 1–3, axillary, 1–1.5 cm in diam.; peduncles 1–3 cm, hairy; bracts at or near tip of peduncle. Flowers yellow, fragrant. Calyx ca. 1.5 mm, 5-toothed. Corolla ca. 2.5 mm, 5-toothed. Stamens ca. 2 × as long as corolla. Ovary cylindric, puberulent. Legume brown, straight or curved, turgid, subcylindric, 3–7 cm × 8–15 mm, glabrous, scarcely dehiscent, filled with a pith separating seeds from each other. Seeds several, brown, ovoid, ca. 6 mm. Fl. Mar–Jun, fr. Jul–Dec. *2n* = 26, 52.

Cultivated in Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Sichuan, Taiwan, Yunnan, Zhejiang [native to tropical America; cultivated throughout the tropics].

This species is grown as a hedge plant and is used medicinally and for dyes and gums.

7. Tribe INGEAE

印加树族 yin jia shu zu

Wu Delin (吴德邻 Wu Te-lin); Ivan C. Nielsen

Leaves pinnate or bipinnate; stipules most often inconspicuous, sometimes spinescent; petiole, rachis, and pinnae most often with glands; leaflets opposite or (rarely) alternate, rarely 1-foliolate. Flowers heteromorphic or not, in heads, corymbs, umbels, racemes, spikes, or panicles, these again axillary or arranged in axillary and/or terminal panicle, cauliflory present in some genera. Calyx gamosepalous, valvate. Corolla gamopetalous, valvate. Stamens numerous, lower part of filaments united into a tube; anther glandless; pollen-grains usually collected into 2–6 masses in each locus. Ovaries 1 to many, free. Legumes various, dehiscent or not, straight, spirally contorted to curved, moniliform or not, segmented or not, funicular aril present in a few species. Seeds various, with pleurogram or not.

About 35 genera and 930–970 species: mostly distributed in tropics; seven genera (four introduced) and 38 species (five endemic, seven introduced) in China.

- 1a. Legume dehiscent into 2 valves.
 - 2a. Legume curved into a circle; stipules spinescent 33. *Pithecellobium*
 - 2b. Legume straight or slightly curved; stipules not spinescent.
 - 3a. Legume with thickened sutures, elastically dehiscing from apex and downward; seeds with pleurogram 32. *Calliandra*
 - 3b. Legume without thickened sutures, dehiscing along both dorsal and ventral sutures; seeds without pleurogram 37. *Archidendron*
- 1b. Legume indehiscent or late dehiscent.
 - 4a. Legume contorted into a half or full circle 36. *Enterolobium*
 - 4b. Legume straight.
 - 5a. Flowers in spikes 34. *Falcataria*
 - 5b. Flowers in head or short corymbs.
 - 6a. Legume septate between seeds, thick, fleshy 38. *Samanea*
 - 6b. Legume not septate between seeds, flat, thin 35. *Albizia*

32. CALLIANDRA Benth, J. Bot. (Hooker) 2: 138. 1840, nom. cons.

朱缨花属 zhu ying hua shu

Shrubs or small trees, usually unarmed. Leaves bipinnate, eglandular; stipules often persistent, or sometimes spinescent, rarely absent; pinnae 1 to several pairs; leaflets opposite, small and numerous, or larger and from few pairs to only 1. Heads globose and axillary, or racemes terminal. Flowers (5 or)6-merous, polygamous. Calyx campanulate, toothed. Petals united to middle; middle flowers sometimes heteromorphic with an elongated tubular corolla. Stamens numerous (to 100), red or white, ± united into a tube and long exerted, showy; anthers mostly glandular hairy. Ovary sessile, ovules numerous; style filiform. Legume slightly falcate, strap-shaped, flat, rigidly leathery, often narrowed to base, margin thickened, 2-valved, valves elastically opening from apex to base, continuous inside. Seeds obovoid or orbicular, compressed, testa hard, with pleurogram, without aril.

About 200 species: mainly in tropical and subtropical regions of the Americas, a few in India, Madagascar, and Myanmar; two species (one introduced) in China.

Calliandra riparia Pittier, native to South America, is not treated here because it is only cultivated in China and not commonly so.

- 1a. Stipules spinelike 1. *C. umbrosa*
- 1b. Stipules not spinelike, ovate-lanceolate 2. *C. haematocephala*

1. *Calliandra umbrosa* (Wallich) Benth in Bentham & Hooker, Gen. Pl. 1: 597. 1865.

云南朱缨花 yun nan zhu ying hua

Inga umbrosa Wallich, Pl. Asiat. Rar. 2: 23. 1831.

Shrubs, 1–2 m tall. Branchlets terete. Stipules spinelike, 0.5–1.5 cm; petiole 0.4–5 cm, glabrous; pinnae 1 pair, 2–5.5 cm, with a pair of large sessile leaflets at apex and an odd one much smaller below on outside, all with a gland on rachis at base; leaflets oblong to elliptic, 3–15 × 1.5–7.5 cm, subleathery, base cuneate, often oblique, apex acuminate. Heads axillary or

on old branches; peduncles 3–4 cm. Flowers homogeneous, tetramerous. Calyx campanulate, ca. 1.3 mm, slightly 4-toothed. Corolla funnel-shaped, ca. 7 mm. Stamens numerous; filaments white. Ovary glabrous. Legume strap-shaped, flat, 10–14 × 2–2.4 cm, margin thickened, base attenuate, apex rounded, oblique, mucronate, dehiscent from apex to base. Seeds 4. Fl. Aug–Oct, fr. Jan–Mar.

Thickets; 300–400 m. W Yunnan (Yingjiang) [India].

2. *Calliandra haematocephala* Hasskarl, Retzia 1: 216. 1855.

朱缨花 zhu ying hua

Shrubs or small trees, deciduous, 1–3 m tall. Branchlets brown, cylindric, rough. Stipules persistent, ovate-lanceolate; petiole 1–2.5 cm; pinnae 1 pair, 8–13 cm; petiolules ca. 1 mm; leaflets 7–9 pairs, obliquely lanceolate, 2–4 cm × 7–15 mm, sparsely pilose along margin, midvein close to upper margin, base oblique, apex obtuse, mucronate. Heads axillary, ca. 3 cm in diam. (including filaments); peduncles 1–3.5 cm. Calyx campanulate, ca. 2 mm. Corolla purplish; tube 3.5–5 mm, 5-lobed; lobes reflexed, ca. 3 mm, glabrous. Stamens numerous, scarlet, very brilliant; staminal tube white, ca. 6 cm, mouth inside with

a subulate appendix; filaments deep red, ca. 2 cm. Legume dull brown, linear-oblongate, 6–11 cm × 5–13 mm, valves elastically open from apex to base along sutures when ripe, reflexed. Seeds 5 or 6, brown, oblong, 7–10 × ca. 4 mm. Fl. Aug–Sep, fr. Oct–Nov.

Cultivated in gardens of Fujian, Guangdong, Taiwan [native to South America].

This plant is grown as an ornamental.

33. PITHECELLOBIUM Martius, Flora 20(2, Beibl.): 114. 1837 [“*Pithecollobium*”], nom. cons.

牛蹄豆属 niu ti dou shu

Trees [or shrubs], armed by spinescent stipules and stipels. Leaves bipinnate, not sensitive to touch; rachis and pinnae usually with extra-floral nectaries; leaflets 1 [to several] pairs per pinna. Inflorescences pedunculate heads or corymbs aggregated in terminal or axillary panicles. Flowers uniform, bisexual, 5-merous. Calyx shortly toothed. Corolla gamopetalous, 5-lobed. Stamens numerous, united into a tube at base. Ovary solitary. Legume spirally contorted [or straight], in most species dark brown outside, reddish orange within, flat, dehiscing along both sutures. Seeds brown or blackish, obovoid or asymmetric; testa hard, with a pleurogram; funicle developed into an aril.

About 18 species: indigenous to tropical and subtropical regions of the Americas; one species (introduced) in China.

1. *Pithecellobium dulce* (Roxburgh) Benth, London J. Bot. 3: 213. 1844.

牛蹄豆 niu ti dou

Mimosa dulcis Roxburgh, Pl. Coromandel 1: 67. 1798.

Trees, evergreen. Branches often pendulous; branchlets armed with spinescent stipules. Pinnae 1 pair; glands at junction of pinnae and leaflets; leaflets sessile, 1 pair per pinna, elliptic or obovate-elliptic, 2–5 × 0.2–2.5 cm, both surfaces glabrous, reticulate veins raised abaxially, base slightly oblique, apex

obtuse or emarginate. Inflorescence pedunculate heads, aggregated in terminal panicles. Calyx funnel-shaped, 1–1.5 mm, tomentose. Corolla ca. 6 mm. Stamens numerous, connate into a tube at base. Legume blackish brown, curved into a circle, flat, 5–7 cm in diam. Seeds dark brown, shiny, ovoid-ellipsoid, ca. 1.5 cm, hard, with pleurogram. Fl. Mar–Jun, fr. Jul. $2n = 26$.

Cultivated in Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, Yunnan, Zhejiang [native to tropical regions of C and N South America; cultivated throughout the tropics].

The timber is used for general construction and the bark for its tannins.

34. FALCATA (I. C. Nielsen) Barneby & J. W. Grimes, Mem. New York Bot. Gard. 74: 254. 1996.

南洋楹属 nan yang ying shu

Paraserianthes sect. *Falcataria* I. C. Nielsen, Bull. Mus. Natl. Hist. Nat., B, Adansonia 5: 327. 1984.

Trees, unarmed. Leaves bipinnate; stipules caducous; pinnae 6–20 pairs; leaflets numerous, subsessile, opposite. Inflorescence axillary, consisting of 2- or 3-times-branched panicles of few flowered spikes. Flowers homomorphic, sessile. Calyx broadly campanulate or hemispherical, 5(or 6)-toothed. Corolla sericeous; lobes as many as calyx teeth, ca. 1/4 connate into a tube. Stamens numerous. Ovary with an intrastaminal disk around base. Legume straight, broadly linear, plano-compressed, stiffly papery, narrowly winged along ventral suture, late dehiscent through both sutures. Testa hard, with pleurogram.

Three species: Australia (Queensland), Indonesia (Maluku Islands), New Guinea, and Pacific islands, one species cultivated in the New World; one species (introduced) in China.

1. *Falcataria moluccana* (Miquel) Barneby & J. W. Grimes, Mem. New York Bot. Gard. 74: 255. 1996.

南洋楹 nan yang ying

Albizia moluccana Miquel, Fl. Ned. Ind. 1: 26. 1855; *Adenantha falcataria* Linnaeus; *Albizia falcata* (Linnaeus) Backer; *A. falcataria* (Linnaeus) Fosberg; *Paraserianthes falcataria* (Linnaeus) I. C. Nielsen.

Trees, large, to 45 m tall. Branchlets minutely pubescent with many tiny, pale lenticels. Stipules caducous, small; leaf rachis to 40 cm, usually with a large, oval, disk-shaped gland near base; pinnae 6–20 pairs, densely rusty tomentose, to 10 cm; leaflets 6–26 pairs, sessile, slightly falcate, obliquely oblong, 1–1.5 cm × 3–6 mm, abaxially sparsely (densely so on veins) puberulent, adaxially glabrous, midvein at ca. 1/4 lamina width along distal margin, other basal veins conspicuous, base

obtuse-rounded or nearly cuneate, apex acute. Spike solitary, axillary, or several arranged in a panicle. Flowers greenish yellow to cream. Calyx broadly campanulate or hemispherical, ca. 2.5 mm, sericeous, with small teeth. Corolla 5–7 mm, sericeous; lobes oblong-ovate, 2.4–4 mm. Stamens ca. 1 cm. Legume straight, strap-shaped, flat, 10–13 × 1.3–2.3 cm, late dehiscent through both sutures. Seeds 10–15, compressed ellipsoid, ca. 7

× 3 mm; testa brown, with narrow U-shaped pleurogram. Fl. Apr–Jul, fr. Sep–Dec. $2n = 26^*$.

Cultivated in Fujian, Guangdong, Guangxi, Hainan, Yunnan [Indonesia (Maluku Islands), New Guinea (including New Britain); Pacific islands (Solomon Islands)].

This species is grown as an ornamental and is widely planted in tropical countries as a fast-growing timber tree.

35. *ALBIZIA* Durazzini, Mag. Tosc. 3(4): 13. 1772.

合欢属 he huan shu

Trees or shrubs, usually unarmed, rarely scandent and with short, recurved hooks. Leaves bipinnate; stipules usually small, rarely larger and caducous; petiole and rachis with glands; leaflets small in numerous pairs or larger in few pairs. Inflorescences of globose heads, arranged in axillary or terminal panicles. Flowers bisexual. Calyx campanulate or funnel-shaped, 5-toothed. Corolla funnel-shaped, upper part 5-lobed. Stamens numerous, connate into a tube at base, free part of filaments long exerted; anthers small. Central flowers of heads with broader calyx and much longer filament tube. Ovary flattened; style long, slender; stigma minute. Legume broadly linear or oblong, straight, plano-compressed, indehiscent, or dehiscent along both sutures, continuous inside. Seeds ovoid or orbicular, compressed, funicle filiform.

Between 120 and 140 species: tropical to warm regions of the world; 16 species (two endemic, two introduced) in China.

- 1a. Midvein of leaflets medial or eccentrically close to lower margin.
- 2a. Shrubs or climbers, with a curved prickle below leaf scar 1. *A. corniculata*
- 2b. Trees, unarmed.
- 3a. Main vein of leaflets slightly eccentrically close to lower margin 2. *A. procera*
- 3b. Main vein medial.
- 4a. Pinnae 1 pair; corolla 8–10 mm; seeds with U-shaped pleurogram 3. *A. attopeuensis*
- 4b. Pinnae 1–4 pairs; corolla 6–7 mm; seeds with single pleurogram.
- 5a. Flowers sessile; pedicel of legume without a joint 4. *A. crassiramea*
- 5b. Flowers pedicellate; pedicel of legume with a joint.
- 6a. Marginal flowers with glabrous calyces; legume indehiscent; seeds narrowly elliptic 5. *A. retusa*
- 6b. Marginal flowers with puberulent to velutinous calyces; legume dehiscent; seeds orbicular in outline 6. *A. lucidior*
- 1b. Midvein of leaflets eccentrically close to upper margin.
- 7a. Leaflets (1.5–)1.8–4.5 × 0.7–2 cm.
- 8a. Flowers sessile; pedicel of legume not jointed 7. *A. odoratissima*
- 8b. Flowers pedicellate (except central flower); pedicel of legume jointed.
- 9a. Both surfaces of leaflets hairy, leaflets 5–14 pairs.
- 10a. Ovary glabrous; leaflets to 4.5 × 2 cm 8. *A. kalkora*
- 10b. Ovary puberulent; leaflets to 2.5 × 1 cm 9. *A. duclouxii*
- 9b. Both surfaces of leaflets glabrous or abaxially sparsely puberulent.
- 11a. Leaflets 4–8 pairs, apically rounded-obtuse or emarginate 10. *A. lebbeck*
- 11b. Leaflets 13–20 pairs, apically rounded and apiculate 11. *A. calcarea*
- 7b. Leaflets smaller than 1.8 × 1 cm.
- 12a. Both surfaces of leaflets hairy.
- 13a. Leaflets 8–15 pairs, falcate-oblong, 12–17 mm, apex acute 12. *A. mollis*
- 13b. Leaflets 10–22 pairs, oblong, 6–10 mm, apex obtuse 13. *A. garrettii*
- 12b. Leaflets glabrous except at margin.
- 14a. Corolla 10–12 mm; stamens 3–3.8 cm 14. *A. sherriffii*
- 14b. Corolla 6.5–8 mm; stamens shorter than 2.5 cm.
- 15a. Stipules smaller than leaflets, linear; rachis of inflorescence short and zigzag; stamens pink 15. *A. julibrissin*
- 15b. Stipules larger than leaflets, half-cordate; rachis of inflorescence long and straight; stamens green-white or yellow 16. *A. chinensis*

1. *Albizia corniculata* (Loureiro) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4: 603. 1917.

天香藤 tian xiang teng

Mimosa corniculata Loureiro, Fl. Cochinch. 2: 651. 1790;
Albizia millettii Benth.

Shrubs, scandent, or lianas ca. 20 m. Branchlets often with a curved prickle below petiole. Stipules deciduous, small; petiole with a complanate gland near base; pinnae 2–6 pairs; leaflets 4–10 pairs, oblong or obovate-oblong, 1.2–2.5 × 0.7–1.5 cm, main vein at middle, abaxially puberulent, adaxially glabrous, base oblique, apex obtuse or emarginate or hardly

mucronate. Heads usually 6–12-flowered, arranged in terminal or axillary panicles; peduncles 5–10 mm, soft, sparsely pubescent. Flowers dimorphic, sessile. Calyx less than 1 mm, calyx and corolla puberulent. Corolla white; tube ca. 4 mm; lobes ca. 2 mm. Filaments ca. 1 cm. Ovary glabrous, stipitate. Legume dehiscent, ligulate, flat, 10–20 × 3–4 cm, glabrous. Seeds brown, oblong. Fl. and fr. Apr–Nov.

Open fields and forests; 100–1000 m. Fujian, Guangdong, Guangxi, Hainan [Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam].

2. *Albizia procera* (Roxburgh) Bentham, London J. Bot. 3: 89. 1844.

黄豆树 huang dou shu

Mimosa procera Roxburgh, Pl. Coromandel 2: 12. 1799.

Trees, deciduous, to 15 m tall. Branchlets slightly pubescent or subglabrous. Leaf petiole with an oblong gland ca. 1 cm above base; pinnae 3–5 pairs, 15–20 cm; petiolules ca. 2 mm; leaflets 6–12 pairs, ovate to subrhombic, 3–4.5 × 1.2–2.2 cm, subleathery, sparsely appressed pubescent, main vein closer to lower side, base oblique, apex obtuse or emarginate. Heads ca. 20-flowered, arranged in axillary or terminal panicles. Flowers uniform, sessile. Calyx 2–3 mm, glabrous. Corolla yellow-white, ca. 6 mm; lobes lanceolate, ca. 2.5 mm, apex pubescent. Staminal tube longer than corolla tube. Ovary glabrous, subsessile. Legume ligulate, flat, 10–15 × 1.5–2.5 cm, glabrous. Seeds 8–12, obovoid-elliptic; pleurogram obovate-elliptic. Fl. May–Sep, fr. Sep–Feb of following year.

Thin forests, thickets; 100–600 m. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [S and SE Asia].

3. *Albizia attopeuensis* (Pierre) I. C. Nielsen var. *laui* (Merrill) I. C. Nielsen, Adansonia, n.s., 19: 210. 1979.

海南合欢 hai nan he huan

Albizia laui Merrill, Lingnan Sci. J. 14: 7. 1935.

Trees, deciduous, ca. 10 m tall. Branchlets conspicuously lenticellate. Stipules inconspicuous; pinnae 1 pair, 10–15 cm; glands at junction of pinnae and leaflets; petiolules 5–7 mm, shortly tomentose; leaflets 2–4 pairs, rarely 1 pair, oblong or narrowly ovate, 5–10 × 2.5–5.5 cm, leathery or subleathery, abaxially puberulent on veins, main vein central, net veins raised on both surfaces, base subrounded to broadly cuneate, slightly asymmetric. Heads several to more than 10-flowered, arranged in panicles, ferruginous pubescent; peduncles 5–25 mm. Flowers dimorphic, yellowish, fragrant. Calyx tubular, 2–2.5 mm; teeth ovate-deltoid, outside densely pubescent. Corolla funnel-shaped, 8–10 mm; lobes oblong. Stamens 30–40; filaments ca. 3 cm, staminal tube shorter than corolla tube. Ovary linear, ca. 3.5 mm, sessile, glabrous. Legume oblong, compressed, 10–15 × 3–4 cm, glabrous, indehiscent. Seeds 9–12, black-brown, ellipsoidal; pleurogram shortly U-shaped. Fl. Feb–Jun, fr. Jun–Oct.

• Forests; 200–300 m. Hainan.

Albizia attopeuensis var. *attopeuensis* (*Pithecellobium attopeuense* Pierre) occurs in Laos, Thailand, and Vietnam.

4. *Albizia crassiramea* Lace, Bull. Misc. Inform. Kew 1915: 402. 1915.

白花合欢 bai hua he huan

Albizia lancangensis Y. Y. Qian; *A. laotica* Gagnepain; *A. yunnanensis* T. L. Wu.

Trees, 8–10 m tall. Branchlets ferruginous pubescent, lenticellate. Stipules inconspicuous; leaf glands elliptic, near base of petiole and near apex of rachis; pinnae 2–4 pairs; petiolules ca. 2 mm; leaflets 4–6 pairs, elliptic, ovate, or obovate, 2–7 × 1.5–4 cm, abaxially pubescent, adaxially glabrous, main vein central, slightly asymmetric, base obliquely truncate, apex rounded-obtuse. Heads 7–10-flowered, arranged in panicles; peduncles 2.5–3.5 cm, densely pubescent. Flowers dimorphic, sessile, white. Calyx cup-shaped, ca. 1 mm, 5-dentate, calyx and corolla yellowish or white tomentose. Corolla tube ca. 3.5 mm; lobes deltoid-ovate, ca. 2.5 mm. Stamens ca. 25; filaments ca. 2.5 cm, basally connate into a tube. Ovary glabrous, stipe ca. 1 mm. Legume dehiscent, red-brown, ligulate, 15–22 × ca. 3.5 cm, thin, glabrous. Seeds 8–11, brown, elliptic, ca. 9 × 6 mm; pleurogram narrowly elliptic. Fl. Aug, fr. Nov.

Forests; 500–1300 m. Guangxi, Yunnan [Laos, Myanmar, Thailand, Vietnam].

5. *Albizia retusa* Bentham, London J. Bot. 3: 90. 1844.

兰屿合欢 lan yu he huan

Albizia littoralis Teijsmann & Binnendijk.

Trees, to 25 m tall. Branchlets terete, glabrous. Stipules inconspicuous; leaf glands circular, with somewhat raised margins, ca. 0.5 cm above base; pinnae ca. 3 pairs; leaflets 4–6 pairs, ovate-subrhombic, 2–3 × 1–1.7 cm, both surfaces sparsely puberulent, main vein medial or almost so, base asymmetric, broadly cuneate, apex rounded. Corymbs ca. 10-flowered, arranged in puberulent to tomentose panicles; peduncles ca. 2.5 cm. Flowers dimorphic, pedicellate. Calyx tubular, 2–3.5 mm; teeth inconspicuous. Corolla white, narrowly funnel-shaped, 7–9.5 mm; tube glabrous to faintly puberulent; lobes ± narrowly triangular, ca. 2.5 mm, puberulent to sericeous, apex acute. Stamens purple to pink; staminal tube irregularly split, intermediate between corolla tube and corolla. Ovary glabrous; stipe 1–2 mm. Legume indehiscent, yellowish, oblong, ca. 14 × 2.8 cm, bullate over seeds, glabrous. Seeds brown, narrowly elliptic, 8.5–9 × ca. 4.5 mm; pleurogram narrowly elliptic.

Sandy beaches, mangroves; low elevations. Taiwan [Indonesia, Japan (Ryukyu Islands), Malaysia, Philippines, S Thailand; Australia, Pacific islands (Vanuatu)].

6. *Albizia lucidior* (Steudel) I. C. Nielsen ex H. Hara, Enum. Fl. Pl. Nepal 2: 104. 1979.

光叶合欢 guang ye he huan

Inga lucidior Steudel, Nomencl. Bot., ed. 2, 1: 810. 1840; *Albizia bracteata* Dunn; *A. lucida* Bentham; *A. meyeri* Ricker; *Mimosa lucida* Roxburgh (1832), not Vahl (1807).

Trees, 8–20 m tall. Branchlets glabrous, angulate. Stipules inconspicuous; pinnae 1–3 pairs, with a gland near base of peti-

ole and between uppermost pinnae; petiolules ca. 3 mm; leaflets 1–6 pairs, elliptic, oblong, or obliquely obovate, 5–11 × 1.5–6 cm, both surfaces glabrous or puberulent, midvein central, base attenuate to subrounded, apex acute, acuminate, or obtuse, sometimes mucronate. Heads arranged in terminal or axillary panicles. Calyx campanulate, 1.5–3 mm. Corolla funnel-shaped, 6–7 mm; lobes lanceolate, ca. 4 mm. Stamens numerous; tube 3–4 mm. Ovary glabrous. Legume dehiscent, brownish, straight, ligulate, 10–30 × 2–4.5 cm. Seeds 4–9, brown, orbicular, 8–9 mm in diam. Fl. Apr–Jun, fr. Sep–Nov.

Secondary forests, thickets; 600–1900 m. Guangxi, Guizhou, Taiwan, Yunnan [S to SE Asia].

This species is grown as an ornamental.

7. *Albizia odoratissima* (Linnaeus f.) Bentham, London J. Bot. 3: 88. 1844.

香合欢 xiang he huan

Mimosa odoratissima Linnaeus f., Suppl. Pl. 437. 1782.

Trees, evergreen, 5–15 m tall. Branchlets pubescent when young. Stipules filiform, ca. 2.5 mm, caducous; leaf glands 1–2 cm above base of petiole and rachis between first and second pinnae, elliptic; pinnae 2–4(–6) pairs; leaflets sessile, 6–14 pairs, oblong, 2–3 × 0.7–1.4 cm, papery, both surfaces sparsely appressed pubescent, main vein eccentric, close to upper margin, base obliquely truncate, apex obtuse, sometimes mucronate. Heads arranged in panicles, ferruginous pubescent. Flowers dimorphic, 10–15, sessile, yellowish, fragrant. Calyx cup-shaped, 1–1.5 mm, puberulent to tomentose; teeth shorter than 0.25 mm. Corolla funnel-shaped, 4.5–6.5 mm; lobes lanceolate, 2–2.5 mm. Staminal tube ca. as long as corolla tube. Ovary ferruginous tomentose; stipe ca. 1 mm. Legume oblong, compressed, 10–18 × 2–4 cm, densely pubescent when young, sparsely pubescent when mature. Seeds 6–12, ovate in outline, ca. 9 × 6 mm; pleurogram narrowly ovate. Fl. Apr–Jul, fr. Jun–Oct.

Thin forests; sea level to 1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam].

8. *Albizia kalkora* (Roxburgh) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 511. 1897.

山槐 shan huai

Mimosa kalkora Roxburgh, Fl. Ind., ed. 1832, 2: 547. 1832; *Acacia macrophylla* Bunge; *Albizia esquirolii* H. Léveillé; *A. henryi* Ricker; *A. longepedunculata* Hayata; *A. simeonis* Harms.

Trees, small, or shrubs, deciduous, 3–8 m tall. Branchlets dark brown, pubescent, with conspicuous lenticels. Stipules inconspicuous; leaf glands 1.5–3 cm above base, and at junctions of distal pairs of pinnae, circular to elliptic in outline; pinnae 2–4 pairs; leaflets 5–14 pairs, oblong or oblong-ovate, 0.8–4.5 × 0.7–2 cm, both surfaces pubescent, main vein slightly close to upper margin, base oblique, apex obtuse, mucronate. Heads 2–7, axillary or terminal, arranged in panicles. Flowers dimorphic, primarily white, turning yellow, with conspicuous pedicels. Ca-

lyx tubular, 2–3 mm, 5-toothed, calyx and corolla villous. Corolla 6–8 mm; lobes lanceolate. Stamens 2.5–3.5 cm, basally connate into a tube; tube shorter than corolla tube. Ovary glabrous; stipe ca. 1 mm. Legume dehiscent, ligulate, 7–17 × 1.5–3 cm, pubescent when young, glabrescent when mature. Seeds 4–12, obovoid or suborbicular; pleurogram oblong. Fl. May–Jun, fr. Aug–Oct. $2n = 26$.

Thickets, thin forests; sea level to 2600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [India, Japan, Myanmar, Vietnam].

9. *Albizia duclouxii* Gagnepain, Notul. Syst. (Paris) 2: 116. 1911.

巧家合欢 qiao jia he huan

Trees, ca. 15 m tall. Branchlets brown, whitish tomentose. Stipules not seen; leaf gland elliptic, close to base of petiole; pinnae 1–3 pairs, ca. 10 cm; leaflets 7–13 pairs per pinna; oblong-falcate, 1.5–2.5 × 0.7–1 cm, both surfaces densely grayish tomentose, main vein eccentric, close to distal margin, base asymmetrically rounded, apex obtuse to shortly attenuate. Peduncles 2 or 3 together, axillary at distal leaves, with dimorphic flowers in corymbs, ca. 3.5 cm in diam.; pedicels to 4 mm. Calyx narrowly campanulate-obconical, ca. 4 mm, hirsute; teeth deltoid, obtuse. Corolla broadly funnel-shaped, ca. 8 mm, tomentose; tube very short, only ca. 2 mm. Staminal tube ca. 4 mm, longer than corolla tube. Ovary fusiform, densely puberulent in distal half, stipitate; style glabrous. Legume and seeds unknown. Fl. Apr–May.

• Forests; ca. 1000 m. Guizhou, Sichuan, NE Yunnan (Qiaojia).

10. *Albizia lebeck* (Linnaeus) Bentham, London J. Bot. 3: 87. 1844 [“*lebeck*”].

阔荚合欢 kuo jia he huan

Mimosa lebeck Linnaeus, Sp. Pl. 1: 516. 1753; *Acacia lebeck* (Linnaeus) Willdenow.

Trees, deciduous, 8–12 m tall. Bark rough. Branchlets minutely pubescent, glabrous when old. Stipules caducous, small; leaf rachis with disklike glands near base and at base of pinnae, pubescent or glabrous; pinnae 2–4 pairs, 6–15 cm; leaflets 4–8 pairs, narrowly elliptic or slightly obliquely oblong, 2–4.5 × (0.9–)1.3–2 cm, both surfaces glabrous or abaxially sparsely finely pubescent, main vein slightly closer to upper margin, apex obtuse or retuse. Peduncles axillary, 2 or more together, to 10 cm; corymbs 30–40-flowered. Flowers dimorphic, fragrant; pedicels 3–4 mm, puberulent. Calyx funnel-shaped, ca. 4 mm, puberulent, with short teeth. Corolla green-yellow, funnel-shaped, 7–8 mm; lobes deltoid-ovate. Stamens white or light yellow-green; tube shorter than corolla tube. Ovary glabrous, sessile. Legume straw-colored, strap-shaped, flat, 15–28 × 2.5–4.5 cm, remaining on trees long after ripening. Seeds brown, 4–12, ellipsoidal, ca. 10 × 6–7 mm; pleurogram parallel to margins of seed. Fl. May–Sep, fr. Oct–May of following year. $2n = 26^*$.

Planted along roadsides and in gardens. Fujian, Guangdong,

Guangxi, Hainan, Taiwan [native to tropical Africa; introduced or naturalized in Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan, Sri Lanka].

This plant is grown as a roadside tree and is used ornamentally and for timber.

11. *Albizia calcarea* Y. H. Huang, Acta Bot. Yunnan. 5: 132. 1983.

光腺合欢 *guang xian he huan*

Trees, ca. 15 m tall. Branchlets subglabrous, with small, orbicular lenticels. Petiole and rachis glabrous; glands near base of petiole, oblong, (2.5–)5–6 mm; pinnae (2–)4–9 pairs; petioles absent or very short; leaflets 13–20 pairs, oblong, 1.5–3 × 0.8–1.4(–1.8) cm, both surfaces glabrous or abaxially sparsely villous, midvein slightly close to upper margin, base oblique, apex obtuse and mucronate. Heads solitary or fasciculate, terminal or axillary, ca. 20-flowered, arranged in panicles; peduncles to 15 cm. Pedicels ca. 3 mm. Calyx ca. 4 mm; teeth 1–1.5 mm, outside villous, apex acute. Corolla yellow-white, villous. Stamens ca. 3.5 mm; filaments connate into a tube at base. Ovary linear, glabrous. Legume brown, ligulate, compressed, 10–20 × 2.5–4 cm, glabrous. Seeds oblong, ca. 8 mm. Fl. Jun, fr. Dec.

• Thin forests of limestone areas; 200–300 m. Guangxi.

12. *Albizia mollis* (Wallich) Boivin, Encycl. 19(2): 33. 1838.

毛叶合欢 *mao ye he huan*

Acacia mollis Wallich, Pl. Asiat. Rar. 2: 76. 1831; *A. julibrissin* Durazzini var. *mollis* (Wallich) Benth.

Trees, 3–18(–30) m tall. Branchlets pubescent, angulate. Leaf glands near base of petiole and rachis of first pinnae insertion; rachis sulcate, villous; pinnae 3–7 pairs, 6–9 cm; leaflets 8–15 pairs, falcate-oblong, 1.2–1.7 cm × 4–7 mm, densely villous or adaxially glabrescent when old, midvein close to upper margin, base truncate, apex mucronate. Heads arranged in axillary panicles. Flowers white; pedicels very short. Calyx campanulate, ca. 2 mm, calyx and corolla tomentose. Corolla ca. 7 mm; lobes deltoid, ca. 2 mm. Filaments ca. 2.5 cm. Legume brown, ligulate, compressed, 10–16 × 2.5–3 cm. Seeds oblong, ca. 7 mm. Fl. May–Jun, fr. Aug–Dec. $2n = 26^*$.

Forests; 1500–2500 m. Guizhou, Xizang, Yunnan [India, Nepal].

This species is planted as a roadside tree and is used for wood.

13. *Albizia garrettii* I. C. Nielsen, Adansonia, n.s., 19: 212. 1979.

黄毛合欢 *huang mao he huan*

Trees, 10–15 m tall. Young branchlets puberulent, glabrescent. Stipules inconspicuous; leaf glands 1–1.5 cm above base, and between junctions of 1 or 2 distal pairs of pinnae, elliptic or slitlike, 2–2.5 mm; pinnae 5–8 pairs, 4–10 cm; leaflets 10–22 pairs, sessile, oblong, 6–10(–15) × (3–)4–6 mm, abaxially puberulent with yellow hairs, adaxially glabrous with few scattered hairs, main vein close to upper margin, base asymmetrically truncate on one side, narrowly cuneate on other side, apex asymmetrically obtuse, mucronate. Corymbs ca. 35-flowered,

axillary; peduncles ca. 5 cm. Flowers dimorphic, marginal flowers pedicellate. Calyx narrowly campanulate, ca. 3 mm; teeth triangular, 0.3–0.5 mm. Corolla funnel-shaped, 6.5–7 mm, puberulent; lobes ovate, ca. 2.5 mm. Staminal tube ca. as long as corolla tube. Ovary ca. 2.5 mm, glabrous; stipe ca. 0.5 mm. Legume dehiscent, brown, flat, ca. 14 × 3 cm, stalk ca. 6 mm, apex mucronate. Seeds ca. 10, elliptic, ca. 10 × 6–7 mm; pleurogram ca. 5 × 2 mm, parallel to margins of seed. Fl. May, fr. Aug–Nov.

Forests; ca. 1500 m. Yunnan [India (Assam), Myanmar, Thailand].

14. *Albizia sherriffii* E. G. Baker, London J. Bot. 76: 20. 1938.

藏合欢 *zang he huan*

Trees, 6–9 m tall. Branchlets brown tomentose. Leaf petiole 2–3.5 cm, with gland at base of petiole and junction of first pinnae; rachis 10–20 cm, brown tomentose; pinnae 8–16 pairs, opposite or subopposite, 5–10 cm, subsessile; leaflets 13–27 pairs, subfalcate-oblong, 5–10 × 1.5–3 mm, abaxially pubescent, adaxially glabrous, midvein close to upper margin, base truncate, apex acute. Heads 6.5–7.5 cm in diam., 40–50-flowered; peduncles 7–10 cm, brown tomentose, with a gland apart from head ca. 1 cm. Calyx 6–6.5 mm, 5-toothed. Corolla yellow-white, 1–1.2 cm, pubescent. Stamens numerous, spreading, 3–3.8 cm; filaments marginally white, centrally golden yellow, basally connate into a tube 7–8 mm. Ovary linear, subglabrous, sessile. Legume dehiscent, ligulate, flat, 10–14 × ca. 1.5 cm, densely tomentose, margin thickened. Seeds 6–10, oblong, ca. 5 × 3 mm; pleurogram parallel to margins of seed. Fl. Mar, fr. Sep.

Dense forests; 1200–1900 m. Xizang, Yunnan [Bhutan, India, Myanmar].

15. *Albizia julibrissin* Durazzini, Mag. Tosc. 3(4): 11. 1772.

合欢 *he huan*

Trees, deciduous, to 16 m tall; crown open. Branchlets angular; branchlet, leaf rachis, and inflorescence tomentose or pubescent. Stipules deciduous, linear-lanceolate, smaller than leaflets; pinnae 4–12 pairs, sometimes to 20 pairs in cultivated species; glands near base of petiole and leaf rachis of uppermost pinnae; leaflets 10–30 pairs, obliquely linear to oblong, 6–12 × 1–4 mm, main vein close to upper margin, base truncate, margin ciliate, apex apiculate. Panicles terminal. Flowers pink. Calyx tubiform, ca. 3 mm, pubescent. Corolla ca. 8 mm; lobes deltoid, ca. 1.5 mm. Filaments pink, ca. 2.5 cm. Legume strap-shaped, flat, 9–15 × 1.5–2.5 cm, glabrous. Fl. May–Jul, fr. Aug–Oct. $2n = 26^*$.

Widely cultivated in Anhui, Fujian, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, ?Liaoning, ?Shaanxi, Shandong, Shanxi, Taiwan, Yunnan, Zhejiang [C, E, and SW Asia].

16. *Albizia chinensis* (Osbeck) Merrill, Amer. J. Bot. 3: 575. 1916.

楹树 *ying shu*

Mimosa chinensis Osbeck, Dagb. Ostind. Resa, 233. 1757; *Acacia stipulata* Candolle; *Albizia stipulata* (Candolle) Boivin.

Trees, deciduous, to 30 m tall. Branchlets yellow pubescent. Stipules deciduous, cordate, large, membranous, apex apiculate; glands just below junctions of pinnae; pinnae 6–12 pairs; leaflets 20–35(–40) pairs, sessile, oblong-linear, falcate, 6–10 × 2–3 mm, abaxially villous, main vein close to upper margin, base subtruncate, margin ciliate, apex acuminate. Heads 10–20-flowered, arranged in a terminal panicle; peduncles long or short, densely villous. Flowers dimorphic, green-white or yellowish, densely yellow-brown tomentose. Calyx funnel-shaped, ca. 3 mm, shortly 5-toothed. Corolla ca. 2 × as long as calyx; lobes ovate-deltoid. Stamens ca. 2.5 cm, tube ca. as long

as or slightly longer than corolla tube. Ovary yellow-brown villous, sessile. Legume indehiscent, or irregularly breaking up, plano-compressed, 10–15 × ca. 2 cm, slightly pubescent when young, glabrous when mature. Seeds elliptic, flat, ca. 7 × 4–5 mm; pleurogram minute, ca. 1 mm in diam., near micropyle. Fl. Mar–May, fr. Jun–Dec.

Forests and open fields; sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Xizang, Yunnan, Zhejiang [most areas with a seasonal climate in S and SE Asia].

This tree is used for its timber.

36. ENTEROLOBIUM Martius, Flora 20(2, Beibl.): 117. 1837.

象耳豆腐 xiang er dou shu

Trees, unarmed. Leaves bipinnate; stipules not conspicuous; petiole with gland; pinnae and leaflets in numerous pairs. Heads globose, solitary or in racemes, axillary. Flowers dimorphic or uniform, bisexual. Calyx campanulate, shortly 5-dentate. Corolla funnel-shaped, 5-lobed. Stamens numerous, basally connate into a tube; anthers eglandular. Ovary sessile, many ovuled; style filiform. Legume broadly circinate or incurved-reniform, thick, hard, not dehiscent; mesocarp spongy, at length hardened. Seeds transverse, compressed, with pleurogram; funicle filiform.

Five species: tropical regions of the Americas; one species (introduced) in China.

1. Enterolobium cyclocarpum (Jacquin) Grisebach, Fl. Brit. W. I. 226. 1860.

象耳豆 xiang er dou

Mimosa cyclocarpa Jacquin, Fragm. Bot. 30. 1800.

Trees, unarmed, deciduous, large, 10–20 m tall; crown spreading, thin. Young branchlets, leaves, and inflorescences white pubescent. Stipules caducous, small; petiole and rachis with glands; pinnae (3 or)4–9 pairs; leaflets 12–25(–30) pairs, subsessile, falcate-lanceolate, 8–14 × 3–6 mm, both surfaces sparsely pubescent, midvein close to upper margin, base trun-

cate, apex mucronate. Heads globose, 1–1.5 cm in diam., fasciculate or in racemes. Flowers greenish or white. Calyx ca. 3 mm, calyx and corolla pubescent. Corolla ca. 6 mm. Stamens numerous, basally connate into a tube. Legume black-brown, curved, auriculate-reniform, 5–7 cm in diam., fleshy, both ends rounded, indehiscent. Seeds 10–20, arranged in 2 rows, dark brown, shiny, narrowly ellipsoidal, ca. 1.5 cm, hard. Fl. Apr–Jun, fr. Oct–Dec.

Cultivated in Fujian, Guangdong, Guangxi, Jiangxi, Zhejiang [native to Central and South America; commonly cultivated in tropical areas].

37. ARCHIDENDRON F. Mueller, Fragm. 5: 59. 1865.

猴耳环属 hou er huan shu

Cylindrokelupha Kostermans; *Paralbizzia* Kostermans.

Trees or shrubs, unarmed. Leaves bipinnate; stipules present or not; petiole, rachis, and pinnae with glands; pinnae in few pairs; leaflets few to several pairs, rarely in 1 pair. Inflorescence a globose head or arranged in panicle, terminal or axillary, or cauliflorous. Flowers white, small, bisexual or polygamous, uniform. Calyx campanulate or tubular, 5-toothed. Petals connate below middle; lobes 5. Stamens numerous; filaments exerted, united into a tube; anthers small, apex eglandular. Carpels 1 to several, free, sessile or stipitate, many ovuled; style filiform; stigma terminal, capitellate. Legume much curved or spirally twisted, or straight, cylindrical, flat or swollen. Seeds ovoid or orbicular, without pleurogram.

About 100 species: tropical Asia; 16 species (three endemic) in China.

Key based on fruiting specimens

1a. Legume contorted.

2a. Pinnae 1 or 2 pairs; leaflets alternate or opposite.

3a. Leaflets alternate except for terminal pair, obliquely ovate or oblong, 5–9 × 2–4.5 cm 1. *A. lucidum*

3b. Leaflets opposite, elliptic or ovate-elliptic, 7–18 × 3–9 cm 2. *A. ellipticum*

2b. Pinnae 2–8 pairs; leaflets opposite.

4a. Branchlets angulate 3. *A. clypearia*

4b. Branchlets terete.

5a. Pinnae 2 or 3 pairs; leaflets 4–7 pairs, larger, 2–9 × 1.5–4 cm 4. *A. utile*

- 5b. Pinnae 5 or 6 pairs; leaflets 7–14 pairs, smaller, 0.5–2 × 0.4–0.9 cm 5. *A. multifoliolatum*
- 1b. Legume straight or slightly curved.
- 6a. Inflorescence cauliflorous; legume valves slightly contorted after dehiscence, conspicuously netted 6. *A. cordifolium*
- 6b. Inflorescence on leafy branches, terminal or axillary; legume valves not as above.
- 7a. Pinnae (1 or)2 pairs, if 1 pair then leaflets alternate.
- 8a. Young branchlets and leaf rachis conspicuously angulate; leaflets 8–30 × 5–12 cm 7. *A. eberhardtii*
- 8b. Young branchlets and leaf rachis not angulate; leaflets smaller than above.
- 9a. Leaflets opposite, abaxially sparsely ferruginous pubescent, lateral veins 5–7 pairs 8. *A. balansae*
- 9b. Leaflets alternate, except terminal one, both surfaces glabrous, lateral veins 3–5 pairs 9. *A. alternifoliolatum*
- 7b. Pinnae 1 pair; leaflets opposite or subopposite.
- 10a. Glands at petiole flat or concave.
- 11a. Leaflets 1–3 pairs, lateral veins 4–6 pairs 14. *A. kerrii*
- 11b. Leaflets 2 or 3 pairs, lateral veins 3, 4, or 6–11 pairs.
- 12a. Lateral veins 3 or 4 pairs 15. *A. robinsonii*
- 12b. Lateral veins 6–11 pairs 16. *A. turgidum*
- 10b. Glands at petiole and leaf rachis raised, more than 1 mm high, hollow.
- 13a. Leaflets 2 pairs.
- 14a. Petiolar gland 3–7 mm in diam.; leaflets to 25 cm 10. *A. xichouense*
- 14b. Petiolar gland 0.5–3 mm in diam.; leaflets to 14 cm 11. *A. chevalieri*
- 13b. Leaflets 2 or 3 pairs.
- 15a. Petiolar gland (1.5–)2(–3) mm in diam.; leaflets 3 pairs 12. *A. laoticum*
- 15b. Petiolar gland 0.5–1.5 mm in diam.; leaflets 2 or 3 pairs 13. *A. tonkinense*

Key based on flowering specimens

- 1a. Branchlets angular or winged.
- 2a. Flowers pedicellate 3. *A. clypearia*
- 2b. Flowers sessile 7. *A. eberhardtii*
- 1b. Branchlets terete.
- 3a. Ovary sessile 16. *A. turgidum*
- 3b. Ovary stipitate.
- 4a. Inflorescence cauliflorous; legume valves conspicuously netted 6. *A. cordifolium*
- 4b. Inflorescence on leafy branches, terminal or axillary; legume valves not netted.
- 5a. Leaflets alternate except for distal pair.
- 6a. Glands on leaf rachis depressed; calyx 1.5–2 mm; legume twisted into a circle 1. *A. lucidum*
- 6b. Glands on leaf rachis globose; calyx ca. 4 mm; legume cylindrical 9. *A. alternifoliolatum*
- 5b. Leaflets all opposite or subopposite.
- 7a. Tertiary veins of leaflets forming ladderlike connections between secondary ones 11. *A. chevalieri*
- 7b. Tertiary veins of leaflets not forming ladderlike connections.
- 8a. Petiolar gland raised, hollow.
- 9a. Calyx glabrous 12. *A. laoticum*
- 9b. Calyx faintly to densely puberulent.
- 10a. Calyx subtubular, ca. 2 mm; corolla ca. 5.5 mm, sericeous 13. *A. tonkinense*
- 10b. Calyx campanulate, ca. 3 mm; corolla ca. 8 mm, puberulent 10. *A. xichouense*
- 8b. Petiolar gland circular, elliptic, or oblong.
- 11a. Calyx tube puberulent to tomentose.
- 12a. Pinnae 1 or 2 pairs 1. *A. lucidum*
- 12b. Pinnae 2–6 pairs.
- 13a. Pinnae 2 or 3 pairs; leaflets 4–7 pairs, larger, 2–9 × 1.5–4 cm 4. *A. utile*
- 13b. Pinnae 5 or 6 pairs; leaflets 7–14 pairs, smaller, 0.5–2 × 0.4–0.9 cm ... 5. *A. multifoliolatum*
- 11b. Calyx tube glabrous.
- 14a. Distal leaves with only 1 pair of leaflets per pinna 14. *A. kerrii*
- 14b. Distal leaves with more than 1 pair of leaflets per pinna.
- 15a. Corolla (9–)12.5–15 mm 15. *A. robinsonii*
- 15b. Corolla to 8 mm.
- 16a. Corolla tube glabrous 14. *A. kerrii*
- 16b. Corolla tube puberulent to woolly.
- 17a. Heads 2–6-flowered 2. *A. ellipticum*
- 17b. Heads 10- or more flowered 8. *A. balansae*

1. Archidendron lucidum (Benth) I. C. Nielsen, *Adansonia*, n.s., 19: 19. 1979.

亮叶猴耳环 liang ye hou er huan

Pithecellobium lucidum Benth, London J. Bot. 3: 207. 1844; *Abarema lucida* (Benth) Kostermans.

Trees, 2–10 m tall, unarmed. Branchlets terete. Branchlet, petiole, and inflorescence shortly brown tomentose. Pinnae 1 or 2 pairs; leaf rachis and base of petiole with round, sunken glands; leaflets 2 or 3 pairs in lower pinnae, 4 or 5 pairs in upper pinnae, adaxially shiny and deep green, obliquely ovate or oblong, 5–9(–11) × 2–4.5 cm, apical ones larger, opposite, proximal ones alternate and smaller, both surfaces glabrous or puberulent on veins, base oblique, apex acuminate, mucronate. Heads globose, 10–20-flowered, arranged in panicles; peduncles to 1.5 cm. Flowers sessile. Calyx less than 2 mm, calyx and corolla shortly brown tomentose. Corolla white, 4–5 mm; lobes connate at middle. Staminal tube slightly shorter than corolla tube. Ovary shortly stipitate, glabrous. Legume twisted into a circle, 2–3 cm wide, margin between seeds constricted. Seeds black, ca. 1.5 × 1 cm. Fl. Apr–Jun, fr. Jul–Dec.

Thin forests; 100–1400 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, Laos, Thailand, Vietnam].

2. Archidendron ellipticum (Blume) I. C. Nielsen, *Adansonia*, n.s., 19: 21. 1979.

椭圆叶猴耳环 tuo yuan ye hou er huan

Inga elliptica Blume, Cat. Gew. Buitenz. 88. 1823.

Trees, small, to 20 m tall. Branchlets terete, with white lenticels; young branchlets brown pubescent. Pinnae 1 or 2 pairs; glands at upper part of petiole and rachis; petiolules 3–4 mm; leaflets 2 or 3 pairs, opposite or subopposite, elliptic or ovate-elliptic, 7–18 × 3–9 cm, both surfaces glabrous, base cuneate to broadly cuneate, apex acuminate to long acuminate. Heads 2–6-flowered, arranged in terminal and axillary panicles. Calyx 4.5–5 mm; teeth 0.5–1 mm. Corolla 4.5–5 mm; lobes 2–2.5 mm. Staminal tube equaling corolla tube. Ovary puberulent. Legume curved into a circle, 4.5–8 mm in diam.; valves 2–3.5 cm wide. Seeds 1.7–2.1 × 1–1.1 cm. Fl. and fr. year-round.

Evergreen broad-leaved forests; ca. 1500 m. Yunnan [Indonesia, Malaysia, Philippines, Thailand].

The record of this species for China is possibly based on a misidentification.

3. Archidendron clypearia (Jack) I. C. Nielsen, *Adansonia*, n.s., 19: 15. 1979.

猴耳环 hou er huan

Inga clypearia Jack, Malay. Misc. 2(7): 78. 1822; *Abarema angulata* (Benth) Kostermans; *A. clypearia* (Jack) Kostermans; *Pithecellobium angulatum* Benth; *P. clypearia* (Jack) Benth; *P. clypearia* var. *acuminatum* Gagnepain.

Trees, to 10 m tall. Branchlets angulate, densely yellow tomentose. Leaf petiole 4-angulate; leaf rachis and base of petiole with glands; glands flat or hollow; pinnae (3 or) 4 or

5(–8) pairs, densely yellow tomentose, lowermost pinna with 3–6 pairs of leaflets, uppermost one with 10–12 pairs of leaflets; leaflets subsessile, adaxially shiny, oblique, rhombic-trapezoid, 1–7 × 0.7–3 cm, upper one largest, downward smaller, leathery, both surfaces slightly brown pubescent, base very unequally sided. Corymbs several flowered, arranged in terminal or axillary panicles. Flowers pedicellate. Calyx campanulate, 1–3 mm, 5-toothed, calyx and corolla densely brown villous. Corolla white or yellowish, 4–5 mm; lobes lanceolate. Stamens ca. 2 × as long as corolla, staminal tube equaling corolla tube. Ovary stipitate, hairy. Legume twisted, 1–1.5 cm wide, margin constricted between seeds. Seeds 4–10, black, ellipsoidal or broadly ellipsoidal, ca. 1 cm; testa wrinkled when dry. Fl. Feb–Jun, fr. Apr–Aug.

Forests; 500–1800 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan, Zhejiang [tropical Asia].

This plant is important for the tannins contained in its bark.

4. Archidendron utile (Chun & F. C. How) I. C. Nielsen, *Adansonia*, n.s., 19: 20. 1979.

薄叶猴耳环 bao ye hou er huan

Pithecellobium utile Chun & F. C. How, Acta Phytotax. Sin. 7: 17. 1958; *Abarema utilis* (Chun & F. C. How) Kostermans.

Shrubs, 1–2 m tall, rarely small trees. Branchlets terete, brown pubescent. Pinnae 2 or 3 pairs, 10–18 cm; glands on petiole and rachis of apical 1 or 2 leaflets at places of insertion, glands circular, sessile; leaflets 4–7 pairs, opposite, oblong-rhombic, 2–9 × 1.5–4 cm, apical ones larger, downward smaller, membranous, abaxially pubescent, adaxially glabrous, base obtuse or acute, apex obtuse, mucronate. Heads ca. 15-flowered, ca. 1 cm in diam. (not including filaments), arranged in terminal panicles ca. 30 cm. Flowers sessile, white, fragrant. Calyx campanulate, 1.5–3 mm, teeth and corolla pubescent. Corolla 6–8 mm; lobes ovate-oblong, ca. 1.5 mm. Staminal tube shorter than corolla tube. Ovary stipitate, glabrous. Legume red-brown, falcate, 6–10 × 1–1.3 cm. Seeds black, shiny, suborbicular, ca. 1 cm. Fl. Mar–Aug, fr. Apr–Dec.

Forests; 100–700 m. Fujian, Guangdong, Guangxi, Hainan, Zhejiang [Vietnam].

5. Archidendron multifoliolatum (H. Q. Wen) T. L. Wu, **comb. nov.**

多叶猴耳环 duo ye hou er huan

Basionym: *Pithecellobium multifoliolatum* H. Q. Wen, Guihaia 15: 212. 1995; *Abarema multifoliolata* (H. Q. Wen) X. Y. Zhu.

Shrubs, ca. 1 m tall. Branchlets terete, brown puberulent. Pinnae 5 or 6 pairs, 4–11 cm; rachis ca. 12 cm; glands oblong or concave at petiolar base and rachis apex, on apical 1 or 2 leaflets at places of insertion; leaflets 7–14 pairs, subsessile, papery, oblong-rhombic, 0.5–2 × 0.4–0.9 cm, apical ones larger, proximal ones smaller, both surfaces puberulent, base unequally sided, margin entire, apex mucronate. Flowers not seen. Legume red, twisted, 7–13 × ca. 1.3 cm, pubescent. Seeds 4–9.

- Forests; ca. 700 m. Guangxi.

6. Archidendron cordifolium (T. L. Wu) I. C. Nielsen, *Acta Phytotax. Sin.* 21: 167. 1983.

心叶猴耳环 xin ye hou er huan

Zygia cordifolia T. L. Wu, *Acta Phytotax. Sin.* 19: 220. 1981; *Abarema cordifolia* (T. L. Wu) C. Chen & H. Sun; *Albizia cordifolia* (T. L. Wu) Y. H. Huang.

Trees. Branchlets brown, terete, glabrous, lenticellate. Pinnæ 1 pair; petiole 16–25 cm; petiolar gland orbicular, flat or concave; leaf rachis 20–22 cm; petiolules 5–7 mm; leaflets 3 or 4 pairs, obovate-oblong, 8–30 × 5–18 cm, both surfaces glandular hairy, more densely so abaxially, lateral veins 10–21 pairs, base slightly cordate, apex rounded or acute. Heads 20–50-flowered, arranged in panicles on old branches or stems. Calyx ca. 1.2 mm. Corolla ca. 2.2 mm. Filaments ca. 2 mm. Ovary ca. 1 mm. Legume brownish outside, orange-red inside, strap-shaped, 23–46 × 3.5–4 cm, dehiscent along both sutures; valves slightly contorted, leathery, conspicuously net-veined. Seeds 6–10, ovoid, compressed, ca. 2.5 × 1.7 × 0.7 cm; testa black. Fl. May, fr. Nov.

- Valleys; 200–300 m. Yunnan [Vietnam].

7. Archidendron eberhardtii I. C. Nielsen, *Adansonia*, n.s., 19: 30. 1979.

大棋子豆 da qi zi dou

Albizia eberhardtii (I. C. Nielsen) Y. H. Huang; *Cylindrokelupha eberhardtii* (I. C. Nielsen) T. L. Wu; *C. macrophylla* T. L. Wu.

Trees, to 10 m tall. Branchlets strong, 1–1.5 cm in diam., obviously angulate. Leaves large; leaf rachis to 34 cm, obviously angulate; glands urceolate, raised; pinnæ 2 pairs; rachis ca. 35 cm; petiolules ca. 6 mm; leaflets 3 pairs, opposite, oblong, 8–30 × 5–12 cm, both surfaces glabrous, midvein central, lateral veins 6–11 pairs, base attenuate, apex acuminate. Heads 4- or 5-flowered, arranged in panicles ca. 20 cm, fasciculate on old branches. Flowers sessile. Calyx cup-shaped, ca. 3 mm; lobes deltoid. Corolla funnel-shaped, 1.1–1.2 cm, sericeous; lobes narrowly ovate, 3–3.5 mm, apex acute. Staminal tube ca. as long as corolla tube. Ovary glabrous, ca. 2.5 mm; stipe ca. 4 mm. Legume cylindrical, ca. 20 × 5 cm, dehiscent along both sutures; valves brown, ca. 5 mm thick, subwoody, squarrose-scaly. Seeds large, bullet-form on both ends, ca. 6 cm high, ca. 4 cm in diam., middle ones shortly cylindrical, ca. 4 cm high. Fr. Jan.

- Valleys, along streams in forests; ca. 1000 m. Guangxi [N Vietnam].

The seeds are rich in starch.

8. Archidendron balansae (Oliver) I. C. Nielsen, *Adansonia*, n.s., 19: 23. 1979.

锈毛棋子豆 xiu mao qi zi dou

Pithecellobium balansae Oliver, *Hooker's Icon. Pl.* 20: t. 1976. 1891; *Albizia balansae* (Oliver) Y. H. Huang; *Cylindrokelupha balansae* (Oliver) Kostermans.

Trees, 8–25 m tall. Branchlets red-brown, obviously lenticellate. Leaf petiole 6–8 cm; glands elliptic, flat; pinnæ 2 pairs; leaf rachis 16–24 cm; petiolules 5–8 mm; leaflets 4 pairs, opposite, with 1 gland per leaflet pair, oblong or oblanceolate, (5–)10–18 × 3–6.5 cm, abaxially ferruginous pubescent, more densely so on veins, adaxially glabrous or very sparsely ferruginous pubescent, lateral veins 5–7 pairs, conspicuous on both surfaces, base attenuate or obtuse, apex shortly acuminate. Flowers sessile, ca. 20 in globose head, heads arranged in panicle ca. 20 cm, ferruginous tomentose, branches sparse. Calyx cup-shaped, ca. 1.5 mm. Corolla tube ca. 2.5 mm; lobes 5, ca. 2 mm. Staminal tube equaling corolla tube; filaments 8–10 mm. Ovary stipitate, glabrous. Legume cylindrical, 7–15 × ca. 6 cm. Seeds 2–6, bullet-form at both ends, middle ones shortly cylindrical, ca. 4.5 cm high and in diam. Fl. Apr–May, fr. Jul.

- Thin forests; 600–1300 m. S Yunnan [Vietnam].

9. Archidendron alternifoliolatum (T. L. Wu) I. C. Nielsen, *Acta Phytotax. Sin.* 21: 164. 1983.

长叶棋子豆 chang ye qi zi dou

Cylindrokelupha alternifoliolata T. L. Wu, *Acta Phytotax. Sin.* 19: 219. 1981; *Albizia alternifoliolata* (T. L. Wu) Y. H. Huang; *Archidendron glabrifolium* (T. L. Wu) I. C. Nielsen; *C. glabrifolia* T. L. Wu.

Trees, to 6 m tall. Branchlets brown, yellow pubescent. Leaf petiole 2.5–6 cm, with globose gland above middle; pinnæ 1 pair; pinna rachis 10–13 cm, sparsely pubescent; petiolules 5–7 mm; leaflets 3 pairs, alternate except terminal opposite pair, oblong, 7–15 × 4–8 cm, lateral veins 3–5 pairs, base acute, apex acuminate. Heads more than 20-flowered, arranged in panicles. Calyx tubular, ca. 4 mm, 5-toothed, sparsely pubescent. Corolla tube ca. 5 mm; lobes lanceolate, ca. 4 mm, yellow pubescent. Filaments ca. 1.5 cm. Ovary glabrous. Legume cylindrical, 18–21 × 4–5 cm, dehiscent along both sutures. Seeds broadly cylindrical, ca. 2.8 cm high, ca. 3.5 cm in diam. Fl. Mar, fr. Nov.

- Forests; 1400–2000 m. Guangxi, Yunnan.

10. Archidendron xichouense (C. Chen & H. Sun) X. Y. Zhu in X. Y. Zhu et al., *Legumes China*, 78. 2007 [*“xichouensis”*].

巨腺棋子豆 ju xian qi zi dou

Cylindrokelupha xichouensis C. Chen & H. Sun, *Acta Bot. Yunnan.* 12: 120. 1990.

Trees, ca. 15 m tall. Branchlets terete. Leaf petiole 4–6 cm; petiolar gland above middle, raised and concave, 1.5–3 mm high, 3–7 mm in diam.; pinnæ 1 pair, 6–10 cm; petiolules 5–7 mm; leaflets 2 pairs, opposite, elliptic, 9–25 × 4–10 cm, terminal one larger, base cuneate, apex acuminate. Heads 10–15-flowered, arranged in panicles 10–20 cm. Calyx campanulate, ca. 3 mm; teeth ca. 0.5 mm. Corolla tubular, ca. 8 mm, puberulent; lobes ovate, ca. 2 mm. Staminal tube ca. as long as corolla tube. Ovary ca. 3 mm, glabrous. Legume slightly curved, cylindrical, ca. 4.5 cm in diam. Seeds cylindrical, 2–3 cm high, ca. 3 cm in diam., both ends truncate; testa hardened.

- Dense forests; 1000–1400 m. Guangxi, Yunnan.

11. Archidendron chevalieri (Kostermans) I. C. Nielsen, *Adansonia*, n.s., 19: 28. 1979.

坛腺棋子豆 tan xian qi zi dou

Cylindrokelupha chevalieri Kostermans, *Reinwardtia* 5: 248. 1960; *Albizia chevalieri* (Kostermans) Y. H. Huang (1983), not Harms (1907).

Trees, small, to 10 m tall. Branchlets gray, terete, glabrous. Leaf petiole 1–4 cm; petiolar gland raised, pot-form, ca. 2 mm high, 0.5–3 mm in diam.; pinnae 1 or 2 pairs, with similar gland at apex; petiolules 3–7 mm; leaflets 2 pairs, opposite, elliptic, 8–14 × 4–8 cm, upper one larger, both surfaces glabrous, mid-vein central, lateral veins 3 or 4 pairs, connected by parallel veins, base attenuate, apex shortly acuminate. Heads 10–20-flowered, arranged in narrow panicles to 15 cm. Flowers white, fragrant, sessile. Calyx 2.5–3 mm, glabrous; teeth inconspicuous. Corolla campanulate, 7–8 mm; lobes linear-oblong, only margin pubescent. Staminal tube ca. as long as corolla tube; anthers minute. Ovary glabrous; stipe ca. 2.5 mm. Legume slightly curved or straight, cylindrical, 4–10 × 2.5–3 cm, dehiscent along both sutures; valves brown, leathery, netted. Seeds 1–4, ca. 3 cm high, ca. 2.5 cm in diam., middle one shortly cylindrical, ca. 2 cm high, both ends turbinate. Fl. May, fr. Jul.

Dense wet forests; below 1700 m. Guangxi [N Vietnam].

12. Archidendron laoticum (Gagnepain) I. C. Nielsen, *Adansonia*, n.s., 19: 27. 1979.

老挝棋子豆 lao wo qi zi dou

Pithecellobium laoticum Gagnepain, *Bull. Soc. Bot. France* 99: 48. 1952; *Cylindrokelupha laotica* (Gagnepain) C. Chen & H. Sun.

Trees, ca. 10 m tall. Branchlets brownish, terete, glabrous. Leaf petiole 3–4.5 cm; petiolar glands at apex and insertion of first leaf pair, more than 1 mm high, 1.5–3 mm in diam., hollow inside; pinnae 1 pair; pinna rachis 5–12 cm; petiolules ca. 3 mm; leaflets 3 pairs, opposite, sublanceolate or oblanceolate, 6–10 × 2–3 cm, terminal one largest, firmly papery, lateral veins 5–9 pairs, glabrous on both surfaces, base attenuate, apex mucronate, slightly unequally sided. Heads ca. 20-flowered, ca. 2 cm in diam. (including filaments), 1 or 2 axillary or arranged in panicles; peduncles 1.5–2 cm. Calyx campanulate, 2–3 mm; teeth deltoid. Corolla 4.5–5.5 mm; lobes lanceolate, ca. 3 mm, margin and apex golden pubescent. Stamens ca. 1 cm, staminal tube equaling corolla tube. Ovary stipitate, glabrous. Legume and seeds unknown. Fl. Mar.

Margins of dense forests; 500–700 m. Yunnan [Laos, Vietnam].

The Chinese record of *Archidendron dalatense* (Kostermans) I. C. Nielsen (FRPS 39: 48. 1988, as *Cylindrokelupha dalatensis* (Kostermans) T. L. Wu) is based on a misidentification of *A. laoticum*. See S. Hang and J. Chen (*Acta Bot. Yunnan*. 12: 121–122. 1990, as *C. laotica*).

13. Archidendron tonkinense I. C. Nielsen, *Adansonia*, n.s., 19: 24. 1979.

绢毛棋子豆 juan mao qi zi dou

Albizia tonkinensis (I. C. Nielsen) Y. H. Huang; *Cylindrokelupha tonkinensis* (I. C. Nielsen) T. L. Wu.

Trees, small, 5–7 m tall. Branchlets brown, terete, glabrous, with small lenticels. Leaf petiole ca. 2.5 cm; petiolar gland raised, subglobose, hollow, 0.5–1 mm high, 0.5–1.5 mm in diam.; pinnae 1 pair; petiolules 2–3 mm; leaflets 2 or 3 pairs, opposite or subopposite, oblong or elliptic, (2.5–)5.5–10 × (1–)2–3.5 cm, both surfaces glabrous, lateral veins 4 pairs, raised abaxially, inconspicuous adaxially, base narrowly cuneate, apex obtuse-acuminate. Heads 12–15-flowered, ca. 1.2 cm in diam. (including filaments), arranged in panicles to 10 cm. Calyx ca. 2 mm; teeth deltoid, ca. 0.5 mm, densely ferruginous pubescent. Corolla campanulate or funnel-shaped, ca. 5.5 mm, sericeous; lobes narrowly oblong, ca. 2 mm. Staminal tube shorter than corolla tube, ca. 3 mm. Ovary ca. 1.5 mm, glabrous; stipe ca. 1.5 mm. Legume ovoid, 7–8 × ca. 5 cm, glabrous, dehiscent along both sutures; valves brown. Seeds 2, brown, turbinate, 3–4 cm high, ca. 3.5 cm in diam.

Thin evergreen forests of valleys; ca. 300 m. Guangxi [N Vietnam].

14. Archidendron kerrii (Gagnepain) I. C. Nielsen, *Adansonia*, n.s., 19: 29. 1979.

碟腺棋子豆 die xian qi zi dou

Pithecellobium kerrii Gagnepain, *Bull. Soc. Bot. France* 99: 49. 1952; *Abarema kerrii* (Gagnepain) Kostermans; *A. yunnanensis* Kostermans; *Albizia yunnanensis* (Kostermans) Y. H. Huang (1983), not T. L. Wu (1981); *Archidendron yunnanense* (Kostermans) I. C. Nielsen; *Cylindrokelupha kerrii* (Gagnepain) T. L. Wu; *C. yunnanensis* (Kostermans) T. L. Wu.

Trees, small, 3–8 m tall. Branchlets brown, terete, glabrous. Leaf petiole 2–5 cm; petiolar gland plate-form, at insertion of pinna and first leaflet pair; pinnae 1 pair; leaflets 1–3 pairs, opposite or subopposite, ovate, elliptic, or lanceolate, 6–14 × 3–6 cm, papery, both surfaces glabrous, lateral veins 4–6 pairs, abaxially conspicuous, base cuneate or acute, apex acuminate or acute. Heads 10–15-flowered, 8–10 mm in diam., arranged in axillary or terminal loose panicles. Calyx urceolate or cup-shaped, 2.3–3 mm; teeth irregular. Corolla tubular or narrowly funnel-shaped, 6–8 mm, glabrous; lobes narrowly deltoid or oblong, 2–3 mm, apex puberulent. Staminal tube ca. as long as corolla tube or shorter. Ovary glabrous; stipe ca. 1.5 mm. Legume cylindrical, ca. 10 × 2–2.5 cm, straight; valves brown. Seeds 6 or 7, shortly cylindrical at middle, 5–7 mm high, 1.3–2 cm in diam., both ends turbinate; testa black, crustaceous. Fl. May, fr. Aug.

Dense forests; 200–1800 m. Guangxi, Yunnan [Laos, Vietnam].

15. Archidendron robinsonii (Gagnepain) I. C. Nielsen, *Adansonia*, n.s., 19: 26. 1979.

棋子豆 qi zi dou

Pithecellobium robinsonii Gagnepain, *Notul. Syst. (Paris)* 2: 281. 1912; *Abarema robinsonii* (Gagnepain) Kostermans; *Albizia robinsonii* (Gagnepain) Y. H. Huang; *Cylindrokelupha robinsonii* (Gagnepain) Kostermans; *Paralbizzia robinsonii* (Gagnepain) Kostermans.

Trees, 8–9 m tall. Branchlets brown or reddish, cylindrical, glabrous, with curved leaf scars. Leaf petiole 2–6 cm; petiolar

gland circular, less than 0.5 mm high, 0.5–0.7 mm in diam., at upper portion of petiole and insertion of leaflets; rachis of pinnae 6–11 cm; pinnae 1 pair; petiolules ca. 4 mm; leaflets 3 pairs, opposite or subopposite, elliptic or lanceolate, 5–14(–20) × 3–5(–10) cm, both surfaces glabrous, lateral veins 3 or 4 pairs, conspicuous, base cuneate or acute, symmetric or not, apex acuminate. Heads 6–8-flowered, arranged in axillary panicles to 20 cm; peduncles 1–1.5 cm. Calyx urceolate or cup-shaped, 4.5–7 mm, glabrous; teeth inconspicuous. Corolla funnel-shaped or campanulate, (0.9–)1.2–1.5 cm; lobes narrowly ovate or elliptic, 4–5 mm, abaxially and apically sericeous. Staminal tube equaling corolla tube. Ovary glabrous; stipe 6–8 mm. Legume straight, cylindric, 10–20 × 3–3.5 cm; valves brown, leathery. Seeds to 7, ca. 2.5 × 2.5 cm, both ends turbinate; testa brown, crustaceous.

Dense forests of valleys; 300–700 m. Guangxi, Yunnan [Vietnam].

16. *Archidendron turgidum* (Merrill) I. C. Nielsen, *Adansonia*, n.s., 19: 32. 1979.

大叶合欢 da ye he huan

Pithecellobium turgidum Merrill, *Philipp. J. Sci.* 15: 239.

1919; *Albizia croizatiana* F. P. Metcalf; *A. turgida* (Merrill) Merrill; *Cylindrokelupha turgida* (Merrill) T. L. Wu; *Paralbizia turgida* (Merrill) Kostermans.

Trees, small, 4–9 m tall. Branches terete. Young branchlets and leaf rachis ferruginous tomentose. Leaf glands near tip of petiole and on rachis at places of leaflet insertion; pinnae 1 pair; petiolules 2–6 mm; leaflets opposite, 2 or 3 pairs, oblong, elliptic, obliquely lanceolate, or obliquely elliptic, 7–20 × 3.5–7 cm, papery, abaxially very sparsely appressed pubescent, more densely so on veins, adaxially glabrous, midvein central, lateral veins 6–11 pairs, base acute or rounded, apex long or shortly acuminate. Heads ca. 1.5 cm in diam., ca. 20-flowered, arranged in axillary or terminal panicles. Flowers white. Calyx cup-shaped, ca. 2 mm, 5-toothed. Corolla ca. 6 mm; lobes oblong, corolla and calyx white tomentose. Staminal tube much shorter than corolla tube. Ovary glabrous, sessile or nearly so. Legume swollen, oblong to strap-shaped, 7–20 × 2.5–3.5 cm. Seeds brown, ellipsoidal, 1.8–2.5 × ca. 2 cm, glabrous. Fl. Mar–May, fr. Jul–Dec.

Forests; 1000–1500 m. Guangdong, Guangxi [N Vietnam].

38. SAMANEA (Bentham) Merrill, *J. Wash. Acad. Sci.* 6: 46. 1916.

雨树属 yu shu shu

Pithecellobium sect. *Samanea* Bentham, *London J. Bot.* 3: 197, 215. 1844.

Trees, large, unarmed, with spreading crown. Leaves bipinnate; stipules deciduous, lanceolate; pinnae 3–6 pairs, with glands between pinnae on rachis; leaflets opposite. Inflorescences axillary corymbs, pedunculate; bracts small. Flowers dimorphic; central flowers enlarged, 7- or 8-merous; marginal flowers smaller, 5-merous. Calyx shortly lobed. Petals connate to middle. Stamens many, united at base into a tube; anthers not glandular. Ovary sessile; style filiform; ovules many. Legume straight or slightly curved, turgid with thickened margins, woody, indehiscent, septate between seeds. Seeds numerous, strongly biconvex, with pleurogram; aril absent.

Three species: mainly around the Amazon and in Central America; one species (introduced) in China.

1. *Samanea saman* (Jacquin) Merrill, *J. Wash. Acad. Sci.* 6: 47. 1916.

雨树 yu shu

Mimosa saman Jacquin, *Fragm. Bot.* 15. 1800; *Albizia saman* (Jacquin) F. Mueller; *Enterolobium saman* (Jacquin) Prain; *Pithecellobium saman* (Jacquin) Bentham.

Trees, 10–25 m tall. Branchlets puberulent to tomentose. Petiole 15–40 cm; pinnae 3–5(or 6) pairs, to 15 cm; glands at junctions of pinnae and leaflets; leaflets 3–8 pairs per pinna, asymmetrically oblong, 2–4 × 1–1.8 cm, abaxially pubescent, adaxially shiny, base half rounded, half truncate, apex rounded

or obtuse, often emarginate and mucronulate. Heads 1–5, together axillary, 5–6 cm in diam.; peduncles 5–6 cm. Marginal flowers pedicellate; calyx funnel-shaped, ca. 6 mm; corolla red or yellowish red, ca. 1.2 cm; stamens white at base, purple toward apex, ca. 3.5 cm; staminal tube shorter than corolla tube. Central flowers sessile; corolla to 1.2 cm; staminal tube longer than corolla. Legume black, oblong, compressed, 10–20 × 1.2–2.5 cm, sutures thickened, septate between seeds. Seeds brown, ellipsoidal, ca. 8 × 5 mm. Fl. Aug–Sep, fr. Dec.

Cultivated in Hainan, Taiwan, Yunnan [native to N part of tropical South America; planted throughout the tropics].

8. Tribe SOPHOREAE

槐族 huai zu

Sun Hang (孙航), Bao Bojian (包伯坚); Michael A. Vincent

Trees, shrubs, lianas, rarely herbs. Leaves pinnately 1- to many foliolate or digitately 3-foliolate. Inflorescence racemose or paniculate, terminal, axillary or leaf-opposed. Calyx 5-toothed or lobed or rarely entire. Corolla papilionaceous or subactinomorphic, petals (1–)5. Stamens (6–)10(–30); filaments free or connate only at base or lower ones up to ca. 1/2 their length, exceptionally 9 joined high up; anthers uniform. Ovary 1- to several ovuled. Legumes various, not jointed, indehiscent or 2-valved, sometimes winged. Seeds reniform, elliptic, or globose; hilum small, sometimes arillate.

About 45 genera and 390–400 species: mostly distributed in the tropics to subtropics; seven genera (one endemic) and 74 species (55 endemic, one introduced) in China.

- 1a. Leaves simple (1-foliolate).
 - 2a. Scandent shrubs or lianas; racemes axillary, to 5 cm; calyx 2–3 mm, teeth short; style ± straight 39. *Bowringia*
 - 2b. Shrubs or small trees, not scandent; panicles terminal (rarely racemes axillary), mostly 5–13 cm; calyx more than 5 mm, teeth longer than calyx tube; style recurved 40. *Ormosia*
- 1b. Leaves compound.
 - 3a. Shrubs, spiny; leaflets 2 (sometimes appearing 1), to 1.5 cm, apex spiny-mucronate 41. *Ammodendron*
 - 3b. Shrubs or trees, usually without spines (if spiny, leaflets many more than 2); leaflets 3 or more, more than 1.5 cm, apex not spiny-mucronate.
 - 4a. Legumes moniliform, cylindric (rarely markedly flattened) 42. *Sophora*
 - 4b. Legumes not moniliform, compressed laterally or markedly flattened.
 - 5a. Buds hidden in swollen petiole base; leaflets usually alternate, stipels present or absent 43. *Cladrastis*
 - 5b. Buds exposed; leaflets mostly opposite, stipels usually absent.
 - 6a. Filaments of 9 stamens fused for ca. 1/2 their length, 1 free; leaflets nearly linear, less than 4 mm wide, blade hard, folded 44. *Salweenia*
 - 6b. Filaments free or all 10 slightly fused basally; leaflets much larger, blade softer, not folded.
 - 7a. Legumes compressed to nearly cylindric, woody to leathery, ovate to long elliptic, unwinged; seeds nearly globose or circular, mostly more than 1 cm; leaflets (1–)3–11(–19); style recurved, stigma elongate, oblique; keel petals free 40. *Ormosia*
 - 7b. Legumes markedly flattened, thinner walled, leathery to papery, linear-lanceolate to long elliptic, often winged; seeds flattened, long elliptic, less than 1 cm; leaflets (5–)9–11; style nearly straight, stigma small, terminal; keel petals fused 45. *Maackia*

39. BOWRINGIA Champion ex Benth, Hooker's J. Bot. Kew Gard. Misc. 4: 75. 1852.

藤槐属 teng huai shu

Bao Bojian (包伯坚); Michael A. Vincent

Scandent shrubs or lianas. Leaves large, simple; stipules very small. Racemes axillary, very short. Calyx cup-shaped, membranous. Corolla white; standard stipitate; wings falcate-oblong; keels similar to wings, slightly larger. Stamens 10, free. Ovary stalked, many ovuled; style subulate; stigma small, terminal. Legume ovoid or globose, dehiscent along sutures; valves membranous, leathery. Seeds oblong to globose, arillate.

About four species: WC Africa and Madagascar, one species in SE Asia including China.

Bowringia was treated by Breteler (Wageningen Agric. Univ. Pap. 94(4): 1–41. 1994) as a synonym of the African genus *Leucomphalos* Benth ex J. E. Planchon.

1. *Bowringia callicarpa* Champion ex Benth, Hooker's J. Bot. Kew Gard. Misc. 4: 75. 1852.

藤槐 teng huai

Leucomphalos callicarpus (Champion ex Benth) Breteler.

Scandent shrubs or lianas, 15–25 m tall. Stipules small, ovate-triangular; petiole slightly inflated at base, 1–3 cm; leaf blade oblong or ovate-oblong, 6–13 × 2–6 cm, ± leathery, glabrous, veins raised on both surfaces, veinlets obvious, base rounded, apex acuminate. Racemes axillary, 2–5 cm. Flowers

sparse; bracts small, caducous; pedicel slender, 10–13 mm. Calyx cup-shaped, 2–3 × 3–4 mm, very small toothed. Corolla white; standard orbicular or oblong, 6–8 mm, retuse or obcordate at apex, claw 1–2 mm; wings falcate; keels shorter, oblong, 5–7 mm, claw 2–3 mm. Stamens 6–10 mm. Ovary pubescent. Legumes ovoid, 2.5–3 cm, ca. 15 mm in diam., beaked at apex, dehiscent along sutures. Seeds 1 or 2(or 3), red, dark brown, or black, elliptic, 9–14 × 8–10 mm; aril white. Fl. Apr–Jun, fr. Jul–Sep.

Forest margins in valleys. Fujian, Guangdong, Guangxi, Hainan [Vietnam].

40. ORMOSIA Jackson, Trans. Linn. Soc. London 10: 360. 1811, nom. cons.

红豆属 hong dou shu

Sun Hang (孙航); Michael A. Vincent

Arillaria Kurz; *Fedorovia* Yakovlev; *Layia* Hooker & Arnott (1833), not Hooker & Arnott ex Candolle (1838, nom. cons.); *Macroule* Pierce; *Ormosiopsis* Ducke; *Podopetalum* F. Mueller; *Ruddia* Yakovlev; *Toullichiba* Adanson; *Trichocytos* Yakovlev.

Trees or shrubs; buds naked or subtended by stipules. Leaves alternate, rarely subopposite, imparipinnate, paripinnate, or rarely simple (1-foliolate); stipules usually small or inconspicuous, rarely lacking; leaflets (1–)3–11(–19), opposite, often leathery or thickly papery; stipules usually absent. Inflorescences paniculate or racemose, axillary or terminal. Bracts small, caducous. Calyx campanulate; teeth 5, unequal, upper 2 connate. Corolla white, yellow, lavender, or purple, longer than calyx; petals clawed; standard suborbicular; wings and keel oblique, obovate-oblong, keel petals free. Stamens 10, exerted, free or only slightly basally connate, subequal, incurved; anthers small, versatile, undeveloped or degenerate on a few filaments. Ovary subsessile; ovules 1 to many; style long, filiform, incurved; stigma oblique or terminal. Legumes woody or leathery, 2(or 3)-valved, rarely indehiscent, ovate to oblong or obovate, laterally compressed to nearly cylindrical; valves internally septate between seeds or without septae; sutures without wings; calyx persistent or deciduous. Seeds 1 to many, red, scarlet, brown, or black, sometimes 2-toned; hilum seldom over 1/2 length of seed, white; cotyledon often fleshy.

About 130 species: tropical America, SE Asia, N Australia; 37 species (34 endemic) in China.

Ormosia monosperma (Swartz) Urban was reported for Taiwan by F. C. Ho (J. Taiwan Mus. 36(2): 1–5. 1983), but the species is not known as an escape, only as a cultivated ornamental.

The Asian species of *Ormosia* are in need of a complete revision.

- 1a. Valves of fruit not internally septate.
 - 2a. Leaves simple.
 - 3a. Flowers pink; standard retuse; ovary glabrous 17. *O. simplicifolia*
 - 3b. Flowers white; standard broadly rounded; ovary yellow pubescent 18. *O. boluoensis*
 - 2b. Leaves imparipinnate.
 - 4a. Legumes densely appressed pubescent.
 - 5a. Legumes indehiscent or tardily dehiscent; hilum 15–18 mm, over 1/2 circumference of seed 1. *O. balansae*
 - 5b. Legumes dehiscent; hilum less than 4 mm.
 - 6a. Hilum 3–4 mm, seed light red; legumes slightly convex; branchlets and leaves abaxially with short hairs, glabrous at maturity; leaves widest at middle 13. *O. nanningensis*
 - 6b. Hilum small, 1–1.5 mm, seed dark brown or chestnut-brown; legumes turgid or somewhat turgid; branchlets and leaves abaxially densely appressed pubescent; leaves often widest above middle.
 - 7a. Leaflet apex caudate, narrow, length ca. 4 × width 4. *O. inflata*
 - 7b. Leaflet apex acute to abruptly mucronate, length less than 3 × width.
 - 8a. Legumes with stipe; branchlets and leaves abaxially densely appressed yellow-brown tomentose 5. *O. sericeolucida*
 - 8b. Stipe absent; branchlets and leaves abaxially sparsely to densely appressed yellow tomentose, or white or brown woolly.
 - 9a. Leaflets 5–7, densely appressed white woolly, becoming gray woolly 2. *O. pachycarpa*
 - 9b. Leaflets 5–9, glabrous adaxially, sparsely to densely yellow-brown tomentose abaxially 3. *O. merrilliana*
 - 4b. Legumes glabrous or sparsely pubescent, sometimes only at margin.
 - 10a. Seeds large, more than 2 cm, hilum inconspicuous.
 - 11a. Legumes compressed, brownish outside, ivory inside; seed red-brown; branchlets densely rusty brown pubescent 7. *O. fordiana*
 - 11b. Legumes swollen, brownish to black outside, brownish inside; seed chestnut-brown; branchlets glabrous or finely white pilose 6. *O. longipes*
 - 10b. Seeds smaller, less than 18 mm, hilum conspicuous, large or small.
 - 12a. Seeds 14–18 mm; legumes yellowish brown.
 - 13a. Hilum small, less than 3 mm; leaflets 3–5; branchlets brownish pilose 16. *O. napoensis*
 - 13b. Hilum 9–10 mm; leaflets 5–7; branchlets glabrous.
 - 14a. Legumes compressed, suborbicular, valves leathery, mesocarp absent; leaflets ovate 14. *O. hosiei*
 - 14b. Legumes fleshy, elliptic, protuberant, valves woody, mesocarp conspicuous; leaflets oblong 15. *O. elliptica*

- 12b. Seeds less than 14 mm; legumes black or light blackish brown.
- 15a. Legumes oblique-elliptic, obovate, or oblong-elliptic, length greater than width; seeds 1–3.
- 16a. Valves thickly leathery; branchlets densely appressed rusty brown tomentose; leaves appressed pubescent abaxially 12. *O. yunnanensis*
- 16b. Valves thinly leathery; branchlets glabrous or glabrescent; leaves glabrous abaxially 11. *O. pingbianensis*
- 15b. Legumes suborbicular, length equaling width; seed 1, rarely 2.
- 17a. Legumes apiculate at apex, mucro 4–6 mm, curved, stipe 5–8 mm; both petiole and rachis glabrous 8. *O. apiculata*
- 17b. Legumes apiculate at apex, mucro less than 4 mm, stipe less than 4 mm; petiole and rachis pubescent.
- 18a. Legumes inequilateral; valves thickly leathery, sparsely pubescent, more conspicuous at margin; leaflets oblong-obovate, thickly leathery, widest above middle, apex acute; rachis prolonged 5–8 mm below terminal leaflet 10. *O. howii*
- 18b. Legumes equilateral; valves thinly leathery, sparsely pubescent at margin when young, becoming glabrescent; leaflets oblong, leathery, widest below (rarely above) middle, apex acuminate; rachis prolonged more than 10 mm below terminal leaflet 9. *O. semicastrata*
- 1b. Valves of fruit internally septate, or if 1-seeded then wall convex at both ends of valve.
- 19a. Legumes very fleshy, valves 6–10 mm thick, often stained red internally; seeds large, 2.5–3 cm, elliptic, red-brown 19. *O. hekouensis*
- 19b. Legumes compressed or slightly fleshy, valves thinly woody or leathery, less than 5 mm thick, not stained red internally; seeds small, less than 2 cm.
- 20a. Branchlets, petiole, and rachis densely appressed brownish or rusty brown tomentose.
- 21a. Legumes densely appressed fulvous sericeous 26. *O. xylocarpa*
- 21b. Legumes glabrous or only basally pubescent at maturity.
- 22a. Valves thinly woody, swollen around seed; leaflets leathery, glossy, pale green when dry; leaf scar flat to concave.
- 23a. Legumes 4–6 cm; seeds 2–4; calyx ca. 7 mm; leaflets 13–19, sparsely appressed pubescent abaxially; branchlets dark rusty brown pubescent 24. *O. ferruginea*
- 23b. Legumes 5–12 cm; seeds 4–8; calyx 12–14 mm; leaflets fewer than above, densely appressed tomentose abaxially; branchlets pale fulvous pubescent 22. *O. henryi*
- 22b. Valves thickly woody, flattened or slightly convex; leaflets papery or rigidly papery, dull, dark green when dry; leaf scar protruding.
- 24a. Leaflets (14–)17–23, both surfaces densely appressed fulvous velvety, more so abaxially 34. *O. saxatilis*
- 24b. Leaflets often fewer than 17, rarely more, glabrous, rarely sparsely appressed pubescent.
- 25a. Leaves larger, often more than 4.5 cm, apex acuminate, lateral veins impressed adaxially when dried 32. *O. olivacea*
- 25b. Leaves smaller, often less than 4.5 cm, apex obtuse, lateral veins slightly raised when dried 33. *O. microphylla*
- 20b. Branchlets, petiole, and rachis glabrous or sparsely appressed pubescent, old branches sparsely glabrous.
- 26a. Leaflets 11–19, abaxially pale when dried.
- 27a. Leaflets 15–19, widest above middle, apex long acuminate or caudate, rachis convex between pair of leaflets 23. *O. pachyptera*
- 27b. Leaflets 11–13, widest at middle or slightly lower, apex obtuse, not long acuminate, rachis not convex 25. *O. purpureiflora*
- 26b. Leaflets 3–9(–11), not pale abaxially when dried.
- 28a. Ovary and legume glabrous.
- 29a. Racemes axillary; leaflets 7–9(–11), apex caudate; valves fulvous when dried; seeds 1.1–1.8 cm, striate 27. *O. striata*
- 29b. Panicles terminal; leaflets 5–7, apex not caudate; valves blackish when dried; seeds 1–1.5 cm, not striate.
- 30a. Leaflets obovate or obovate-elliptic, apex obtuse, emarginate; calyx pubescent along outer margin and inside; standard apex rounded 20. *O. emarginata*
- 30b. Leaflets ovate or elliptic-lanceolate, apex acuminate; calyx pubescent inside and out; standard apex retuse 21. *O. glaberrima*

- 28b. Ovary completely pubescent or at least on margin; legumes ± pubescent, rarely glabrous.
- 31a. Legumes cylindric or slightly compressed, orange-red at maturity and brownish when dry 28. *O. pinnata*
- 31b. Legumes compressed, brownish at maturity and blackish brown when dry.
- 32a. Leaflets obovate or oblanceolate, apex obtuse or emarginate; legumes 2–4.5 cm.
- 33a. Young branchlets sparsely fulvous velvety; leaflets 7–9, often oblanceolate, lateral veins 4–6 pairs 29. *O. indurata*
- 33b. Young branchlets densely appressed fulvous pubescent; leaflets (5–)7, obovate, lateral veins 5–8 pairs 30. *O. eugenifolia*
- 32b. Leaflets elliptic or oblong, apex acute; legumes 3–10 cm.
- 34a. Legumes somewhat fleshy, swollen, densely appressed short grayish brown pubescent; leaflets 5, often elliptic, apex acute 31. *O. pubescens*
- 34b. Legumes slightly compressed; leaflets 7–23, oblong, apex acuminate, caudate, or acute.
- 35a. Rachis prolonged more than 1 cm below terminal leaflet; legumes more than 4 cm; plants of mainland China 37. *O. nuda*
- 35b. Rachis prolonged less than 1 cm below terminal leaflet; legumes less than 3 cm; plants restricted to Taiwan.
- 36a. Leaflets 3–5(–7), apex acute to acuminate, margin entire, not sinuous; flowers white; seeds globose 35. *O. formosana*
- 36b. Leaflets (5–)7(–9), apex acute to obtuse, slightly retuse, margin entire, often sinuous; flowers reddish purple; seeds angular 36. *O. hengchuniana*

1. *Ormosia balansae* Drake, J. Bot. (Morot) 5: 215. 1891.

长脐红豆 *chang qi hong dou*

Macroule balansae (Drake) Yakovlev; *Ormosia elliptilimba* Merrill & Chun.

Trees evergreen, trunk vertical, to 30 m, to 60 cm d.b.h. Bark of young trees grayish, smooth, of old trees grayish brown, minutely longitudinally striate. Branchlets terete, densely appressed brownish pannose. Leaves imparipinnate, 15–20(–35) cm; petiole 2–6.3 cm; petiole and rachis densely appressed pubescent; leaflets 5–7, often 7 near inflorescence; petiolule 5–9 mm, pubescent; blades oblong or elliptic, (5–)8–13(–20) × (2.5–)4–5.5(–8.5) cm, leathery or thinly so, ± yellowish appressed pannose abaxially, glabrous, sometimes villosulous at midvein, adaxially, base rounded or broadly cuneate, apex obtuse, retuse, or acute, rarely acuminate or caudate; midvein raised abaxially, impressed adaxially, lateral veins 16 or 17 pairs, angled 50° with midvein, raised. Panicles terminal or axillary, large, to ca. 19 cm, branches to 20 cm at base of inflorescence; peduncle and pedicel densely appressed grayish brown tomentulose; pedicel 2–3 mm. Calyx campanulate; teeth dimorphic, upper 2 triangular, others lanceolate, densely brownish velvety. Corolla white; standard suborbicular, shortly stipitate; wings and keel oblong. Stamens unequal. Ovary densely appressed short grayish brown velvety; ovules 2; style glabrous. Legumes indehiscent or tardily dehiscent, broadly ovate, suborbicular, or obovate, 3–4.5 × 2.4–3 cm (excluding stipe), swollen around seed, beak oblique, stipe 3–4 mm; valves thinly leathery, fragile, densely appressed brownish velvety; calyx persistent. Seed 1(or 2), red or carmine, rounded or elliptic, 1.3–2 × 1.2–1.7 cm; hilum 1.5–1.8 cm, over 1/2 circumference of seed. Fl. Jun–Jul, fr. Oct–Dec.

Valleys and streamsides in broad-leaved mixed forests; 300–1000 m. Guangxi (Shiwan Dashan), Hainan, Jiangxi, Yunnan (Hekou) [Vietnam].

2. *Ormosia pachycarpa* Champion ex Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 76. 1852.

茸荚红豆 *rong jia hong dou*

Trees evergreen, to 15 m, to 20 cm d.b.h. Bark grayish green. Branchlets densely appressed pallid pannose. Leaves imparipinnate, 18–30 cm; stipule broadly triangular, densely appressed white woolly; petiole 3–6.2 cm, densely appressed pubescent; leaflets 5–7; petiolule 4–9 mm; blades obovate-oblong, 6.7–11.7 × 2.5–4.7 cm, leathery, base cuneate-subrounded, apex acute, mucronate; lateral veins 12–22 pairs, arcuate, pubescent abaxially with brown hairs or densely white woolly hairs. Panicles terminal, up to 20 cm; flowers subsessile. Calyx broadly campanulate; teeth woolly abaxially, sparsely hairy adaxially. Corolla white; standard suborbicular, ca. 8 × 1 mm, apex retuse; petal stalk ca. 3 × 2 mm; wings oblong, ca. 10 × 4 mm; keel falcate, nearly same size as wings, laterally 1-auriculate at base. Stamens nearly equal, 0.7–1.5 cm. Ovary ovate or elliptic, densely appressed pubescent; ovules 3–6; style filiform, glabrous. Legumes elliptic or suborbicular, 2.5–5 × 2.5–3 × ca. 1.3 cm, turgid, ends obtuse; valve walls ca. 2 mm thick, septum absent. Seeds 1 or 2, brownish red, subrhombic or rounded, asymmetric at base, 1.8–2.5 × ca. 1.4 cm, fleshy, glossy; hilum small, ca. 1 mm, elliptic, indented, slightly oblique. Fl. Jun–Jul.

• Mountain slopes, valleys or streamsides in mixed forests, roadsides. Guangdong.

1a. Lateral veins of leaflets 12–14 pairs,

- densely white woolly abaxially 2a. var. *pachycarpa*
 1b. Lateral veins of leaflets 18–22 pairs,
 sparsely brown hairy abaxially 2b. var. *tenuis*

2a. *Ormosia pachycarpa* var. *pachycarpa*

茸荚红豆(原变种) rong jia hong dou (yuan bian zhong)

Trichocycamos pachycarpum (Champion ex Benth) Yakovlev.

Leaflet lateral veins 12–14 pairs, densely white woolly abaxially.

- Mountain slopes, valleys or streamsides in mixed forests. Guangdong.

2b. *Ormosia pachycarpa* var. *tenuis* Chun ex R. H. Chang, Acta Phytotax. Sin. 22: 14. 1984.

薄毛茸荚红豆 bao mao rong jia hong dou

Leaflet lateral veins 18–22 pairs, sparsely appressed brown hairy abaxially, without white woolly pubescence.

- Valleys, roadsides. Guangdong.

3. *Ormosia merrilliana* L. Chen, Sargentia 3: 99. 1943.

云开红豆 yun kai hong dou

Trichocycamos merrillianum (L. Chen) Yakovlev.

Trees evergreen, to 20 m. Stems with grayish brown bark and shallower longitudinal stripes; young branches fulvous tomentose. Leaves imparipinnate, 20–30 cm; stipule triangular, densely appressed fulvous velvety; petiole 4–5 cm; rachis 8–12 cm, not elongate at uppermost leaflet pair; leaflets 5–9; stipel lanceolate, densely appressed tomentose; petiolule thickened, 2–5 mm, densely appressed brown pubescent; blades elliptic-oblong to oblanceolate, 5–20 × 3–7 cm, leathery, sparsely to densely gray to yellow-brown pubescent abaxially, glabrous and greenish adaxially, base cuneate to broadly acute, apex shortly acute to acuminate; lateral veins 12–17 pairs, raised on both surfaces, somewhat arcuate at margin. Panicles terminal, 17–30 cm, sparsely branched, slightly to densely patulous or appressed hairy; pedicel 2–5 mm; bracts deciduous. Calyx teeth triangular-oblong, ca. 4 × 3 mm, densely appressed rusty brown hairy. Corolla white; standard broadly ovate, ca. 1.2 × 1 cm including claw; wings broadly elliptic, ca. 9 × 6 mm, base 2-auriculate; keel ca. 7 × 4 mm, base shortly laterally 1-auriculate, claw 4–5 mm. Stamens subequal; filaments glabrous, 6–12 mm. Ovary broadly ovate, sessile, densely appressed pilose; ovule 1; style filiform, 6–12 mm, base laterally pubescent. Legumes broadly ovate or obovate, turgid, 3.5–4.5 × 2.5–3.5 × ca. 1.5 cm, base rounded, apex obtuse or mucronate, stipe absent; valves densely appressed tomentose, internal septum absent. Seed 1, dark chestnut-brown or blackish, suborbicular or broadly obovate, slightly compressed, 1.5–2.4 × 1–1.5(–2.1) cm, glossy; testa densely concavely dotted; hilum small, elliptic, 1–1.5 mm. Fl. Jun, fr. Oct.

- Mountain slopes, valleys in open forests, forest margins; below 100–1200 m. Guangdong, Guangxi, Yunnan (Funing).

4. *Ormosia inflata* Merrill & Chun, Sargentia 3: 100. 1943.

胀荚红豆 zhang jia hong dou

Trichocycamos inflatum (Merrill & Chun) Yakovlev.

Trees evergreen, 6–10 m, to 30 cm d.b.h. Stems terete, glabrous; bark brownish. Branchlets, petiole, rachis, and inflorescence densely appressed rusty brownish pubescent. Leaves imparipinnate, 10.5–19.5 cm; petiole 1.5–2.1 cm; rachis 3–6 cm, not elongate at uppermost leaflet pair; leaflets 5–7; petiolule 2–5 mm, densely appressed pilose; blades oblong-lanceolate or oblong, 5–11 × 1.5–3.5 cm, densely appressed rusty or brownish pilose abaxially, glabrous adaxially, base narrowly cuneate, apex caudate; midvein raised abaxially, impressed adaxially, lateral veins 10–15 pairs, arcuate with conspicuous veinlets abaxially, inconspicuous adaxially. Panicles terminal, 12–15 cm, sparsely branched. Flowers congested, 1–1.2 cm; pedicel short. Calyx teeth ovate, abaxially densely appressed brownish tomentose, apex obtuse. Corolla white; standard suborbicular, apex retuse, 7–8 mm, claw 2–5 mm; wings and keel oblong, ca. 8 × 2 mm, claw ca. 3 mm. Ovary densely appressed villous; ovules 2 or 3; style slightly puberulent. Legumes ovate or elliptic, fleshy, turgid, 3–5 × 2–2.5 × ca. 1.5 cm; valves thickly leathery, densely appressed brownish tomentose outside, glabrous inside, septum absent. Seeds 1 or 2, chestnut-brownish, subelliptic or suborbicular, slightly compressed, ca. 1.5 × 1.7 × 1 cm, glossy; hilum small, ca. 1 mm. Fl. May, fr. Oct–Nov.

- Streamsides in open or dense forests; 300–1100 m. Hainan.

5. *Ormosia sericeolucida* L. Chen, Sargentia 3: 107. 1943.

亮毛红豆 liang mao hong dou

Trichocycamos sericeolucidum (L. Chen) Yakovlev.

Trees evergreen, to 24 m, to 34 cm d.b.h. Bark grayish brown with shallow longitudinal stripes. Branches, branchlets, petiole, rachis, and inflorescence densely appressed fulvous pubescent. Leaves imparipinnate, 16–21 cm; petiole 3.5–4 cm; rachis 7.6–7.8 cm, prolonged 3–15 mm below terminal leaflet; leaflets 5–7; petiolule 8–10 mm, densely appressed pubescent; blades oblong-oblong to obovate-oblong, or oblong, widest above middle, 5.5–11.6 × 2.3–4.8 cm, leathery, adnate yellow sericeous abaxially, olive-green, glossy, and glabrous adaxially, base cuneate, margin slightly revolute, apex acute or obtuse; midvein impressed adaxially, lateral veins 10–12 pairs, conspicuous and raised abaxially, inconspicuous adaxially. Panicles terminal, ca. 20 cm, much branched. Calyx ca. 1 cm, persistent; teeth unequal, densely appressed pilose. Corolla white. Legumes slightly compressed, elliptic or obovate, oblique, 3–5 × 2.2–2.6 cm, apex rounded to shortly acuminate, sometimes oblique; stipe 4–5 mm; valves leathery, ca. 1 mm thick, densely appressed fulvous pubescent, internal septum absent. Seeds 1 or 2, reddish brown, becoming chestnut-brown at maturity, oblique, subrhombic-square or obovate, compressed, 1.6–1.8 × 1.2–2 × 0.3–0.4 cm, glossy; hilum small, less than 1 mm, slightly oblique. Fl. Aug, fr. Oct.

- Valleys or streamsides in mixed forests; 300–2400 m. Guangdong (Yangchun), Guangxi (Shangsi).

6. *Ormosia longipes* L. Chen, Sargentia 3: 100. 1943.

纤柄红豆 xian bing hong dou

Trees, 6–30 m, to 50 cm d.b.h. Branchlets brownish, glabrous or inconspicuously pilose. Leaves imparipinnate, 25–49 cm; petiole 6.5–7.5 cm; rachis 12–17 cm, prolonged 0.3–1.7 cm below terminal leaflet; leaflets 7–9; petiolule 5–8 mm, thick, rough; blades pale green abaxially, green or olive-green adaxially, narrowly oblong or broadly oblong-lanceolate, 12–24 × 2.5–6.2 cm, papery, glabrous or very sparsely white pubescent, base acute to cuneate, apex acuminate to caudate; lateral veins 8–10 pairs, conspicuously raised, arcuate, anastomosing. Panicles terminal, to 26 cm, branches few at base, up to ca. 18 cm, flowers sparse; pedicel 5–6 mm, peduncle and pedicel glabrous or sparsely grayish pubescent; bractlets acicular, caducous or absent, glabrous or grayish hairy. Calyx ca. 1.2 cm; teeth oblong, ca. 7 mm, both surfaces grayish pubescent. Corolla russet-red; standard suborbicular, ca. 10 × 12 mm, apex retuse, claw ca. 1 mm, thickened at base; wings obovate-elliptic, ca. 1 × 0.4 cm, claw ca. 2 mm; keel elliptic, ca. 9 × 5 mm, laterally 1-auriculate, claw ca. 3 mm. Stamens unequal, 7–13 mm. Ovary sparsely yellow pubescent, becoming glabrescent. Legumes elliptic or oblong-elliptic, 3.5–4 × ca. 2.5 × 2 cm, stipe ca. 5 mm; valves brownish or black, ca. 1 mm thick, leathery, glabrous, rugose, internal septum absent. Seeds 1–3, elliptic or ovate, 2–2.3 × 1.7–2.3 × ca. 1.8 cm; testa brownish, fragile, easy to separate from cotyledon; hilum small, inconspicuous. Fl. Jul, fr. Sep–Oct.

• Valleys and streamsides in dense or open forests; 1000–1600 m. SE Yunnan.

7. *Ormosia fordiana* Oliver, Hooker's Icon. Pl. 25: t. 2422. 1895.

肥荚红豆 fei jia hong dou

Ruddia fordiana (Oliver) Yakovlev.

Trees, to 17 m, to 20 cm d.b.h. Bark of stems dark gray, with shallow longitudinal stripes. Young branches and leaves densely appressed rusty brown pubescent, becoming sparsely hairy or glabrescent. Leaves imparipinnate, 19–40 cm; petiole 3.5–7 cm; rachis 5.5–15.5 cm, prolonged 3–15 mm below terminal leaflet; leaflets (5–)7–9(–13); petiolule 6–8 mm, grooved, rusty pubescent, becoming glabrate; blades obovate-lanceolate or obovate-elliptic, rarely elliptic, terminal leaflet larger, 6–20 × 1.5–7 cm, thinly leathery, base cuneate or suborbicular, apex acute or caudate; midvein raised abaxially, impressed adaxially, lateral veins 11 pairs, angled 40° with midvein, lateral veins and veinlets inconspicuous on both surfaces, scattered rusty brown appressed pubescent or glabrous abaxially, glabrous adaxially. Panicles terminal on young branches, 15–26 cm; peduncle and pedicel densely appressed rusty pubescent. Pedicel 6–12 mm; bractlets 2, at pedicel apex, lanceolate, 3–5 mm, densely appressed rusty brown pubescent. Flowers 2–2.5 cm. Calyx light brown-green, 1.5–2 cm; teeth oblong-lanceolate, slightly obtuse, upper 2/3 of upper pair connate, densely appressed rusty pubescent; tube short. Corolla purplish red, ca. 1.5 cm; standard rounded, cucullate, upper margin strongly inflexed, yellow spotted subcentrally, claw short, thick, compressed; keel similar to wings, elliptic-obovate, apex obtuse, claw short. Stamens unequal, all functional; filaments basally thickly compressed. Ovary flattened, densely appressed rusty brown silky pubescent; ovules usually 4; style incurved, glabrescent. Legumes

semicircular or oblong, 5–12 × 5–6.8 cm, apex obliquely beaked, stipe compressed, 5–10 mm, convex at seed; valves woody, dehiscent, ca. 2 mm thick, externally yellow pubescent or glabrescent, internally glossy, often whitish, stained reddish, septum absent, slightly thickened at margin, tip reflexed; calyx persistent. Seeds 1–4, large, oblong, obtuse at ends, 2.5–3.3 × 1.7–2.7 cm, slightly flattened; testa red or red-purple, fleshy, becoming thin and fragile when dry; hilum suborbicular, 3–4 mm. Fl. Jun–Jul, fr. Nov.

Valleys, roadsides on mountain slopes, streamsides in mixed open forests; 100–1400 m. Guangdong, Guangxi, Hainan, S to SE Yunnan [Bangladesh, Myanmar, Thailand, Vietnam].

8. *Ormosia apiculata* L. Chen, Sargentia 3: 111. 1943.

喙顶红豆 hui ding hong dou

Ormosia semicastrata Hance f. *apiculata* (L. Chen) Yakovlev.

Trees evergreen, ca. 19 m tall. Bark of stems grayish, smooth. Branchlets grayish green, grayish brown tomentose or glabrescent. Leaves imparipinnate, 14–24.5 cm; petiole 2–4 cm; rachis 3–4.7 cm, prolonged 0.3–2.8 cm below terminal leaflet, glabrous; leaflets 3–5; petiolule 5–7 mm; blades dark green abaxially, oblong, 6–14.5 × 2.5–3.7 cm, terminal leaflet larger, leathery, both surfaces glabrous, base cuneate, apex acuminate, obtuse, or retuse; midvein raised abaxially, impressed adaxially, lateral veins 7–11 pairs, angled 40° with midvein, veinlets anastomosing, raised on both surfaces, conspicuous abaxially. Panicles terminal, up to 20 cm in fruit, lower branches up to 15 cm; peduncle appressed fulvous pubescent, becoming sparsely pubescent to glabrescent. Legumes broadly orbicular or obliquely elliptic, 1.5–2.5 × 1.8–2.4 cm (excluding beak and stipe), compressed to slightly swollen, abruptly contracted to oblique beak, 4–6 mm, base truncate to suborbicular, stipe 5–8 mm; valves leathery, ca. 1 mm thick, sparsely pubescent, glabrescent when old; calyx persistent, densely appressed yellowish brown pubescent. Seed 1 (or 2), dark red, oblate, rarely prolate, 10–13 mm in diam., thick; hilum elliptic, ca. 1 mm. Fl. Apr, fr. Sep–Oct.

• Forests of mountain slopes; ca. 1400 m. Guangxi (Lingyun).

9. *Ormosia semicastrata* Hance, J. Bot. 20: 78. 1882.

软荚红豆 ruan jia hong dou

Ormosia cathayensis L. Chen; *O. semicastrata* f. *litchii-folia* F. C. How; *O. semicastrata* f. *pallida* F. C. How.

Trees evergreen, up to 14 m. Bark of stems brown; lenticels convex with irregular cracks. Branchlets yellowish pilose. Leaves imparipinnate, 18.5–24.5 cm; petiole, rachis, and petiolule appressed grayish brown pilose; rachis prolonged 1–2.4 cm below terminal leaflet; leaflets 3–9(–13), green or sometimes glaucous abaxially, ovate-oblong, elliptic, or lanceolate, 4–14.2 × 1–5.7 cm, leathery, glabrous on both surfaces, sometimes appressed pilose along midvein abaxially, base rounded or broadly to narrowly cuneate, apex acuminate or acute, obtuse or retuse; lateral veins 10 or 11 pairs, angled 60° with midvein, arcuate, inconspicuous. Panicles terminal, sometimes axillary, subequal to leaves; peduncle and pedicel densely appressed fulvous pi-

lose. Flowers ca. 7 mm. Calyx broadly campanulate, 4–5 mm; teeth triangular, subequal, abaxially densely appressed fulvous tomentose, adaxially sparsely rusty brown pilose. Corolla white, ca. 2 × as long as calyx; standard suborbicular, ca. 4 × 4 mm, claw ca. 4 mm; wings linear-oblongate, ca. 4.5 × 2 mm, claw ca. 4.5 mm; keel oblong, ca. 4 × 2 mm, claw ca. 2 mm. Stamens unequal, 5 developed, 5 shorter, reduced and without functional anthers. Ovary ovate, ovary sutures and lower style densely appressed fulvous pubescent; ovules 2. Legumes small, dark brown when dried, suborbicular, compressed, slightly swollen, leathery, 1.5–2 cm, apex shortly beaked, stipe 2–3 mm. Seed 1, red to red-brown, compressed laterally, ca. 9 × 9 × 6 mm; hilum ca. 2 mm. Fl. Apr–May, fr. Aug–Sep.

• Mixed forests, mountains, valleys, streamsides, roadsides; 100–1700 m. SE Fujian, Guangdong, Guangxi, SE Guizhou, Hainan, Hunan, S Jiangxi.

10. *Ormosia howii* Merrill & Chun, *Sargentia* 3: 112. 1943.

缘毛红豆 yuan mao hong dou

Ormosia semicastrata Hance f. *howii* (Merrill & Chun) Yakovlev.

Trees evergreen, to 10 m, to 12 cm d.b.h. Bark of stem grayish brown. Branchlets terete to angled, densely appressed grayish brown pubescent, becoming glabrate. Leaves imparipinnate, 14.5–36 cm; petiole 4.2–5 cm; rachis 6.5–7 cm, prolonged 5–8 mm below terminal leaflet; petiole, rachis, and petiolule grayish pubescent; leaflets 5–7; petiolule 7–10 mm, slightly grooved adaxially; blades oblong-obovate or oblong, 6–17 × 2–6.5 cm, thickly leathery, both surfaces glabrous or pubescent only on midvein abaxially, base cuneate or rounded, apex mucronate, obtuse, or retuse; lateral veins ca. 12 pairs, rarely 17, angled 60° with midvein, veinlets raised abaxially, impressed adaxially. Panicles terminal, up to 15 cm at fruiting, densely appressed brownish pubescent. Legumes obliquely elliptic-ovate or ovate-rhombic, slightly compressed, 2–2.5 × 1.5–2 cm, apex abruptly contracted to oblique beak, 3–4 mm, stipe 3–4 mm; valves light brown, thickly leathery, young valves and margin brownish pubescent, glabrescent or sparsely appressed brownish villous along margin at maturity; calyx persistent, densely appressed rusty brown pubescent. Seeds 1 or 2, dark red, suborbicular, slightly compressed or triangular, one surface flattened, 8–9 × 8–9 mm, glossy; hilum retuse, elliptic, ca. 2 mm.

• Open forests of mountain slopes, mostly on granite mountains; below 100–900 m. Hainan.

11. *Ormosia pingbianensis* Cheng & R. H. Chang, *Acta Phytotax. Sin.* 22: 18. 1984.

屏边红豆 ping bian hong dou

Trees evergreen, to 15 m tall. Youngest branchlets appressed yellowish brown pubescent, glabrous with age; bud naked, stalked, gray pubescent. Leaves imparipinnate, alternate or rarely subopposite, 15–17 cm; petiole and rachis glabrous; petiole 2.5–3.5 cm; rachis 3–5 cm, prolonged 1.4–2 cm below terminal leaflet; leaflets (5–)7; petiolule ca. 3 mm, glabrous, grooved; blades oblong, 5.2–8.5 × 1.7–2.6 cm, thinly leathery, both surfaces glabrous, base cuneate or rarely rounded, apex

acuminate or long acuminate; midvein impressed adaxially, lateral veins and veinlets raised when dried. Inflorescence rachis brown pubescent. Legumes oblong, elliptic-obovate, or long ovate, 3.2–4.4 × 1.8–2 cm, base rounded or cuneate, apex obtuse, mucronate, stipe 3–4 mm; calyx persistent and small, densely appressed fulvous pilose; valves thinly leathery, less than 1 mm thick, blackish brown when dried, glabrous, internal septum absent. Seeds 1–3, red to red-purple, suborbicular, slightly compressed, ca. 10 × 9 × 7 mm; hilum elliptic, retuse, ca. 2 mm.

• Valleys of open forests; 900–1000 m. Guangxi (Ningming), Yunnan (Jinping, Pingbian).

This species is similar to *Ormosia glaberrima* but differs from that species in having legumes without septae, valves thinly leathery (vs. woody), and leaflets usually 7 (vs. (3–)5–7) and smaller.

12. *Ormosia yunnanensis* Prain, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 69: 183. 1900.

云南红豆 yun nan hong dou

Trees evergreen, to 25 m, ca. 80 cm d.b.h. Bark of stems gray. Branchlets and buds densely appressed rusty brown tomentose. Leaves imparipinnate, 14–31 cm; petiole, rachis, and petiolule densely appressed rusty brown tomentose; petiole 3.3–5.5 cm; rachis 6.5–12.5 cm, prolonged 0.6–1.5 cm or not prolonged below terminal leaflet; leaflets (7–)9–13(–15), opposite or upper rarely alternate; petiolule 2–3 mm, grooved; blades oblong or oblong-lanceolate, rarely obovate-oblong, 4.7–13.4 × (1.5–)2.2–3.8 cm, leathery, densely appressed rusty brown tomentose abaxially, becoming glabrescent, glabrous and glossy adaxially, base broadly cuneate to rounded, apex acute to acuminate or obtuse; lateral veins 7–9 pairs, raised abaxially, impressed adaxially. Panicles terminal and axillary, congested, 14–25 cm; peduncle and pedicel densely appressed rusty brown pilose; pedicel 2–3 mm; bracts 2–5 × ca. 1.5 mm, acute, deciduous, rusty pilose. Flowers 0.9–1.1 cm. Calyx campanulate, ca. 8 mm; teeth divided to middle part of calyx, triangular, densely appressed rusty brown tomentose inside and out. Corolla pink to orange-red. Ovary rusty brown pilose at margin. Legumes obovate, oblique, or oblong, 2.5–6 × 1.8–2.5 cm, beak acute, stipe ca. 5 mm, densely appressed rusty brown pilose at margin and base; valves thinly leathery, black when dry, glabrous, swollen around seeds, constricted between seeds; calyx persistent. Seeds 1–3, bright red, ovate or oblate, 8–13 × 6–12 × ca. 5 mm, glossy; hilum elliptic, sunken, 1–1.5 mm. Fl. Mar, fr. Oct.

• Plains, bottoms of ravines, mixed forests of mountain slopes; 500–1700 m. S Yunnan.

It is difficult to distinguish between this species and *Ormosia olivacea* from vegetative characters. The former has dense appressed rusty brown hairs; leaflets acute at the apex, glossy adaxially, with lateral veins arcuate; and legume valves thinly leathery, constricted between seeds. The latter has yellowish brown hairs; leaflets acuminate at the apex, dull adaxially, with lateral veins straight; and legume valves woody, not constricted between seeds.

“*Ormosia lancifolia*” (Cheng & Q. W. Yao, *Sylva Sin.* 2: 1324. 1985) belongs here but was not validly published because no Latin description or diagnosis was provided and no type was indicated (*Vienna Code*, Art. 36.1, 37.1).

13. *Ormosia nanningensis* L. Chen, *Sargentia* 3: 113. 1943.

南宁红豆 nan ning hong dou

Ormosia semicastrata Hance f. *nanningensis* (L. Chen) Yakovlev.

Trees evergreen, to ca. 20 m. Branchlets appressed grayish brown pubescent. Leaves imparipinnate, 13–28 cm; rachis and petiolule densely appressed grayish pubescent; leaflets 5; petiolule 7–10 mm, thin; blades green adaxially and paler abaxially, oblong or oblong-lanceolate, widest at middle, 6–15 × 1.5–4 cm, thinly leathery, young leaves densely appressed pilose abaxially, becoming glabrate, glabrous adaxially, base cuneate or rounded, apex obtuse or acuminate, rarely retuse; lateral veins 9–11 pairs, fine, slightly raised on both surfaces. Inflorescence 10–15 cm, densely appressed very short grayish pubescent. Legumes suborbicular or elliptic, slightly convex, 2.4–4 × 2–2.8 cm, apex beak acute, stipe ca. 4 mm; valves densely appressed grayish brown pubescent, internal septum absent; calyx persistent, densely appressed grayish pubescent. Seeds 1 or 2, dark red, suborbicular, slightly compressed, 9–13 × 8–11 mm, hard; hilum 3–4 mm. Fr. Oct.

• Mountain slopes, valley forests, infrequent; 100–700 m. Guangxi (Shiwan Dashan).

14. *Ormosia hosiei* Hemsley & E. H. Wilson, *Bull. Misc. Inform. Kew* 1906: 156. 1906.

红豆树 hong dou shu

Ormosia taiana C. Y. Chiao.

Trees evergreen or deciduous, 20–30 m, to 1 m d.b.h. Bark of stems grayish green, smooth. Branchlets green, yellowish brown pubescent, becoming glabrescent; winter buds brownish yellow pubescent. Leaves imparipinnate, 12.5–23 cm; petiole 2–4 cm; rachis 3.5–7.7 cm, prolonged 0.2–2 cm below terminal leaflet, petiolule and rachis sparsely appressed pubescent or glabrous; leaflets (3–)5(–9); petiolule 2–6 mm, rounded, without groove; blades pale green abaxially, dark green adaxially, ovate or ovate-elliptic, rarely suborbicular, 3–10.5 × 1.5–5 cm, thinly leathery, young leaves sparsely appressed pubescent, becoming glabrate or with scattered hairs only on midvein abaxially, base rounded or broadly cuneate, apex acute or acuminate; lateral veins 8–10 pairs, angled 60° with midvein, both lateral veins and veinlets conspicuously reticulate when dried. Panicles terminal or axillary, 15–20 cm, pendulous. Flowers few, fragrant; pedicel 1.5–2 cm. Calyx broadly campanulate; teeth purplish green, triangular, densely appressed brownish pubescent. Corolla white or purplish; standard obovate, 1.8–2 cm; both wings and keel oblong. Stamens unequal; anthers yellow. Ovary glabrous; ovules 5 or 6; style purple, filiform, curved; stigma oblique. Legumes suborbicular, compressed, 3.3–4.8 × 2.3–3.5 cm, apex shortly beaked, stipe 5–8 mm; valves subleathery, 2–3 mm thick, brownish when dried, glabrous, veins obvious, internal septum absent. Seeds 1 or 2, red, suborbicular or elliptic, 15–18 × 12–15 × ca. 5 mm; hilum 9–10 mm. Fl. Apr–May, fr. Oct–Nov.

• Riversides, mountain slopes, valley forests; 200–900(–1400) m. Anhui, Fujian, Gansu, Guizhou, Hubei, SE Jiangsu, Jiangxi, S Shaanxi, Sichuan, Zhejiang.

15. *Ormosia elliptica* Q. W. Yao & R. H. Chang, *Acta Phytotax. Sin.* 22: 20. 1984.

厚荚红豆 hou jia hong dou

Trees, ca. 15 m tall. Leaves imparipinnate, 15–18 cm; petiole 2.3–3.2 cm; rachis ca. 3 cm, prolonged 1–1.5 cm below terminal leaflet, glabrous or sparsely hairy at base; leaflets 5(–7), oblong, 3.3–9 × 1–3 cm, glabrescent or sparsely hairy only on midvein abaxially, glabrous adaxially, base cuneate, apex obtuse; lateral veins 6–8 pairs, angled 40° with midvein, veinlets indistinct, conspicuous, raised on both surfaces when dried. Inflorescence racemose, terminal or axillary. Legumes elliptic, 4.5–5.6 × 2.5–3 cm; valves fleshy, woody, 3–4 mm thick, glabrous externally, internal septum absent. Seeds 1 or 2(or 3), ellipsoid, ca. 1.6 × 1–1.3 × 0.7–0.8 cm; hilum 8–10 mm.

• Roadsides, riversides. Fujian, Guangdong, Guangxi.

This species is close to *Ormosia hosiei* but differs from that species by its oblong leaflets, elliptic legumes, and fleshy valves.

16. *Ormosia napoensis* Z. Wei & R. H. Chang, *Acta Phytotax. Sin.* 22: 21. 1984.

那坡红豆 na po hong dou

Trees small, to ca. 10 m, to 25 cm d.b.h. Branchlets appressed rusty brown pubescent. Leaves imparipinnate, 8.3–19 cm; petiole 1.5–4.8 cm; petiole and petiolule glabrous or glabrescent; rachis 1–3.5 cm, prolonged 0.5–1.5 cm below terminal leaflet; leaflets 3–5; petiolule ca. 2 mm; blades oblong, terminal leaflet larger, 6–13.2 × 1.5–4 cm, glabrous or glabrescent on both surfaces, base rounded or cuneate, apex acuminate to caudate. Panicles terminal. Inflorescence 11–12 cm. Legumes compressed, suborbicular or elliptic, 2.8–4.5 × 2.4–2.8 cm, stipe 3–5 mm, sparsely grayish pubescent, sometimes glabrous, pubescent only at apex and base; valves woody, dehiscent at maturity, reflexed outward, 2–3 mm thick, externally yellowish, internally rough, yellowish brown. Seed 1, dark red-brown, large, elliptic, 1.4–1.8 × 1–1.2 cm, slightly mucilaginous, slightly hard but fragile, easily separated from cotyledons; hilum on shorter axis but slightly off-center, white, convex, aril a yellow ring.

• Forests of mountain slopes; 400–500 m. Guangxi (Napo).

This species is close to *Ormosia fordiana* but has fewer leaflets, smaller legumes, with valves that are not internally glossy or stained reddish, and a smaller seed. Also it differs by its hilum not at the center of axis but slightly oblique, with white funicle and yellow aril ring.

17. *Ormosia simplicifolia* Merrill & Chun, *Sargentia* 3: 102. 1943.

单叶红豆 dan ye hong dou

Fedorovia simplicifolia (Merrill & Chun) Yakovlev.

Shrubs or small trees, 2–5 m. Branches glabrous; buds triangular-ovoid, densely appressed brownish tomentose. Leaves simple, alternate or sometimes subopposite at apex; stipules absent; petiole 4–8 mm, with short hairs; leaf blade oblong or lanceolate, 4.7–25 × 1.4–6 cm, leathery, sparsely appressed reddish brown hirtellous abaxially, glabrous adaxially, base cuneate or rounded, apex long caudate, sometimes retuse; lateral

veins 8–10 pairs, inconspicuous. Inflorescence paniculate or racemose, terminal or in upper axils, 6–10 cm, grayish brown pubescent or glabrescent. Flowers 1.2–1.5 cm, fragrant; pedicel thin, 0.7–1 cm, appressed yellowish gray pubescent. Calyx appressed short yellowish gray hairy; teeth triangular, blunt, slightly longer than calyx tube. Corolla rose-pink; standard broadly ovate, ca. 1.5 cm wide, base broadly truncate to rounded, apex retuse, claw 1.8–2 mm; wings and keel oblong to oblanceolate, 1.2–1.4 × ca. 0.5 cm, claw ca. 4 mm. Stamens unequal, 8–15 mm. Ovary glabrous; ovules 4. Legumes compressed, oblong or obovate, 3–4.5(–6) × 2–2.5 cm; valves nearly woody, ca. 2 mm thick, internal septum absent. Seeds 1–3, red, elliptic, ca. 1.5 × 1.2 × 0.6 cm, glossy; hilum small, aril absent. Fl. Jul, fr. Sep–Oct.

- Valley forests; 400–1300 m. Guangxi, Hainan.

18. *Ormosia boluoensis* Y. Q. Wang & P. Y. Chen, J. Trop. Subtrop. Bot. 3: 29. 1995.

博罗红豆 bo luo hong dou

Shrubs or small trees, 2–4 m. Branchlets glabrous. Leaves simple, alternate; petiole 1.8–3 cm; leaf blade oblong-elliptic, 5–9 cm, leathery, glabrous, base cuneate, apex acuminate; midvein raised abaxially, impressed adaxially. Inflorescence paniculate (terminal) or racemose (axillary), 3–13 cm, densely yellow pubescent. Flowers 1.2–1.5 cm; pedicels 1–3 mm. Calyx bilateral, broader toward base, narrowing toward mouth, 0.6–0.7 mm, densely yellow pubescent; teeth 0.3–0.4 mm, apex acute. Corolla white; standard broadly ovate, 1–1.2 × 1.3–1.5 cm, base truncate-rounded to broadly cuneate, apex rounded, claw thickened, ca. 1 mm; wings narrowly obovate to broadly spatulate, 1–1.2 × 0.5–0.6 cm, oblique, claw ca. 1 mm; keel narrowly ovate to elliptic, 1–1.2 × 0.5–0.6 cm, base cuneate, 1- or 2-auriculate, apex blunt to obliquely narrowly rounded, claw ca. 1 mm. Stamens unequal, free, 0.9–1.5 cm, curved; anthers well developed on 5, poorly developed and infertile on 5. Ovary ovate-elliptic, yellow pubescent; style curved. Legumes unknown. Fl. May.

- Sparse riverine forests; 800–900 m. Guangdong.

19. *Ormosia hekouensis* R. H. Chang, Acta Phytotax. Sin. 22: 110. 1984.

河口红豆 he kou hong dou

Trees, to 20 m. Branchlets dark brown pubescent, becoming glabrescent; buds densely appressed black pubescent. Leaves imparipinnate, 26–41 cm; petiole 3–5 cm; rachis 10–20 cm, prolonged 0.8–1.8 cm below terminal leaflet, glabrous or glabrescent; leaflets 9–11; petiolule 3–5 mm, grooved, glabrous or sparsely pubescent; blades lanceolate, obovate-lanceolate, or oblong, 6.5–18 × 2.7–6.4 cm, young leaves dark brownish pubescent, becoming glabrescent, hairs short abaxially, base narrowly cuneate, apex acute; midvein impressed adaxially, lateral veins 9 or 10 pairs, raised abaxially. Panicles terminal; rachis densely appressed grayish brown pubescent. Legumes large, very fleshy, woody, spheroidal or oblong, 4.5–9 × ca. 4 cm, beak 6–8 mm, stipe absent or short; valves grayish brown, 6–10 mm, apex and base densely appressed yellowish brown pubescent, internally white, tinged reddish near seed, septum between

seeds membranous. Seeds 1–3, reddish brown, elliptic, 2.5–3 × 1.7–2 cm, fragile; hilum 2–3 mm, slightly off-center.

- Humid open forests and riversides; ca. 300 m. Yunnan (Hekou, Mengla).

Ormosia hekouensis is similar to *O. crassivalvis* Gagnepain (of Vietnam) but differs by its larger, differently shaped leaflets and its terminal panicles. The latter has linear-lanceolate leaflets, ca. 15 × 2 cm, and axillary inflorescences.

20. *Ormosia emarginata* (Hooker & Arnott) Benth, Hooker's J. Bot. Kew Gard. Misc. 4: 77. 1852.

凹叶红豆 ao ye hong dou

Layia emarginata Hooker & Arnott, Bot. Beechey Voy. 183. 1833; *Fedorovia emarginata* (Hooker & Arnott) Yakovlev; *Macrotropis emarginata* (Hooker & Arnott) Walpers.

Trees evergreen, small, 6(–12) m, 8(–30) cm d.b.h., sometimes shrubs; bark of young trees greenish, becoming grayish green. Branchlets green, smooth, glabrous, lenticels inconspicuous; buds rusty brown pubescent. Leaves imparipinnate, (6.5–)11–20.5 cm; petiole (2.3–)3.4–4.8 cm; rachis (2.3–)4–8.6 cm, not prolonged or prolonged 1.2–2 cm below terminal leaflet, young petiole, rachis, and leaves abaxially sparsely appressed yellowish brown pilose, becoming glabrescent, both petiole and rachis grooved; leaflets (3–)5–7; petiolule 3–5 mm, stout, grooved, wrinkled; blades obovate, obovate-elliptic, long-obovate, or oblong, (1.4–)3.7–7 × (0.9–)1.6–3.2 cm, thickly leathery, base cuneate or rounded, apex obtuse, emarginate; lateral veins 7 or 8 pairs, fine, angled 45° with midvein, veinlets fine, raised, more conspicuous abaxially. Panicles terminal, 10–11.5 cm, few flowered. Flowers fragrant; pedicel 3–5 mm, glabrous. Calyx broadly campanulate, flared out and appearing flat-faced; teeth isometric, margin and inner surface gray tomentose. Corolla white or pink; standard semiorbicular, ca. 7 × 8 mm, apex rounded, claw ca. 2 mm; wings oblong, base auriculate, claw 2.5–3 mm; keel oblong, somewhat curved, slightly auriculate, claw ca. 2.5 mm. Stamens unequal. Ovary glabrous. Legumes dark brown or black, compressed, rhombic or oblong, 3–5.5 × 1.7–2.4 cm, apiculate, stipe 2–3 mm; valves woody, septate. Seeds 1–4, red-brown, suborbicular or elliptic, slightly compressed, 7–10 × ca. 7 mm; hilum whitish yellow, small, ca. 2 mm. Fl. May–Jun, fr. Aug–Oct.

Mountain slopes, mixed valley forests. Guangdong, S Guangxi (Dongxing), Hainan [Vietnam].

21. *Ormosia glaberrima* Y. C. Wu, Bot. Jahrb. Syst. 71: 182. 1940.

光叶红豆 guang ye hong dou

Fedorovia glaberrima (Y. C. Wu) Yakovlev; *Ormosia kwangsiensis* L. Chen.

Trees evergreen, 15(–21) m, to 40 cm d.b.h., or shrubs. Bark of stems grayish green, smooth. Branchlets green, dark green when dried, rusty brown pubescent, becoming glabrescent; buds brown pubescent. Leaves imparipinnate, 12.5–19.7 cm; petiole 2.5–3.7 cm; rachis 3.5–7.2(–10.8) cm, prolonged 0.7–0.8 cm below terminal leaflet, not grooved, yellowish brown pubescent when young, becoming glabrescent; leaflets

(3–)5–7, ovate or elliptic-lanceolate, (2.7–)4–9.5 × 1.4–3.6 cm, leathery or thinly so, both surfaces glabrous, base broadly cuneate to rounded, apex acute to acuminate, slightly retuse, lateral veins 9 or 10 pairs, angled 45° with midvein; petiolule 3–6 mm, grooved. Panicles terminal or axillary, 9–12 cm; peduncle and pedicel densely appressed rusty pubescent, becoming glabrescent. Flowers ca. 1 cm; pedicel short. Calyx campanulate; teeth broadly flared out and appearing flat-faced, appressed yellowish pubescent abaxially, fulvous pubescent adaxially. Standard suborbicular, ca. 8 × 8 mm, apex retuse, claw 2–3 mm; wings oblong, 8–9 × 3.5–4 mm, 2-auriculate, claw 2–3 mm; keel oblong, 8–9 × 3.5–4 mm, curved, 2-auriculate, claw 2–3 mm. Stamens unequal, 3–5 longer, others shorter, incurved. Ovary glabrous; ovules 5. Legumes compressed, elliptic or oblong, 3.5–5 × 1.7–2 cm, base cuneate, apex acute, beak short, slightly curved, stipe ca. 1 mm; valves black, woody, glabrous, internally septate. Seeds 1–4, red-brown, oblate or oblong, 1–1.1 × 0.8–0.9 cm, glossy; hilum elliptic, concave, 1–3 mm. Fl. Jun, fr. Oct.

• Mountain slopes, open valley forests; 200–800 m. W Guangdong, SE Guangxi, Hainan, Hunan (Jianghua), Jiangxi.

Ormosia glaberrima is similar to *O. emarginata* due to the color and shape of the legumes and to the flat-faced calyx. The former has ovate or elliptic-lanceolate leaflets that are thinly leathery, with tapering, slightly retuse apices; its calyx is hairy on both surfaces; the standard apex is emarginate; and the peduncle is often covered with appressed yellow-brown silky hairs. The latter has obovate, obovate-elliptic, or oblong leaflets that are thickly leathery, with broadly rounded, emarginate apices; its calyx is glabrous on the outside, hairy only on the margin and inside; the apex of the standard is rounded; and the peduncle is glabrous.

22. *Ormosia henryi* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 69: 180. 1900.

花榈木 hua lü mu

Fedorovia henryi (Prain) Yakovlev; *Ormosia mollis* Dunn.

Trees evergreen, to 16 m, to 40 cm d.b.h. Bark of stems grayish green, smooth, shallowly striate. Branchlets, rachis, and inflorescence densely appressed tawny tomentose. Leaves imparipinnate, 13–32.5(–35) cm; leaflets (3–)5–7; petiolule 3–6 mm; blades elliptic or oblong-elliptic, 4.3–13.5(–17) × 2.3–6.8 cm, leathery, abaxial surface and petiole densely appressed yellowish brown tomentose, adaxial surface dark green and glabrous, base rounded or broadly cuneate, sometimes slightly cordate, margin slightly repand, apex broadly rounded or acute, blunt or mucronate; lateral veins 6–11 pairs, angled 45° with midvein. Panicles terminal, or racemes axillary, (8–)11–17 cm, densely appressed brownish tomentose. Flowers ca. 2 × 2 cm; pedicel 7–12 mm. Calyx campanulate, 5.5–6 mm; teeth ca. 2/3 length of calyx, triangular-ovate, densely appressed brownish tomentose on both surfaces. Corolla greenish white, darker at center, margin green and slightly purplish; standard suborbicular, apex rounded or retuse, claw thickened; wings purplish green, obovate-oblong, ca. 1.4 × 1 cm, claw ca. 3 mm; keel obovate-oblong, ca. 1.6 × 0.7 cm, claw ca. 3.5 mm. Stamens free, 1.3–2.5 cm, unequal; filaments light green; anthers light grayish purple. Ovary flattened, densely appressed brownish villous along suture, otherwise glabrous; ovules 9 or 10; style

filiform; stigma oblique. Legumes compressed, oblong, 5–12 × 1.5–4 cm, apex beaked, stipe ca. 5 mm; valves purplish brown, 2–3 mm thick, leathery, glabrous, internally septate. Seeds (1–)4–8, red-brown to scarlet, ellipsoid or ovoid, 0.8–1.5 cm, glossy; hilum ca. 3 mm. Fl. Jul–Aug, fr. Oct–Nov.

• Mountain slopes, streamsides in mixed forests; 100–1300 m. Anhui, Guangdong, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, SE Yunnan, Zhejiang.

23. *Ormosia pachyptera* L. Chen, Sargentia 3: 104. 1943.

菱荚红豆 ling jia hong dou

Fedorovia pachyptera (L. Chen) Yakovlev.

Trees, ca. 8 m, ca. 18 cm d.b.h. Bark of stems gray, smooth, not fissured. Branchlets glabrous, lenticels inconspicuous, buds superposed, suborbicular, brown pubescent, leaf scars circular and convex. Leaves imparipinnate, congested at ends of branches, 25–28.5 cm; petiole 5.8–6.4 cm; rachis 15.2–19.7 cm, prolonged 0.7–2.8 cm below terminal leaflet, a convex gland at junction of 2 leaflets; petiole, rachis, and petiolule sparsely appressed white pubescent or glabrescent; leaflets 15–19; petiolule 4–6 mm; blades oblong-oblong-elliptic or oblong, often widest above middle, 3.7–8.6 × 1.3–2.4 cm, leathery, pale green and sparsely appressed pubescent abaxially, dark green and glabrous adaxially, base cuneate, apex acute to acuminate; midvein raised abaxially, impressed adaxially, lateral veins 6 or 7 pairs, veinlets inconspicuous, lateral veins raised abaxially when dried, veinlets slightly raised. Inflorescence axillary, 15–18 cm; peduncle sparsely pubescent; pedicel 6–7 mm, hairs brownish. Legumes rhombic to obovate, compressed, 4–6.5 × 3.7–5.2 cm (excluding stipe), apex broadly rounded, abruptly acuminate, stipe 5–6 mm; valves black, thinly woody, densely appressed short grayish pubescent, broadly winged along suture, wings 1–1.6 cm wide, internally septate; calyx persistent, abaxially sparsely appressed short pallid pubescent, adaxially densely yellowish brown pubescent. Seeds 1 or 2(–4), red, prolate, slightly compressed, 13–15 × 7–12 × ca. 3 mm; hilum small, ellipsoid and slightly concave, ca. 3 mm.

• Sandy acidic lowland slopes, scattered at forest margins; 400–1000 m. SW Guangxi.

24. *Ormosia ferruginea* R. H. Chang, Acta Phytotax. Sin. 22: 112. 1984.

锈枝红豆 xiu zhi hong dou

Trees small, evergreen, ca. 2.5 m. Branches, buds, petiole, and rachis densely appressed rusty tomentose. Leaves imparipinnate or paripinnate, 11–15.5 cm; petiole 1.3–2 cm; rachis 5–8.3 cm, prolonged ca. 2 mm below terminal leaflet, or terminating rachis; leaflets 13–19; petiolule ca. 2 mm, densely appressed rusty brown tomentose; blades green adaxially, elliptic or obovate-elliptic, (2.1–)3–5.8 × 1.7–2 cm, leathery, midvein with brown tomentose hairs, sparsely appressed brownish pubescent abaxially, base rounded or cuneate, apex obtuse, slightly retuse; midvein raised, lateral veins 6–8 pairs, angled 40° with midvein, slightly arcuate, raised abaxially. Panicles or racemes terminal or axillary. Calyx deeply cleft to slightly below middle; teeth triangular, adaxially densely appressed rusty tomentose, obtuse at apex. Inflorescence ca. 13 cm; pedicels

3–5 mm, densely appressed rusty tomentose. Legumes elliptic, 4–6 × 1.6–2 cm, apex shortly beaked, stipe 3–5 mm, dark blue-gray at maturity; valves thinly woody, smooth, glabrous, internally septate. Seeds 2–4, red-brown, elliptic, slightly compressed, ca. 1 × 0.7 cm; hilum small, elliptic, ca. 3 mm, indented at narrow end. Fl. Jul, fr. Oct.

- Mountain slopes, open forest margins. Guangdong (Yangchun).

Ormosia ferruginea is similar to *O. emarginata*, but the former (excluding leaflets) is densely appressed rusty tomentose and has 13–19 leaflets that are sparsely appressed brown pubescent abaxially, while the latter is largely glabrous and has only 5–7 leaflets.

25. *Ormosia purpureiflora* L. Chen, *Sargentia* 3: 105. 1943.

紫花红豆 *zi hua hong dou*

Shrubs or small trees, ca. 3 m. Bark of stems smooth. Branchlets inconspicuously grayish pubescent. Leaves imparipinnate, 21–31 cm; petiole 3.3–9 cm; rachis 5.5–13 cm, prolonged 6–10 mm below terminal leaflet; petiole and rachis short gray pubescent; leaflets 11–13 pairs; petiolule 2–5 mm, corrugated, grooved, sparsely gray pubescent; blades pale abaxially, dark green adaxially, ovate-elliptic or oblong-lanceolate, 6–12 × (1.5–)2–2.5 cm, widest below middle, leathery, sparsely short gray pubescent abaxially, glabrous adaxially, base broadly cuneate to rounded, apex obtuse, slightly apiculate; midvein raised abaxially and impressed adaxially, lateral veins 5–8 pairs, arcuate, both lateral veins and veinlets slightly raised, inconspicuous. Panicles terminal, 12–20 cm, appressed gray pubescent; pedicel 5–6 mm, densely appressed short gray pubescent. Calyx teeth oblong-ovate, slightly longer than calyx tube, 3–5 mm, abaxially appressed pubescent, adaxially gray pubescent inside. Corolla purple; standard broadly ovate, ca. 1.5 cm wide, widest at base, truncate-rounded, claw ca. 2 mm; wings 2-auriculate at base; keel marginally puberulent. Stamens unequal; filaments 0.8–1.5 cm, free. Ovary sessile, ovate or oblong, glabrous; ovules 6. Legumes ellipsoid or oblong, 3.5–7.2 × 2–2.3 cm, stipe 2–3 mm; valves black and glabrous, thinly leathery, internally septate, tissue loose, velvety, spongy. Seeds 2–6, red, ellipsoid, ca. 1.1 × 0.7 × 0.6 cm; hilum elliptic, ca. 3 mm. Fl. Jun, fr. Sep.

- Dense forests. Guangdong (Longmen, Luoding).

26. *Ormosia xylocarpa* Chun ex Merrill & L. Chen, *Sargentia* 3: 105. 1943.

木荚红豆 *mu jia hong dou*

Fedorovia xylocarpa (Chun ex Merrill & L. Chen) Yakovlev; *Ormosia polysperma* L. Chen.

Trees evergreen, 12–20 m, 0.4–1.5 m d.b.h. Bark of stems gray or brown, glabrous. Branches densely appressed tawny pubescent. Leaves imparipinnate, (8–)11–24.5 cm; petiole 3–5 cm; rachis 3.2–5.4 cm, prolonged 6–10 mm below terminal leaflet; petiole and rachis sparsely or densely appressed yellow pubescent; leaflets (3–)5–7; petiolule (4–)7–12 mm, grooved, densely appressed short pubescent; blades oblong or oblong-ob lanceolate, 3–14 × 1.3–5.3 cm, thickly leathery, densely or sparsely appressed short tawny pubescent abaxially, more densely so along midvein, glabrous adaxially, base narrowly to

broadly cuneate, margin slightly repand, apex obtuse or acute. Panicles terminal, 8–14 cm, pubescent. Flowers 2–2.5 cm, fragrant; pedicel ca. 8 mm. Calyx ca. 10 mm; teeth oblong, ca. 8 mm, subequal, densely appressed short brownish yellow sericeous. Corolla white or pink. Ovary densely appressed short tawny sericeous; ovules 7–9. Legumes obovate to oblong or rhombic, 5–7 × 2–4 × ca. 1.5 cm, compressed, slightly rounded around seeds; valves thickly woody, ventral suture margin reflexed outward, densely appressed short yellowish brown sericeous, internally septate. Seeds 1–5, red, prolate or suborbicular, slightly inequilateral, 0.8–1.3 × 0.6–0.8 × 0.4–0.5 cm, glossy, often viscid when moist; hilum small, 1.5–2.5 mm, somewhat oblique. Fl. Jun–Jul, fr. Oct–Nov.

- Mountain slopes, valleys, roadsides, streamsides, open or dense forests; 200–1600 m. Fujian, Guangdong, Guangxi, E Guizhou, Hainan, S Hunan, S Jiangxi.

27. *Ormosia striata* Dunn, *J. Linn. Soc., Bot.* 35: 492. 1903.

槽纹红豆 *cao wen hong dou*

Fedorovia striata (Dunn) Yakovlev.

Trees, 7–30 m, ca. 50 cm d.b.h. Branchlets glabrous; terminal bud large, densely appressed brownish pubescent. Leaves imparipinnate, 17–35.5 cm; petiole 4.2–9.5 cm; rachis 7–10.5 cm, prolonged 1.4–2.3 below terminal leaflet; petiole and rachis glabrous; leaflets 7–9(–11); petiolule glabrous; blades oblong or ovate-lanceolate, upper leaflets larger, 5–15 × 1.9–6 cm, thinly leathery, both surfaces glabrous, base obtuse, apex acuminate to caudate; veinlets conspicuous when dried. Racemes axillary, equal to leaves or slightly shorter. Flowers ca. 1 cm, 2 flowers nearly opposite at apex of inflorescence, alternate below. Calyx abaxially densely appressed pubescent, adaxially glabrous; teeth broadly triangular, obtuse. Corolla yellow, ca. 3 × as long as calyx; standard striate. Ovary stipitate, glabrous; ovules 2–4. Legumes rhombic-oval or ellipsoid, 2.3–4.8 × 1.7–2.3 cm, apex obliquely beaked, gibbous, constricted between seeds; valves thickly leathery, yellowish brown when dry, glabrous, internally septate. Seeds 1 or 2, red, elliptic, 1.1–1.8 × 0.7–1.2 × 0.6–0.8 cm, striate; hilum small, 2–3 mm, grooved along one side of long axis, 9–13 mm. Fl. in summer.

- Riversides, mountain slope forests; 1000–1500 m. S Yunnan.

28. *Ormosia pinnata* (Loureiro) Merrill, *Lingnan Sci. J.* 14: 12. 1935.

海南红豆 *hai nan hong dou*

Cynometra pinnata Loureiro, *Fl. Cochinch.* 1: 268. 1790; *Fedorovia pinnata* (Loureiro) Yakovlev; *Ormosia hainanensis* Gagnepain.

Trees or shrubs, evergreen, 3–18(–25) m, ca. 0.3 m d.b.h. Bark of stems grayish; xylem mucilaginous. Young branches brownish pubescent, becoming glabrescent. Leaves imparipinnate, 16–22.5 cm; petiole 2–3.5(–6.5) cm; rachis 2.5–9 cm, prolonged 0.2–2.6 cm below terminal leaflet; leaflets 7(–9); petiolule 3–6 mm, grooved, pubescent or nearly glabrous; blades lanceolate to oblanceolate, 12–15 × 4(–5) cm, thinly leathery, both surfaces glabrous, apex obtuse or acute, rarely acuminate;

lateral veins 5–7 pairs. Panicles terminal, 20–30 cm. Flowers 1.5–2 cm. Calyx campanulate, longer than pedicel, pubescent; teeth broadly triangular. Corolla pink and yellowish white; standard ca. 13 mm, base shallowly 2-auriculate, claw short and stout; wings spatulate-obovate, claw ca. 4 mm, narrow; keel broadly spatulate-obovate, slightly to not auriculate at base, claw ca. 4 mm, narrow. Ovary densely appressed brown pubescent; ovules 4; style glabrous, curved. Legumes 3–7 × ca. 2 cm, body turgid and slightly curved, constricted between seeds; valves thickly woody, orange-red at maturity, brown when dried, with light-colored spots, glabrous; stipe conspicuous, curved obliquely from body of legume. Seeds 1–4, red, ellipsoid, 1.5–2 cm; hilum less than 1 mm. Fl. Jul–Aug, fr. Oct.

• Valleys, mountain slopes, roadside forests, at middle and low elevations. SW Guangdong, S Guangxi, Hainan.

29. *Ormosia indurata* L. Chen, Sargentia 3: 104. 1943.

韧荚红豆 ren jia hong dou

Fedorovia indurata (L. Chen) Yakovlev.

Trees evergreen, 5–9 m. Old branches dark purplish brown or yellowish brown, glabrous, leaf scars convex, lenticels convex. Young branchlets conspicuously or sparsely yellow-brown pilose. Leaves imparipinnate, 8–15.5 cm; petiole 1.7–2.5 cm; rachis 3.8–5 cm, prolonged 2–10 mm (rarely not prolonged) below terminal leaflet; petiole and rachis glabrous; leaflets (5–)7–9, opposite; petiolule 3–5 mm, thin, grooved; blades pale greenish abaxially, narrowly oblanceolate or elliptic, 2.5–6 × 0.7–2 cm, leathery, sparsely yellowish pubescent or glabrous abaxially, glabrous adaxially, base cuneate, margin slightly repand, apex acute to obtuse-acuminate, slightly retuse; lateral veins 4–6 pairs, fine, inconspicuous adaxially, veinlets slightly raised abaxially. Panicles terminal, ca. 5 cm before flowering, bud obovate, inflorescence and bud appressed short rusty sericeous. Petals white. Ovary densely appressed grayish brown pilose; ovules 4. Legumes obovate or oblong, 3–4.5 × 2–2.5 cm, woody, apex acute, stipe ca. 5 mm; valves thickly woody, slightly turgid, slightly appressed short brown pubescent when young, becoming glabrescent, internally septate; calyx persistent, densely appressed short grayish brown pubescent. Seeds 1 or 2, ellipsoid, slightly compressed, ca. 1 × 0.7 cm; testa red-brown, hard, glossy; hilum elliptic, excavated, ca. 2 mm.

• Mixed forests. Fujian (Hua'an), Guangdong (Luofu Shan).

30. *Ormosia eugeniifolia* Tsiang ex R. H. Chang, Acta Phytotax. Sin. 22: 115. 1984.

蒲桃叶红豆 pu tao ye hong dou

Trees evergreen, 5–16 m. Buds and branchlets densely appressed yellow-brown pubescent. Older branches with convex lenticels, nearly glabrous. Leaves imparipinnate, 8–12 cm; petiole 1–2.2 cm; rachis 2.7–3.7 cm, prolonged 0.4–1.7 mm below terminal leaflet; petiole and rachis sparsely appressed short pubescent or glabrescent, brown hairy at junction of leaflets; leaflets (5–)7; petiolule 2–6 mm, grooved adaxially when dry, nearly glabrous; blades obovate, obovate-spatulate, or elliptic, 3.6–6.3 × 1.6–2.8 cm, thickly leathery, sparsely appressed short pubescent, becoming glabrescent abaxially, glabrous adaxially, base cuneate, margin slightly rolled upward, apex

rounded, obtuse, or retuse; lateral veins 5–8 pairs, inconspicuous, angled 40° with midvein. Inflorescences terminal panicles or axillary racemes, brown pubescent. Legumes rhombic or ellipsoid, 2–4.1 × 2–2.4 cm; fruiting pedicel 5–6 mm, both ends acute; stipe 3–5 mm; valves dark brown, woody, 2–3 mm thick, ± brown pubescent toward base, internally septate. Seeds 2 or 3, purple, elliptic, slightly compressed, 1–1.3 × 0.7–0.8 × ca. 0.5 cm; hilum white, slightly oblique, elliptic, ca. 2 mm. Fr. Nov.

• Valleys, riversides, sparse forests; 200–800 m. Guangxi (Shangsi).

31. *Ormosia pubescens* R. H. Chang, Acta Phytotax. Sin. 22: 115. 1984.

柔毛红豆 rou mao hong dou

Trees evergreen, to 20 m, to 40 cm d.b.h. Branchlets brown pubescent. Leaves imparipinnate, 12–16 cm; petiole 1.5–4 cm; rachis 2–2.7 cm, prolonged 1.2–1.5 cm below terminal leaflet; petiole and rachis slightly pubescent or subglabrate; leaflets 5; petiolule ca. 6 mm, impressed adaxially, nearly glabrous; blades elliptic or oblong, 4.5–9.5(–11) cm, light colored pubescent abaxially, green adaxially, base cuneate, apex acute, mucronate. Inflorescences terminal panicles or axillary racemes, ca. 8 cm; peduncle and pedicel densely appressed short brown pubescent, pedicel ca. 5 mm. Calyx teeth triangular, abaxially densely appressed brownish pubescent. Standard fan-shaped, ca. 7.5 × 10 mm, claw ca. 1.5 mm; wings elliptic, ca. 9 × 3 mm, claw ca. 3 mm; keel oblong, ca. 8 × 3–5 mm, claw ca. 4 mm. Stamens 5–10 mm, unequal. Ovary densely appressed yellow-brown pubescent. Legumes rhombic or ellipsoid, turgid, 3.3–5.6 × ca. 2.7 × 1.2 cm; valves woody, ca. 4 mm thick, densely appressed yellowish brown pubescent, internally septate. Seeds 1–4, red, ellipsoid, ca. 1.4 × 0.8 × 0.7 cm; hilum ca. 2 mm. Fr. Sep–Oct.

• Valleys of mountain slopes. S Guangxi (Dongxing, Shangsi).

Ormosia pubescens is similar to *O. xylocarpa*, but the former has 5 leaflets, which are elliptic or oblong, with an acute and mucronate apex, and legumes that are more turgid, with valves densely appressed yellowish brown pubescent and margins not reflexed. The latter has 5–7 leaflets, which are oblong or oblong-lanceolate, with an obtuse or shortly acute apex, and legumes that are compressed, with valves densely appressed short yellowish brown sericeous and margins reflexed outward.

32. *Ormosia olivacea* L. Chen, Sargentia 3: 110. 1943.

榄绿红豆 lan lü hong dou

Fedorovia olivacea (L. Chen) Yakovlev.

Trees, 20–25 m, to 1 m d.b.h. Branchlets and buds densely appressed brown pilose. Leaves imparipinnate, 17–38 cm; petiole ca. 5.3 cm; rachis ca. 18.5 cm, densely appressed brown pubescent, prolonged ca. 7 mm below terminal leaflet; leaflets (9–)15–17, opposite, sometimes subopposite on lower rachis; petiolule 2–4 mm, pubescent; blades lanceolate to lanceolate-oblong or ovate, 3.4–10.5 × 1.6–2.7 cm, thickly papery, brownish pilose abaxially, glabrous or slightly hairy only along midvein adaxially, base broadly cuneate to rounded, apex acuminate; midvein raised abaxially, impressed adaxially, lateral veins 5–8 pairs, straight or slightly arcuate, raised abaxially,

slightly impressed adaxially. Inflorescences terminal panicles, or terminal or axillary racemes, densely appressed brown pilose to nearly glabrous. Legumes compressed, elliptic or obovate-lanceolate, 5.2–8.9 × 2.5–4 cm, apex acute, shortly mucronate, stipe 5–8 mm, often yellowish brown hirtellous; valves internally septate, woody; persistent calyx densely appressed rusty brown pilose. Seeds (1 or) 2–4, red-brown, obovate or subreniform, ca. 1 × 1 cm, slightly compressed, hard, glossy; hilum ca. 3 mm. Fl. Apr, fr. Nov–Dec.

• Forest margins, secondary forests on mountain slopes; 700–2100 m. N Guangxi, S Yunnan.

33. *Ormosia microphylla* Merrill, Sargentia 3: 109. 1943.

小叶红豆 xiao ye hong dou

Fedorovia microphylla (Merrill) Yakovlev; *Ormosia microphylla* var. *tomentosa* R. H. Chang.

Trees or shrubs, 3–10 m. Bark of stems gray-brown. Old branches purplish brown, terete, nearly glabrous; branchlets densely appressed brownish pubescent; bud naked, densely appressed yellowish brown pilose. Leaves imparipinnate, 12–16 cm; petiole 2.2–3.2 cm; rachis 6.5–7.8 cm, densely appressed yellowish brown pilose, prolonged 5–7 mm below terminal leaflet; leaflets 11–15(–17); petiolule 1.5–2 mm, densely appressed yellowish brown pilose; blades dark green adaxially, paler abaxially, elliptic, (1.5–)2–4 × 1–1.5 cm, papery, ± appressed pubescent abaxially, glabrous or sparsely pilose adaxially, base rounded, apex acute or shortly acuminate; midvein densely yellowish pubescent, lateral veins 5–7 pairs, fine, raised abaxially, inconspicuous, arcuate, not anastomosing along margin, veinlets reticulate. Inflorescence terminal. Legumes subrhombic or oblong, 5–6 cm, compressed, apex mucronate, stipe short; valves dark brown or black, thickly leathery or woody, glossy, internally transversely septate. Seeds 3 or 4, red, ca. 2.2 × 0.6–0.8 cm, hard, slightly glossy; hilum 3–3.5 mm.

• Dense forests, mixed forests, valleys, mountain slopes, roadsides; 500–700 m. Fujian, Guangdong, E and S Guangxi, SE Guizhou.

34. *Ormosia saxatilis* K. M. Lan, J. Nanjing Technol. Coll. Forest Prod. 1: 134. 1981.

岩生红豆 yan sheng hong dou

Trees evergreen, trunk vertical, to 15 m, to 44 cm d.b.h. Bark of stems grayish green, smooth when young, with rounded convex lenticels or longitudinal striations forming with age. Branchlets densely appressed yellowish brown tomentose; winter buds naked. Leaves imparipinnate, 14–17(–23) cm; petiole and rachis densely appressed gray pubescent; leaflets 17–23; petiolule short, ca. 2 mm; blades oblong-lanceolate or ovate-lanceolate, 2.7–5(–7) × 1.1–1.5 cm, thinly leathery, densely appressed yellowish brown pubescent abaxially, faintly appressed pubescent or glabrous adaxially, base rounded or broadly cuneate, apex acute, acuminate, or obtuse, sometimes retuse; midvein raised abaxially, impressed adaxially, lateral veins 5 or 6(or 7) pairs. Inflorescence racemose or few branched, terminal and axillary. Legumes oblong or rhombic, compressed, 4–6 × 1.6–2.3 cm, glabrous; valves thickly woody, black at maturity. Seeds 1–3, red-brown, suborbicular, ca. 10 × 8 mm; hilum ca. 3 mm.

• Limestone neutral or slightly acidic soil of forests, often mixed with *Carpinus*, *Quercus*, etc.; 1100–1200 m. Guizhou (Qianling Shan).

Ormosia saxatilis is similar to *O. microphylla*, but its branchlets are densely appressed yellowish brown tomentose, its leaves are 17–23-foliolate, and its leaflets are densely appressed yellowish brown tomentose abaxially.

35. *Ormosia formosana* Kanehira, Bot. Mag. (Tokyo) 30: 420. 1916.

台湾红豆 tai wan hong dou

Fedorovia formosana (Kanehira) Yakovlev.

Trees evergreen, 5–15 m, 17(–50) cm d.b.h. Bark smooth, tawny. Branchlets green, brown pubescent, becoming glabrate. Leaves imparipinnate, 9–11 cm; petiole 1.8–2.5 cm; rachis 1.8–2 cm, prolonged 0.2–0.8 cm below terminal leaflet; leaflets (3–)5–7; petiolule ca. 5 mm, with short hairs; blades pale green abaxially, green and smooth adaxially, oblong-lanceolate or oblong, 3.5–4 × 1.1–2 cm, thinly leathery, base cuneate to rounded, margin entire, apex acute, acuminate to shortly caudate; midvein conspicuously raised abaxially, impressed adaxially, lateral veins 5–7 pairs, angled 40° with midvein, both lateral veins and veinlets inconspicuous. Racemes terminal, 8–10 cm; peduncle rusty pilose; pedicel 7–10 mm, rusty brown pilose. Flowers ca. 1.2 × 1 cm. Calyx campanulate, sparsely rusty brown pilose; teeth triangular, 3–4 mm; tube 2–3 mm. Corolla creamy white; standard suborbicular, 1–1.2 cm, apex rounded, claw 1.5–2 mm; wings long elliptic, ca. 1.4 × 0.7 cm, claw ca. 3 mm; keel oblong-elliptic, ca. 1.4 × 0.8 cm, claw ca. 3 mm. Stamens unequal; filaments 0.8–1.4 cm; anthers oblong. Ovary hispid; style filiform, incurved at tip, with curved hispid oblique stigma; ovules 1–4. Legumes elliptic, 1.2–1.5 cm, slightly compressed to nearly globose, acute at both ends, apex beaked, stipe 1.5–1.9 mm; valves woody, appressed short brown pubescent, internally septate. Seeds 1–4, scarlet, suborbicular, slightly compressed, ca. 1 cm, glossy; hilum ca. 3 mm. Fl. May, fr. Oct.

• Evergreen broad-leaved forests; 300–1000 m. C Taiwan.

36. *Ormosia hengchuniana* T. C. Huang, S. F. Huang & K. C. Yang, Taiwania 35: 2. 1990.

恒春红豆树 heng chun hong dou shu

Trees evergreen, to 8 m. Branchlets golden yellow pubescent. Leaves imparipinnate, 7–9(–10) cm; petiole 3.8–4.5 cm; rachis 3–6.5 cm, prolonged 0.2–0.4 cm below terminal leaflet; leaflets (5–)7(–9); petiolule 5–7 mm; blades oblong-lanceolate or oblong, 1.5–12 × 0.8–5 cm, thinly leathery, golden yellow pubescent abaxially, becoming glabrate, green and smooth adaxially, base cuneate to rounded, rarely slightly cordate, margin entire, often slightly sinuous, apex acute to obtuse, slightly retuse; midvein raised abaxially, impressed adaxially, lateral veins 7–12 pairs, angled 40° with midvein. Racemes terminal, rarely axillary, 8–10 cm, golden yellow pilose; pedicel 5–7 mm, golden yellow pilose. Flowers ca. 1 × 1.2 cm. Calyx campanulate, sparsely rusty brown pilose; teeth broadly triangular, ca. 1 mm; tube ca. 2 mm. Corolla reddish purple; standard oblong-orbicular, obcordate, 0.9–1 cm, apex deeply emarginate, claw 1–2 mm; wings narrowly obovate, inequilateral, midvein along one margin, ca. 1.2 × 0.7 cm, claw ca. 6 mm; keel narrowly

obovate, inequilateral, midvein along one margin, ca. 1.2×0.6 cm, claw ca. 5 mm. Stamens unequal; filaments 0.7–1.2 cm; anthers oblong. Ovary glabrous; ovules 1–4; style thickened, incurved at tip; stigma oblique. Legumes oblong, 2–2.5 cm, slightly compressed, acute at both ends, apex beaked, stipe 3–5 mm; valves woody, glabrous, internally septate. Seeds 1–3, pale red, globose-angular, ca. 1 cm, slightly glossy; hilum 3–4 mm. Fl. May, fr. Oct.

• Forest margins, stream banks; 200–500 m. S Taiwan (Hengchun Peninsula).

37. *Ormosia nuda* (F. C. How) R. H. Chang & Q. W. Yao, *Acta Phytotax. Sin.* 22: 117. 1984.

秃叶红豆 tu ye hong dou

Ormosia henryi Prain var. *nuda* F. C. How, *Acta Phytotax. Sin.* 1: 232. 1951; *Fedorovia henryi* (Prain) Yakovlev var. *nuda* (F. C. How) Yakovlev; *O. yaanensis* N. Chao.

Trees evergreen, 7–27 m, to 50 cm d.b.h. Bark of stems

gray or grayish brown. Branches brownish green, appressed short pubescent when young, becoming glabrous; buds superposed. Leaves imparipinnate, 11.5–25 cm; petiole 2–4.5 cm; rachis 2.7–7.8 cm, prolonged 1.4–2.5 cm below terminal leaflet; petiole and rachis sparsely tomentose or glabrescent; leaflets 5–7; petiolule ca. 5 mm, rounded, sparsely pubescent; blades elliptic, $5-9.5 \times 2-3.5$ cm, leathery, slightly yellow tomentose or glabrous abaxially, green and glabrous adaxially, base cuneate or rounded, apex acuminate or caudate; midvein slightly raised abaxially, slightly impressed adaxially, lateral veins 7 or 8 pairs, inconspicuous. Flowers not seen. Infructescence with short pubescence. Legumes oblong or elliptic, $4.3-6.6 \times 2.6-3$ cm; valves black, thickly woody, 3–7 mm thick, appressed short yellowish brown bristly, densely pubescent at apex and base, internally septate. Seeds 1–5, dark red, elliptic, $8-10 \times 5-7 \times$ ca. 6 mm; hilum 2–2.5 mm. Fl. Jul–Aug, fr. Oct.

• Valleys, mixed forests; 800–2000 m. N Guangdong, S Guizhou, Hubei (Liquan), Yunnan (Jingdong).

41. AMMODENDRON Fischer ex Candolle, *Prodr.* 2: 523. 1825.

银砂槐属 yin sha huai shu

Bao Bojian (包伯坚); Michael A. Vincent

Shrubs, silvery-white pubescent. Leaves paripinnate, spinescent at apex of rachis; stipules small; leaflets 1 or 2 pairs. Racemes terminal; bracts small, caducous or absent; bracteoles absent. Calyx tube short, campanulate; teeth subequal, upper 2 slightly joined. Standard circular, reflexed; wings obliquely oblong; keels incurved, 2 lobes free. Stamens 10, free; anthers versatile. Ovary sessile, few ovuled; style incurved, subulate; stigma terminal, small. Legume oblong or lanceolate, flat, narrowly winged along both sutures, indehiscent. Seeds 1 or 2, oblong or subcylindric.

About six species: N Asia; one species in China.

1. *Ammodendron bifolium* (Pallas) Yakovlev, *Bot. Zhurn.* (Moscow & Leningrad) 57: 592. 1972.

银砂槐 yin sha huai

Sophora bifolia Pallas, *Sp. Astragal.* 124. 1803; *Ammodendron argenteum* Kuntze; *A. sieversii* Candolle, nom. illeg. superfl.; *Podalyria argentea* Willdenow; *Robinia argentea* Sievers; *S. argentea* Pallas (1797), not Salisbury (1796).

Shrubs, 30–150 cm tall. Branches and leaves gray-white pubescent. Leaves paripinnate, 2-foliolate, terminal one becoming spinose; stipules spinose, persistent, 1–2 mm; petiole equal to leaflets in length; leaflets opposite, without stipel, obo-

vate-oblong or obovate-lanceolate, $10-15 \times 4-10$ mm, gray-white sericeous on both surfaces, narrowing to cuneate at base, obtuse and rigidly mucronate at apex. Racemes terminal, 3–5 cm. Pedicel 4–8(–10) mm. Calyx shortly cup-shaped, triangular 5-toothed. Corolla dark purple, 5–7 mm; standard orbicular, shorter; wings oblong-obovate; keels obtuse at apex. Stamens 10, free and persistent. Ovary pubescent. Legumes flat, oblong-lanceolate, $18-20 \times 5-6$ mm, glabrous or pilose on stalk, 2-winged along suture, indehiscent, with 1 or 2 seeds. Fl. May–Jun, fr. Jun–Aug.

Dry stony regions. Xinjiang [Russia].

42. SOPHORA Linnaeus, *Sp. Pl.* 1: 373. 1753.

槐属 huai shu

Bao Bojian (包伯坚); Michael A. Vincent

Ammothamnus Bunge; *Cephalostigmaton* Yakovlev; *Edwardsia* Salisbury; *Goebelia* Bunge ex Boissier; *Keyserlingia* Bunge ex Boissier; *Styphnolobium* Schott; *Vexibia* Rafinesque.

Deciduous or evergreen trees, shrubs, subshrubs, or perennial herbs, rarely twining. Leaves imparipinnate; stipules present or absent; leaflets many, entire, rarely with stipels. Racemes terminal or axillary. Flowers white, yellow, or purple; bracts small and linear or absent. Calyx campanulate or cup-shaped, 5-lobed, equal, upper 2 lobes nearly bilabiate. Standard orbicular, oblong, elliptic, obovate, or oblanceolate; wings asymmetric or symmetric; keel similar to wings. Stamens 10, free or fused at base; anthers versatile. Ovary stalk short or absent; ovules several to many; stigma small, terminal, globose. Legumes cylindrical, moniliform, fleshy or leathery, sometimes winged, indehiscent or tardily dehiscent. Seeds 1 to many, ovate, elliptic, or subspheroidal, black, dark brown, or light red.

About 70 species: widespread in tropical and temperate zones; 21 species (nine endemic, one introduced) in China.

- 1a. Trees, rarely shrubs; petiole base inflated, covering caducous bud stipules; stipels present; inflorescence paniculate.
- 2a. Ovary almost equal to stamens in length; legume linear, slightly constricted between seeds; seeds closely spaced 21. *S. brachygyna*
- 2b. Ovary obviously shorter than stamens in length; legume thick, obviously constricted between seeds; seeds more distantly spaced 20. *S. japonica*
- 1b. Small trees, shrubs, subshrubs, or herbs; petioles not inflated at base, buds exposed; stipules present or absent; stipels absent; inflorescence racemose.
- 3a. Herbs or subshrubs; flowers white to creamy white; raceme terminal.
- 4a. Legume indehiscent, seeds 2 per loment section; leaflets small, (3.5–)15–20(–27) × (2–)3–7 mm 19. *S. pachycarpa*
- 4b. Legume tardily dehiscent, seed 1 per loment section; leaflets large, 1.5–6 × 1–2 cm.
- 5a. Branches and leaflets densely hairy; flowers in dense racemes; keel mucronate at apex 10. *S. alopecuroides*
- 5b. Branches and leaflets glabrous or pilose when young; flowers in lax racemes; keel obtuse at apex 11. *S. flavescens*
- 3b. Small trees, shrubs, or climbing shrubs; flowers white-yellow or purple, or, if herbs, flowers yellow; inflorescence terminal, opposite or alternate with leaves.
- 6a. Plants spiny; stipules spinescent.
- 7a. Stems villous; flower ca. 2 cm, blue-purple 8. *S. moorcroftiana*
- 7b. Stems glabrous; flower ca. 1.5 cm, white or creamy white, rarely blue-purple 9. *S. davidii*
- 6b. Plants without spines; stipules not spinescent.
- 8a. Legume winged; plants flowering before leaves expand; some terminal leaflets changed to tendrils 12. *S. mollis*
- 8b. Legume wingless; plants flowering after leaves expand; terminal leaflets normal.
- 9a. Stipules absent or very small.
- 10a. Legume slightly curved; leaflets obviously smaller toward base; stipules very small; standard shorter than other petals 7. *S. tonkinensis*
- 10b. Legume straight; leaflets not obviously smaller toward base; stipules absent; standard equal to other petals.
- 11a. Shrubs or small trees, 2–4 m tall; leaflets large, 2.5–5 × 2–3.5 cm; flowers large, ca. 15 mm, yellow or creamy white 13. *S. tomentosa*
- 11b. Subshrubs, 0.2–1 m tall; leaflets small, 1–2.5 × 0.7–1.5 cm; flowers small, ca. 10 mm, purple 18. *S. praetorulosa*
- 9b. Stipules subulate, 4–10 mm.
- 12a. Legume dehiscent into 4 limbs; calyx compressed campanulate or cup-shaped, teeth small or not obvious.
- 13a. Leaflet veins not obvious adaxially; seed 1 per legume, gray-brown.
- 14a. Inflorescence terminal; leaflets oblong or ovate-oblong, reflexed at margin; corolla ca. 10 mm 14. *S. franchetiana*
- 14b. Inflorescence alternate or opposite a leaf; leaflets ovate or ovate-elliptic, not reflexed at margin; corolla ca. 15 mm 15. *S. wilsonii*
- 13b. Leaflet veins obvious adaxially; seeds 2–4 per legume, red.
- 15a. Leaflets papery to nearly leathery, ovate-elliptic, ovate, or long elliptic, acute or shortly acuminate at apex 16. *S. prazeri*
- 15b. Leaflets papery, ovate-oblong or ovate-lanceolate, long acuminate or caudate-acuminate at apex 17. *S. benthamii*
- 12b. Legume dehiscent into 2 limbs; calyx campanulate, teeth obvious, unequal.
- 16a. Leaflets small, less than 20 mm, ovate or elliptic-ovate, densely long hairy on both surfaces 4. *S. yunnanensis*
- 16b. Leaflets large, (15–)20–40(–50) mm, usually ovate-lanceolate, or other shapes except ovate and elliptic-ovate, pilose adaxially or glabrous.
- 17a. Inflorescence terminal, rarely opposite a leaf; flowers dense, yellow; seeds green 6. *S. xanthoantha*
- 17b. Inflorescence opposite a leaf, pseudo-terminal or axillary; flowers sparse, white or purple-red; seeds yellow, yellow-brown, or red-brown.
- 18a. Flowers white; seeds long ovoid, 7–8 mm 5. *S. albescens*
- 18b. Flowers purple-red; seeds oblong or long ovate, 5–9 mm.
- 19a. Fine veins on leaflets impressed adaxially; seeds long ovate, 5–6 mm ... 2. *S. dunnii*
- 19b. Fine veins on leaflets not impressed adaxially; seeds oblong, elliptic, or long ovate, 6–9 mm.

- 20a. Legume slender; seeds long ovate or elliptic, ends rounded,
6–7 mm 3. *S. microcarpa*
20b. Legume thick, slightly compressed; seeds oblong-reniform,
ends acute to rounded, 7–9 mm, yellow or yellow-brown 1. *S. velutina*

1. *Sophora velutina* Lindley, Bot. Mag. 14: t. 1185. 1828.

短绒槐 *duan rong huai*

Shrubs, ca. 2 m high. Young branches, rachis, young branches of flower, and leaf densely velutinous. Leaves 15–20 cm; stipules linear, 6–7 mm, villous; leaflets 13–41, opposite or nearly opposite, ovate-lanceolate, elliptic, elliptic-lanceolate, oblong, or ovate-oblong, 1–4 × 0.5–2 cm, papery, hairy on both surfaces, glabrous, or glabrous adaxially, midvein raised, base rounded or obtuse, apex acuminate or acute with mucro. Racemes opposite with leaf or pseudo-opposite, 15–20(–30) cm. Flowers many, widely spaced; bracts similar to stipule, 6–8 mm, hairy; pedicel short, 2–3 mm. Calyx campanulate, ca. 13 mm; teeth 5, unequal, dark brown hairy. Standard reflexed, obovate-lanceolate or obovate-oblong, ca. 16 × 3–5 mm, apex retuse, narrowing to base; wings oblong, less than 15 mm, base auriculate; keel falcate, slightly shorter than wings. Stamens 10, free or slightly fused at base. Ovary terete, densely yellow pubescent, stalked; ovules 4–6; style straight, glabrous; stigma capitate, very small. Legumes moniliform, slightly compressed, 6–10 × 0.7–1 cm, hairy or nearly glabrous. Seeds 2–4, yellow or yellow-brown, oblong-reniform, ends acute to rounded. Fl. and fr. Apr–Aug.

Forests, mountain forests, valleys, riverbanks, rocky places; 500–2500 m. Guangxi, Guizhou, Sichuan, Yunnan [Bangladesh, Bhutan, India, Myanmar].

- 1a. Leaflets hairy on both surfaces; legumes densely hairy 1a. var. *velutina*
1b. Leaflets glabrous or nearly glabrous adaxially; legumes sparsely hairy or nearly glabrous.
2a. Inflorescence terminal; leaflets (19–)25–35(–41), small, 10–15 × 5–6 mm 1b. var. *multifoliolata*
2b. Inflorescence opposite with leaf; leaflets fewer than 21, large, 2–4 × 1.5–2 cm.
3a. Midvein of leaflets raised; fruit neck long, 2–4 cm 1c. var. *dolichopoda*
3b. Midvein of leaflets impressed; fruit neck short, less than 1.5 cm.
4a. Erect shrubs; legumes nearly glabrous 1d. var. *cavaleriei*
4b. Climbing shrubs or woody vines; legumes pilose 1e. var. *scandens*

1a. *Sophora velutina* var. *velutina*

短绒槐(原变种) *duan rong huai* (*yuan bian zhong*)

Sophora glauca Leschenault ex Candolle.

Shrubs, ca. 2 m high. Leaflets hairy on both surfaces. Legumes densely hairy.

Valleys, riverbanks; 1000–2500 m. Guizhou, Sichuan, Yunnan [Bangladesh, India, Myanmar].

1b. *Sophora velutina* var. *multifoliolata* C. Y. Ma, Acta Phytotax. Sin. 20: 466. 1982.

多叶槐 *duo ye huai*

Leaflets (19–)25–35(–41), elliptic or lanceolate-elliptic, 1–1.5(–2.5) cm × 5–6 mm, glabrous adaxially or pilose near midvein. Inflorescence terminal. Fruit neck 2–4 cm or more.

- Mountain forests; 1100–1600 m. Yunnan (Menghai).

1c. *Sophora velutina* var. *dolichopoda* C. Y. Ma, Acta Phytotax. Sin. 20: 465. 1982.

长颈槐 *chang jing huai*

Leaflets fewer than 21, 2–4 × 1.5–2 cm, glabrous adaxially. Inflorescence opposite with leaf. Fruit neck long, 2–4 cm.

- Forests, valleys; 500–2000 m. Guizhou, Yunnan.

1d. *Sophora velutina* var. *cavaleriei* (H. Léveillé) Brummitt & J. B. Gillett, Kirkia 5: 621. 1966.

光叶短绒槐 *guang ye duan rong huai*

Sophora cavaleriei H. Léveillé, Fl. Kouy-Tchéou, 242. 1914–1915; *S. velutina* subsp. *cavaleriei* (H. Léveillé) Yakovlev.

Leaflets glabrous. Legumes almost glabrous.

- Forests, valleys; 1000–2000 m. Guangxi, Guizhou, Yunnan.

1e. *Sophora velutina* var. *scandens* C. Y. Ma, Acta Phytotax. Sin. 20: 465. 1982.

攀援槐 *pan yuan huai*

Woody vines or climbing shrubs. Leaflets 13–17, rarely 21, retuse at midvein. Legumes pilose.

- Valleys, rocky places; 1500–2000 m. Sichuan, Yunnan.

2. *Sophora dunnii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 466. 1897.

柳叶槐 *liu ye huai*

Sophora dispar Craib.

Shrubs, ca. 2 m high. Branchlets dark yellow hairy. Leaves to 20 cm; stipules linear, ca. 10 mm, hairy; petiole hairy; leaflets 15–23, opposite, ovate-lanceolate or elliptic-lanceolate, 25–35(–50) × 10–15 mm, papery, veins obvious abaxially, base rounded or obtuse, apex mucronate. Racemes ca. 20 cm, opposite a leaf or appearing opposite. Flowers many; pedicel short, ca. 5 mm, hairy; bract similar to stipule, longer than pedicel. Calyx campanulate; teeth 5, orbicular or triangular, unequal, upper 2 nearly fused to bilabiate, brown hairy. Corolla purple-red; standard obovate-oblong or obovate-elliptic, ca. 15 mm, retuse at apex, 2-auriculate at middle, narrowing to a claw at base;

wings slightly shorter than standard, falcate, unequally auriculate at base; keels ca. 13 mm, long ovate. Stamens 10, slightly fused at base. Ovary densely yellow-brown hairy; ovules 4–6. Legumes moniliform, 10–15 cm, darkly brown pilose, dehiscent along sutures. Seeds 2 or 3, long ovate, yellow-brown or brown. Fl. Mar–Jun, fr. May–Aug.

Valleys and forests on slopes; 1000–2000 m. Guizhou, Sichuan, Yunnan [Myanmar, Thailand].

3. *Sophora microcarpa* C. Y. Ma, Acta Phytotax. Sin. 20: 466. 1982.

细果槐 xi guo huai

Shrubs, 1–2 m high, few branched. Branches gray-white pubescent. Leaves 15–20 cm; stipules linear, ca. 10 mm; petiole gray-brown pubescent; leaflets 19–25, subopposite or nearly opposite, ovate-lanceolate or long elliptic, 30–35 × ca. 10 mm, papery, pubescent on both surfaces, base rounded, slightly oblique, apex acuminate, mucronate; petiolule less than 1 mm, hairy. Racemes terminal; rachis sulcate, gray-white pubescent. Flowers many, dense; pedicel 4–5 mm; bract linear, equal to pedicel in length, hairy. Calyx campanulate, ca. 6 mm; teeth 5, unequal. Corolla purple-red; standard oblong, ca. 6 × 4 mm, 2-auriculate at middle; wings hastate, slightly rugose; keel slightly shorter than standard, falcate, apex rounded, 1-auriculate at base. Stamens 10, 1 free and other 9 fused at base. Ovary terete, hairy; ovules many; stigma capitate, very small. Legumes moniliform, slender, 6–10 cm, gray-white pubescent, dehiscent along sutures. Seeds 3–6, brown-red, long ovate or elliptic. Fl. and fr. Feb–Aug.

• Mountain forests; 1000–1700 m. Guizhou, Yunnan.

4. *Sophora yunnanensis* C. Y. Ma, Acta Phytotax. Sin. 20: 467. 1982.

云南槐 yun nan huai

Shrubs or small trees. Stem gray-white pubescent when young; branches densely hairy. Leaves 10–15 cm; stipules subulate, ca. 3.5 mm, tomentose; leaflets 13–21, opposite, ovate or elliptic-ovate, 15–20 × 8–10 mm, papery, densely hairy on both surfaces, veinlets obscure, apex rounded; petiolule short, ca. 1 mm, hairy. Racemes opposite a leaf or appearing terminal. Flowers dense; bracts subulate, ca. 6 mm, hairy. Calyx campanulate, ca. 10 mm; teeth 5, subequal, triangular, hairy. Corolla white; standard oblong, retuse, obcordate, narrowing to a claw, 2-auriculate at middle; wings hastate; keel ovate-oblong, claw slender, equal to petal. Stamens 10, 1 free, others somewhat fused at base. Ovary gray-brown hairy, stalk short; ovules 4–6; style slender, ca. 2.5 mm, glabrous; stigma small, capitate, slightly hairy. Fl. Mar.

• Mountain scrub. Yunnan.

5. *Sophora albescens* (Rehder) C. Y. Ma, Acta Phytotax. Sin. 20: 468. 1982.

白花槐 bai hua huai

Sophora glauca Leschenault ex Candolle var. *albescens* Rehder in Sargent, Pl. Wilson. 3: 447. 1917; *S. velutina* Lindley var. *albescens* (Rehder) P. C. Tsoong.

Shrubs, 1–2 m. Branchlets gray-white pubescent. Leaves 15–20(–25) cm; stipules linear, 3–4 mm, caducous; leaflets 17–25, ovate-lanceolate or ovate-oblong, 2–3(–4) × 1–1.5 cm, papery, pubescent abaxially, glabrous adaxially, base rounded or obtuse, apex cuspidate. Racemes opposite a leaf or appearing terminal; bracts linear, 6–8 mm, hairy. Calyx campanulate, ca. 10 mm; teeth 5, short, hairy. Corolla white; standard reflexed, obovate-lanceolate, ca. 16 × 3–5 mm, 2-auriculate at middle, apex retuse; wings oblong or broadly linear, 13–14 mm, unequally 2-auriculate at base, claw slender, ca. 6 mm; keel obovate or falcate. Stamens 10, slightly fused and sparsely pubescent at base. Ovary gray-brown hairy, stalk short; style straight, glabrous. Legumes moniliform, 6–15 cm, constricted between seeds, beaked, gray-white pubescent or subglabrous. Seeds 2–4(–6), yellow-brown or red-brown, long ovoid. Fl. and fr. Mar–Aug.

• Shady damp places in valleys; 1100–2500 m. Sichuan, Yunnan.

The name “*Sophora albescens* J. St.-Hil. (1806) Duham. Arb. 3: 86,” as cited in Zhu et al. (Legumes China, 580. 2007), does not exist and is an error picked up from various indices.

6. *Sophora xanthoantha* C. Y. Ma, Acta Phytotax. Sin. 20: 468. 1982.

黄花槐 huang hua huai

Herbs or subshrubs, less than 1 m. Stem and branches densely golden velutinous. Leaves 15–20 cm; stipules caducous; leaflets 17–25, opposite, oblong or long elliptic, 2.5–3.5 × 1–1.5 cm, papery, densely golden velutinous abaxially, especially on midrib and petiole, sparsely gray-white hairy adaxially, both ends obtuse; veinlets evident abaxially. Racemes terminal, 6–8 cm. Flowers dense; bracts subulate, equal to calyx. Calyx campanulate, ca. 7 mm; teeth 5, triangular, unequal, pilose. Corolla yellow; standard oblong or nearly oblong, ca. 11 mm, apex retuse, 2-auriculate at middle, narrowing to claw, ca. 3 mm; wings equal to standard, hastate, apex beaked; keel slightly shorter than wings, 1-auriculate. Stamens 10, slightly fused and sparsely very shortly hairy at base. Ovary densely brown hairy on both sides; ovules many; style straight, glabrous; stigma very small, capitate, sometimes shortly hairy. Legumes moniliform, 8–13 × 0.8–1 cm, villous, beak 1–2 cm, base with neck 1.5–4 cm, 2-dehiscent. Seeds 2–4, green, long elliptic, 9–10 × 4–5 mm, rounded at one end, acute at other end.

• Hill meadows; 500–1800 m. Yunnan.

7. *Sophora tonkinensis* Gagnepain, Notul. Syst. (Paris) 3: 18. 1914.

越南槐 yue nan huai

Shrubs to 1.3 m. Stems slender; branches green, glabrous, much branched; branchlets gray hairy. Leaves 10–15 cm; stipules very small or nearly absent; petiole 1–2 cm, inflated at base; leaflets 11–33(–39), opposite or nearly alternate; petiolule 1–2 mm, slightly inflated; blades oblong, elliptic, ovate-oblong, or lanceolate, 15–25 × 10–15 mm, leathery, terminal one largest, 30–40 × ca. 20 mm, gray-brown hairy abaxially, glabrous or sparsely pubescent adaxially, midrib obvious abaxially, base rounded or slightly cordate, apex cuspidate. Inflorescence a ra-

cence or branched into a panicle from base, terminal, 10–30 cm; rachis and peduncle hairy; bracts small, subulate, hairy. Flowers 10–12 mm; pedicel ca. 5 mm. Calyx cup-shaped, ca. 2 × 3–4 mm; teeth small, gray-brown hairy. Corolla yellow or dark purple; standard orbicular, ca. 6 × 5 mm, shortly stipitate; wings slightly longer than standard, oblong or ovate-oblong, 1-auriculate at base; keel longer, obovate, ca. 9 × 4 mm, 1-auriculate at base. Stamens 10, slightly fused at base. Ovary hairy; ovules 4; style straight, glabrous; stigma hairy. Legumes moniliform, 3–5 cm, sparsely pubescent, dehiscent along both sutures. Seeds 1–3, ovoid, black. Fl. May–Jul, fr. Aug–Dec.

Forests on sunny slopes, scrub on stony mountains, calcareous or sandstone hill slopes; 1000–2000 m. Guangxi, Guizhou, Yunnan [Vietnam].

- 1a. Leaflets (25–)27–33(–39), lanceolate ... 7c. var. *polyphylla*
 1b. Leaflets 11–19, elliptic, oblong, or ovate-oblong.
 2a. Corolla yellow 7a. var. *tonkinensis*
 2b. Corolla dark purple 7b. var. *purpurascens*

7a. *Sophora tonkinensis* var. *tonkinensis*

越南槐(原变种) yue nan huai (yuan bian zhong)

Cephalostigmaton tonkinense (Gagnepain) Yakovlev; *Sophora subprostrata* Chun & T. C. Chen.

Leaflets 11–19, elliptic, oblong, or ovate-oblong. Corolla yellow.

Scrub on stony mountains; 1000–2000 m. Guangxi, Guizhou, Yunnan [Vietnam].

7b. *Sophora tonkinensis* var. *purpurascens* C. Y. Ma, Acta Phytotax. Sin. 20: 469. 1982.

紫花越南槐 zi hua yue nan huai

Leaflets 11–19, elliptic, oblong, or ovate-oblong. Corolla dark purple.

- Forests on sunny slopes; 1100–1200 m. Guizhou.

7c. *Sophora tonkinensis* var. *polyphylla* S. Z. Huang & Z. C. Zhou, Acta Phytotax. Sin. 22: 487. 1984.

多叶越南槐 duo ye yue nan huai

Leaflets (25–)27–33(–39), lanceolate, pubescent abaxially.

- Calcareous or sandstone hill slopes. Guangxi.

8. *Sophora moorcroftiana* (Benth) Benth ex Baker in J. D. Hooker, Fl. Brit. India 2: 249. 1876.

砂生槐 sha sheng huai

Caragana moorcroftiana Benth in Royle, III. Bot. Himal. Mts. 198. 1835.

Shrubs, ca. 1 m high, densely branched. Branchlets densely hairy. Leaves 4–6 cm; stipules subulate, 4–7 mm, spinescent, persistent; leaflets 11–15, obovate, ca. 10 × 6 mm, hairy on both surfaces, base cuneate or rounded, apex obtuse or retuse, usually mucronate. Racemes terminal at branchlets, 3–5 cm. Flowers large. Calyx blue, shortly campanulate; teeth 5, ca.

7 × 3–5 mm, glabrous. Corolla blue-purple; standard ovate-oblong, ca. 9 × 5 mm, reflexed, apex retuse, narrowing to a claw, claw equal to blade; wings obovate-elliptic, ca. 16 mm, 1-auriculate at base, claw ca. 6 mm; keel ovate-falcate, auriculate on one side, claw slender, ca. 18 mm. Stamens 10, unequal, slightly fused at base. Ovary shorter than stamens, yellow-brown hairy; ovules many. Legumes not obviously moniliform, slightly compressed, ca. 6 × 0.7 cm, 2-valvate along sutures. Seeds 1–4(or 5), light yellow, ellipsoidal, ca. 4.5 mm. Fl. May–Jul, fr. Jul–Oct.

Valley forests; 3000–4500 m. Xizang [Bhutan, India, Myanmar].

9. *Sophora davidii* (Franchet) Skeels, U.S.D.A. Bur. Pl. Industr. Bull. 282: 68. 1913.

白刺槐 bai ci huai

Shrubs or small trees, 1–2 m high, rarely 3–4 m. Branches glabrous; sterile branches spiny at tip, some spines branched. Leaves 2–6.5(–8) cm; stipules subulate, some becoming spiny, sparsely pubescent, persistent; leaflets 11–19, usually elliptic-ovate or obovate-oblong, 5–20 mm, sparsely villous abaxially, glabrous adaxially, apex rounded or retuse, usually with mucro. Racemes terminal at branchlets. Flowers small, ca. 15 mm or less. Calyx campanulate, blue-purple, unequally 5-toothed, glabrous. Corolla white or light yellow, some red-purple on standard, rarely blue-purple; standard obovate-oblong, ca. 14 × 6 mm, rounded at apex, with slender claw at base, reflexed; wings equal to standard, obovate-oblong, ca. 3 mm wide, auriculate on one side; keel slightly shorter than wings, falcate-obovate, auriculate. Stamens 10, equal, slightly fused at base. Ovary longer than stamens, densely yellow-brown hairy, many ovuled; style curved, glabrous. Legumes slightly compressed, 6–8 × 0.6–0.7 cm, 2-valvate along sutures, sparsely hairy. Seeds 3–5, dark brown, ovoid, ca. 4 mm. Fl. Mar–Aug, fr. Jun–Oct.

- Valley scrub, hill slopes, sandy places in valleys; below 3400 m. Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang.

- 1a. Leaflets large, 15–20 mm, oblong, lateral veins obvious; legume long constricted between seeds 9c. var. *liangshanensis*
 1b. Leaflets small, 5–15 mm, elliptic-ovate to broadly ovate, lateral veins not obvious; legume shortly or not obviously constricted between seeds.
 2a. Corolla white or light yellow; leaflets 10–15 mm, elliptic-ovate or obovate-oblong 9a. var. *davidii*
 2b. Corolla blue-purple; leaflets very small, 5–6 mm, usually broadly ovate 9b. var. *chuansiensis*

9a. *Sophora davidii* var. *davidii*

白刺槐(原变种) bai ci huai (yuan bian zhong)

Sophora moorcroftiana (Benth) Baker var. *davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 5: 253; Pl. David. 1: 101. 1883; *Caragana chamlago* B. Meyer (1909), not C.

chamlagu Lamarck (1785); *S. moorcroftiana* subsp. *viciifolia* Yakovlev; *S. viciifolia* Hance (1881), not Salisbury (1796).

Leaflets 11–19, elliptic-ovate or obovate-oblong, 10–15 mm, lateral veins not obvious. Corolla white or creamy white. Legumes slightly compressed, not obviously constricted between seeds. Seeds 3–5.

• Valley scrub, hill slopes; below 2500 m. Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Yunnan, Zhejiang.

9b. *Sophora davidii* var. *chuansiensis* (C. Y. Ma) C. Y. Ma ex B. J. Bao & Vincent, **comb. nov.**

川西白刺槐 *chuan xi bai ci huai*

Basionym: *Sophora viciifolia* Hance var. *chuansiensis* C. Y. Ma, Acta Phytotax. Sin. 20: 469. 1982.

Leaflets very small, usually obovate, 5–6 × 2–4 mm, lateral veins not obvious. Corolla blue-purple. Legumes shortly constricted between seeds.

• Dry hill slopes, sandy places in valleys; 2500–3400 m. Sichuan, Xizang, Yunnan.

9c. *Sophora davidii* var. *liangshanensis* (C. Y. Ma) C. Y. Ma ex B. J. Bao & Vincent, **comb. nov.**

凉山白刺槐 *liang shan bai ci huai*

Basionym: *Sophora viciifolia* Hance var. *liangshanensis* C. Y. Ma, Acta Phytotax. Sin. 20: 470. 1982.

Leaflets large, oblong, 15–20 mm, lateral veins obvious, gray-white pilose. Legumes moniliform, long constricted between seeds. Seeds 2 or 3, rarely 5.

• 700–800 m. Sichuan.

10. *Sophora alopecuroides* Linnaeus, Sp. Pl. 1: 373. 1753.

苦豆子 *ku dou zi*

Herbs or subshrubs, ca. 1 m high, densely branched. Branches white villous or patulous-tomentose. Leaves 15–30 × 4–9 cm; stipules subulate, ca. 5 mm, caducous; petiole 1–2 cm; leaflets 11–27, lanceolate-oblong or elliptic-oblong, 15–40 × 5–14 mm, papery, densely hairy abaxially, pilose adaxially, lateral veins not obvious. Racemes terminal. Flowers many, dense; pedicel 3–5 mm; bracts subulate, caducous. Calyx compressed campanulate; teeth 5, unequally triangular-ovate. Corolla white or creamy white; standard varying in shape, usually oblong-ob lanceolate, 15–20 × 3–4 mm, apex rounded or obcordate, narrowing to claw; wings ca. 16 mm, ovate-oblong, 1-auriculate; keel similar to wings, claw slender, ca. 1/2 as long as blade. Stamens 10, slightly fused at base, shortly hairy where fused. Ovary densely white hairy; stigma very small, pilose. Legumes moniliform, straight, 8–13 cm. Seeds many, brown or light brown, ovoid. Fl. May–Jun, fr. Aug–Oct.

Grasslands, deserts. Gansu, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Afghanistan, India, Pakistan; C and SW Asia].

1a. Branches and leaflets appressed villous 10a. var. *alopecuroides*

1b. Branches and leaflets densely patulous-tomentose 10b. var. *tomentosa*

10a. *Sophora alopecuroides* var. *alopecuroides*

苦豆子(原变种) *ku dou zi* (*yuan bian zhong*)

Goebelia alopecuroides (Linnaeus) Bunge ex Boissier; *Pseudosophora alopecuroides* (Linnaeus) Sweet; *Sophora orientalis* Pallas; *S. pallida* Salisbury; *Vexibia alopecuroides* (Linnaeus) Yakovlev.

Branches white villous. Leaflets appressed villous, densely so abaxially.

Near grasslands, deserts. Gansu, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [India; C and SW Asia].

10b. *Sophora alopecuroides* var. *tomentosa* (Boissier) Bornmüller, Bot. Centralbl. Beih. 27: 347. 1910.

毛苦豆子 *mao ku dou zi*

Goebelia alopecuroides var. *tomentosa* Boissier, Fl. Orient. 2: 629. 1872; *Sophora alopecuroides* subsp. *tomentosa* (Boissier) Yakovlev; *Vexibia alopecuroides* var. *tomentosa* (Boissier) Yakovlev.

Branches and leaflets densely patulous-tomentose.

Xinjiang [Afghanistan, Pakistan; SW Asia (Iran)].

11. *Sophora flavescens* Aiton, Hort. Kew. 2: 43. 1789.

苦参 *ku shen*

Herbs or subshrubs, 1–2 m. Stem striped, pilose when young. Leaves 20–25(–30) cm; stipules lanceolate, 6–8 mm, acuminate; leaflets 13–25, elliptic, ovate, or lanceolate, 3–4(–6) × (0.5–)1.2–2 cm, papery, pilose or glabrescent abaxially, glabrous adaxially, base cuneate or slightly cordate, apex obtuse or acute. Racemes terminal, 15–25 cm. Flowers many, widely spaced; pedicel slender, ca. 7 mm; bracts linear, ca. 2.5 mm. Calyx campanulate, oblique; teeth not obvious, sparsely pubescent. Corolla white, pale yellow, purple-red, or red; standard obovate-spatulate, 14–15 × 6–7 mm, apex rounded or retuse, narrowing to a claw; wings rugose, claw equal to blade, ca. 13 mm; keel similar to wings, slightly broader, ca. 4 mm wide. Stamens 10, free or slightly fused at base. Ovary nearly sessile, hairy; ovules many; style slightly curved. Legumes 5–10 cm, slightly constricted between seeds, slightly quadrangular, sparsely or densely pubescent or glabrescent, 4-valvate. Seeds 1–5, red-brown or purple-brown, long ovoid, slightly compressed. Fl. Jun–Aug, fr. Jul–Oct.

Scrub, hill slopes, farm fields; below 1500 m. All provinces [India, Japan, Korea, Russia].

1a. Corolla purple-red or red 11c. var. *galegoides*

1b. Corolla white or pale yellow.

2a. Branchlets and leaflets pilose or glabrescent; legume sparsely hairy 11a. var. *flavescens*

2b. Branchlets and leaflets densely brown villous; legume densely hairy 11b. var. *kronei*

11a. *Sophora flavescens* var. *flavescens*

苦参(原变种) ku shen (yuan bian zhong)

Sophora angustifolia Siebold & Zuccarini; *S. flavescens* f. *angustifolia* (Siebold & Zuccarini) Yakovlev; *S. flavescens* var. *angustifolia* (Siebold & Zuccarini) Kitagawa; *S. flavescens* var. *stenophylla* Hayata.

Branchlets and leaflets pilose or glabrescent. Corolla white or pale yellow. Legume sparsely pubescent or glabrescent.

Scrub, hill slopes, farm fields; below 1500 m. All provinces [India, Japan, Korea, Russia].

11b. *Sophora flavescens* var. *kroni* (Hance) C. Y. Ma, Acta Phytotax. Sin. 20: 470. 1982.

毛苦参 mao ku shen

Sophora kroni Hance, Ann. Sci. Nat., Bot., sér. 4, 18: 219. 1862.

Branchlets and leaflets densely brown villous. Legume densely hairy.

• Scrub, hill slopes, farm fields; below 1000 m. Gansu, Hebei, Henan, Hubei, Jiangsu, Shaanxi, Shandong, Shanxi.

11c. *Sophora flavescens* var. *galeoides* (Pallas) Candolle, Prodr. 2: 96. 1825.

红花苦参 hong hua ku shen

Sophora galeoides Pallas, Sp. Astragal. 118. 1803.

Corolla purple-red or red.

• Anhui, Guizhou, Zhejiang.

This taxon is similar to *Sophora flavescens* var. *flavescens* but is distinguished by its purple-red corolla.

12. *Sophora mollis* (Royle) Baker in J. D. Hooker, Fl. Brit. India 2: 251. 1876.

翅果槐 chi guo huai

Edwardsia mollis Royle, Ill. Bot. Himal. Mts. 196. 1835; *E. hortensis* Boissier & Buhse; *Keyserlingia buxbaumii* Bunge ex Boissier; *K. hortensis* (Boissier & Buhse) Yakovlev.

Shrubs, ca. 1 m high. Branchlets gray-white hairy. Leaves 12–25 cm; petiole base slightly inflated; leaflets (11–)19–35, ovate, elliptic, oblong, or lanceolate, (10–)15–22(–27) × 5–9(–15) mm, leathery, sparsely hairy or glabrescent, base cuneate to rounded, apex rounded or retuse. Racemes 5–10 cm. Flowers 20–26 mm; pedicel 5–20 mm; bracts linear-lanceolate to ovate, 2–3(–3.5) mm. Calyx sparsely hairy; teeth short to absent. Standard rounded, claw equal to 1/2 of petal; wings oblong, rugose in upper part; keel similar to wings, 1-auriculate. Stamens 10, free. Legumes winged, obviously constricted, quadrangular. Seeds 1–7, red-brown, oblong, ca. 8 mm.

Yunnan [Afghanistan, India, Kashmir, Nepal, Pakistan; SW Asia (Iran)].

13. *Sophora tomentosa* Linnaeus, Sp. Pl. 1: 373. 1753.

绒毛槐 rong mao huai

Shrubs or small trees, 2–4 m high. Branches shortly tomentose. Leaves 12–18 cm; stipules absent; leaflets 11–15(–19),

oval or rounded, rarely ovate, 2.5–5 × 2–3.5 cm, nearly leathery, densely gray-white tomentose abaxially, glabrous adaxially, lateral veins obscure, base rounded, apex rounded or retuse. Racemes terminal, 10–20 cm, gray-white tomentose. Flowers dense; pedicel equal to calyx, 15–17 mm; bracts linear. Calyx campanulate, 5–6 mm, shortly tomentose. Corolla yellow or creamy white; standard broadly ovate, ca. 17 × 10 mm, claw ca. 3 mm; wings long elliptic, 1-auriculate, claw slender, ca. 5 mm; keel similar to wings, slightly shorter. Stamens 10, free. Ovary densely pubescent; style short, less than 2 mm. Legumes moniliform, 7–10 × 0.9–1 cm, shortly hairy. Seeds many, brown, globose, lustrous. Fl. Aug–Oct, fr. Sep–Dec.

Sand dunes, seashores. Guangdong, Hainan, Taiwan [seashores throughout the tropics].

14. *Sophora franchetiana* Dunn, J. Linn. Soc., Bot. 38: 358. 1908.

闽槐 min huai

Shrubs or small trees, 1–3 m. Branchlets densely brown tomentose. Leaves 10–15 cm; stipules subulate, ca. 4 mm; petiole 1–2 cm; leaflets 11–15, elliptic-oblong or ovate-oblong, 3–4 × 1.5–2 cm, papery, tomentose abaxially, glabrous and light green adaxially, lateral veins obscure, base rounded or narrowed, apex acute or acuminate. Racemes terminal, ca. 6 cm, densely tomentose; rachis ca. 2 cm. Flowers 12–15 mm. Calyx 2–3 × 4–5 mm, densely tomentose; teeth 5, equal, triangular. Corolla white; standard obovate-oblong or orbicular, ca. 10 × 6 mm, base abruptly clawed, apex retuse; wings oblong, petal ca. 7 × 3.5 mm, auricle nearly absent, claw slender; keel nearly falcate, obtuse at apex, petal ca. 6 × 4 mm, claw ca. 3 mm. Stamens 10, free or slightly fused at base. Ovary sparsely brown hairy; ovules 4. Legumes terete, 4–6 cm, brown hairy, slenderly beaked, constricted between seeds if more than 1. Seeds 1, rarely 2 or 3, yellow, ovoid, ca. 8 mm, lustrous. Fl. and fr. Apr–Sep.

Valley scrub; below 1000 m. Fujian, Guangdong, Hunan, Zhejiang [Japan].

15. *Sophora wilsonii* Craib in Sargent, Pl. Wilson. 2: 94. 1914.

瓦山槐 wa shan huai

Shrubs, 1–2 m high. Branches sparsely golden pubescent; branchlets densely hairy. Leaves 10–12 cm; stipules subulate, ca. 4.5 mm, persistent; leaflets 9–15; petiolule ca. 1 mm; blades elliptic, 15–25 × 7–12 mm, papery, densely brown hairy abaxially, glabrous adaxially, lateral veins obscure, base cuneate, apex obtuse, mucronate. Racemes alternate with leaves. Bracts subulate, 2–3 mm, caducous. Calyx campanulate, obviously oblique, 6–7 mm; teeth 5. Corolla white or pale yellow; standard linear-obovate, ca. 15 × 5 mm, apex retuse; wings oblong, equal to standard in length, claw ca. equal to petal; keel similar to wings, shorter, 1-auriculate. Stamens 10, slightly fused at base, sparsely hairy at fused parts. Ovary sparsely hairy; style and stigma glabrous. Legumes dark brown, terete, 7.5–8.5 × 1–1.2 cm, rigid, sparsely pubescent, base slender necked, apex beaked. Seed 1, dark brown, large, oblong, ca. 13 mm, obtuse at both ends. Fl. and fr. May–Oct.

• Valley scrub; 500–1700 m. Gansu, Guizhou, Sichuan, Yunnan.

16. *Sophora prazeri* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 466. 1897.

锈毛槐 xiu mao huai

Millettia esquirolii H. Léveillé; *Sophora duclouxii* Gagnepain; *S. mairei* Pampanini; *S. prazeri* subsp. *mairei* (Pampanini) Yakovlev; *S. prazeri* var. *mairei* (Pampanini) P. C. Tsoong.

Shrubs, 1–3 m high. Branches brown; branchlets red-brown tomentose. Leaves 7–11 × 3–4 cm; stipules setaceous, hairy; petiole sulcate adaxially; leaflets 7–15, usually ovate-elliptic, ovate, or long elliptic, rigidly papery; terminal leaflet ca. 8 × 4 cm, base cuneate to broadly cuneate, apex acute to broadly acute; middle leaflets oblong-lanceolate or ovate, 3–5 × 2–3.5 cm; basal leaflets smaller, veinlets obvious on both surfaces, densely hairy abaxially, lustrous adaxially. Racemes lateral, alternate with leaves, 5–20 cm. Pedicel 3–6 mm; bracts setaceous, caducous. Calyx obliquely campanulate; teeth 5, 8–9 × 5–7.5 mm, hairy. Corolla white or pale yellow; standard obovate or oblong-obovate, 15–17 × ca. 5 mm, apex retuse, narrowing to claw from middle; wings oblong, equal to standard in length, 1-auriculate, claw slender; keel shorter, obovate-oblong, 1-auriculate. Stamens 10, slightly fused at base. Ovary densely red-brown hairy. Legumes moniliform, 4–10 cm, apex beaked, neck densely hairy, constricted between seeds. Seeds 2–4, dark red or light red, ovoid or elliptic, ca. 8 mm, both ends acute. Fl. and fr. Apr–Sep.

Mountain forests, valleys, wet slopes; below 2000 m. Guangxi, Guizhou, Yunnan [Myanmar].

17. *Sophora benthamii* Steenis, Bull. Jard. Bot. Buitenzorg, sér. 3, 17: 428. 1948.

尾叶槐 wei ye huai

Sophora acuminata Benthham ex Baker.

Shrubs, 1–3 m high. Branches light brown pubescent, becoming glabrous. Leaves 15–25 cm; stipules setaceous, brown pubescent; leaflets 9–19; petiolules ca. 1 mm; blades papery, ovate-oblong or ovate-lanceolate, rarely obovate, terminal leaflet largest, to 10 cm, lateral leaflets smaller, veinlets obvious, base cuneate or rounded, apex acuminate, mucronate. Racemes slender, sometimes curved, 10–15 cm, opposite leaves. Bracts setaceous, gray-brown hairy. Calyx obliquely campanulate; teeth 5, obtuse. Corolla white or pale yellow; standard oblong or obovate-lanceolate, ca. 16 × 6 mm, apex retuse, narrowing to claw from middle; wings ovate-oblong, 1-auriculate, rugose; keel shorter than wings, 1-auriculate, claw equal to blade. Stamens 10, somewhat fused at base. Ovary stalked, gray-brown hairy; ovules many. Legumes moniliform, 12–16 × 1–1.2 cm, pubescent, densely so where constricted, beak long. Seeds (1 or) 2–4 (or 5), dark red or red, ca. 12 × 7 mm, acute at both ends. Fl. and fr. Apr–Sep.

Valleys; 1300–2500 m. Xizang, Yunnan [Bhutan, India, Myanmar].

18. *Sophora praetorulosa* Chun & T. C. Chen, Acta Phytotax. Sin. 7: 28. 1958.

疏节槐 shu jie huai

Subshrubs, 20–100 cm high. Stem yellow-brown, gla-

brous, much branched from base. Leaves many and dense, 10–15 cm; stipules absent; leaflets 11–17, opposite, variable in shape, elliptic, orbicular, ovate, or obovate-oblong, 10–25 × 7–15 mm, nearly leathery, hairy when young, becoming glabrous, usually glandular-punctate, base rounded, apex obtuse or mucronate. Racemes terminal, ca. 12 cm. Flowers widely spaced; bracts subulate, less than 1 mm, persistent; pedicel ca. 5 mm. Calyx obliquely campanulate, pilose; teeth 5, unequal. Corolla purple; standard obovate, 5–7 × 3–4 mm, apex retuse, narrowing to claw; wings linear-oblong, 2-auriculate, claw ca. 1.5 mm; keel falcate, incurved. Stamens 10, slightly fused at base. Ovary pilose, shortly stalked; ovules 6; style glabrous. Legumes moniliform, glabrescent, apex beaked. Seeds 2 or 3, dark brown, elliptic, ca. 6 mm, lustrous. Fl. Jul–Aug.

• Dry wastelands. Hainan.

19. *Sophora pachycarpa* Schrenk ex C. A. Meyer in Fischer & Avé-Lallemant, Index Sem. Hort. Petrop. 9: 89. 1843.

厚果槐 hou guo huai

Goebelia pachycarpa (Schrenk ex C. A. Meyer) Bunge ex Boissier; *Vexibia pachycarpa* (Schrenk ex C. A. Meyer) Yakovlev.

Herbs or subshrubs, 30–60 cm; plant gray hairy. Leaves (5–)9–15(–20) cm; leaflets 13–33, opposite, lanceolate to oblong-lanceolate, (3.5–)15–20(–27) × (2–)3–7 mm, papery. Racemes terminal, to 20 cm, narrow. Calyx obliquely campanulate, ca. 8 × 4.5 mm, 5-lobed, pubescent. Corolla white to creamy yellow; standard oblong-obovate, apex obcordate, narrowing to claw, claw equal to blade in length; wings unequal, auriculate, claw shorter than blade; keel falcate, auriculate. Stamens 10, fused at base. Ovary densely gray-brown pubescent; ovules many. Legumes indehiscent, 4–5 × 0.8–0.9 cm. Seeds red-brown, 5–6 × 4–4.5 mm, lustrous.

• Gansu.

20. *Sophora japonica* Linnaeus, Mant. Pl. 1: 68. 1767.

槐 huai

Anagyris chinensis Sprengel; *Macrotripis foetida* Candelolle; *Ormosia esquirolii* H. Léveillé; *Pongamia chinensis* Candelolle; *Robinia mitis* Loureiro (1790), not Linnaeus (1763); *Sophora angustifoliola* Q. Q. Liu & H. Y. Ye [“*angustifolia*”]; *S. japonica* f. *columnaris* Schwerin; *S. japonica* f. *hybrida* Carrière; *S. japonica* f. *oligophylla* Franchet; *S. japonica* f. *pendula* Loudon; *S. japonica* var. *praecox* Schwerin; *S. japonica* var. *pubescens* (Tausch) Bosse; *S. japonica* f. *variegata* Nichols; *S. japonica* var. *vestita* Rehder; *S. japonica* var. *violacea* Carrière; *S. mairei* H. Léveillé (1915), not Pampanini (1910); *S. pubescens* Tausch; *S. sinensis* Forrest; *S. vaniotii* H. Léveillé; *Styphnolobium japonicum* (Linnaeus) Schott.

Trees, to 25 m. Bark gray-brown, longitudinally striate; branches of current year green, glabrous. Leaves 15–25 cm; stipules ovate to linear, caducous; petiole inflated at base, bud hidden; leaflets 9–15; stipules subulate; blades ovate-lanceolate or ovate-oblong, 2.5–6 × 1.5–3 cm, papery, glaucous and sparsely to densely pubescent abaxially, usually becoming glabrate, base broadly cuneate or rounded, apex acuminate, mucro-

nate. Panicles terminal, to 30 cm; bracteole subulate. Calyx shortly campanulate, 3.5–4.5 mm; teeth 5, obtuse, pubescent. Corolla white or creamy yellow, rarely purple-red; standard broadly ovate, claw short, base cordate, apex retuse; wings ovate-oblong, ca. 10 × 4 mm; keel similar to wings, but broader. Stamens 10, unequal, free, persistent. Ovary glabrescent. Legumes green, moniliform, 2.5–5 × ca. 1 cm, obviously constricted between seeds, indehiscent, fleshy. Seeds 1–6, yellow-green, black-brown when dry, ovoid. Fl. Jul–Aug, fr. Aug–Oct.

Cultivated throughout China [native to Japan and Korea; widely cultivated elsewhere].

Many intergrading varieties and horticultural forms exist that are not worthy of recognition at this level. *Sophora angustifoliola* appears to be merely a narrow-leaved form of this species.

21. *Sophora brachygyna* C. Y. Ma, Acta Phytotax. Sin. 20: 472. 1982.

短蕊槐 duan rui huai

Trees, to 20 m or more. Bark gray-brown; branches of cur-

rent year green. Leaves to 20 cm; stipules caducous; petiole obviously inflated at base, bud hidden; leaflets 9–15; stipels subulate; petiolule ca. 3 mm; blades gray-white abaxially, green adaxially, ovate-lanceolate or ovate-oblong, 2.5–4(–6) × 1.5–2(–2.5) cm, glabrescent on both surfaces, base obtuse, apex acuminate. Panicles large, to 25 cm. Bractlets caducous. Calyx shortly campanulate, ca. 4 × 4 mm; teeth absent or obscure, gray-white ciliate. Corolla white or pale yellow; standard ovate, ca. 13 × 11 mm, base cordate, apex retuse, claw ca. 3 mm; wings oblong, ca. 11 × 4 mm, 2-auriculate, claw slender, ca. 4 mm; keel similar to wings, broader, 2-auriculate. Stamens 10, nearly free. Ovary shorter than 1/2 of stamens, white pilose; style curved. Legumes moniliform, sturdy, 4–6 × ca. 1.5 cm, obviously constricted between seeds, apex beaked, neck 1–2 cm, glabrous, indehiscent. Seeds 1 or 2(–4), brown-black, ovoid, compressed, ca. 11 × 7 mm. Fl. Aug–Nov, fr. Oct–Jan.

• Hill slopes, roadsides; ca. 300 m. Guangxi, Hunan, Jiangxi, Zhejiang.

This species may prove to be synonymous with *Sophora japonica*.

43. CLADRASITIS Rafinesque, Cincinnati Lit. Gaz. 1(8): 60. 1824.

香槐属 xiang huai shu

Bao Bojian (包伯坚); Michael A. Vincent

Trees, deciduous, rarely woody lianas; bud enclosed within inflated base of petiole. Leaves imparipinnate; stipules absent; stipels present or absent; leaflets alternate or subopposite, membranous, entire. Paniculate racemes terminal; bracts and bracteoles caducous. Calyx campanulate; teeth 5. Corolla white (or pink); petals subequal. Stamens 10, free; filaments distinct or slightly joined at base; anthers versatile. Ovary linear-lanceolate, shortly stalked; ovules few to many; style incurved; stigmas small. Legume compressed, winged or not, tardily dehiscent. Seeds 1 to many.

Eight species: SE Asia and E North America; six species (five endemic) in China.

See the synopsis of *Cladrastis* by Duley and Vincent (Rhodora 105: 205–239. 2003).

- 1a. Leaflets dark green adaxially, paler abaxially, stipels and bracteoles absent; legumes wingless.
- 2a. Leaflets ovate-lanceolate or oblong-lanceolate, broadest near rounded base; flowers up to 1.5 cm; ovary pilose 2. *C. delavayi*
- 2b. Leaflets ovate or oblong-ovate, broadest at or above middle, base acute; flowers ca. 2 cm; ovary densely sericeous 6. *C. wilsonii*
- 1b. Leaflets concolorous, stipels present; bracteoles usually caducous; legume margins winged.
- 3a. Leaflets less than 4 cm, nearly membranous; panicle less than 10 cm 3. *C. parvifolia*
- 3b. Leaflets more than 4 cm, papery; panicle 15–20 cm.
- 4a. Wooden lianas or climbing shrubs; wings and keels smaller than standard 5. *C. scandens*
- 4b. Trees; wings and keels larger than standard.
- 5a. Stipels simple, subulate, 1 on each side of pulvinus; fruit apex and base acute; leaflets typically 11 or more 4. *C. platycarpa*
- 5b. Stipels branched and/or 2 or more on each side of pulvinus; fruit apex and base rounded; leaflets typically 9 or fewer 1. *C. chingii*

1. *Cladrastis chingii* Duley & Vincent, Rhodora 105: 217. 2003.

秦氏香槐 qin shi xiang huai

Trees, to 13 m tall; bark gray or gray-brown, smooth, lenticellate. Leaves imparipinnately compound; leaflets 9 or fewer, alternate; stipels 1 or 2 or more on each side of pulvinus, simple or branched; petiolule 3–5 mm, white hairy when young, then glabrous; blades ovate to elliptic, 3.9–7.8 × 1.2–3.5 cm, somewhat leathery, glabrous to sparsely white pilose along main vein abaxially, yellow-green and glabrous adaxially, veins

raised on both surfaces, base rounded to broadly cuneate, apex acute-acuminate. Panicle terminal, to 30 cm, erect; bracteoles caducous. Calyx campanulate, 4.5–4.8 mm, rusty brown tomentose. Corolla white; standard elliptic or ovate-elliptic, ca. 5.6 × 5.1 mm, rounded at apex, claw ca. 1.5 mm; wings sagittate, ca. 6 × 3.4 mm, auriculate at base, obtuse at apex; keels lanceolate, ca. 6 × 3.4 mm, auriculate at base. Ovary sessile, densely white sericeous; ovules 3–6; style slightly curved, glabrous. Legumes oblong, flat, 6–8 cm, rounded to acute at apex, winged, with 1–3 seeds. Fl. Apr–May, fr. Jun–Aug.

• Hill forests. Guangxi, Hunan, Yunnan, Zhejiang.

2. *Cladrastis delavayi* (Franchet) Prain, Ann. Roy. Bot. Gard. (Calcutta) 10: 109. 1904.

小花香槐 xiao hua xiang huai

Dalbergia delavayi Franchet, Pl. Delavay. 186. 1890; *Cladrastis sinensis* Hemsley.

Trees, to 20 m tall. Young branches gray-brown hairy. Leaves imparipinnate, to 20 cm; leaflets 9–13, alternate; stipels absent; petiolule 1–3 mm; blades ovate-lanceolate or oblong-lanceolate, 3.9–11.3 × 1.7–3.8 cm, gray-white hairy abaxially, dark green and glabrous adaxially, veins obviously raised abaxially with obvious veinlets, base obtuse or slightly cordate, apex acuminate or obtuse. Panicle terminal, 12–30 cm; bracts caducous. Calyx campanulate, 4.6–6.9 mm, with 5 semiorbicular teeth, densely whitish rusty brown pubescent. Corolla white or light yellow, rarely pink; standard obovate or orbicular, 6.4–14.4 mm, retuse at apex, narrowing to claw at base, claw 0.6–3.2 mm; wings sagittate, 6.4–9.6 mm, claw 2.1–4 mm; keels lanceolate, 6.2–10.5 mm, auriculate at base. Ovary linear, light yellow pilose, 6–10-ovuled. Legumes flat, elliptic or long elliptic, wingless, 3–8 × 1–2 cm, with 1–3(–5) seeds. Seeds brown, ovoid, compressed, ca. 4 × 2 mm. Fl. Jun–Aug, fr. Aug–Oct.

• Warm hill forests; 1000–2500 m. Fujian, Gansu, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

3. *Cladrastis parvifolia* C. Y. Ma, Bull. Bot. Res., Harbin 2(1): 110. 1982.

小叶香槐 xiao ye xiang huai

Trees; bark gray-white or brown, lenticellate. Young branches green, glabrous. Leaves imparipinnate, 10–15 cm; petiole gray-brown pilose; leaflets 3- or 4-paired; stipel subulate, glabrous; petiolule ca. 4 mm, brown pubescent; blades ovate, 2–4 × ca. 2 cm, membranous, pilose along veins abaxially, veins obviously raised abaxially with obvious veinlets, base obtuse, apex acuminate. Panicle terminal; rachis slender, 5–10 cm, gray-brown hairy. Flowers ca. 7 mm; pedicel short, ca. 4 mm, pubescent. Calyx cup-shaped, with 2 caducous bracts at base, unequally toothed, hairy. Corolla white; standard oblong, ca. 7 × 3.5 mm, rounded at apex, narrowing to claw at base, claw ca. 1.5 mm; wings ovate-oblong, claw ca. 2 mm; keels similar to wings. Ovary densely gray-white sericeous; style erect. Legumes narrowly winged on both sides, pilose. Fl. Oct.

• Guangxi.

This taxon is doubtfully a species of *Cladrastis*, and according to Duley and Vincent (Rhodora 105: 234–235. 2003), based on the descriptions, it may be conspecific with *Maackia fauriei* (H. Léveillé) Takeda (*Cladrastis fauriei* H. Léveillé), described from Korea.

4. *Cladrastis platycarpa* (Maximowicz) Makino, Bot. Mag. (Tokyo) 15: 62. 1901.

翅荚香槐 chi jia xiang huai

Sophora platycarpa Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 18: 398. 1873; *Cladrastis yungchunii* Xiang W. Li & G. S. Fan; *Platyosprion platycarpum* Maximowicz.

Trees, to 30 m tall, 80–120 cm d.b.h.; bark dark gray,

many lenticellate. Leaves imparipinnately compound; leaflets (7–)13(–15); stipels 1 on either side of pulvinus, unbranched, subulate, to 2 mm, glabrous; petiolule 3–5 mm, densely gray-brown hairy; blades long elliptic or ovate-oblong, smaller toward base, 2–10 × 1–3.5 cm, pilose near midrib or glabrous abaxially, glabrous adaxially, veins obviously raised abaxially with obvious veinlets, base obtuse or broadly cuneate, apex acuminate. Panicle 9–30 cm, to 15 cm in diam. Pedicel slender, 7–11 mm. Calyx campanulate, densely white-yellow sericeous, triangular toothed. Corolla white, with yellow spot in throat; standard oblong, 5.3–8.2 × 5.3–8.6 mm, rounded or retuse at apex, claw 1.2–4.8 mm; wings lanceolate-ovate, 5.9–9.3 × 3.2–5.4 mm, slightly auriculate, claw 2.9–5.1 mm; keels lanceolate, 6.4–9.9 × 3.5–5.9 mm, base auriculate. Ovary linear, yellow-white pubescent, 5–7-ovuled; style slightly curved. Legumes long elliptic or oblong, 5–8 × 1.5–2 cm, winged on both sides, indehiscent. Seeds 1–3, dark brown or black, oblong, ca. 8 mm. Fl. Apr–Jun, fr. Jul–Oct.

Forests in valleys and on slopes; below 1000 m. Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Yunnan, Zhejiang [Japan].

5. *Cladrastis scandens* C. Y. Ma, Bull. Bot. Res., Harbin 2(1): 111. 1982.

藤香槐 teng xiang huai

Lianas or climbing shrubs; stem lenticellate. Leaves imparipinnate; leaflets 4-paired, alternate; stipel subulate, glabrous; petiolule ca. 2 mm, glabrous; blades elliptic or oblong, terminal one larger, ca. 9 × 6 cm, smaller toward base, usually 3–6 × 2–4 cm, papery, glabrous, veins obviously raised abaxially and with obvious veinlets, base obtuse, apex rounded or acute. Panicle terminal and large. Pedicel 6–8 mm, brown-gray pubescent. Calyx cup-shaped, equally and triangular toothed, hairy. Corolla white; standard oblong, rounded at apex, narrowing to claw at base, claw ca. 3 mm; wings triangular-ovate, claw ca. 4 mm; keels similar to wings, slightly broad, ca. 3.5 mm, one auriculate at base. Ovary linear, white pilose, 6–8-ovuled; style slightly curved; stigma very small.

• Hill scrub; ca. 1200 m. Guizhou.

According to Duley and Vincent (Rhodora 105: 234. 2003), based on the description, it is highly probable that this species is conspecific with *Cladrastis platycarpa*.

6. *Cladrastis wilsonii* Takeda, Notes Roy. Bot. Gard. Edinburgh 8: 103. 1913.

香槐 xiang huai

Cladrastis lichuanensis Q. W. Yao & G. G. Tang.

Trees, to 16 m tall; bark gray or gray-brown, smooth, lenticellate. Leaves imparipinnately compound; leaflets 8–11, alternate; stipels absent; petiolule 4–5 mm, white hairy when young, then glabrous; blades ovate or oblong-ovate, terminal one larger, usually 3.5–14.3 × 1.8–6.5 cm, papery, golden pilose along main vein abaxially, dark green and glabrous adaxially, veins raised on both surfaces, base broadly cuneate, apex acute. Panicle terminal or axillary, 10–28 cm; bracts caducous. Calyx campanulate, 7.2–8 mm, triangular toothed, yellow-brown tomentose. Corolla white; standard elliptic or ovate-elliptic, 9.3–

15.2 × 9–13 mm, rounded or retuse at apex, claw 2.3–5.1 mm; wings sagittate, 9.3–14.4 mm, auriculate at base, obtuse at apex; keels falcate, 8.8–14.9 × 4.8–7.2 mm, auriculate at base. Ovary sessile, densely yellow-white sericeous; ovules (1–)3–5; style slightly curved, glabrous. Legumes oblong, flat, 4.5–8 × 0.8–1

cm, beaked at apex, wingless. Seeds 1–5, gray-brown, reniform. Fl. May–Jul, fr. Aug–Sep.

• Hill forests; 1000–1500 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang.

44. SALWEENIA E. G. Baker, J. Bot. 73: 134. 1935.

冬麻豆属 *dong ma dou shu*

Sun Hang (孙航); Michael A. Vincent

Shrubs, evergreen, 0.5–2 m tall. Leaves imparipinnate; stipules herbaceous; leaflets opposite, linear and entire, conduplicate; stipels absent. Flowers clustered at ends of branches; bracts and bractlets small, bractlets well below calyx; pedicel present. Calyx campanulate; teeth 5, deltoid, upper 2 partially connate; disk adnate to calyx base. Petals all clawed; standard obovate, apex emarginate; wings oblong; keel boat-shaped. Stamens diadelphous; anthers homomorphic, dorsifixed. Ovary with long stalk. Legumes linear-oblong, compressed, stalked, 2-valved; segments thinly papery. Seeds ovate, compressed.

• One species: China.

1. *Salweenia wardii* E. G. Baker, J. Bot. 73: 135. 1935.

冬麻豆 *dong ma dou*

Stems erect, greenish yellow to dark brown. Young branches longitudinally ridged when dry, densely appressed gray-whitish villous; bud scales triangular, apex acute to tapering, persistent. Leaves 1.2–3 cm; stipules triangular, 1–2 mm, appressed gray-white villous, persistent; petiole and rachis appressed gray-white villous, grooved above; leaflets 7–19, sessile, 1–2.7 × 0.2–0.35 cm, straight to curved, densely appressed adnate gray-whitish pubescent, becoming glabrate adaxially, lateral veins inconspicuous, margin entire, apex acute or blunt. Flowers 3–7, clustered at end of branchlets; bracts persistent, ovate-triangular, 3–5 mm, appressed gray-whitish villous abaxially, glabrous adaxially, apex acute; pedicels 5–7 mm, ap-

pressed gray-whitish pubescent; bractlets 2, acicular, 2–3 mm. Calyx campanulate, 8–9 mm; teeth 1–2 mm, appressed gray-whitish pubescent. Corolla yellow; standard obovate to broadly ovate, 1.6–1.8 × 1.3–1.5 cm, apex emarginate; wings oblong, 11–12 × 4–5 mm, claw 7.5–8 mm; keel boat-shaped, 11–12 mm, claw 7.5–8 mm. Stamen filaments 1.4–1.8 cm. Ovary densely appressed villous; carpopodium 4–6 mm; ovules 6–8. Legumes linear-oblong, 5.5–9 × 0.8–1.2 cm, apex beaked; stalk 6–8 mm, densely appressed gray-whitish villous; calyx persistent; segments brittle, sparsely appressed pubescent. Seeds 3–7; funicle slender, 0.8–1 mm.

• Dry shrublands or gravelly slopes in valleys of Lancang Jiang, Nu Jiang, and Yalong Jiang; 2700–3600 m. W Sichuan (Jiulong), E Xizang.

45. MAACKIA Ruprecht, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 15: 143. 1856.

马鞍树属 *ma an shu shu*

Bao Bojian (包伯坚); Michael A. Vincent

Trees or shrubs; buds axillary, exposed, bud scales imbricate. Leaves imparipinnately compound, alternate, estipulate, petiolate, deciduous; leaflets opposite or nearly opposite, entire, estipellate; petiolule short. Racemes simple or branched at base, terminal. Flowers many, dense; bracteoles caducous. Calyx inflated, campanulate or cylindrical, 5-toothed. Corolla white to greenish white; standard obovate, long elliptic-obovate, or obovate-cuneate, reflexed; wings oblique-oblong, hastate at base; keels slightly incurved, partially fused ventrally. Stamens 10; filaments slightly fused at base; anthers versatile, elliptic. Ovary subsessile, densely hairy, few ovuled; style slightly incurved; stigmas small, terminal. Legume flat, long elliptic to linear or ovate, straight or curved, narrowly winged along ventral suture or not. Seeds 1–5, long elliptic, flat.

Twelve species: E Asia; seven species (six endemic) in China.

- 1a. Leaflets 3–5(–7); legume slightly curved to falcate; fruit neck slender, 5–15 mm; flowers ca. 20 mm 1. *M. tenuifolia*
 1b. Leaflets (7–)9–15; legume not falcate; fruit neck absent; flowers less than 12 mm.
 2a. Legume winged along ventral suture; wing 2–6 mm wide.
 3a. Leaflets lanceolate-elliptic or long ovate-elliptic, acuminate at apex; flowers 7–8 mm; legume wing 1–4 mm wide 6. *M. taiwanensis*
 3b. Leaflets ovate or ovate-elliptic, obtuse at apex; flowers ca. 10 mm; legume wing 2–6 mm wide 7. *M. hupehensis*
 2b. Legume ± wingless along ventral suture, rarely winged to 1 mm.
 4a. Leaves sparsely pubescent abaxially.
 5a. Flowers ca. 10 mm; small trees; leaflets acute at apex 4. *M. hwashanensis*
 5b. Flowers ca. 6 mm; shrubs; leaflets acuminate at apex 5. *M. chekiangensis*

4b. Leaves glabrous abaxially, rarely hairy at base of main vein.

6a. Legume 3–7 cm, length usually 3–6 × width; flowers ca. 10 mm 2. *M. amurensis*

6b. Legume less than 3.5 cm, length less than 3 × width; flowers 6–7 mm 3. *M. australis*

1. *Maackia tenuifolia* (Hemsley) Handel-Mazzetti, Symb. Sin. 7: 544. 1933.

光叶马鞍树 *guang ye ma an shu*

Euchresta tenuifolia Hemsley, J. Linn. Soc., Bot. 23: 200. 1887; *Maackia honanensis* L. H. Bailey.

Shrubs or trees, 2–7 m tall; stem gray; buds densely brown hairy. Leaves 12–16.5 cm; rachis sparsely gray-white pubescent; leaflets 3–5(–7); petiolule very short; terminal leaflet obovate or elliptic, ca. 10 × 6 cm, base cuneate or rounded, apex acuminate; lateral leaflets elliptic or long elliptic, 4–9.5 × 2–4.5 cm, hairy along main vein, base cuneate, apex acuminate. Racemes terminal, 6–10.5 cm. Flowers 1.8–2.1 cm; pedicel 8–12 mm, slender. Calyx cylindric, ca. 8 mm; teeth short, gray pubescent at margin. Corolla green-white. Ovary densely yellow-brown pubescent, ca. 12 mm, stalked; style ca. 1 mm. Legumes brown, linear, 5.5–10 × 0.9–1.4 cm, slightly curved to falcate, compressed, densely villous, wingless; fruit neck 5–15 mm; fruit stalk ca. 1 cm. Seeds 2–4, light red to scarlet, reniform, compressed. Fl. Apr–May, fr. Aug–Sep.

• Forests, hill slopes. Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Zhejiang.

2. *Maackia amurensis* Ruprecht, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 15: 128, 143. 1856.

朝鲜槐 *chao xian huai*

Cladrastis amurensis (Ruprecht) Benth.

Trees deciduous, to 15 m tall, to 60 cm d.b.h.; bark green-brown, scaly; branches purple-brown, lenticellate, hairy when young, then glabrous; buds glabrous. Leaves 15–23 cm; leaflets 7–9(–11); petiolule 3–6 mm; blades ovate to obovate-elliptic, 3.5–6.8(–9.7) × (1–)2–3.5(–5) cm, papery, densely hairy when young, becoming glabrate, rarely sparsely villous near main vein abaxially, base broadly cuneate or cuneate, apex acute to acuminate. Racemes 5–9 cm; rachis densely brown hairy. Flowers 0.8–1.2 cm; pedicel (3.2–)4–6(–10) mm. Calyx campanulate, 2.1–4 mm; teeth short, densely yellow-brown appressed pubescent. Corolla white, 7–11 mm; standard obovate, apex emarginate, narrowing to claw at base; wings oblong, 2-auriculate at base. Ovary linear, densely yellow-brown hairy. Legumes dark brown, linear, 3–7 × 1–1.2 cm, pubescent or subglabrous, wing 0.4–1.2 mm; stalk 5–10 mm. Seeds 1–4, yellow to yellow-brown, long elliptic, 6–8 mm. Fl. Jun–Jul, fr. Sep–Oct.

Forests on hill slopes; 300–900 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong [Korea, Russia].

3. *Maackia australis* (Dunn) Takeda, Notes Roy. Bot. Gard. Edinburgh 8: 102. 1913.

华南马鞍树 *hua nan ma an shu*

Cladrastis australis Dunn, Bull. Misc. Inform. Kew, Addit. Ser. 10: 86. 1912; *Maackia elliptocarpa* Merrill.

Shrubs or small trees, to 2 m tall; branchlets ± glabrous. Leaves 13.8–22 cm; leaflets 7–11, ovate to ovate-elliptic, 2.5–7.6 × 1.3–4.1 cm, glabrous, base cuneate or rounded, apex acute or acuminate. Racemes 10–20 cm. Flowers 6–7 mm; pedicels 2.5–5 mm. Calyx campanulate, 2.1–2.4 mm; teeth to 1 mm. Corolla white, 5–6 mm; standard elliptic-obovate, apex slightly emarginate, narrowed to a short claw; wings narrowly elliptic, auricles short. Ovary narrowly elliptic, densely hairy. Legumes flat, oval or ovate, 2.8–3.5 × 1.2–1.7 cm, pubescent to nearly glabrous, at least slightly golden glandular, wing 0.4–1.1 mm, rarely absent; fruit neck absent. Seeds 1–3, yellow, flat, oval, 7–9 mm. Fl. Jul.

• Scrub. Guangdong.

4. *Maackia hwasanensis* W. T. Wang ex C. W. Chang, Fl. Tsinling. 1(3): 444. 1981.

华山马鞍树 *hua shan ma an shu*

Trees small, to 2 m tall; branchlets gray-brown; buds ovoid, hairy. Leaves 18–24(–27) cm; leaflets 9–11; petiolule 2–3 mm, densely white pubescent; blades elliptic-ovate or ovate-oblong, 3.5(–7.7) × 1.6–4 cm, adnate gray hairy abaxially, glabrous adaxially, base broadly cuneate or rounded, apex acute to acuminate. Racemes 3.4–4.5 cm; rachis brown hairy. Flowers 1–1.2 cm; pedicel 4–8 mm. Calyx campanulate, 4–6 mm; teeth to 2.5 mm. Corolla white, 9–11 mm; standard broadly elliptic, slightly emarginate at apex, abruptly narrowed to a narrow claw; wings narrowly elliptic, auricles small. Ovary narrowly elliptic, pubescent. Legumes long elliptic or ovate-elliptic, 3.5–5.5 × 1.3–1.5 cm, beaked at apex; stalk 6–7 mm, pubescent. Seeds reddish brown to yellow-brown, reniform, 8–10 × 5–5.3 mm. Fl. Jul–Aug, fr. Aug–Sep.

• Forests in valleys and on hill slopes; 100–2100 m. Henan, Shaanxi.

5. *Maackia chekiangensis* S. S. Chien, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 8: 132. 1932.

浙江马鞍树 *zhe jiang ma an shu*

Shrubs, 1–1.5 m tall; branchlets gray-brown, lenticellate, smooth, glabrous. Leaves 13–20 cm; leaflets 9–11, opposite; petiolule 1–2 mm; blades ovate-lanceolate or elliptic-ovate, 2.1–6.3 × 1.1–3 cm, sparsely light brown hairy abaxially, glabrous adaxially, base cuneate, apex acuminate. Racemes 8–14 cm; rachis light brown pubescent. Flowers dense; pedicel slender, 2–3.5 mm; bracteoles subulate, 1.3–2 mm. Calyx campanulate, 2.1–2.4 mm; teeth to 1.3 mm, brown adnate hairy. Corolla white; standard oblong, 3–5 × 1.2–1.7 mm, slightly emarginate at apex, claw ca. 0.6 mm; keels oval-oblong, spurred at base. Ovary narrowly oblong, shortly stalked, densely brown hairy. Legumes elliptic, ovate, or oblong, 2.7–4 × 1.1–1.5 cm, beaked at apex, narrowly winged along sutures, brown pubescent; fruit neck absent; stalk ca. 3 mm. Seed 1, yellow-brown. Fl. Jun, fr. Sep.

• Forests; below 500 m. Anhui, Guangdong, Jiangxi, Zhejiang.

6. *Maackia taiwanensis* Hoshi & H. Ohashi, J. Jap. Bot. 62: 98. 1987.

多花马鞍树 duo hua ma an shu

Maackia tashiroi Makino var. *taiwaniana* Kanehira.

Trees, to 10 m tall; young branches densely pubescent, then dark gray or dark purple, glabrous; buds ovoid, glabrous or glabrescent. Leaves 10–16 cm; leaflets 11–15; petiolule 2–6 mm; blades lanceolate-elliptic or long ovate-elliptic, 2–4.2 × 1–2 cm, glabrous, base cuneate or rounded, apex acute. Racemes 8–10 cm, erect, yellow-brown hairy. Flowers 7–8 mm; pedicel 2–4 mm. Calyx campanulate; teeth short, densely yellow-brown hairy. Corolla white; standard obovate, apex emarginate. Ovary narrowly elliptic, shortly stalked, densely brown hairy. Legumes flat, elliptic, 3.3–6 × 1–1.5 cm, wing 1–4 mm, shortly hairy. Seeds 1 or 2, elliptic, 5–7 mm, brown-purple. Fl. Jul–Aug.

• Hills. Taiwan.

The Chinese record of *Maackia floribunda* (Miquel) Takeda (FRPS 40: 62. 1994) is referable to *M. taiwanensis*.

7. *Maackia huphensis* Takeda in Sargent, Pl. Wilson. 2: 98. 1914.

马鞍树 ma an shu

Maackia chinensis Takeda; *M. floribunda* (Miquel) Takeda var. *chinensis* (Takeda) Hatusima.

Trees, 5–23 m tall, 20–80 cm d.b.h.; bark green-gray or gray-brown, smooth; young branches and buds hairy, old branches purple-brown, glabrous. Leaves 12–20 cm; leaflets 9–13, opposite distally, sometimes subopposite proximally, ovate, ovate-elliptic, or elliptic, 2–8 × 1.5–2.8 cm, pubescent, base cuneate or rounded, apex obtuse or acute. Racemes 3.5–8 cm; rachis densely brown hairy. Flowers 8–10 mm; pedicel 2–4 mm, slender, densely hairy. Calyx 1.6–3.3 mm, campanulate; teeth to 1.6 mm, densely yellow-brown hairy. Corolla white; standard ovate or obovate, 4–6 mm, claw to 2 mm. Ovary densely villous, linear-oblong. Legumes brown, narrowly ovate to elliptic, flat, 4.5–8.5 × 1.6–2.5 cm; wing 2–6 mm; stalk 5–7 mm. Seeds 2 or 3, yellow-brown, lustrous, elliptic. Fl. Jun–Jul, fr. Aug–Sep.

• Hill slopes, valleys, streamsides; 500–2300 m. Anhui, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Zhejiang.

9. Tribe EUCHRESTEAE

山豆根族 shan dou gen zu

Sun Hang (孙航); Kai Larsen

Shrubs. Leaves pulvinate, imparipinnate; stipules small, caducous; stipels absent. Inflorescences racemose. Calyx campanulate to tubular. Standard attenuate into a stalk; wings similar to keel. Stamens diadelphous, vexillary stamen free, remainder connate; anthers uniform, dorsifixed. Ovary long stipitate, often 2-ovuled. Legumes drupelike, bluish purple, indehiscent, 1-seeded. Testa membranous, adherent to fruit wall.

One genus and about four species: Bhutan, China, India, Indonesia, Japan, Korea, Laos, Nepal, Philippines, Thailand, Vietnam; four species (one endemic) in China.

46. EUCHRESTA Bennett in Bennett & R. Brown, Pl. Jav. Rar. 148. 1840.

山豆根属 shan dou gen shu

Shrubs. Leaves alternate, imparipinnate; leaflets 3–7, opposite, estipellate. Flowers solitary along inflorescence rachis; bract persistent, small; bractlets absent. Calyx campanulate to tubular, very oblique and gibbous at back, caducous in fruit; teeth 5. Corolla much exerted; standard suberect, narrow, slightly longer than wings and keel; wings oblong, obtuse, slightly falcate, free, claw very long; keel rather like wings, scarcely cohering at apex. Stamens 10, diadelphous (9+1), vexillary free, remainder slightly connate; anthers small, versatile. Ovary stipitate, 1- or 2-ovuled; style filiform, incurved; stigma capitate, small. Legume stipitate, ovoid or ellipsoid, drupelike, indehiscent, 1-seeded. Seeds exalbuminous, without strophiole; testa white, membranous. $x = 9$.

Geographic distribution is the same as that of the tribe.

- 1a. Calyx tubular, longer than 1 cm, upper part broader, lower part narrower 4. *E. tubulosa*
1b. Calyx cup-shaped or campanulate, shorter than 1 cm.
2a. Leaflets often 3(–5); calyx cup-shaped, 2–5 mm; standard not concave at apex 1. *E. japonica*
2b. Leaflets (3–)5–7(–9); calyx obliquely campanulate, ca. 9 mm; standard retuse at apex.
3a. Leaflets to 9, elliptic-lanceolate or narrowly elliptic, tapering at apex 2. *E. formosana*
3b. Leaflets (3–)5, often obovate or broadly elliptic, apex cuspidate, abaxially appressed lanulose 3. *E. horsfieldii*

1. *Euchresta japonica* J. D. Hooker ex Regel, Gartenflora 14: 321. 1865.

山豆根 shan dou gen

Euchresta trifoliata Merrill.

Climbing shrubs, nearly not branched. Stems often with adventitious roots. Leaves 3-foliolate; petiole 4–5.5 cm, appressed pubescent, adaxially with a conspicuous groove; terminal petiolule 0.5–1.3 cm, lateral petiolule nearly absent; leaflets abaxially pale green, adaxially dark green, elliptic, 8–9.5 × 3–5 cm, thickly papery, abaxially appressed pubescent, adaxially glabrous, corrugated when dried, lateral veins very inconspicuous, base broadly cuneate, apex acuminate to obtuse. Racemes 6–10.5 cm; peduncle 3–5.5 cm; pedicel 0.5–0.7 cm, both surfaces appressed pubescent; bract fine, subulate. Calyx cup-shaped, 3–5 × 4–6 mm, outside and inside appressed pubescent; lobes bluntly triangular. Corolla white; standard elliptic-oblong, ca. 1 cm × 2–3 mm, abaxially sparsely appressed pubescent at base, apex rounded, stalk linear, slightly reflexed, ca. 2 mm; wings oblong, ca. 9 × 2–3 mm, apex obtuse, stalk linear, ca. 2.5 mm, less than 1 mm wide; keel elliptic, ca. 1 cm × 3.5 mm, with distal margins connate, base with small auricle, stalk ca. 2 mm. Ovary prolate or linear, ca. 5 mm, stipe ca. 4 mm; style ca. 3 mm. Infructescence ca. 8 cm. Legume dark, ellipsoid, 1.2–1.7 × ca. 1.1 cm, glabrous, apex obtuse, mucronulate; pedicel ca. 1 cm, with carpopodium ca. 4 cm, glabrous.

Valleys, mountain slopes, dense forests; 800–1400 m. Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Zhejiang [Japan, Korea].

2. *Euchresta formosana* (Hayata) Ohwi, J. Jap. Bot. 12: 659. 1936.

台湾山豆根 tai wan shan dou gen

Euchresta horsfieldii (Leschenault) Bennett var. *formosana* Hayata, Icon. Pl. Formosan. 3: 81. 1913.

Shrubs. Branches flexuose, very fine fulvous pubescent at apex. Leaflets (3–)5–7(–9), narrowly elliptic to elliptic-lanceolate, papery to membranous, base cuneate, apex acuminate; terminal leaflet ca. 9 × 3.5 cm, petiolule ca. 1.2 cm; lateral leaflets 6–8 × 2.5–2.8 cm, petiolule ca. 2 mm. Racemes 10–15 cm; flowers congested; peduncle brown appressed pubescent; pedicel 2–6 mm; bract lanceolate, small, ca. 2 mm. Flowers purple-white. Calyx campanulate, ca. 8 × 6–7 mm at tip, both surfaces very shortly pubescent; teeth short, blunt. Standard spatulate, ca. 1.5 cm × 5.5 mm, tapering to base, both surfaces pubescent at base, without stalk; wings suboblong, ca. 9 × 3 mm, base auriculate, stalk linear, ca. 6 mm, less than 1 mm wide, glabrous; keel oblong, ca. 8 × 4 mm, base auriculate, apex blunt, stalk linear, ca. 5.5 mm, less than 1 mm wide; filament equal to keel, outside pubescent at base. Anther short. Ovary stipitate, compressed, ca. 7 mm, glabrous. Legume glossy, dark at apex, oval, ca. 2.2 cm, carpopodium ca. 1 mm at base. Seed 1. Fl. Aug, fr. next Feb.

Taiwan [Japan (Ryukyu Islands), Philippines].

3. *Euchresta horsfieldii* (Leschenault) Bennett in Bennett & R. Brown, Pl. Jav. Rar. 148. 1840.

伏毛山豆根 fu mao shan dou gen

Andira horsfieldii Leschenault, Ann. Mus. Natl. Hist. Nat. 16: 481. 1810 ["*harsfieldii*"]; *Euchresta strigillosa* C. Y. Wu.

Shrubs, ca. 45 cm tall. Branches and branchlets glabrous, longitudinally striate. Leaves 3–5-foliolate; petiole 8–12 cm; leaflets thickly papery, abaxially densely adpressed lanuginose, adaxially glabrous, midvein slightly convex abaxially, slightly impressed adaxially, lateral veins 5 or 6 pairs, inconspicuous on both surfaces; terminal leaflet broadly elliptic or obovate-elliptic, 11–17.5 × 6–8 cm, base cuneate, apex cuspidate; petiolule ca. 1.3 cm; lateral leaflets nearly sessile, opposite, elliptic, 9–15 × 4.5–8 cm, base cuneate to suborbicular, apex cuspidate. Racemes 13–21 cm, densely adpressed hairy; peduncle ca. 10 cm; bract inconspicuous, ca. 1 mm. Calyx broadly campanulate, 5–6 × 5–6 mm, 5-lobed at tip, obliquely nearly truncate, with very fine appressed hairs. Corolla easily deciduous, nodding, milky, ca. 1.5 cm; standard rectangular, ca. 1.1 cm × 4 mm, apex obtuse and retuse, base small auriculate at both sides, conduplicate, reflexed, with stalk ca. 5 × 1 mm; wings rectangular, ca. 1 cm × 3 mm, apex obtuse, base small auriculate at both sides, upper lateral larger, stalk ca. 4 mm, less than 1 mm wide; keel obovate-oblong, apex rounded, base small auriculate on both sides, upper lateral larger, distal margins connate, ca. 1.1 cm × 4 mm, stalk to 4 mm, less than 1 mm wide. Stamen tube ca. 1.4 cm. Ovary oblong, ca. 6 mm, attenuate at base; stipe ca. 5 mm; ovule 1; style ca. 4 mm; stigma punctiform, small. Legume glossy black, ellipsoid, ca. 2 × 1.3 cm, indehiscent, stalk 6–8 mm, carpopodium ca. 1.2 cm, with 1 joint between both.

Evergreen broad-leaved forests in limestone areas; 1000–1400 m. SE Yunnan (Hekou, Maguan, Malipo), SE Xizang (Mêdog) [Bhutan, India, Indonesia, Laos, Nepal, Philippines, Thailand, Vietnam].

4. *Euchresta tubulosa* Dunn, J. Linn. Soc., Bot. 35: 492. 1903.

管萼山豆根 *guan e shan dou gen*

Shrubs. Leaves 3–7-foliolate; petiole 6–7(–10.5) cm; terminal petiolule 0.6–1(–1.5) cm, lateral petiolules 2(–5) mm; leaflets elliptic, obovate, or obovate-elliptic, terminal leaflet subequal to lateral leaflets, 8–10.5 × 3.5–4.5 cm (or terminal leaflet 13.5–14 × 9–10 cm, lateral leaflets 10.5–13 × ca. 7 cm), papery, abaxially appressed fulvous pubescent, adaxially glabrous, midvein slightly convex abaxially, flat or slightly impressed adaxially, lateral veins 5 or 6 pairs, inconspicuous, base cuneate to rounded, apex cuspidate to blunt. Racemes terminal, 8–16 cm; peduncle ca. 4 cm; pedicel ca. 4 mm, appressed fulvous pubescent. Flowers 2–2.2 cm. Calyx tubular, lower ones narrow, 4–5 mm or 9–10 mm, ca. 2 mm wide, with bursicule at base; upper ones expanded to cup-shaped, ca. 6 mm; lobes bluntly triangular, 1–1.5 mm. Standard reflexed and curved, ca. 1.5 cm, apex blunt or retuse, upper half ca. 5 mm wide, downward attenuate to stalk, base ca. 2 mm wide; wings oblong, ca. 8.5 × 3.5 mm, base truncate, without auricles, apex obtuse, claw

straight on one side and arcuate on other side, stalk ca. 7 × 1 mm; keel oblong, lower part free, upper part connate, apex obtuse, claw ca. 7 × 3 mm, with small projection at base, stalk ca. 6 mm, less than 1 mm wide. Stamen tube ca. 1.2 mm. Ovary linear, ca. 5.5 mm, stipe ca. 1.3 cm; style linear, ca. 4 mm. Legume dark brown, ellipsoid, 1.5–1.8 cm × ca. 8 mm, both ends obtuse, apex with a very short mucro; infructescence ca. 10 cm, carpopodium ca. 1.4 cm. Fl. May–Jun(–Jul), fr. Jul–Sep.

• 300–1700 m. Guangxi, NW Hubei, Hunan, Sichuan, Yunnan.

- 1a. Leaflets elliptic or obovate-elliptic, terminal leaflet subequal to lateral leaflets, 8–10.5 × 3.5–4.5 cm; inflorescence ca. 8 cm 4a. var. *tubulosa*
- 1b. Leaflets obovate or elliptic, terminal leaflet larger than lateral leaflets; inflorescence 14–16 cm.
 - 2a. Leaflets obovate; calyx tube longer below, 9–10 mm 4b. var. *longiracemosa*
 - 2b. Leaflets elliptic; calyx tube shorter below, 4–5 mm 4c. var. *brevituba*

4a. *Euchresta tubulosa* var. *tubulosa*

管萼山豆根(原变种) *guan e shan dou gen* (*yuan bian zhong*)

Leaflets elliptic or obovate-elliptic, terminal leaflet subequal to lateral leaflets, 8–10.5 × 3.5–4.5 cm. Inflorescence ca. 8 cm.

• 300–1700 m. NW Hubei, Hunan, Sichuan.

4b. *Euchresta tubulosa* var. *longiracemosa* (S. Lee & H. Q. Wen) C. Chen, Acta Phytotax. Sin. 30: 50. 1992.

长序山豆根 *chang xu shan dou gen*

Euchresta longiracemosa S. Lee & H. Q. Wen, Guihaia 4: 139. 1984.

Leaves 3–5-foliolate; petiole 7–10.5 cm; leaflets obovate, apex shortly cuspidate; terminal leaflet 13.5–14 × 9–10 cm, petiolule 1–1.5 cm; lateral leaflets 10.5–13 × ca. 7 cm, base cuneate to broadly so, petiolule 3–5 mm. Racemes 14–16 cm. Calyx tube longer below, 9–10 mm. Fl. Apr–Jun.

• Forests on limestone mountain slopes; ca. 1200 m. Guangxi.

4c. *Euchresta tubulosa* var. *brevituba* C. Chen, Acta Phytotax. Sin. 30: 50. 1992.

短萼山豆根 *duan e shan dou gen*

Leaflets elliptic. Inflorescence ca. 14.5 cm. Calyx tube shorter below, 4–5 mm. Fl. Jun.

• 700–800 m. Yunnan (Mengla).

10. Tribe THERMOPSIDEAE

野决明族 ye jue ming zu

Wei Zhi (韦直); J. Michael Lock

Shrubs or perennial herbs, latter often with a woody rootstock. Leaves usually 3-foliolate, rarely 1-foliolate; stipulate; stipels absent. Flowers in terminal racemes, strongly papilionaceous. Calyx imbricate in bud. Petals 5. Stamens (9 or)10, free (occasionally 2 or 3 fused to near apex); anthers all similar. Ovary 1- to many ovuled; upper part of style usually glabrous and upturned. Legumes elongated, flattened or globose. Seeds oblong-reniform, ellipsoid to discoid; hilum small.

Six genera and 40–50 species: scattered throughout temperate areas of North America, the Mediterranean basin, and C and NE Asia; three genera and 15 species (five endemic) in China.

This tribe, with the exception of the North American *Pickeringia*, appears to be monophyletic, and it lies closest to Euchrestea and to a Podalyriae-Crotalariae-Genisteae clade (see discussion in Lewis et al., Legumes World, 263. 2005).

- 1a. Aerial portions of plant herbaceous, dying back to rootstock in winter 49. *Thermopsis*
1b. Aerial portions of plant woody, persistent.
2a. Stipules small, subulate, not united; bracteoles 2, positioned just below calyx 47. *Ammopiptanthus*
2b. Stipules prominent, united, soon falling, leaving a prominent scar; bracteoles absent 48. *Piptanthus*

47. AMMOPIPTANTHUS S. H. Cheng, Bot. Zhurn. (Moscow & Leningrad) 44: 1381. 1959.

沙冬青属 sha dong qing shu

Evergreen shrubs. Leaves digitately 1- or 3-foliolate; stipules subulate, mostly adnate to petiole; leaflets entire, silvery tomentose. Flowers in short racemes terminating branchlets; bracts small, deciduous. Calyx campanulate, 5-toothed, subglabrous. Corolla yellow; petals subequal, clawed. Stamens 10; filaments free; anthers uniform. Ovary stipitate, with several ovules; style glabrous. Legume linear to oblong, flat, dehiscent. Seeds reniform, compressed, strophiolate.

One species: China, Kazakhstan, Kyrgyzstan, Mongolia.

1. *Ammopiptanthus mongolicus* (Maximowicz ex Komarov) S. H. Cheng, Bot. Zhurn. (Moscow & Leningrad) 44: 1381. 1959.

沙冬青 sha dong qing

Piptanthus mongolicus Maximowicz ex Komarov, Trudy Glavn. Bot. Sada 34: 33. 1920; *Ammopiptanthus nanus* (Popov) S. H. Cheng; *P. nanus* Popov.

Evergreen shrubs, 1.5–2 m tall; bark yellowish brown. Stems terete, weakly ridged, gray puberulent at first, glabrescent. Leaves 1- or 3-foliolate; stipules small, triangular, adnate to petiole, silvery tomentose; petiole 4–15 mm; leaflets rhombic-elliptic or broadly elliptic to broadly ovate, 1.5–4 × 0.6–2.4 cm, densely silvery tomentose on both surfaces, lateral veins inconspicuous, base broadly cuneate to rounded, apex obtuse,

often mucronate. Flowers 4–15, in short dense terminal racemes; bracts ovate, 5–6 mm, deciduous; pedicels ca. 1 cm, subglabrous, with 2 bracteoles at midpoint. Calyx 5–7 mm. Corolla yellow, ca. 2 cm, petals long clawed. Ovary stipitate, glabrous. Legume linear-oblong, 3–8 × 1–2 cm, flat, apex acute to obtuse; stipe 8–10 mm. Seeds 2–5, orbicular-reniform, ca. 6 mm in diam. Fl. Apr–Jun, fr. May–Aug.

Sand dunes, gravel slopes, terraces beside ravines. Gansu, Nei Mongol, Ningxia, W Xinjiang (Kashi) [Kazakhstan, Kyrgyzstan, S Mongolia].

Two species have been recognized, but the differences between them are of degree only and do not appear to merit recognition of more than one rather variable species. Many species of arid areas vary considerably in their morphology according to water availability, grazing, and season, and this species appears to be no exception.

48. PIPTANTHUS Sweet, Brit. Fl. Gard. 3: t. 264. 1828.

黄花木属 huang hua mu shu

Shrubs, 1–4 m tall. Leaves digitately 3-foliolate, entire; stipules large, opposite to petiole, basal 2/3 fused and surrounding stem, leaving a prominent scar when fallen, free apical portion acute. Racemes terminal, with 2 or 3 flowers at nodes, in whorls; bracts stipulelike, connected at base into a sheath, deciduous; bracteoles absent. Calyx 5-toothed, proximal 2 lobes mainly fused with a bifid tip, falling after flowering at articulation surrounding perigynous line. Corolla yellow, petals subequal. Stamens free; anthers uniform. Ovary stipitate; ovules 2–10. Legume broadly linear, stipitate, thinly leathery, compressed, continuous inside. Seeds reniform, with a minute strophiole.

Two species: Bhutan, China, India, Kashmir, Nepal; two species (one endemic) in China.

- 1a. Keel equaling or slightly longer than standard; stems and calyces white woolly; leaflets yellow silky abaxially when young, then glabrescent; legume glabrous 1. *P. nepalensis*

- 1b. Keel slightly shorter than standard; leaflets densely tomentose abaxially, even when mature; legume rusty tomentose 2. *P. tomentosus*

1. *Piptanthus nepalensis* (Hooker) Sweet, Brit. Fl. Gard. 3: t. 264. 1828.

黄花木 huang hua mu

Baptisia nepalensis Hooker, Exot. Fl. 2: 131. 1824; *Piptanthus bicolor* Craib; *P. bombycinus* C. Marquand; *P. concolor* Harrow ex Craib; *P. concolor* subsp. *harrowii* Stapf; *P. concolor* subsp. *yunnanensis* Stapf; *P. forrestii* Craib; *P. laburnifolius* (D. Don) Stapf; *P. laburnifolius* f. *nepalensis* Stapf; *P. laburnifolius* f. *sikkimensis* Stapf; *P. leiocarpus* Stapf; *P. leiocarpus* var. *sericopetalus* P. C. Li; *P. nepalensis* f. *leiocarpus* (Stapf) S. Q. Wei; *P. nepalensis* var. *leiocarpus* (Stapf) X. Y. Zhu; *P. nepalensis* f. *sericopetalus* (P. C. Li) S. Q. Wei; *P. nepalensis* var. *sericopetalus* (P. C. Li) X. Y. Zhu; *Thermopsis laburnifolia* D. Don.

Shrubs, 1.5–3 m tall. Stems terete, ridged, white woolly to appressed pubescent, glabrescent. Stipules lanceolate to ovate, 7–14 mm; petiole 1–3 cm, with a wide groove adaxially; leaflets elliptic, oblong-elliptic, or linear-ovate, 4–14 × 1.5–4 cm, flat on both surfaces, papery, dark green, yellow silky and white appressed pubescent abaxially, gradually glabrescent, becoming glaucous, glabrous or sparsely hairy along midrib adaxially, lateral veins 6–8 pairs, base cuneate, margins sometimes ciliate, apex acute or acuminate. Racemes terminal, 5–8 cm, with flowers in 2–7 whorls, axis densely white woolly, elongating at anthesis; bracts broadly ovate to obovate, 7–12 mm, acute; pedicels 1.5–2.5 cm. Calyx campanulate, 1–1.6 cm, white woolly. Corolla bright yellow, 1.8–2.6 cm; standard orbicular to broadly cordate, with 4–6 mm claw; wings shorter; keel equal to or slightly longer than standard, to 2.2 cm. Ovary stipitate, densely sericeous to almost glabrous, 4–10-ovuled. Legume broadly linear, flat, 7–15 × 0.9–1.5 cm, stipitate, apex sharply pointed; valves membranous, reticulate, glabrous to very sparsely pubescent. Seed brown, reniform, 4–5 × 3–3.5 mm, compressed. Fl. Apr–Jul, fr. Jun–Sep.

Coniferous forests, woodland margins, thickets, meadows; 1600–4000 m. Gansu, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Nepal].

This is a very variable species, and several taxa have been distinguished on the basis of variation in the indumentum of the ovary, legume, and leaves. Turner (Brittonia 32: 281–285. 1980) revised the genus and concluded that variation in these characters was continuous and that only two taxa should be recognized, and we agree. Even *Piptanthus tomentosus* could be considered to be a very hairy higher-elevation ecotype, but it is here retained as distinct.

2. *Piptanthus tomentosus* Franchet, Rev. Hort. [Paris] 59: 474. 1887.

绒叶黄花木 rong ye huang hua mu

Shrubs, 1–3 m tall; bark dark brown. Stems terete, ridged, young branchlets tomentose, glabrescent. Stipules broadly ovate, 5–15 mm, tomentose; petiole 1–2 cm, furrowed adaxially; leaflets ovate-elliptic or lanceolate to obovate-lanceolate, 2.5–8 × 1–3 cm, rusty and gray mixed tomentose-sericeous abaxially, densely white silky at first adaxially, indumentum thinning with age but never completely absent, base cuneate, apex acute or obtuse. Racemes terminal, elongated, 5–15 cm; internodes 1.5–2 cm, usually 3-whorled; bracts broadly ovate, 1–1.5 cm, acute; pedicels ca. 1.5 cm. Calyx 1–1.2 cm, rusty tomentose. Corolla lemon-yellow, 1.8–2.2 cm; standard orbicular or broadly cordate, with ca. 6 mm claw; wings short; keel slightly shorter than standard. Ovary densely rusty tomentose, with ca. 5 mm stipe; ovules 4–8. Legume linear, 45–90 × 9–10 mm, compressed, rusty tomentose, apex acute. Seeds 2–6, brown, reniform, 5–6 × 4–5 mm. Fl. Apr–Jul, fr. Aug–Sep.

• Thickets by woodlands, meadows on slopes; 3000–3800 m. SW Sichuan, W Yunnan.

49. THERMOPSIS R. Brown in W. T. Aiton, Hort. Kew., ed. 2, 3: 3. 1811.

野决明属 ye jue ming shu

Perennial herbs. Rhizome creeping, producing annual erect stems, basal stipules joined to form a sheath, thin and scarious, 3-fid. Leaves digitately 3-foliolate, pedicellate; stipules large, leaflike, free. Racemes leaf-opposed or terminal; bracts connate with lateral stipules, becoming 3(or 6)-fid, persistent; bracteoles absent. Calyx campanulate, or gibbous and baglike on proximal side, 5-toothed. Corolla yellow, rarely purple, petals clawed. Stamens 10, free. Ovules 4–22. Legume linear-oblong or ovate, straight or curved, leathery. Seed reniform or orbicular; hilum small, white.

About 25 species: C and E Asia and North America; 12 species (four endemic) in China.

The genus in China appears to be divisible into three groups. *Thermopsis lupinoides* and *T. chinensis* are upright plants with terminal inflorescences, apparently from a single rootstock. *Thermopsis lanceolata* is an upright plant with terminal inflorescences; there are numerous aerial shoots arising from a spreading rhizome. *Thermopsis barbata*, *T. inflata*, *T. smithiana*, and *T. alpina* are all precociously flowering species, in which the inflorescences arise early from the rootstock, before the main leafy shoots appear. Then, basal buds on the flowering shoot, below the inflorescence, develop into long leafy shoots completely different in appearance from the precociously flowering material.

- 1a. Flowers alternate; petioles subequal to stipules; stems more than 50 cm.
 2a. Leaflets 3.5–8 cm; stipules broadly ovate, obtuse or mucronate; legume inclined extrorsely, valves papery, sparsely villous 1. *T. lupinoides*
 2b. Leaflets 2–4.5 cm; stipules lanceolate, acuminate; legumes appressed to stem, valves thinly woody, appressed hirsute 2. *T. chinensis*

- 1b. Flowers opposite or verticillate; petioles shorter than stipules; stems less than 30 cm.
- 3a. Calyx not gibbous, base tapering, distal tooth ca. $2 \times$ length of tube; corolla yellow or purple.
- 4a. Corolla purple 11. *T. barbata*
- 4b. Corolla yellow 12. *T. gyirongensis*
- 3b. Calyx gibbous proximally, distal tooth subequal to tube; corolla yellow.
- 5a. Legume elliptic or narrowly elliptic, inflated; leaflets obovate or broadly obovate; plant usually 7–15(–18) cm.
- 6a. Legume stipitate, equal to calyx tube, beak exerted from dorsal suture, downcurved; ovules 12–17; seeds reniform; wings narrower than keel; leaflets broadly obovate, apex acute, both sides asymmetric 9. *T. inflata*
- 6b. Legume without stipe, base tapering, apex rounded, mucronate; ovules 3–5; seeds ellipsoid; wings ca. as broad as keel; leaflets obovate to narrowly elliptic, apex rounded 10. *T. smithiana*
- 5b. Legume linear to oblong, compressed; leaflets oblanceolate, oblong, to ovate; plant usually 15–30 cm.
- 7a. Leaflets narrowly elliptic or linear, length more than $5 \times$ width; wings much narrower than keel.
- 8a. Leaflets glabrous adaxially, appressed pubescent abaxially; legume flat, 8–13 mm wide, seeds close to dorsal suture 5. *T. turkestanica*
- 8b. Leaflets appressed pubescent adaxially, rather densely so abaxially; legume 7–9(–11) mm wide, seeds prominent in legume, at central line of valve 8. *T. mongolica*
- 7b. Leaflets oblanceolate to ovate, length less than $4.5 \times$ width; wings as wide as keel or slightly narrower.
- 9a. Leaflets plane, $1.5\text{--}2.5 \times$ as long as broad; wings and keel subequal in width; ovules 4–8; legume flat 3. *T. alpina*
- 9b. Leaflets involute along margins, $2.5\text{--}4.5 \times$ as long as broad; wings slightly narrower than keel; ovules 10–20; legume prominent with seeds.
- 10a. Leaflets to 7.5 cm; legumes with straight sutures 4. *T. lanceolata*
- 10b. Leaflets less than 4 cm; legume contracted between seeds.
- 11a. Plant appressed puberulent or tomentose; leaflets narrowly obovate, rounded at apex; seeds dark green 6. *T. przewalskii*
- 11b. Plant villous; leaflets narrowly oblong, apex acute; seeds black 7. *T. yushuensis*

1. *Thermopsis lupinoides* (Linnaeus) Link, Enum. Hort. Berol. Alt. 1: 401. 1821.

野决明 *ye jue ming*

Sophora lupinoides Linnaeus, Sp. Pl. 1: 374. 1753; *Podalyria lupinoides* (Linnaeus) Willdenow; *S. fabacea* Pallas; *Thermopsis fabacea* (Pallas) Candolle.

Perennial herbs, 50–80 cm tall. Stems erect, vertically ridged, apical part white puberulent, basal part glabrescent. Stipules elliptic or ovate, $2\text{--}5 \times 1.5\text{--}3$ cm, equaling petiole; leaflets broadly elliptic, $3.5\text{--}8 \times (2\text{--})2.5\text{--}3.5(4.7)$ cm, base cuneate, apex obtuse or acute, terminal one rather longer, broadly lanceolate, white pubescent abaxially, glabrous adaxially. Racemes terminal, 5–18(–25) cm, densely pubescent; flowers alternate, numerous and scattered; bracts lanceolate, 8–15 mm; pedicels 5–10 mm. Calyx ca. 10 mm, densely appressed pubescent. Corolla 2–2.5 cm, petals subequal. Ovary densely silky; ovules 10–14. Legume linear, $3\text{--}9(12) \times 0.5\text{--}0.8$ cm, straight and tapering upward, spreading, sparsely brown hairy. Seed dark brown, reniform, compressed, $3\text{--}4 \times 2\text{--}3$ mm. Fl. May–Aug.

Sandy beaches and flood lands of ravines or marine areas. Heilongjiang, Jilin [Japan, Korea, Russia (Kamchatka, Sakhalin)].

The name *Sophora lupinoides*, applied in this sense, was proposed for conservation with a conserved type by Zhu and Kirkbride (Taxon 55: 1047–1049. 2006).

2. *Thermopsis chinensis* Bentham ex S. Moore, J. Bot. 16: 131. 1878.

霍州油菜 *huo zhou you cai*

Perennial herbs, ca. 50 cm tall. Stems erect, ridged, spreading villous when young, glabrescent, branched, branchlets ascending. Stipules on main stem linear-ovate, longer than petiole, on branches lanceolate, shorter than petiole; leaflets obovate or narrowly obovate, $2\text{--}4.5 \times 0.8\text{--}2$ cm, sparsely villous abaxially, glabrous adaxially, base cuneate, apex rounded, mucronate. Racemes 10–30 cm; flowers alternate; bracts ovate, 1.2–1.9 cm. Calyx 8–13 mm, sparsely puberulent. Corolla yellow, 2.4–2.8 cm, petals long clawed. Ovary densely silky; ovules 16–22. Legume linear-lanceolate, $5\text{--}7 \times 0.7\text{--}0.8$ cm, held almost erect and close to stem, thinly woody, beaked, sparsely appressed yellowish hirsute. Seeds 15–20, reddish brown, reniform, ca. 2.5×2 mm, densely glandular. Fl. Apr–May, fr. Jun–Jul.

Stream banks, wastelands, roadsides. Anhui, Fujian, Hebei, Hubei, Jiangsu, Shaanxi, Zhejiang [Japan].

3. *Thermopsis alpina* (Pallas) Ledebour, Fl. Altaic. 2: 112. 1830.

高山野决明 *gao shan ye jue ming*

Sophora alpina Pallas, Sp. Astragal. 121. 1803; *Thermopsis alpestris* Czefranova; *T. alpina* var. *licentiana* (E. Peter) Z. X. Peng & Y. M. Yuan; *T. alpina* var. *yunnanensis* Franchet; *T. licentiana* E. Peter; *T. yunnanensis* (Franchet) P. C. Li.

Perennial herbs, 12–30 cm tall, from a substantial woody rootstock. Stems erect, simple or few branched, white spreading villous at least on nodes. Stipules ovate or broadly lanceolate, 2–3.5 cm, base cuneate or rounded, apex acute; leaflets linear-obovate to ovate, $2\text{--}5.5 \times 0.8\text{--}2.5$ cm, usually densely villous

abaxially, glabrous or villous along midrib and margins adaxially, apex acute. Racemes terminal, 5–15 cm; flowers 2 or 3 verticillate in 2 or 3 whorls; bracts 10–18 mm, villous. Calyx 10–17 mm, slightly gibbous. Corolla yellow, 2–2.8 cm, petals long clawed. Ovary 4–8-ovuled; stipe 2–5 mm. Legume clear shiny brown, ovate-oblong, 2–5(–6) × 1–2 cm, flat, usually curved downward, sparsely white villous, long cuspidate. Seeds 3 or 4, prominent, brown, reniform, 5–6 × 3–4 mm, compressed; hilum gray. Fl. May–Jul, fr. Jul–Aug.

Sandy river beaches, alpine tundra, gravel deserts; 2400–4800 m. SW Gansu, Hebei, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Kazakhstan, Mongolia, Russia].

4. *Thermopsis lanceolata* R. Brown in W. T. Aiton, Hort. Kew., ed. 2, 3: 3. 1811.

披针叶野决明 pi zhen ye ye jue ming

Thermopsis dahurica Czefranova; *T. glabra* Czefranova; *T. lanceolata* subsp. *glabra* (Czefranova) Kurbatski; *T. lanceolata* var. *glabra* (Czefranova) Yakovlev; *T. lanceolata* subsp. *sibirica* (Czefranova) Kurbatski; *T. orientalis* Czefranova; *T. sibirica* Czefranova.

Perennial herbs. Stems erect, 12–40 cm, ridged, creamy pubescent. Stipules ovate-lanceolate, 1.5–3 cm, acuminate; petiole 3–8 mm; leaflets linear-oblong or oblanceolate to linear, 2.5–7.5 × 0.5–1.6 cm, appressed puberulent abaxially, glabrous adaxially. Racemes terminal, 6–17 cm; flowers 2 or 3 verticillate in 2–6 whorls; bracts 8–20 mm, persistent. Calyx 1.5–2.2 cm, gibbous, densely hairy. Corolla yellow, 2.5–2.8 cm, petals with long claw. Ovary densely hairy, with 2–3 mm stipe; ovules 12–20. Legume brown, linear, 5–9 × 0.7–1.2 cm, puberulent, beaked. Seeds 6–14, at central line of valve, black with grayish waxy coating, reniform, 3–5 × 2.5–3.5 mm, smooth. Fl. May–Jul, fr. Jun–Oct.

Grasslands, ravines, waste fields. Gansu, ?Hebei, Nei Mongol, Shaanxi, Shanxi, Xinjiang, Xizang [Kyrgyzstan, Mongolia, Russia].

The name *Thermopsis lanceolata*, applied in this sense, was proposed for conservation with a conserved type by Zhu and Kirkbride (Taxon 55: 1047–1049. 2006). Conservation as proposed was recommended (see Brummitt, Taxon 58: 282–283. 2009).

5. *Thermopsis turkestanica* Gandoger, Bull. Soc. Bot. France 60: 462. 1913.

新疆野决明 xin jiang ye ye jue ming

Thermopsis kaxgarica Chang Y. Yang; *T. lanceolata* R. Brown subsp. *turkestanica* (Gandoger) Gubanov; *T. lanceolata* var. *turkestanica* (Gandoger) Gubanov.

Perennial herbs, 30–50 cm tall. Stems erect, ridged, branched, appressed puberulent toward apex, glabrescent toward base. Stipules lanceolate, 1.8–3.2(–4) cm; petiole short or sessile; leaflets narrowly lanceolate, (2–)3.5–8 × 0.5–1 cm, tapering at both ends, densely puberulent abaxially, glabrous adaxially. Racemes terminal, 4.5–15(–20) cm; flowers in 5 or 6 whorls; bracts lanceolate. Calyx 15–20 mm, slightly gibbous. Corolla yellow, 2.3–2.5(–2.8) cm, petals long clawed. Ovary with 2–5 mm stipe; ovules 12–18. Legume linear, 4.5–7 × 0.8–1.3 cm, flat, densely white pubescent, cuspidate, undulate along

ventral suture. Seeds close to dorsal suture, prominent, dark green, opaque, ellipsoid, 3.5–4.5 × 3–3.5 mm; hilum gray. Fl. May–Jul, fr. Jul–Aug.

Slopes, sandy river beaches; 1200–1800 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Mongolia (Altai), Russia (Siberia), Tajikistan, Turkmenistan, Uzbekistan].

The illustration in FRPS (42(2): 404, t. 104: 1–7. 1998) suggests that this is probably a synonym of *Thermopsis lanceolata*.

6. *Thermopsis przewalskii* Czefranova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 210. 1954.

青海野决明 qing hai ye ye jue ming

Thermopsis kuenlunica Czefranova; *T. ladyginii* Czefranov; *T. tibetica* Czefranov.

Perennial herbs, 10–18(–35) cm tall. Stems erect, branched, ridged, densely pale yellow appressed pubescent or tomentose. Stipules lanceolate, 1.7–2.4(–3.2) cm; petiole 3–7 mm; leaflets narrowly obovate, 1.7–3.8(–4.2) × 0.7–1.2 cm, 2.5–3 × as long as broad, appressed pubescent abaxially, glabrous adaxially, base cuneate, apex rounded. Racemes terminal, lax, 5–11(–20) cm, basal racemes shorter; flowers in 3–6 whorls; bracts ovate, acute, 1.5–2.2 cm. Calyx 1.8–2.1 mm. Corolla yellow, 2.2–2.7 cm. Ovary 10–18-ovuled, densely hairy; stipe 4–8 mm. Legume straight, linear, 3.5–5 × 0.8–1.5 cm, abruptly contracted into long beak, thinly tomentose, spreading, contracted between seeds. Seeds 6–12, prominent, dark green, orbicular or suborbicular, 3.5–4.5 × 3–4 mm; hilum gray. Fl. May–Jul.

• Thickets or grasslands by ravines, valleys, and lakes, often with *Thermopsis alpina*; 1500–2000(–4600) m. Gansu, Nei Mongol, Qinghai, Shaanxi, Xizang.

This is probably a synonym of *Thermopsis alpina*.

7. *Thermopsis yushuensis* S. Q. Wei, Bull. Bot. Res., Harbin 4(2): 136. 1984.

玉树野决明 yu shu ye ye jue ming

Perennial herbs, 5–12 cm tall. Stems erect, branched, ridged, densely pale yellow villous. Stipules narrowly ovate, 7–12 mm, acute; petiole 3–4 mm; leaflets narrowly oblong, 14–20 × 3–5 mm, densely pale yellow-villous abaxially, especially dense on midrib and margins, glabrous adaxially, base cuneate, apex acute. Racemes lax, terminal, 4–5 cm; flowers in 2–4 whorls; bracts persistent, ovate, 10–12 mm, acute. Calyx 10–13 mm, gibbous. Corolla yellow, 2–2.4 cm, petals subequal. Ovary white villous; stipe ca. 3 mm; ovules 14–16. Legume linear, slightly curved, 5–6.2 × 0.7–0.9 cm, ascending, acute with long beak, undulate along ventral suture. Seeds close to dorsal suture, prominent, black, suborbicular, 4–4.5 × 3–3.5 mm; hilum white.

• Riverbanks, ravine beaches; ca. 4200 m. Qinghai.

This is probably a synonym of *Thermopsis lanceolata*.

8. *Thermopsis mongolica* Czefranova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 213. 1954.

蒙古野决明 meng gu ye ye jue ming

Thermopsis grubovii Czefranová; *T. hirsutissima* Czefranová; *T. junatovii* Czefranová; *T. lanceolata* R. Brown var. *mongolica* (Czefranová) Q. R. Wang & X. Y. Zhu; *T. mongolica* subsp. *schischkinii* (Czefranová) Yakovlev; *T. saurensis* Chang Y. Yang; *T. schischkinii* Czefranová.

Perennial herbs, 20–30(–40) cm tall. Stems erect, solitary or branched, ridged, white pubescent. Leaflets linear-lanceolate to linear, 3–7 × 0.6–2.2 cm, densely white appressed pubescent on both surfaces, especially dense and also with long hairs abaxially, base cuneate, apex acute. Racemes lax, terminal, 5–18 cm; bracts narrowly ovate, 1.2–2(–3) cm, densely silky, acuminate. Calyx 1.4–2 cm, slightly gibbous. Corolla yellow. Ovary densely silky, shortly stipitate; ovules 9–14. Legume linear, straight or slightly curved, 4–8 × 0.7–1 cm, white pubescent, spreading horizontally at right angles to axis, acute. Seeds 5–12, at central line of valve, prominent, dark brown, reniform, 3.5–4.5 × 3–3.5 mm, spotted; hilum white. Fl. Jun–Jul, fr. Aug–Sep.

Prairies, gravel deserts, saline beaches. Gansu, Nei Mongol, N Xinjiang [Kazakhstan, Mongolia, Russia (W Siberia)].

This is probably a synonym of *Thermopsis lanceolata*.

9. *Thermopsis inflata* Cambessèdes in Jacquemont, Voy. Inde 4(Bot.): 35. 1835–1844.

轮生叶野决明 lun sheng ye ye jue ming

Perennial herbs, 10–20 cm tall. Stems erect, branched, white. Stipules broadly obovate, acute, 1.5–2.5 cm; petiole 1–3 mm, or leaves sessile; leaflets obovate, 1–2.5 × to 1.6 cm, white spreading villous abaxially, especially when young, glabrous adaxially, base cuneate, asymmetric, apex acute. Racemes lax, 3–10 cm; bracts 1–1.5 cm; peduncle 5–7 mm. Calyx 1.6–2.0 mm, slightly gibbous, white villous. Corolla yellow, ca. 2.5 cm, petals subequal. Ovary 12–17-ovuled, linear, with 5–10 mm stipe. Legume pale brown, broadly ovate, 3–5 × 1.8–3 cm, inflated, curved downward, white villous, base with stipe equal to calyx, apex rounded, with a long beak exerted from dorsal suture. Seeds numerous, black, reniform, 6–7 × 4–5 mm, smooth. Fl. Jun–Jul, fr. Jul–Aug.

Gravelly meadows by lakes or streams, slopes, alpine rocky cliffs; 4500–5000 m. S Xinjiang, Xizang [Bhutan, NE India, Kashmir, Nepal, Pakistan].

10. *Thermopsis smithiana* E. Peter, Acta Horti Gothob. 13: 412. 1940.

矮生野决明 ai sheng ye ye jue ming

Thermopsis alpina (Pallas) Ledebour var. *humilis* Czefranová.

Perennial herbs, 7–12(–15) cm tall. Stems erect, 2–4-branched, quadrangular, white villous, base articulate; leaves at base 3 verticillate and connate into a tawny membranous sheath. Stipules 10–16 mm; leaflets obovate to narrowly elliptic, 1.5–2 × 0.5–0.7 cm, white villous abaxially, glabrous adaxially, base

tapering, apex obtuse, rarely mucronate. Racemes short, 3–5 cm; flowers 3 verticillate; bracts broadly ovate, acute. Calyx ca. 1.5 cm, slightly gibbous. Corolla bright yellow, ca. 2 cm, petals long clawed. Ovary subsessile, 3–5-ovuled, densely hairy. Legume elliptic, oblong, or obovate, 3–6 × 1.5–2.5 cm, base tapering, apex obtuse, shortly beaked; valves membranous, tawny when dry, white villous. Seeds 1–4, dark scarlet, ellipsoid, 6–7 × ca. 5 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Mountain slopes; 3500–4500 m. W Sichuan, Xizang, NW Yunnan.

11. *Thermopsis barbata* Benth in Royle, Ill. Bot. Himal. Mts. 196. 1835.

紫花野决明 zi hua ye jue ming

Thermopsis atrata Czefranová.

Perennial herbs, 8–30 cm tall, densely white or brown villous, with silky sheen, sparsely so in fruit. Stems erect, branched, ridged; leaves at base 4–7 verticillate and connate into a sheath. Stipules leafy; leaflets oblong or lanceolate to oblanceolate, 1–2(–3) × 0.3–0.5(–1) cm, lateral leaflets unequal, densely white villous on both surfaces, base tapering to narrowly winged petiole, apex acute. Racemes lax, 4–19 cm; bracts ovate, 1–1.5 cm, base connate into a sheath. Calyx 1.4–2(–2.3) cm. Corolla deep purple, sometimes becoming blue when dry, 2.4–2.8 cm, petals subequal. Ovary 4–13-ovuled, with 4–8 mm stipe, villous. Legume brown, narrowly elliptic, acute, 2–4.5 × 1–1.8 cm. Seed yellowish brown, reniform, 7–8 × 4–5 mm, convex; hilum white. Fl. Jun–Jul, fr. Aug–Sep.

Valleys, slopes; 2700–4500 m. Qinghai, W Sichuan, Xinjiang (Tian Shan), Xizang, SW Yunnan [India, Kashmir, Nepal, Pakistan].

12. *Thermopsis gyirongensis* S. Q. Wei, Bull. Bot. Res., Harbin 4(2): 138. 1984.

吉隆野决明 ji long ye jue ming

Thermopsis barbata Benth f. *chrysantha* P. C. Li; *T. barbata* var. *gyirongensis* (S. Q. Wei) Z. X. Peng & Y. M. Yuan.

Perennial herbs, 20–30 cm tall. Stems branched from woody articulate base; leaves at base 4–9 verticillate and connate into sheath, densely tawny villous. Leaflets oblong-lanceolate, 2–3 × 0.4–0.8 cm, lateral leaflets unequal, tawny villous abaxially, especially on margins, glabrous adaxially, base tapering to narrowly winged petiole, apex acute. Racemes lax, 8–10 cm; flowers in 2 or 3 whorls; bracts lanceolate, 1.2–2 cm, 3–6 connate from base. Calyx 1.5–1.7 cm. Corolla yellow, 2.6–2.8 cm, never becoming blue; keel obviously longer than standard. Ovary with 5–6 mm stipe; ovules 4 or 5. Mature legume not seen. Fl. Jun.

• Alpine meadows; ca. 3400 m. S Xizang (Gyirong).

The illustration in FRPS (42(2): 410, t. 106: 10–17. 1998) suggests that this is probably a synonym of *Thermopsis alpina*.

11. Tribe CROTALARIEAE

猪屎豆族 zhu shi dou zu

Li Jianqiang (李建强), Sun Hang (孙航), Wei Zhi (韦直); Roger M. Polhill, Michael G. Gilbert

Shrubs or herbs. Leaves generally digitately 3(–7)-foliolate, sometimes 1-foliolate or simple, usually pulvinate; stipels absent. Inflorescences terminal, ± leaf-opposed, or less often axillary, racemes or heads, sometimes flowers solitary or aggregated into leafy pseudoracemes. Calyx generally with 5 subequal lobes. Corolla papilionaceous; standard sometimes with basal calluslike appendages. Stamens all connate into a sheath split above; anthers generally dimorphic, alternately basifixed and dorsifixed. Ovary 2- to many ovuled; style bearded lengthwise or minutely ciliate on adaxial side. Legumes usually turgid or inflated, rarely compressed, 2-valved, continuous within. Seeds estrophiolate.

Eleven genera and slightly more than 1,200 species: most diverse in S Africa where all but one N African genus occur, two genera extending east to China and one pantropical (*Crotalaria*); three genera (one introduced) and 44 species (nine endemic, seven introduced) in China.

- 1a. Stamens all similar; legume compressed, narrowly oblong, 3.5–5.5 × ca. 0.2 cm 52. *Rothia*
- 1b. Stamens dimorphic, 5 shorter with oblong basifixed anthers alternating with 5 longer with ovoid dorsifixed anthers; legume usually conspicuously inflated, or if not then less than 1.5 cm and/or more than 0.4 cm wide.
 - 2a. Calyx lobes distinct or sometimes 2 adaxial ones connate; legume usually conspicuously inflated (but flat in *C. psoraleoides*) 50. *Crotalaria*
 - 2b. Calyx with 4 adaxial lobes connate in pairs; legume only slightly inflated 51. *Lotononis*

50. CROTALARIA Linnaeus, Sp. Pl. 2: 714. 1753, nom. cons.

猪屎豆属 zhu shi dou shu

Li Jianqiang (李建强), Sun Hang (孙航); Roger M. Polhill, Michael G. Gilbert

Goniogyna Candolle; *Heylandia* Candolle; *Priotropis* Wight & Arnott.

Herbs or shrubs, often short-lived, rarely small trees. Stems terete or angled. Stipules filiform to leaflike or lacking. Leaves simple or 3-foliolate, usually petiolate. Inflorescences terminal, leaf-opposed, or occasionally axillary, racemose, occasionally condensed and headlike; bracts usually present. Flowers usually pedicellate; bracteoles 2, rarely lacking. Calyx subcampanulate, with 5 subequal lobes or 2-lipped with 3 narrow abaxial lobes and 2 broader adaxial lobes often connate or partly connate. Corolla usually yellow, less often white, purplish red, or dark purplish blue; standard usually orbicular or oblong, outside glabrous or with trichomes, basally almost always with 2 appendages inside; wings oblong or narrowly elliptic; keel rounded to angled, generally extended into a well-developed beak. Stamens monadelphous, dimorphic, 5 usually shorter with oblong and basifixed anthers alternating with 5 longer with ovoid and dorsifixed anthers. Ovary stipitate or sessile, with or without trichomes, with 2 to many ovules; style long, basally curved or geniculate, almost always with 1 or 2 lines of trichomes on apical part; stigma minute, oblique, rarely 2-lobed. Legume subsessile to long stipitate, oblong, cylindric, ovoid-globose, or rarely rhombic, usually conspicuously inflated, rarely compressed, 2- to many seeded, with or without a stipe. Seeds obliquely cordate to oblong-reniform, with a definite hilar sinus.

About 700 species: throughout tropics and extending into subtropics, most numerous in E and S tropical Africa; 42 species (nine endemic, six introduced) in China.

The indumentum of many species of *Crotalaria* darkens significantly in herbarium collections and is often variously described as yellow or brown, but in living material it may often be ± colorless rather than as indicated in many descriptions.

Some species of *Crotalaria* are grown as fiber crops, fodder, and green manure, while others are used medicinally and as ornamentals. Pyrrolizidine alkaloids are present in some species, which in livestock can cause acute or more often chronic poisoning known as “crotalism.”

- 1a. Leaves 3-foliolate; calyx subcampanulate.
 - 2a. Legume 0.3–0.5 cm, 2-seeded.
 - 3a. Leaflet blades elliptic, 2–3 × 1–1.5 cm; legume ca. 5 mm in diam.; corolla keel without twisted beak 5. *C. uncinella*
 - 3b. Leaflet blades obovate to oblanceolate, 1–2 × 0.3–0.8 cm; legume 3–4 mm in diam.; corolla keel with twisted beak 39. *C. medicaginea*
 - 2b. Legume 2–4 cm, (4–)20–30-seeded.
 - 4a. Legume densely pubescent, not glabrescent; corolla only slightly longer than calyx.
 - 5a. Leaflet blades suborbicular to elliptic-obovate, 2–4 × 1–2 cm; stems spreading pilose 1. *C. incana*
 - 5b. Leaflet blades elliptic to narrowly elliptic, 5–7 × 2–4 cm; stems appressed pilosulose.
 - 6a. Corolla 10–15 mm; legume 2.5–4 × 1–1.5 cm 2. *C. micans*
 - 6b. Corolla 5–9 mm; legume ca. 2 × 0.5–1 cm.
 - 7a. Leaflet blades elliptic to oblong-elliptic, 3–5 × 2–2.5 cm, apex obtuse; legume stipe ca. 4 mm 3. *C. jianfengensis*
 - 7b. Leaflet blades narrowly elliptic, 5–7 × 2.5–4 cm, apex acuminate; legume stipe absent 4. *C. bracteata*

- 4b. Legume thinly pubescent when young, later glabrous; corolla ca. 2 × as long as calyx.
- 8a. Calyx glabrous.
- 9a. Leaflet blades oblong to narrowly elliptic, 2–3 cm wide; corolla standard orbicular 9. *C. trichotoma*
- 9b. Leaflet blades linear to linear-lanceolate, 0.5–1 cm wide; corolla standard oblong 10. *C. ochroleuca*
- 8b. Calyx with trichomes.
- 10a. Legume compressed, 4–8-seeded 6. *C. psoraleoides*
- 10b. Legume inflated, 20- or more seeded.
- 11a. Leaflet blades oblong to elliptic, 3–6 × 1.5–3 cm 7. *C. pallida*
- 11b. Leaflet blades linear to linear-lanceolate, 5–9(–12) × 0.5–1 cm 8. *C. lanceolata*
- 1b. Leaves simple; calyx subcampanulate or 2-lipped.
- 12a. Stipules lanceolate-lunate; corolla pale yellow, white, or often tinged blue 11. *C. verrucosa*
- 12b. Stipules not lanceolate-lunate, sometimes absent; corolla red, purple, purplish blue, yellow, or rarely pale yellow or white.
- 13a. Corolla purplish red to purple or purplish blue.
- 14a. Flowers in a condensed headlike raceme; corolla deep purple or purplish blue 27. *C. mairei*
- 14b. Flowers in an elongated raceme or rarely solitary; corolla purplish red to purple.
- 15a. Plant prostrate; leaf blade obovate to obovate-elliptic, less than 2 × as long as wide; legume with trichomes 23. *C. hainanensis*
- 15b. Plant erect; leaf blade linear-lanceolate to elliptic-oblancheolate, more than 2.5 × as long as wide; legume glabrous.
- 16a. Leaf blade 2–4 × 0.6–0.8 cm, adaxially with trichomes; plants ca. 0.6 m tall 22. *C. chiayiana*
- 16b. Leaf blade 5–8 × ca. 2 cm, adaxially glabrous; plants 1–1.5 m tall 24. *C. occulta*
- 13b. Corolla usually yellow, rarely pale yellow or white.
- 17a. Stipules winglike, decurrent along stem 12. *C. alata*
- 17b. Stipules not winglike, sometimes absent.
- 18a. Plant ca. 9 cm tall, erect; leaf blade 0.5–1 cm.
- 19a. Calyx subcampanulate, 5–6 mm, lobes all similar; corolla standard without glandular trichomes ... 41. *C. tiantaiensis*
- 19b. Calyx 2-lipped, ca. 7 mm, adaxial 2 lobes distinctly wider than abaxial 3 lobes; corolla standard with glandular trichomes along margin near base 42. *C. anningensis*
- 18b. Plant 20–150 cm tall or prostrate; leaf blade 1.5–20(–25) cm.
- 20a. Legume ovoid-globose, 0.4–0.7 cm, 6–12-seeded.
- 21a. Bracts ovate-triangular, 6–7 mm; calyx 8–10 mm, divided for ca. 1/2 its length 35. *C. dubia*
- 21b. Bracts lanceolate or linear, 1.5–3(–4) mm; calyx 4–7 mm, deeply divided.
- 22a. Leaf blade broadly ovate-elliptic to suborbicular, apex not mucronate 36. *C. humifusa*
- 22b. Leaf blade narrowly linear, oblanceolate, or oblong, apex mucronate.
- 23a. Leaf blade oblanceolate to oblong; plants ascending to erect, 50–100 cm tall; inflorescences elongated, 10–20 cm 37. *C. linifolia*
- 23b. Leaf blade narrowly linear; plants prostrate to erect, to 30 cm tall; inflorescences very short and headlike 38. *C. nana*
- 20b. Legume cylindric, 1–4(–6) cm, 10–30-seeded.
- 24a. Legume 1–1.5 cm, 10–15(–30)-seeded; herbs.
- 25a. Stipules absent.
- 26a. Leaf blade 3–8 × 2–4 mm, elliptic to ovate, adaxially glabrous 34. *C. similis*
- 26b. Leaf blade 10–60 × 4–25 mm, elliptic to linear, adaxially usually with trichomes (sometimes glabrous in *C. chinensis*).
- 27a. Corolla standard 4–5 mm; calyx 3–4 mm 33. *C. prostrata*
- 27b. Corolla standard 6–11 mm; calyx 5–10 mm.
- 28a. Leaf blade oblong-linear to linear; racemes 1–5-flowered 29. *C. chinensis*
- 28b. Leaf blade narrowly elliptic to elliptic; racemes 5–30-flowered 32. *C. yunnanensis*
- 25b. Stipules present but sometimes caducous.
- 29a. Stipules needlelike, ca. 1 mm.
- 30a. Racemes terminal or axillary, 20–30-flowered 30. *C. albida*
- 30b. Racemes axillary, (1 or)2- or 3-flowered 31. *C. uliginosa*
- 29b. Stipules linear, 2–6 mm.
- 31a. Leaf blade orbicular to elliptic; corolla 4–6 mm 28. *C. acicularis*
- 31b. Leaf blade linear, linear-lanceolate, or elliptic-oblancheolate; corolla 8–12 mm.
- 32a. Leaf blade linear-elliptic to elliptic-oblancheolate, ca. 2 cm wide 24. *C. occulta*
- 32b. Leaf blade linear to linear-lanceolate, 0.5–1 cm wide 26. *C. sessiliflora*
- 24b. Legume 2–4(–6) cm, (10–)20–30-seeded; herbs or shrublets.

- 33a. Calyx 2–3 cm, black when mature 25. *C. calycina*
 33b. Calyx less than 1.5 cm, brownish yellow when mature.
 34a. Stems 3- or 4-angled.
 35a. Stems 4-angled; leaf blade 10–20(–25) cm; racemes 6–10-flowered; legume 4–5 cm 18. *C. tetragona*
 35b. Stems 3-angled; leaf blade 2–3 cm; racemes 1–3-flowered; legume ca. 2 cm 40. *C. triquetra*
 34b. Stems terete.
 36a. Stipules 5–30 mm.
 37a. Stipules leaflike, broadly lanceolate, 10–30 mm 13. *C. mysorensis*
 37b. Stipules ovate-triangular, lanceolate, or triangular-lanceolate, 5–10 mm.
 38a. Stems and leaf blade adaxially glabrous; leaf blade 7–15 cm; stipules ovate-triangular, ca. 10 mm 14. *C. spectabilis*
 38b. Stems and leaf blade adaxially pilose; leaf blade 2–6 cm; stipules lanceolate to triangular-lanceolate, 5–8 mm 21. *C. ferruginea*
 36b. Stipules 1–3 mm.
 39a. Leaf blade obovate to obovate-elliptic, 1–3 cm; corolla yellow or purplish red 23. *C. hainanensis*
 39b. Leaf blade narrowly elliptic, lanceolate, or linear, 5–12 cm; corolla always yellow.
 40a. Corolla 1–1.2(–1.5) cm, equal to or only slightly exerted beyond calyx.
 41a. Leaf blade linear to oblong-linear, 4–7 × 0.4–1 cm; legume 3–4 cm, densely brown silky pubescent 19. *C. yaihsienensis*
 41b. Leaf blade narrowly elliptic, 6–11 × 2–3 cm; legume 1–2.5 cm, glabrous 20. *C. kurzii*
 40b. Corolla 1.5–2.5 cm, clearly exerted beyond calyx.
 42a. Leaf blade linear-lanceolate to oblong-linear, 0.5–2 cm wide 17. *C. juncea*
 42b. Leaf blade oblanceolate or narrowly elliptic, 2–4 cm wide.
 43a. Leaf blade apex obtuse to acuminate, mucronate; legume 4–6 cm 15. *C. assamica*
 43b. Leaf blade apex emarginate, not mucronate; legume 2.5–3 cm 16. *C. retusa*

1. *Crotalaria incana* Linnaeus, Sp. Pl. 2: 716. 1753.

圆叶猪屎豆 *yuan ye zhu shi dou*

Crotalaria incana subsp. *purpurascens* (Lamarck) Milne-Redhead; *C. purpurascens* Lamarck; *C. schimperi* A. Richard.

Herbs or shrublets, to 1 m tall. Stems brownish yellow spreading pubescent. Stipules acicular, 2–3 mm, tardily caducous. Leaves 3-foliolate; petiole 3–5 cm; petiolules 1–3 mm; leaflet blades elliptic-obovate, obovate, or suborbicular, 2–4 × 1–2 cm, terminal one larger than lateral ones, thin, abaxially pubescent to nearly glabrous, adaxially glabrous, secondary veins 6–10 on each side of midvein, secondary and tertiary veins abaxially distinct and adaxially inconspicuous, base rounded to broadly cuneate, apex obtuse and mucronate. Racemes terminal or leaf-opposed, 10–20 cm, 5–15-flowered; bracts 1–10 mm, caducous. Pedicel 3–4 mm; bracteoles inserted at base of calyx tube, similar to bracts, 2–3 mm. Calyx subcampanulate, 6–8 mm, 5-lobed, pubescent; lobes lanceolate, longer than tube. Corolla yellow, exerted beyond calyx; standard elliptic, 8–10 mm, base with appendages, apically usually pilose; wings oblong, 8–10 mm; keel ± as long as wings, abruptly rounded below middle, beak well developed and incurved. Legume clavate, 2–3 × 0.7–1 cm, apically slightly oblique, 20–30-seeded, densely rusty pilose; stipe ca. 2 mm. Fl. Oct–Dec, fr. Jan–Feb.

Sparse grasslands, along trails; below 100–2000 m. Cultivated or naturalized in Anhui, Guangdong, Guangxi, Jiangsu, Taiwan, Yunnan, and Zhejiang [pantropical; origin obscure].

2. *Crotalaria micans* Link, Enum. Hort. Berol. Alt. 2: 228. 1822.

三尖叶猪屎豆 *san jian ye zhu shi dou*

Crotalaria anagyroides Kunth.

Herbs or shrublets, to 2 m tall. Stems terete, thick, densely rusty appressed pubescent. Stipules acicular, very minute, persistent or caducous. Leaves 3-foliolate; petiole 2–5 cm; petiolules ca. 2 mm; leaflet blades elliptic to narrowly elliptic, 4–7(–10) × 2–3 cm, terminal one larger than lateral ones, thin, veins distinct on both surfaces, midvein abaxially sparsely pilose and adaxially pilose, secondary veins 8–15 on each side of midvein, base cuneate, apex acuminate and mucronate. Racemes terminal, 10–30 cm, 20–30-flowered; bracts linear, 0.7–1.3 cm, caducous. Pedicel 5–7 mm; bracteoles similar to bracts but smaller. Calyx subcampanulate, 7–10 mm, 5-lobed, densely rusty silky pilose; lobes broadly lanceolate, ± as long as tube. Corolla yellow, exerted beyond calyx; standard orbicular, ca. 1.4 cm in diam., base with 2 appendages, apex obtuse to retuse; wings oblong, ca. 1.3 cm; keel ca. 1 cm, abruptly rounded slightly below middle, beak slightly incurved. Legume oblong, 2.5–4 × 1–1.5 cm, 20–30-seeded, densely pilose when young, glabrescent; stipe 2–4 mm. Seeds black when mature, obliquely cordate, nearly smooth. Fl. May–Sep, fr. Aug–Dec.

Grasslands, slopes, along trails; below 100–2400 m. Cultivated or naturalized in Fujian, Guangdong, Guangxi, Hainan, Taiwan, and Yunnan [native to South America and Mexico].

3. *Crotalaria jianfengensis* C. Y. Yang, Acta Phytotax. Sin. 20: 478. 1982.

尖峰猪屎豆 *jian feng zhu shi dou*

Herbs or shrublets, 60–120 cm tall. Stems terete, ribbed, densely brownish yellow pubescent. Stipules acicular, ca. 2 mm, caducous. Leaves 3-foliolate; petiole 3–5 cm; petiolules ca. 1.5 mm; leaflet blades elliptic to oblong-elliptic, 3–5 × 2–2.5 cm, terminal one larger than lateral ones, thin, abaxially slightly pubescent to subglabrous, adaxially glabrous, veins dis-

tinct on both surfaces, secondary veins 8–10 on each side of midvein, base narrow, apex obtuse to retuse and mucronate. Racemes terminal or axillary, ca. 40 cm, 50–80-flowered; bracts linear, 3–5 mm, caducous. Pedicel 0.8–1.2 cm; bracteoles inserted at base of calyx tube, similar to bracts but shorter. Calyx subcampanulate, 8–10 mm, 5-lobed, brownish yellow appressed pubescent; lobes lanceolate, subequal in length. Corolla yellow, included in calyx; standard obovate, 5–8 mm; wings oblong, 4–6 mm; keel ovate, ± as long as standard, narrowed apically from middle. Legume cylindrical, many seeded, densely appressed pubescent; stipe 3–4 mm. Fl. Feb.

- Sandy areas, grassy slopes along rivers; ca. 600 m. Hainan.

4. *Crotalaria bracteata* Roxburgh ex Candolle, Prodr. 2: 130. 1825.

毛果猪屎豆 mao guo zhu shi dou

Herbs or shrublets, 60–120 cm tall. Stems terete, appressed pubescent. Stipules acicular, 3–4 mm. Leaves 3-foliolate; petiole 3–5 cm; petiolules 1–1.5 mm; leaflet blades narrowly elliptic, 5–7(–9) × 2.5–4 cm, terminal one larger than lateral ones, thin, abaxially sparsely pilose, adaxially glabrous, veins distinct on both surfaces, secondary veins 8–18 on each side of midvein, base attenuate, apex acuminate. Racemes leaf-opposed or rarely terminal, 10–15 cm, 10–30-flowered; bracts acicular, ca. 1 mm. Pedicel 3–7 mm; bracteoles inserted at base of calyx tube, ovate-lanceolate, ca. 3 mm. Calyx subcampanulate, 5–6 mm, 5-lobed, pilose; lobes lanceolate, ± as long as tube. Corolla yellow, exerted from calyx; standard oblong, ca. 9 mm, base with 2 appendages; wings oblong, ca. 8 mm; keel ± as long as wing, curved, beak narrow and slightly incurved. Ovary sessile. Legume ellipsoid-fusiform, ca. 2 × 0.5–1 cm, 7- or 8-seeded, densely rusty pubescent; style persistent. Fl. Aug–Sep, fr. Oct–Dec.

Along trails, riverbanks, forests; 700–1000 m. Yunnan (Xishuangbanna) [Bangladesh, Bhutan, Cambodia, India, Laos, Myanmar, Philippines, Thailand, Vietnam].

5. *Crotalaria uncinella* Lamarck subsp. **elliptica** (Roxburgh) Polhill, Kew Bull. 25: 284. 1971.

球果猪屎豆 qiu guo zhu shi dou

Crotalaria elliptica Roxburgh, Fl. Ind., ed. 1832, 3: 279. 1832; *C. splendens* Vogel.

Herbs, to 2 m, sometimes trailing or scandent. Stems terete, glabrescent. Stipules ovate-triangular, 1–1.5 mm. Leaves 3-foliolate; petiolules ca. 1 mm; leaflet blades elliptic, 1–3 × 0.8–1.5 cm, abaxially pubescent, adaxially glabrous, midvein abaxially raised, base cuneate, apex obtuse and mucronate or sometimes retuse. Racemes terminal or leaf-opposed, 10–30-flowered or more; bracts ovate-triangular, ca. 1 mm. Pedicel 2–3 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx subcampanulate, 3–4 mm, 5-lobed, densely pubescent; lobes broadly lanceolate, ± as long as tube. Corolla yellow, exerted beyond calyx; standard suborbicular to elliptic, ca. 5 mm; wings oblong, ± as long as standard; keel 5–6 mm, longer than standard, strongly rounded, apex with a short straight beak. Ovary sessile. Legume ovoid, 6–7 mm, 2-seeded, pubescent. Seeds brownish. Fl. Aug–Oct, fr. Nov–Dec.

Mountains, along trails; below 100–1100 m. Guangdong, Guangxi, Hainan [India, Malaysia, Thailand, Vietnam].

Crotalaria uncinella subsp. *uncinella* is found in Africa and the Mascarene Islands and has larger flowers (keel 0.9–1.1 cm) and legumes (8–11 mm).

6. *Crotalaria psoraleoides* D. Don, Prodr. Fl. Nepal. 242. 1825 [*“psoralioides”*].

黄雀儿 huang que er

Crotalaria cytisoides Roxburgh ex Candolle; *C. szemaensis* Gagnepain; *Priotropis cytisoides* (Roxburgh ex Candolle) Wight & Arnott.

Shrubs, 50–100 cm tall. Stems and branches terete, appressed brownish pubescent when young, glabrescent. Stipule subulate, often caducous. Leaves 3-foliolate; petiole 2–4 cm; petiolules less than 1 mm; leaflet blades elliptic to oblong, 5–7 × 1.5–5 cm, with terminal one longer than lateral ones, thin, abaxially slightly appressed pubescent, adaxially glabrous, base tapered, apex acuminate and mucronate. Racemes terminal or leaf-opposed, 10–30-flowered; bracts linear, 2–4 mm. Pedicel 6–8 mm; bracteoles 2, basal to calyx tube and at middle or apical part of pedicel, lanceolate-triangular. Calyx subcampanulate, 5–7 mm, pubescent, 5-lobed; lobes lanceolate, ± as long as calyx tube, apex acuminate. Corolla yellow, turning red when old, exerted from calyx; standard oblong, 7–10 mm; wings obovate-oblong, broader at base; keel strongly rounded around middle through almost 90°, beak not twisted. Legume ellipsoid, ca. 3 cm, compressed, with trichomes when young, glabrescent when mature; stipe 4–5 mm. Seeds 4–8, smooth. Fl. and fr. Apr–Dec.

Trailsides on mountain slopes; 800–1500 m. Xizang, Yunnan [Bangladesh, Bhutan, N India, N Myanmar, Nepal, N Thailand].

Crotalaria psoraleoides belongs to the same section as *C. bracteata* and *C. uncinella* but has been placed by some authors in the genus *Priotropis* on the basis of its compressed legumes. Such legumes are found in other, unrelated species of *Crotalaria* and do not justify the recognition of a distinct genus.

7. *Crotalaria pallida* Aiton, Hort. Kew. 3: 20. 1789.

猪屎豆 zhu shi dou

Crotalaria mucronata Desvaux; *C. obovata* G. Don; *C. pallida* var. *obovata* (G. Don) Polhill; *C. striata* Candolle.

Herbs, perennial. Branches terete, ribbed, densely appressed pubescent. Stipules acicular, very minute, caducous. Leaves 3-foliolate; petiole 2–4 cm; petiolules 1–2 mm; leaflet blades oblong to elliptic, 3–6 × 1.5–3 cm, abaxially sparsely silky pubescent, adaxially glabrous, veins distinct on both surfaces, base broadly cuneate, apex obtuse to retuse. Racemes terminal, ca. 25 cm, 10–40-flowered; bracts linear, ca. 4 mm, caducous. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts, ca. 2 mm. Calyx subcampanulate, 4–6 mm, 5-lobed, densely pubescent; lobes triangular, ± as long as tube. Corolla yellow, exerted beyond calyx; standard orbicular to elliptic, ca. 1 cm in diam., base with 2 appendages; wings oblong, ca. 8 mm, marginally pilose on basal part; keel ca. 1.2 cm, rather shallowly rounded, marginally pilose at base, beak

narrow and \pm projecting. Ovary subsessile. Legume oblong, 3–4 \times 0.5–0.8 cm, 20–30-seeded, pilose when young but glabrescent. Fl. Sep–Oct, fr. Nov–Dec.

Grasslands, disturbed sandy areas; 100–1100 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America].

Crotalaria pallida is a very weedy species that is adventive throughout the tropics. It is suspected of being poisonous to livestock.

8. *Crotalaria lanceolata* E. Meyer, *Comm. Pl. Afr. Austr.* 24: 1836.

长果猪屎豆 chang guo zhu shi dou

Herbs, 50–100 cm tall. Branches terete, pilose when young but glabrescent. Stipules absent. Leaves 3-foliolate; petiole 3–6 cm; petiolules 1–2 mm; leaflet blades linear to linear-lanceolate, 5–9(–12) \times 0.5–1 cm, both surfaces sparsely pilose or glabrous, base cuneate, apex acuminate and mucronate. Racemes terminal, to 20 cm, 10–40-flowered; bracts subulate to filiform, 0.5–3 mm, expanded at base. Pedicel 3–5 mm; bracteoles normally inserted at base of calyx or rarely on pedicel, narrow, 0.3–1 mm. Calyx subcampanulate, ca. 3 mm, 5-lobed, pubescent; lobes triangular, shorter than tube. Corolla yellow, exerted beyond calyx; standard broadly elliptic to orbicular, ca. 1 cm in diam., base with 2 appendages; wings oblong, ca. 1 cm, marginally pilose at base; keel \pm as long as wings, apical half rounded, marginally pubescent at base, beak long. Ovary subsessile. Legume oblong, 2–3 \times 0.5–1 cm, many seeded, glabrous. Seeds obliquely cordate. Fl. Jun–Aug, fr. Sep–Nov.

Grasslands, along trails; to ca. 900 m. Cultivated or naturalized in Fujian, Taiwan, and Yunnan [native to Africa and Madagascar].

This species is adventive in North and South America.

9. *Crotalaria trichotoma* Bojer, *Ann. Sci. Nat., Bot., sér. 2*, 4: 265. 1835.

光萼猪屎豆 guang e zhu shi dou

Crotalaria usaramoensis E. G. Baker; *C. zanzibarica* Benth.

Herbs or shrublets, to 2 m tall. Branches terete, ribbed, pubescent. Stipules subulate, ca. 1 mm. Leaves 3-foliolate; petiole 3–5 cm; petiolules ca. 2 mm; leaflet blades narrowly elliptic, 6–10 \times 1–2(–3) cm, abaxially pubescent, adaxially glabrous, base cuneate, apex acuminate and mucronate. Racemes terminal, ca. 20 cm, 10–20-flowered; bracts linear, 2–3 mm. Pedicel 3–6 mm; bracteoles inserted on apical half of pedicel, similar to bracts in shape but shorter. Calyx subcampanulate, 4–5 mm, 5-lobed; lobes triangular, \pm as long as tube, glabrous to sparsely pubescent. Corolla yellow, exerted beyond calyx; standard orbicular, ca. 1.2 cm in diam., base with 2 appendages, apex awned; wings oblong, \pm as long as standard; keel ca. 1.5 cm, slightly rounded, narrowed apically from middle, marginally pubescent at base, beak rather long. Ovary subsessile. Legume cylindrical, 3–4 \times 0.7–1.2 cm, 50–70-seeded, glabrescent; style and calyx persistent. Seeds orangish buff to terra-cotta-colored, reniform, smooth. Fl. Apr–Aug, fr. Sep–Dec.

Grasslands, along trails; 100–2000 m. Cultivated or naturalized in Fujian, Guangdong, Guangxi, Hainan, Hunan, Sichuan, Taiwan, and Yunnan [native to E Africa; introduced in Australia, Indonesia, Malaysia, Philippines, Sri Lanka, and Vietnam].

10. *Crotalaria ochroleuca* G. Don, *Gen. Hist.* 2: 138. 1832.

狭叶猪屎豆 xia ye zhu shi dou

Herbs or shrublets, erect, to 1.5 m tall. Branches ribbed, pubescent when young but glabrescent. Stipules absent. Leaves 3-foliolate; petiole 1–3 cm; petiolules ca. 1 mm; leaflet blades linear to linear-lanceolate, 5–9(–12) \times 0.5–1 cm, abaxially sparsely pilose, adaxially glabrous, base broadly cuneate, apex acuminate and mucronate. Racemes terminal, 10–15 cm, 10–15-flowered, lax; bracts minute. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx subcampanulate, ca. 4 mm, 5-lobed, glabrous; lobes triangular. Corolla pale yellow or white, exerted far beyond calyx; standard oblong, 0.8–1.2 cm, base with 2 appendages; wings obovate, ca. 1.3 cm; keel 1.7–2.3 cm, longer than wings, shortly rounded, beak rather long and projecting. Ovary subsessile. Legume oblong, 4–7 \times 1.5–2 cm, 20–30[–100]-seeded, sparsely pubescent. Seeds pale yellow to orange, reniform, smooth. Fl. Aug–Oct, fr. Nov–Dec.

Shaded places with thin soil. Cultivated or naturalized in Guangdong, Guangxi, and Hainan [native to Africa; introduced in Australia, North America, Papua New Guinea, and South America (Brazil)].

11. *Crotalaria verrucosa* Linnaeus, *Sp. Pl.* 2: 715. 1753.

多疣猪屎豆 duo you zhu shi dou

Crotalaria acuminata G. Don; *C. angulosa* Lamarck; *C. mollis* Weinmann.

Herbs, erect, 50–100 cm tall. Branches 4-angled, glabrescent. Stipules leaflike, ovate-falcate, 5–8 mm. Leaves simple; petiole 3–5 mm; leaf blade ovate to elliptic, 10–15 \times 3–5 cm, thinly membranous, abaxially densely pubescent, adaxially glabrous, base broadly cuneate, apex acuminate. Racemes terminal, 10–20-flowered; bracts linear, ca. 1 mm. Pedicel 3–4 mm; bracteoles inserted apically from middle of pedicel. Calyx subcampanulate, 8–10 mm, 5-lobed; lobes lanceolate, slightly longer than tube. Corolla pale yellow, white, or often tinged blue; standard orbicular to obovate, 1–1.8 cm, base with 2 appendages; wings oblong, 1–1.6 cm; keel \pm as long as wings, exerted beyond calyx, rounded with an incurved, fairly shortly twisted beak. Ovary subsessile, pilose on apical part. Legume oblong, 2–4 cm, 10–12-seeded, pubescent. Seeds nearly smooth to papillose, shiny. Fl. Aug–Oct, fr. Nov–Dec.

Grasslands, sparse forests; 100–200 m. Guangdong, Hainan, Taiwan [Bangladesh, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Australasia, introduced in Africa and the Americas].

Crotalaria verrucosa is now quite a common weed throughout the tropics.

12. *Crotalaria alata* Buchanan-Hamilton ex D. Don, *Prodr. Fl. Nepal.* 241. 1825.

翅托叶猪屎豆 chi tuo ye zhu shi dou

Crotalaria bialata Roxburgh (1832), not Schrank (1819); *C. bidiei* Gamble.

Herbs or shrublets, erect, 5–100 cm tall. Branches zigzag, silky pilose. Stipules decurrent on stem as a broad wing. Leaves simple, nearly sessile; leaf blade elliptic to obovate-elliptic, 3–8 × 1–5 cm, both surfaces with trichomes but abaxially slightly denser, base attenuate to cuneate, apex obtuse and mucronate. Racemes terminal or leaf-opposed, 2- or 3-flowered; bracts ovate-lanceolate, ca. 3 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 6–10 mm; lobes lanceolate, apex acuminate. Corolla yellow; standard obovate-orbicular, 5–8 mm, abaxially bearded at apex; wings oblong, shorter than standard; keel ovate, apically with a long twisted beak. Ovary glabrous. Legume oblong, 3–4 cm, 30–40-seeded, sparsely pubescent or glabrous, apex with a slightly curved beak; neck ca. 3 mm. Seeds obliquely cordate, smooth. Fl. Jun–Aug, fr. Sep–Dec.

Montane grasslands; 100–2000 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; cultivated and naturalized in Africa and Madagascar].

Crotalaria alata has been used for erosion control and soil improvement.

13. *Crotalaria mysorensis* Roth, Nov. Pl. Sp. 338. 1821.

褐毛猪屎豆 he mao zhu shi dou

Crotalaria decasperma Naik; *C. stipulacea* Roxburgh.

Herbs, erect, 50–100 cm tall. Branches terete, densely rusty spreading pilose. Stipules broadly lanceolate, 1–3 × 0.3–0.5 cm. Leaves simple, nearly sessile; leaf blade lanceolate to broadly lanceolate, 5–7(–8) × 0.5–1.5 cm, both surfaces sparsely pilose, base cuneate, apex obtuse. Racemes terminal, 6–9-flowered; bracts lanceolate, 5–8 mm. Pedicel 2–3 mm; bracteoles inserted at base of calyx tube, similar to bracts, 6–10 mm. Calyx 2-lipped, 0.8–1.5 cm, parted to base. Corolla yellow; standard narrowly elliptic, 1.2–1.5 cm, base with 2 appendages, apical half pilose; wings lanceolate-oblong, 1.2–1.4 cm; keel slightly longer than wings, narrowed apically from middle and extended into a long suberect twisted beak. Legume broadly oblong, 2–3 × 1.2–1.5 cm, 20–30-seeded. Fl. Aug.

Near sea level. Guangdong (coastal islands) [Bangladesh, India, Indonesia, Malaysia, Nepal, Pakistan, ?Philippines, Sri Lanka].

14. *Crotalaria spectabilis* Roth, Nov. Pl. Sp. 341. 1821.

大托叶猪屎豆 da tuo ye zhu shi dou

Crotalaria leschenaultii Candolle; *C. sericea* Retzius (1788), not N. L. Burman (1768), nor Willdenow (1802).

Herbs, erect, 0.6–1.5 m tall. Branches terete, glabrous. Stipules ovate-triangular, ca. 1 cm. Leaves simple; petiole 2–8 mm; leaf blade oblanceolate to narrowly elliptic, 7–15 × 2–5 cm, thin, abaxially appressed silky pubescent, adaxially glabrous, base broadly cuneate, apex obtuse and mucronate. Racemes terminal, 20–30-flowered; bracts ovate-triangular, 7–10 mm. Pedicel 1–1.5 cm; bracteoles inserted at or apical to middle of pedicel, linear, ca. 1 mm. Calyx 2-lipped, 1.2–1.5 cm, glabrous; lobes broadly lanceolate-triangular, longer than tube. Corolla pale yellow; standard veined purplish red, suborbicular

to oblong, 1–2 cm, base with 2 appendages, apex obtuse to retuse; wings obovate, ca. 2 cm; keel rounded about middle, with a fairly short and slightly incurved twisted beak exerted beyond calyx. Legume broadly oblong, 2.5–3 × 1.5–2 cm, 20–30-seeded, shortly stipitate, glabrous. Seeds smooth. Fl. Aug–Oct, fr. Oct–Dec.

Montane grasslands, along trails; 100–1500 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Taiwan, Yunnan, Zhejiang [Bangladesh, India, Malaysia, Myanmar, Nepal, ?Philippines, Thailand; cultivated and naturalized in Africa and Madagascar].

15. *Crotalaria assamica* Benth, London J. Bot. 2: 481. 1843.

大猪屎豆 da zhu shi dou

Herbs, erect, to 1.5 m tall. Branches terete, sericeous. Stipules linear, minute. Leaves simple; petiole 2–3 mm; leaf blade oblanceolate to narrowly elliptic, 5–15 × 2–4 cm, thin, abaxially sericeous, adaxially glabrous, base cuneate, apex obtuse and mucronate. Racemes terminal or leaf-opposed, to 30 cm, 20–30-flowered; bracts linear, 1–2 mm. Bracteoles similar to bracts but shorter. Calyx 2-lipped, 1–1.5 cm, pubescent; lobes lanceolate-triangular, ± as long as tube. Corolla deep golden yellow; standard suborbicular to elliptic, 1.5–2 cm, base with 2 appendages, apex retuse; wings 1.5–1.8 cm; keel rounded through 90°, narrowed apically from middle and extended into a long twisted beak exerted beyond calyx. Ovary glabrous. Legume oblong, 4–6 × ca. 1.5 cm, 20–30-seeded; stipe ca. 5 mm. Fl. May–Sep, fr. Aug–Dec.

Montane grasslands, along trails; below 100–3000 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [India, Laos, Myanmar, Philippines, Thailand, Vietnam].

Baker (Fl. Brit. India 2: 75. 1876) suggested that *Crotalaria sericea* N. L. Burman (Fl. Indica, 156. 1768) might be conspecific with this species. If this was the case, then Burman's name would have priority, but there seems to be too much doubt as to the exact identity of Burman's species to justify displacing a well-established name. Some authors have cited Burman's name as a synonym of *C. assamica* in the apparent belief that *C. sericea* N. L. Burman was a later homonym of *C. sericea* Retzius (1788), following Candolle who published the replacement name *C. burmanii* Candolle, but this is not correct as Burman's name has priority.

16. *Crotalaria retusa* Linnaeus, Sp. Pl. 2: 715. 1753.

吊裙草 diao qun cao

Lupinus cochinchinensis Loureiro.

Herbs, erect, 60–120 cm tall. Branches terete, pubescent. Stipules subulate, ca. 1 mm. Leaves simple; petiole 2–4 mm; leaf blade oblong to oblanceolate, 3–8 × 1–3.5 cm, abaxially slightly pubescent, adaxially glabrous, veins distinct on both surfaces, base cuneate, apex retuse. Racemes terminal, 10–20-flowered; bracts lanceolate, 2–3 mm. Pedicel 3–5 mm; bracteoles inserted on apical part of pedicel, filiform, very minute. Calyx 2-lipped, 1–1.2 cm, sparsely pubescent; lobes broadly lanceolate. Corolla yellow; standard suborbicular to elliptic, 1–1.5 cm, base with 2 appendages; wings oblong, 1–1.5 cm; keel ± as long as wings, narrowed apically from middle and extended into a long twisted beak exerted beyond calyx. Legume

oblong, 3–4 × 1–1.8 cm, 10–20-seeded, glabrous; stipe ca. 2 mm. Fl. Oct–Dec, fr. Jan–Apr.

Montane grasslands, seashore sandy areas. Guangdong, Hainan [Bangladesh, Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America, SW Asia, Pacific islands].

This species is cultivated in Hunan. It is toxic to livestock.

17. *Crotalaria juncea* Linnaeus, Sp. Pl. 2: 714. 1753.

菽麻 shu ma

Crotalaria benghalensis Lamarck; *C. sericea* Willdenow (1802), not N. L. Burman (1768), nor Retzius (1788); *C. tenuifolia* Roxburgh ex Hornemann.

Herbs, erect, 50–100 cm tall. Branches terete, ribbed, appressed silky pubescent. Stipules linear, ca. 2 mm, caducous. Leaves simple; petiole 3–5 mm; leaf blade oblong to linear-lanceolate, 6–12 × 0.5–2 cm, both surfaces pilose but abaxially more densely so, base attenuate, apex acuminate and mucronate. Racemes terminal, 10–20-flowered; bracts linear, 3–4 mm. Pedicel 5–8 mm; bracteoles inserted at base of calyx tube, shorter than bracts, densely pubescent. Calyx 2-lipped, 1–1.5 cm, parted almost to base, densely rusty pilose; lobes lanceolate, curved. Corolla yellow; standard oblong, 1.5–2.5 cm, base with 2 appendages; wings obovate-oblong, 1.5–2 cm; keel subangular, slightly longer than wings, apex with a long slightly incurved twisted beak exerted beyond calyx. Legume subsessile, cylindrical, 2–4 × 1.2–1.7 cm, 10–15-seeded, rusty pubescent. Seeds smooth to papillose around hilum. Fl. Aug–Dec, fr. Jan–May.

Sparse forests, along trails; below 100–2000 m. Cultivated or naturalized in Fujian, Guangdong, Guangxi, Jiangsu, Shaanxi, Shandong Sichuan, Taiwan, Yunnan, and Zhejiang [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

Crotalaria juncea is cultivated as a fiber crop (“Sunn Hemp”) and as a green manure. It is widely naturalized in Africa, tropical and subtropical America, Asia, Australia, and Papua New Guinea. Its original distribution is probably S Asia.

18. *Crotalaria tetragona* Roxburgh ex Andrews, Bot. Repos. 9: t. 593. 1812.

四棱猪屎豆 si leng zhu shi dou

Crotalaria esquirolii H. Léveillé.

Herbs, erect, to 2 m tall. Branches 4-angled, silky pubescent. Stipules linear to linear-lanceolate, 4–5 mm. Leaves simple; petiole ca. 4 mm; leaf blade oblong-elliptic to linear-lanceolate, 10–20(–25) × 1–2.5 cm, both surfaces finely appressed pubescent, midvein abaxially pale and prominent, base broadly cuneate to obtuse, apex acute to slightly acuminate. Racemes terminal or leaf-opposed, 6–10-flowered; bracts lanceolate, 4–6 mm. Pedicel 1–1.5 cm; bracteoles inserted at apex of pedicel, linear, 3–4 mm. Calyx 2-lipped, 1.5–2.5 cm, divided to near base, densely brown pilose; abaxial lobes narrowly triangular-lanceolate, connate for ca. 1/4 of length, 4–5 mm wide at base; adaxial lobes similar, divided to near base. Corolla yellow; standard suborbicular to oblong, ca. 2.5 cm, base with 2 appen-

dages; wings narrowly elliptic to lanceolate-elliptic, ca. 2 cm; keel ± as long as wings, broad and rounded, abaxial margin woolly, beak long, twisted, and exerted beyond calyx. Legume oblong, 4–5 cm, 10–20-seeded, [dark brown tomentose or] densely brownish yellow pubescent. Fl. Sep–Nov, fr. Dec–Feb.

Sparse forests, along trails; 500–1600 m. Guangdong, Guangxi, Sichuan, Yunnan [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, ?Philippines, Thailand, Vietnam].

19. *Crotalaria yaihsienensis* T. C. Chen, Acta Phytotax. Sin. 8: 349. 1963.

崖州猪屎豆 ya zhou zhu shi dou

Herbs, to 1 m tall. Branches terete, ribbed, appressed silky pubescent. Stipules filiform, less than 1 mm, caducous. Leaves simple; petiole 2–3 mm; leaf blade linear, 4–7 × 0.4–1 cm, both surfaces silky pilose but abaxially more densely so, midvein abaxially prominent and adaxially sulcate, secondary veins 12–15 on each side of midvein, base slightly cuneate, apex obtuse. Racemes terminal or leaf-opposed, 10–20 cm, 8–12-flowered, lax; bracts ovate-triangular, ca. 1.5 mm. Bracteoles inserted at base of calyx tube. Calyx 2-lipped, ca. 1 cm; abaxial 3 lobes linear-lanceolate, ca. 1 cm; adaxial 2 lobes lanceolate, ca. 9 mm. Corolla yellow; standard suborbicular, ca. 7 mm; keel ± as long as standard, narrowed apically from middle and extended into a long beak included in calyx. Ovary subsessile, with trichomes. Legume oblong, 2.5–3 cm, 10–20-seeded, densely brown silky pubescent. Fl. Sep–Nov, fr. Dec–Jan.

• Seashores, montane grasslands. S Hainan (Sanya).

20. *Crotalaria kurzii* Baker ex Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 229. 1874.

薄叶猪屎豆 bao ye zhu shi dou

Crotalaria peguana Benthham ex Baker; *C. peguana* var. *qiubeiensis* (C. Y. Yang) C. Chen & J. Q. Li; *C. qiubeiensis* C. Y. Yang.

Herbs or shrublets, erect, 0.6–1.5 m tall. Branches terete, appressed pubescent. Stipules acicular, very minute. Leaves simple; petiole 1–2 mm; leaf blade narrowly elliptic, 6–11 × 2–3 cm, thinly to thickly papery, abaxially silky pubescent, adaxially glabrous or pilose, veins abaxially raised, base attenuate to slightly cuneate, apex acuminate. Racemes terminal, to 20 cm, many flowered; bracts linear, 2–4 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube or on middle of pedicel, similar to bracts. Calyx 2-lipped, 0.8–1.2 cm, parted nearly to base, pubescent; lobes linear, linear-lanceolate, or broadly lanceolate, apex acuminate. Corolla yellow, included in or ± as long as calyx; standard oblong to ovate-oblong, 0.8–1.2 cm, base with 2 appendages, apically barbate; wings oblong, 8–10 mm, apex obtuse; keel ca. 9 mm, rounded, apex with a long twisted beak. Ovary subsessile. Legume oblong, 1–2(–2.5) × 0.5–1 cm, 8–15-seeded, glabrous. Fl. Jun–Oct, fr. Sep–Dec.

Thickets, open woodlands; 800–1500 m. Guangxi, Yunnan [Bangladesh, India, Laos, Myanmar, Thailand, Vietnam].

Collections with more broadly lanceolate calyx lobes have been treated as *Crotalaria peguana* var. *qiubeiensis*.

21. *Crotalaria ferruginea* Graham ex Bentham, London J. Bot. 2: 476. 1843.

假地蓝 jia di lan

Crotalaria bodinieri H. Léveillé; *C. ferruginea* var. *pilosissima* Bentham ex Baker; *C. lonchophylla* Handel-Mazzetti; *C. pilosissima* Miquel; *C. rufescens* Franchet.

Herbs, erect to ascending, 20–60(–120) cm tall. Branches brownish yellow spreading pilose. Stipules lanceolate to triangular-lanceolate, 5–8 mm. Leaves simple; leaf blade elliptic, 2–6 × 1–3 cm, both surfaces pilose but abaxially more densely so, base slightly cuneate, apex obtuse to acuminate. Racemes terminal, 2–6-flowered; bracts lanceolate, 2–4 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube. Calyx 2-lipped, 1–1.2 cm, parted to base, densely pilose; lobes lanceolate. Corolla yellow; standard narrowly elliptic, 8–10 mm; wings oblong, ca. 8 mm; keel ± as long as wings, narrowed apically from middle and extended into a long twisted beak included in or exerted slightly beyond calyx. Ovary subsessile. Legume oblong, 2–3 cm, 20–30-seeded, glabrous. Fl. Jun–Oct, fr. Sep–Dec.

Open forests, montane grasslands; 400–2200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

22. *Crotalaria chiayiana* Y. C. Liu & F. Y. Lu, Quart. J. Chin. Forest. 12(4): 79. 1979.

红花假地蓝 hong hua jia di lan

Crotalaria ferruginea Graham ex Bentham var. *chiayiana* (Y. C. Liu & F. Y. Lu) S. S. Ying.

Herbs, erect, to 60 cm tall. Branches terete, densely pubescent. Stipules triangular-lanceolate, spreading, longer than petiole, persistent. Leaves simple; petiole very short; leaf blade linear-lanceolate, 2–4 × 0.6–0.8 cm, both surfaces hirsute, apex acuminate. Racemes terminal or leaf-opposed, 1–4-flowered. Calyx campanulate, sericeous; lobes linear-lanceolate, much longer than tube. Corolla purplish red or purple, ± as long as calyx. Legume ellipsoidal, glabrous.

- Wastelands, open roadsides; 1400–1600 m. Taiwan.

This species is known to us only from the protologue but seems to be easily identifiable by the unusual corolla color.

23. *Crotalaria hainanensis* C. C. Huang, Acta Phytotax. Sin. 6: 393. 1957.

海南猪屎豆 hai nan zhu shi dou

Herbs, prostrate. Branches sparsely hirsutulous. Stipules subulate to ovate-lanceolate, ca. 2 mm. Leaves simple; petiole short; leaf blade obovate to obovate-elliptic, 1–3 × 1–2 cm, both surfaces glabrescent, veins abaxially raised, base broadly cuneate, apex obtuse and mucronate. Racemes terminal, 1–3-flowered; bracts ovate-triangular, ca. 3 mm. Pedicel 2–6 mm; bracteoles inserted on pedicel at or below middle, linear, ca. 1 mm. Calyx 2-lipped, 8–10 mm, parted, pubescent; lobes lanceo-

late. Corolla yellow or purplish red; standard rhombic to suborbicular, 0.8–1.2 cm, glabrous, base with 2 appendages; wings oblong, 8–10 mm; keel ± as long as standard, narrowed basally from middle, apically extended into a long twisted beak. Ovary subsessile. Legume oblong, 2–3 cm, 10–15-seeded, densely rusty pilose. Seeds brown, reniform, glabrous. Fl. Aug–Oct, fr. Sep–Dec.

- Dry grasslands, open sands. Hainan (Changjiang).

24. *Crotalaria occulta* Graham ex Bentham, London J. Bot. 2: 565. 1843.

紫花猪屎豆 zi hua zhu shi dou

Herbs, 1–1.5 m tall. Branches terete, densely pilose. Stipules linear to filiform, 5–8 mm, persistent. Leaves simple; petiole very short; leaf blade linear-oblong to elliptic-oblong, 5–8 × ca. 2 cm, abaxially sparsely pilose, adaxially glabrous, base attenuate, apex acuminate. Racemes terminal or leaf-opposed, to 15 cm, 1–20-flowered; bracts linear, ca. 1 cm. Bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 1.5–1.8 cm, densely rusty pilose; abaxial lobes narrow, 2–3 mm wide; adaxial lobes 5–6 mm wide. Corolla yellow or purplish blue, included in calyx; standard obovate, 1–1.2 cm, base with 2 appendages; wings oblong, ± as long as standard; keel rounded with a long twisted beak. Legume cylindrical, ca. 1.5 cm, included in or ± as long as calyx, 10–15-seeded, glabrous. Fl. Aug–Oct, fr. Nov–Feb.

Sparse forests, along trails; 800–1000 m. Yunnan [Bangladesh, Bhutan, India, N Laos].

Indian collections note that the flowers open at dusk and have a sweet scent similar to that of *Viola odorata*.

25. *Crotalaria calycina* Schrank, Pl. Rar. Hort. Monac. t. 12. 1817.

长萼猪屎豆 chang e zhu shi dou

Crotalaria roxburghiana Candolle.

Herbs, annual or short-lived perennial, erect, 30–80 cm tall. Branches terete, densely coarsely pilose. Stipules filiform, ca. 1 mm, persistent or caducous. Leaves simple, subsessile; leaf blade oblong-linear to linear-lanceolate, 3–12 × 0.5–1.5 cm, abaxially densely brownish pilose, adaxially pilose on midvein, base narrow, apex acute. Racemes terminal, usually condensed or headlike, 3–12-flowered, often with solitary axillary flowers below; bracts lanceolate, slightly ovate-falcate, 1–2 cm. Pedicel 2–4 mm, thick; bracteoles inserted at base of calyx tube or on middle or apical part of pedicel, similar to bracts but shorter. Calyx 2-lipped, 2–3 cm, parted to base, abaxially brownish pilose; lobes lanceolate. Corolla yellow, included in calyx; standard obovate to suborbicular, 1.5–2.5 cm, base with 2 appendages, apically pubescent; wings narrowly elliptic, ± as long as standard; keel with a long straight shortly twisted beak. Legume black when mature, subcylindric, 2–2.5 cm, 20–30-seeded, glabrous. Fl. Jun–Sep, fr. Oct–Dec.

Open forests, along trails; below 100–2400 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Pakistan,

Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific islands].

26. *Crotalaria sessiliflora* Linnaeus, Sp. Pl., ed. 2, 2: 1004. 1763.

野百合 *ye bai he*

Crotalaria brevipes Champion ex Benth.

Herbs, annual or short-lived perennial, erect, 30–100 cm tall. Stems often branching from lower parts, terete, densely coarsely hirsute. Stipules linear, 2–3 mm, persistent or caducous. Leaves simple; petiole nearly absent; leaf blade variable in shape, usually linear to linear-lanceolate, 3–8 × 0.5–1 cm, abaxially densely silky pubescent, adaxially glabrous, base attenuate, apex acuminate. Racemes terminal or leaf-opposed or densely congested and headlike on branch apices, few to many flowered or flowers solitary in axils; bracts linear-lanceolate, 4–6 mm. Pedicel ca. 2 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 1–1.5 cm, conspicuously long brownish pilose; abaxial lobes lanceolate to triangular-lanceolate, to 2.5 mm wide, connate for ca. 1/4 of length; adaxial lobes ca. 4 mm wide, joined for ca. 1/3 length, apices long acuminate. Corolla blue to purplish blue or pale yellow, slightly shorter than calyx; standard oblong, 7–10 × 4–7 mm, abaxially sparsely strigose along midvein, base with 2 appendages, apex obtuse to retuse; wings oblong to linear-oblong, shorter than standard; keel ± as long as standard, bent sharply below middle, adaxial margin proximally woolly, apex extended into straight twisted beak. Ovary sessile. Legume dark with age, cylindrical, ca. 1 cm, ± included in calyx, 10–15-seeded, glabrous. Fl. May–Nov, fr. Oct–Feb.

Valley grasslands, along trails; below 100–1600 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam; Pacific islands].

27. *Crotalaria mairei* H. Léveillé, Bull. Acad. Int. Geogr. Bot. 25: 49. 1915.

头花猪屎豆 *tou hua zhu shi dou*

Herbs, perennial, ascending to erect, 10–60 cm tall. Stems many from base, terete, densely silky pilose. Stipules acicular, 1–2 mm, persistent or caducous. Leaves simple; petiole 1–4 mm; leaf blade lanceolate, oblong-lanceolate, or rarely oblanceolate, 1.5–3 × 0.5–1.5 cm, abaxially densely brown pilose, adaxially glabrous or very sparsely pilose, base cuneate, apex shortly acuminate to rounded and cuspidate. Racemes terminal, headlike, less than 5 cm, 10–20-flowered; bracts linear to linear-lanceolate, 4–8 mm. Pedicel ca. 2 mm or ca. 5 mm when flowers arranged laxly on branch tip and not headlike; bracteoles inserted at base of calyx, similar to bracts. Calyx 2-lipped, 1–1.3 cm, deeply divided, densely brown pilose or pubescent; lobe apices long acuminate; abaxial lobes lanceolate; adaxial lobes oblong-ovate, ca. 3 mm wide. Corolla deep purple or purplish blue, ± as long as calyx; standard ovate to suborbicular, 0.8–1.3 cm, abaxially pilose near tip, base with 2 appendages, apex obtuse to retuse; wings oblong, 0.8–1.3 cm; keel ovate, ±

sharply angled near base, margins proximally woolly, apex extended into a long straight twisted beak. Ovary sessile. Legume cylindrical, ca. 1 cm, included in or slightly exerted beyond calyx, 10–15-seeded, glabrous. Fl. Sep–Nov, fr. Dec–Feb.

Montane grasslands; 300–3000 m. Guangxi, Guizhou, Sichuan, Xizang, Yunnan [India, Myanmar, Nepal, Sri Lanka].

- 1a. Calyx densely brown pilose; legume included within calyx 27a. var. *mairei*
 1b. Calyx pubescent; legume exerted slightly beyond calyx 27b. var. *pubescens*

27a. *Crotalaria mairei* var. *mairei*

头花猪屎豆(原变种) *tou hua zhu shi dou* (yuan bian zhong)

Crotalaria capitata Baker (1876), not Lamarck (1786).

Calyx densely brown pilose. Legume included within calyx.

Montane grasslands; 300–3000 m. Guangxi, Guizhou, Sichuan, Yunnan [India, Myanmar, Nepal, Sri Lanka].

27b. *Crotalaria mairei* var. *pubescens* C. Chen & J. Q. Li, J. Wuhan Bot. Res. 6: 220. 1988.

短毛头花猪屎豆 *duan mao tou hua zhu shi dou*

Calyx pubescent. Legume exerted slightly beyond calyx.

• Montane grasslands; 1000–2400 m. Yunnan.

28. *Crotalaria acicularis* Buchanan-Hamilton ex Benth., London J. Bot. 2: 476. 1843.

针状猪屎豆 *zhen zhuang zhu shi dou*

Herbs, ascending, 20–80 cm tall. Branches densely brown spreading silky pilose. Stipules linear, 2–4 mm. Leaves simple; petiole short; leaf blade suborbicular to oblong, 1–2(–3) × 1–1.5 cm, membranous to papery, both surfaces sparsely white spreading silky pilose, base narrow to slightly cordate, apex obtuse to acuminate. Racemes terminal, 5–30-flowered; bracts lanceolate to acicular, 2–3 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube or on apical part of pedicel, acicular. Calyx 2-lipped, 4–6 mm, parted to base, densely brown silky pilose; lobes lanceolate. Corolla yellow; standard suborbicular to obovate, 4–5 mm; wings narrowly elliptic, slightly shorter than standard; keel suborbicular, apex with a long twisted beak. Ovary sessile. Legume cylindrical, ca. 1 cm, 10–12-seeded, glabrous. Fl. Aug–Nov, fr. Dec–Feb.

Along trails, thickets on slopes; 100–1700 m. Hainan, Taiwan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam; Australia].

29. *Crotalaria chinensis* Linnaeus, Syst. Nat., ed. 10, 2: 1158. 1759.

中国猪屎豆 *zhong guo zhu shi dou*

Crotalaria akoensis Hayata; *C. kawakamii* Hayata; *C. sinensis* J. F. Gmelin.

Herbs, 15–60 cm tall, brownish yellow pilose except for legumes. Stems terete, branched at base. Stipules absent. Leaves

simple, subsessile; leaf blade variable in shape, usually lanceolate, linear-lanceolate, linear, or oblong-linear, 2–3.5 × 0.4–1 cm, abaxially densely brown coarsely pilose but more densely so on veins and along margin, adaxially glabrous or sparsely pilose, base attenuate, apex acuminate. Racemes congested on branch apices, 1–5-flowered or with 1 or 2 flowers in axils; bracts lanceolate, 3–5 mm. Pedicel 2–4 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 8–10 mm, parted to base; abaxial 3 lobes linear to linear-lanceolate; adaxial 2 lobes broadly lanceolate. Corolla pale yellow, included in or ± as long as calyx; standard ovate to orbicular, 7–9 mm, base with 2 appendages; wings oblong, 7–9 mm; keel narrowed apically from middle and extended into a twisted beak. Ovary subsessile. Legume cylindrical, 0.8–1.2 cm, included in or exerted from calyx, 15–20-seeded. Seeds cordate, ca. 2.5 mm, smooth. Fl. Jun–Oct, fr. Sep–Dec.

Montane grasslands; below 100–1000 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand, Vietnam].

30. *Crotalaria albida* Heyne ex Roth, Nov. Pl. Sp. 333. 1821.

响铃豆 *xiang ling dou*

Herbs, short-lived or perennial, erect to ascending, 10–80 cm tall. Stems sometimes branched above base, occasionally branched only at base, appressed pubescent to spreading pilose. Stipules acicular, minute, caducous, sometimes apparently absent. Leaves simple, subsessile; leaf blade oblanceolate, elliptic, or obovate, 1–2.5 × 0.4–1.2 cm, abaxially strigose, adaxially glabrous, base cuneate, apex obtuse and mucronate. Racemes terminal, often on lateral branches, rarely leaf-opposed, to 20 cm, 20–30-flowered; bracts filiform, ca. 1 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 4–8 mm, parted; abaxial 3 lobes lanceolate; adaxial 2 lobes broader, falcate, apices slightly obtuse to acuminate. Corolla pale yellow; standard elliptic, 5–8 mm, base with appendages, apex barbate; wings oblong, ± as long as standard; keel rounded, narrowed apically from middle and extended into a twisted beak. Ovary subsessile. Legume cylindrical, ca. 1 cm, slightly exerted beyond calyx, 6–12-seeded, glabrous. Fl. May–Sep, fr. Sep–Dec.

Open montane forests, grassy slopes, along trails; 200–2800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

- 1a. Leaf blade usually oblanceolate; adaxial calyx lobes slightly obtuse at apex 30a. var. *albida*
 1b. Leaf blade elliptic; adaxial calyx lobes acuminate at apex 30b. var. *gengmaensis*

30a. *Crotalaria albida* var. *albida*

响铃豆(原变种) *xiang ling dou* (yuan bian zhong)

Crotalaria formosana Itô & Matsumura.

Leaf blade usually oblanceolate. Calyx with adaxial lobes

slightly obtuse at apex. Legume 6–12-seeded.

Open montane forests, along trails; 200–2800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

Many collections are of relatively robust plants branching mainly well above the base and probably relatively short-lived. Some collections from Xizang are of much smaller plants, many branched from base, and probably longer lived.

30b. *Crotalaria albida* var. *gengmaensis* (Z. Wei & C. Y. Yang) C. Chen & J. Q. Li, J. Wuhan Bot. Res. 6: 225. 1988.

耿马猪屎豆 *geng ma zhu shi dou*

Crotalaria gengmaensis Z. Wei & C. Y. Yang, Acta Phytotax. Sin. 20: 479. 1982.

Leaf blade elliptic. Calyx with adaxial lobes acuminate at apex. Legume 6–8-seeded.

- Grassy slopes; 1600–1700 m. Yunnan (Gengma).

31. *Crotalaria uliginosa* C. C. Huang, Acta Phytotax. Sin. 6: 396. 1957.

湿生猪屎豆 *shi sheng zhu shi dou*

Herbs, to 20 cm tall. Stems branched at base, glabrescent. Stipules acicular, ca. 1 mm. Leaves simple; petiole to ca. 0.5 mm; leaf blade on basal part of branches oblong-ob lanceolate to oblong-elliptic but linear-elliptic toward tips of branches, 7–15 × 3–5 mm, abaxially sparsely appressed pubescent, adaxially glabrous, midvein abaxially raised, base broadly cuneate to rounded, apex obtuse to rarely truncate and mucronate. Racemes leaf-opposed, (1 or)2- or 3-flowered. Pedicel 2–3 mm; bracteoles inserted at base of calyx tube, linear, ca. 0.5 mm. Calyx 2-lipped, 4–5 mm; lobes lanceolate, apex acuminate. Corolla yellow; standard broadly obovate, 4–5 × 3–4 mm, base with 2 appendages, apex obtuse; wings oblong, ca. 4 mm; keel slightly longer than wings, rounded to 90°, narrowed apically from middle and extended into a long twisted beak. Ovary subsessile; style ca. 2.5 mm. Legume cylindrical, 10–15 × ca. 5 mm, 7–15-seeded, glabrous, base with persistent calyx and filaments. Seeds brown, reniform, ca. 1 mm, shiny.

- By streams. Yunnan (Yanshan).

32. *Crotalaria yunnanensis* Franchet, Pl. Delavay. 151. 1889.

云南猪屎豆 *yun nan zhu shi dou*

Herbs, perennial, erect, 15–70 cm tall. Stems few branched, coarsely spreading pilose. Stipules absent. Leaves simple; petiole ca. 1.5 mm; leaf blade oblong to elliptic, 2–6 × 0.5–2.5 cm, both surfaces sparsely brown pilose but abaxially more densely so on midvein, veins abaxially raised, base slightly cuneate, apex obtuse to acuminate and mucronate. Racemes terminal, 5–20 cm, 5–30-flowered; bracts linear, 2–9 mm. Pedicel ± as long as or shorter than bract; bracteoles inserted at base of calyx tube, pilose. Calyx 2-lipped, 5–10 mm, densely brown pilose; lobes lanceolate. Corolla yellow; standard suborbicular, 0.9–1.1 cm in diam., base with 2 appen-

dages; wings obovate-oblong, 7–10 mm; keel \pm as long as wings, rounded, narrowed apically from middle and extended into a long twisted beak. Legume cylindric, ca. 1 cm, glabrous. Fl. May–Aug, fr. Aug–Oct.

• Open grasslands, thickets, *Pinus-Quercus* forests; 100–3000 m. Sichuan, Yunnan.

- 1a. Bracts 2–4 mm, \pm as long as pedicel
..... 32a. var. *yunnanensis*
1b. Bracts 6–9 mm, longer than pedicel
..... 32b. var. *heqingensis*

32a. *Crotalaria yunnanensis* var. *yunnanensis*

云南猪屎豆(原变种) yun nan zhu shi dou (yuan bian zhong)

Bracts 2–4 mm, \pm as long as pedicel.

• Open grasslands, thickets; 100–3000 m. Sichuan, Yunnan.

32b. *Crotalaria yunnanensis* var. *heqingensis* (C. Y. Yang) C. Chen & J. Q. Li, J. Wuhan Bot. Res. 6: 226. 1988.

鹤庆猪屎豆 he qing zhu shi dou

Crotalaria heqingensis C. Y. Yang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(7): 112. 1980.

Bracts 6–9 mm, longer than pedicel.

• *Pinus-Quercus* forests; 1700–1900 m. Yunnan (Heqing).

33. *Crotalaria prostrata* Rottler ex Willdenow, Enum. Pl. 2: 747. 1809.

俯伏猪屎豆 fu fu zhu shi dou

Crotalaria jinpingensis C. Y. Yang; *C. prostrata* var. *jinpingensis* (C. Y. Yang) C. Y. Yang.

Herbs, prostrate. Branches slender, densely spreading pubescent to white appressed pilose. Stipules absent. Leaves simple; petiole very short; leaf blade elliptic to ovate-oblong, 1–3 \times 0.5–1 cm, both surfaces with trichomes, base oblique, apex obtuse. Racemes terminal or leaf-opposed, 2–8-flowered; bracts subulate. Pedicel 1–2 mm; bracteoles inserted at base of calyx tube, similar to bracts, densely brown pilose. Calyx 2-lipped, 3–4 mm, parted to base; lobes lanceolate. Corolla yellow; standard suborbicular to elliptic, 4–5 mm, apex obtuse to retuse; wings oblong, \pm as long as standard; keel narrowed apically from middle and extended into a long beak included in calyx. Ovary sessile. Legume cylindric, ca. 1 cm, 10–15-seeded. Fl. May–Aug, fr. Aug–Dec.

Montane grassy wetlands, grassy slopes; 100–1300 m. Yunnan [Bangladesh, Cambodia, India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam].

34. *Crotalaria similis* Hemsley, Ann. Bot. (Oxford) 9: 152. 1895.

屏东猪屎豆 ping dong zhu shi dou

Herbs, prostrate, 5–20 cm, densely silky pilose. Stipules absent. Leaves simple; petiole very short; leaf blade ovate to elliptic, 3–8 \times 2–4 mm, abaxially densely pilose, adaxially glabrous, base obtuse, apex acute. Racemes terminal, short, (1–)3–

5-flowered; bracts lanceolate. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, ca. 6 mm, very densely silky pilose; abaxial 3 lobes lanceolate; adaxial 2 lobes broadly lanceolate. Corolla bright yellow; standard oblong to suborbicular, ca. 6 mm, apex barbate; wings oblong, \pm as long as standard; keel slightly longer than standard, upcurved, beak rather blunt. Ovary sessile. Legume cylindric, ca. 1 cm, 10–20-seeded. Fl. May.

• Sandy soils near coast; near sea level. Taiwan.

35. *Crotalaria dubia* Graham ex Bentham, London J. Bot. 2: 565. 1843.

卵苞猪屎豆 luan bao zhu shi dou

Herbs, annual, 1–1.5 m tall. Stems terete, densely pubescent. Stipules filiform, caducous. Leaves simple; petiole short; leaf blade obovate to ovate-oblong, 3–5 \times 1.5–3 cm, thickly papery, both surfaces densely rusty pilose, veins abaxially raised, base cuneate, apex obtuse to acuminate and mucronate. Racemes terminal, congested and headlike, many flowered; bracts ovate-triangular, 6–7 mm. Pedicel ca. 1 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 8–10 mm, divided for ca. 1/2 its length; lobes lanceolate. Corolla yellow; standard oblong, ca. 5 mm, base with 2 appendages, apex obtuse to retuse; wings narrowly elliptic, \pm as long as standard; keel slightly rounded, narrowed apically from middle and extended into a long beak. Legume ovoid, 5–7 mm in diam., included in calyx, 6–8-seeded, glabrous. Fl. Oct–Nov, fr. Dec–Feb.

By streams, wetlands; ca. 1000 m. Yunnan [Bangladesh, India, Myanmar, N Thailand].

36. *Crotalaria humifusa* Graham ex Bentham, London J. Bot. 2: 476. 1843.

匍地猪屎豆 pu di zhu shi dou

Herbs, annual or short-lived perennial, prostrate, to 20 cm, most parts adpressed pilose. Stems terete, densely pubescent. Stipules linear, to 4 \times 1.8 mm, somewhat persistent. Leaves simple; petiole shorter than stipules, to 2 mm; leaf blade broadly elliptic-ovate, often slightly oblique, 1.2–3.6 \times 1–2.4 cm, both surfaces silky pilose but more densely so abaxially, abaxially grayish green, base broadly cuneate to rounded, apex rounded and not mucronate. Racemes leaf-opposed or terminal on short flowering branches, ascending, very lax, 2–8-flowered; bracts linear, ca. 1.5 mm. Pedicel to 4 mm; bracteoles inserted at base of calyx, similar to bracts. Calyx \pm 2-lipped, 4–6 mm, deeply divided; abaxial 3 lobes linear-lanceolate, falcate, 2–3.5 mm; adaxial lobes connate, slightly wider, apex attenuate. Corolla yellow; standard oblong-orbicular, 5.5–6.5 mm, midline abaxially with trichomes; keel slightly longer than standard, \pm sharply angled near base, apex extended into a straight slightly twisted beak. Legume cylindric-ovoid, 6–8 mm, ca. 12-seeded, glabrous. Seeds very pale brown, \pm D-shaped, ca. 1.3 mm, glossy.

Disturbed areas including sandy river margins; 1800–1900 m. Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand; Australia].

37. *Crotalaria linifolia* Linnaeus f., Suppl. Pl. 322. 1782.

线叶猪屎豆 xian ye zhu shi dou

Herbs, annual or short-lived perennial, erect to ascending, 0.5–1 m tall. Stems terete, densely silky pubescent. Stipules minute, caducous. Leaves simple; petiole short; leaf blade linear to oblong, 2–5 × 0.3–1.5 cm, both surfaces silky pilose, adaxially sometimes only along midvein, base cuneate to rounded, apex acuminate to obtuse and mucronate. Racemes terminal, lax, 10–20 cm, many flowered; bracts lanceolate, 2–3 mm. Pedicel to 2.5 mm; bracteoles inserted at base of calyx, similar to bracts. Calyx 2-lipped, 6–7 mm, deeply divided, densely rusty pilose; abaxial lobes lanceolate; adaxial lobes slightly longer and broader. Corolla yellow with darker veins; standard oblong to suborbicular, 5–7 mm, margin pilose at base and with 2 appendages, apex retuse; wings oblong, 6–7 mm; keel ca. 8 mm, ± sharply angled near base, margins minutely woolly, apex extended into a long straight twisted beak. Legume rhombic to ovoid, 5–6 mm, 8–10-seeded, glabrous; stipe almost absent. Fl. Aug–Oct, fr. Nov–Dec.

Slopes, seashore sandy areas, along trails; 400–2500 m. Guangdong, Guangxi, Guizhou, Hainan, Hunan, Sichuan, Taiwan, Xizang, Yunnan [India, Japan (Ryukyu Islands), Myanmar, Sri Lanka].

- 1a. Leaf blade oblanceolate to oblong, 5–15 mm wide, base narrow, apex acuminate; legume rhombic 37a. var. *linifolia*
 1b. Leaf blade linear to linear-oblong, 3–4 mm wide, base rounded, apex obtuse; legume rhombic to ovoid 37b. var. *stenophylla*

37a. *Crotalaria linifolia* var. *linifolia*

线叶猪屎豆(原变种) xian ye zhu shi dou (yuan bian zhong)

Crotalaria linifolia var. *pygmaea* Yamamoto.

Leaf blade oblanceolate to oblong, 2–5 × 0.5–1.5 cm, base narrow, apex acuminate. Legume rhombic.

Slopes, along trails; 500–2500 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Xizang, Yunnan [India, Japan (Ryukyu Islands), Myanmar, Sri Lanka].

37b. *Crotalaria linifolia* var. *stenophylla* C. Y. Yang, Acta Phytotax. Sin. 20: 479. 1982.

窄叶猪屎豆 zhai ye zhu shi dou

Crotalaria stenophylla Vogel, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 7. 1843, not Ecklon & Zeyher (1836).

Leaf blade linear to linear-oblong, 2.5–3.5 × 0.3–0.4 cm, base rounded, apex obtuse. Legume rhombic to ovoid.

• Seashore sandy areas, along trails. Guangdong, Guangxi, Hunan, Taiwan.

38. *Crotalaria nana* N. L. Burman var. *patula* Baker in J. D. Hooker, Fl. Brit. India 2: 71. 1876.

座地猪屎豆 zuo di zhu shi dou

Herbs, annual, prostrate to erect. Stems terete, branched at

base, densely yellow silky pubescent. Stipules absent. Leaves simple, subsessile; leaf blade linear, 1.5–3 × 0.2–0.4 cm, both surfaces silky pilose but more densely so abaxially, base slightly cuneate, apex obtuse and mucronate. Racemes terminal, headlike, 2–6-flowered; bracts linear, 2–3 mm. Pedicel short; bracteoles inserted at base of calyx, subulate, ca. 3 mm, silky pilose. Calyx 2-lipped, 4–5 mm; abaxial 3 lobes lanceolate-triangular; adaxial 2 lobes connate, oblong, apex obtuse. Corolla yellow, slightly shorter than and included in calyx. Ovary sessile. Legume ovoid to globose, 4–5 mm, 6–12-seeded.

Sandy soils; below 100–1900 m. Hainan [India, Myanmar, Nepal].

Crotalaria nana var. *nana*, recorded from W India and Sri Lanka, has wider leaves and coarser trichomes on the calyx.

39. *Crotalaria medicaginea* Lamarck, Encycl. 2: 201. 1786.

假苜蓿 jia mu xu

Herbs, shrublets, or shrubs, prostrate to erect, to 1 m tall. Stems slender, branched, appressed silky pubescent. Stipules filiform, 2–3 mm. Leaves 3-foliolate; petiole 0.2–2 cm; petioles ca. 1 mm; leaflet blades oblanceolate, obovate-oblong, or ovate-oblong, (1–)2–3 × 0.3–1.2 cm, abaxially densely silky pubescent, adaxially glabrous, base cuneate, apex obtuse, truncate, or retuse. Racemes terminal or leaf-opposed, many flowered; bracts minute. Pedicel 2–3 mm. Calyx subcampanulate, 2–4 mm, 5-lobed; lobes broadly lanceolate. Corolla yellow; standard elliptic to ovate-oblong, 3–5 mm, base with 2 appendages, apex pilosulose; wings oblong to obovate, 3–4 mm; keel ± as long as wings, rounded and narrowed apically from middle, beak long and twisted. Ovary sessile. Legume globose, 3–5 mm in diam., included in or slightly exerted beyond calyx, pubescent, 2-seeded, apex shortly beaked. Fl. Aug–Oct, fr. Nov–Dec.

Seashore sandy areas, grassy slopes, along trails; below 100–2800 m. Guangdong, Guangxi, Sichuan, Taiwan, Yunnan [Afghanistan, Bangladesh, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

- 1a. Petiole 0.2–1 cm; leaf blade oblanceolate to obovate, 3–8 mm wide 39a. var. *medicaginea*
 1b. Petiole 1–2 cm; leaf blade ovate-oblong, 10–12 mm wide 39b. var. *luxurians*

39a. *Crotalaria medicaginea* var. *medicaginea*

假苜蓿(原变种) jia mu xu (yuan bian zhong)

Crotalaria neglecta Wight & Arnott; *C. yuanjiangensis* C. Y. Yang.

Petiole 0.2–1 cm; leaf blade oblanceolate to obovate, 1–2 × 0.3–0.8 cm.

Seashore sandy areas, along trails; below 100–1400 m. Guangdong, Guangxi, Sichuan, Taiwan, Yunnan (Yuanjiang) [Bangladesh, India, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam].

39b. *Crotalaria medicaginea* var. *luxurians* (Bentham) Baker in J. D. Hooker, Fl. Brit. India 2: 81. 1876.

大叶假苜蓿 da ye jia mu xu

Crotalaria luxurians Bentham, London J. Bot. 2: 578. 1843.

Petiole 1–2 cm; leaf blade ovate-oblong, 1–2.5 × 1–1.2 cm.

Grassy slopes; 700–900 m. Yunnan (Xishuangbanna) [Afghanistan, India, Nepal, Pakistan, Sri Lanka].

40. *Crotalaria triquetra* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 34. 1850.

砂地野百合 sha di ye bai he

Crotalaria triquetra var. *garambiensis* Y. C. Liu & F. Y. Lu.

Herbs, annual, erect to ascending, to 50 cm tall. Branches 3-angled, pubescent. Stipules linear-lanceolate, ca. 3 mm, caducous. Leaves simple; petiole ca. 1 mm; leaf blade elliptic-oblong, 2–3 × 0.7–1 cm, adaxial surface pellucid punctate, secondary veins 7 or 8 on each side of midvein, base rounded, apex obtuse. Racemes terminal or leaf-opposed, 1–3-flowered. Pedicel ± as long as calyx. Calyx ± 2-lipped, divided to ca. 1/2 its length, pubescent; lobes triangular-lanceolate. Corolla pale yellow, 1–1.2 cm, longer than calyx; standard ovate, base with 2 appendages; wings oblong, slightly shorter than standard; keel ± as long as wings, angled near base, beak straight and twisted. Legume cylindrical, ca. 2 cm, ca. 16-seeded, pubescent.

Open grasslands, wastelands; below 300 m. S Taiwan [India, Indonesia, Sri Lanka].

41. *Crotalaria tiantaiensis* Yan C. Jiang, X. Y. Zhu, Y. F. Du & H. Ohashi, J. Jap. Bot. 79: 373. 2004.

天台猪屎豆 tian tai zhu shi dou

Herbs, perennial, 6–12 cm tall, with appressed rubiginous trichomes. Stipules absent. Leaves simple; petiole ca. 1 mm; leaf blade narrowly oblong, 4–10 × 1–2 mm, with dense white papillae and appressed rubiginous trichomes. Racemes terminal, 1.5–3.5 cm, 3–7-flowered; bracts linear, ca. 1 mm. Pedicel 1.5–2 mm; bracteoles linear, ca. 1.5 mm. Calyx subcampanulate, 5–6 mm, deeply 5-lobed, with appressed trichomes

and ciliate margins; lobes narrowly lanceolate, 4–5 mm, all similar. Corolla pale yellow when dry, exerted from calyx; standard ovate, ca. 5 × 3 mm, midline abaxially with trichomes, base with claw ca. 0.5 mm, with 2 pulvinate callosities, apex rounded; wings oblong, ca. 4 × 1.5 mm; keel ± as long as standard, incurved above middle, beak not twisted. Ovary sessile, glabrous. Legume ellipsoidal, 6–8 × 4–4.5 mm, glabrous. Fl. and fr. Sep.

• Zhejiang.

Crotalaria tiantaiensis is known to us only from the protologue based on a single collection. Apparently, it is very similar vegetatively to the preceding species.

42. *Crotalaria anningensis* X. Y. Zhu & Y. F. Du in X. Y. Zhu et al., Legumes China, 631. 2007.

安宁猪屎豆 an ning zhu shi dou

Herbs, perennial, ca. 9 cm tall, with appressed ferruginous trichomes. Stipules absent. Leaves simple; petiole ca. 1 mm; leaf blade elliptic, 5–7 × 2–3 mm, abaxially with appressed trichomes, adaxially green, with dense white papillae, base cuneate, apex acute. Racemes terminal, 3–6 cm, 6–15-flowered; bracts linear, ca. 2 mm. Pedicel 2–4 mm; bracteoles similar to bracts, ca. 2 mm. Calyx 2-lipped, ca. 7 mm, deeply (4 or) 5-lobed, with appressed trichomes; abaxial 3 lobes linear 5–6 mm; adaxial 2 lobes ovate-lanceolate. Corolla yellow, exerted from calyx; standard suborbicular, ca. 6 × 5 mm, margins proximally with glandular trichomes, basal claw ca. 1 mm, with 2 pulvinate callosities, apex rounded; wings oblong, 4–6 × 2–3 mm; keel ± as long as standard, incurved above middle, beak not twisted. Ovary sessile, ?glabrous. Legume not seen. Fl. Mar.

• Yunnan (Anning).

Crotalaria anningensis is known to us only from the protologue. The presence of glandular trichomes on the margins of the standard are atypical for *Crotalaria* and, coupled with the absence of fruit, throws some doubt on the generic placement of this taxon. In the protologue, it states that the ovary is pilose, but in the illustration accompanying the protologue the ovary is shown as glabrous.

51. LOTONONIS (Candolle) Ecklon & Zeyher, Enum. Pl. Afric. Austral. 176. 1836, nom. cons.

罗顿豆属 luo dun dou shu

Wei Zhi (韦直); Roger M. Polhill, Michael G. Gilbert

Ononis sect. *Lotononis* Candolle, Prodr. 2: 166. 1825.

Herbs [or shrublets], annual or perennial. Stipules distinct. Leaves digitately 3-foliolate, usually petiolate. Inflorescences leaf-opposed, umbellate [or racemose], long pedunculate. Calyx cuplike, most abaxial tooth narrowly triangular and longest but other 4 teeth ± joined in pairs. Corolla standard ovate or obovate, glabrous, claw short; wings sometimes much shorter than standard; keel rounded at apex. Stamens 10, connate into a dorsally split sheath; anthers dimorphic, 4 longer and basifixed, 6 shorter and dorsifixed. Ovary sessile; ovules many; style incurved; stigma terminal. Legume subsessile, slightly inflated, usually many seeded. Seeds without an aril; funicle threadlike.

About 100 species: Africa, S Asia, S Europe; one species (introduced) in China.

1. *Lotononis bainesii* Baker, Fl. Trop. Afr. 2: 6. 1871.

罗顿豆 luo dun dou

Herbs, perennial, prostrate, mat-forming, 0.3–1.8 m wide. Stems slender, decumbent, branching and rooting at nodes, glabrous or sparsely puberulent. Stipules ovate, 4–10 mm, one

smaller than other, base auriculate, apex acute. Leaves 3-foliolate, apical one larger; petiole 6–7.5 mm; leaflet blades linear-elliptic to lanceolate, 1.5–4 × 0.6–1 cm, glabrous or sparsely puberulent, base cuneate, apex rounded and mucronate. Inflorescences umbellate heads, 8–12-flowered; bracts and bracteoles minute, inconspicuous; peduncle to 25 cm. Flowers sessile. Calyx 3–4 mm. Corolla bright yellow, ca. 1 cm; standard orbicular to oblong, long clawed; wings obliquely ovate to ob-

long; keel 8–9 mm, incurved and obtuse, longer than standard. Legume linear, 7–12 × 2–3 mm, white villous, with a curved beak. Seeds ca. 1 mm in diam.

Cultivated in Taiwan [native to S Africa].

Lotononis bainesii is widely grown as a fodder crop. It is particularly suitable for red lateritic soils.

52. ROTHIA Persoon, Syn. Pl. 2: 638, [659]. 1807, nom. cons., not Schreber (1791), nor Lamarck (1792), nor Borkhausen (1792).

落地豆属 *luo di dou shu*

Li Jianqiang (李建强); Roger M. Polhill, Michael G. Gilbert

Dillwynia Roth (1806), not Smith (1805); *Goetzea* Reichenbach; *Westonia* Sprengel.

Herbs, annual, ± prostrate. Stipules distinct, sometimes solitary. Leaves digitately 3-foliolate, usually petiolate. Inflorescences terminal or leaf-opposed but often appearing axillary, racemose, few flowered, shortly pedunculate to almost sessile; bracts and bracteoles inconspicuous. Calyx cuplike; tube membranous; lobes 5, subequal, with dorsal pair somewhat curved. Corolla shorter than calyx; standard ovate or oblong, with a linear claw; wings and keel ± as long as standard; keel rounded at apex. Stamens 10, connate into a dorsally split sheath; anthers uniform. Ovary sessile; ovules many; style straight. Legume sessile, ± oblong or linear, ± inflated or slightly compressed, many seeded. Seeds strongly curved; funicle ± as long as seed.

Two species: one in Asia, one in the drier regions of Africa; one species in China.

1. Rothia indica (Linnaeus) Druce, Rep. Bot. Exch. Club Soc. Brit. Isles 3: 423. 1914.

落地豆 *luo di dou*

Trigonella indica Linnaeus, Sp. Pl. 2: 778. 1753; *Dillwynia trifoliata* Roth; *Rothia trifoliata* (Roth) Persoon; *Westonia humifusa* Sprengel, nom. illeg. superfl.; *W. indica* (Linnaeus) Kuntze.

Herbs, annual, ascending, to 25 cm. Stems adpressed-pilose. Stipules lanceolate, ca. 4 × 1.5 mm. Petiole ca. 7 mm; petiolules to 1 mm; leaflet blades oblanceolate, 1–2.2 × 0.4–0.8 cm, both surfaces adpressed pilose, base cuneate, apex rounded

to broadly acute. Inflorescences leaf-opposed or extra-axillary, 1–3-flowered, congested; bracts filiform, ca. 1.5 mm; peduncle 0–2.5 mm. Pedicel ca. 1.5 mm. Calyx obconical, 4–6 mm, divided to slightly below middle; lobes triangular, apex acuminate. Corolla yellow, exerted from calyx; standard oblong-orbicular, 5.5–6.5 mm, abaxially pilose along midline; wings oblong, slightly shorter than standard; keel ± as long as standard. Legume narrowly oblong, 3.5–5.5 × ca. 0.2 cm, straight, slightly compressed, more than 20-seeded, adpressed pubescent. Seeds brown, D-shaped, ca. 1.3 mm, smooth. Fl. and fr. Mar–Jun.

Sandy areas; near sea level. Guangdong, Hainan [India, Indonesia, Laos, Malaysia, Sri Lanka, Thailand, Vietnam; N Australia].

12. Tribe GENISTEAE

染料木族 ran liao mu zu

Wei Zhi (韦直); Nicholas J. Turland

This tribe comprises 25 genera and 550–570 species, mainly distributed in Africa and Europe, but with most species of *Lupinus* in North and South America. The 13 Chinese species (in seven genera) are all introduced and cultivated, and the present authors are not aware of any among them having become naturalized. Therefore, full treatments are not provided here; instead there follow a synopsis and key to the genera and species.

Cytisus Desfontaines (金雀儿属 jin que er shu). One species is widely cultivated: *C. scoparius* (Linnaeus) Link (Enum. Hort. Berol. Alt. 2: 241. 1822; *Spartium scoparium* Linnaeus, Sp. Pl. 2: 709. 1753), native to the N Atlantic islands and Europe.

Genista Linnaeus (染料木属 ran liao mu shu). One species is widely cultivated: *G. tinctoria* Linnaeus (Sp. Pl. 2: 710. 1753; *G. sibirica* Linnaeus), native from W Europe to Kazakhstan and W Siberia, approaching the N borders of China. It might be expected to occur as a native species in N parts of Xinjiang, Nei Mongol, or Heilongjiang.

Laburnum Fabricius (毒豆属 du dou shu). One species is cultivated in NE and NW China: *L. anagyroides* Medikus (Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 363. 1787; *Cytisus laburnum* Linnaeus, Sp. Pl. 2: 739. 1753), native to SC Europe.

Lembotropis Grisebach (变黑金雀儿属 bian hei jin que er shu). One species is widely cultivated: *L. nigricans* (Linnaeus) Grisebach (Spic. Fl. Rumel. 1: 10. 1843; *Cytisus nigricans* Linnaeus, Sp. Pl. 2: 739. 1753), native to C and SE Europe.

Lupinus Linnaeus (羽扇豆属 yu shan dou shu). At least seven species are widely cultivated: *L. albus* Linnaeus (Sp. Pl. 2: 721. 1753), *L. angustifolius* Linnaeus (loc. cit.: 721, 1200), *L. luteus* Linnaeus (loc. cit.: 722), and *L. micranthus* Gussone (Fl. Sicul. Prodr. 2: 400. 1828–1832), all native to the Mediterranean region; *L. perennis* Linnaeus (loc. cit.: 721) and *L. polyphyllus* Lindley (Bot. Reg. 13: t. 1096. 1827), both native to North America; and *L. pubescens* Bentham (Pl. Hartw. 169. 1845), native to South America.

Spartium Linnaeus (鹰爪豆属 ying zhua dou shu). One species is widely cultivated: *S. junceum* Linnaeus (Sp. Pl. 2: 708. 1753), native from the N Atlantic islands (Azores), through the Mediterranean region, to the Caucasus region.

Ulex Linnaeus (荆豆属 jing dou shu). One species is widely cultivated: *U. europaeus* Linnaeus (Sp. Pl. 2: 741. 1753), native to W Europe.

- 1a. Shrubs or small trees; leaves 3-foliolate, simple, or reduced to scales.
- 2a. Small trees; leaves 3-foliolate; flowers in pendulous racemes 10–30 cm *Laburnum anagyroides*
- 2b. Shrubs; leaves 3-foliolate, simple, or reduced to scales; flowers not in pendulous racemes.
- 3a. Branchlets sharply spiny; leaves reduced to scales *Ulex europaeus*
- 3b. Branchlets not spiny; leaves 3-foliolate or simple, not reduced to scales.
- 4a. Calyx subspathaceous; corolla 20–25 mm; legume 6–9 cm *Spartium junceum*
- 4b. Calyx not spathaceous; corolla 7–18(–20) mm; legume 1.5–4(–7) cm.
- 5a. Leaves simple; legume linear, 1.5–2.5 cm × 3–4 mm *Genista tinctoria*
- 5b. Leaves 3-foliolate, or simple on upper part of plant; legume broadly linear or linear-lanceolate, 2–4(–7) cm × 5–10(–13) mm.
- 6a. Corolla 7–10 mm; legume 5–6(–7) mm wide *Lembotropis nigricans*
- 6b. Corolla 16–18(–20) mm; legume 8–10(–13) mm wide *Cytisus scoparius*
- 1b. Herbs; leaves digitately 5- or more foliolate (*Lupinus*).
- 7a. Corolla yellow, somewhat purple at tip of keel *Lupinus luteus*
- 7b. Corolla white to blue, pale red, lilac, or violet.
- 8a. Proximal calyx lip divided to near base; plants annual.
- 9a. Leaflets oblanceolate to obovate, 5–15 mm wide, both surfaces hirsute; racemes shorter than leaves; plants brownish hirsute *Lupinus micranthus*
- 9b. Leaflets linear, 2–4 mm wide, adaxially glabrous; racemes longer than leaves; plants white appressed villous *Lupinus angustifolius*
- 8b. Proximal calyx lip bifid but not divided to near base; plants annual or perennial (sometimes short lived).
- 10a. Plants perennial; stems subglabrous; flowers alternate, pedicel 4–10 mm.
- 11a. Leaflets usually 8, 2–5 × 0.7–1.4 cm; racemes lax *Lupinus perennis*
- 11b. Leaflets 9–15, 4–10 × 1–2.5 cm; racemes dense *Lupinus polyphyllus*
- 10b. Plants annual or short-lived perennial; stems hairy; flowers alternate or verticillate, pedicel 2–5 mm.
- 12a. Racemes 10–35 cm, flowers usually verticillate; leaflets both surfaces densely villous; seeds less than 6 mm *Lupinus pubescens*
- 12b. Racemes 5–10 cm, flowers usually alternate; leaflets abaxially and at margin appressed sericeous, adaxially glabrous; seeds more than 8 mm *Lupinus albus*

13. Tribe AMORPHEAE

紫穗槐族 *zi sui huai zu*

Wei Zhi (韦直); Michael G. Gilbert

Small trees, shrubs, or herbs, with glandular punctae or pustules. Leaves paripinnate, imparipinnate, or less often pinnately to digitately 3-foliolate or 1-foliolate; stipels sometimes present. Flowers in racemes, spikes, or heads, terminating axis of origin (most becoming leaf-opposed). Calyx marcescent, upper lobes sometimes joined higher. Corolla papilionaceous, imperfect, or absent; lower petals often epistemonous, sometimes little differentiated. Stamens (5–)9 or 10, almost free to largely joined, usually monadelphous; anthers usually uniform, sometimes gland-tipped. Ovary 1- or 2(–7)-ovuled. Legumes 1-seeded, indehiscent, continuous with receptacle and falling together with marcescent calyx. Seeds with small hilum.

Eight genera and 240–250 species: all native to the Americas; one species (introduced) in China.

The Amorpheae was first thought to be most closely related to the Psoraleae, but both molecular and morphological analyses now place it as sister to the Dalbergioid clade (e.g., McMahon & Hufford, *Amer. J. Bot.* 91: 1219–1230. 2004).

53. AMORPHA Linnaeus, Sp. Pl. 2: 713. 1753.

紫穗槐属 *zi sui huai shu*

Shrubs or shrublets, glandular-punctate. Leaves imparipinnate; stipules small or absent; leaflets many, small. Inflorescences terminal, racemes or spikes, these sometimes in leafy panicles. Calyx 5-toothed. Corolla reduced to just standard, embracing stamens and pistil. Stamens 10, monadelphous, sheath split adaxially; anthers uniform. Ovary sessile, 2-ovuled. Legume oblong, falcate, indehiscent, often densely glandular-warty, falling with persistent calyx. Seed with small hilum.

About 15 species: mostly in North America, including Mexico; one species (introduced) in China.

1. *Amorpha fruticosa* Linnaeus, Sp. Pl. 2: 713. 1753.

紫穗槐 *zi sui huai*

Deciduous shrubs, 1–4 m tall. Stems pubescent, glabrescent. Leaves 10–15 cm; stipules bristlelike; petiole 1–2 cm; leaflets 11–25, ovate to elliptic, 1–4 × 0.6–2 cm, abaxially white puberulent, adaxially glabrous or sparsely pubescent, black glandular-dotted, base broadly cuneate or rounded, apex acute, obtuse, or retuse, with a shortly curved spinose tip. Racemes 1 to many, terminal or subterminal, 7–15 cm, densely pubescent; bracts 3–4 mm. Calyx 2–3 mm; teeth triangular, shorter than tube. Standard purple, obcordate, ca. 6 mm; wings and keel

absent. Style puberulent. Legume dark brown, oblong, curved, 6–10 × 2–3 mm, apex beaked, strongly glandular-dotted, 1-seeded. Seed lustrous, reniform, ca. 5 mm, curved upward. Fl. May–Jun, fr. Jul–Sep.

Sandy banks of ravines, cultivated or escaped. Anhui, Fujian, Gansu, Guangxi, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Zhejiang [native to North America; widely introduced in N Asia and Europe].

This is a variable species with many synonyms and described varieties in North America. It is regarded as a noxious weed in some parts of the United States.

14. Tribe DALBERGIEAE

黄檀族 huang tan zu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Kai Larsen

Trees, shrubs, or lianas, with hard wood. Leaves pulvinate, mostly imparipinnate; stipels absent; leaflets 5 to numerous, alternate or opposite, rarely 1–3-foliolate. Flowers in racemes or panicles, small; bracts and bracteoles usually small and caducous, rarely persistent. Calyx 5-toothed, upper lobes joined higher, sometimes spathaceous, 2-lipped or subtruncate. Standard generally without calluses. Stamens all connate into a sheath split along upper (adaxial) side, or vexillary filament free or absent, or sheath split also on lower side forming two bundles; anthers uniform, dorsifixed, dehiscent by slits or by pores. Ovary sessile to long stipitate, 1- to few ovuled. Legumes with 1(to few) specialized indehiscent seed-chambers, winged, drupaceous or flat and curved, eglandular. Seeds 1–3, globose to oblong-reniform.

About 26 genera (excluding genera of Aeschynomeneae) and ca. 825 species: distributed in the tropics; two genera and 30 species (14 endemic, one introduced) in China.

- 1a. Trees, shrubs, or woody climbers; corolla usually white, sometimes light green, light yellow, or purple; legume oblong, ligulate, elliptic, or strap-shaped, rarely half-moon-shaped 54. *Dalbergia*
1b. Trees; corolla yellow; legume orbicular, compressed, broadly winged around margin 55. *Pterocarpus*

54. DALBERGIA Linnaeus f., Suppl. Pl. 52, 316. 1782, nom. cons.

黄檀属 huang tan shu

Trees, shrubs, or woody climbers. Leaves alternate, imparipinnate; stipules often small and early caducous; leaflets alternate, rarely opposite, estipellate. Inflorescences terminal or axillary, racemes or panicles, usually numerous flowered; bracts and bracteoles usually small, caducous, rarely persistent. Flowers small. Calyx campanulate, 5-toothed; teeth unequal, rarely subequal, lowest tooth usually largest, upper pair usually wider than others and partially connate. Corolla white, pale green, or rarely purple; petals clawed; standard ovate, oblong, or orbicular; wings with base cuneate, truncate, or sagittate; keel often boat-shaped, \pm united above. Stamens 9 or 10, monadelphous, usually united in an open sheath, or diadelphous and then in 2 bundles of 5 each (5+5), or 9 united and 1 free (9+1); anthers erect, small, dehiscent by short apical slits. Ovary stipitate, few ovuled; style usually incurved, long or short; stigma terminal, small. Fruit an indehiscent legume, of 4 types: (a) strongly flattened, translucent, raised over seeds ("samaroid"); (b) thicker, \pm leathery, often with lenticels; (c) thick, \pm woody; (b+c) when more than 1 seed develops, legume lomentaceous. Seeds reniform, compressed, those of legume types b, c, and b+c usually not visible from outside; radicle inflexed.

Between 100 and 120 species: tropical and subtropical regions of North and South America, Africa, and Asia; 29 species (14 endemic, one introduced) in China.

Due to insufficient data, *Dalbergia tonkinensis* (species no. 29) could not be included in the key.

Dalbergia esquirolii H. Léveillé (Fl. Kouy-Tchéou, 230. 1914–1915), described from Guizhou, could not be treated here because no material was seen by the present authors.

- 1a. Stamens 10, filaments connate at base, irregularly separated to incompletely 3–5-adelphous on upper part; leaflets (7 or)9(or 11–13), ovate to ovate-lanceolate, 1.5–4 \times 0.8–1.6 cm 28. *D. polyadelpha*
1b. Stamens 9 or 10, monadelphous or diadelphous.
2a. Stamens 10, diadelphous (5+5).
3a. Leaflets numerous (13–21); stipules large, leaflike, ovate-lanceolate or falcate-lanceolate; inflorescence densely brown villous, pubescent, or silky pubescent.
4a. Legume 2.5–5 \times 0.6–1 cm; leaflets abaxially densely pubescent 25. *D. sericea*
4b. Legume 5–11 \times 1.2–3.2 cm; leaflets sparsely appressed puberulent, gradually glabrous.
5a. Length of leaflet blade nearly 3 \times width; legume wider, apex obtuse or broadly cuneate, base rounded or broadly cuneate 23. *D. stipulacea*
5b. Length of leaflet blade 1.5–2 \times width; legume narrower, apex acute, base attenuate to cuneate 24. *D. assamica*
3b. Leaflets fewer (7–17); stipules small, not leaflike; inflorescence sparsely puberulent.
6a. Leaflets shortly acuminate, never emarginate at apex; standard obovate-oblong; corolla pink 26. *D. hainanensis*
6b. Leaflets rounded, obtuse, or slightly emarginate at apex; standard orbicular; corolla white or light purple.
7a. Leaflet abaxial surface with finely reticulate veinlets; legume 16–23 mm wide 11. *D. volubilis*
7b. Leaflet abaxial surface without obvious reticulate veinlets; legume narrow, 13–15 mm wide 27. *D. hupeana*
2b. Stamens 9, occasionally 10, monadelphous.
8a. Leaflets less than 2 cm, numerous, usually more than 21 (21–41) (except *D. tsoi* occasionally with 17).

- 9a. Legume reddish brown when dry, strongly reticulate throughout; leaflets 17–27, elliptic to oblong 1. *D. tsoi*
- 9b. Legume not reddish brown, finely reticulate everywhere or opposite seeds; leaflets 21–42, linear-oblong or narrowly oblong, 2.5–3 × as long as wide.
- 10a. Leaflets trapezoid-oblong, two sides of base asymmetric, one side rounded, other side cuneate; petals long clawed; inflorescence densely rusty puberulent; legume brown and shiny when dry 2. *D. pinnata*
- 10b. Leaflets symmetric at base (except *D. millettii* with leaflets slightly asymmetric); petals shortly clawed; inflorescence somewhat hairy or glabrous; legume dull colored, not shiny when dry.
- 11a. Leaflets membranous, oblong, 8–15 mm, appressed brown silky pubescent on both surfaces; standard transversely elliptic 3. *D. peishaensis*
- 11b. Leaflets papery, linear-oblong or narrowly oblong, glabrous on both surfaces or hairy when young, glabrous when old; standard oblong-obovate, broadly obovate, or orbicular.
- 12a. Leaflets 31–41, obtuse or rounded at both ends; legume ca. 7.5 mm wide 4. *D. stenophylla*
- 12b. Leaflets 21–35, truncate, emarginate at apex, cuneate or broadly cuneate at base; legume 10–20 mm wide.
- 13a. Standard oblong-obovate; legume reticulate opposite seeds 5. *D. mimosoides*
- 13b. Standard orbicular; legume veined throughout 6. *D. millettii*
- 8b. Leaflets more than 2 cm (except *D. hancei* with leaflets 1–2 cm).
- 14a. Leaflets 3–5.
- 15a. Leaflets suborbicular or obcordate, length and width of blade subequal, apex rounded and shortly caudate, both surfaces glabrous and adaxially shiny when old; teeth of calyx unequal, lowest lanceolate, longer than others; legume faintly reticulate opposite seeds 7. *D. sissoo*
- 15b. Leaflets ovate, longer than wide, obtuse, slightly emarginate at apex, abaxially densely rusty pubescent; teeth of calyx subequal, triangular; legume distinctly reticulate throughout 8. *D. henryana*
- 14b. Leaflets 5–15.
- 16a. Legume half-moon-shaped, less than 2.5 cm when 1-seeded; inflorescence sessile; woody climbers growing in littoral region 9. *D. candenatensis*
- 16b. Legume oblong, ligulate-oblong, or strap-shaped, longer than 3 cm; inflorescence with peduncle; plants not of littoral region.
- 17a. Teeth of calyx subequal in length, triangular, broadly triangular, ovate-triangular, or ovate.
- 18a. Standard not reflexed, obovate or elliptic; ovary shortly stipitate 10. *D. hancei*
- 18b. Standard reflexed, orbicular or elliptic; ovary long stipitate.
- 19a. Leaflets ovate-lanceolate, 7–10 cm, apex acute 12. *D. kingiana*
- 19b. Leaflets ovate, elliptic, or oblong, 3.5–6 cm, apex obtuse, rounded, or emarginate.
- 20a. Climbers; leaflets 5–7, base cuneate; standard elliptic, base shortly auriculate 13. *D. benthamii*
- 20b. Trees; leaflets 9–13, base rounded; standard orbicular, base not auriculate 14. *D. burmanica*
- 17b. Teeth of calyx unequal in length, lowest teeth lanceolate or oblong (*D. rimosa* with lowest tooth of calyx lanceolate, but subequal in length to others).
- 21a. Leaflets less than 4 cm (1–4 × 0.8–2 cm; though sometimes larger and up to 5.5 cm in *D. ximengensis*).
- 22a. Climbers or shrubs; standard oblong, obovate-oblong, or suborbicular.
- 23a. Large climbers; leaflets thinly leathery, glabrous, shiny adaxially, veinlets finely and closely reticulate, conspicuously prominent on both surfaces 15. *D. dyeriana*
- 23b. Shrubs; leaflets papery, appressed sparsely grayish white pubescent and veins slightly impressed adaxially 16. *D. jingxiensis*
- 22b. Trees; standard obovate or obcordate.
- 24a. Leaflets (7–)11–13, leathery, ovate-elliptic or oblong, adaxially glabrous, terminal and lateral leaflets subequal in length 17. *D. cultrata*
- 24b. Leaflets 7–9, thickly papery, elliptic or obovate, adaxially appressed pubescent, terminal and lateral leaflets very unequal in length (terminal leaflet often more than 4 × as large as lowest) 18. *D. ximengensis*

- 21b. Leaflets more than 4 cm (4–14 × 2–8 cm; though sometimes smaller and less than 4 cm in *D. yunnanensis*).
- 25a. Leaflets rounded at both ends, slightly emarginate at apex.
- 26a. Leaflets 2.5–5(–7.5) × 1–2(–3.3) cm, length usually ca. 2 × width, both surfaces appressed puberulent, more densely so on midvein abaxially; standard obovate-oblong 19. *D. yunnanensis*
- 26b. Leaflets 5–14 × 4.5–8 cm, length and width subequal or length slightly exceeding width, both surfaces glabrous; standard oblong ... 20. *D. obtusifolia*
- 25b. Leaflets acuminate or acute at apex.
- 27a. Leaflets glabrous on both surfaces; legume ± inconspicuously reticulate, reticulation distinctly prominent opposite seeds 21. *D. odorifera*
- 27b. Leaflets sparsely hairy; legume reticulate throughout, reticulation conspicuously and slightly prominent opposite seeds 22. *D. rimosa*

1. *Dalbergia tsoi* Merrill & Chun, Sunyatsenia 2: 244. 1935.

红果黄檀 hong guo huang tan

Woody climbers. Leaves 8–10 cm; rachis pubescent; leaflets 17–27; petiolules ca. 1 cm; blades elliptic to oblong, 10–17(–30) × 5–8(–14) cm, both surfaces appressed pubescent, veins and veinlets obscure, base rounded or broadly cuneate, apex rounded, emarginate. Panicles axillary, branches few, corymbose. Flowers minute, ca. 3.5 mm. Pedicels 1–1.5 mm, puberulent as calyx and bracteoles; basal bracteoles orbicular; epicalycine bracteoles suborbicular, persistent. Calyx campanulate, 5-toothed; teeth all ciliate, elliptic except lowest cucullate-lanceolate, longer, apex rounded or obtuse. Corolla ca. 3 mm; standard transversely elliptic, emarginate, cuneate, base attenuate to a short, broad claw; wings and keel oblong, all auriculate, with claw narrow, ca. 0.8 mm. Stamens 9, monadelphous. Ovary oblong, glabrous except on long stipe and along lower suture; stigma capitate. Legume oblong or linear, compressed, 5–7 × 1.2–2 cm, with rounded, apiculate tip, distinctly and strongly reticulate throughout or opposite seeds, usually reddish brown when dry, 1- or rarely 2-seeded. Seeds reniform, compressed, ca. 9 × 5 mm. Fl. Apr, fr. Jul–Dec.

- Dense forests, ravines; 100–900 m. Hainan.

2. *Dalbergia pinnata* (Loureiro) Prain, Ann. Roy. Bot. Gard. (Calcutta) 10: 48. 1904.

斜叶黄檀 xie ye huang tan

Derris pinnata Loureiro, Fl. Cochinch. 2: 432. 1790; *Dalbergia tamarindifolia* Roxburgh.

Trees or sometimes shrubby climbers. Branches long, flexuose; young branchlets puberulent. Leaves 12–15 cm; rachis and petioles densely puberulent as short petiolules; stipules lanceolate, ca. 5 mm, puberulent; leaflets 21–42, trapezoid-oblong, small, 12–18 × 5–7.5 mm, firmly papery, both surfaces puberulent, at length abaxially glaucous, adaxially glabrescent, base asymmetric, apex rounded, slightly emarginate. Panicles axillary, congested, with corymblike branches, 1.5–5 × 1.2–2.5 cm; peduncles short, as branches and pedicels densely puberulent; bracts and bracteoles persistent, ovate, puberulent. Flowers small, ca. 6 mm. Calyx campanulate, ca. 3 mm, outside puberulent or glabrescent; teeth ovate, upper 2 subconnate. Corolla white; petals long clawed; standard reflexed, ovate; wings with sagittate base; keel united above, blade hastate on upper side below. Stamens 9 or 10, monadelphous. Ovary stip-

itate, glabrous; ovules 2 or 3. Legume brown and shiny when dry, oblong-ligulate, thin, 2.5–6 × 1–1.4 cm, glabrous, uniformly finely reticulate, base attenuate to long slender stipe, acute, 1–4-seeded. Seeds narrow, ca. 18 × 4 mm. Fl. Jan–Apr, fr. May–Jul.

Dense forests; below 1400 m. Guangxi, Hainan, Xizang, Yunnan [Indonesia (Java), Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

3. *Dalbergia peishaensis* Chun & T. C. Chen, Acta Phytotax. Sin. 7: 24. 1958.

白沙黄檀 bai sha huang tan

Woody climbers. Stems glabrous; young shoots sparsely puberulent. Leaves 10–14 cm; petiole puberulent; leaflets 21–31; petiolules ca. 1 mm, puberulent; blades oblong, small, 8–15 × 3–6 mm, membranous, both surfaces appressed silky pubescent, base rounded or cuneate, somewhat slightly oblique, apex obtuse to rounded, cuspidate. Panicles axillary, 3–5 × 3–4 cm, rusty pubescent; peduncles 1–2 cm. Flowers minute, 2.5–3 mm, aggregated at apices of few branches of inflorescence; bracts ovate, minute, ca. 0.8 mm, apex acute; bracteoles 2, oblong, larger than bracts, persistent. Pedicel ca. 1 mm. Calyx shallowly campanulate, ca. 1 mm, 5-toothed; teeth unequal, lowest broadly ovate, upper pair half-orbicular, larger than lateral ones, lateral 2 ovate. Corolla white; petals subequal in length, shortly clawed; standard transversely elliptic, base subhastate, apex emarginate; wings obovate-oblong; keel broadly elliptic, base of blade auriculate. Stamens 10, monadelphous. Ovary stipitate, oblanceolate, glabrous except on lower suture, 3-ovuled; style short. Legume oblong, finely reticulate throughout. Fl. Apr, fr. Jun.

- Dense forests. Hainan.

4. *Dalbergia stenophylla* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 56. 1901.

狭叶黄檀 xia ye huang tan

Dalbergia cavaleriei H. Léveillé.

Woody climbers. Branchlets dark brown or nearly blackish when dry, glabrous or sparsely puberulent. Leaves 4–6(–10) cm; rachis and petiole sparsely puberulent; stipules caducous, ovate; leaflets 31–41; petiolules short, subglabrous; blades narrowly linear-oblong, ca. 12 × 3 mm, both surfaces appressed sparsely puberulent when young, soon glabrous except abaxi-

ally on midvein, apex obtuse or rounded. Panicles axillary, 4–6 cm; peduncles, rachis, branches, and pedicels puberulent. Flowers small, 3–4 mm; bracteoles puberulent, basal persistent, lanceolate, epicalycine bracteoles embracing lower 1/3 of calyx tube, deciduous. Calyx campanulate, ca. 1.5 mm, sparsely puberulent; teeth short, upper pair obtuse, lateral acute, lowest longer than others, broadly lanceolate. Corolla white or pale yellow; petals shortly clawed; standard broadly ovate to suborbicular, emarginate; wings oblong; keel obovate, blade hastate on upper side below. Stamens 9, monadelphous; filaments alternately shorter and longer. Ovary long stipitate, sparsely pubescent along sutures, 3-ovuled; style short; stigma small. Legume ligulate to strap-shaped, 2.5–5 × ca. 0.75 cm, base attenuate to distinct stipe, apex subacute, 1- or 2-seeded. Seeds reniform, compressed. Fl. May–Jun, fr. Aug–Nov.

Among bushes in wet ravines. Guangxi, Guizhou, Hubei, Sichuan [Vietnam].

5. *Dalbergia mimosoides* Franchet, Pl. Delavay. 187. 1890.

象鼻藤 xiang bi teng

Dalbergia millettii Benth. var. *mimosoides* (Franchet) Thothathri.

Shrubs, 4–6 m tall. Branches many, spreading; young shoots densely brown tomentose. Leaves 6–8(–10) cm; rachis, petiole, and petiolules densely pubescent initially, gradually glabrescent; stipules caducous, ovate, membranous; leaflets 21–35, linear-oblong, small, 6–12(–18) × 5–6 mm, both surfaces finely rusty pubescent especially abaxially on midvein when young, glabrous or nearly so when old, finely reticulate veinlets blackish when dry, base rounded or broadly cuneate, margin of young leaflets of flowering branches obscurely undulate, apex truncate, obtuse, or emarginate. Panicles axillary, shorter than leaves, 1–1.5 cm, with corymbose branches; peduncles, rachis, branches, and pedicels appressed pubescent. Flowers small, ca. 5 mm, slightly compact; bracteoles deciduous, ovate, pubescent. Calyx campanulate, sparsely puberulent; teeth ciliate, ovate except lowest lanceolate. Corolla white or pale yellow; petals shortly clawed; standard oblong-obovate, emarginate; wings obovate-oblong; keel elliptic. Stamens 9, occasionally 10, monadelphous; filaments alternately longer and shorter. Ovary stipitate, glabrous except lower suture sparsely pilose, 2- or 3-ovuled; style short; stigma small. Legume stipitate, oblong to strap-shaped, 3–6 × 1–2 cm, leathery, glabrous, reticulate opposite 1 seed, rarely 2-seeded, base obtuse or cuneate, apex acute. Seeds reniform, compressed, ca. 10 × 6 mm. Fl. Apr–May, fr. Jun–Aug.

• Open forests, ravines, among bushes on mountain slopes; 800–2000 m. Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang.

6. *Dalbergia millettii* Benth. J. Linn. Soc., Bot. 4(Suppl.): 34. 1860.

香港黄檀 xiang gang huang tan

Woody climbers. Branches sometimes hooked, blackish when dry, glabrous. Leaves 4–5 cm; stipules caducous, narrowly lanceolate, 2–3 mm; petiole and petiolules glabrous; leaflets 23–35, small, closely set, linear or narrowly oblong,

(4–)10–15 × (2–)3–5 mm, both surfaces glabrous, base rounded or obtuse, somewhat unequal on two sides, apex truncate, sometimes emarginate; distal ones often obovate or obovate-oblong. Panicles axillary, compact, 1–1.5 cm; peduncles, rachis, and branches very sparsely puberulent. Pedicel very short. Flowers minute, 2.5–3 mm; bracts persistent; bracteoles deciduous, ovate, ciliate, embracing lower 1/3 of calyx tube. Calyx campanulate, ca. 1 mm, nearly glabrous; teeth short, subequal in length, lateral ovate, upper 2 rounded, subconnate, obtuse except for lowest, lowest triangular, acute. Corolla white; petals shortly clawed; standard orbicular, emarginate; wings ovate-oblong; keel oblong. Stamens 9, monadelphous. Ovary stipitate, sparsely pilose, 2- or 3-ovuled; style short; stigma small. Legume stipitate, oblong to linear, compressed, 4–6 × 1.2–1.6 cm, glabrous, leathery, reticulate veined throughout, but more conspicuously so opposite 1 seed, rarely 2-seeded, base broadly cuneate, apex obtuse or rounded. Seeds reniform, compressed, 8–12 × ca. 6 mm. Fl. May, fr. Aug.

• Sparse or dense forests, ravines; 300–800 m. Guangdong, Guangxi, Shaanxi, Zhejiang.

7. *Dalbergia sissoo* Roxburgh ex Candolle, Prodr. 2: 416. 1825.

印度黄檀 yin du huang tan

Trees, with rough, gray bark. Branches numerous, horizontally spreading; young shoots puberulent. Leaves 12–15 cm; stipules caducous, lanceolate; leaflets 3–5; petiolules 8–10 mm, initially puberulent, ultimately glabrous; blades green when young, shiny when old, suborbicular, occasionally rhombic-obovate, 3.5–6 cm, puberulent when young, glabrous when old, apex rounded, shortly caudate. Panicles axillary, short, ca. 7 cm; rachis and bracteoles puberulent. Flowers nearly sessile, fragrant; bracts caducous, lanceolate. Calyx campanulate, 6–7 mm, enclosed within 2 large, broadly ovate, membranous, very caducous bracteoles, outside puberulent, 5-toothed; teeth shorter than tube, upper pair rounded, lateral 2 subacute, shorter than lowest, lowest rather narrowly lanceolate. Corolla yellowish white; petals rather long clawed; standard broadly obovate, emarginate; wings and keel oblanceolate, base without auricles, cuneate, attenuate to claw. Stamens 9, monadelphous. Ovary oblong, pubescent, with rather long stipe ca. 4.5 mm, 4–6-ovuled; style very short; stigma capitate. Legume pale brown when dry, linear-oblong to strap-shaped, 4–8 × 0.6–1.2 cm, leathery, glabrous, faintly veined opposite 1 or 2(or 3) seeds. Seeds reniform, compressed. Fl. Mar–Apr, fr. Jun–Nov.

Cultivated; 900–1500 m. Fujian, Guangdong, Hainan, Taiwan, Zhejiang [native to India; widely cultivated in the tropics].

8. *Dalbergia henryana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 46. 1901.

蒙自黄檀 meng zi huang tan

Woody climbers, large. Young shoots densely rusty pubescent. Leaves 12–22 cm; rachis, petiole, and petiolules densely rusty pubescent; leaflets 4 or 5, ovate, 6–8.5 × 3.5–4 cm, leathery, abaxially pubescent, adaxially glabrous, base cuneate or rounded, apex obtuse, sometimes emarginate, acute when young; terminal leaflets largest. Panicles axillary, lax, (3.5–)6–8.5 cm; peduncles short, ca. 1 cm, rusty pubescent as

rachis, branches, and pedicels. Flowers 5–6 mm; bracts and bracteoles deciduous, ovate, puberulent, obtuse. Calyx campanulate, 3–4 mm, outside rusty tomentose, 5-toothed; lowest tooth longest, lanceolate, others subequal, triangular, obtuse, upper 2 subconnate. Corolla white; petals long clawed; standard reflexed, suborbicular, slightly emarginate, wings and keel auriculate at base; wings oblong. Stamens 9, monadelphous; filaments free in upper 1/4 and alternately shorter and longer. Ovary long stipitate, puberulent as stipe, 2-ovuled; style subulate, slender; stigma minute. Legume yellowish brown when dry, ligulate to strap-shaped, thinly leathery, finely reticulate throughout, somewhat shiny, 1- or 2-seeded. Fl. Mar–Apr, fr. Jun–Aug.

• Dense forests on mountain slopes, among bushes at bases of mountains; 700–1300 m. Guizhou, SE Yunnan.

9. *Dalbergia candenatensis* (Dennstedt) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 49. 1901.

弯枝黄檀 wan zhi huang tan

Cassia candenatensis Dennstedt, Schlüssel Hortus Malab. 32. 1818; *Dalbergia monosperma* Dalzell.

Woody climbers. Branches blackish when dry, glabrous, apex often twisting and spirally hooked. Leaves 6–7.5 cm; leaflets (3–)5–7; petiolules ca. 1.5 mm, slightly puberulent or subglabrous; blade abaxially glaucous, adaxially dark green, obovate-oblong, 1.5–3 × 1–2 cm, abaxially very sparsely appressed puberulent, adaxially glabrous, base cuneate, sometimes subrounded, apex rounded or obtuse, sometimes emarginate. Panicles axillary, 2.5–5 cm, subsessile or with very short peduncles; branches slightly puberulent; bracts ovate-lanceolate; bracteoles larger than bracts, broadly ovate, embracing lower 1/3 of calyx tube. Calyx broadly campanulate, subglabrous; teeth subequal, broadly triangular to ovate, obtuse, upper pair of teeth subconnate. Corolla white; petals long clawed; standard reflexed, oblong; wings obovate-oblong, sagittate on upper side; keel oblong, united above, auriculate on upper side below. Stamens 9(or 10), monadelphous. Ovary stipitate, oblong, glabrous, 1(or 2)-ovuled; style subulate, slender; stigma small. Legume shortly stipitate, half-moon-shaped, compressed, 2–2.4 cm when 1-seeded, 3.5–4 cm when 2-seeded, 1–1.2 cm wide, firmly leathery, ventral suture straight, dorsal suture arcuate, faintly reticulate throughout, not prominent opposite seeds. Seeds reniform, compressed, ca. 6 × 3 mm. Fl. May–Aug, fr. Jun–Nov.

Coastal areas, climbing on trees in forests; sea level to 200 m. SE and SW Guangdong, SE Guangxi [Bangladesh, Cambodia, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam].

10. *Dalbergia hancei* Benth, J. Linn. Soc., Bot. 4(Suppl.): 44. 1860.

藤黄檀 teng huang tan

Woody climbers. Branches slender; young shoots slightly pubescent; branchlets sometimes hooked or twisted. Leaves 5–8 cm; stipules caducous, lanceolate, membranous; leaflets 7–13, narrowly oblong or obovate-oblong, 10–20 × 5–10 mm, both surfaces initially sparsely appressed pubescent, soon glabrous adaxially, persistently pubescent abaxially, base rounded or broadly cuneate, apex obtuse or rounded, emarginate. Flowers

small, in axillary, compact, short panicles; bracts early deciduous, scaly, boat-shaped, imbricate, enclosing young inflorescence. Pedicel 1–2 mm; bracteoles deciduous, rusty puberulent, basal minute, lanceolate, epicalycine pair ovate, enclosing base of calyx tube. Calyx broadly campanulate, ca. 3 mm, outside rusty puberulent; teeth broadly triangular, very short, ciliate, obtuse or rounded except for lowest, lowest rather longer, acute. Corolla greenish white, fragrant, ca. 6 mm, rather long clawed; standard elliptic, emarginate, base of blade truncate, auriculate, attenuate to broad claw; wings and keel oblong. Stamens 9 or sometimes 10, monadelphous, sometimes with a free vexillary stamen. Ovary shortly stipitate, linear, glabrous except for ciliate ventral suture; style short; stigma small. Legume distinctly stipitate, oblong or strap-shaped, compressed, 3–7 × 0.8–1.4 cm, glabrous, 1-seeded, rarely 2–4-seeded. Seeds reniform, compressed, ca. 8 × 5 mm. Fl. Mar–May, fr. Jun–Nov.

• Among bushes on mountain slopes, by streams along valleys; 200–1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Zhejiang.

11. *Dalbergia volubilis* Roxburgh, Pl. Coromandel 2: 48. 1805.

南亚黄檀 nan ya huang tan

Woody climbers, large, occasionally erect. Branches glabrescent, twining or twisted into spiral hooks; branchlets puberulent, striate. Leaves 7–20 cm; leaflets 9–13, obovate to ovate-elliptic, 2.5–7 × 1.6–3 cm, glabrous, veinlets finely reticulate abaxially, base narrow, apex obtuse and mucronulate. Panicles terminal, rarely axillary, copiously branched, 13.5–30 cm. Flowers 6–8 mm; bracts lanceolate. Calyx campanulate, outside rusty tomentose; teeth 5, lowest one lanceolate, much longer than rest, upper 2 subconnate. Corolla blue to lilac; standard orbicular, reflexed; wings obliquely oblong, clawed; keel boat-shaped, clawed. Stamens 10, diadelphous (5+5), staminal sheath 4.5–5.5 mm; filaments free in upper 1/3. Ovary 4–5 mm, stipitate, pubescent at sutures and stipe, 2-ovuled; style slender; stigma minute. Legume indehiscent, oblong, rarely ovate-oblong, 5–9 × 1.6–2.3 cm, stalked, glabrous, uniformly reticulate, narrowed at base, obtuse to mucronate at apex. Seeds reniform, compressed, ca. 7 × 5 mm. Fl. Jan–May, fr. Mar–Jun.

Sparse forests, climbing on trees, among bushes; 100–700 m. SW Yunnan (Gengma) [Bangladesh, India, Myanmar, Sri Lanka].

This species was recorded from China by S. J. Li and H. Wu (J. Trop. Subtrop. Bot. 15: 171–172. 2007) based on *G. Forrest 12139* (BM, K).

12. *Dalbergia kingiana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 67: 289. 1898.

滇南黄檀 dian nan huang tan

Shrubs. Branches puberulent, soon glabrous, lenticellate. Leaves 17–20 cm; rachis and petiole initially puberulent, later glabrous; leaflets 7–9; petiolules initially finely puberulent, ultimately glabrescent; blade abaxially pale green, ovate-lanceolate, 7–10 × 3–4 cm, lowest rather smaller than others, leathery, abaxially sparsely puberulent when young, soon glabrous, adaxially glabrous, base cuneate, apex acute. Panicles axillary, short, 5–7 × ca. 5 cm; branches broadly spreading; peduncles, rachis, branches, and short pedicels rusty tomentose; bracts

deciduous, ovate-lanceolate, obtuse; bracteoles spatulate-lanceolate. Calyx campanulate, extremely rusty tomentose; teeth subequal, triangular, upper 2 subconnate, broader. Corolla white; petals long clawed; standard reflexed, orbicular; keel half-moon-shaped, auriculate as elliptic wings. Stamens 9, monadelphous. Ovary long stipitate, oblong, glabrous, 2-ovuled; style subulate, slender; stigma minute. Legume unknown.

- Mountain slopes; ca. 1300 m. Yunnan (Simao).

13. *Dalbergia benthamii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 67: 289. 1898 [*"benthami"*].

两粤黄檀 liang yue huang tan

Climbing shrubs, large, occasionally erect. Branches black, long, glabrous. Leaves 12–17 cm; rachis and petioles appressed puberulent; leaflets 5–7, ovate or elliptic, 3.6–6 × 1.5–3 cm, subleathery, abaxially glaucous and minutely appressed puberulent, adaxially glabrous, base cuneate, apex obtuse, emarginate. Panicles axillary, ca. 4 × 2.5 cm; short peduncle and slender pedicels ca. 2.5 mm, rusty tomentose. Flowers ca. 8 mm, fragrant; bracts deciduous, oblong; bracteoles persistent, lanceolate. Calyx campanulate, outside rusty tomentose; teeth subequal, ovate-triangular, obtuse. Corolla white; petals long clawed; standard reflexed, elliptic, base shortly auriculate, emarginate; wings obovate-oblong, incurved auriculate on upper side below as keel; keel half-moon-shaped, with claws ca. as long as calyx. Stamens 9, monadelphous. Ovary long stipitate, glabrous, 2- or 3-ovuled; style subulate. Legume ligulate-oblong, 5–7.5 × ca. 1.5 cm, thinly leathery, 1- or 2-seeded. Seeds reniform, compressed, ca. 11 × 5 mm. Fl. Mar–Jun, fr. Jul–Oct.

Sparse forests, among bushes, climbing on trees; 100–700 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan [Vietnam].

14. *Dalbergia burmanica* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 448. 1897.

缅甸黄檀 mian dian huang tan

Trees, 7–10 m tall, with spreading branches, or occasionally climbers. Branches densely rusty puberulent. Leaves 12–17 cm; stipules very caducous, lanceolate, small; leaflets 9–13; petiolules 2–3 mm; blades narrowly ovate and acute when young, oblong and obtuse when mature, (2.5–)4–6 × 1.5–2 cm, lowest rather smaller than others, membranous, both surfaces initially silky pubescent, ultimately subglabrous adaxially, sparsely pubescent abaxially, base slightly unequal, apex rounded or emarginate. Panicles lateral, with corymbose branches, appearing shortly before leaves; peduncles, branches, rachis, and ca. 2 mm pedicels densely rusty pubescent. Flowers 6–8 mm; basal and epicalycine bracteoles lanceolate. Calyx campanulate, ca. 3 mm, outside rusty pubescent; teeth subequal, acute, upper pair rather wider than lower 3. Corolla purple or white (according to field notes); petals long clawed; standard orbicular, emarginate, reflexed; wings and keel with downward auricles on upper side below. Stamens 9, monadelphous. Ovary long stipitate, glabrous, 1–3-ovuled; style slender; stigma small. Legume distinctly stipitate, yellowish brown, ligulate-oblong, thin, (5–)7–9 × 1.5–2 cm, glabrous, acute and with an apiculate tip at apex when young, rounded at both ends when

mature, reticulate throughout, 1- or 2-seeded. Seeds narrowly oblong, compressed, 10–12 × 6–7 mm. Fl. Apr, fr. Jun.

Mountain slopes, broad-leaved forests, by streams; 600–1700 m. Guizhou, Yunnan [Myanmar].

15. *Dalbergia dyeriana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 44. 1901.

大金剛藤 da jin gang teng

Woody climbers, large. Branchlets rather slender, glabrous. Leaves 7–13 cm; leaflets (7–)9–15; petiolules 2–2.5 mm; blade adaxially shiny, obovate-oblong or oblong, 2.5–4(–5) × 1–2(–2.5) cm, thinly leathery, abaxially sparsely appressed pubescent, adaxially glabrous, veinlets finely closely reticulate, prominent on both surfaces, apex rounded or retuse, occasionally emarginate. Panicles axillary, lax, few flowered, 3–5 × ca. 3 cm; peduncles, branches, and pedicels puberulent. Pedicel 1.5–3 mm; bracts and bracteoles deciduous, oblong and lanceolate. Calyx campanulate, puberulent, soon glabrous; teeth triangular, obtuse, upper 2 widest, lowest longer than others, subacute. Corolla yellowish white; petals slightly long clawed; standard oblong, emarginate; wings ovate-oblong, without auricles; keel narrowly oblong, shortly auriculate on upper side below. Stamens 9, monadelphous; filaments free in upper 1/4. Ovary shortly stipitate, puberulent or subglabrous, 1–3-ovuled; style short, glabrous; stigma small. Legume distinctly stipitate, oblong or strap-shaped, compressed, 5–6(–9) × 1.2–2 cm, thinly leathery, finely but distinctly reticulate opposite 1(or 2) seeds, base cuneate, apex rounded, obtuse, or acute, with apiculate tip. Seeds oblong-reniform, ca. 10 × 5 mm. Fl. May.

• Mountain slopes, among bushes and thickets, along valleys; 700–1500 m. Gansu, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang.

16. *Dalbergia jingxiensis* S. Y. Liu, J. Trop. Subtrop. Bot. 12: 575. 2004.

靖西黄檀 jing xi huang tan

Shrubs, 2–3 m tall. Branches spreading; branchlets grayish black, densely yellowish brown pubescent, glabrescent, lenticellate. Leaves 4–11 cm; petiole 8–12 mm, puberulent as rachis; leaflets 5–15, abaxially light green, adaxially green, oblong, 1–3.5 × 0.8–1.5 cm, abaxially sparsely appressed light brown pubescent and veins prominent, adaxially sparsely appressed grayish white pubescent and veins slightly impressed, base broadly cuneate or subrounded, margin revolute, apex rounded, obtuse, or emarginate, cuspidate; petiolules ca. 2 mm, densely light brown pubescent; terminal leaflet obovate-oblong. Panicles terminal and axillary, few branched, 2–5 × 1–3.5 cm, densely dirty brown pubescent. Flowers small, compact. Pedicel 1–2 mm. Calyx campanulate, 5–6 mm, densely blackish brown appressed hispidulous; tube ca. 4 mm, 5-toothed; teeth triangular or triangular-oblong, ca. 1 mm, lowest one longer than others, ca. 1.5 mm, inside densely pubescent, apex acuminate, rounded, or obtuse. Corolla white; petals subequal in length, clawed, claw 2–3 mm; standard obovate, orbicular, or suborbicular, sometimes cucullate, 3–4 × 2–2.5 mm, slightly unequally sided, apex rounded, obtuse, or emarginate; wings

oblong; keel obovate-oblong, as wings ca. 4 mm and auriculate on upper side below. Stamens 9, monadelphous, 4–5 mm; filaments alternately longer and shorter, occasionally among them 1 or 2 reduced and enlarged to petaloid. Ovary long stipitate, oblong, 1.5–2 mm, glabrous, 2- or 3-ovuled; style slender, ca. 2 mm; stigma small. Legume unknown. Fl. Jan–Feb.

- Rocky hills, thickets. Guangxi (Jingxi).

17. *Dalbergia cultrata* Graham ex Benth in Miquel, Pl. Jungh. 254. 1852.

黑黄檀 hei huang tan

Dalbergia fusca Pierre; *D. fusca* var. *enneandra* S. Q. Zou & J. H. Liu.

Trees; wood red. Branches slender, slightly finely appressed puberulent, glabrescent, lenticellate. Leaves 10–15 cm; stipules caducous; leaflets (7–)11–13, ovate or elliptic, 2–4 × 1.2–2 cm, leathery, abaxially appressed pubescent, at length glabrescent, adaxially glabrous, apex rounded or emarginate, cuspidate. Panicles axillary and infra-axillary, 4–5 cm; branches 2–3 cm, pubescent. Pedicel ca. 2 mm, slender, puberulent; bracteoles linear, ca. 1 mm, acute. Calyx campanulate, 5-toothed; upper 2 teeth conical, subconnate, lateral 2 broadly triangular, acute, lowest tooth ca. 1.5 × as long as others. Corolla white; petals rather long clawed; standard broadly obovate or subreniform; wings elliptic; keel arcuate. Stamens (9 or)10, monadelphous. Ovary stipitate, glabrous, 3-ovuled. Legume stipitate, oblong to strap-shaped, 6–10 × 0.9–1.5 cm, thinly leathery, finely reticulate opposite 1 or 2 seeds, both ends obtuse. Seeds reniform, compressed, ca. 10 × 6 mm. Fl. Feb, fr. Apr–Sep.

Mixed forests, mountain slopes; ca. 1700 m. Yunnan (Simao) [Laos, Myanmar, Vietnam].

18. *Dalbergia ximengensis* Y. Y. Qian, J. Trop. Subtrop. Bot. 7: 151. 1999.

西盟黄檀 xi meng huang tan

Trees, ca. 8 m tall. Branchlets lenticellate, pubescent. Leaves 10–14 cm; stipules caducous; leaflets 7–9, elliptic or obovate, 1.3–5.5 × 0.7–3.5 cm, thickly papery, both surfaces appressed pubescent, densely so on midvein abaxially, base rounded or cuneate, rarely subcordate, apex emarginate, rarely rounded and cuspidate. Panicles terminal, 5–7 cm, pubescent; branches 2–4 cm. Pedicel 0.5–1 mm, pubescent; bracteoles ovate, 0.8–1 mm, apex obtuse. Calyx campanulate, ca. 2 mm, outside pubescent, 5-toothed; upper 2 ovate, ca. 1 mm, lateral 2 oblong, 0.8–0.9 mm, apex obtuse, lowest one lanceolate, ca. 1.3 mm. Corolla white; petals clawed; standard obcordate, 3.3–3.5 mm; wings oblong-obovate, 2.7–2.9 mm; keel obliquely elliptic, 2.4–2.6 mm. Stamens 10, monadelphous. Ovary stipitate, pubescent on ventral suture, 2-ovuled. Legume oblong, 5.5–9.5 × 1.5–2.2 cm, base cuneate or attenuate, apex obtuse, cuspidate, valves thinly leathery, reticulate, 1- or 2-seeded. Seeds reniform, compressed, 8–13 × 5–9 mm. Fl. Apr, fr. Jul–Oct.

- Forests; ca. 1200 m. Yunnan (Ximeng).

19. *Dalbergia yunnanensis* Franchet, Pl. Delavay. 187. 1890.

滇黔黄檀 dian qian huang tan

Dalbergia collettii Prain; *D. yunnanensis* var. *collettii* (Prain) Thothathri.

Woody climbers, large, sometimes erect shrubs or small trees. Stems subsarmentose; branches numerous, spreading, some occasionally reduced to spiral-hooked. Leaves 20–30 cm; rachis puberulent; stipules caducous; leaflets (13–)15–19; petioles ca. 5 mm, pubescent; blades oblong, elliptic-oblong, or ovate, 2.5–5(–7.5) × 1–2(–3.3) cm, subleathery or membranous, both surfaces finely appressed pubescent, more densely so on midvein abaxially, both ends rounded, occasionally apex obtuse, emarginate. Panicles terminal, often extending into axils of upper leaves, compact, cymose; peduncles and branches puberulent. Flowers shortly pedicellate; bracteoles deciduous, ovate, membranous. Calyx campanulate, outside sparsely pubescent, 5-toothed; teeth with ciliate margins, lowest oblong, apex rounded, longer than others, others subequal and ca. as long as tube, upper 2 subconnate. Corolla white; standard broadly obovate-oblong, emarginate, cuneate base attenuate to short, broad claw; wings obovate-oblong; keel half-moon-shaped, shortly auriculate on upper side below, long, narrowly clawed as wings. Stamens 9, monadelphous; filaments free on upper side, alternately shorter and longer. Ovary long stipitate, glabrous or puberulent along suture, 2- or 3-ovuled; style short; stigma capitate. Legume oblong or elliptic, 3.5–6.5 × 2–2.5 cm, leathery, glabrous, distinctly reticulate opposite 1 seed or occasionally 2 or 3 seeds. Seeds orbicular-reniform, compressed, ca. 12 × 7 mm. Fl. Apr–Jun, fr. Aug–Oct.

Forests, sparse forests, thickets, mountain slopes; 1300–2200 m. Guangxi, Guizhou, Sichuan, Yunnan [Myanmar].

20. *Dalbergia obtusifolia* (Baker) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 42. 1901.

钝叶黄檀 dun ye huang tan

Dalbergia ovata Graham ex Benth var. *obtusifolia* Baker in J. D. Hooker, Fl. Brit. India 2: 231. 1876; *D. glauca* Kurz.

Trees, 13–17 m tall. Branches spreading; young shoots pendulous, glabrous. Leaves 20–30 cm; stipules early caducous; leaflets 5–7; petioles ca. 5 mm; blades elliptic or obovate, sometimes basal suborbicular, subleathery, terminal one largest, 5–14 × 4.5–8 cm, both surfaces glabrous, both ends rounded or sometimes apex emarginate and base broadly cuneate. Panicles terminal or axillary, 15–20 × 12–15 cm; peduncles and pedicels yellowish puberulent; bracts and bracteoles ovate, puberulent; bracteoles ca. 1/2 as long as calyx, caducous. Calyx campanulate, 5-toothed; teeth ovate, shorter than tube, obtuse, lowest tooth slightly longer than others. Corolla pale yellow; petals slightly long clawed; standard oblong, emarginate; wings and keel with downward short auricles on upper side below. Stamens 10, monadelphous; filaments alternately shorter and longer. Ovary long stipitate, elliptic, glabrous, 3-ovuled; style long; stigma small. Legume oblong to strap-shaped, 4–8 × 1–1.5 cm, leathery, distinctly reticulate opposite 1 or 2 seeds. Seeds reniform, ca. 10 × 6 mm; testa brown, smooth. Fl. Mar, fr. Jun–Aug.

• Open forests, mountain slopes, among bushes at riversides; 800–1300 m. Guizhou, S Yunnan.

21. *Dalbergia odorifera* T. C. Chen, Acta Phytotax. Sin. 8: 351. 1963.

降香黄檀 jiang xiang huang tan

Trees, 10–15 m tall, glabrous except for young shoots; inflorescence and ovary puberulent. Bark brown or pale brown, rough, longitudinally splitting; branchlets with small, dense lenticels. Leaves 12–25 cm; stipules caducous; petiole 1.5–3 cm; leaflets (7–)9–11(–13); petiolules 3–5 mm; blades ovate or elliptic, (2.5–)4–7(–9) × 2–3.5 cm, distal longest, basal pair ca. 1/3 as long as distal, subleathery, base rounded or broadly cuneate, apex obtuse to acuminate. Panicles axillary, 8–10 × 6–7 cm; peduncles 3–5 cm. Flowers ca. 5 mm, initially aggregated at apices of corymbose branches of inflorescence, lax afterward; bracts subtriangular, ca. 0.5 mm; bracteoles broadly ovate, ca. as long as ca. 1 mm pedicels. Calyx campanulate, ca. 2 mm, 5-toothed; lowest tooth lanceolate, longer than others, other teeth broadly ovate, acute. Corolla creamy white or pale yellowish; petals subequal in length, clawed; standard obcordate, ca. 5 mm including claw, ca. 3 mm wide, apex truncate, emarginate; wings oblong; keel half-moon-shaped, arcuate on lower side. Stamens 9, monadelphous. Ovary narrowly elliptic, 1- or 2-ovuled, with long stipe ca. 2.5 mm. Legume ligulate-oblong, 4.5–8 × 1.5–1.8 cm, leathery, apex obtuse or acute, base abruptly narrowed to slender 5–10 mm stipe; reticulation distinctly prominent opposite 1(or 2) seeds. Seeds reniform, compressed. Fl. Apr–Jun, fr. Jul–Dec.

• Open forests, mountain slopes, margins of forests or wastelands, beside villages; 100–500 m. Fujian, Hainan, Zhejiang.

22. *Dalbergia rimosa* Roxburgh, Fl. Ind., ed. 1832, 3: 233. 1832.

多裂黄檀 duo lie huang tan

Dalbergia discolor Blume ex Miquel; *D. mengsuoensis* Y. Y. Qian.

Woody climbers, sometimes erect shrubs or small trees, 4–6(–10) m tall. Leaves 10–20 cm; rachis and petioles puberulent; leaflets 5–9; petiolules puberulent; blade ovate, obovate, or elliptic, (3–)5–8 × (2–)2.5–5 cm, firmly papery, abaxially sparsely puberulent, adaxially glabrous and with dense, prominent veinlets, base rounded or broadly cuneate, apex acute, obtuse, or emarginate, cuspidate. Panicles terminal or sometimes extending into axils of uppermost leaves, 5–25 × 4–12 cm, with cymose, dichotomous branches. Flowers minute, ca. 3 mm; bracts and bracteoles persistent, ovate-lanceolate, ca. 1/2 as long as calyx tube. Calyx campanulate, 5-toothed; teeth subequal, rounded or obtuse except lowest rather longer and lanceolate. Corolla white or yellowish green; petals shortly clawed; standard obovate-oblong, emarginate; wings obovate or elliptic; keel half-moon-shaped. Stamens 9(or 10), monadelphous. Ovary stipitate, oblong, puberulent, 1- or 2-ovuled; style short. Legume oblong or sometimes elliptic, 5–8 × 2–4 cm, leathery, glabrous, reticulate throughout but strongly so opposite 1(or 2) seeds, base broadly cuneate, apex acute or obtuse. Seeds reniform, much compressed, ca. 12 × 6 mm; testa brown, shiny. Fl. Apr–Jun, fr. Jul–Dec.

Forests, open forests, mountain slopes, ravines, riversides; 800–1700 m. Yunnan [NE India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

23. *Dalbergia stipulacea* Roxburgh, Fl. Ind., ed. 1832, 3: 233. 1832.

托叶黄檀 tuo ye huang tan

Woody climbers, large, sometimes small trees. Bark brown; branches spreading. Leaves 15–20 cm; stipules early caducous, ovate-lanceolate to lanceolate, membranous; leaflets 17–21; petiolules 1.5–2 mm; blades oblong to obovate-oblong, 2.8–3.5 × 1–1.2(–2) cm, lowest sometimes elliptic, 1.2–1.5 × ca. 1 cm, thinly papery, abaxially sparsely appressed puberulent, adaxially glabrous, base broadly cuneate or rounded, apex acute, ultimately rounded or obtuse, sometimes emarginate. Panicles in axils of leaves, which at apex of branchlets rise among clustered, scalelike, early-deciduous bracts; peduncle, rachis, branches, and bracts appressed brown pubescent, lower part of inflorescence with many scattered, ovate, membranous, empty bracts. Bracts of flowers smaller than inflorescence bracts; bracteoles obovate, enclosing ca. 2/3 of calyx. Calyx campanulate, puberulent; teeth ovate, shorter than tube except lowest ca. as long as tube. Corolla pale blue or pale purplish red; petals distinctly clawed; standard orbicular, slightly emarginate; wings with downward auricles on upper side below. Stamens 10, diadelphous (5+5). Ovary glabrous except for pubescent long stipe, 1(or 2)-ovuled; style slender; stigma small. Legume broadly ligulate to ovoid or elliptic, (6.5–)9–11 × 3.2(–4) cm, firmly leathery, glabrous, not veined except sometimes opposite seed where mesocarp is much thickened, base cuneate or rounded, apex obtuse or rounded, 1-seeded, very rarely 2-seeded. Seeds reniform, ca. 15 × 8 mm. Fl. Apr–May, fr. Aug–Jan.

Open forests, ravines to mountain summits; 700–1700 m. Yunnan [Cambodia, NE India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

24. *Dalbergia assamica* Benth in Miquel, Pl. Jungh. 256. 1852.

秧青 yang qing

Dalbergia balansae Prain; *D. lanceolaria* Linnaeus f. var. *assamica* (Benth) Thothathri; *D. szemaoensis* Prain.

Trees, 7–10 m tall. Branches horizontally spreading. Leaves 25–30 cm; stipules caducous, large, leaflike, ovate to ovate-lanceolate, ca. 10 × 6 mm; leaflets 13–21; petiolules ca. 5 mm, puberulent, soon glabrous; blade oblong or oblong-elliptic, 3–5(–6) × 1.5–2.5(–3) cm, papery, both surfaces sparsely appressed puberulent, but soon glabrous adaxially, with close, finely, slightly prominent reticulate veinlets on both surfaces, base rounded or cuneate, apex obtuse, rounded or emarginate. Panicles axillary, lax, 10–15 × 7.5–10 cm; peduncles, branches, and pedicels densely rusty puberulent; bracts and bracteoles deciduous, ovate, puberulent. Flowers 6–8 mm. Calyx campanulate, 5-toothed; lowest tooth longer than tube and ca. 2 × as long as triangular, acute others, upper 2 teeth subconnate. Corolla white, with purple stripes inside; petals long clawed; standard reflexed, orbicular, emarginate, base slightly thickened;

wings broadly ovate; keel half-moon-shaped, with downward auricles on upper side below as wings. Stamens 10, diadelphous (5+5); filaments free in upper 1/3, alternately shorter and longer. Ovary stipitate, pubescent, 1–4-ovuled; style subulate, slender; stigma minute. Legume broadly ligulate or oblong to strap-shaped, 5–9 × 1.2–1.8(–2.5) cm, leathery, base attenuate, cuneate, apex acute, inconspicuously reticulate opposite 1 or 2(–4) seeds. Seeds reniform, compressed, ca. 6 × 2.5 mm. Fl. Apr–Jul, fr. Sep–Dec.

Mixed forests, open forests, among bushes, mountain slopes, riversides, wastelands beside villages; 300–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan, Zhejiang [India (Sikkim), Laos, Myanmar, Thailand, Vietnam].

One of us (Chen) prefers to recognize *Dalbergia assamica* and *D. balansae* as separate species.

25. *Dalbergia sericea* G. Don, Gen. Hist. 2: 375. 1832.

毛叶黄檀 mao ye huang tan

Dalbergia hircina Buchanan-Hamilton ex Benth.

Trees, 5–6 m tall. Young shoots silky puberulent, gradually glabrous. Leaves 15–25 cm; stipules caducous, subfalcate-lanceolate, silky puberulent; leaflets 17–21, ovate or oblong, 2.5–5 × 2–2.5 cm, papery, abaxially rather densely puberulent, adaxially appressed puberulent, base rounded or cuneate, apex slightly obtuse. Panicles axillary, rather shorter than leaves, 2.5–5 × 1.2–2 cm; peduncles, branches, and pedicels densely silky puberulent. Calyx campanulate, densely puberulent, 5-toothed; teeth obtuse, shorter than tube except lowest lanceolate and ca. as long as tube. Corolla white; petals rather long clawed; standard suborbicular, emarginate. Stamens 10, diadelphous (5+5). Ovary shortly stipitate, pubescent, 4- or 5-ovuled; style slender; stigma small. Legume narrowly ligulate, 2.5–5 × 0.6–1 cm, leathery, reticulate opposite 1–3 seeds, base attenuate to short stipe, apex acute. Seeds reniform, compressed, ca. 5 × 2.5 mm. Fl. Apr–May, fr. Jun–Sep.

Mountain slopes, roadsides; 900–1600 m. SE Xizang (Zayü) [Bhutan, NE India, Myanmar, Nepal, N Vietnam].

26. *Dalbergia hainanensis* Merrill & Chun, Sunyatsenia 2: 32. 1934.

海南黄檀 hai nan huang tan

Trees, 9–16 m tall. Bark dull gray, furrowed; young shoots slightly puberulent. Leaves 15–18 cm; rachis and petioles brown puberulent; leaflets (7–)9–11; petiolules 3–4 mm, brown puberulent; blades ovate or elliptic, 3–5.5 × 2–2.5 cm, papery, both surfaces yellowish brown appressed puberulent when young, subglabrous when old, base rounded or broadly cuneate, apex shortly acuminate, obtuse at tip. Panicles axillary, 4–9(–13) × 4–10 cm, slightly brown puberulent. Flowers small, initially orbicular; bracteoles ovate to suborbicular. Calyx ca. 5 mm, brown puberulent as pedicels, 5-toothed; teeth unequal. Corolla pale pink; petals each with long claw 2–2.5 mm; standard obovate-oblong, ca. 9 × 5 mm; wings rhombic-oblong, 9–10 × ca. 3 mm; shorter keel and wings with downward auricles on upper side. Stamens 10, diadelphous (5+5). Ovary shortly

stipitate, linear, densely puberulent except on style, 1–3-ovuled. Legume straight or slightly curved, oblong, oblanceolate, or strap-shaped, 5–9 × 1.5–1.8 cm, brown puberulent, obscurely prominent and reticulate opposite 1(or 2) seeds, base cuneate, attenuate to a short stipe, apex acute. Seeds reniform, compressed. Fl. Mar–Apr, fr. May–Jul.

• Sparse or dense forests, mountain slopes; sea level to 700 m. Hainan.

27. *Dalbergia hupeana* Hance, J. Bot. 20: 5. 1882.

黄檀 huang tan

Dalbergia hupeana var. *bauhiniifolia* Pampanini; *D. sacerdotum* Prain.

Trees, 10–20 m tall. Bark dull gray; young shoots pale green, glabrous. Leaves 15–25 cm; leaflets 7–11, elliptic to oblong-elliptic, 3.5–6 × 2.5–4 cm, subleathery, both surfaces glabrous, shiny adaxially, veinlets prominent, base rounded or broadly cuneate, apex obtuse or slightly emarginate. Panicles terminal or extending into axils of uppermost leaves, 15–20 × 10–20 cm, sparsely rusty puberulent. Flowers 6–7 mm. Pedicel ca. 5 mm, sparsely rusty puberulent as calyx; bracts and bracteoles deciduous, ovate, pubescent. Calyx campanulate, 2–3 mm, 5-toothed; upper pair of teeth rounded, subconnate, lateral 2 smaller, ovate, lowest tooth lanceolate, ca. 2 × as long as others. Corolla white or light purple; petals clawed; standard orbicular, emarginate; wings obovate and half-moon-shaped; keel auriculate on upper side below. Stamens 10, diadelphous (5+5). Ovary shortly stipitate, glabrous except at base and stipe, 2- or 3-ovuled; style slender; stigma capitate, small. Legume oblong or broadly ligulate, 4–7 × 1.3–1.5 cm, thinly leathery, reticulate opposite 1 or 2(or 3) seeds, base attenuate to stipe, apex acute. Seeds reniform, 7–14 × 5–9 mm. Fl. May–Jul.

• Forests, among bushes on mountain slopes, ravines, by streams, woodland slopes; 800–1400 m. Anhui, Fujian, Guangdong, Guangxi, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.

28. *Dalbergia polyadelpa* Prain, Ann. Roy. Bot. Gard. (Calcutta) 10: 84. 1904.

多体蕊黄檀 duo ti rui huang tan

Trees, 4–10 m tall. Leaves 10–20 cm; rachis and petioles densely rusty tomentose; stipules very caducous, ovate-lanceolate; leaflets (7 or)9(or 11–13); petiolules ca. 3 mm, densely rusty tomentose; blades ovate to ovate-lanceolate, 1.5–4(–7) × 0.8–1.6(–2.8) cm, firmly papery, abaxially glabrescent or sparsely appressed puberulent, adaxially glabrous except for puberulent midvein, base cuneate or rounded, apex acuminate or obtuse, sometimes mucronate. Panicles axillary or infra-axillary, rather compact, ca. 6 × 5.5 cm; peduncles slightly stout, glabrous. Pedicel ca. 5 mm; bracts ovate; bracteoles deciduous, lanceolate, sparsely pubescent. Calyx campanulate, ca. 5 mm; tube outside glabrous below, sparsely puberulent above, 5-toothed; teeth ciliate, unequal, lowest lanceolate, ca. as long as tube and longer than others, lateral 2 triangular; upper pair ovate, subconnate. Corolla white; petals distinctly striate; standard broadly ovate, base attenuate to short, broad claw; oblong

wings and half-moon-shaped keel with downward broad auricles on upper side below. Stamens 10; filaments connate at base, irregularly separated to incompletely 3–5-adelphous on upper part. Ovary glabrous except for pubescent long stipe, 3- or 4-ovuled; style subulate-conical; stigma minute. Legume oblong to strap-shaped, (4–)7–9.5 × 1.5–2.8 cm, leathery, glabrous except for short stipe, distinctly reticulate opposite 1 or 2 seeds. Seeds reniform to subreniform-oblong, compressed, ca. 9 × 4 mm; testa black, shiny. Fl. Mar, fr. Apr–May.

Mountain slopes, thickets, bushes; 1000–2000 m. Guangxi, Guizhou, Yunnan [N Vietnam].

29. *Dalbergia tonkinensis* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 42. 1901.

越南黄檀 yue nan huang tan

Trees, 5–13 m tall. Leaves 9–20 cm; rachis glabrous; stipules caducous, small, tawny puberulent; leaflets (7–)9–11; petiolules glabrous; blades ovate, 4–9 × (1.8–)3–5 cm, subleathery, sparsely puberulent when young, soon glabrous, base rounded, apex shortly acuminate. Panicles corymbose, axillary, ca. 5 × 3.8 cm. Flowers white, fragrant. Legume distinctly stipitate, ovoid or oblong, 5–7.5 × ca. 2 cm, reticulate opposite seeds, base cuneate, apex subacute. Seeds reniform, compressed, ca. 9 × 5 mm.

Hainan [N Vietnam].

The present authors have seen no material of this species from China.

55. **PTEROCARPUS** Jacquin, Select. Stirp. Amer. Hist. 283. 1763, nom. cons., not Linnaeus (1754).

紫檀属 zi tan shu

Trees. Branches spreading, glabrous to pubescent. Leaves alternate, imparipinnate; stipules small, caducous; stipels absent; leaflets alternate, rarely subopposite. Inflorescence a simple raceme to a lax, terminal or axillary panicle. Flowers yellow; bracts and bracteoles small, caducous. Pedicel articulate. Calyx often incurved, obconical, 5-toothed; teeth short, upper 2 ± connate. Corolla papilionaceous, exserted beyond calyx; petals long clawed; standard ovate to orbicular, as keel crisped on margin. Stamens 10, monadelphous to diadelphous (5+5 or 9+1), staminal sheath split open dorsally; anthers versatile. Ovary stipitate or sessile, 2–6-ovuled; style incurved, filiform, glabrous; stigma terminal. Legume indehiscent, orbicular, compressed, broadly hardened winged around margin, usually 1-seeded; style persistent, incurved. Seeds oblong or subreniform, hilum small.

About 30 species: pantropical with the exception of Australia, with the greatest diversity in Africa; one species in China.

1. *Pterocarpus indicus* Willdenow, Sp. Pl. 3: 904. 1802.

紫檀 zi tan

Pterocarpus wallichii Wight & Arnott; *P. zollingeri* Miquel.

Trees, 15–25 m tall. Bark grayish. Leaves 15–30 cm; stipules early caducous; petiolules 4–7 mm; rachis and petiolule glabrous; leaflets 5–7(–11), ovate-elliptic, 5–11 × 3.5–5.5 cm, thinly papery, both surfaces glabrous, veins slender, lateral veins 6–8 pairs, base truncate, margin entire, apex shortly acuminate. Inflorescence a raceme or panicle, mostly axillary, rarely terminal, 10–18 cm, puberulent. Flowers 1–1.5 cm; bracteoles 2, linear-oblong, at base of calyx. Pedicel 7–10 mm, slender. Calyx campanulate, 4–6 mm, appressed brown silky; teeth broadly

triangular, ca. 1 mm, 2 larger than others. Corolla yellow; petals long clawed; standard ovate-orbicular to oblong, crisped at margin; wings oblong, ca. as long as standard; keel narrowly oblong, smaller than wings. Stamens 10, diadelphous (9+1), sheath 8–9 mm, vexillary filament free to base, filaments of varying heights; anthers versatile. Ovary shortly stipitate, oblong, 7–8 mm, densely pubescent; ovules 2; style curved; stigma minute. Legume orbicular, 4–4.5 × 3.5–4.5 cm, shortly stalked, flat, slightly hairy and reticulate opposite seed, 1-seeded, broadly winged around margin, wing to 2 cm wide. Seed brownish, reniform, narrow and oblique. Fl. Mar–Apr, fr. Apr–May.

Open forests on slopes, cultivated in villages and gardens. Guangdong, Taiwan, Yunnan [India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; Pacific islands].

15. Tribe AESCHYNOMENEAE

合萌族 he meng zu

Sa Ren (萨仁); Alfonso Delgado Salinas

Herbs or shrubs, sometimes scandent, rarely small trees, sometimes glandular with pellucid punctate or with tuberculate-based hairs. Leaves pari- or imparipinnate; leaflets usually 5 to many, sometimes 1–4, alternate or opposite; stipules sometimes appendiculate below point of attachment, sometimes spinescent; stipels usually absent. Inflorescences racemose or sometimes paniculate, fasciculate, or subcymose, or flowers solitary, axillary or terminal; bracts similar to stipules or large and circular, often enclosing flowers and fruit; bracteoles paired. Calyx campanulate with subequal lobes or teeth, or bilabiate. Corolla papilionaceous. Stamens 10, usually monadelphous or diadelphous (5+5); anthers uniform or dimorphic. Legumes usually a loment or lomentaceous (except *Arachis* unjointed and geocarpic), usually straight or slightly curved, or sometimes coiled or plicate, enclosed in calyx. Seeds reniform; hilum short, lateral.

About 23 genera (*Arthrocarpum* I. B. Balfour and *Pachecoa* Standley & Steyermark have been merged into *Chapmannia* Torrey & A. Gray) and ca. 530 species: tropical, subtropical, and warm-temperate areas; seven genera (three introduced) and 14 species (five introduced) in China.

The circumscription adopted here follows V. E. Rudd's revision of Aeschynomeneae (in R. M. Polhill & P. H. Raven, *Advances Legume Syst.* 1: 347–354. 1981). Recently, all members of Aeschynomeneae have been included in an enlarged Dalbergieae sensu lato (Lavin & Klitgaard in Lewis et al., *Legumes World*, 307–335. 2005). However, the two elements are so disparate morphologically that a conservative treatment has been adopted here, i.e., maintaining both tribes.

The Aeschynomeneae contains members of economic importance. Notable among them is the worldwide crop *Arachis hypogaea* (peanut). Cultivars of two additional species of *Arachis* and two of *Stylosanthes* have been introduced and grown as fodder plants in China.

- 1a. Stipules not spurred, free or largely or partly adnate to petiole.
 - 2a. Stipules free, not adnate to petiole; leaflets 9–17 per leaf; flowers pedicellate, with a short hypanthium; calyx subequally 5-toothed; legume walls longitudinally parallel veined 59. *Ormocarpum*
 - 2b. Stipules largely or partly adnate to petiole (pseudopetiole); leaflets 3 or 4 per leaf; flowers sessile, with a long hypanthium; calyx usually 2-lipped; legume walls reticulate veined.
 - 3a. Leaflets 4 per leaf; legume not a loment, geocarpic, subterete, apex not beaked 57. *Arachis*
 - 3b. Leaflets 3 per leaf; legume a loment, not geocarpic, compressed, apex of apical article beaked 61. *Stylosanthes*
- 1b. Stipules spurred below point of insertion, peltate or bilaterally auriculate.
 - 4a. Leaflets 8 to many per leaf; bracts small, shorter than flowers, not enclosing flowers and fruit; bracteoles present.
 - 5a. Inflorescences racemose, lax; bracts membranous, usually persistent; fruit with articles flattened, not plicate, not enclosed in calyx 56. *Aeschynomene*
 - 5b. Inflorescences usually scorpioid-cymose, congested; bracts scarious, caducous; fruit with articles plicate, enclosed in calyx 60. *Smithia*
 - 4b. Leaflets usually 2 or 4 per leaf; bracts enlarged, usually enclosing flowers and often fruit; bracteoles absent.
 - 6a. Leaves pinnate, with 4 leaflets; leaflet blades black punctate; leaf rachis swollen to shortly winged; bracts suborbicular to obliquely reniform; fruit with 1 or 2 articles 58. *Geissaspis*
 - 6b. Leaves digitate, with 2 leaflets; leaflet blades pellucid punctate; leaf rachis not fleshy; bracts usually peltate, longer than broad; fruit with 2–7 articles 62. *Zornia*

56. AESCHYNOMENE Linnaeus, Sp. Pl. 2: 713. 1753.

合萌属 he meng shu

Herbs or shrublets. Vegetative and reproductive parts covered usually with viscid tubercular-based trichomes. Stems erect or creeping, often hollow. Stipules spurred below point of insertion, peltate or unilaterally auriculate, caducous. Leaves paripinnate, 20- to many foliolate, often sensitive; leaflets opposite, subsessile, with 1 midvein or 2 to several primary veins. Inflorescences usually axillary, usually racemose, with several flowers; bracts paired, stipule-shaped, not spurred, persistent or caducous, margin denticulate. Flower small to medium-sized. Bracteoles present. Hypanthium short. Calyx membranous, usually 2-lipped, abaxial lip 3-lobed, adaxial lip 2-lobed. Corolla usually yellow; standard orbicular, large; wings without an auricle; keels curved, with a small beak. Stamens diadelphous (5+5) or basally connate; anthers uniform. Ovary linear, with numerous ovules; style filiform, inflexed; stigma terminal. Legume a loment, compressed, stipitate, divided into 4–8 articles, surface often muricate. Seed 1 per article.

About 150 species: tropics and subtropics worldwide; two species (one introduced) in China.

- 1a. Stems viscid; leaflets with 2 to several primary veins; legume oblong, slightly curved, abaxial suture undulate and indented; articles rounded 1. *A. americana*
- 1b. Stems not viscid; leaflets with 1 midvein; legume linear-oblong, straight, abaxial suture straight and slightly indented; articles quadrate 2. *A. indica*

1. Aeschynomene americana Linnaeus, Sp. Pl. 2: 713. 1753.

敏感合萌 min gan he meng

Herbs or shrublets, (0.4–)1.5–2 m tall. Stems erect, many branched, glabrous, viscid. Stipules lanceolate, 10–12 × 1–3 mm, membranous, base auriculate, apex acute. Leaves 30–40-foliolate; leaflet blades linear-oblong, 8–10 × 2–4 mm, papery, primary veins 2–4, base oblique, apex obtuse and mucronate. Inflorescences axillary, racemose, laxly branched, 2–4-flowered; bracts cordate, membranous. Bracteoles linear-ovate, striate. Calyx deeply 2-lobed. Corolla yellow, ca. 7 mm. Legume oblong, 2.5–3 cm × 2.5–3 mm, herbaceous to leathery, slightly curved, abaxial suture undulate and indented; articles 4–7, rounded, slightly muricate. Seeds brown, reniform. Fl. and fr. Oct–Nov.

Roadsides. Naturalized in Taiwan [native to tropical America].

2. Aeschynomene indica Linnaeus, Sp. Pl. 2: 713. 1753.

合萌 he meng

Shrublets or annual herbs, (15–)30–100(–150) cm tall. Stems erect, many branched, cylindric, hollow, glabrous, corky at base, often with nodule-bearing adventitious roots. Stipules elliptic to lanceolate, 4–11 × 1–2 cm, membranous, caducous,

base auriculate, apex acuminate. Leaves 20–60-foliolate, often sensitive; petiole 2–4 mm; rachis with tuberculate-based trichomes; leaflet blades linear-oblong, 3–13 × 1–3 mm, papery, base oblique, apex obtuse and mucronate. Inflorescences axillary, racemose, sometimes short or reduced to a solitary flower; peduncle 4–7 mm, with tuberculate-based trichomes; bracts ovate, caducous, margin often denticulate. Bracteoles ovate-lanceolate, persistent. Calyx 3–4 mm, membranous, glabrous. Corolla pale yellow with purplish longitudinal striations. Legume linear-oblong, 2.2–3.4 cm × 3–5 mm, straight, herbaceous to leathery, abaxial suture straight, slightly indented; articles 2–8, quadrate, slightly muricate and with tuberculate-based trichomes. Seeds blackish brown, reniform, ca. 2 mm. Fl. Jul–Sep, fr. Jul–Oct. $2n = 40$.

Field margins, ditches, grasslands, trailsides and river margins in sunny places; 100–1300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; tropical Africa, SW Asia, Australia, Pacific islands, South America].

This species is used for green fertilizer, medicinal purposes, and as an industrial raw material.

57. ARACHIS Linnaeus, Sp. Pl. 2: 741. 1753.

落花生属 luo hua sheng shu

Herbs, annual. Stipules large, partly adnate with petiole, not spurred. Leaves paripinnate; leaflets opposite, sessile. Inflorescences axillary, usually reduced to a solitary flower or a cluster of flowers. Hypanthium long. Calyx membranous; tube slender, elongating with flower development, 5-lobed, adaxial 4 lobes connate. Corolla yellow; standard almost orbicular, without an auricle; wings oblong, auriculate; keel apex slightly beaked. Stamens monadelphous, 10 but usually one absent; anthers dimorphic, long and short ones alternate, long ones almost dorsifixed, short ones basifixed. Ovary sessile, base elongated and curved after fertilization, with 2 or 3(–6) ovules; style filiform; stigma terminal. Legume oblong, subtorulose, with thick walls, reticulated, 1–5(or 6)-seeded, not breaking into segments, indehiscent, apex not beaked.

About 22 species: tropics of America; one species (introduced) in China.

Two other species, *Arachis glabrata* Benth and *A. pintoi* Krapovickas & W. C. Gregory, have been experimentally introduced for fodder in S China.

1. Arachis hypogaea Linnaeus, Sp. Pl. 2: 741. 1753.

落花生 luo hua sheng

Lathyrus esquirolii H. Léveillé.

Herbs, annual, erect to decumbent. Stems erect or procumbent, (6–)30–80 cm tall, yellowish pubescent, glabrescent. Stipules 2–4 cm, pilose. Leaves usually 4-foliolate; petiole 3.7–10 cm, covered with long flexuous trichomes, basally adnate to stipule; petiolules 1–10 mm, velutinous; leaflet blades ovate-oblong to obovate, 1.1–5.9 × 0.5–3.4 cm, papery, both surfaces with long trichomes, veins ca. 10 on each side of midvein, base almost rounded, margin ciliate, apex obtuse or emarginate and mucronate. Bracts lanceolate, apex acuminate. Flowers 8–10 mm, sessile; bracteoles lanceolate, ca. 5 mm, velutinous. Calyx tube 4–6 mm, thin. Corolla yellow to golden yellow; standard

spreading, apex emarginate; wings distinct, oblong to obliquely ovate, slender; keels distinct, long ovate, shorter than wings, inflexed, apex acuminate to beaked. Ovary oblong; style longer than calyx; stigma terminal, small, sparsely pubescent. Legume geocarpic, oblong, inflated, 2–5 × 1–1.3 cm, thick-walled, reticulate veined, with 1–4(–6) seeds. Seeds light brown, oblong, 5–10 mm in diam. Fl. May–Aug, fr. Jul–Sep. $4n = 40$.

Grown in sandy warm areas. Cultivated in Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, and Zhejiang [native to tropical South America].

Peanuts are grown over much of China except for Heilongjiang, Qinghai-Xizang Plateau, and Xinjiang. In addition to being used for food, they are used as a source of oil, soap, cosmetics, green fertilizer, fodder, and paper.

58. GEISSASPIS Wight & Arnott, Prodr. Fl. Ind. Orient. 217. 1834.

睫苞豆属 jie bao dou shu

Herbs. Stipules membranous, spurred below point of insertion. Leaves paripinnate, 4-foliolate; leaflets opposite, sessile. In-

florescences axillary or terminal racemes; peduncle long; bracts large, reniform, imbricate, membranous, striate, persistent, margin ciliate. Flowers small. Bracteoles absent. Hypanthium short. Calyx tubular, membranous, deeply 2-lipped, abaxial lip with inconspicuous lobes, adaxial lip entire and often cucullate. Corolla purple or yellow, 2–3 × as long as calyx; standard almost orbicular, nearly fattened, without an auricle; wings shorter than standard, obliquely obovate, without an auricle; keel short. Stamens monadelphous; anthers uniform. Ovary sessile, with 1 or 2 ovules; style inflexed; stigma small, capitate. Legume a loment, small, inflated, shortly stipitate, indehiscent, reticulate veined, margin conspicuously flattened, with 1 or 2 articles. Seeds 1 per article.

Three species: tropical Asia and Africa; one species in China.

1. Geissaspis cristata Wight & Arnott, Prodr. Fl. Ind. Orient. 218. 1834.

睫苞豆 *jie bao dou*

Herbs, annual, 15–60 cm tall. Stems becoming somewhat woody at base, procumbent, many branched at base, with above-ground adventitious roots; branchlets sparse, slender. Stipules lanceolate, 3–4 mm, membranous, apically striate, margin long ciliate. Leaves 4-foliolate; petiole 3–4 mm; rachis swollen to shortly winged; leaflets subsessile; leaflet blades obovate to obovate, 4–7 × 3–4 mm, secondary veins 3–5 on each side of midvein, base cuneate and oblique, apex acute to slightly emar-

ginate and mucronate. Racemes axillary, congested, 1.5–1.6 cm; peduncle ca. 1.2 cm; bracts 6–12, almost orbicular to obliquely reniform, 0.7–1 × ca. 1.5 cm, with yellow setaceous cilia. Calyx 1.2–1.5 mm. Corolla yellow or purple; standard ca. 5 mm wide, creamy outside, with 2 purple-red spots inside near base; wings obovate, small; keels purplish black, small. Ovary linear; style filiform; stigma terminal. Legume oblong, ca. 4 mm, with conspicuous margin, with 1 or 2 articles, apex shortly beaked. Seeds chestnut-brown, reniform, ca. 2 mm in diam. Fl. and fr. May–Jan.

Beaches, sandy wetlands; below 100 m. Guangdong (Guangzhou) [Cambodia, India, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

59. ORMOCARPUM P. Beauvois, Fl. Oware 1: 95. 1807, nom. cons.

链荚木属 *lian jia mu shu*

Diphaca Loureiro.

Shrubs. Stipules triangular-spiculiform, free, not spurred, slightly connate at base, persistent. Leaves subfasciculate on short lateral branches, imparipinnate; leaflets alternate, subsessile. Inflorescences sparse racemes or reduced to 1 or 2 flowers on lateral shoots; bracts paired, persistent. Flowers large. Bracteoles similar to bracts. Hypanthium short. Calyx campanulate, membranous, 5-lobed; abaxial 3 lobes lanceolate and ± as long as tube, adaxial 2 lobes triangular and short. Corolla yellow, longer than calyx; standard suborbicular, with 2 appendages at base, without auricles; keels conspicuously inflexed, without a beak. Stamens diadelphous (5+5); anthers uniform. Ovary linear, with many ovules; style filiform, inflexed; stigma terminal, small. Legume a loment (but articulations developing late), linear to oblong, inflated, shortly stipitate, rugose, glabrous or with coarse soft prickles, divided into several articles, indehiscent. Seeds 1 per article.

About 20 species: tropics of E Hemisphere; one species (introduced) in China.

1. Ormocarpum cochinchinense (Loureiro) Merrill, Philipp. J. Sci., C, 5: 76. 1910.

链荚木 *lian jia mu*

Diphaca cochinchinensis Loureiro, Fl. Cochinch. 2: 454. 1790; *Hedysarum sennoides* Willdenow; *Ormocarpum sennoides* (Willdenow) Candolle.

Shrubs, evergreen, 2–3 m tall. Stems and branchlets fissured at maturity, corky. Stipules lanceolate, 2–3 mm. Leaves alternate, imparipinnate, 9–17-foliolate; petiole 1.5–2.5 cm; rachis viscid, lustrous pitch-black when dry; leaflet blades elliptic, obovate, or oblong, 1.2–2.5 × 0.5–1 cm, papery, stained purple when dry, venation reticulate, midvein thick and raised, secondary veins 3 or 4 on each side, base rounded, apex obtuse and mucronate. Racemes axillary, ca. 3 cm, 2–6-flowered; pe-

duncle 7–8 mm, viscid, lustrous and sticky when dry; bracts triangular, small, spreading. Flowers 1.5–2 cm. Pedicel ca. 2 cm; bracteoles lanceolate, ca. 1 mm, persistent. Hypanthium 5–6 mm. Calyx ca. 1 cm, membranous, abaxial lobes ca. 5 mm. Corolla yellow or white. Ovary linear to slightly curved, sparsely pubescent; style filiform, glabrous; stigma terminal. Legume a loment, oblong, slightly falcate, 10–12 cm × 5–6 mm, inflated, shortly stipitate, with longitudinal slightly raised parallel veins, divided into 4 or 5 articles. Seeds brown, oblong, ca. 6 × 2.5 mm, compressed; hilum eccentric. Fl. Jun–Sep, fr. Sep–Oct. *2n* = 24.

Cultivated and naturalized in Guangdong, Hainan, and Taiwan [native and/or naturalized in India, Japan, Malaysia, Pacific islands, Philippines, Sri Lanka, Thailand, and Vietnam; introduced and often naturalized in many tropical areas].

60. SMITHIA Aiton, Hort. Kew. 3: 496. 1789, nom. cons., not Scopoli (1777).

坡油甘属 *po you gan shu*

Damapana Adanson.

Herbs or shrublets. Stems herbaceous or often slightly woody, bristly to glabrescent. Stipules spurred below point of insertion, scarious, persistent, basal portion 1- or 2-auriculate. Leaves opposite, paripinnate, subsessile, few to 12-foliolate, sensitive; rachis often ending in a spine; leaflet blades usually linear-oblong, bristly on abaxial side and margins, apex mucronate. Inflorescences axil-

lary, dense racemes or ± scorpioid cymes, sometimes reduced to a solitary flower; bracts stipule-shaped, scarious, striate, caducous. Flowers small. Bracteoles scarious, persistent. Hypanthium short, much reduced. Calyx membranous or scarious, persistent and often accrescent at fruit, 2-lipped, lips usually entire. Corolla white, purple, yellow, or blue, longer than calyx; standard orbicular to oblong; wings and keel almost as long as standard; keel inflexed, lateral appendages nearly as long as claws, apex blunt. Stamens usually diadelphous (5+5); anthers uniform. Intrastaminal disk present. Ovary linear, with numerous ovules; style filiform, inflexed, persistent to fruit; stigma terminal, small. Legume a loment, plicate within calyx, shortly stipitate, with few to many articles. Seeds orbicular or reniform, compressed; hilum eccentric.

About 20 species: tropics of Asia and Africa; five species in China.

- 1a. Shrublets 1. *S. blanda*
 1b. Annual herbs.
 2a. Calyx lips membranous, with reticulate veins.
 3a. Leaflet blades 0.6–1.2 cm; inflorescences often with more than 12 flowers; corolla slightly longer than calyx; fruit divided into 6–8 articles 2. *S. ciliata*
 3b. Leaflet blades 1.5–2 cm; inflorescences with 5 or 6 flowers; corolla ca. 1.5 × as long as calyx; fruit divided into 10–12 articles 4. *S. salsuginea*
 2b. Calyx lips scarious, with parallel veins.
 4a. Floral nodes congested apically on inflorescence axis; scorpioid cymes and leaves clustered at branch tips 3. *S. conferta*
 4b. Floral nodes not congested apically on inflorescence axis; racemes and leaves not clustered at branch tips 5. *S. sensitiva*

1. *Smithia blanda* Wallich ex Wight & Arnott, Prodr. Fl. Ind. Orient. 221. 1834.

黄花合叶豆 huang hua he ye dou

Smithia blanda var. *paniculata* (Arnott) Baker; *S. blanda* var. *racemosa* (Wight & Arnott) Baker; *S. bodinieri* H. Léveillé; *S. paniculata* Arnott; *S. racemosa* Wight & Arnott; *S. yunnanensis* Franchet.

Shrublets, 40–60 cm tall. Stems densely golden setose. Stipules lanceolate, villous. Leaves 4–10-foliolate; petiolules less than 1 mm; leaflet blades oblong to obovate-lanceolate, 6–12 × 2.5–3 mm, papery, midvein setose, base oblique, margin setose, apex obtuse to rounded and with a spinelike mucro. Inflorescences axillary, scorpioid cymes, with flowers usually clustered at apical part; peduncle 1.5–4 cm, setose; bracts ovate-orbicular. Flowers ca. 1 cm. Pedicel 1–3 mm; bracteoles suborbicular, 2.5–3.5 mm, membranous. Corolla yellow; standard orbicular, with short claw, base acuminate, apex cuneate to slightly emarginate; wings smaller than standard, with an auricle; keels ± as long as wings, with an auricle. Stamens diadelphous. Ovary with trichomes; style filiform; stigma terminal. Legume a plicate loment, 2.5–3 mm wide, shortly stipitate, divided into 5 or 6 articles; articles with reticulate veins. Seeds not seen. Fl. Aug–Sep, fr. Sep–Oct.

Mountains, plains; 1000–2100 m. Guizhou, SW Sichuan, Yunnan [India, Laos, Sri Lanka, Thailand].

2. *Smithia ciliata* Royle, Ill. Bot. Himal. Mts. 201. 1835.

缘毛合叶豆 yuan mao he ye dou

Smithia japonica Maximowicz; *S. nagasawae* Hayata.

Herbs, annual, 15–60 cm tall. Stems and branchlets slender, glabrous. Stipules lanceolate, ca. 8 mm, membranous, glabrous. Leaves 10–14-foliolate; petiole 1.5–2 cm, glabrous; rachis 1.5–3 cm; petiolules less than 1 mm, glabrous; leaflet blades oblanceolate to linear-oblong, 6–12 × 2–4 mm, midvein and margin bristly, apex obtuse to rounded. Inflorescences

axillary or terminal, scorpioid cymes, often with 12 or more flowers in cluster; peduncle 1–2 mm; bracts stipule-shaped, almost as long as calyx, margin ciliate. Bracteoles lanceolate, 4–5 mm, with trichomes. Calyx 4–8 mm, membranous, with reticulate veins, margin densely setose. Corolla yellow or white, slightly longer than calyx; standard obovate, ca. 5 mm wide; wings and keels small, straight, auriculate. Stamens diadelphous. Ovary with a short stipe, with trichomes. Legume a plicate loment, shortly stipitate, divided into 6–8 articles; articles almost globose, 1–1.5 mm, densely papillate. Seeds not seen. Fl. Aug–Sep, fr. Oct–Nov.

Roadsides, mountains, wetlands; 100–2800 m. Fujian, N Guangdong, N Guangxi, SW Guizhou, Hunan, S Jiangxi, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Malaysia, Nepal, Philippines, Thailand, Vietnam].

This species has been reported to have staminodes alternate with stamens (P. K. Basu, Current Science 47(3): 94. 1978).

3. *Smithia conferta* Smith in Rees, Cycl. 33: *Smithia* n. 2. 1816.

密节坡油甘 mi jie po you gan

Smithia conferta var. *geminiflora* (Roth) Cooke; *S. geminiflora* Roth; *S. geminiflora* var. *conferta* (Smith) Baker.

Herbs, annual, 15–90 cm tall. Stems slender, many branched, glabrous; nodes congested apically on stems. Stipules lanceolate, ca. 1 cm. Leaves 6–12-foliolate; petiole 2–4 mm; rachis sparsely long hirsute; leaflets sessile; leaflet blades linear-oblong, 6–12 × 2–3 mm, thickly papery, abaxially hirsute, adaxially glabrous, secondary veins 5 on each side of midvein, apex obtuse-rounded. Inflorescences axillary, scorpioid cymes, many flowered in a cluster; peduncle short; bracts ovate, 5–8 mm, membranous. Flowers 6–8 mm. Pedicel ca. 1 cm; bracteoles ovate, membranous. Calyx 6–8 mm, thickly papery, bristly, with parallel veins. Corolla yellow, ± as long as calyx; standard oblong-obovate; wings and keels ± equal, smaller than standard. Stamens diadelphous. Ovary with a short stipe,

pubescent. Legume a plicate loment, inflated, shortly stipitate, divided into 4–6 articles; articles papillate. Seeds not seen. Fl. Jul–Aug, fr. Sep–Dec. $2n = 38$.

Sandy areas, trailsides, mountain valleys; 200–400 m. Fujian, Guangdong, Guangxi [India, Indonesia, Laos, Malaysia, Nepal, Sri Lanka, Vietnam; N Australia].

4. *Smithia salsuginea* Hance, J. Bot. 7: 164. 1869.

盐碱土坡油甘 yan jian tu po you gan

Smithia dichotoma Dalzell ex Baker.

Herbs, annual, 30–45 cm tall. Stems slender, rarely branched, sparsely setose. Stipules ovate-lanceolate, ca. 3 mm. Leaves 2- or 4-foliolate; petiole ca. 1 mm; rachis 1–1.5 cm; leaflet blades oblong-oblongate, 1.5–2 × 0.6–0.7 cm, membranous, both surfaces glabrous, apex obtuse. Inflorescences shortly scorpioid cymes, with 5 or 6 flowers; peduncle upward spreading, 3–7 mm; bracts ovate-lanceolate. Bracteoles linear, 1/4–1/3 as long as calyx, membranous. Calyx 1–1.2 cm, membranous, dry, almost glabrous, with reticulate veins, abaxial lip apex acute, adaxial lip longer and apex acute to slightly emarginate. Corolla yellow, ca. 1.5 × as long as calyx. Stamens diadelphous. Ovary with a short stipe. Legume a plicate loment, shortly stipitate, divided into 10–12 articles; articles globose, outside smooth or papillate. Seeds not seen. Fl. and fr. Aug–Oct.

Beaches. Guangdong [India].

5. *Smithia sensitiva* Aiton, Hort. Kew. 3: 496. 1789.

坡油甘 po you gan

Smithia javanica Benth.

Herbs, annual, 15–100 cm tall, ascending to decumbent. Stems slender, many branched, glabrous; nodes congested apically on stems. Stipules membranous, dry, glabrous. Leaves 6–20-foliolate, sensitive; rachis 1–3 cm, with small spinelike trichomes; petiolules ca. 1 mm, glabrous; leaflet blades oblong, 4–10 × 1.5–3 mm, thinly papery, secondary veins 5 on each side of midvein, apex obtuse to rounded and with a spinelike micro. Inflorescences axillary racemes, with 1–6 or more flowers clustered near apex; peduncle short; bracts stipule-shaped, caducous. Flowers 8–10 mm. Pedicel 2–3 mm; bracteoles 2, ovate, ca. 1/3 as long as calyx, adnate to calyx, persistent, margin ciliate. Calyx 5–8 mm, thickly papery, sparsely setose, with parallel veins. Corolla yellow, slightly longer than calyx; standard obovate, ca. 5 mm wide, claw short, apex slightly emarginate; wings oblong, shorter than standard; keels ± as long as wings. Stamens diadelphous. Ovary linear, with numerous ovules. Legume a plicate loment, shortly stipitate, divided into 4–6 articles; articles densely papillate. Seeds not seen. Fl. Jul–Sep, fr. Sep–Nov. $2n = 38$.

Field margins, wetlands; near sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Bhutan, India, Indonesia, Kashmir, Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia].

This species probably is introduced in some regions of its stated range. It is used for medicinal purposes and fodder.

61. STYLOSANTHES Swartz, Prodr. 7, 108. 1788.

笔花豆属 bi hua dou shu

Shrublets or perennial herbs. Stems erect or spreading, with sparse glandular trichomes. Stipules sheathlike, adnate to petiole, not spurred, persistent. Leaves pinnately 3-foliolate; leaflets subsessile. Inflorescences terminal or axillary spikes, with small clustered flowers; bracts membranous, persistent. Bracteoles lanceolate, membranous, persistent. Hypanthium long. Calyx tubular, 5-lobed; abaxial lobe narrow and distinct, adaxial 4 lobes connate. Corolla yellowish orange; standard orbicular, broadly ovate, or obovate, without an auricle, base narrowly cuneate, apex emarginate; wings oblong to obovate, shorter than standard, distinct, auriculate; keels similar to wings. Stamens 10, monadelphous, basal part closed or tubular; anthers dimorphic, alternate with longer 5 almost basifixed and shorter 5 dorsifixed. Ovary linear, sessile, with 2 or 3 ovules; style thin and straight; stigma terminal, calyptiform, extremely small. Legume a loment, oblong to ellipsoid, small, depressed, without a stipe, with coarse reticulate veins, often tuberculate, with 1 or 2 articles, indehiscent, apex with a beak. Seeds ovoid or reniform; hilum usually oblique, with a prominent radicle lobe.

About 25 species: tropical and subtropical Africa, America, and Asia; two species (both introduced) in China.

- 1a. Inflorescences with each flower not subtended by a rudimentary axis; legume ovoid, 2–3 × ca. 1.8 mm, glabrous or near apex pubescent, with 1 article, beak 0.1–0.5 mm, inflexed 1. *S. guianensis*
 1b. Inflorescences with each flower subtended by a rudimentary axis; legume quadrate, 2–3.5 × ca. 2 mm, commonly pubescent, with 2 articles, beak 3–3.5 mm, uncinata 2. *S. hamata*

1. *Stylosanthes guianensis* (Aublet) Swartz, Kongl. Vetensk. Acad. Nya Handl. 10: 301. 1789.

圭亚那笔花豆 gui ya na bi hua dou

Trifolium guianense Aublet, Hist. Pl. Guiane 2: 776. 1775; *Stylosanthes gracilis* Kunth.

Herbs or shrublets, 60–100 cm tall, erect or rarely climbing. Stems glabrous or sparsely pubescent. Stipules

sheathing, 0.4–2.5 cm. Leaves 3-foliolate; petiole short; petiolules ca. 1 mm; leaflet blades ovate, elliptic, or lanceolate, 0.5–3(–4.5) × 0.2–1(–2) cm, glabrous, sparsely villous, or setose, base cuneate, margin sometimes sinuate, apex acute to cuspidate. Inflorescences 1–1.5 cm, with 2–40 clustered flowers, each flower without a rudimentary axis; primary bracts 1–2.2 cm, densely long spreading setose; secondary bracts 2.5–5.5 × ca. 0.8 mm. Bracteoles 2–4.5 mm. Hypanthium 4–8 mm. Calyx tube ellipsoid to oblong, 3–5 × 1–1.5 mm. Corolla orangish

yellow, with red slender striations; standard 4–8 × 3–5 mm. Legume ovoid, 2–3 × ca. 1.8 mm, glabrous or near apex pubescent, with 1 article, beak 0.1–0.5 mm and inflexed. Seeds grayish brown, oblate-ellipsoid, ca. 2.2 × 1.5 mm. $2n = 20$.

Cultivated and naturalized in Guangdong and Taiwan [native range from Mexico to N Argentina].

This species is grown for fodder and green fertilizer and is naturalized in additional areas of SE Asia.

2. *Stylosanthes hamata* (Linnaeus) Taubert, Verh. Bot. Vereins Prov. Brandenburg 32: 22. 1890.

有钩柱花草 you gou zhu hua cao

Hedysarum hamatum Linnaeus, Syst. Nat., ed. 10, 2: 1170. 1759; *Stylosanthes procumbens* Swartz, nom. illeg. superfl.

Herbs or shrublets, 10–50 cm tall, prostrate or ascending.

Stems sparsely pubescent. Stipules sheathing, 4–12 mm. Leaves 3-foliolate; petiole short; petiolules ca. 0.5 mm; leaflet blades ovate, elliptic, or lanceolate, 8–14 × 3–5 mm, commonly glabrous, base cuneate, margin setose, apex acute and mucronate. Inflorescences 1–1.5 cm, with 2–10 clustered flowers, each flower subtended by a rudimentary axis; primary bracts 1–1.2 cm, spreading setose; secondary bracts 2–3.5 × ca. 0.5 mm. Bracteoles ca. 2 mm. Hypanthium 2–2.5 mm. Calyx tube oblong, ca. 2 × 1 mm. Corolla yellow, with red slender striations; standard ca. 4 × 3 mm. Legume quadrate, 2–3.5 × ca. 2 mm, commonly pubescent, with 2 articles, beak 3–3.5 mm and unciniate. Seeds light brown, ellipsoid, ca. 2 × 1 mm. $2n = 20$.

Reported as cultivated in Hainan [native to Caribbean, Central America, SE North America, and South America].

No material of this species has been seen by the present authors.

The species is cultivated for fodder.

62. ZORNIA J. F. Gmelin, Syst. Nat. 2: 1076, 1096. 1792.

丁癸草属 ding gui cao shu

Herbs, annual or perennial, usually prostrate or decumbent. Stems slender. Stipules leaflike, spurred basally to point of insertion, basal portion usually divided. Leaves paripinnate, 2[–4]-foliolate; leaflets opposite, subsessile; leaflet blades usually pellucid punctate. Inflorescences axillary or terminal, sparse spikes; bracts usually peltate, stipulelike. Flowers small, usually enclosed in a pair of bracts. Bracteoles absent. Hypanthium short. Calyx small, 2-lipped, adaxial lobes short. Corolla usually yellow; petals ± equal. Stamens monadelphous; anthers dimorphic. Ovary linear, undulate, with 5–8 ovules; style filiform; stigma terminal. Legume a loment, compressed, not stipitate, smooth or surface echinate-setose, indehiscent, divided into few to many subglobose-oblate articles, abaxial suture straight, adaxial suture sinuate, apex usually without a beak. Seeds 1 to several, ovoid or reniform, compressed.

About 75 species: tropics and temperate regions worldwide; two species in China.

- 1a. Leaflet blades ovate-oblong, obovate, or lanceolate, abaxially with brown and black glands; fruit surface echinate-setose 1. *Z. gibbosa*
 1b. Leaflet blades ovate-lanceolate, abaxially without brown and black glands; fruit surface smooth 2. *Z. intecta*

1. *Zornia gibbosa* Spanoghe, Linnaea 15: 192. 1841.

丁癸草 ding gui cao

Zornia cantoniensis Mohlenbrock; *Z. gibbosa* var. *cantoniensis* (Mohlenbrock) H. Ohashi; *Z. graminea* Spanoghe.

Herbs, perennial, 20–50 cm tall, sometimes with a thick tuber. Stems slender, many branched, glabrous. Stipules lanceolate, ca. 1 mm, glabrous, with a long auricle at base. Leaves 2-foliolate; leaflet blades ovate-oblong, obovate, or lanceolate, 0.8–2.5 × 0.3–0.9 cm, glabrous but abaxially with brown and black glands, base oblique, apex acute and mucronate. Inflorescences axillary spikes, 2–6 cm, sparsely 3–6(–10)-flowered; bracts 2, ovate, 6–7(–10) mm, peltately inserted, margin ciliate. Calyx ca. 3 mm. Corolla yellow; standard with longitudinal striations; wings and keels small. Legume usually longer to rarely shorter than bracts, divided into 2–7 articles; articles subglobose, 2–4 × 2–4 mm, echinate-setose, with conspicuous reticulate veins. Seeds not seen. Fl. Apr–Jul, fr. Jul–Sep.

Sandy places, floodplains; 100–1200 m. Fujian, Guangdong, Guangxi, Hainan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang

[Bhutan, India, Japan, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand; Australia].

This species is used for medicinal purposes.

2. *Zornia intecta* Mohlenbrock, Webbia 16: 84. 1961.

台东癸草 tai dong gui cao

Zornia diphylla (Linnaeus) Persoon var. *ciliaris* Ohwi.

Herbs, perennial, to 40 cm tall, erect. Stems glabrous or pubescent. Stipules glabrous, 5-veined. Leaves 2-foliolate; petiole and petiolules pubescent; leaflet blades ovate-lanceolate, 1.4–2 × 0.4–0.6 cm, not glandular punctate, secondary veins 5–9 on either side of midvein, apex acute and mucronate. Inflorescences spikes, many flowered; bracts ovate-lanceolate, ca. 8 × 5 mm, apex abruptly acute. Calyx ca. 3.5 mm, strigose. Corolla pale yellow, ca. 1 cm. Legume divided into 5 or 6 articles; articles 2–2.2 × 2–2.2 mm, surface smooth. Seeds not seen.

Sunny places in mountains; 500–1500 m. Taiwan [India, Sri Lanka, Vietnam].

16. Tribe INDIGOFEREAE

木蓝族 mu lan zu

Gao Xinfen (高信芬), Sun Hang (孙航); Brian D. Schrire

Shrubs or herbs, often gray or silvery with medifixed (T-shaped) trichomes. Stipules usually small. Leaves generally imparipinnate, sometimes 3-foliolate, 1-foliolate, or leaflets absent; stipels present or absent. Flowers in axillary racemes; bracteoles absent. Corolla papilionaceous, usually reddish or purple but sometimes white or yellow. Stamens mostly diadelphous, vexillary filament free from base or rarely connate with others into a sheath split above or a closed tube; anthers uniform or dissimilar, mostly gland-tipped. Ovary with 1 to many ovules; style glabrous. Legume 2-valved, septate between seeds, rarely jointed or leathery, turgid and indehiscent. Seeds globose to rectangular, without a caruncle.

Six genera and ca. 800 species: tropical and subtropical regions worldwide but mainly in tropical Africa and Asia; two genera (one introduced) and 80 species (45 endemic, three introduced) in China.

- 1a. Leaflet blade margins entire; legume less than 3 mm wide, erect, spreading, or reflexed, not longitudinally ridged 63. *Indigofera*
1b. Leaflet blade margins dentate; legume 3–8 mm wide, erect, longitudinally ridged 64. *Cyamopsis*

63. INDIGOFERA Linnaeus, Sp. Pl. 2: 751. 1753.

木蓝属 mu lan shu

Gao Xinfen (高信芬); Brian D. Schrire

Shrubs, shrublets, perennial herbs, or rarely annual herbs or small trees; trichomes typically medifixed (T-shaped), equally to very unequally 2-branched and sometimes crisped, or rarely simple multicellular hairs present with glandular tips. Stipules persistent or caducous. Leaves usually imparipinnate but for some species simple or reduced to 1 leaflet; stipels present or absent; leaflet blades usually opposite but sometimes subopposite or alternate, rarely with glands, margin entire. Racemes axillary; bracts usually caducous. Calyx campanulate or cup-shaped; teeth 5, subequal or abaxial one longer. Corolla usually reddish, sometimes white or yellow; standard usually covered outside with appressed trichomes but occasionally glabrous, base shortly clawed, apex usually obtuse to emarginate and mucronate; wings narrow, base auricled; keel falcate or spatulate, with spur adnate to wings. Stamens 10, diadelphous, only vexillary one free; anthers uniform, basifixed or subbasifixed, sometimes both ends hairy, apex apiculate; pollen 3-colporate. Ovary sessile, with 1 to many ovules; style linear, usually glabrous; stigma capitate. Legume linear, oblong, or ovoid, cylindrical or 4-sided in cross section, 2-valved, septate, dehiscent; endocarp often spotted with tannin deposits. Seeds globose to rectangular; hilum small; cotyledons unequal; radicle oblique.

About 750 species: tropics and subtropics worldwide; 79 species (45 endemic, two introduced) in China.

A single collection has been seen from Yunnan of what appears to be an additional species closely related to *Indigofera laxiflora* Craib (Kew Bull. 1912: 148. 1912), otherwise only known from Thailand.

- 1a. Leaves simple or 1-foliolate.
2a. Leaf blade abaxially with disk-shaped or dotlike glands.
3a. Main root not tuberous; leaf blade ovate-elliptic to obovate-orbicular, abaxially with small dotlike pearl bodies, medifixed trichomes perpendicular to margin on both surfaces; legume falcate, adaxial suture echinate 1. *I. nummulariifolia*
3b. Main root tuberous; leaf blade narrowly obovate-lanceolate, abaxially with sparse disk-shaped glands, medifixed trichomes \pm parallel to margin on both surfaces; legume straight, sutures narrowly winged, not echinate 2. *I. squalida*
2b. Leaf or leaflet blade abaxially without any glands or pearl bodies.
4a. Leaf or leaflet blade 0.4–3 \times 0.3–0.6 cm; legume globose to shortly oblong, 1- or 2(or 3)-seeded.
5a. Leaf or leaflet blade usually linear but sometimes elliptic to ovate-elliptic, adaxially with appressed medifixed trichomes; legume 1-seeded 5. *I. linifolia*
5b. Leaf blade oblong to cordate, adaxially with long spreading white subbasifixed trichomes; legume (1 or)2-seeded 6. *I. cordifolia*
4b. Leaf or leaflet blade 3–10 \times 2–5.5 cm; legume cylindrical, more than 3-seeded.
6a. Leaf or leaflet blade abaxially with very unequally 2-branched trichomes; corolla standard outside with stiff brown 2-branched trichomes; stamens 8–10 mm 7. *I. caloneura*
6b. Leaflet blade abaxially with medifixed trichomes; corolla standard outside with soft white 2-branched trichomes; stamens 6–7 mm 8. *I. shipingensis*

Extensive contributions on *Indigofera* were also received from Munivenkatappa Sanjappa, Central National Herbarium, Botanical Survey of India, P.O. Botanic Garden, Howrah, Kolkata 711 103, West Bengal, India.

- 1b. Leaves 3- or more foliolate.
- 7a. Leaves 3-foliolate, leaflet blades abaxially with red to brown disk-shaped glands; legume sutures usually narrowly winged.
- 8a. Branches trailing; inflorescence longer than leaf; pedicel 3–5 mm 3. *I. pedicellata*
- 8b. Branches erect to ascending; inflorescence shorter than leaf; pedicel 0.5–1 mm 4. *I. trifoliata*
- 7b. Leaves more than 3-foliolate, or if 3-foliolate then leaflet blades without glands; legume sutures not narrowly winged.
- 9a. All leaflets alternate.
- 10a. Racemes 0.5–3 cm; peduncle to 8 mm or absent.
- 11a. Leaflet blades obovate to narrowly obovate; legume oblong, 0.3–0.8 cm, 1–3-seeded 9. *I. linnaei*
- 11b. Leaflet blades linear to sometimes narrowly oblong; legume linear, 1.5–2.5 cm, 7–10-seeded 11. *I. litoralis*
- 10b. Racemes 1.8–16 cm; peduncle 9–18 mm.
- 12a. Leaves 5–9-foliolate; stamens 4–5 mm 10. *I. hendecaphylla*
- 12b. Leaves 4–6-foliolate; stamens 3–3.5 mm 12. *I. taiwaniana*
- 9b. Leaflets opposite or subopposite.
- 13a. Stems, pedicels, and calyces with gland-tipped trichomes.
- 14a. Leaflet blades 0.4–1.4(–1.8) cm; racemes 2–6(–8) cm; stamens 3–4 mm 13. *I. colutea*
- 14b. Leaflet blades 1.5–3 cm; racemes 12–18 cm; stamens 5.5–7 mm.
- 15a. Calyx 3–4.5 mm, softly pubescent, lobes more than 2 × as long as tube and filiform; leaflet blades without gland-tipped trichomes; petioles and pedicels pilose 14. *I. dolichochaete*
- 15b. Calyx 2–2.5(–3) mm, strigose, lobes up to 2 × length of tube and linear-lanceolate; leaflet blades with gland-tipped trichomes along margin and abaxial midvein; petioles and pedicels tomentose 15. *I. scabrida*
- 13b. Plants without gland-tipped trichomes.
- 16a. Stems, leaf rachises, and peduncles with ± spreading, basifixed to medifixed trichomes or crisped multicellular trichomes.
- 17a. Stems, leaf rachises, and leaflet blade abaxial surfaces with spreading flattened and crinkly multicellular trichomes; stamens 1.2–1.3 cm 26. *I. parkesii*
- 17b. Stems, leaf rachises, and peduncles with spreading basifixed to medifixed 2-branched trichomes; stamens either less than 1.2 cm or greater than 1.3 cm (but may fall within 1.2–1.3 cm for *I. dumetorum*, *I. esquirolii*, and *I. penduloides*).
- 18a. Corolla standard 4–5 mm; calyx teeth 3–5 × as long as tube; corolla ± as long as calyx; stamens 3–4.5 mm 37. *I. hirsuta*
- 18b. Corolla standard 6 mm or more; calyx teeth less than 3 × as long as tube; corolla distinctly exerted from calyx; stamens (5.5–)6 mm or longer.
- 19a. Racemes 2–6 cm.
- 20a. Stamens 1.4–1.5 cm; flowers usually opening before leaves; leaves 11–19(–23)-foliolate 39. *I. pampaniniana*
- 20b. Stamens 1 cm or less; flowers opening after leaves; leaves 3–13(or 15)-foliolate.
- 21a. Dwarf shrubs or shrublets; stems slender, with dense spreading long stiff brown trichomes and submedifixed 2-branched trichomes; stamens 9–10 mm 38. *I. argutidens*
- 21b. Shrubs; stems robust, with spreading or subspreading mixed appressed pale brown or white 2-branched trichomes; stamens 5.5–7 mm 53. *I. balfouriana*
- 19b. Racemes (5–)6–45 cm (5–9 cm in *I. cylindracea*, 5–13 cm in *I. megaphylla*, and 5–15 cm in *I. dosua*).
- 22a. Leaflet blades 0.7–2 cm.
- 23a. Shrubs 1–3 m tall; pedicel ca. 1.5 mm; stamens 9–10.5 mm 42. *I. stachyodes*
- 23b. Shrubs 1 m tall or less; pedicel 3–6 mm; stamens 6.5–8 mm (sometimes to 9 mm in *I. dosua*).
- 24a. Ovary and legume hairy; leaves ± sessile 43. *I. dosua*
- 24b. Ovary and legume glabrous; leaves with a 5–10 mm petiole.
- 25a. Stipules caducous, 2–4 mm; leaves (9 or)11–15-foliolate; racemes 5–9 cm 46. *I. cylindracea*
- 25b. Stipules persistent, 5–10 mm; leaves 17–25-foliolate; racemes ca. 16 cm 47. *I. lacei*
- 22b. Leaflet blades 2–8 cm.
- 26a. Corolla purple or pink (not stated for *I. penduloides*).
- 27a. Stamens 0.5–0.6 cm; peduncle 0.3–0.5 cm; pedicel 0.5–1 mm; ovary densely pubescent; leaves (1 or)3- or 5(or 7)-foliolate 52. *I. megaphylla*
- 27b. Stamens 1.1–1.4 cm; peduncle 3.5–6 cm; pedicel 2–3 mm; ovary glabrous.
- 28a. Leaves 17–23-foliolate; stamens 1.1–1.2 cm 44. *I. penduloides*

- 28b. Leaves 5–9-foliolate; stamens 1.25–1.4 cm 45. *I. jikongensis*
- 26b. Corolla white or yellowish.
- 29a. Leaflet blades adaxially glabrous; calyx 2–3 mm; stamens 0.6–0.8 cm 36. *I. caudata*
- 29b. Leaflet blades adaxially hairy; calyx 4.5–6 mm; stamens 1.2–1.6 cm.
- 30a. Leaves 9–15-foliolate; leaflet blade apices rounded to truncate; peduncle 1–1.3 cm; legume ca. 4.5 cm 40. *I. esquirolii*
- 30b. Leaves 5–9-foliolate; leaflet blade apices obtuse to acute; peduncle 2–3 cm; legume ca. 7 cm 41. *I. dumetorum*
- 16b. Stems, leaf rachises, and peduncles glabrous or with appressed or appressed and spreading medifixed trichomes.
- 31a. Leaves 3- or 5-foliolate (5–9-foliolate in *I. balfouriana* and *I. muliensis*).
- 32a. Stems, petioles, and peduncles glabrous; stamens 5–6.5 mm 51. *I. muliensis*
- 32b. Stems, petioles, and peduncles with 2-branched trichomes; stamens 6–9 mm.
- 33a. Leaves ca. 2 cm, 3-foliolate; pedicel ca. 0.8 mm; stamens 6.5–7.5 mm 79. *I. neosericipetala*
- 33b. Leaves 3–9 cm, 3–9-foliolate; pedicel 1–3 mm.
- 34a. Stems, petioles, and peduncles with both appressed and spreading 2-branched trichomes; stamens 6–7 mm 53. *I. balfouriana*
- 34b. Stems, petioles, and peduncles with only appressed 2-branched trichomes; stamens 7–9 mm.
- 35a. Subshrubs; leaflets with appressed trichomes; corolla purplish red to purple, standard 6.5–8 mm; stamens 7–8 mm; ovary glabrous 54. *I. sticta*
- 35b. Shrubs; leaflets with spreading 2-branched trichomes especially dense and white; corolla pinkish, standard 8.5–11 mm; stamens 8–9 mm; ovary densely appressed white hispid 55. *I. dichroa*
- 31b. Leaves 5–50-foliolate (5- or 7-foliolate in *I. byobiensis*, 5–9-foliolate in *I. muliensis*, *I. calcicola*, and *I. lenticellata*).
- 36a. Ovary and legume glabrous (legume glabrescent in *I. hamiltonii* and *I. atropurpurea*).
- 37a. Corolla standard outside glabrous or with trichomes only at margin (glabrescent in *I. hamiltonii*).
- 38a. Bracts to 3.5 mm wide, boat-shaped; racemes sessile or subsessile, with persistent bud scales at base 23. *I. cassioides*
- 38b. Bracts 1–1.5 mm wide, ovate, ovate-lanceolate, or linear-lanceolate; racemes pedunculate, without persistent bud scales at base.
- 39a. Stamens 1.2–1.4 cm; pedicel 3–5 mm 16. *I. kirilowii*
- 39b. Stamens 0.5–0.8 cm; pedicel 1–2 mm.
- 40a. Leaves 3- or 5(–11)-foliolate, to 2.2 × 1.2 cm; racemes much longer than leaves 24. *I. hamiltonii*
- 40b. Leaves (7–)11–19(or 21)-foliolate, to 6.5 × 2.5 cm; racemes equal to slightly longer than leaves 25. *I. atropurpurea*
- 37b. Corolla standard outside hairy.
- 41a. Bracts 4–6 × 2–3 mm, cuspidate.
- 42a. Subshrubs to 0.9 m; stems and branches mostly glabrous; leaflet blades 1.2–2.5(–3.2) × 0.6–1 cm, adaxially hairy; stamens 7–8 mm 21. *I. bracteata*
- 42b. Robust shrubs 1–3 m; stems and branches with appressed medifixed trichomes; leaflet blades 1.2–6.5(–8) × 0.7–3.5(–4.5) cm, adaxially glabrous; stamens 8–10 mm 22. *I. hebetepetala*
- 41b. Bracts 1–5 × 1–1.5 mm, linear-lanceolate to ovate.
- 43a. Leaves (13 or)15–19-foliolate; leaflet blades 0.8–1.3 cm wide; pedicel 1–1.5 mm 60. *I. delavayi*
- 43b. Leaves 5–15-foliolate (if to 23 leaflets in *I. decora*, then pedicels 3–6 mm); leaflet blades to 3 cm wide; pedicel 2–6 mm.
- 44a. Leaflet blades with appressed medifixed trichomes on both surfaces; stamens (11–)12–15 mm.
- 45a. Leaflet blades usually ovate-lanceolate, ovate-oblong, or lanceolate, apex acuminate, acute, or rarely obtuse; calyx 2.5–3.5 mm; stipels ca. 1.5 mm 18. *I. decora*
- 45b. Leaflet blades elliptic to ovate-elliptic, apex obtuse; calyx 4–4.5 mm; stipels 2–4 mm 20. *I. carlesii*
- 44b. Leaflet blades adaxially glabrous.
- 46a. Stamens 0.7–0.9 cm 17. *I. fortunei*
- 46b. Stamens 1.1–1.4 cm.
- 47a. Leaflet blades ovate-lanceolate, ovate-oblong, or lanceolate, 2–7.5(–10) cm; bracts linear-lanceolate, ca. 3 mm; pedicel 3–6 mm 18. *I. decora*
- 47b. Leaflet blades ovate, ovate-rhombic, or suborbicular, 1.3–2.5 cm; bracts ovate-lanceolate, 2–2.5 mm; pedicel ca. 2.5 mm 19. *I. venulosa*
- 36b. Ovary and legume hairy.

- 48a. Leaflet blades adaxially ± glabrous (adaxially with sparse trichomes in *I. bungeana*, adaxially glabrous or subglabrous in *I. delavayi*, adaxially glabrous except for isolated appressed hairs along midrib in *I. sensitiva*).
- 49a. Stamens (1.3–)1.4–1.7 cm; legume 4–5(–6) cm 60. *I. delavayi*
- 49b. Stamens 0.3–0.8 cm; legume 2–3.5 cm.
- 50a. Stems, petioles, and peduncles glabrous 51. *I. muliensis*
- 50b. Stems, petioles, and peduncles sparsely hairy.
- 51a. Leaves 3–9-foliolate.
- 52a. Shrubs to 1 m tall; leaves 2.5–5 cm; leaflet blades 5–15(–25) × 3–10(–15) mm; peduncle 1–5 mm 57. *I. bungeana*
- 52b. Subshrubs to 30 cm tall; leaves 0.6–1.5(–2) cm; leaflet blades 3.5–6 × 1.5–2.5 mm; peduncle 9–15 mm 64. *I. chaetodonta*
- 51b. Leaves 11–31-foliolate.
- 53a. Leaves 21–31-foliolate; stamens 3–4 mm 63. *I. sensitiva*
- 53b. Leaves 11–21-foliolate; stamens 5–5.5 mm 65. *I. mengtzeana*
- 48b. Leaflet blades adaxially with appressed 2-branched trichomes.
- 54a. Corolla standard outside with appressed stiff brown trichomes.
- 55a. Stamens 13–16 mm 33. *I. sootepensis*
- 55b. Stamens 3–7 mm.
- 56a. Corolla standard with tuft of hairs inside at base; legume 1.7–2.8 cm 31. *I. nigrescens*
- 56b. Corolla standard without tuft of hairs inside; legume 2–9 cm.
- 57a. Legume deflexed; stamens 3–5 mm.
- 58a. Legume 10–15 × 2.5–3 mm, falcate; stamens 3–4 mm 27. *I. suffruticosa*
- 58b. Legume 25–30 × 1–2(–2.2) mm, straight to semicircular but never falcate; stamens 4–5 mm 30. *I. tinctoria*
- 57b. Legume spreading to erect; stamens 3–7 mm.
- 59a. Leaflet blades ovate-lanceolate, 3–6 cm; legume spreading, 2.5–4.5 cm; seeds discoid, stacked like a pile of coins 32. *I. zollingeriana*
- 59b. Leaflet blades oblanceolate-oblong, 2–4 cm; legume ascending to erect; seeds rectangular to quadrate, arranged typically as in genus.
- 60a. Legume 6–9 cm; racemes 5–12 cm; stamens 5–7 mm 34. *I. galegoides*
- 60b. Legume 2–3.5 cm; racemes to 26 cm; stamens 3–4 mm 35. *I. densifruca*
- 54b. Corolla standard outside with white 2-branched trichomes (unknown for *I. jindongensis*).
- 61a. Pedicel (2–)4–9 mm; leaf rachis adaxially flattened, slightly winged.
- 62a. Calyx 2–3 mm, teeth ± equaling tube 48. *I. henryi*
- 62b. Calyx 4–5 mm, teeth to 2 × as long as tube 49. *I. myosurus*
- 61b. Pedicel 0.5–3(–4) mm; leaf rachis not flattened or winged.
- 63a. Racemes usually (9–)10–25(–35) cm.
- 64a. Racemes usually erect or ascending.
- 65a. Corolla standard incurved at apex; peduncle to 0.5 cm; stamens 5–6 mm; corolla pink 56. *I. amblyantha*
- 65b. Corolla standard not incurved at apex; peduncle 0.8–5 cm; stamens 7.5–8.5 mm; corolla dark crimson-red 75. *I. szechuensis*
- 64b. Racemes usually pendulous or spreading.
- 66a. Racemes pendulous, to 30 cm; corolla standard bluish pink, densely downy white puberulent dorsally; leaves (11 or)13–23(–27)-foliolate, leaflet blades adaxially glabrous 61. *I. pendula*
- 66b. Racemes spreading ± horizontally with tips ascending; corolla standard bright reddish pink, thinly strigillose-puberulent; leaves (7 or)9–17(–23)-foliolate, leaflet blades adaxially hairy 62. *I. howellii*
- 63b. Racemes usually shorter, (1–)2–10(–15) cm.
- 67a. Shrublets, 10–30 cm tall; leaflet blade venation obviously reticulate on both surfaces; stamens 4–5 mm, much shorter than 7–9 mm tapering corolla keel 50. *I. reticulata*
- 67b. Shrubs, mostly taller than 30 cm; leaflet blade venation obscure on both surfaces; stamens only ca. 1 mm shorter than corolla keel.
- 68a. Leaves 21–31-foliolate; stamens 3–4 mm 63. *I. sensitiva*
- 68b. Leaves usually 21-foliolate or less (if more than 21-foliolate in *I. franchetii*, *I. hancockii*, *I. heterantha*, and *I. wightii*, then stamens 5–11.5 mm); stamens usually longer than 4 mm (3–4 in *I. byobiensis*, *I. ramulosissima*, and *I. silvestrii* and unknown in *I. jindongensis*).

- 69a. Leaves (9–)13–25(–29)-foliolate.
- 70a. Stamens 5–5.5 mm.
- 71a. Leaflet blades with appressed 2-branched trichomes on both surfaces, midvein abaxially prominent and terminating in a tubular gland; legume erect 59. *I. wightii*
- 71b. Leaflet blades with sparse trichomes abaxially and glabrescent adaxially, midvein not as above; legume spreading 65. *I. mengtzeana*
- 70b. Stamens 6–11.5 mm.
- 72a. Petiole 1–9 mm; stamens (6–)7–11.5 mm; young racemes in bud grayish green; racemes ascending to erect (71. *I. chenii* will also key out here; see note under description of this species) 70. *I. heterantha*
- 72b. Petiole 8–20 mm; stamens 6–7 mm; young racemes in bud dark brown or densely appressed white hairy; racemes stiffly erect.
- 73a. Leaves (5–)9–19-foliolate; young branches, leaves, and racemes with appressed brown 2-branched trichomes 68. *I. hancockii*
- 73b. Leaves (11–)17–27-foliolate; young branches, leaves, and racemes with dense appressed grayish white 2-branched trichomes 69. *I. franchetii*
- 69b. Leaves usually 5–13-foliolate (occasionally to 17-foliolate in *I. mairei*).
- 74a. Legume 3.5–6 cm (unknown in *I. acutipetala* and *I. wilsonii*).
- 75a. Petiole 1.2–5 cm; leaflet blades 1–4(–5) cm.
- 76a. Stems terete; leaves to 18 cm; petiole (1.5–)2–5 cm; racemes 11–15 cm 56. *I. amblyantha*
- 76b. Stems 4-ribbed; leaves 8.5–10.5 cm; petiole 1.2–1.7 cm; racemes 4–7 cm (but only known in fruit) 78. *I. jindongensis*
- 75b. Petiole 0.2–1.1(–1.3) cm; leaflet blades 0.3–1.6 cm.
- 77a. Stipules 5–6(–7) mm; pedicel 2.5–4 mm; corolla standard 11–14 mm 74. *I. wilsonii*
- 77b. Stipules 2–4 mm; pedicel 1–2 mm; corolla standard 7–9.5 mm.
- 78a. Leaves 4–10 cm; racemes 10–19 cm; stamens 7.5–8.5 mm 75. *I. szechuensis*
- 78b. Leaves ca. 3 cm; racemes 5–9 cm; stamens 5–6.5 mm 77. *I. acutipetala*
- 74b. Legume 1.5–3 cm (to 3.5 cm in *I. mairei*, unknown in *I. acutipetala* and *I. wilsonii*).
- 79a. Stamens 6.5–13 mm (sometimes ca. 6 mm in *I. mairei*, 5–6.5 mm in *I. acutipetala*).
- 80a. Corolla standard outside spreading soft pubescent.
- 81a. Shrubs 1–2(–3) m tall; peduncle 0.1–1 cm; corolla standard 0.7–0.9(–1) cm; stamens 6–8 mm 72. *I. mairei*
- 81b. Shrubs 0.3–0.8 m tall; peduncle 1.5–4 cm; corolla standard 1.1–1.4 cm; stamens 10–13 mm 74. *I. wilsonii*
- 80b. Corolla standard outside with dense appressed straight and stiffly medifixed 2-branched trichomes.
- 82a. Corolla standard with a distinct ca. 1 mm mucro at apex; stamens 5–6.5 mm 77. *I. acutipetala*
- 82b. Corolla standard without a mucro; stamens 7–12 mm.
- 83a. Stamens 11–12 mm; pedicel 2–4 mm 76. *I. pseudoheterantha*
- 83b. Stamens 7–9 mm; pedicel 1–2 mm.
- 84a. Corolla standard pink to rose; peduncle 0.1–0.5(–1) cm; stipules ca. 1 mm; leaves 1.5–2.5 cm; racemes 3–6(–8) cm 73. *I. rigioclada*
- 84b. Corolla standard dark crimson-red; peduncle 0.8–5 cm; stipules 2–4 mm; leaves 4–10 cm; racemes 10–19 cm 75. *I. szechuensis*
- 79b. Stamens 3–6.5 mm.
- 85a. Stamens 3–4 mm.
- 86a. Stems prostrate; legume 4-angled, spreading (from Taiwan only) 28. *I. byobiensis*
- 86b. Stems erect; legume cylindrical.
- 87a. Racemes not spinescent (from Taiwan only) 29. *I. ramulosissima*
- 87b. Racemes spinescent 58. *I. silvestrii*
- 85b. Stamens 5–6.5 mm (4–5 mm in *I. bungeana*).
- 88a. Leaflet blades 0.5–4(–5) × 0.3–2 cm; racemes 4–15 cm.
- 89a. Corolla standard apically hooded; leaves to 18 cm; terminal leaflet blade narrowly ovate to elliptic, 2–5 cm; petiole (1.5–)2–5 cm; stamens 5–6 mm 56. *I. amblyantha*
- 89b. Corolla standard not apically hooded; leaves 2.5–5 cm; terminal leaflet blade obovate to elliptic, 0.5–1.5(–2.5) cm; petiole 0.4–1.6(–2) cm; stamens 4–5 mm 57. *I. bungeana*

88b. Leaflet blades $0.3\text{--}0.7 \times 0.2\text{--}0.5$ cm; racemes 1–5 cm.

90a. Leaflet blade indumentum very densely silvery white strigose with appressed 2-branched trichomes, obscuring surfaces 66. *I. calcicola*

90b. Leaflet blade indumentum less dense, abaxially not obscuring surfaces 67. *I. lenticellata*

1. *Indigofera nummulariifolia* (Linnaeus) Livera ex Alston, Handb. Fl. Ceylon 6(Suppl.): 72. 1931.

刺莢木藍 ci jia mu lan

Hedysarum nummulariifolium Linnaeus, Sp. Pl. 2: 746. 1753 [*“nummularifolium”*]; *Acanthonotus echinata* (Willdenow) Benthams; *Alysicarpus nummulariifolius* (Linnaeus) Candolle; *H. cuneifolium* Roth; *H. erinaceum* Poiret; *H. rotundifolium* Vahl; *Indigofera echinata* Willdenow; *Onobrychis cuneifolia* (Roth) Candolle; *O. rotundifolia* (Vahl) Desvaux.

Herbs, perennial, prostrate. Stems with appressed medifixed symmetrically 2-branched trichomes. Stipules narrowly triangular, $2\text{--}2.5 \times$ ca. 0.7 mm. Leaves simple; petiole 2–3 mm, pulvinate; leaf blade obovate-elliptic to obovate, $1\text{--}2 \times 0.7\text{--}1$ cm, both surfaces and vertically along margin with sparse appressed medifixed trichomes, abaxially with many small dotlike glands, secondary veins 3–5 on each side of midvein, base cuneate to broadly cuneate, apex obtuse to rounded and with a ca. 0.3 mm mucro. Racemes 1.5–2 cm; peduncle 1–1.8 cm; bracts narrowly triangular, $1.5\text{--}2$ mm, not longer than buds. Pedicel 0.5–1 mm. Calyx tube ca. 1 mm; teeth narrowly triangular, $1.5\text{--}2$ mm. Corolla standard broadly ovate, ca. 3×1.5 mm, outside hairy; wings very narrow, ca. 2.5×0.8 mm, glabrous; keel ca. 3.5×1 mm, glabrous, lateral spur small, broad, and obtuse. Stamens 2–2.5 mm; anthers ca. 0.1×0.1 mm. Ovary 2–2.5 mm, hairy, with 1 or 2 ovules. Legume falcate, ca. 7×4 mm, adaxial margin echinate near suture; endocarp not blotched. Seeds 1 per legume, reddish brown, ovoid, flattened, ca. 0.3×1.8 mm. Fl. Oct, fr. Oct–Nov. $2n = 16$.

Sunny sandy areas near seashores, open grasslands; near sea level to 200 m. Hainan, Taiwan [Cambodia, India, Indonesia, Myanmar, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, S Vietnam; Africa, N Australia, Madagascar].

2. *Indigofera squalida* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 355. 1897.

远志木藍 yuan zhi mu lan

Corchorus oenotheroides H. Léveillé [*“oenotheroides”*]; *Indigofera changensis* Craib; *I. oenotheroides* (H. Léveillé) Lauener; *I. polygaloides* Gagnepain.

Herbs, perennial, erect, to 60 cm tall. Roots tuberous. Stems striate, with appressed white medifixed symmetrically 2-branched trichomes. Stipules narrowly triangular, ca. 2 mm. Leaves simple; petiole 3–4 mm; leaf blade narrowly elliptic to obovate, $2.5\text{--}5.5(-7) \times 0.7\text{--}2.5$ cm, both surfaces with appressed medifixed trichomes, abaxially with sparse deciduous disk-shaped glands, secondary veins 10 or 11 on each side of midvein, base cuneate, apex acute and with a ca. 0.5 mm mucro. Racemes 1–2(–3) cm, very densely flowered; bracts narrowly triangular, $2\text{--}2.5 \times$ ca. 0.5 mm. Peduncles, pedicels, bracts, and calyces all with very dense appressed medifixed tri-

chomes. Pedicel 1–1.5 mm. Calyx tube ca. 1 mm; teeth narrowly triangular, $1\text{--}1.5 \times$ ca. 0.5 mm. Corolla red; standard elliptic, $4\text{--}5 \times 2.5\text{--}3$ mm, outside with very dense appressed medifixed trichomes; wings $3.5\text{--}4 \times$ ca. 1 mm, glabrous; keel $4\text{--}4.5 \times$ ca. 2 mm, outside surface with very dense appressed trichomes. Stamens 3–4 mm; anthers glabrous. Ovary hairy, with 5 or 6 ovules. Legume cylindric, descending, straight, $1.1\text{--}1.4$ cm \times $1.5\text{--}2$ mm, with dense appressed medifixed trichomes; style usually persistent and then glands still visible; endocarp not blotched. Seeds 3–5 per legume, yellowish brown, ovoid, ca. 1.2×1 mm. Fl. Jun–Sep, fr. Sep–Nov.

Trailsides, open grasslands, foot of hills; 100–1000 m. Guangdong, Guangxi, Guizhou, Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

3. *Indigofera pedicellata* Wight & Arnott, Prodr. Fl. Ind. Orient. 200. 1834.

长梗木藍 chang geng mu lan

Indigofera liukiensis Makino.

Herbs, trailing, to 35 cm tall. Stems many branched, gray pubescent and glandular, glabrescent. Stipules narrowly triangular. Leaves 1.4–1.7 cm, 3-foliolate; petiole 5–6 mm; leaflet blades obovate to obovate-lanceolate, $3.7\text{--}10 \times 3\text{--}6$ mm, abaxially with yellowish dots, adaxially glabrous, base cuneate to narrowly cuneate, apex emarginate or obtuse. Racemes 1.3–2.5 cm but elongating in fruit to 3.5 cm, 8–12-flowered; peduncle 5–9 mm; bracts to 1 mm. Pedicel 3–5 mm. Corolla red, 6–7 mm; standard obovate, ca. 5 mm, outside appressed pubescent and glandular; wings ca. 4.5 mm, glabrous; keel spatulate, ca. 5 mm, outside pubescent and glandular. Stamens 4.5–5 mm. Ovary glabrous. Legume straight, 4-sided in cross section, $1.5\text{--}2.5$ cm \times $2\text{--}2.5$ mm, narrowly winged. Seeds 5–8 per legume. Fl. May–Nov, fr. Jul–Dec. $2n = 16$.

Open seashores; below 100 m. Taiwan (Hengchun Peninsula) [India].

This record is based on Sanjappa (Taiwania 29: 111–112. 1984), who drew attention to the unusual disjunct distribution. The material was originally misidentified as *Indigofera trifoliata* (T. C. Huang & H. Ohashi, Fl. Taiwan 3: 309. 1977).

4. *Indigofera trifoliata* Linnaeus, Cent. Pl. II. 29. 1756.

三叶木藍 san ye mu lan

Shrublets or perennial herbs, erect or ascending, 15–60 cm tall. Stems with appressed white medifixed symmetrically 2-branched trichomes. Stipules narrowly triangular, $3\text{--}5 \times$ ca. 0.2 mm. Leaves 3-foliolate; petiole 6–10 mm, with dense appressed medifixed trichomes; stipels linear, ca. 0.5 mm, glabrous; petioles 1–2 mm, with very dense appressed medifixed trichomes; leaflet blades opposite, narrowly obovate to obovate-elliptic, $0.6\text{--}3 \times 0.3\text{--}0.5(-1.2)$ cm, both surfaces with sparse appressed medifixed trichomes, abaxially with dark red disk-shaped

glands, secondary veins not visible, base narrowly cuneate, apex rounded to emarginate and with a ca. 0.2 mm mucro. Racemes 5–10 mm, densely flowered; peduncle to 2.5 mm; bracts narrowly triangular, ca. 1×0.2 mm, with dense appressed medifixed trichomes. Pedicel 0.5–1 mm. Calyx 2.5–3 mm, with dense appressed medifixed trichomes; tube 0.5–1 mm; teeth narrowly triangular, 1.2–1.5 mm. Corolla red; standard orbicular, ca. $(2-5) \times 2-3$ mm, outside hairy; wings ca. $(2-4) \times 0.5$ mm, glabrous; keel ca. $(2-5) \times 1$ mm, outside hairy. Stamens $(2-5)-6$ mm; anthers globose, glabrous. Ovary glabrous, with 3–6 ovules. Legume straight, laterally flattened, $10-15 \times$ ca. 2.5 mm, with dense appressed medifixed trichomes and often with disk-shaped glands, sutures thickened; endocarp not blotched. Seeds ca. 2×2 mm. Fl. Jun–Sep, fr. Sep–Oct.

Trailsides, grasslands, near rivers, cultivated fields; below 1900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Hubei, Hunan, Jiangxi, S Sichuan, Taiwan, Yunnan [Bhutan, India, Indonesia, S Japan, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia].

- 1a. Stamens 5–6 mm 4a. var. *trifoliata*
1b. Stamens 2–3 mm 4b. var. *zhengkangensis*

4a. *Indigofera trifoliata* var. *trifoliata*

三叶木蓝(原变种) san ye mu lan (yuan bian zhong)

Indigofera glandulifera Hayata (1911), not Page ex Steudel (1840).

Stamens 5–6 mm. $2n = 16$.

Trailsides, grasslands; below 1900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Hubei, Hunan, Jiangxi, S Sichuan, Taiwan, Yunnan [Bhutan, India, Indonesia, S Japan, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia].

4b. *Indigofera trifoliata* var. *zhengkangensis* H. Sun in C. Y. Wu & S. K. Chen, Fl. Yunnan. 10: 847. 2006.

镇康三叶木蓝 zhen kang san ye mu lan

Stamens 2–3 mm.

• Near rivers, cultivated fields; 1100–1200 m. W Yunnan (Jingdong, Zhenkang).

5. *Indigofera linifolia* (Linnaeus f.) Retzius, Observ. Bot. 4: 29. 1786.

单叶木蓝 dan ye mu lan

Hedysarum linifolium Linnaeus f., Suppl. Pl. 331. 1782; *Sphaerodiophorum linifolium* (Linnaeus f.) Desvaux.

Shrublets or perennial herbs, prostrate or erect, many branched. Stems usually 4-angled, with appressed white medifixed symmetrically 2-branched trichomes. Stipules narrowly triangular, $2-3 \times$ ca. 0.2 mm, partly adnate with petiole. Leaves simple or 1-foliolate; petiole 2.5–3 mm, with dense appressed medifixed trichomes; stipels linear, ca. 0.5 mm, glabrous; leaf or leaflet blade usually linear but sometimes elliptic to ovate-elliptic, $0.5-3$ cm \times $2-4$ mm, both surfaces with appressed medifixed trichomes but abaxially more densely so, secondary veins not visible, base narrowly cuneate, apex acuminate and

mucronate. Racemes 1–1.5 cm; peduncle ca. 0.5 mm; bracts ovate, ca. 1×1 mm, with dense appressed medifixed trichomes. Pedicel 0.5–1 mm. Calyx with dense appressed medifixed trichomes; tube ca. 0.5 mm; teeth narrowly triangular, ca. 2 mm. Corolla red; standard elliptic, $4-4.5 \times 2-2.5$ mm, outside hairy; wings $3.5-4 \times$ ca. 1.5 mm, glabrous; keel $3.5-4.5 \times 1-1.5$ mm, glabrous. Stamens 3–4 mm; anthers glabrous. Ovary with minute appressed trichomes, with 1 ovule. Legume ovoid, ca. 2×2 mm, with dense appressed white medifixed 2-branched trichomes; endocarp not blotched. Seed 1 per legume, cubic, ca. 1×1 mm. Fl. Apr–Sep, fr. May–Oct. $2n = 16$.

Grasslands on dry slopes, sunny riversides; below 1200 m. S Sichuan, Taiwan, Yunnan [Afghanistan, Bhutan, Cambodia, India, Indonesia, Kashmir, Laos, Myanmar, Pakistan, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Africa, Australia].

6. *Indigofera cordifolia* B. Heyne ex Roth, Nov. Pl. Sp. 357. 1821.

心叶木蓝 xin ye mu lan

Herbs, procumbent or ascending, 10–30 cm tall. Stems with appressed to slightly spreading white symmetrically to slightly asymmetrically 2-branched trichomes. Stipules lanceolate, ca. 2 mm, with spreading subbasifixed extremely asymmetrically 2-branched trichomes, apex cuspidate. Leaves simple; petiole ca. 1 mm; leaf blade oblong to cordate, $4-8 \times 3-6$ mm, abaxially with dense long spreading subsymmetrically to symmetrically 2-branched trichomes, adaxially with long spreading white subbasifixed trichomes, secondary veins not visible, base cordate, apex acute and with a ca. 0.2 mm mucro. Racemes 2–3 mm, 1–4-flowered; bracts narrowly triangular, ca. 2×0.5 mm, apex cuspidate. Pedicel 0–0.5 mm. Calyx with dense spreading white subbasifixed long trichomes; tube ca. 0.5 mm; teeth linear-triangular, 1.5–2 mm. Corolla standard spatulate to cuneate, $2.5-3 \times 1-1.5$ mm, outside hairy at apex, apex obtuse; wings ca. 2.5×0.2 mm, glabrous; keel ca. 2.5×0.5 mm, glabrous, lateral spur ca. 0.3 mm. Stamens 2–2.5 mm; anthers ca. 0.2×0.3 mm, glabrous. Ovary with spreading white long trichomes, with (1 or)2 ovules. Legume ellipsoid to subglobose, $2.5-3 \times$ ca. 1.6 mm, with densely subspreading white trichomes. Seeds (1 or)2 per legume, reddish brown. Fl. Oct–Nov, fr. Nov–Dec. $2n = 16$.

Sunny slopes; 100–400 m. Guangdong [Afghanistan, India, Indonesia, Pakistan; NE Africa, SW Asia, N Australia].

7. *Indigofera caloneura* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 229. 1874.

美脉木蓝 mei mai mu lan

Indigofera oblonga Craib.

Shrubs, erect. Branches angular, with dense appressed brown subbasifixed asymmetrically 2-branched trichomes. Stipules narrowly triangular, 4–5 mm. Leaves simple or 1-foliolate; petioles 1–1.5 cm; stipels linear-subulate, 1.5–2 mm; leaflet blade oblong to elliptic, $8-10 \times 4-5.5$ cm, thickly papery, abaxially with gray and spreading to subspreading gray or brown subbasifixed extremely asymmetrically 2-branched trichomes, adaxially dark green and glabrous, secondary veins 15–17 on each side of midvein and conspicuous, base broadly cuneate to

rounded, apex obtuse to rounded. Racemes 7–13 cm; peduncle short; bracts linear-setaceous, 3.5–4 mm, caducous. Pedicel 3–5 mm in fruit, densely tomentose. Calyx 2–2.5 mm, with densely ascending subbasifixed trichomes; teeth triangular. Corolla pink; standard ovate, 8–10 mm, outside densely appressed brown pubescent, apex obtuse and mucronate; wings 6–8 mm, margin ciliate; keel outside densely appressed brown pubescent. Stamens 8–10 mm; anthers hairy at base. Ovary glabrous or sparsely strigose. Legume cylindrical, 4–5.3 cm, with small appressed trichomes; endocarp red blotched. Seeds 8–11 per legume, dark brown. Fl. unknown for China, fr. Nov–Dec.

Moist places near rivers; ca. 900 m. S Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

This species was described by Kurz as having pink flowers and a densely silky pubescent ovary; however, Sanjappa (Reinwardtia 10: 218–219. 1985) described it as having a glabrous ovary, and de Kort and G. Thijssse (Blumea 30: 112. 1984) described it as having whitish and yellow flowers and a strigose ovary. The Chinese specimens are without flowers. Two specimens from Thailand were recorded as flowering “pinkish” (*Kerr no. 5171*, K!) and “yellow-white” (*K. Larsen et al. no. 1912*, K!), respectively.

8. *Indigofera shipingensis* X. F. Gao, Novon 19: 159. 2009.

石屏木藍 shi ping mu lan

Shrubs. Stems with dense appressed brown medifixed 2-branched trichomes. Stipules subulate, ca. 4 mm. Leaves 1-foliolate; petiole 1–1.5 cm, with usually dense appressed brown medifixed 2-branched trichomes and fewer spreading trichomes; petiolule 2–4 mm, with appressed 2-branched trichomes; stipels 1.5–2.5 mm; leaflet blade oblong to elliptic-ovate, 3–4 × 2–2.5 cm when young, both surfaces with appressed brown medifixed 2-branched trichomes, abaxially canescent, secondary veins 12–15 on each side of midvein. Racemes 3.5–6 cm, densely flowered; peduncle 4–7 mm; bracts subulate, 1–1.5 mm. Pedicel ca. 2 mm. Calyx ca. 2 mm, outside with dense spreading white 2-branched trichomes with unequally long arms; tube ca. 1 mm; teeth ± equaling tube. Corolla standard obovate, ca. 7 mm, outside with dense spreading white and soft 2-branched trichomes; wings narrowly oblong, 1.6–1.8 mm wide, margin ciliate; keel densely spreading hairy at apex, spur ca. 1 mm. Stamens 6–7 mm; anthers glabrous. Ovary with white dense appressed 2-branched trichomes. Fl. Apr, fr. unknown.

- Trailsides. S Yunnan (Shiping).

9. *Indigofera linnaei* Ali, Bot. Not. 111: 549. 1958.

九叶木藍 jiu ye mu lan

Hedysarum prostratum Linnaeus, Mant. Pl. 1: 102. 1767, not *Indigofera prostrata* Willdenow (1802); *I. dominii* Eichler; *I. tsiangiana* F. P. Metcalf.

Shrublets or perennial herbs, usually prostrate, sometimes ascending, 20–90 cm tall. Stems with appressed medifixed sub-symmetrically 2-branched trichomes. Stipules ovate, 3–4 × ca. 2 mm, apex acuminate. Leaves 1.5–3 cm, 5–9-foliolate; petiole and petiolules with appressed medifixed trichomes; stipels not visible; leaflet blades alternate, obovate to narrowly obovate, 5–10(–15) × 2–3(–5) mm, both surfaces with medifixed 2-

branched trichomes, secondary veins not visible, base cuneate, apex obtuse to truncate and with a ca. 0.1 mm mucro. Racemes 0.5–2.5 cm, sessile; bracts ovate to triangular, 2–2.5 × ca. 1 mm. Pedicels, bracts, and calyces with medifixed trichomes. Pedicel ca. 0.5 mm. Calyx 2–2.5 mm, with appressed medifixed trichomes; tube ca. 1 mm; teeth narrowly triangular, 1–1.5 mm. Corolla red; standard red to orangish red, broadly ovate to orbicular, 3–4.5 × 2.5–4 mm, outside hairy; wings 3–4 × 1–1.5 mm, glabrous, margin shortly ciliate; keel 3–4 × ca. 1.5 mm, glabrous, margin shortly ciliate, lateral spur ca. 0.5 mm. Stamens 2.5–4 mm; anthers glabrous. Ovary densely strigose, with (1 or)2 or 3 ovules. Legume oblong, straight, spreading, 3–8 × 1.5–2 mm, densely hairy, apex slightly beaked; endocarp not blotched. Seeds (1 or)2 or 3 per legume, dark brown, cubic, ca. 1 × 1 mm. Fl. Jun–Nov, fr. Nov–Dec. $2n = 16, 32$.

Sandy ground near rivers or seashores, dry open places, sunny trailsides; 100–700(–1200) m. Hainan, S Sichuan, Yunnan [India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Australia].

The name *Indigofera enneaphylla* Linnaeus has been incorrectly applied to this species. As now lectotypified, this name is an illegitimate synonym of *Psoralea pinnata* Linnaeus.

10. *Indigofera hendecaphylla* Jacquin, Collectanea 2: 358. 1788.

穗序木藍 sui xu mu lan

Herbs, perennial, prostrate or weakly ascending, 20–100 cm. Branchlets rooting at nodes; young branches dark red, cylindrical, with sparse appressed white medifixed symmetrically 2-branched trichomes, glabrescent. Stipules lanceolate to narrowly triangular, 4–6 × 1.5–2 mm, membranous, glabrescent, apex caudate. Leaves 2.5–7.5 cm, 5–9-foliolate; petiole and rachis with sparse appressed medifixed trichomes, glabrescent; petiole 0.5–2 mm; rachis 1–2.2 cm; stipels spiculate, ca. 0.5 mm; petiolules 1–1.5 mm; leaflet blades alternate, obovate, narrowly obovate, or obovate-oblong, 5–22 × 3–10 mm, abaxially with appressed medifixed trichomes, adaxially glabrous, secondary veins not visible, base cuneate, apex rounded and with a ca. 0.2 mm mucro. Racemes 5–16 cm; peduncle to 1.8 cm; bracts ovate to ovate-lanceolate, 2.5–3 × ca. 1 mm, caducous, apex caudate. Peduncles, bracts, pedicels, and calyces with sparse appressed medifixed trichomes. Pedicel 0.5–1 mm, deflexed in fruit. Calyx tube 0.5–1 mm; teeth narrowly triangular, 2–2.5 mm. Corolla red; standard broadly ovate, 4–5.5 × 3–4 mm, outside with appressed medifixed trichomes, glabrescent when flowering; wings 3–4.5 × 1.5–2 mm, glabrous, margin ciliate along upper auricle; keel 4–5.5 × 2–2.5 mm, outside with medifixed trichomes in bud, glabrescent when flowering, margin ciliate, lateral spur ca. 1 mm. Stamens 4–5 mm; anthers ovoid, glabrous. Ovary with minute appressed trichomes, with 8 or 9 ovules. Legume linear, 4-sided in cross section, 1–2.5 cm × 2–2.5 mm, with appressed medifixed trichomes, apex with ca. 2 mm beak; endocarp not blotched. Seeds 7–9 per legume, dark brown, globose, 1.5–2 × 1–1.2 mm. Fl. Sep–Nov, fr. Nov–Jan.

Open ground, moist sunny trailsides; 800–1100 m. Guangdong, Guangxi (cultivated), Taiwan, Yunnan [Cambodia, India, Indonesia,

Japan (Ryukyu Islands), Laos, Philippines, Sri Lanka, Thailand, Vietnam].

Indigofera hendecaphylla has been misidentified as the African and SW Asian species *I. spicata* Forskål by Y. Y. Fang and C. Z. Zheng (FRPS 40: 316. 1994), T. C. Huang and H. Ohashi (Fl. Taiwan, ed. 2, 3: 305. 1993), C. Z. Zheng (C. T. Cheng) and Y. Y. Fang (Higher Pl. China 7: 145. 2001), and X. Y. Zhu et al. (Legumes China, 439. 2007). See Du Puy et al. (Kew Bull. 48: 727–733. 1993).

11. *Indigofera litoralis* Chun & T. C. Chen, Acta Phytotax. Sin. 7: 26. 1958.

滨海木蓝 bin hai mu lan

Herbs, perennial, prostrate. Roots very long. Stems angled when young, with appressed gray medifixed symmetrically 2-branched trichomes. Stipules lanceolate, 3–4 mm. Leaves 1.5–3 cm, 3–7-foliolate; petiole 1.5–3 mm, adaxially grooved, with appressed white medifixed trichomes; stipels absent; leaflet blades alternate, linear to sometimes narrowly oblong, 7–20 × 1.5–3 mm, both surfaces with appressed medifixed trichomes, secondary veins not visible, base cuneate, apex acuminate to acute and with a ca. 0.2 mm mucro. Racemes 2–3 cm, densely flowered; peduncle 5–8 mm; bracts ovate, ca. 1 mm, caducous. Peduncles, pedicels, bracts, and calyces with appressed medifixed trichomes. Pedicel 0.5–1 mm, reflexed in fruit. Calyx ca. 2.5 mm; tube ca. 0.5 mm; teeth linear, equal, ca. 3–4 × as long as tube, apex acuminate. Corolla red; standard obovate, ca. 5 × 3 mm, outside hairy, base narrowly cuneate, apex obtuse; wings obovate-oblong, glabrous; keel falcate, glabrous. Stamens ca. 4 mm; anthers globose, apex with a ca. 0.2 mm mucro. Ovary linear, densely hairy, with 8–11 ovules. Legume straight, 1.5–2.5 cm × 1.5–2 mm, with small appressed medifixed trichomes, sutures thickened; endocarp not blotched. Seeds 7–10 per legume, dark brown, ellipsoid, ca. 1.2 × 0.8 mm, both ends truncate. Fl. Aug–Sep, fr. Oct.

• Sandy ground near seashores, dry open places, sunny trailsides; below 500 m. Hainan.

12. *Indigofera taiwaniana* T. C. Huang & M. J. Wu, Taiwania 37: 79. 1992.

台湾木蓝 tai wan mu lan

Herbs, annual or perennial, decumbent, to 30 cm tall. Stems with appressed medifixed symmetrically 2-branched trichomes. Leaves 4–6-foliolate; leaflet blades alternate, oblanceolate, oblong, or obovate, 8–18 × 2.5–5 mm, membranous, adaxially with appressed medifixed trichomes along upper margin, secondary veins obscure, base cuneate to narrowly cuneate, apex obtuse and mucronate. Racemes 1.8–4.5 cm, densely flowered; peduncle 9–10 mm; bracts narrowly triangular, ca. 1.8 × 0.7 mm. Calyx teeth narrowly triangular, 2–2.5 × 0.5–0.6 mm. Corolla ± blood-red; standard broadly elliptic, 4.5–5 × 4–4.5 mm, outside hairy; wings 5–5.5 × 1.5–1.7 mm, margin ciliate at base; keel 5–6 × 1–1.2 mm, margin ciliate, spur 0.5–0.6 mm. Stamens 3–3.5 mm; anthers ellipsoid. Ovary hairy, with 9 or 10 ovules. Legume straight, 4-sided in cross section, 2.1–2.3 cm × 1.8–2 mm, apex with a 1–1.5 mm beak; endocarp yellowish brown blotched. Seeds 7–10 per legume, yellow, hexagonal, 1.2–1.5 × ca. 1 mm. Fl. Jun–Sep, fr. Aug–Nov.

• Dry and open meadows on rocks; below 100 m. Taiwan.

13. *Indigofera colutea* (N. L. Burman) Merrill, Philipp. J. Sci. 19: 355. 1921.

疏花木蓝 shu hua mu lan

Galega colutea N. L. Burman, Fl. Indica, 172. 1768; *Indigofera chuniana* F. P. Metcalf.

Herbs, annual or perennial, procumbent or prostrate. Stems with brown gland-tipped trichomes and appressed white medifixed symmetrically 2-branched trichomes. Stipules linear, 3–4 mm, with appressed medifixed trichomes. Leaves 1.5–4 cm, (5–)9- or 11-foliolate; petiole and rachis with appressed medifixed trichomes and gland-tipped trichomes; petiole 7–10 mm; stipels absent; leaflet blades opposite, elliptic to narrowly elliptic, 4–14(–18) × 1.5–4(–8) mm, both surfaces with appressed white medifixed trichomes and gland-tipped trichomes, secondary veins not visible, base cuneate, apex obtuse and minutely mucronate. Racemes (1–)2–6(–8) cm, laxly flowered; bracts linear, ca. 1 mm. Peduncles and pedicels with appressed medifixed trichomes and gland-tipped trichomes. Pedicel ca. 0.5 mm. Calyx ca. 1.2 mm, with spreading medifixed trichomes and gland-tipped trichomes; tube ca. 0.5 mm; teeth linear, ca. 0.7 mm, apex apiculate. Calyces and staminal tubes persistent. Corolla red; standard obovate, ca. 4 mm, outside hairy; wings linear-oblong; keel narrowly obovate. Stamens 3–4 mm; anthers globose, glabrous, apex mucronate. Ovary linear, densely hairy; style short, glabrous. Legume cylindrical, 1.1–2 cm × 1.5–2 mm, with small spreading medifixed trichomes and gland-tipped trichomes; endocarp red blotched. Seeds 9–12 per legume, dark brown, cubic, ca. 1 × 1 mm. Fl. Jun–Aug, fr. Aug–Dec. $2n = 16$.

Sandy ground or wastelands; below 500 m. Guangdong, Hainan [India, Indonesia, Myanmar, Pakistan, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Africa, SW Asia, Australia, Pacific islands (New Zealand)].

Material of this species was misidentified as *Indigofera laotica* Gagnepain by T. Hosokawa (Trans. Nat. Hist. Soc. Formosa 32: 195. 1942).

14. *Indigofera dolichochoete* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 64. 1913.

长齿木蓝 chang chi mu lan

Indigofera mollis Franchet (1889), not Ecklon & Zeyher (1834).

Shrubs, erect. Stems with spreading short and white medifixed 2-branched trichomes and long gland-tipped trichomes. Stipules linear, 6–7 mm. Leaves 10–12 cm, 11- or 13-foliolate; petiole and rachis with gland-tipped trichomes and short white medifixed trichomes; petiole 1.5–2 cm; stipels setaceous, ca. 1 mm; petiolules with spreading white medifixed trichomes; leaflet blades elliptic to oblong, 1.8–3 × 1.1–2.2 cm, both surfaces with spreading white basifixed or subbasifixed trichomes, midvein abaxially prominent and adaxially compressed, base rounded, apex obtuse and with a ca. 1 mm mucro. Racemes 12–16 cm, slender; peduncle and rachis with dense spreading medifixed trichomes and sparse glandular trichomes; bracts linear,

3–4 mm, caducous, abaxially with spreading subbasifixed trichomes and sparsely glandular trichomes. Pedicel ca. 2 mm, with spreading medifixed trichomes. Calyx 3–4.5 mm, outside with spreading white medifixed trichomes; tube 0.5–1 mm; teeth linear, 3–4 mm, margin sparsely glandular. Corolla purple; standard elliptic, 6–7 mm, outside with dense appressed white and soft medifixed trichomes, apical mucro ca. 0.2 mm; wings and keel outside with appressed trichomes. Stamens 5.5–6.5 mm; anthers glabrous. Ovary hairy, with 4 or 5 ovules. Legume linear, cylindric, ca. 3 cm, hairy. Fl. Jul–Aug, fr. Aug–Sep.

- Slopes; 1300–2000 m. S Sichuan, Yunnan.

15. *Indigofera scabrida* Dunn, J. Linn. Soc., Bot. 35: 487. 1903.

腺毛木蓝 xian mao mu lan

Indigofera scabrida f. *alba* H. F. Comber; *I. smithiana* E. Peter.

Shrubs, erect, 50–80 cm tall. Stems terete, with dense rusty brown gland-tipped trichomes and spreading minute basifixed extremely asymmetrically 2-branched trichomes. Stipules narrowly lanceolate to narrowly triangular, with long rusty brown gland-tipped trichomes. Leaves 9–13 cm, 7–13-foliolate; petiole and rachis with rusty brown gland-tipped trichomes and minutely basifixed trichomes; petiole 1.5–1.8 cm; stipels subulate, 1–2 mm; petiolules 1.5–2.5 mm; leaflet blades opposite, elliptic to elliptic-oblong, 1.5–3 × 0.7–2 cm, abaxially with sparse appressed basifixed trichomes or medifixed trichomes, adaxially glabrescent or with ± spreading basifixed trichomes or appressed medifixed trichomes, midvein and margin with sparse rusty brown gland-tipped trichomes, midvein abaxially prominent and adaxially impressed, secondary veins 6–8 on each side of midvein, base rounded, apex obtuse and with a ca. 0.5 mm mucro. Racemes 16–18 cm, many flowered; peduncle 1–2 cm; bracts linear-triangular, 2–3 mm, caducous, margin with rusty brown gland-tipped trichomes. Peduncles and pedicels with rusty brown gland-tipped trichomes and spreading minutely basifixed to medifixed trichomes as on branches. Pedicel ca. 1 mm but to 2–3 mm and spreading in fruit. Calyx 2–2.5(–3) mm, with appressed white basifixed or medifixed trichomes and rusty brown gland-tipped trichomes; tube 0.5–1 mm; teeth linear, 1–2 mm, apex acuminate. Corolla crimson; standard ovate to obovate, ca. 7 × 4 mm, outside puberulent, apex obtuse and with a short mucro; wings ca. 6 mm, margin ciliate; keel ca. 7 mm, outside puberulent, margin ciliate. Stamens (5.5–)6–7 mm; anthers ovoid-ellipsoid, glabrous. Ovary linear, ca. 5 mm, glabrescent or sparsely hairy along sutures; style ca. 2 mm. Legume subcylindric, straight, 2.8–4 cm × 2.5–4 mm, with very sparse minute appressed trichomes, sutures thin. Seeds 8–12 per legume, glossy dark brown, smooth, ca. 2 × 1 mm, both ends truncate. Fl. Jun–Sep, fr. Aug–Oct.

Sparse forests, *Pinus* forests, thickets; 1400–2100 m. Guizhou, Sichuan, Yunnan [Laos, Myanmar].

We have not seen the type of *Indigofera smithiana* (H. Smith 1695).

16. *Indigofera kirilowii* Maximowicz ex Palibin, Trudy Glavn. Bot. Sada 17: 62. 1898.

花木蓝 hua mu lan

Indigofera kirilowii var. *alba* Q. Z. Han; *I. macrostachya* Bunge (1858), not Ventenat (1804).

Shrubs, 30–10 cm tall. Stems terete; young branches angular, with sparse appressed medifixed 2-branched trichomes, glabrescent. Stipules lanceolate, 4–6 mm, caducous. Leaves 6–15 cm, (5 or)7–11-foliolate; petiole and rachis flat, adaxially slightly grooved, glabrous or with appressed medifixed trichomes; petiole 0.1–2.5(–3) cm; stipels subulate, 2–3 mm, persistent; petiolules ca. 2.5 mm, densely hairy; leaflet blades opposite, broadly ovate, ovate-rhombic, or elliptic, 1.5–4(–5) × 1–2.3(–3) cm, papery, both surfaces with appressed medifixed trichomes, abaxially pale green, adaxially darker, midvein abaxially obviously prominent and adaxially slightly prominent, secondary veins obvious, base cuneate to broadly cuneate, apex rounded to acute. Racemes 5–12(–20) cm; rachis striate, with sparse appressed white medifixed trichomes; bracts linear-lanceolate, 2–5 mm. Pedicel 3–5 mm, glabrous. Calyx campanulate, 2.5–4 mm, glabrous; tube ca. 1.5 mm; teeth triangular, shorter than to ± equaling tube, most abaxial one ca. 2 mm, margin ciliate. Corolla pink or rarely white; standard elliptic, 1.2–1.4(–1.8) × ca. 0.8 cm, outside glabrous, margin ciliate, apex obtuse; wing margin ciliate. Stamens 1.2–1.4 cm; anthers broadly ovoid, both ends hairy. Ovary glabrous. Legume brown, cylindric, 3.5–7 cm × ca. 5 mm, glabrous; endocarp blotched. Seeds more than 10 per legume, reddish brown, oblong, ca. 5 × 2.5 mm. Fl. May–Jul, fr. Aug–Oct. $2n = 16$.

Scrub on slopes, woodlands; 100–400 m. Hebei, Henan, Jiangsu, SE Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Japan, Korea].

17. *Indigofera fortunei* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 53. 1913.

华东木蓝 hua dong mu lan

Indigofera alba A. Gouault; *I. subnuda* Craib.

Shrubs, to 1 m tall. Stems grayish brown or gray; young branches striate, glabrous. Stipules narrowly lanceolate, 3.5–4(–8) mm, caducous. Leaves 10–15(–20) cm, 7–15-foliolate; petiole and rachis adaxially grooved, glabrous; petiole 1.5–4(–5) cm; stipels subulate, ca. 1 mm; petiolules ca. 1 mm, glabrous; leaflet blades opposite or rarely alternate, ovate, broadly ovate, ovate-elliptic, or ovate-lanceolate, 1.5–4(–5.5) × 0.8–2.8 cm, abaxially with sparse appressed medifixed trichomes on midvein and at margin when young but glabrescent, adaxially glabrous, midvein abaxially prominent and adaxially impressed, secondary veins obvious, base rounded to broadly cuneate, apex obtuse to acute and emarginate with a ca. 2 mm mucro. Racemes 8–18 cm; peduncle ca. 3 cm, glabrous; bracts ovate, ca. 1 mm, caducous. Pedicel ca. 3 mm, glabrous. Calyx 2.5–3.5 mm, with appressed medifixed trichomes; teeth triangular, ca. 0.5 mm, shorter than tube. Corolla purple to pink; standard obovate, 8–10 × 6–8.5 mm, outside with dense appressed trichomes, apex emarginate; wings 8–10 × ca. 2.5 mm, margin ciliate, claws ca. 1 mm; keel 9–10 × 4–4.5 mm, outside apically hairy, margin ciliate, spur very short. Stamens 7–9 mm; anthers ovoid, both ends hairy. Ovary glabrous, with more than

10 ovules. Legume brown, cylindric, 3–4(–5) cm, glabrous; endocarp blotched. Fl. Apr–May, fr. May–Sep.

• Scrub, woodlands; 200–800 m. Anhui, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Zhejiang.

18. *Indigofera decora* Lindley, J. Hort. Soc. London 1: 68. 1846.

庭藤 ting teng

Shrubs, 0.4–2 m tall. Stems terete, striate, glabrous. Stipules caducous. Leaves 8–25 cm, 5–15(–23)-foliolate; petiole and rachis glabrous or with sparse appressed medifixed trichomes; petiole 1–2.5 cm; rachis adaxially grooved; stipules subulate, ca. 1.5 mm; petiolules ca. 2 mm; leaflet blades opposite or rarely alternate or only alternate on basal part of leaf, usually ovate-lanceolate, ovate-oblong, or lanceolate, 2–7.5(–10) × 1–3.5 cm, papery, abaxially with appressed white medifixed trichomes, adaxially glabrous or hairy, base cuneate to broadly cuneate, apex acuminate, acute, or rarely obtuse and mucronate. Racemes 13–21 cm; peduncle 2–4 cm; rachis striate, glabrous; bracts linear-lanceolate, ca. 3 mm, caducous. Pedicel 3–6 mm, glabrous. Calyx cup-shaped, 2.5–3.5 mm, with appressed short trichomes or glabrous; tube 1.5–2 mm; teeth triangular, ca. 1 mm, most abaxial one as long as tube. Corolla light purple, pink, or rarely white; standard elliptic, 1.2–1.8 × ca. 0.7 cm, outside white strigillose-pubescent, sometimes with brown hairs; wings 1.2–1.4 cm, margin ciliate; keel as long as wings, spur ca. 1 mm. Stamens (1.1–)1.3–1.4 cm; anthers ovoid, both ends hairy. Ovary glabrous, with more than 10 ovules. Legume brown, cylindric, 2.5–6.5(–8) cm, glabrous; endocarp blotched. Seeds 7 or 8 per legume, ellipsoid, 4–4.5 mm. Fl. Apr–Jun, fr. Jun–Oct.

Near streams, valleys, woodlands, scrub, trailsides; 200–1800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang [Japan].

1a. Leaves 13–23-foliolate.

2a. Leaflet blades adaxially glabrous 18a. var. *decora*

2b. Leaflet blades with sparse appressed medifixed 2-branched trichomes on both surfaces 18c. var. *cooperi*

1b. Leaves 5–13-foliolate.

3a. Leaves 5–9-foliolate 18b. var. *chalara*

3b. Leaves 9–13-foliolate 18d. var. *ichangensis*

18a. *Indigofera decora* var. *decora*

庭藤(原变种) ting teng (yuan bian zhong)

Indigofera ichangensis Craib f. *leptantha* Craib; *I. ichangensis* f. *rigida* Craib.

Leaves 13–19-foliolate; leaflet blades adaxially glabrous.

Near streams, valleys, woodlands, scrub; 200–1800 m. Anhui, Fujian, Guangdong, Jiangsu, Zhejiang [Japan].

18b. *Indigofera decora* var. *chalara* (Craib) Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 27: 164. 1989.

兴山木蓝 xing shan mu lan

Indigofera chalara Craib, Notes Roy. Bot. Gard. Edinburgh 8: 49. 1913.

Leaves 5–9-foliolate; leaflet blades alternate or opposite, both surfaces with sparse appressed medifixed trichomes. Pedicel 4–5 mm but to 1 cm in fruit.

• Scrub. W Hubei (Xingshan).

18c. *Indigofera decora* var. *cooperi* (Craib) Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 27: 164. 1989.

宁波木蓝 ning bo mu lan

Indigofera cooperi Craib, Notes Roy. Bot. Gard. Edinburgh 8: 50. 1913.

Leaves 13–17(–23)-foliolate; leaflet blades alternate or opposite, both surfaces with sparse appressed medifixed 2-branched trichomes.

• Near streams, scrub, trailsides; 400–1500 m. Fujian, Jiangxi, Zhejiang.

18d. *Indigofera decora* var. *ichangensis* (Craib) Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 27: 164. 1989.

宜昌木蓝 yi chang mu lan

Indigofera ichangensis Craib, Notes Roy. Bot. Gard. Edinburgh 8: 50. 1913; *I. faberi* Craib; *I. ichangensis* f. *calvescens* Craib.

Leaves 9–13-foliolate; leaflet blades with appressed medifixed trichomes on both surfaces.

• Scrub, woodlands; 400–800(–1100) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Zhejiang.

19. *Indigofera venulosa* Champion ex Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 44. 1852.

脉叶木蓝 mai ye mu lan

Indigofera glabra S. S. Chien (1932), not Linnaeus (1753); *I. neoglabra* Hu ex F. T. Wang & Tang; *I. venulosa* var. *glauca* Hayata.

Shrubs, 30–60 cm tall. Stems terete, glabrous. Stipules minute, caducous. Leaves 10–15 cm, 5–13-foliolate; petiole and rachis terete or adaxially grooved, glabrous; petiole 1.5–3.5 cm; stipules as long as petiolules; petiolules ca. 2 mm; leaflet blades opposite, ovate, ovate-rhombic, or suborbicular, 1.3–2.5 × 1–2.7 cm, abaxially with sparse appressed white medifixed trichomes, adaxially glabrous, midvein adaxially impressed, secondary veins and tertiary veins abaxially obvious, base cuneate to rounded, apex obtuse to acute. Racemes ca. 10 cm, laxly flowered; peduncle 2–3 cm, glabrous; bracts ovate-lanceolate, 2–2.5 mm. Pedicel ca. 2.5 mm. Calyx 3–3.5 mm, outside with sparse appressed medifixed trichomes; tube ca. 2 mm; teeth triangular, 1–1.5 mm. Corolla light purple; standard oblong to obovate-oblong, 1.2–1.5 cm, base shortly clawed, outside with appressed white and brown medifixed trichomes, apex obtuse or emarginate; wings narrow, as long as standard, margin ciliate; keel slightly shorter than wings, outside apically hairy, margin ciliate. Stamens 1.1–1.4 cm; anthers ovoid-ellipsoid, both ends hairy. Ovary glabrous. Legume straight, 4–

5 cm, glabrous. Seeds 10–12 per legume. Fl. Mar–May, fr. Jul–Aug.

• Valleys, slopes in forests; ca. 500 m. Guangdong, Taiwan, Zhejiang.

20. *Indigofera carlesii* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 48. 1913.

苏木蓝 su mu lan

Indigofera decora Lindley subsp. *carlesii* (Craib) P. S. Hsu & Y. Y. Fang.

Shrubs, to 1.5 m tall. Stems terete but angular when young, with sparse appressed white medifixed symmetrically 2-branched trichomes. Stipules narrowly lanceolate, 7–10 mm, caducous. Leaves 7–20 cm, 5–9(–13)-foliolate; petiole and rachis with appressed white medifixed trichomes, glabrescent; petiole 1.5–3.5 cm; rachis adaxially grooved; stipels subulate, 2–4 mm, with appressed white trichomes; petiolules 2–4 mm; leaflet blades opposite or rarely alternate, elliptic to ovate-elliptic, 2–5 × 1–3 cm, stiffly papery, both surfaces with dense appressed white medifixed trichomes, midvein abaxially prominent and adaxially impressed, secondary veins 6–10 on each side of midvein, base obtuse to broadly cuneate, apex obtuse and mucronate. Racemes 10–20 cm; peduncle and rachis with sparse appressed medifixed trichomes; peduncle ca. 1.5 cm; rachis striate; bracts ovate, 2–4 mm, caducous. Pedicel 2–4 mm. Calyx cup-shaped, 4–4.5 mm, with appressed white medifixed trichomes; teeth lanceolate, most abaxial one as long as tube. Corolla pink to rose; standard elliptic, 1.3–1.5(–1.8) × 0.7–0.9 cm, apex rounded; wings and keel ca. 1.3 cm, margin ciliate; keel spur ca. 1.5 mm. Stamens 1.3–1.7 cm; anthers ovoid, both ends hairy. Ovary glabrous. Legume brown, cylindrical, 4–6 cm, glabrous; endocarp blotched. Fl. Apr–Jun, fr. Aug–Oct.

• Slopes along trailsides, scrub in hills; 500–1000 m. Anhui, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shanxi, Zhejiang.

This species is cultivated in Fujian, Guangdong, Guangxi, and Yunnan.

21. *Indigofera bracteata* Graham ex Baker in J. D. Hooker, Fl. Brit. India 2: 100. 1876.

苞叶木蓝 bao ye mu lan

Shrubs or shrublets, erect or prostrate, 20–90 cm tall. Stems and young branches glabrous. Stipules narrowly lanceolate, 3–7 mm, glabrous. Leaves 3–11 cm, 5- or 7-foliate; petiole and rachis glabrous; petiole 1.5–3.5 cm; rachis adaxially grooved; stipels subulate, 2–2.5 mm; petiolules 1–1.5 mm; leaflet blades opposite, elliptic to obovate-elliptic, 1.2–2.5(–3.2) × 0.6–1 cm, membranous, both surfaces with appressed medifixed trichomes, abaxially pale green, adaxially darker, midvein abaxially prominent, secondary veins 5–10 on each side of midvein and obvious, base broadly cuneate to rounded, apex rounded to emarginate and mucronate. Racemes 8–15 cm, densely flowered; peduncle (1–)3–5 cm, glabrous; bracts cuspidate, 4–6 × 2–2.2 mm, covering buds, reticulate veined, margin ciliate, apex acuminate. Pedicel (1.5–)2–3 mm. Calyx 1–1.5(–2) mm, with appressed white or brown trichomes; tube 1–1.5 mm; teeth triangular, ca. 0.5 mm. Corolla light purple or white; stan-

dard broadly ovate, 7–9 × 5.5–6 mm, outside with appressed white or light brown trichomes; wings 6–8 mm, margin ciliate; keel 7–9 mm, spur ca. 1 mm. Stamens 7–8 mm; anthers ovoid, base with a few trichomes. Ovary glabrous, with 8 or 9 ovules. Legume cylindrical, spreading, 3–3.5 cm × 2–3 mm, glabrous. Seeds 7–10 per legume. Fl. May–Jul, fr. unknown for China. $2n = 16$.

Grasslands in mountain forests; 2700–3000 m. S Xizang [?Bhutan, India, Kashmir, Nepal].

22. *Indigofera hebetata* Bentham ex Baker var. **glabra** Ali, Bot. Not. 3: 572. 1958.

光叶毛瓣木蓝 guang ye mao ban mu lan

Indigofera hebetata f. *glabra* (Ali) H. Ohashi.

Shrubs, 1–3 m tall. Stems dark brown, terete; young branches with sparse appressed medifixed symmetrically 2-branched trichomes, glabrescent. Stipules narrowly lanceolate, ca. 3 mm, caducous. Leaves 10–15(–25) cm, 5–13(or 15)-foliolate; petiole and rachis with appressed brown medifixed trichomes; petioles 2–5 cm; rachis adaxially grooved; stipels subulate, ca. 2 mm; petiolules 2–3 mm, densely hairy; leaflet blades opposite, ovate, ovate-elliptic, or oblong, 1.2–6.5(–8) × 0.7–3.5(–4.5) cm, papery, abaxially with white and brown appressed medifixed trichomes, midvein adaxially flat, secondary veins 6–8 on each side of midvein, base rounded to broadly cuneate, apex obtuse to emarginate. Racemes 10–25 cm; peduncle 2–2.5 cm; bracts boat-shaped, ca. 6 × 1–3 mm, covering buds, outside hairy. Pedicel 1–2 mm. Calyx campanulate, ca. 2 mm, with appressed brown trichomes; tube ca. 1.5 mm; teeth triangular, ca. 0.5 mm. Corolla purple; standard 1.2–1.4 × 0.6–0.8 cm, outside hairy; wings 1–1.1 cm, glabrous; keel as long as wings. Stamens 8–10 mm; anthers ovoid, base with a few trichomes. Ovary glabrous. Legume cylindrical, 2.5–5.5 cm, glabrous; endocarp not blotched. Seeds 8–10 per legume, ca. 2 × 1.5 mm. Fl. Jun–Jul, fr. Jul–Oct. $2n = 16$.

Evergreen forests, slopes in scrub; 1700–2900 m. S Xizang [Bhutan, India, Nepal, Pakistan].

Indigofera hebetata var. *hebetata* occurs in India, Pakistan, and Nepal and differs in having leaflet blades pubescent on both surfaces.

23. *Indigofera cassioides* Rottler ex Candolle, Prodr. 2: 225. 1825.

椭圆叶木蓝 tuo yuan ye mu lan

Indigofera arborea Roxburgh; *I. elliptica* Roxburgh; *I. leptostachya* Candolle; *I. pulchella* Roxburgh; *I. violacea* Roxburgh.

Shrubs, 1–1.5 m tall. Stems brown, robust, with obvious lenticels; young branches green or red-brown, angular, with appressed white medifixed symmetrically 2-branched trichomes. Stipules linear, caducous. Leaves 5.5–15 cm, 13–21-foliate; petiole and rachis with sparse appressed medifixed trichomes; petiole 1.1–1.8 cm; rachis adaxially grooved; stipels subulate, ca. 1 mm; petiolules ca. 2 mm, hairy; leaflet blades opposite, subopposite, or rarely alternate, elliptic to obovate, 1–2.4 × 0.7–1.5 cm, both surfaces with appressed white medifixed tri-

chomes, midvein abaxially prominent and adaxially slightly impressed, secondary veins 8–11 on each side of midvein and obvious, base cuneate to rounded, apex obtuse to truncate. Racemes 4–17 cm; peduncle very short, base with persistent bud scales; rachis angular, with appressed brown trichomes; bracts ovate to lanceolate, 2–4 mm, caducous, abaxially with appressed brown to grayish brown trichomes. Pedicel 1–2 mm, hairy. Calyx cup-shaped, 2.5–3.5 mm, outside with sparse appressed white trichomes; teeth triangular, as long as tube. Corolla purple to light purple; standard broadly ovate, ca. 10 × 7–7.5 mm, glabrous, base clawed, apex obtuse; wings 8–9.5 mm, base auriculate and clawed, margin ciliate; keel 9–9.5 mm, outside apically hairy, very shortly spurred, margin ciliate. Stamens 7–9.5 mm; anthers ovoid to ellipsoid, glabrous. Ovary glabrous. Legume cylindric, 2.4–4.5 cm × ca. 4 mm, glabrous; endocarp blotched. Seeds 8–12 per legume, reddish brown, cubic, ca. 2 × 2 mm. Fl. Jan–Mar, fr. Apr–Jun. $2n = 16$.

Slopes, grasslands, sparse woodlands, scrub; 300–2000 m. W Guangxi, Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam].

24. *Indigofera hamiltonii* Graham ex Duthie & Prain, Ann. Roy. Bot. Gard. (Calcutta) 9: 22. 1901.

腾冲木蓝 teng chong mu lan

Indigofera tengyuehensis H. T. Tsai & T. T. Yu.

Shrubs. Stems yellowish gray, with appressed white medifixed 2-branched trichomes. Stipules narrowly lanceolate, ca. 3 mm, caducous. Leaves ca. 13 cm, mostly 3- or 5-foliolate, more rarely to 11 (or 13)-foliolate; petiole and rachis with appressed medifixed trichomes; petiole 1.5–2 cm; rachis flattened and adaxially grooved; stipels subulate, minute; petiolules 1.5–2 mm, with appressed brown trichomes; leaflet blades opposite, elliptic-oblong, 1.2–2.2 × 0.7–1.2 cm, papery, both surfaces with appressed white medifixed trichomes, midvein adaxially impressed, secondary veins 5 or 6 on each side of midvein, base broadly cuneate to subrounded, apex rounded, truncate, or emarginate and mucronate. Racemes 15–20 cm, laxly flowered; peduncle 1.5–2 cm; bracts linear-lanceolate, ca. 2 mm, caducous. Pedicel 1–2 mm, deflexed in fruit, hairy. Calyx campanulate, ca. 3 mm, with appressed medifixed trichomes; tube ca. 1.5 mm; teeth triangular to ovate, most abaxial one as long as tube, margin densely ciliate, apex long acuminate. Corolla purple; standard elliptic-oblong, 10–12 × ca. 6 mm, outside glabrescent, base clawed, apex obtuse; wings and keel clawed at base; wings as long as keel. Stamens 5–8 mm; anthers ovoid, base with a few trichomes. Ovary glabrous, with 6–8 ovules. Legume linear, cylindric, ca. 3.5 cm, glabrescent. Fl. and fr. May.

Forests on slopes; ca. 1000 m. W Yunnan [India].

Sanjappa (Bull. Bot. Surv. India 21: 73. 1995) reported the leaves of this species as 3- or 5(-13)-foliolate.

Although the protologue of *Indigofera tengyuehensis* is not a good match for *I. hamiltonii* as currently understood, examination of isotype material (E!) shows that it obviously belongs here. We have not found the holotype specimen; its leaves were described as 9–15-foliolate in the protologue, but they are only 3–7-foliolate in the examined isotype.

25. *Indigofera atropurpurea* Buchanan-Hamilton ex Home-mann, Hort. Bot. Hafn., Suppl. 152. 1819.

深紫木蓝 shen zi mu lan

Indigofera cavaleriei H. Léveillé.

Shrubs or small trees, 1.5–5 m tall. Stems brown, terete, with round lenticels; young branches green, angular, with appressed white or brown medifixed symmetrically 2-branched trichomes. Stipules lanceolate-subulate, 3–5 mm, caducous. Leaves ca. 2.4 cm, (7–)11–19 (or 21)-foliolate; petiole and rachis with appressed white and brown medifixed trichomes; petioles 2.5–3.5 cm; rachis flattened or adaxially slightly grooved; stipels subulate, as long as petiolules; petiolules 1.5–2.5 mm; leaflet blades opposite, ovate to elliptic, 1.5–6.5(-8) × 1–2.5 cm, membranous, both surfaces with appressed medifixed trichomes or adaxially glabrous, midvein abaxially prominent and adaxially impressed, secondary veins 8–10 on each side of midvein, base broadly cuneate to rounded, apex obtuse, emarginate, or acute and mucronate. Racemes 8–15(-28) cm; peduncle and rachis with sparse appressed medifixed trichomes; peduncle 1.5–2.5 cm; bracts ovate to ovate-lanceolate, 2.5–3.5(-5) mm, abaxially with appressed brown trichomes. Pedicel ca. 1.5 mm. Calyx ca. 2.5 mm, with dense appressed grayish brown medifixed trichomes; teeth triangular, ca. 0.5 mm. Corolla dark purple; standard elliptic, 7–8.5 × 4.5–5.5 mm, glabrous; wings 7–8 mm, margin apically ciliate; keel 7.5–8.5 mm, outside apically hairy, margin ciliate. Stamens 6–7 mm; anthers globose, base with a few trichomes. Ovary glabrous, with 6–9 ovules. Legume cylindric, 2.5–5 cm, with sparse appressed trichomes when young, glabrescent when mature, sutures thickened; endocarp not blotched. Seeds 6–9 per legume, rufous brown, cubic, ca. 1.8 × 1.5 mm. Fl. May–Sep, fr. Aug–Dec. $2n = 16, 32$.

Scrub on mountains, sparse forests, grasslands near trailsides or streams; 300–1900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Hunan, S Jiangxi, S Sichuan, SE Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Vietnam].

26. *Indigofera parkesii* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 59. 1913.

浙江木蓝 zhe jiang mu lan

Shrublets, erect, 30–60 cm tall. Stems flexuous, terete or angular, with appressed white or brown basifixed crisped trichomes. Stipules linear, ca. 8 mm. Leaves 8–15(-20) cm, 5–25-foliolate; petiole 1–3 cm; rachis terete to slightly flattened, adaxially grooved, with appressed crisped trichomes; stipels subulate, ca. 3.5 mm; petiolules 1.5–2 mm, hairy; leaflet blades opposite, ovate, broadly ovate, or elliptic, 1.3–7 × 1–3.7 cm, stiffly papery, abaxially with spreading crisped basifixed trichomes, adaxially with sparse appressed medifixed trichomes, midvein adaxially flat to slightly impressed, secondary veins 6 on each side of midvein and looped near margin, base cuneate to rounded, apex rounded to acute and mucronate. Racemes 3–25 cm; peduncle 1–7 cm, with spreading crisped trichomes; bracts linear, 3–5.5 mm. Pedicel 2–2.5 mm. Calyx campanulate, 4–4.5 mm, with sparse spreading crisped trichomes; teeth lanceolate, unequal, most abaxial one as long as tube. Corolla pale purple or white; standard obovate-elliptic, 10–13 × 5.5–7.5

mm, outside with dense appressed white trichomes, base broadly cuneate, apex obtuse; wings 1.1–1.2 cm, margin ciliate; keel 1.1–1.4 cm. Stamens 1.2–1.3 cm; anthers ovoid-ellipsoid, both ends hairy. Ovary glabrous. Legume cylindric, 3–5 cm, glabrous; endocarp not blotched. Fl. May–Sep, fr. Sep–Oct.

• Forests, scrub, trailsides on slopes, woodlands on slopes; 100–1000 m. Anhui, Fujian, Jiangxi, Zhejiang.

1a. Leaves 15–25-foliolate 26c. var. *polyphylla*

1b. Leaves 5–11-foliolate.

2a. Racemes 3–13 cm, usually shorter than leaves; peduncle 1–1.5 cm 26a. var. *parkesii*

2b. Racemes 15–25 cm, longer than leaves; peduncle to 7 cm 26b. var. *longipedunculata*

26a. *Indigofera parkesii* var. *parkesii*

浙江木蓝(原变种) zhe jiang mu lan (yuan bian zhong)

Leaves 5–11-foliolate; leaflet blades ovate to elliptic, 1.3–3(–5) × 1–3 cm. Racemes 3–13 cm; peduncle 1–1.5 cm. Corolla pale purple or rarely white.

• Forests, scrub; 100–600 m. Anhui, Fujian, Jiangxi, Zhejiang.

26b. *Indigofera parkesii* var. *longipedunculata* (Y. Y. Fang & C. Z. Zheng) X. F. Gao & Schrire, **comb. et stat. nov.**

长总梗木蓝 chang zong geng mu lan

Basionym: *Indigofera longipedunculata* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 331. 1983 [*“longipedmculata”*].

Leaves 5- or 7-foliolate; leaflet blades ovate to elliptic, 4–7 × 2–3.7 cm. Racemes 15–25 cm; peduncle to 7 cm. Corolla purple or white.

• Trailsides on slopes, forests; 700–1000 m. Jiangxi, Zhejiang.

26c. *Indigofera parkesii* var. *polyphylla* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 336. 1983.

多叶浙江木蓝 duo ye zhe jiang mu lan

Leaves 15–25-foliolate; leaflet blades ovate to lanceolate, 1.3–3(–5) × 1–3 cm. Racemes 5–13 cm; peduncle 1–1.5 cm. Corolla white.

• Trailsides, woodlands on slopes; 400–500 m. Anhui, Jiangxi.

27. *Indigofera suffruticosa* Miller, Gard. Dict., ed. 8, *Indigofera* no. 2. 1768.

野青树 ye qing shu

Shrubs or shrublets, erect, 0.8–1.5 m tall. Stems grayish green, with appressed medifixed symmetrically 2-branched trichomes. Stipules narrowly triangular, ca. 4 mm. Leaves 5–10 cm, 11–15(–19)-foliolate; petiole and rachis adaxially grooved, with appressed medifixed trichomes; petiole ca. 1.5 cm; leaflet blades oblong to oblanceolate, 1–4 × 0.5–1.5 cm, abaxially pale green and with appressed medifixed trichomes, adaxially green and with dense appressed medifixed trichomes or glabrescent, base broadly cuneate to rounded, apex acute to rarely rounded. Racemes 2–3 cm, densely flowered; peduncle very short or

absent; bracts linear, ca. 2 mm, caducous, abaxially with appressed medifixed trichomes. Pedicel reflexed in fruit. Calyx ca. 1.5 mm, outside hairy; teeth broadly triangular, as long as tube. Corolla red; standard obovate, 4–5 mm, outside with dense brown trichomes; keel as long as wings, hairy. Stamens 3–4 mm; anthers globose, glabrous, apex mucronate. Ovary densely hairy. Legume deflexed and upwardly falcate, 1–1.5 cm, hairy; endocarp blotched. Seeds 6–8, brown, shortly cylindric, both ends truncate. Fl. Mar–May, fr. Jun–Oct. $2n = 16, 32$.

Cultivated or naturalized in Fujian, Guangdong, Guangxi, Jiangsu, Taiwan, Yunnan, and Zhejiang [native to tropical America; widely cultivated in tropical and subtropical Asia].

Indigofera suffruticosa is cultivated as an alternative to *I. tinctoria* for the production of the dye indigo.

28. *Indigofera byobensis* Hosokawa, J. Soc. Trop. Agric. 4: 200. 1932.

屏東木蓝 ping dong mu lan

Shrubs, 30–50 cm tall, with prostrate branches. Stems slender, cylindric, with appressed medifixed symmetrically 2-branched trichomes. Stipules setaceous, 1–2 mm. Leaves 5- or 7-foliolate; petiole ca. 2 cm; leaflet blades opposite, oblong to elliptic, 7–10 mm, both surfaces with appressed medifixed trichomes but especially dense on light green abaxial surface, adaxially green, base obtuse to cuneate, apex obtuse and with a ca. 0.3 mm mucro. Racemes 5–7 cm, much longer than leaves. Pedicel ca. 1 mm. Calyx ca. 3 mm, with appressed medifixed trichomes; tube ca. 1 mm; teeth lanceolate, ca. 2 mm. Corolla red; standard broadly obovate-rhombic, ca. 4.5 × 5 mm; wings obovate-rhomboid, ca. 5 × 2 mm; keel spatulate, ca. 3 × 1.5 mm, margin ciliate. Stamens 3–4 mm. Ovary linear, ca. 3 mm, with 7 ovules; style upwardly curved, ca. 1 mm. Legume straight, 4-sided in cross section, ca. 2.5 cm, with appressed medifixed trichomes. Seeds 5–7 per legume, cubic, ca. 1.5 × 1.5 mm, both ends truncate. Fl. Jul–Nov, fr. Aug–Dec. $2n = 16^*$.

• Dry and open fields; below 100 m. Taiwan.

29. *Indigofera ramulosissima* Hosokawa, J. Soc. Trop. Agric. 4: 199. 1932.

多枝木蓝 duo zhi mu lan

Shrubs, dwarf, many branched. Stems rigid, slightly angular, with appressed white medifixed symmetrically 2-branched trichomes. Stipules spiculate, minute. Leaves 1–3 cm, 7-foliolate; petiole and rachis with appressed white medifixed trichomes; petiole ca. 8 mm; rachis terete; stipels minute, bristle-like; leaflet blades opposite, obovate, 3–8 × 2–3 mm, both surfaces with appressed medifixed trichomes but abaxially denser, secondary veins not visible, base broadly cuneate to rounded, apex obtuse and mucronate. Racemes 1.3–2.5 cm, laxly flowered; peduncle ca. 5 mm; bracts ca. 1 mm. Pedicel 1–1.5 mm, hairy, spreading or reflexed in fruit. Calyx 2–3 mm, with appressed gray trichomes; teeth triangular, as long as tube. Corolla standard broadly obovate, ca. 3.5 × 3 mm, outside hairy; wings oblong, ca. 3.2 mm, margin ciliate; keel obovate, ca. 3.5 mm. Stamens 3–4 mm; anthers ovoid. Ovary linear, glabrous. Legume linear, cylindric, ca. 1.5 cm. Seeds 4–6 per legume, reniform, ca. 2 mm. Fl. Jun–Nov, fr. Aug–Dec.

- Dry rocky slopes; 700–1500 m. Taiwan.

30. *Indigofera tinctoria* Linnaeus, Sp. Pl. 2: 751. 1753.

木蓝 mu lan

Shrublets, erect, 50–100 cm tall. Young branches with appressed white medifixed symmetrically 2-branched trichomes. Stipules narrowly triangular, ca. 2 mm. Leaves 2.5–11 cm, 9–13-foliolate; petiole and rachis adaxially grooved, with appressed medifixed trichomes; petiole 1.3–2.5 cm; stipels minute; petiolules ca. 2 mm; leaflet blades opposite, obovate-oblong to obovate, 1.5–3 × 0.5–1.5 cm, both surfaces with appressed medifixed trichomes, adaxially sometimes glabrous, midvein adaxially impressed, secondary veins not visible, base broadly cuneate to rounded, apex rounded to emarginate. Racemes 2.5–5(–9) cm, laxly flowered; peduncle absent; bracts bristlelike, 1–1.5 mm. Pedicel 4–5 mm, reflexed in fruit. Calyx ca. 1.5 mm, with appressed medifixed trichomes; teeth triangular, as long as tube. Corolla red; standard broadly obovate, 4–5 mm, outside with brown trichomes; wings ca. 4 mm; keel as long as wings. Stamens 4–5 mm; anthers cordate. Ovary glabrous. Legume linear, deflexed and straight to semicircular but never falcate, 2.5–3 cm, hairy or glabrous; endocarp purplish red blotched. Seeds 5–12 per legume, cubic, ca. 1.5 mm. Fl. year-round, fr. Oct. $2n = 16$.

Cultivated in SW Anhui, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, and Yunnan [widely distributed in tropical Asia and Africa].

Indigofera tinctoria is widely used as the source of the dye indigo.

31. *Indigofera nigrescens* Kurz ex King & Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 67: 286. 1898.

黑叶木蓝 hei ye mu lan

Indigofera atropurpurea Buchanan-Hamilton ex Hornemann var. *nigrescens* E. Pottinger & Prain; *I. mekongensis* Jesson.

Shrubs, erect, 1–2 m tall. Stems reddish brown; young branches green, striate, with appressed brown medifixed symmetrically 2-branched trichomes. Stipules linear, 5–8 mm. Leaves 8–18 cm, 11–23-foliolate; petiole and rachis with sparse appressed medifixed trichomes; petiole 2–2.5 cm; rachis terete or slightly flattened, adaxially grooved; leaflet blades opposite, elliptic to obovate-elliptic, 1.5–2.5 × 0.7–1.3 cm, papery, both surfaces with sparse appressed medifixed trichomes, abaxially usually becoming dark or black or with black spots when dry, base broadly cuneate to rounded, apex obtuse and mucronate. Racemes ca. 19 cm, densely flowered; peduncle ca. 2 cm; bracts linear, 5–7(–9) mm, abaxially with brown medifixed trichomes. Pedicel 1–1.5 mm, with brown medifixed trichomes. Calyx 3–5 mm, with appressed brown and white medifixed trichomes; tube 2.5–3 mm; teeth triangular, most abaxial one ca. 1 mm. Corolla red to purple; standard obovate, 6.5–7 × ca. 4 mm, outside with appressed brown and white medifixed trichomes, inside basally hairy, base clawed, apex obtuse; wings 5.5–6 mm, margin ciliate; keel as long as wings, outside apically hairy, margin ciliate, spur ca. 1 mm. Stamens 4–5 mm; anthers ovoid-globose, base with a few trichomes. Ovary glabrous, with 8 or 9 ovules. Legume cylindrical, 1.7–2.8 cm, with

sparse appressed medifixed trichomes, apex obtuse; endocarp blotched. Seeds 7 or 8 per legume, reddish brown, ovoid, ca. 2.5 mm. Fl. Jun–Sep, fr. Sep–Oct.

Hills, scrub, sparse forests, sunny grasslands, fields, river beaches; 500–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [India, Indonesia, Laos, Myanmar, Philippines, Thailand, S Vietnam].

32. *Indigofera zollingeriana* Miquel, Fl. Ned. Ind. 1: 310. 1855.

尖叶木蓝 jian ye mu lan

Indigofera benthamiana Hance; *I. kotoensis* Hayata; *I. teysmanii* Miquel.

Shrubs or small trees, erect, 1–3 m tall. Stems with slightly appressed medifixed symmetrically 2-branched trichomes. Stipules narrowly lanceolate, 5–8 mm, caducous. Leaves 20–25 cm, 11–19-foliolate; petiole and rachis with appressed white and brown medifixed trichomes; petiole 2–2.5 cm; rachis flattened and adaxially grooved; stipels spiculate, 1.5–2 mm; petiolules 2–3 mm, with appressed trichomes; leaflet blades opposite, ovate-lanceolate, 3–6 × 1.5–2 cm, papery, both surfaces with appressed medifixed trichomes, midvein prominent, secondary veins 13 or 14 on each side of midvein and obvious, base rounded to broadly cuneate, apex acuminate. Racemes 7–13 cm, densely flowered; peduncle with appressed or spreading rust-colored trichomes; bracts lanceolate, ca. 1.5 mm. Pedicel as long as bracts, with appressed brown trichomes. Calyx 1–2 mm, with dense appressed grayish brown trichomes; tube ca. 1 mm; teeth triangular, ca. 0.5 mm. Corolla white or purple; standard ovate-lanceolate, 6.5–8 mm, outside with dense appressed brown trichomes; wings as long as standard, margin ciliate; keel 7–7.5 mm, outside with dense appressed brown trichomes. Stamens 5–6.5 mm; anthers ellipsoid, base with a few trichomes. Ovary glabrous. Legume cylindrical, spreading, 2.5–4.5 cm × 5.5–6 mm, sparsely hairy; endocarp blotched. Seeds 10–16, discoid, ca. 2 mm in diam., arranged like a pile of coins. Fl. Jun–Sep, fr. Oct–Dec. $2n = 16$.

Sunny places, trailsides, forests; 400–600 m. Guangdong, Guangxi, Hainan, Taiwan, S Yunnan [Indonesia, Japan, Laos, Malaysia, Philippines, Thailand, Vietnam].

33. *Indigofera sootepensis* Craib, Bull. Misc. Inform. Kew 1911: 35. 1911.

福建木蓝 fu jian mu lan

Shrubs, to 2 m tall. Stems with dense appressed brown 2-branched trichomes with equally long arms. Stipules narrowly triangular, 7–10 mm, caducous. Leaves 7–10 cm, 13–19-foliolate; petiole and rachis with appressed brown 2-branched trichomes; petiole 1–2 cm; stipels narrowly triangular, ca. 2 mm; leaflet blades oblong to elliptic, 1.8–2.2 × 0.9–1.1 cm, both surfaces with appressed 2-branched trichomes, base rounded, apex obtuse and mucronate. Racemes 4–8 cm; bracts narrowly triangular, ca. 4 mm, longer than buds. Pedicel ca. 1.5 mm. Calyx with appressed brown trichomes; tube ca. 2 mm; teeth broadly triangular, ca. 0.5 mm. Corolla red; standard narrowly elliptic, 1.4–1.6 × 0.5–0.6 cm, outside with appressed stiff brown 2-branched trichomes, apex acute; wings narrowly ellip-

tic, 1–1.1 cm × ca. 2 mm, margin apically ciliate, apex hairy; keel 1.8–2 cm × ca. 3 mm, margin apically ciliate, apex long acute and hairy. Stamens 1.3–1.6 cm; anthers ellipsoid, glabrous. Ovary glabrous. Legume ca. 4.5 cm × 5 mm, sparsely strigose with appressed trichomes; endocarp blotched. Seeds 8–11 per legume, brown, ellipsoid.

Fujian [Cambodia, Laos, Thailand, Vietnam].

There seems to be some doubt about the identity of the Fujian material. Typical *Indigofera sootepensis* has leaves 15–20 cm, 29–51-foliolate; stipules 7–12 mm, attenuate; and racemes 10–13 cm. The distribution of typical *I. sootepensis* in Indochina is tropical dipterocarp forests to 1000 m.

34. *Indigofera galeoides* Candolle, Prodr. 2: 225. 1825.

假大青藍 jia da qing lan

Indigofera finlaysoniana Graham ex Ridley; *I. mansuensis* Hayata; *I. uncinata* Roxburgh.

Shrubs or shrublets, 1–2 m tall. Young branches angular, with appressed white or grayish brown medifixed symmetrically 2-branched trichomes, glabrescent. Stipules linear, 3–4 mm. Leaves ca. 20 cm, 11–25-foliolate; petiole and rachis with appressed white mixed brownish gray medifixed trichomes; petiole 1.5–3 cm; rachis adaxially grooved; stipels subulate, 0.5–1 mm; petiolules ca. 2 mm, with brown trichomes; leaflet blades opposite or subopposite, oblong to oblanceolate-oblong, 2–4 × 0.7–1.6 cm, membranous, both surfaces with appressed brown and white medifixed trichomes, midvein abaxially prominent and adaxially impressed, secondary veins 11 on each side of midvein, base broadly cuneate to rounded, apex rounded to acute and mucronate. Racemes 5–12 cm, densely flowered; peduncle and rachis with appressed white medifixed trichomes; peduncle 7–10 mm; bracts subulate, 1–2 mm. Pedicel as long as bracts, with appressed medifixed trichomes. Calyx campanulate, ca. 2 mm, with slightly appressed trichomes; tube 1–1.5 mm; teeth triangular, ca. 0.5 mm. Corolla pink; standard ovate-oblong, 8–9 × ca. 5 mm, outside with dense appressed brown trichomes; wings ca. 8 mm, margin ciliate; keel as long as wings, outside with dense appressed brown trichomes at apex, spur ca. 1.5 mm. Stamens 5–7 mm; anthers ovoid-ellipsoid, glabrous. Ovary glabrous, with 20 ovules. Legume cylindrical, ascending to erect, 6–9 cm, with slightly appressed brown trichomes when young, glabrescent; endocarp blotched. Seeds 15–18 per legume. Fl. Apr–Aug, fr. Sep–Oct.

Open places, valleys; 600–1700 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, S Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

35. *Indigofera densifruita* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 327. 1983.

密果木藍 mi guo mu lan

Shrubs, to 2 m tall. Stems brown, terete, with pale yellow lenticels; young branches obviously 4-sided, with appressed white and brown medifixed symmetrically 2-branched trichomes. Stipules linear, 3–5 mm. Leaves 9–15 cm, 13–19-foliolate; petiole 1.3–2.5 cm; petiolules 1.5–2 mm; leaflet blades

ovate, oblong-lanceolate, or lanceolate, 1.7–3.5 × 0.9–1.3 cm, both surfaces with appressed white medifixed trichomes and extremely dense on margin and abaxial midvein, base broadly cuneate to rounded, apex obtuse to acute and mucronate. Racemes 9–16(–26) cm, densely flowered; peduncle 1–1.5 cm; bracts linear, 1–1.5 mm. Pedicel ca. 2 mm. Calyx with appressed brown medifixed trichomes; tube ca. 1 mm; teeth triangular, ca. 0.5 mm, rarely margin glandular. Corolla light purple; standard oblong, ca. 6 × 4 mm, outside with dense appressed white and brown trichomes; wings oblanceolate, ca. 5 × 1.3 mm, apical margin ciliate; keel slightly longer than wings, outside apically with appressed white trichomes, spurs ca. 1 mm. Stamens 3–4 mm; anthers ovoid. Ovary glabrous. Legume cylindrical, ascending to erect, 2–3.5 cm, constricted between seeds, with appressed brown trichomes. Seeds 6–10 per legume, rufous brown, globose. Fl. Jun, fr. Jun–Aug.

• Riverbanks, moist slopes; ca. 700 m. N Guangdong, NW Guangxi, Guizhou, Hunan.

36. *Indigofera caudata* Dunn, Gard. Chron., ser. 3, 32: 210. 1902.

尾叶木藍 wei ye mu lan

Shrubs, to 2.5 m tall. Stems brown, terete, with sparse spreading medifixed symmetrically 2-branched trichomes; young branches grayish brown, angular, with dense spreading brown subbasifixed very asymmetrically 2-branched trichomes. Stipules linear, ca. 7 mm, persistent or caducous, with spreading brown crooked basifixed trichomes. Leaves 12–18 cm, 5–11-foliolate; petiole and rachis with dense spreading brown submedifixed trichomes; petiole 2–3 cm; rachis trigonous, adaxially flattened or grooved; stipels subulate, ca. 2 mm, hairy; petiolules 2–3 mm; leaflet blades opposite, ovate, elliptic, or ovate-lanceolate, 2.7–8 × 1.7–3.2 cm, papery, abaxially with appressed brown medifixed trichomes, adaxially glabrous, midvein abaxially obviously prominent and adaxially impressed, secondary veins 6–9 on each side of midvein, base rounded to cuneate, apex acute to acuminate and mucronate. Racemes 12–20 cm; peduncle 1.5–2 cm, with spreading brown asymmetrically crooked trichomes; bracts bristlelike, 4–6 mm, abaxially with brown trichomes. Pedicel ca. 1 mm but to 2 mm and deflexed in fruit. Calyx campanulate, 2–3 mm, with appressed medifixed trichomes; tube 1.5(–2) mm; teeth triangular, 0.5–1 mm. Corolla white; standard broadly ovate, 7–8 × ca. 5 mm, outside with appressed brown trichomes, base truncate, apex obtuse; wings as long as standard; keel 7–8 mm, outside hairy, spurred. Stamens 6–8 mm; anthers ovoid, glabrous. Ovary hairy or glabrous. Legume brown, cylindrical, 5–6.5 cm, with dense appressed brown medifixed trichomes, sutures thickened; endocarp blotched. Seeds 11 or 12 per legume. Fl. Aug–Oct, fr. Oct–Dec.

Mountain slopes, valleys, trailsides, scrub, woodlands; 600–2000 m. Guangxi, S Guizhou, S Yunnan [N Laos].

37. *Indigofera hirsuta* Linnaeus, Sp. Pl. 2: 751. 1753.

硬毛木藍 ying mao mu lan

Shrubs or shrublets, erect, 30–100 cm tall. Stems rufous, with spreading rust-colored basifixed extremely asymmetrically

2-branched trichomes looking like simple trichomes. Stipules narrowly triangular, 1–1.2 cm. Leaves 2.5–10 cm, 5–9-foliolate; petiole and rachis adaxially grooved, with spreading rust-colored basifixed trichomes; petioles 0.8–1.2 cm; stipels 1–2 mm; petiolules 1.5–2 mm; leaflet blades opposite, elliptic to obovate, 1.5–3.5 × 0.7–2 cm, both surfaces with dense spreading gray basifixed trichomes, midvein abaxially prominent, secondary veins 4–6 on each side of midvein, base cuneate, apex rounded and with a ca. 0.2 mm mucro. Racemes 10–20 cm, densely flowered; bracts linear-triangular, ca. 4 mm, caducous. Pedicel ca. 2 mm, deflexed after flowering. Calyx 4–6 mm, with spreading gray basifixed trichomes; tube ca. 1 mm; teeth setaceous, 3–5 × as long as tube. Corolla red; standard with white blotches at base, obovate-elliptic, 4–5 × 3–4 mm, outside hairy; wings 4–5 × 1.2–1.5 mm, glabrous, apical margin hairy; keel white with a red tip, 4–5 × 1.2–2.5 mm, glabrous, apical margin hairy, spur ca. 0.7 mm. Stamens 3–4.5 mm; anthers ovoid. Ovary hairy, with 6–9 ovules. Legume cylindrical, straight, round in cross section, 1.5–2 cm × 2–2.5 mm, with spreading trichomes; endocarp black blotched. Seeds 6–9 per legume, brown, cubic. Fl. Jul–Sep, fr. Oct–Dec. $2n = 16$.

Open slopes, trailsides, grasslands near rivers, sandy ground near seashores; below 100 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, SE Yunnan, Zhejiang [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Pacific islands].

38. *Indigofera argutidens* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 65. 1913.

尖齿木蓝 jian chi mu lan

Indigofera canocalyx Gagnepain; *I. leptosepala* Diels (1912), not Nuttall (1838).

Shrubs or shrublets, 30–80 cm tall, many branched. Stems terete toward base, angular when young, with dense spreading long stiff brown trichomes and some short and submedifixed 2-branched trichomes. Stipules linear, 8–10 mm, persistent, with dense long spreading white or brown stiff trichomes. Leaves 3.5–8 cm, 7–13(or 15)-foliolate; petiole and rachis with dense spreading long stiff brown trichomes; petiole 3–5 mm; rachis adaxially grooved; stipels absent; petiolules ca. 1 mm; leaflet blades opposite, elliptic, oblong, obovate, or obovate-oblong, 0.7–2(–2.5) × 0.4–0.9(–1.3) cm, papery, both surfaces with sparse ± spreading white or gray and long basifixed to subbasifixed trichomes, abaxially with long stiff brown basifixed trichomes along midvein, midvein adaxially obviously depressed, secondary veins not visible, base cuneate to rounded, apex obtuse to emarginate and with a 1.5–3 mm mucro. Racemes ca. 3.5 cm; peduncle and rachis with dense spreading long stiff white trichomes; peduncle ca. 1.2 cm; bracts linear, 7–8 mm, abaxially with long white trichomes. Pedicel 2–2.5 mm but to 4 mm in fruit, with long stiff white trichomes. Calyx ca. 5 mm, outside with long stiff spreading white trichomes; tube ca. 1.5 mm; teeth narrowly triangular, 2–3(–4) mm. Corolla purplish red; standard broadly elliptic, 9–11 × ca. 5 mm, outside with spreading white long soft trichomes; wings ca. 9 mm, base auriculate, margin ciliate; keel 0.9–1.1 cm, outside apically hairy, margin ciliate, spur minute. Stamens 9–10 mm; anthers ovoid-globose, glabrous or base very sparsely hairy. Ovary gla-

brous, with more than 10 ovules. Legume cylindrical, 2–3 cm, glabrescent; endocarp blotched. Seeds 8 or 9 per legume. Fl. May–Jul, fr. Sep.

• Grasslands, thickets, *Pinus* forests; 2000–3000 m. NW Yunnan.

39. *Indigofera pampaniniana* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 58. 1913.

昆明木蓝 kun ming mu lan

Indigofera duclouxii Craib; *I. mairei* Pampanini var. *proterantha* Pampanini; *I. proterantha* (Pampanini) Gagnepain.

Shrubs, 20–80 cm tall. Stems brown; old branches terete, with strumose lenticels; young branches angular, with densely ascending brown and white subbasifixed or basifixed curly asymmetrically 2-branched trichomes, glabrescent. Stipules narrowly lanceolate, 7–8 mm. Leaves to 15 cm, 11–19(–23)-foliolate; petiole and rachis with ascending basifixed or subbasifixed trichomes; petiole to 2.2 cm; rachis adaxially grooved; stipels subulate, ca. 3 mm, persistent; petiolules 1.5–2 mm, with brown trichomes; leaflet blades opposite, oblong, 1.5–3 × 1–1.5 cm, papery, both surfaces with appressed white medifixed trichomes, abaxially with long trichomes on midvein, midvein slightly prominent, secondary veins 8 or 9 on each side of midvein and obvious on both surfaces, base rounded to slightly cordate, apex obtuse to retuse and with a ca. 1 mm mucro. Racemes produced before leaves, 3–6 cm; peduncle and rachis with ascending trichomes; peduncle ca. 5 mm; bracts linear-lanceolate, 2.5–3 mm, caducous, outside with brown trichomes, margin ciliate. Pedicel ca. 2 mm but to 4 mm in fruit. Calyx ca. 5 mm, with ascending medifixed trichomes; tube ca. 2.5 mm; teeth lanceolate, most abaxial one as long as tube. Corolla purple; standard obovate-elliptic, 1.3–1.5(–1.8) × 0.8–0.9 cm, outside with appressed white trichomes at base, margin ciliate; wings 1.2–1.3 cm; keel as long as wings, outside apically sparsely hairy, spurs ca. 1 mm. Stamens 1.4–1.5 cm; anthers ovoid, base hairy. Ovary glabrous, with 11 or 12 ovules. Legume cylindrical, ca. 4.5 cm, with minute appressed white medifixed trichomes, glabrescent; endocarp blotched. Fl. Mar–Jun, fr. Aug–Nov.

• Dry scrub slopes; 2000–2100 m. Yunnan.

40. *Indigofera esquirolii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 190. 1913.

黔南木蓝 qian nan mu lan

Indigofera arborea Gagnepain (1915), not Roxburgh (1832); *I. neoarborea* Hu ex F. T. Wang & Tang.

Shrubs, 1–4 m tall. Stems nut-brown, terete, with round yellowish lenticels; young branches brown, angular, with dense spreading long brown or rufous subbasifixed asymmetrically 2-branched trichomes and short subsymmetrically 2-branched trichomes. Stipules linear, 5–8 mm, caducous, densely hairy. Leaves ca. 12 cm, 9–15-foliolate; petiole and rachis terete and adaxially grooved, indumentum same as branches; petiole 1–1.5 cm; stipels subulate, ca. 1 mm, with brown trichomes; petiolules ca. 1.5 mm, with spreading brown trichomes; leaflet blades opposite, elliptic, broadly obovate, or obovate-elliptic, 2–3 × 1–1.7 cm, papery, abaxially with long white trichomes,

midvein with spreading brown trichomes, adaxially with shorter spreading brown subbasifixed to medifixed trichomes, midvein abaxially prominent and adaxially impressed, secondary veins 4 or 5 on each side of midvein, base cuneate to rounded, apex rounded to truncate and with a ca. 1 mm mucro. Racemes ca. 12 cm; peduncle 1–1.3 cm; rachis striate, with spreading brown trichomes; bracts linear, ca. 4 mm, abaxially with subbasifixed 2-branched brown trichomes. Pedicel ca. 3 mm. Calyx with spreading brown subbasifixed 2-branched trichomes; tube 2–2.5 mm; teeth lanceolate-subulate, 2.5–3.5 mm. Corolla white; standard elliptic to oblong, 11–14 × ca. 5 mm, outside with appressed white medifixed-subbasifixed trichomes, base rounded, apex obtuse and with a ca. 1 mm mucro; wings ca. 13 × 2 mm, base auriculate, margin ciliate; keel ca. 1.5 cm, outside apically hairy, claw ca. 1 mm. Stamens 1.2–1.3 cm; anthers ovoid, glabrous. Ovary hairy, with 13–15 ovules. Legume cylindrical, ca. 4.5 cm, with appressed brown trichomes. Seeds 14 or 15 per legume. Fl. Apr–Aug, fr. Jul–Aug.

• Woodlands, scrub; 400–2500 m. N Guangxi, S Guizhou, E Yunnan.

41. *Indigofera dumetorum* Craib, Notes Roy. Bot. Gard. Edinburgh 9: 109. 1916.

黄花木蓝 huang hua mu lan

Shrubs, to 2.5 m tall. Stems rufous brown or gray, terete, with obvious lenticels; young branches striate, with spreading brown medifixed subsymmetrically crooked 2-branched trichomes. Stipules narrowly lanceolate, 5–8 mm, caducous. Leaves ca. 13 cm, 5–9-foliolate; petiole and rachis terete, adaxially slightly flattened, with dense spreading white crooked medifixed trichomes; petiole ca. 2 cm; stipules not visible; petiolules ca. 2 mm; leaflet blades opposite or subopposite, oblong, elliptic, or ovate, 2–5 × 1.5–2.5 cm, thickly papery, abaxially with dense spreading white medifixed crooked trichomes, adaxially with appressed white medifixed trichomes, midvein abaxially prominent and adaxially slightly impressed, secondary veins 8–10 on each side of midvein, base broadly cuneate to rounded, apex obtuse to acute. Racemes ca. 15 cm; peduncle and rachis with dense spreading white medifixed trichomes and crooked trichomes; peduncle 2–3 cm; rachis striate; bracts caducous. Pedicel 2–4 mm, hairy. Calyx campanulate, 4.5–5 mm, with dense spreading brown submedifixed crooked trichomes; tube ca. 2.5 mm; teeth triangular, unequal, most abaxial one as long as tube. Corolla yellowish; standard ovate-oblong, 1.2–1.7 × 0.6–0.7 cm, outside with appressed white trichomes, base not clawed, apex emarginate; wings 10–12 × ca. 2.5 mm, outside glabrous, margin ciliate; keel as long as standard, outside with appressed brown trichomes on top part, clawed at base, spur ca. 0.5 mm. Stamens 1.3–1.6 cm; anthers ovoid-ellipsoid, glabrous. Ovary with 12–15 ovules. Legume slightly compressed, ca. 7 cm, with spreading brown or gray submedifixed trichomes, apex hooked. Fl. Jun, fr. Aug–Sep.

• Dry woodlands; 2100–2700 m. SW Sichuan, NW Yunnan.

42. *Indigofera stachyodes* Lindley, Bot. Reg. 1: t. 14. 1843.

茸毛木蓝 rong mao mu lan

Indigofera bodinieri H. Léveillé; *I. dosua* Buchanan-

Hamilton ex D. Don var. *stachyodes* (Lindley) H. Léveillé; *I. dosua* var. *tomentosa* Baker.

Shrubs, 1–3 m tall. Stems grayish brown; young branches angular, with dense long spreading brown basifixed or subbasifixed extremely asymmetrically 2-branched trichomes and short appressed submedifixed symmetrically 2-branched trichomes. Stipules linear, 5–6 mm, with ascending basifixed trichomes. Leaves 10–20 cm, (19–)31–41-foliolate; petiole and rachis with densely ascending basifixed trichomes; petiole very short, adaxially grooved; leaflet blades opposite, subopposite, or alternate, lanceolate-oblong but terminal one obovate-oblong, 1.2–2 × 0.4–0.9 cm, both surfaces with densely ascending brown to grayish brown basifixed trichomes, midvein adaxially slightly impressed, secondary veins not visible, base cuneate to rounded, apex obtuse to acute. Racemes ca. 12 cm, many flowered; peduncle and rachis with dense spreading basifixed trichomes; peduncle longer than petioles; bracts linear, ca. 7 mm, hairy. Pedicel ca. 1.5 mm, hairy. Calyx ca. 3.5 mm, with long spreading brown basifixed trichomes; tube ca. 1.5 mm; teeth lanceolate, most abaxial one ca. 2 mm. Corolla yellowish; standard elliptic, 10–11 × ca. 5 mm, outside with appressed long trichomes; wings ca. 9.5 mm, glabrous; keel ca. 1 cm, outside ciliate and hairy on top. Stamens 9–10.5 mm; anthers ovoid, glabrous. Ovary hairy. Legume subcylindric, deflexed, 3–4 cm, with densely ascending basifixed trichomes; endocarp blotched with purple. Seeds more than 10 per legume, reddish brown, cubic, ca. 2 × 2 mm. Fl. Apr–Jul, fr. Aug–Nov.

Sunny places, scrub; 700–2400 m. NW Guangxi, Guizhou, SW Hubei, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Thailand, Vietnam].

43. *Indigofera dosua* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 244. 1825.

滇西木蓝 dian xi mu lan

Indigofera polyphylla Candolle; *I. virgata* Roxburgh.

Shrubs, 5–20 cm tall. Stems striate, with dense spreading brown 2-branched trichomes with very unequally long arms. Stipules linear, 7–10 mm, abaxially with spreading white or brown trichomes. Leaves 4–10 cm, 13–39-foliolate; petiole absent; rachis with dense spreading brown trichomes; stipules minute or absent; petiolules ca. 1 mm; leaflet blades elliptic to oblong, 7–15 × 4–6 mm, abaxially with dense subbasifixed trichomes, adaxially with slender white appressed medifixed trichomes, secondary veins not visible, base cuneate to rounded, apex obtuse to rounded and mucronate. Racemes 5–15 cm; peduncle and rachis with dense spreading long white trichomes; peduncle 4–7 mm; bracts linear to narrowly triangular, 8–10 mm, abaxially with long spreading white trichomes. Pedicel ca. 3 mm, with long spreading trichomes. Calyx ca. 3 mm, outside with long spreading white trichomes; tube ca. 2 mm; teeth triangular, ca. 1 mm. Corolla pink; standard elliptic to oblong, 8–10 × ca. 4.5 mm, outside with dense spreading brown or white long trichomes, apex mucronate; wings oblong, 8–9 mm, glabrous, margin ciliate; keel 8–9 mm, outside apically with spreading white trichomes, margin ciliate, apex acute. Stamens 7.5–9 mm; anthers hairy at base. Ovary with dense appressed white trichomes. Legume linear, cylindrical, deflexed to

spreading, 3–4 cm × 3–4 mm, with white appressed 2-branched trichomes; endocarp not blotched. Seeds 6–10 per legume, dark brown, cubic, 1.5–2 × 1.5–2 mm. Fl. Apr–Jun, fr. Jun–Aug.

Valley slopes; 1800–2500 m. W Yunnan [Bhutan, India, Indonesia, Laos, Myanmar, Nepal, Thailand, Vietnam].

44. *Indigofera penduloides* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 333. 1983.

拟垂序木蓝 ni chui xu mu lan

Shrubs. Stems pale grayish brown, terete, ca. 6 mm thick, with lenticels; branches purplish red, angulate, with spreading brown and submedifixed 2-branched trichomes, glabrescent. Stipules linear, 3–5 mm. Leaves 12–22 cm, 17–23-foliolate; petiole and rachis adaxially grooved, with sparse brown submedifixed trichomes; petiole 2.3–5 cm; stipels not visible; petiolules ca. 2 mm; leaflet blades ovate-oblong to elliptic-lanceolate, 2.5–4.5 × 0.8–1.6 cm, both surfaces with appressed medifixed trichomes, secondary veins 6–8 on each side of mid-vein and adaxially obvious, base cuneate to broadly cuneate, apex obtuse to emarginate and mucronate. Racemes 30–45 cm, usually drooping; peduncle 1.5–4 cm, striate, with spreading brown submedifixed trichomes; bracts lanceolate, ca. 3 mm. Pedicel 2–3 mm. Calyx tube 1.2–1.5 mm; teeth triangular, ca. 1.5 mm. Corolla standard broadly oblong to obovate-oblong, 12–13 × ca. 6 mm, outside with appressed grayish brown trichomes; wings ca. 11 × 2.5 mm; keel 12–13 × ca. 3 mm, spurred at middle. Stamens 1.1–1.2 cm; anthers ellipsoid, glabrous. Ovary, style, and stigma all hairy; ovules 12 or 13. Fl. Sep, fr. unknown.

• Scrub, forests; ca. 1700 m. W Yunnan (Weishan).

45. *Indigofera jikongensis* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 329. 1983.

鸡公木蓝 ji gong mu lan

Shrubs, to 4 m tall. Stems obviously 4-sided, with spreading submedifixed 2-branched trichomes. Stipules lanceolate, 5–8 mm, caducous. Leaves 11–22 cm, 5–9-foliolate; petiole and rachis with spreading submedifixed or subbasifixed trichomes; petiole 1.5–5.5 cm; stipels linear, 2–4 mm, with spreading subbasifixed white trichomes; petiolules ca. 2 mm; leaflet blades opposite, ovate, ovate-elliptic, or obovate-elliptic, 2.8–7.5 × 1.5–4 cm, abaxially with spreading white medifixed or long subbasifixed trichomes, adaxially with short appressed medifixed trichomes, base broadly cuneate, apex obtuse, emarginate, or acute and mucronate. Racemes 11–20 cm; peduncle 3.5–6 cm, with spreading subbasifixed trichomes. Pedicel 2–3 mm, slender, with spreading subbasifixed trichomes. Calyx with spreading white crooked trichomes; tube 1.5–2 mm; teeth triangular, 1–1.3 mm. Corolla purple; standard broadly oblong, 1.3–1.4 × ca. 0.8 cm, outside with appressed white crooked trichomes; wings 13.5–14.5 × ca. 4 mm, glabrous, base auriculate; keel as long as wings, spur ca. 1.5 mm. Anthers ovoid, both ends hairy. Ovary glabrous, with 9 ovules. Fl. May, fr. unknown.

• Scrub, mixed forests; ca. 1300 m. Henan, Hubei.

46. *Indigofera cylindracea* Graham ex Baker in J. D. Hooker, Fl. Brit. India 2: 99. 1876.

筒果木蓝 tong guo mu lan

Indigofera heterantha Wallich ex Brandis var. *longipedicellata* Thothathri.

Shrubs, erect or ascending, 80–100 cm tall. Stems striate, with sparse spreading 2-branched trichomes with unequally long arms. Stipules triangular, 2–4 mm, persistent, with appressed brownish 2-branched trichomes. Leaves 4–6 cm, 11–15-foliolate; petiole and rachis adaxially grooved, with brownish 2-branched trichomes; petiole 5–10 mm; stipels ca. 1 mm; petiolules ca. 1 mm; leaflet blades opposite, elliptic to oblong, 7–15 × 3–5 mm, abaxially with medifixed trichomes, adaxially with appressed white unequally 2-branched trichomes, base cuneate, apex obtuse to rounded and mucronate. Racemes 5–9 cm; peduncle and rachis with spreading brownish 2-branched trichomes; peduncle ca. 1.5 cm; bracts narrowly triangular, 1.5–2 mm, caducous. Pedicel 4–6 mm but to 1 cm in fruit, with spreading brownish 2-branched trichomes. Calyx outside with appressed brownish 2-branched trichomes; tube ca. 1.8 mm; teeth triangular, 0.5–0.8 mm. Corolla pink; standard obovate, 7–9 × 4–6 mm, outside with appressed 2-branched trichomes, apex mucronate; wings 6.5–8 × 2–3.5 mm, glabrous; keel as long as standard, spur ca. 1 mm. Stamens 7–8 mm; anthers ovoid. Ovary glabrous, with 8–10 ovules. Legume cylindrical, 4–5 cm × 3–4 mm, glabrous. Seeds 8–10 per legume. Fl. May–Jul, fr. Jul–Sep.

Forest margins, grasslands on slopes; 2200–2400 m. S Xizang [Bhutan, India, Myanmar, Nepal].

47. *Indigofera lacei* Craib, Bull. Misc. Inform. Kew 1910: 382. 1910.

思茅木蓝 si mao mu lan

Indigofera simaoensis Y. Y. Fang & C. Z. Zheng.

Shrublets, 80–100 cm tall. Stems slightly terete, striate; young branches with dense spreading primarily basifixed asymmetrically 2-branched long trichomes, glabrescent. Stipules linear, 5–10 mm. Leaves ca. 11 cm, 17–25-foliolate; petiole 5–10 mm; rachis adaxially flattened; stipels linear, as long as petiolules; petiolules 1.5–2 mm; leaflet blades opposite, oblanceolate to oblong, 7–15 × 4–6 mm, papery, both surfaces with appressed white medifixed trichomes, base broadly cuneate to rounded, apex obtuse to rounded and mucronate. Racemes ca. 16 cm; peduncle ca. 3 cm, with brown trichomes; bracts caducous. Pedicel 3–4 mm. Calyx tube ca. 1.5 mm; teeth triangular, ca. 0.5 mm. Corolla dark purple; standard broadly oblong, ca. 8 × 6 mm; wings as long as keel. Stamens 6.5–7 mm; anthers ovoid, glabrous. Ovary glabrous. Legume purple, 3–3.5 cm, glabrous. Seeds cubic, ca. 2 mm. Fl. Sep, fr. Nov.

Moist thickets; ca. 1400 m. S Yunnan [India, Myanmar, Thailand].

48. *Indigofera henryi* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 54. 1913.

亨利木蓝 heng li mu lan

Indigofera henryi var. *silvarum* Craib; *I. souliei* Craib; *I.*

subsecunda Gagnepain; *I. subverticillata* Gagnepain, nom. illeg. superfl.

Shrubs or shrublets, erect or ascending, 30–100 cm tall, many branched. Branches brown, angular, with appressed white medifixed 2-branched trichomes. Stipules linear, ca. 5 mm. Leaves 3–10 cm, 11–19-foliolate; petiole 3–10 mm; rachis adaxially flattened, slightly winged, with appressed white medifixed trichomes; stipels ca. 1 mm; petiolules ca. 1 mm; leaflet blades opposite, oblong-obovate, 1.7–2.3 × 0.5–1.2 cm, papery, abaxially with spreading unequally 2-branched trichomes, adaxially with appressed medifixed trichomes, midvein prominent on both surfaces, secondary veins 4–6 on each side of midvein but not visible or obscure, base broadly cuneate, rounded, or truncate, apex rounded. Racemes (3–)4–9(–12) cm, laxly flowered; peduncle 7–12 mm, with sparse medifixed trichomes; bracts linear, 2–2.5 mm, caducous. Pedicel 2–6(–9) mm, deflexed in fruit. Calyx 2–3 mm, outside with appressed white medifixed trichomes; tube 1–1.5 mm; teeth triangular, 1–1.5 mm, apex acuminate. Corolla white; standard obovate, 7–9 × 5–6 mm, outside densely white puberulent with medifixed trichomes, base rounded, apex rounded to acute; wings 7–8 × ca. 2.5 mm, margin ciliate; keel 7–9 mm. Stamens 7–8 mm; anthers ovoid-globose, base densely hairy. Ovary hairy. Legume brown, cylindrical, 2.5–3 cm, with sparse appressed medifixed trichomes; endocarp blotched. Fl. Aug–Sep, fr. Oct–Nov.

• Grasslands, slopes, scrub near trailsides; 1200–2500 m. Guizhou, S Sichuan, Yunnan.

Indigofera subverticillata was nomenclaturally superfluous when published, and is therefore illegitimate, because the single gathering cited in the protologue is also the type of the senior name *I. souliei*.

49. *Indigofera myosurus* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 58. 1913.

华西木蓝 hua xi mu lan

Shrublets, erect, 0.8–1.2 m tall, many branched. Branches brown, angular, with appressed white medifixed 2-branched trichomes. Stipules linear, ca. 5 mm. Leaves 5–8.5 cm, 11–19-foliolate; petiole 5–10 mm; rachis adaxially flattened, slightly winged, with appressed white medifixed trichomes; stipels ca. 1 mm; petiolules ca. 1 mm; leaflet blades opposite, elliptic-obovate, 1–1.8 × 0.4–0.8 cm, papery, both surfaces with sparse appressed medifixed trichomes, abaxially with longer trichomes, midvein prominent on both surfaces, secondary veins 4–6 on each side of midvein and abaxially visible, base broadly cuneate to obtuse, apex rounded to obtuse and mucronate. Racemes 4–9 cm, laxly flowered; peduncle 0.8–1.6 cm, with sparse medifixed trichomes; bracts linear, 2–2.5 mm, caducous. Pedicel 2–5 mm, deflexed in fruit. Calyx 4–5 mm, outside with appressed white medifixed trichomes; tube 1.5–2 mm; teeth lanceolate, 2–3 mm, apex acuminate. Corolla light pink; standard obovate, 8–10 × 5–6 mm, outside minutely puberulent, base rounded, apex rounded to acute; wings 7–9 × ca. 2.5 mm, margin ciliate; keel 7–10 mm, apex acute. Stamens 8–9 mm; anthers ovoid-globose, base densely hairy. Ovary hairy. Legume brown, cylindrical, 2.5–3 cm, with sparse appressed medifixed trichomes; endocarp blotched. Fl. May–Jun, fr. Aug.

• Hill slopes, forest margins; 1600–2800 m. Sichuan, N Yunnan.

50. *Indigofera reticulata* Franchet, Pl. Delavay. 153. 1889.

网叶木蓝 wang ye mu lan

Indigofera craibeana H. Léveillé.

Subshrubs, sometimes prostrate, 10–30 cm tall, branching from base. Young branches slender, angular, with appressed brown medifixed symmetrically 2-branched trichomes. Stipules linear, 3–4 mm. Leaves 2–6 cm, 5–13-foliolate; petiole and rachis hairy; petiole 4–11 mm; rachis terete, adaxially grooved; stipels ca. 1 mm; petiolules ca. 1 mm; leaflet blades opposite, oblong to elliptic, 5–17 × 3–7 mm, papery, both surfaces with white and brown appressed medifixed trichomes, midvein adaxially prominent, secondary veins 5 or 6 on each side of midvein and obvious, base rounded to subcordate, apex obtuse to emarginate and mucronate. Racemes 2–4 cm; peduncle 4–5 mm, hairy; bracts linear, ca. 2 mm. Pedicel 2–3 mm. Calyx ca. 3 mm, outside hairy; teeth lanceolate-subulate, as long as tube. Corolla purple; standard broadly ovate, 6–7 mm, outside hairy, apex rounded; wings 7–9 mm, margin ciliate; keel as long as wings, outside hairy, apically tapering and acute. Stamens 4–5 mm, much shorter than petals; anthers ovoid, base with a few trichomes. Ovary glabrous. Legume cylindrical, 1–2 cm, with appressed medifixed trichomes; endocarp blotched. Seeds rufous brown, ellipsoid, 1.5–2 mm. Fl. May–Jul, fr. Sep–Dec.

Forests, scrub, grassland slopes; 1200–3000 m. W Guizhou, SW Sichuan, S Xizang, Yunnan [Thailand].

51. *Indigofera muliensis* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 333. 1983.

木里木蓝 mu li mu lan

Shrubs, 60–100 cm tall. Stems terete but 4-angled when young, with lenticels, glabrous; young branches 4-ribbed, glabrous. Stipules lanceolate, 5–6(–10) mm. Leaves 3–7.5 cm, 5–9-foliolate; petiole 1–2 cm, glabrous; stipels as long as petiolules; petiolules 1–1.5 mm; leaflet blades opposite, oblong to ovate-oblong, 1–3 × 0.6–1.5 cm, papery, abaxially with appressed white and brown medifixed trichomes, adaxially glabrous, secondary veins 4–6 on each side of midvein, base rounded, apex obtuse to acute and mucronate. Racemes 4–8 cm; peduncle 0.5–2 cm, glabrous; bracts ovate, ca. 1.5 mm. Pedicel ca. 1.5 mm but to 4 mm in fruit. Calyx tube ca. 1 mm; teeth triangular to triangular-subulate, 1–1.5 mm. Corolla purplish red; standard 5.5–7.5 × 3.5–4.5 mm, outside hairy; wings 6–7 × ca. 2 mm; keel 6–7 × ca. 1.5 mm, spur ca. 1.5 mm. Stamens 5–6.5 mm; anthers broadly ovoid, glabrous. Ovary glabrous, with 1 ovule. Legume dark brown, cylindrical, 3–3.5 cm, glabrous. Fl. May–Jun, fr. Jun–Jul.

• Moist slopes, forests, *Pinus* forests; 2100–3200 m. Sichuan, Yunnan.

52. *Indigofera megaphylla* X. F. Gao, Novon 19: 160. 2009.

大叶木蓝 da ye mu lan

Shrubs, 1–2 m tall, erect. Stems with dense spreading brownish 2-branched trichomes with equally long arms. Stipules narrowly triangular, 5–6 mm. Leaves 12–15 cm, (1 or 3- or 5(or 7)-)foliolate; petiole and rachis terete, with sparse brownish

2-branched trichomes; petiole 3–5 cm; stipels 2–3 mm; petiolules 3–4 mm; leaflet blades oblong, ovate-oblong, or obovate-oblong, 5–8 × 4–6 cm, abaxially with long white 2-branched trichomes, adaxially with short spreading brownish 2-branched trichomes, primary to tertiary venation markedly impressed adaxially and prominent abaxially, secondary veins 9–14 on each side of midvein, base rounded to cuneate, apex obtuse to emarginate. Racemes 5–13 cm; peduncle and rachis with very dense spreading brown 2-branched trichomes; peduncle 3–5 mm; bracts ovate, ca. 2.5 × 1.2 mm, abaxially with appressed trichomes. Pedicel 0.5–1 mm. Calyx 2.5–3 mm, outside with dense spreading trichomes; tube ca. 1 mm; teeth narrowly triangular, 1.5–2 mm. Corolla purple, 7–8 mm; standard ovate-oblong, 4–4.5 mm wide, outside with spreading white trichomes; wings narrowly oblong, 1.6–1.8 mm wide, margin ciliate; keel densely spreading white pubescent distally and along upper margin, spur ca. 1 mm. Stamens 5.5–6 mm; anthers glabrous. Ovary densely pubescent with white and brown hairs. Legume (3–)4–5 cm, with dense spreading gray or pale brown trichomes; endocarp not blotched. Seeds 9–12 per legume, dark brown. Fl. Apr–May, fr. May–Jul.

- Scrub, trailsides; 1200–1600 m. S Yunnan (Shiping, Yuanjiang).

53. *Indigofera balfouriana* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 48. 1913.

丽江木蓝 li jiang mu lan

Indigofera dielsiana Craib.

Shrubs, 0.6–2 m tall. Old stems blackish brown, angular; young branches brown, angular, with spreading or subspreading mixed appressed pale brown or white 2-branched trichomes, glabrescent. Stipules narrowly lanceolate, 3–6 mm, hairy. Leaves 3–9 cm, 5–9-foliolate; petiole and rachis terete, adaxially grooved, with spreading curly medifixed trichomes; petiole 1–2.3 cm; stipels subulate, ca. 1 mm; petiolules ca. 1.5 mm, hairy; leaflet blades opposite, elliptic, 0.6–2.6 × 0.4–1.3 cm, papery, both surfaces with ± spreading white medifixed trichomes, midvein abaxially prominent and adaxially impressed, secondary veins not visible, base broadly cuneate to rounded, apex rounded to emarginate and with a ca. 0.3 mm mucro. Racemes 2–6 cm; peduncle and rachis with spreading medifixed trichomes; peduncle 0.5–1.5 cm; bracts ovate, ca. 3 mm, abaxially with spreading trichomes. Pedicel 1–3 mm, with spreading white 2-branched trichomes. Calyx 2–3 mm, with spreading submedifixed to subbasifixed 2-branched trichomes; tube 1–2 mm; teeth lanceolate, 1–1.5 mm. Corolla red to purple; standard nearly rounded, 6–9.5 × 5–6 mm, sessile, outside with spreading white soft trichomes, apex slightly emarginate; wings 7–9.5 × ca. 2 mm, base auriculate, margin ciliate; keel 7.5–8.5 mm, outside apically with sparse spreading white trichomes, margin ciliate, spur ca. 1 mm. Stamens (5.5–)6–7 mm; anthers ovoid-globose, glabrous. Ovary densely white hairy, with 10 or 11 ovules. Legume brown, cylindrical, 2.5–4 cm, hairy; endocarp blotched. Seeds 6–10 per legume. Fl. Apr–Jul, fr. Jul–Sep.

- Scrub, forests; 2100–3000 m. Sichuan, S Xizang, W Yunnan.

54. *Indigofera sticta* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 61. 1913.

矮木蓝 ai mu lan

Subshrubs, to 70 cm tall. Stems nut-brown, angular; young branches with appressed medifixed symmetrically 2-branched trichomes. Stipules narrowly lanceolate, ca. 3.5 mm. Leaves 4–9 cm, 3- or 5-foliolate; petiole and rachis adaxially grooved, with appressed medifixed trichomes; petiole 3–3.5 cm; stipels minute; petiolules ca. 2.5 mm; leaflet blades opposite, elliptic to ovate-elliptic, 2.5–4 × 1.7–2.8 cm, papery, abaxially with dense medifixed trichomes, adaxially with appressed medifixed trichomes, midvein adaxially slightly impressed, secondary veins 5 or 6 on each side of midvein, base rounded, apex obtuse to emarginate and mucronate. Racemes 5(–9) cm; peduncle and rachis with dense appressed white medifixed trichomes; peduncle 1.3–1.7 cm; bracts ovate, ca. 1.5 mm, caducous. Pedicel ca. 2 mm. Calyx ca. 3.5 mm, with appressed medifixed trichomes; tube 1.5–2 mm; teeth triangular, ca. 1.5 mm. Corolla purplish red to purple; standard elliptic to obovate-elliptic, 6.5–8 × 3.5–4 mm, outside hairy; wings ca. 6 mm, base auriculate, margin ciliate; keel ca. 6.5 mm, apically hairy, spur ca. 1 mm. Stamens 7–8 mm; anthers ovoid, glabrous. Ovary glabrous. Fl. May, fr. unknown.

- Forests; ca. 1800 m. Yunnan.

55. *Indigofera dichroa* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 50. 1913.

川西木蓝 chuan xi mu lan

Shrubs, 1–1.5 m tall. Stems blackish brown, terete; young branches angular, primarily with appressed white and brown medifixed symmetrically 2-branched trichomes, glabrescent. Stipules linear, 4–6 mm. Leaves 4–8 cm, 3- or 5-foliolate; petiole and rachis with appressed medifixed trichomes; petiole 1.2–3.5 cm; rachis adaxially grooved; stipels minute, caducous; petiolules 1.5–2 mm, hairy; leaflet blades opposite, elliptic, ovate-elliptic, or elliptic-obovate, 1–4 × 0.8–5.5 mm, papery, abaxially with dense appressed short medifixed trichomes, adaxially with longer medifixed trichomes, midvein adaxially prominent, secondary veins 6 on each side of midvein, base cuneate to rounded, apex obtuse to acuminate and mucronate. Racemes ca. 6 cm; peduncle and rachis with dense appressed white medifixed trichomes; peduncle 5–9 mm; bracts ovate, ca. 1.5 mm, caducous. Pedicel ca. 1.5 mm, trichomes white. Calyx 3–3.5 mm, outside with appressed medifixed trichomes; tube ca. 2 mm; teeth triangular-lanceolate, 1–1.5 mm. Corolla pinkish; standard elliptic-obovate, 8.5–11 × 3–3.5 mm, outside hairy, base acuminate, apex obtuse; wings 8.5–11 mm; keel slightly longer than other petals. Stamens 8–9 mm; anthers ovoid-globose, glabrous. Ovary densely appressed white hispid; style glabrous. Legume brown, linear, cylindrical, ca. 4.5 cm, appressed white hispid; endocarp not blotched. Seeds cubic. Fl. May–Jun, fr. Jul–Aug.

- Grasslands, scrub; 1300–2000 m. Sichuan, N Yunnan.

56. *Indigofera amblyantha* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 47. 1913.

多花木蓝 duo hua mu lan

Indigofera amblyantha var. *purdomii* Rehder.

Shrubs, erect, 0.8–2(–3) m tall. Stems brown to pale brown, terete; young branches 4-sided, with dense appressed white medifixed symmetrically 2-branched trichomes, glabrescent. Stipules triangular-lanceolate, ca. 1.5 mm. Leaves to 18 cm, 5–9(–13)-foliolate; petiole and rachis with appressed medifixed trichomes; petiole (1.5–)2–5 cm; stipels minute; petiolules ca. 1.5 mm, hairy; leaflet blades opposite or rarely alternate, obovate-oblong, oblong-elliptic, elliptic, or orbicular, 1–4(–5) × 0.8–2 cm, abaxially pale and with dense appressed medifixed trichomes, adaxially green and with sparse appressed medifixed trichomes, midvein abaxially prominent and adaxially impressed, secondary veins 4–6 on each side of midvein, base cuneate to broadly cuneate, apex rounded-obtuse and mucronate. Racemes 11–15 cm, subspicate, sessile or peduncle to 5 mm; bracts linear, ca. 2 mm, caducous. Pedicel 1–2(–2.5) mm. Calyx 2–3.5 mm, with appressed white medifixed trichomes; tube 1–1.5 mm; teeth 1.5–2 mm. Corolla pink; standard obovate, 6–6.5 mm, somewhat hooded at apex, outside hairy; wings ca. 7 mm; keel shorter than wings. Stamens 5–6 mm; anthers globose, apex mucronate. Ovary linear, hairy, with 17 or 18 ovules. Legume brown, cylindrical, straight, 3.5–6 cm, with short appressed medifixed trichomes; endocarp not blotched. Seeds brown, ellipsoid, ca. 2.5 mm. Fl. May–Jul, fr. Sep–Nov. $2n = 48^*$.

• Grasslands near streams, trailsides, scrub at forest margins; 600–1600 m. Anhui, Chongqing, Gansu, Guizhou, Hebei, Henan, Hubei, NW Hunan, Jiangsu, NW Jiangxi, Shaanxi, Shanxi, Sichuan, Zhejiang.

57. *Indigofera bungeana* Walpers, *Linnaea* 13: 525. 1839.

河北木藍 he bei mu lan

Indigofera hosiei Craib; *I. longispica* Gagnepain; *I. micrantha* Bunge (1833), not Desvaux (1826); *I. pseudotinctoria* Matsumura.

Shrubs, erect, 40–100 cm tall. Stems brown, terete; branches whitish gray, with appressed white medifixed symmetrically 2-branched trichomes. Stipules triangular, ca. 1 mm, caducous. Leaves 2.5–5 cm, 5–9(or 11)-foliolate; petiole and rachis with appressed medifixed trichomes; petiole 0.4–1.6(–2) cm; stipels very small; petiolules ca. 0.5 mm; leaflet blades opposite, elliptic, 5–15(–25) × 3–10(–15) mm, abaxially pale green and with longer medifixed trichomes, adaxially green and with sparse appressed medifixed trichomes or glabrescent, base rounded, apex obtuse. Racemes 4–6(–10) cm; peduncle 1–5 mm; bracts linear, ca. 1.5 mm. Pedicel 1–2 mm. Calyx 2–2.5 mm, with appressed white medifixed trichomes; teeth triangular-lanceolate, equal, ca. 2 × as long as tube. Corolla purple to purplish red; standard broadly obovate, 5–6 mm, outside with appressed medifixed trichomes; wings and keel equal, ca. 5.5 mm; keel with spur in middle. Stamens 4–5 mm; anthers globose, apex mucronate. Ovary linear, sparsely hairy. Legume cylindrical, straight, 2–2.5 cm, with appressed white medifixed trichomes; endocarp red blotched. Seeds ellipsoid, ca. 2 mm. Fl. May–Jul, fr. Aug–Oct. $2n = 16$.

Grasslands, river beaches, slopes; 500–2300 m. Anhui, Chongqing, Fujian, Gansu, NE Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, E Xizang, Yunnan, Zhejiang [Japan, Korea].

58. *Indigofera silvestrii* Pampanini, *Nuovo Giorn. Bot. Ital.*, n.s., 17: 397. 1910.

刺序木藍 ci xu mu lan

Indigofera bungeana Walpers var. *nana* L. C. Wang & X. G. Sun; *I. bungeana* f. *spinescens* Kobuski.

Shrubs, 0.6–1.5 m tall, many branched. Stems brown, terete; young branches yellowish green, glabrous. Stipules ca. 1 mm. Leaves 1–2 cm, (5 or)7- or 9-foliate; petiole and rachis adaxially grooved, with appressed white medifixed trichomes; petiole 4–5 mm; stipels not visible; petiolules ca. 0.5 mm, hairy; leaflet blades opposite, obovate, obovate-oblong, oblong, or elliptic, 3–8 × 2–4 mm, abaxially pale and with appressed medifixed trichomes, adaxially green and glabrous or glabrescent, midvein adaxially impressed, secondary veins not visible, base broadly cuneate to rounded, apex obtuse to rounded and mucronate. Racemes 2–5 cm, many flowered, spinescent; peduncle ca. 5 mm; bracts linear, ca. 1.5 mm, caducous. Pedicel ca. 1 mm, hairy, deflexed in fruit. Calyx ca. 2.5 mm, with appressed medifixed trichomes; tube ca. 1 mm; teeth linear, ca. 1.5 mm. Corolla purplish red; standard obovate, 4.5–5.5 mm, outside hairy, apex rounded; wings auriculate near base, margin ciliate; keel slightly shorter than wings, outside apically hairy. Stamens 3–4 mm; anthers globose, glabrous. Ovary linear, white hairy. Legume cylindrical, straight, 2–3 cm, hairy; endocarp red blotched. Seeds 6 or 7 per legume, reddish brown, oblong to cubic, 2–3 × ca. 2 mm. Fl. Jun–Jul, fr. Aug–Oct.

• Dry slopes, sunny rocks, riverbanks; 100–2700 m. Chongqing, S Gansu, Guizhou, Hubei, S Shaanxi, Sichuan, E Xizang, Yunnan.

59. *Indigofera wightii* Graham ex Wight & Arnott, *Prodr. Fl. Ind. Orient.* 202. 1834.

海南木藍 hai nan mu lan

Indigofera hainanensis H. T. Tsai & T. T. Yu; *I. inamoena* Thwaites; *I. pallida* Craib.

Shrublets, 1–1.5 m tall. Stems with appressed white and brown medifixed symmetrically 2-branched trichomes. Stipules 1.5–2.5 mm, caducous. Leaves 3.5–5 cm, 11–19(–29)-foliolate; petiole and rachis adaxially grooved, with appressed gray medifixed trichomes; petiole ca. 1 cm; stipels minute; petiolules ca. 1 mm; leaflet blades opposite, elliptic-oblong to oblong-lanceolate, 5–10(–15) × 2.5–5(–8) mm, both surfaces with appressed white medifixed trichomes, midvein adaxially impressed and abaxially prominent ending in a tubular gland, secondary veins not visible, base cuneate, apex rounded to acute and mucronate. Racemes 1.5–3.5(–6) cm; peduncle 3–5 mm, with appressed gray medifixed trichomes; bracts triangular, ca. 1.5 mm, caducous. Pedicel 1–2 mm, with spreading trichomes, spreading or reflexed in fruit. Calyx 1.5–2 mm, with appressed medifixed trichomes; tube ca. 1 mm; teeth ovate, 1–1.2 mm. Corolla red; standard broadly ovate, ca. 6 mm, outside with dense 2-branched trichomes, base broadly cuneate, apex acute; wings narrowly elliptic, ca. 3 × 1 mm; keel ca. 6 × 1.5 mm. Stamens 5–5.5 mm; anthers ellipsoid, glabrous. Ovary hairy. Legume cylindrical, 1.5–3 cm × 2–3 mm, with dense appressed medifixed trichomes; endocarp purplish red blotched. Seeds 6–11 per legume. Fl. Aug, fr. Oct–Nov. $2n = 16$.

Sandy places on slopes or trailsides; 600–1800 m. Hainan [Cambodia, India, Laos, Myanmar, Sri Lanka, Thailand, Vietnam].

60. *Indigofera delavayi* Franchet, Pl. Delavay. 154. 1889.

滇木藍 dian mu lan

Indigofera daochengensis Y. Y. Fang & C. Z. Zheng.

Shrubs to 2 m tall. Stems pinkish brown, angular when young, with very sparse appressed medifixed symmetrically 2-branched trichomes, glabrescent. Stipules subulate, 5–7 mm, persistent, base thickened. Leaves 8–18 cm, (13 or)15–19-foliolate; petiole 3–4 cm; rachis terete, flattened, or adaxially grooved, glabrous; stipels subulate, 1–1.5 mm; petiolules ca. 2 mm, with dense appressed medifixed trichomes; leaflet blades opposite, oblong to slightly obovate, 1.3–3 × 0.8–1.3 cm, papery, abaxially with sparse appressed short medifixed trichomes, adaxially glabrous or subglabrous, midvein abaxially prominent and adaxially impressed, secondary veins 6 or 7 on each side of midvein, base broadly cuneate to rounded, apex rounded, truncate, or emarginate and mucronate. Racemes ca. 20 cm, laxly flowered; peduncle and rachis with sparse appressed medifixed trichomes; peduncle 1.5–2.5 cm; rachis angular; bracts linear, ca. 5 mm. Pedicel ca. 1.5 mm, deflexed in fruit. Calyx ca. 3 mm, with appressed minute trichomes; teeth triangular, apex acuminate. Corolla white or pink; standard broadly elliptic, 1.2–1.5(–1.8) cm, outside with sparse appressed minute soft trichomes, base shortly clawed, apex obtuse; wings 1.1–1.2 cm, base clawed and auriculate, margin ciliate; keel 1.3–1.4 cm, outside apically hairy, margin ciliate. Stamens 1.3–1.7 cm; anthers ellipsoid, ca. 1.5 mm, both ends hairy. Ovary glabrous, with 14 or 15 ovules; stigma with white trichomes. Legume linear, cylindric, 4–5(–6) cm, glabrous, curved upward at apex, sutures thickened. Fl. Jul–Sep, fr. Aug–Sep.

• Grasslands, scrub, forests, riverbanks; 1400–3400 m. SW Sichuan, N Yunnan.

61. *Indigofera pendula* Franchet, Pl. Delavay. 156. 1889.

垂序木藍 chui xu mu lan

Indigofera pendula var. *angustifolia* Y. Y. Fang & C. Z. Zheng; *I. pendula* var. *macrophylla* Y. Y. Fang & C. Z. Zheng; *I. pendula* var. *pubescens* Y. Y. Fang & C. Z. Zheng; *I. pendula* f. *umbrosa* Craib; *I. pendula* var. *umbrosa* (Craib) Y. Y. Fang & C. Z. Zheng.

Shrubs, 2–3(–4) m tall, often scandent. Stems dark brown, terete, with obvious lenticels; young branches light brown, angular, with appressed brown medifixed symmetrically 2-branched trichomes, glabrescent. Stipules lanceolate, 2–3 mm, caducous. Leaves 10–20 cm, (11 or)13–23(–27)-foliolate; petiole and rachis with appressed medifixed trichomes; petiole 1–5(–6) cm; rachis adaxially grooved; stipels subulate, 0.5–1 mm, persistent; petiolules 1.5–2 mm, hairy; leaflet blades opposite, elliptic to oblong but terminal one obovate, 1–2.5(–3.5) × 0.5–1.5 cm, papery, abaxially with sparse appressed white medifixed trichomes, adaxially glabrous, midvein adaxially impressed, secondary veins 6 on each side of midvein and obvious, base cuneate, broadly cuneate, or rounded, apex obtuse

to emarginate. Racemes 30–35 cm, drooping; peduncle 1–2 cm, with appressed medifixed trichomes; bracts lanceolate, ca. 3 mm. Pedicel 2–3 mm. Calyx cup-shaped, 2.5–3 mm, outside with appressed medifixed trichomes; tube ca. 1.5 mm; teeth ovate to lanceolate, mostly shorter than tube. Corolla pink; standard oblong, 9–11 × ca. 5 mm, bluish pink, outside densely white strigillose-puberulent, base shortly clawed; wings ca. 1 cm, base auriculate and shortly clawed, margin ciliate; keel as long as wings, outside apically hairy, margin ciliate, spurs ca. 1.5 mm. Stamens 8–9.5 mm; anthers broadly ovoid, base with a few trichomes. Ovary glabrous, with 9–12 ovules. Legume brown, cylindric, ca. 5 cm × 3–4 mm, with sparse appressed medifixed trichomes; endocarp blotched. Seeds 8–10 per legume, reddish brown, ellipsoid, ca. 3 × 2 mm. Fl. Jun–Aug, fr. Sep–Oct.

• Mountain slopes, valleys, riverbanks, scrub, forest margins; 1900–3300 m. SW Sichuan, NW and W Yunnan.

62. *Indigofera howellii* Craib & W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 207. 1920.

长序木藍 chang xu mu lan

Indigofera deginensis Sanjappa; *I. emarginata* Y. Y. Fang & C. Z. Zheng.

Shrubs, to 3 m tall. Stems brown, terete, with yellowish lenticels, with appressed medifixed symmetrically 2-branched trichomes. Stipules narrowly lanceolate, 2–3 mm, with appressed brown trichomes. Leaves 9–11 cm, (7 or)9–17(–23)-foliolate; petiole and rachis with sparse appressed white and some brown medifixed trichomes; petiole (0.5–)1–3(–4) cm; rachis terete, adaxially narrowly grooved; stipels minute; petiolules ca. 1 mm, with appressed medifixed trichomes; leaflet blades opposite, elliptic, 0.8–3(–3.5) × 0.3–1.5(–2) cm, thinly papery, both surfaces with appressed white medifixed trichomes, midvein abaxially prominent and adaxially impressed, secondary veins 4 or 5 on each side of midvein and adaxially obvious, base broadly cuneate, apex rounded to truncate and with a ca. 1 mm mucro. Racemes 10–20 cm, densely flowered; peduncle and rachis hairy; peduncle 1–2 cm; bracts ovate to ovate-lanceolate, 2–3 mm, caducous, abaxially with brown trichomes. Pedicel 2–3 mm. Calyx cup-shaped, (2–)3–4 mm, outside hairy; tube ca. 2 mm; teeth triangular to lanceolate, ca. 1–2 × as long as tube. Corolla purple; standard obovate to obovate-elliptic, 8–10.5 × 5–6 mm, outside with dense appressed white trichomes, base shortly clawed, apex obtuse; wings 8–10 × ca. 2.5 mm; keel 8–10.5 mm, outside apically hairy. Stamens (6.5–)7–8 mm; anthers ovoid, base with a few trichomes. Ovary glabrous. Fl. May–Sep, fr. unknown.

• Scrub, sparse forests on hill slopes; 800–3500 m. SW Sichuan, Xizang, W Yunnan.

Most material cultivated in England as *Indigofera potaninii* (here treated as a synonym of *I. szechuensis*) belongs instead to *I. howellii*.

63. *Indigofera sensitiva* Franchet, Pl. Delavay. 157. 1889.

敏感木藍 min gan mu lan

Shrubs, erect, 60–90 cm tall. Stems brown; young branches with sparse appressed medifixed symmetrically 2-branched

trichomes. Stipules lanceolate, ca. 5 mm, with appressed medifixed trichomes. Leaves ca. 15 cm, 21–31-foliolate; petiole and rachis adaxially grooved, with appressed medifixed trichomes; petiole 1–2 cm; stipels subulate, ca. 1 mm; petiolules ca. 1 mm; leaflet blades opposite, narrowly lanceolate, 1.2–2 × 0.2–0.7 cm, thickly papery, abaxially pale green and with sparse appressed medifixed trichomes or glabrescent, adaxially green and with sparse appressed medifixed trichomes or glabrescent with isolated hairs along midvein, midvein abaxially prominent and adaxially flat, secondary veins 4 or 5 on each side of midvein and abaxially obvious, base rounded, apex acute and mucronate. Racemes 3–4 cm, shorter than leaves, many flowered; peduncle shorter than petioles, hairy; bracts linear-lanceolate, 1.5–2 mm, caducous, abaxially with appressed medifixed trichomes. Pedicel ca. 1 mm, hairy, reflexed in fruit. Calyx ca. 2.5 mm, with appressed medifixed trichomes; teeth triangular, as long as tube. Corolla purplish blue; standard broadly elliptic, ca. 5 × 3.5 mm, outside with appressed trichomes; wings ca. 4.5 mm; keel ca. 4.5 mm, spurred at middle. Stamens 3–4 mm; anthers ovoid-globose, glabrous. Ovary glabrous, with 7 or 8 ovules. Legume linear, cylindrical, 2.5–3 cm, with sparse appressed medifixed trichomes; endocarp red blotched. Seeds 6 or 7 per legume, 2.5–3 × ca. 2 mm. Fl. Jun–Aug, fr. Sep–Nov.

- Grasslands, scrub, thickets; 1100–2400 m. NW Yunnan.

64. *Indigofera chaetodonta* Franchet, Pl. Delavay. 155. 1889.

刺齿木蓝 ci chi mu lan

Indigofera gracillima H. T. Tsai & T. T. Yu.

Subshrubs, 10–30 cm tall. Stems spreading, many branched, base woody. Young branches, yellowish brown, slender, with sparse appressed white medifixed symmetrically 2-branched trichomes, glabrescent. Stipules linear, 1.5–3 mm. Leaves 0.6–1.5(–2) cm, (5 or) 7- or 9-foliolate; petiole and rachis with sparse appressed medifixed trichomes; petiole 0.2–5(–6) mm; stipels ca. 0.5 mm; petiolules ca. 1 mm; leaflet blades opposite, oblong to oblanceolate, 3.5–6 × 1.5–2.5 mm, papery, abaxially pale green and with sparse appressed medifixed trichomes, adaxially green and glabrous, midvein adaxially impressed, secondary veins not visible, base rounded, cuneate, or broadly cuneate, apex obtuse-rounded and mucronate. Racemes 2–5 cm, many flowered; peduncle 0.9–1.5 cm, sparsely hairy; rachis scattered with reddish pearl bodies; bracts linear, 1–1.5 mm, caducous, abaxially with appressed medifixed trichomes. Pedicel 0.5–1 mm, hairy, deflexed in fruit. Calyx 2–3 mm, outside with sparse appressed medifixed trichomes; tube 0.5–1 mm; teeth linear-lanceolate, 1.5–2 mm. Corolla red; standard broadly elliptic, 5–7 × ca. 4 mm, outside hairy; wings 5–7 × ca. 2 mm; keel 5–6.5 mm, spur ca. 0.5 mm. Stamens 4–5 mm; anthers globose, base hairy. Ovary hairy, with 7 or 8 ovules. Legume linear, cylindrical, 1.5–2 cm, glabrous or with sparse appressed medifixed trichomes; endocarp purple blotched. Seeds 6 or 7 per legume. Fl. Jun–Aug, fr. Aug–Oct.

- Grassy slopes, *Pinus* forests; 2300–2600 m. Yunnan.

65. *Indigofera mengtzeana* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 57. 1913.

蒙自木蓝 meng zi mu lan

Indigofera mairei Pampanini var. *micrantha* Pampanini; *I. vaniotii* H. Lévillé.

Shrubs, 0.5–2 m tall. Stems purplish brown, terete; young branches grayish brown, angular, with dense appressed white and brown medifixed symmetrically 2-branched trichomes, glabrescent. Stipules linear, ca. 3 mm. Leaves 3–9 cm, 11–21-foliolate; petiole and rachis adaxially depressed, with appressed medifixed trichomes; petiole 1.5–2 cm; stipels ca. 0.5 mm; petiolules ca. 1 mm; leaflet blades opposite, narrowly oblong, oblong, or elliptic-oblong, 5–13 × 3–6 mm, papery, abaxially pale green and with sparse appressed medifixed trichomes, adaxially green and glabrous, midvein adaxially impressed, secondary veins not visible, base rounded, cuneate, or broadly cuneate, apex obtuse-rounded and mucronate. Racemes 3–4 cm, shorter than leaves, many flowered; peduncle 3–8 mm, sparsely hairy; rachis with reddish brown glands; bracts linear, 1–1.5 mm, caducous, abaxially with appressed medifixed trichomes. Pedicel ca. 1 mm, hairy, deflexed in fruit. Calyx outside with sparse appressed medifixed trichomes; tube 1–1.5 mm; teeth triangular, 1–2 mm. Corolla purplish blue; standard broadly elliptic, ca. 6.5 × 4 mm, outside hairy; wings ca. 6.5 × 2 mm; keel ca. 6.5 mm, spur ca. 0.5 mm. Stamens 5–5.5 mm; anthers globose, base hairy. Ovary glabrous, with 7 or 8 ovules. Legume linear, cylindrical, ca. 2.5 cm, glabrous or with sparse appressed medifixed trichomes; endocarp purple blotched. Seeds 6 or 7 per legume, 2.5–3 × ca. 2 mm. Fl. May–Jun, fr. Jul–Oct.

- Grassland slopes in dry sunny valleys, trailsides in scrub; 1400–2100 m. SW Sichuan, Yunnan.

66. *Indigofera calcicola* Craib, Notes Roy. Bot. Gard. Edinburgh 9: 108. 1916.

灰岩木蓝 hui yan mu lan

Shrubs, 30–120 cm tall, many branched, all parts except for old stems with very dense appressed silvery medifixed 2-branched trichomes. Old stems grayish brown; lateral branches short. Stipules ovate, ca. 0.5 mm. Leaves 1–2.5 cm, 5–9-foliolate; petiole and rachis adaxially slightly grooved; petiole 3–7 mm; stipels ca. 0.1 mm, covered with silvery trichomes, usually not visible; petiolules ca. 0.5 mm; leaflet blades opposite, obcordate to obovate, 4–5 × 2.5–3 mm, midvein adaxially impressed, secondary veins not visible, base broadly cuneate to rounded, apex rounded to emarginate. Racemes 1–5 cm; peduncle 4–10 mm; bracts ca. 0.8 mm, caducous. Pedicel ca. 1 mm. Calyx ca. 2 mm; teeth ovate-oblong, as long as tube, margin ciliate. Corolla red; standard elliptic-oblong to ovate-oblong, ca. 7 mm, outside densely hairy; wings ca. 7 mm, outside hairy; keel ca. 7 mm. Stamens 5–6.5 mm; anthers ovoid, apex mucronate. Ovary hairy; style glabrous. Legume cylindrical, 1.5–2.5 cm, with dense appressed grayish white medifixed trichomes, apex mucronate; endocarp purplish red blotched. Fl. Jul, fr. Aug.

- Dry stony situations; 1800–2500 m. Yunnan.

The syntypes of this species, *G. Forrest 10350* (K) and *10505* (E), were collected from the Jinsha Jiang dry valley; the type of *Indigofera lenticellata*, *E. H. Wilson 3386* (K), was collected from the Min Jiang dry valley. The two valleys have the same dry climate, but the Jinsha

Jiang is hotter than Min Jiang. The two species may prove to be just one species and need to be further researched.

67. *Indigofera lenticellata* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 56. 1913.

岷谷木藍 min gu mu lan

Shrubs, erect, to 1.2 m tall. Stems purplish brown; branches terete, with rufous lenticels, with appressed white medifixed symmetrically 2-branched trichomes. Stipules triangular, ca. 1.5 mm. Leaves 1–3 cm, 5–9-foliolate; petiole and rachis with dense appressed white mixed brown medifixed trichomes; petiole 2–7 mm; stipels minute; petiolules ca. 0.5 mm; leaflet blades opposite, elliptic to obovate, 3–7 × 2–5 mm, both surfaces with white and brown appressed medifixed trichomes, abaxially with denser trichomes, secondary veins not visible, base rounded to broadly cuneate, apex rounded to truncate and mucronate. Racemes 2.5–4 cm; peduncle 3–10 mm, longer than petioles; bracts ovate, ca. 1.5 mm, caducous. Pedicel ca. 1 mm, reflexed in fruit. Calyx hairy; tube ca. 1 mm; teeth as long as tube. Corolla red; standard broadly elliptic, ca. 7 × 4–4.5 mm, outside hairy; wings and keel ca. 7 mm. Stamens 5–6.5 mm. Legume dark purple, cylindric, 1.2–3 cm, with sparse appressed medifixed trichomes. Fl. May–Jul, fr. Sep–Oct.

• Sunny slopes, valleys, thickets; 1500–3900 m. Sichuan, E Xizang, NW Yunnan.

See the note under the preceding species, *Indigofera calcicola*.

68. *Indigofera hancockii* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 53. 1913.

苍山木藍 cang shan mu lan

Indigofera forrestii Craib.

Shrubs, 0.5–1.8 m tall. Stems light brown, with sparse scattered lenticels; young branches with appressed white and brown medifixed symmetrically 2-branched trichomes, glabrescent. Stipules lanceolate, 1.5–2 mm. Leaves 6–9 cm, (5–)9–19-foliolate; petiole and rachis adaxially grooved, with appressed medifixed trichomes; petiole 0.8–2 cm; stipels minute; petiolules ca. 1 mm; leaflet blades opposite, narrowly elliptic, 6–12(–18) × 4–6(–10) mm, both surfaces with sparse white and brown appressed medifixed trichomes, abaxially green, adaxially brown or black when dry, midvein abaxially prominent and adaxially impressed, secondary veins not visible, base broadly cuneate to rounded, apex rounded to truncate and mucronate. Racemes 6–12 cm, densely flowered; peduncle 4–15 mm; bracts ovate, ca. 1.5 mm, abaxially with appressed brown medifixed trichomes. Pedicel ca. 1.5 mm. Calyx 2–2.5 mm, with appressed brown medifixed trichomes; teeth triangular-lanceolate, as long as tube. Corolla red, 6–9 mm; standard elliptic, ca. 6.5 mm, outside with appressed medifixed trichomes; wings ca. 6.5 mm; keel ca. 4.5 mm, outside apically hairy. Stamens 6–7 mm; anthers broadly ovoid, glabrous, apex mucronate. Ovary hairy, with 9 ovules; style glabrous. Legume linear, cylindric, 3–4 cm, with sparse appressed medifixed trichomes; endocarp blotched. Fl. May–Aug, fr. Oct–Nov.

• Sunny slopes, near streams; 2400–2900 m. S Sichuan, Yunnan.

Indigofera hancockii is very closely related to *I. franchetii* and might be better treated as a variety of that species.

69. *Indigofera franchetii* X. F. Gao & Schrire, **nom. nov.**

灰色木藍 hui se mu lan

Replaced synonym: *Indigofera cinerascens* Franchet, Pl. Delavay. 153. 1889, not *Indigofera cinerascens* Candolle, Prodr. 2: 226. 1825, nor *Indigofera cinerascens* Ecklon & Zeyher, Enum. Pl. Afric. Austral. 2: 241. 1836.

Shrubs, to 1 m tall. Stems with dense appressed white medifixed symmetrically 2-branched trichomes. Stipules ca. 1 mm. Leaves ca. 9 cm, (11–)17–27-foliolate; petiole and rachis adaxially grooved, with appressed medifixed trichomes; petiole 0.8–1.5 cm; stipels ca. 0.5 mm; petiolules ca. 1 mm; leaflet blades opposite, closely spaced, narrowly elliptic, elliptic, or obovate-elliptic, 5–9(–14) × 3–6 mm, both surfaces with appressed white medifixed trichomes, adaxially green, abaxially paler, midvein abaxially prominent and adaxially impressed, base broadly cuneate to rounded, apex rounded to acute and mucronate. Racemes 5.5–11 cm; peduncle 0.7–3 cm, with appressed white mixed brown medifixed trichomes; bracts ovate, minute. Pedicel 0.5–1 mm. Calyx cup-shaped, ca. 3 mm, with appressed grayish trichomes; teeth ca. 1–2 × as long as tube. Corolla purplish red; standard oblong-elliptic, 7–8 mm, outside with appressed medifixed trichomes; wing margin ciliate; keel margin ciliate, apex mucronate. Stamens 6–6.5 mm; anthers ovoid, glabrous. Ovary hairy; style glabrous. Legume linear, cylindric, 3–4 cm, with appressed white trichomes. Fl. Jun–Sep, fr. Oct.

• Scrub on sunny slopes, grasslands, trailsides; 600–1800 m. SW Sichuan, Yunnan.

70. *Indigofera heterantha* Wallich ex Brandis in Brandis & Stewart, Forest Fl. N.W. India, 135. 1874.

异花木藍 yi hua mu lan

Indigofera gerardiana Wallich ex Baker; *I. gerardiana* var. *heterantha* (Wallich ex Brandis) Baker; *I. heterantha* var. *gerardiana* (Wallich ex Baker) Ali.

Shrubs, 1–2(–3) m tall. Stems grayish brown, terete, with rounded lenticels, covered with appressed medifixed trichomes; young branches angular, with slightly spreading white medifixed symmetrically 2-branched trichomes. Stipules linear, ca. 3 mm, caducous, with appressed brown trichomes. Leaves 6–7 cm, (9–)13–25-foliolate; petiole and rachis adaxially grooved, with appressed medifixed trichomes; petiole 1–9 mm; stipels subulate, ca. 1 mm; petiolules ca. 1 mm; leaflet blades opposite, elliptic, obovate, or oblanceolate, 5–15(–25) × 2–10(–15) mm, papery, both surfaces with appressed white medifixed trichomes, midvein abaxially prominent and adaxially flat, secondary veins not visible, base broadly cuneate to rounded, apex obtuse to truncate and mucronate. Racemes 3–8 cm; peduncle (0.5–)1.4–2(–3) cm; young inflorescences in bud grayish green with few brownish hairs, rachis with dense appressed medifixed trichomes; bracts minute, caducous. Pedicel 1.5–3 mm, hairy, deflexed in fruit. Calyx 2.5–3.5(–4) mm, with appressed medifixed trichomes; tube ca. 1.5 mm; teeth triangular-lanceolate,

1.5–2.5 mm. Corolla purple to light purple; standard elliptic, 7.5–9(–13) × 4–5 mm, outside hairy; wings 7.5–10 mm, margin ciliate; keel 0.7–1.3 cm, outside apically hairy, margin ciliate, spur ca. 1 mm. Stamens (6–)7–11.5 mm; anthers ovoid-globose, base hairy. Ovary hairy, with 10 ovules. Legume brown, linear, cylindrical, 1–1.5(–2) cm, glabrescent; endocarp purple blotched. Seeds 6–10 per legume, oblong, ca. 2.5 mm. Fl. May–Jun, fr. Jul–Oct. $2n = 16, 32, 48$.

Forested slopes; ca. 2300 m. S Xizang [Afghanistan, Bhutan, India, Nepal, Pakistan, Sri Lanka; Africa].

71. *Indigofera chenii* S. S. Chien, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 9: 150. 1934.

南京木藍 nan jing mu lan

Shrubs, erect, to 1 m tall. Stems brown, terete; branches with appressed white medifixed symmetrically 2-branched trichomes. Stipules bristlelike, ca. 2 mm. Leaves 5–7 cm, 11–19-foliolate; petiole and rachis adaxially grooved, with appressed white medifixed trichomes; petiole 4–6 mm; stipels bristlelike, ca. 0.5 mm; petiolules ca. 1 mm; leaflet blades opposite, oblong, 8–12 × 4–5 mm, rigidly papery, both surfaces with appressed medifixed trichomes, midvein abaxially prominent and adaxially impressed, secondary veins not visible, base rounded to cuneate, apex obtuse to truncate and mucronate. Racemes ca. 8.5 cm; peduncle 1.4–2 cm; bracts bristlelike, ca. 1 mm, caducous. Pedicel 1–2 mm, with spreading white trichomes. Calyx 2–3 mm; teeth shorter than or as long as tube. Corolla red; standard oblong, 10–11 × 6–7 mm, outside hairy, base cuneate, apex truncate; wings oblong-spatulate, margin ciliate; keel cuneate, apex ciliate. Stamens 8–9 mm; anthers ovoid, glabrous, apex mucronate. Ovary sparsely hairy, with 5–7 ovules. Fl. Sep, fr. unknown.

• Foothills, Jiangsu (Nanjing).

On the basis of available material, no characters or character combinations appear to distinguish *Indigofera chenii* from *I. heterantha*. The widely separate distributions of Xizang and Yunnan provinces for *I. heterantha* and near Nanjing in Jiangsu province for *I. chenii*, however, indicate that more research is needed to establish the status of this species.

72. *Indigofera mairei* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 16. 1910.

西南木藍 xi nan mu lan

Indigofera mairei var. *intermedia* Pampanini; *I. monbeigii* Craib.

Shrubs, 1–2(–3) m tall. Stems chestnut-brown, terete or angular, with yellowish round lenticels; young branches with appressed white or brown medifixed symmetrically 2-branched trichomes, glabrescent. Stipules subulate, 3–5(–6) mm. Leaves 2.5–10 cm, 5–13(–17)-foliolate; petiole and rachis with appressed brown mixed white medifixed trichomes; petiole 0.7–1.5(–2) cm; rachis adaxially grooved; stipels subulate, 0.5–1 mm; petiolules 1–2 mm; leaflet blades opposite, elliptic to elliptic-oblong, (0.5–)1–3(–3.5) × (0.3–)0.6–1.8(–2) cm, papery, both surfaces with lightly appressed white medifixed trichomes, midvein adaxially obviously depressed, secondary veins not

visible, base cuneate to broadly cuneate, apex obtuse to emarginate and mucronate. Racemes 2–6(–8) cm; peduncle and rachis with appressed white and brown medifixed trichomes; peduncle 1–10 mm; bracts narrowly lanceolate, 2–3 mm, persistent or caducous, hairy. Pedicel 1–2 mm, hairy, deflexed in fruit. Calyx 2.5–3 mm; teeth shorter than to as long as tube. Corolla pinkish purple; standard elliptic, 7–9(–10) × 5–6 mm, sessile, outside with appressed white medifixed trichomes; wings 7–9(–10) mm, margin ciliate; keel 7–9(–10) mm, outside hairy, spur minute. Stamens 6–8 mm; anthers ovoid, base with a few trichomes. Ovary hairy on sutures and at apex, with 6–8 ovules. Legume brown, cylindrical, 2–3.5 cm, glabrescent; endocarp blotched. Seeds 6 or 7 per legume, cubic. Fl. May–Jun, fr. Jul–Aug.

• Slopes in scrub or thickets; 2100–2700 m. S Gansu, Guizhou, N and W Sichuan, SE Xizang, N Yunnan.

73. *Indigofera rigioclada* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 60. 1913.

硬叶木藍 ying ye mu lan

Shrubs, to 1 m tall. Stems dark brown when dry, terete; young branches with appressed medifixed symmetrically 2-branched trichomes, glabrescent. Stipules rigid, ca. 1 mm. Leaves 1.5–2.5 cm, 5–13-foliolate; petiole and rachis adaxially grooved, with appressed white and brown medifixed trichomes; petiole 4–10 mm; stipels minute, hairy; petiolules ca. 1 mm; leaflet blades opposite, oblong to obovate-oblong, 3–10(–15) × 2–5 mm, both surfaces with appressed medifixed trichomes, midvein adaxially impressed, secondary veins not visible, base broadly cuneate, apex rounded and mucronate. Racemes 3–6(–8) cm, densely flowered; peduncle 1–5(–10) mm or nearly absent, hairy, reflexed in fruit; bracts ovate, ca. 2 mm, caducous. Pedicel 1–2 mm, with appressed medifixed trichomes. Calyx with appressed medifixed trichomes; tube ca. 1.5 mm; teeth triangular, ca. 1.5 mm. Corolla pink to rose; standard elliptic, 8–10 × 4.5–7.5 mm, outside hairy; wings 8–10 × ca. 2 mm; keel 7.5–10 × 2.5–3 mm. Stamens 7–9 mm; anthers ovoid, glabrous. Ovary hairy, with 8–10 ovules. Legume cylindrical, ca. 2 cm, hairy. Fl. Apr–Jul, fr. Jul–Sep.

• Trailsides, *Pinus* forests, slopes; 2400–3300 m. W Sichuan, SE Xizang, NW Yunnan.

74. *Indigofera wilsonii* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 63. 1913.

大花木藍 da hua mu lan

Shrubs, 30–80 cm tall, with ascending branches. Stems terete, with brown lenticels; young branches with sparse appressed medifixed 2-branched trichomes, glabrescent. Stipules linear-subulate, 5–6(–7) mm. Leaves 2.5–5 cm, 9–13-foliolate; petiole and rachis hairy; petiole 5–11(–13) mm; rachis adaxially grooved; stipels subulate, ca. 0.5 mm; petiolules ca. 1 mm, hairy; leaflet blades opposite, elliptic to obovate, 6–16 × 4–10 mm, papery, both surfaces with appressed white medifixed trichomes, midvein adaxially impressed, base rounded, apex obtuse. Racemes 5–10(–15) cm, laxly flowered; peduncle 1.5–4 cm, hairy; bracts linear, ca. 3 mm. Pedicel 2.5–4 mm. Calyx outside hairy; tube 2–2.5 mm; teeth lanceolate, ca. 3 mm. Co-

rolla standard obovate, 11–14 × 6–8 mm, outside white hairy; wings 11–14.5 × 3–3.5 mm, margin ciliate; keel 11–15 × 4.5–6 mm. Stamens 1–1.3 cm; anthers ovoid, glabrous. Ovary hairy. Fl. May–Jun, fr. unknown.

• Mountain forests; 1300–2000 m. W Sichuan (Pingwu, Wenchuan).

75. *Indigofera szechuensis* Craib, Notes Roy. Bot. Gard. Edinburgh 8: 62. 1913.

四川木藍 si chuan mu lan

Indigofera potaninii Craib.

Shrubs, 0.8–2.5 m tall. Stems rufous to blackish brown, terete, with sparse scattered yellow lenticels; young branches angular, with dense appressed mixed white and brown medifixed symmetrically 2-branched trichomes, glabrescent. Stipules lanceolate, 2.5–4 mm, stiff. Leaves 4–10 cm, (5 or)7–13-foliolate; petiole and rachis adaxially flat, with appressed white medifixed trichomes; petiole 0.5–1.5(–2.5) cm; stipels ca. 0.5 mm; petiolules ca. 1 mm; leaflet blades opposite, elliptic, obovate, oblong, or obovate-oblong, 5–20(–30) × 4–9(–10) mm, papery, both surfaces with dense appressed white medifixed trichomes, abaxially pale green, adaxially green, midvein adaxially flat or slightly depressed, secondary veins not visible on both surfaces, base rounded to cuneate, apex rounded, truncate, or acute and mucronate. Racemes 10–19 cm; peduncle 0.8–5 cm, hairy; bracts ovate to linear-lanceolate, 1.5–3 mm, caducous, with appressed medifixed trichomes. Pedicel 1.5–2 mm, hairy. Calyx 2–3.5 mm, with appressed brown medifixed trichomes; tube 1–1.5 mm; teeth triangular, 1–2 mm. Corolla crimson-red; standard broadly ovate-elliptic to obovate-elliptic, 7.5–9.5 × 5–6.5 mm, outside with appressed medifixed trichomes; wings 7.5–9.5 × ca. 2.5 mm, base clawed, margin ciliate; keel 7.5–9.5 mm, outside apically hairy, margin ciliate. Stamens 7.5–8.5 mm; anthers ovoid-globose, glabrous. Ovary hairy, with 8–10 ovules. Legume linear, cylindric, spreading or drooping, 3.5–4 cm, with sparse appressed medifixed trichomes when young, glabrescent. Seeds 8 or 9 per legume, 2.5–3 × ca. 2 mm. Fl. May–Jun, fr. Jul–Oct.

• Slopes, trailsides, riverbanks; 2500–3800 m. W Gansu, Sichuan, E Xizang, NW Yunnan.

Indigofera potaninii differs from *I. szechuensis* only by the size of the leaves and inflorescences, which change very substantially as the plant grows from early spring through late summer. Most material cultivated in England as *I. potaninii* is not this species but *I. howellii* (see comment under that species, p. 159). The epithet is sometimes given as "*szechuanensis*," but this is not correct.

76. *Indigofera pseudoheterantha* X. F. Gao & Schrire, Novon 19: 163. 2009.

拟多花木藍 ni duo hua mu lan

Shrubs, 0.2–3 m tall. Stems ribbed, strigose with equally 2-branched appressed minute white and scattered brown trichomes. Stipules triangular, ca. 1 mm. Leaves 1.5–3 cm, (5 or)7–11(or 13)-foliolate; petiole and rachis with appressed white trichomes; petiole 4–7 mm; stipels absent; leaflet blades elliptic to oblong, 4–9 × 2–4 mm, both surfaces with appressed equally 2-branched white trichomes but these adaxially sparser,

secondary veins not visible, base cuneate to rounded, apex rounded to obtuse. Racemes 1–4 cm, laxly 1–25-flowered; peduncle ca. 1 cm; bracts 1–1.5 mm, subulate. Flowers 1.2–1.3 cm. Pedicel 2–4 mm. Calyx ca. 2 mm; teeth lanceolate to triangular, ± to 2 × as long as tube. Corolla greenish yellow and rose to purple; standard outside strigose with appressed white trichomes; wings ciliate at margin; keel with appressed trichomes at apex. Stamens 1.1–1.2 cm; anthers ovoid, glabrous, apex mucronate. Style 4–5 mm. Legume 2.5–3 cm when young, with minute appressed trichomes. Fl. Jul–Aug, fr. Aug–Sep.

• Sunny and dry scrub, grasslands; 2700–2900 m. SW Sichuan, NW Yunnan.

77. *Indigofera acutipetala* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 325. 1983.

尖瓣木藍 jian ban mu lan

Shrubs, to 1.3 m tall. Stems dark brown when dry, terete, 4-ribbed, with small white lenticels, with appressed sparse white medifixed symmetrically 2-branched trichomes. Stipules linear, ca. 2 mm. Leaves ca. 3 cm, 5–11-foliolate; petiole 2–6 mm; stipels not visible; petiolules short; leaflet blades opposite, obovate to obovate-oblong, 3–7 × 2–4 mm, both surfaces with dense appressed white and brown medifixed trichomes but abaxially denser, secondary veins not visible, base cuneate to broadly cuneate, apex rounded and mucronate. Racemes 5–9 cm, densely flowered; peduncle 2–3 cm, longer than petioles, with some glands. Pedicel ca. 1 mm. Calyx with appressed white medifixed trichomes; tube ca. 1 mm; teeth lanceolate, ca. 1.5 mm. Corolla dark purple; standard 7–7.5 × ca. 4 mm, outside hairy, apical mucro ca. 1 mm; wings ca. 6 × 2 mm; keel ca. 6.5 mm. Stamens 5–6.5 mm; anthers ovoid, apex with a ca. 0.3 mm mucro. Ovary glabrous. Fl. Jul, fr. unknown.

• Moist slopes; ca. 2400 m. Sichuan (Jiulong).

This is a doubtful species.

78. *Indigofera jindongensis* Y. Y. Fang & C. Z. Zheng, Acta Phytotax. Sin. 21: 331. 1983.

景东木藍 jing dong mu lan

Shrubs, 60–100 cm tall. Stems 4-ribbed, with sparse scattered white lenticels, with appressed medifixed symmetrically 2-branched trichomes. Stipules lanceolate, ca. 3 mm, with appressed trichomes. Leaves 8.5–10.5 cm, 9–13-foliolate; petiole 1.2–1.7 cm, adaxially flattened; stipels minute; petiolules 1–1.5 mm; leaflet blades opposite, oblong to ovate-oblong, 1.5–3.2 × 0.9–1.4 cm, papery, both surfaces with appressed white medifixed trichomes, secondary veins 6–8 on each side of midvein, base ± rounded, apex obtuse and mucronate. Racemes 4–7 cm in fruit; peduncle 6–12 mm. Flowers not seen. Fruiting pedicel 2–4 mm. Legume cylindric, 3.5–4.5 cm, with sparse appressed trichomes. Seeds ca. 8 per legume, oblong, ca. 3 mm. Fl. unknown, fr. Dec.

• Mixed forests; ca. 1300 m. Yunnan (Jingdong).

79. *Indigofera neosericeopetala* P. C. Li, Acta Bot. Yunnan. 11: 285. 1989.

绢毛木藍 juan mao mu lan

Shrubs. Stems angular; young branches with appressed white medifixed trichomes, glabrescent. Stipules brown, lanceolate, ca. 2 mm, sparsely pubescent. Leaves ca. 2 cm, 3-foliolate; petiole 1–1.2 cm, sparsely pubescent; leaflet blades oblong, ca. 11 × 6 mm, both surfaces with dense appressed white medifixed trichomes, base cuneate, apex rounded and prominently mucronate. Racemes 5–6 cm; peduncle 4–5 mm, sparsely pubescent; bracts to 1 mm, deciduous. Pedicel ca. 0.8 mm. Calyx ca. 2 mm, pubescent; tube ca. 1 mm; teeth triangular, ca.

1 mm. Corolla purple; standard broadly oblong, ca. 7.5 × 5 mm, base broadly cuneate, apex slightly emarginate; wings 7–7.5 × ca. 2 mm; keel 7.5–8 × ca. 2 mm. Stamens 6.5–7.5 mm. Ovary densely pubescent. Fl. Jun, fr. unknown.

- *Quercus* forests; ca. 2000 m. Yunnan (Yongsheng).

No material of *Indigofera neosericipetala* has been seen. The description is taken from the protologue. We could not locate the type, *Exped. Qinghai-Xizang 655* (PE). This species needs further research.

64. CYAMOPSIS Candolle, Prodr. 2: 215. 1825.

瓜儿豆属 *gua er dou shu*

Sun Hang (孙航); Brian D. Schrire

Cordaea Sprengel.

Herbs, annual, with appressed medifixed (T-shaped) trichomes. Stipules subulate or linear. Leaves 3-foliolate [or simple or imparipinnate]; leaflet blades on both surfaces or only abaxially with appressed white medifixed trichomes, margin serrate [or entire or parted]. Inflorescence axillary, racemose; peduncle present or absent. Calyx 5-toothed, most abaxial one longest. Corolla yellowish, yellow, or pink; keel not curled, ± bursiform, spur short or absent. Stamens 10, monadelphous; filaments connate into a tube, base not squamate; anthers with rigid point at apex. Ovary sessile. Legume nearly 4-angled, flattened, apex tapered to a beak. Seeds cubic or nearly so, surface slightly tubercular bulged.

Four species: tropical Africa and S Asia; one species (introduced) in China.

1. *Cyamopsis tetragonoloba* (Linnaeus) Taubert in Engler & Prantl, Nat. Pflanzenfam. 3(3): 259. 1894 [*“tetragonolobus”*].

瓜儿豆 *gua er dou*

Psoralea tetragonoloba Linnaeus, Mant. Pl. 1: 104. 1767; *Cyamopsis psoraloides* Candolle, nom. illeg. superfl.

Herbs, 0.6–1.3 m tall. Stems erect, branched, almost glabrous, base woody; branches conspicuously 4-angled. Stipules linear, 5–8(–10) mm. Leaves 3-foliolate; petiole 0.8–4 cm; leaflet blades ovate to subrhombic, 3–7 × 1.5–4 cm, abaxially with appressed grayish medifixed trichomes, adaxially sparsely appressed hairy or almost glabrous, base cuneate to broadly

cuneate, margin dentate to crenate, apex obtuse to acute. Racemes 4–10 cm, 6–30-flowered; peduncle 3–5 mm. Calyx 3–4.5 mm, outside hairy; teeth triangular, 2–2.5 mm, but most abaxial one longer than calyx tube. Corolla pink, 4–5.5 mm; standard broadly ovate, claw short, apex obtuse; keel pocketed at side, spur absent. Stamens 2.5–4.5 mm. Ovary glabrous. Legume nearly linear, 4–7 cm × 3–8 mm, erect, longitudinally ridged, with septa between seeds. Seeds 6–12 per legume, black to grayish, surface tuberculate. $2n = 14, 16$.

Cultivated in W Yunnan [probably native to NW India].

This species is cultivated for the gum from its seeds (guar gum), which is used as a stabilizer in processed food.

17. Tribe MILLETTIEAE

崖豆藤族 ya dou teng zu

Wei Zhi (韦直), Chen Dezhaoy (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘), Sun Hang (孙航); Les Pedley

Trees, lianas, or shrubs. Stipules often caducous. Leaves pulvinate, usually imparipinnate; leaflets (1–)5–15 (to over 40), usually opposite, rarely alternate; stipels present or absent. Inflorescences various, but not in elongated racemes. Flowers often in fascicles and these arranged in pseudoracemes or pseudopanicles, sometimes on leafless branches or on main trunk. Bracteoles usually present. Calyx various, truncate or with 4 or 5 short lobes. Corolla papilionaceous; standard with or without basal calluses; wings free or \pm adherent to keel. Stamens 10, monadelphous or diadelphous; vexillary filament free or connate to others; anthers versatile, sometimes with trichomes. Disk generally present, tubular, surrounding stipe of ovary; ovary with 1–12 or more ovules. Legumes dehiscent or indehiscent, winged or not; valves woody or papery. Seeds variously shaped, flat or round in cross section; testa hard or woody.

About 45 genera and 900–920 species: widespread in tropical and subtropical regions of the world, poorly represented in Australia, *Callerya* extending into temperate parts of China, and *Wisteria* extending into temperate parts of E Asia and North America; 13 genera and 84 species (35 endemic, five introduced) in China.

This tribe was incorrectly named Tephrosieae in FRPS. The name Millettieae has priority.

- 1a. Inflorescences racemes or panicles; flowers solitary in axil of a bract.
 - 2a. Inflorescences racemes (or sometimes panicles in *Afgekia*); bracts longer than corresponding flower buds, persistent and covering them completely until anthesis.
 - 3a. Corolla standard with 2 basal curved laminar calluses; ovary with trichomes, with 2 ovules; legume inflated, tardily dehiscent with 1 or 2 seeds; valves thickly woody 69. *Afgekia*
 - 3b. Corolla standard without basal calluses; ovary glabrous, with 9–12 ovules; legume linear, raised over seeds, dehiscent along adaxial suture, with 4–10 seeds; exocarp fleshy (papery when dry) and endocarp thin, leathery, lining seed cavity 70. *Sarcodum*
 - 2b. Inflorescences racemes or panicles; bracts occasionally as long as flower buds, not persistent or not covering them completely.
 - 4a. Trees; stipels absent; flowers 0.8–1 cm; corolla standard long ovate, length:width ratio 2–2.5; anthers dehiscing by short terminal slits; legumes dehiscent, thickly woody, not winged, with 1 (or 2) seeds 68. *Antheroporum*
 - 4b. Lianas or sprawling trees or shrubs; stipels present, caducous, or absent; flowers 0.8–3 cm or more; corolla standard ovate to orbicular, length:width ratio less than 2; legume tardily or not dehiscent, leathery or woody, winged or not, with 1–10 seeds.
 - 5a. Flowers in pendent racemes; corolla standard with 2 distinct basal calluses forming a ridge on distal part of claw; legume leathery, compartmented, not winged 75. *Wisteria*
 - 5b. Flowers in terminal or axillary panicles, not pendent; corolla standard either without calluses or calluses not forming a ridge on distal part of claw; legume not compartmented, winged or not.
 - 6a. Corolla wings free from keel at least proximally; ovary sessile or stipitate; legume with 1 or 2 wings; seed hilum eccentric 67. *Aganope*
 - 6b. Corolla wings often partially adnate to keel; ovary stipitate; legume not winged; seed hilum not markedly eccentric 73. *Callerya*
 - 1b. Inflorescences pseudoracemes or pseudopanicles; flowers inserted on short lateral branches of floral axis (brachyblasts), these occasionally reduced to a bract subtending 2 or 3 bracteate flowers.
 - 7a. Leaflet secondary veins numerous, straight, closely parallel, few or not anastomosing, extending to margins; legumes not woody; shrubs or herbs with woody bases 77. *Tephrosia*
 - 7b. Leaflet secondary veins relatively few, curved, usually anastomosing, not extending to margins; shrubs, trees, or lianas.
 - 8a. Inflorescences cauliflorous on trunk or older branches or axillary on branchlets of previous year; supra-axillary buds covered by many subulate cataphylls 71. *Fordia*
 - 8b. Inflorescences not on older branches, trunks, or branchlets of previous year; buds not covered by cataphylls.
 - 9a. Flowers borne on slight protuberances of floral axis, mixed occasionally with solitary flowers.
 - 10a. Ovary with (1 or) 2–10 ovules; legume dehiscent, flat, sometimes inflated but then secondary veins reaching margins, or legume velutinous 72. *Millettia*
 - 10b. Ovary with 2 ovules; legume indehiscent, thick with secondary veins not reaching margins, glabrous 74. *Pongamia*
 - 9b. Flowers borne on distinct projections of floral axis (brachyblasts).

- 11a. Leaves 3-foliolate, lateral leaflets markedly asymmetric; stamens diadelphous 76. *Craspedolobium*
 11b. Leaves 7–21-foliolate, or if fewer leaflets (1–5) then lateral ones symmetric; stamens monadelphous or rarely vexillary stamen free in bud and adherent to others in mature flowers.
 12a. Legume dehiscent, not winged on sutures or with 2 wings perpendicular to adaxial or both adaxial and abaxial sutures; flowers 2–5 in clusters or fascicles on knoblike brachyblasts 72. *Millettia*
 12b. Legume indehiscent, winged on both abaxial and adaxial sutures; flowers 3–15 or more at tip of brachyblasts or scattered along them.
 13a. Flowers 3–15 or more usually scattered along knoblike or slender brachyblasts; corolla standard without calluses; anthers without indumentum 65. *Derris*
 13b. Flowers 2 or 3(–5) at tip of slender brachyblasts; corolla standard with prominent basal calluses; anthers usually with some indumentum 66. *Paraderris*

65. DERRIS Loureiro, Fl. Cochinch. 2: 423, 432. 1790, nom. cons.

鱼藤属 *yu teng shu*

Chen Dezha (陈德昭 Chen Te-chao); Les Pedley

Brachypterum (Wight & Arnott) Bentham; *Dalbergia* subg. *Brachypterum* Wight & Arnott.

Lianas, rarely erect shrubs or trees. Stipules small. Leaves imparipinnate; stipels absent; leaflets opposite, margins entire. Inflorescences axillary pseudoracemes, these often combined with terminal or axillary pseudopanicles; rachis nodes with 1 to many flowers, fascicled or on a short spur or branchlet; bracts and bracteoles small, deciduous. Calyx campanulate or cup-shaped, apex subtruncate or with 4 or 5 short and broad teeth. Corolla white, purplish red, or pink, longer than calyx; standard broad, usually glabrous but outside sometimes subglabrous or pubescent, without basal calluses; wings long clawed, often auriculate, adhering to keel; keels incurved, base often auriculate, apex blunt. Stamens monadelphous. Ovary sessile or with a short stipe, with 1–11 ovules; style incurved; stigma capitate. Legume globose, oblong, or ligulate-oblong, indehiscent; adaxial suture or both adaxial and abaxial sutures with a narrow wing. Seeds 1 to several per legume, reniform, compressed.

About 50 species: tropical and subtropical Africa, Asia, Australia, and Pacific islands; 16 species (nine endemic) in China.

- 1a. Legume winged only on adaxial suture.
 2a. Leaves more than 13-foliolate.
 3a. Leaflet blades 1.5–4 cm; trees 1. *D. robusta*
 3b. Leaflet blades 5–7.5 cm, lianas 2. *D. eriocarpa*
 2b. Leaves 11-foliolate or less.
 4a. Leaves (3 or)5(or 7)-foliolate 5. *D. trifoliata*
 4b. Leaves 7–11-foliolate.
 5a. Leaflet blades abaxially densely puberulent 3. *D. yunnanensis*
 5b. Leaflet blades abaxially glabrous 4. *D. harrowiana*
 1b. Legume winged on both sutures.
 6a. Leaflet blades abaxially pubescent or puberulent.
 7a. Branchlets robust, densely rust-colored pubescent; leaves 5–9-foliolate, leaflet blades adaxially shiny; legume with wing of abaxial suture only slightly narrower than wing of adaxial suture 6. *D. ferruginea*
 7b. Branchlets slender, glabrescent; leaves 5-foliolate, leaflet blades adaxially not shiny; legume with wing of abaxial suture almost 1/2 width of adaxial suture wing 7. *D. cavaleriei*
 6b. Leaflet blades abaxially glabrous.
 8a. Flowers in pseudoracemes.
 9a. Leaflet blade apices caudate-acuminate; calyx glabrous 8. *D. caudatilimba*
 9b. Leaflet blade apices obtusely acuminate to shortly acuminate; calyx puberulent or pilose.
 10a. Legume adaxial wing ca. 5 mm wide, abaxial wing 1–2 mm wide 11. *D. tonkinensis*
 10b. Legume adaxial wing 3–5 mm wide, abaxial wing 0.5–1 or 2–3 mm wide.
 11a. Leaves 5- or 7-foliolate; legume abaxial wing 2–3 mm wide 9. *D. breviramosa*
 11b. Leaves 7–13-foliolate; legume abaxial wing 0.5–1 mm wide 10. *D. scabricaulis*
 8b. Flowers in pseudopanicles.
 12a. Rachis of inflorescences pilose, hispidulous, or pubescent.
 13a. Trees or climbing shrubs 11. *D. tonkinensis*
 13b. Lianas.
 14a. Leaves 5- or 7-foliolate, leaflet blades thickly papery to thinly leathery; legume 4–10 cm, thinly leathery 12. *D. fordii*

- 14b. Leaves (3 or)5-foliolate, leaflet blades leathery; legume 2–5 cm, leathery 13. *D. alborubra*
 12b. Rachis of inflorescences glabrous.
 15a. Leaflet blades 5, closely inserted on a very short rachis, forming subpalmate leaves 16. *D. palmifolia*
 15b. Leaflet blades 5 or 7, forming distant pinnate leaves.
 16a. Leaflet blades obovate-elliptic to obovate; flowers fascicled on branches of
 inflorescences 14. *D. marginata*
 16b. Leaflet blades elliptic; flowers scattered on branches of inflorescences 15. *D. laxiflora*

1. *Derris robusta* (Roxburgh ex Candolle) Bentham, J. Proc. Linn. Soc., Bot. 4(Suppl.): 104. 1860.

大鱼藤树 da yu teng shu

Dalbergia robusta Roxburgh ex Candolle, Prodr. 2: 417. 1825; *Brachypterum robustum* (Roxburgh ex Candolle) Dalzell & Gibson.

Trees, 10–15 m tall, deciduous. Branches slightly sparsely pubescent, glabrescent. Leaves 13–21-foliolate; rachis 10–15 cm, including petiole 1.5–4 cm; leaflet blades oblong to obovate, 1.5–4 × 0.9–1.5 cm, membranous, both surfaces puberulent or adaxially glabrous, base obliquely cuneate, apex obtuse and shortly cuspidate. Pseudoracemes axillary, elongated, 5–15 cm; rachis nodes with 2 or 3 fascicled flowers. Pedicel 4–5 mm, slender. Flowers ca. 8 mm. Calyx campanulate, 2–5 mm, outside sericeous; teeth minute, deltoid. Corolla white; petals clawed; standard orbicular-subcordate. Ovary puberulent. Legume linear-oblong, flat, 3.5–5 × 0.9–1 cm, glabrous or puberulent, both ends narrowed; adaxial suture with a 2–3 mm wide wing. Seeds 1–5(–10) per legume. Fl. Feb–Apr, fr. May–Jan. *2n* = 22.

Mountain slopes; 300–1600 m. Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

2. *Derris eriocarpa* F. C. How, Acta Phytotax. Sin. 3: 223. 1954.

毛果鱼藤 mao guo yu teng

Lianas. Young shoots rust-colored puberulent. Leaves 13- or 15-foliolate; rachis 20–30 cm, including petiole 5–6 cm; rachis and petiole canaliculate, sparsely puberulent; leaflet blades oblong to ovate-oblong but apical one obovate-elliptic, 5–7.5 × 2–2.5 cm, stiffly papery, both surfaces appressed scattered yellowish puberulent, base obliquely rounded to obtuse, apex shortly acuminate to slightly obtuse. Pseudoracemes axillary, solitary, longer than leaves; rachis yellowish puberulent; rachis nodes with 3–10 flowers, fascicled or on a 2–4 mm spur. Pedicel filiform, 4–5 mm, appressed yellowish pubescent. Flowers 1–1.2 cm. Calyx cup-shaped, 3–4 mm long and wide, outside densely yellowish pubescent; teeth small, unequal in length. Corolla white flushed with red; standard elliptic-ovate, outside glabrous or sparsely puberulent along veins, base truncate and shallowly cordate, apex slightly emarginate. Stamens unequal in length. Ovary villous. Legume linear-oblong, flat, 6–11 × 1.2–1.6 cm, sparsely villous, base attenuate into a stipe, apex apiculate; adaxial suture with a ca. 2 mm wide wing. Seeds 1–8 per legume. Fl. Jun–Jul, fr. Sep–Jan.

Sparse forests on mountain slopes; 800–1600 m. Guangxi, S Guizhou, S Yunnan [N Thailand].

3. *Derris yunnanensis* Chun & F. C. How, Acta Phytotax. Sin. 2: 69. 1952.

云南鱼藤 yun nan yu teng

Lianas, large. Young shoots, petioles, pedicels, bracteoles, and legumes yellowish puberulent. Branchlets robust. Leaves 9- or 11-foliolate; rachis ca. 25 cm, including petiole 4–4.5 cm; leaflet blades oblong or apical one oblanceolate, 6.5–11 × 2–3.5 cm, subleathery, abaxially densely yellowish puberulent, adaxially glabrous or yellowish puberulent in vein axils, base broadly cuneate, apex obtusely acuminate. Infructescences axillary. Pseudoracemes axillary, 20–30 cm; rachis nodes with 2 or 3 flowers borne singly along a short branchlet; bracts linear. Pedicel ca. 2.5 mm. Flowers 1.4–2 cm. Calyx cup-shaped, 4–6 mm, puberulent; teeth 5, abaxial tooth longer than others, adaxial 2 teeth subconnate. Corolla glaucous whitish, 1–1.4 cm; petals all long clawed. Ovary sessile, densely pubescent; style long and incurved, glabrous. Legume oblong, flat, 5–15 × 2–2.5 cm, densely yellowish brown shortly villous, base abruptly constricted, apex obtusely acute; adaxial suture with a 1–2 mm wide wing. Seeds 1–4 per legume. Fl. Jul–Aug, fr. Oct.

• Cliff bases in mountains; ca. 2000 m. Guangxi, Guizhou, Yunnan.

4. *Derris harrowiana* (Diels) Z. Wei, Acta Phytotax. Sin. 23: 290. 1985.

大理鱼藤 da li yu teng

Millettia harrowiana Diels, Notes Roy. Bot. Gard. Edinburgh 5: 246. 1912.

Lianas. Branches with tuberculate whitish lenticels. Leaves 7–11-foliolate, juvenile at anthesis; rachis 10–12 cm, including petiole 6–8 cm; leaflet blades oblong-elliptic to sometimes narrowly ovate, 4.5–5.5 × 1.5–2.5 cm, both surfaces glabrous, apex shortly acuminate. Pseudoracemes 12–16 cm including peduncle; rachis nodes with 2 or 3 fascicled flowers. Pedicel 2–3 mm. Flowers ca. 1.2 cm. Calyx campanulate, ca. 5 mm, densely rust-colored sericeous; teeth short. Corolla whitish or rose-red, ca. 7 mm. Stamens 7–8 mm. Ovary sericeous. Legume narrowly oblong, 7–16 × 2–2.3 cm, compressed, glabrous, apex mucronate; adaxial suture with a 2–4 mm wide wing. Seeds 2 or 3 per legume. Fl. Apr–May, fr. Jun–Aug.

• Forests on mountain slopes; 1900–2000 m. Yunnan (Dali).

5. *Derris trifoliata* Loureiro, Fl. Cochinch. 2: 433. 1790.

鱼藤 yu teng

Derris uliginosa (Roxburgh ex Willdenow) Bentham;
Robinia uliginosa Roxburgh ex Willdenow.

Lianas, glabrous. Leaves (3 or)5(or 7)-foliolate; rachis

7–15 cm, including petiole 5–9 cm; leaflet blades ovate-oblong, 5–10 × 2–4 cm, firmly papery to subleathery, base rounded to slightly cordate, apex obtusely acuminate. Pseudoracemes axillary, 5–10 cm; rachis nodes with 2 or 3(–6) fascicled flowers sometimes borne on a short branchlet. Pedicel 2–4 mm. Flowers ca. 1.2 cm. Calyx campanulate, ca. 2 mm, glabrous or subglabrous; teeth very short, obtuse. Corolla whitish to pink, ca. 1 cm; standard suborbicular. Ovary sparsely pubescent. Legume obliquely ovoid, globose, or oblong, 2.5–4 × 2–3 cm, compressed, glabrous; adaxial suture with a narrow wing. Seeds 1 or 2 per legume. Fl. Apr–Aug, fr. Aug–Dec. $2n = 22$.

Coastal areas along beaches or riverbanks, thickets, forests; below 1000 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan [Cambodia, India, Indonesia, Japan, Malaysia, Papua New Guinea, Sri Lanka, Thailand, Vietnam; E Africa, Australia, Pacific islands].

6. *Derris ferruginea* Benth in Miquel, Pl. Jungh. 252. 1852.

锈毛鱼藤 xiu mao yu teng

Robinia ferruginea Roxburgh, Fl. Ind., ed. 1832, 3: 329. 1832, not Kunth (1823).

Lianas. Branchlets densely rust-colored pubescent. Leaves 5–9-foliolate; rachis 5.5–9(–15) cm, including petiole 3.5–5(–10) cm; leaflet blades elliptic to obovate-oblong, 6–13 × 2–5 cm, leathery, abaxially slightly rust-colored puberulent, adaxially glabrous and shiny, base rounded, apex obtusely acuminate. Pseudopanicles axillary, 15–30 cm, densely rust-colored puberulent; rachis nodes with 2 or 3(–8) fascicled flowers often borne on a short branchlet. Pedicel slender, 4–6 mm. Flowers 1–1.4 cm. Calyx ca. 3 mm; teeth minute. Corolla pale red to whitish, 8–10 mm. Ovary pubescent. Legume oblong to ligulate-oblong, 5–8 × ca. 2.5 cm, leathery, flat, densely rust-colored sericeous when young, nearly glabrescent when old; abaxial suture with a 2–4 mm wide wing, adaxial suture with a 3–5 mm wide wing. Seeds 1 or 2 per legume. Fl. Apr–Jul, fr. Sep–Dec.

Sparse forests and thickets, low elevation mountain slopes; 500–1200 m. Guangdong, S Guangxi, SW Guizhou, Hainan, S Yunnan [Bangladesh, India, Laos, Myanmar, Thailand, Vietnam].

7. *Derris cavaleriei* Gagnepain, Notul. Syst. (Paris) 2: 347. 1913.

黔桂鱼藤 qian gui yu teng

Lianas. Branches slender, yellowish pubescent when young, glabrescent, dark brown when dried. Leaves 5-foliolate; rachis 9–12 cm, including petiole 5–7 cm; leaflet blades ovate-oblong, 5–10 × 2–4 cm, leathery, abaxially densely appressed yellowish brown pubescent, adaxially sparsely pubescent or glabrous and not shiny, secondary veins 7–10 on each side of midvein, base rounded to broadly cuneate, apex obtusely acuminate. Pseudopanicles terminal or lateral, 7–10 cm, compact, with few branches; rachis nodes with 2–5 fascicled flowers. Pedicel ca. 6 mm. Flowers ca. 1.3 cm. Calyx campanulate, ca. 3 mm, hispidulous. Corolla whitish, 8–10 mm; standard elliptic. Ovary pubescent. Legume broadly ellipsoid, 6–13 × 3–4.5 cm, compressed, densely rust-colored pubescent, both ends subtruncate; abaxial suture with a 3–6 mm wide wing, adaxial suture with a 0.7–1.3 cm wide wing. Seeds 1 or 2 per legume. Fl. Apr–May, fr. Oct–Dec.

• Thickets or sparse forests on mountain slopes; 300–1300 m. Guangdong, Guangxi, Guizhou, Yunnan.

8. *Derris caudatilimba* F. C. How, Acta Phytotax. Sin. 3: 221. 1954.

尾叶鱼藤 wei ye yu teng

Lianas. Branches glabrous, with pale gray lenticels. Leaves 7- or 9-foliolate; rachis 10–15 cm, including petiole 4–5 cm; leaflet blades oblong, 4–10 × 1.4–2.8 cm, papery, abaxially glabrous, midvein raised on both surfaces, secondary veins 6 or 7 on each side of midvein, base broadly cuneate to slightly obtuse, apex caudate-acuminate. Racemes axillary, narrow and elongated, 10–25 cm; rachis sparsely puberulent, with 2–6 fascicled flowers. Pedicel filiform, 3–5 mm, sparsely puberulent. Flowers 9–10 mm. Calyx campanulate, ca. 3 mm long and wide, glabrous; teeth deltoid. Corolla whitish, 6–7 mm; standard elliptic to orbicular, base subtruncate, apex emarginate. Ovary puberulent. Legume ligulate-oblong, 4–9 × 1.2–1.5 cm, compressed, glabrous; abaxial suture with a 0.8–1.5 mm wide wing, adaxial suture with a 3–4 mm wide wing. Seed 1 per legume. Fl. May–Aug, fr. Nov–Dec.

• Thickets or sparse forests on mountain slopes; 500–1400 m. Guangdong, Yunnan.

9. *Derris breviramosa* F. C. How, Acta Phytotax. Sin. 3: 219. 1954.

短枝鱼藤 duan zhi yu teng

Lianas. Leaves 5- or 7-foliolate; rachis 15–20 cm, including petiole 6–7 cm; leaflet blades obovate-oblong to oblong, 5–10 × 2.5–4.5 cm, subpapery, glabrous, secondary veins 7 or 8 on each side of midvein, slender, and raised on both surfaces, base broadly cuneate to obtuse, apex obtusely acuminate to shortly acuminate. Pseudoracemes axillary, much longer than leaves, without branches or paniculate and with a few branches near base of rachis; rachis nodes with several fascicled flowers on a 4–6 mm branchlet. Pedicel puberulent, 3–6 mm. Flowers 9–10 mm. Calyx campanulate, ca. 3 mm long and wide, puberulent, with numerous minute orange glandular dots. Corolla whitish, 8–9 mm; petals all clawed; standard oblong. Ovary pubescent. Legume oblong, inserted on scarred nodal short branchlets, 5–7.5 × 1.8–2 cm, compressed, finely veined, glabrous, both ends slightly obtuse; abaxial suture with a 2–3 mm wide wing, adaxial suture with a 3.5–5 mm wide wing. Seed 1 per legume. Fl. Jun, fr. Aug.

• Mountain valleys, streamsides. Hainan.

10. *Derris scabricalis* (Franchet) Gagnepain, Notul. Syst. (Paris) 2: 367. 1913.

粗茎鱼藤 cu jing yu teng

Millettia scabricalis Franchet, Pl. Delavay. 158. 1889.

Lianas. Branches scabrous, with convex lenticels, brownish pubescent when young. Leaves 7–13-foliolate; rachis 9–14 cm, including petiole 4.5–6 cm; petiolules blackish brown; leaflet blades obovate-oblong to oblong, 5–9 × 1.5–3 cm, papery, glabrous, base obtuse, rounded, or broadly cuneate and rather oblique except for apical one, apex shortly acumi-

nate. Pseudoracemes axillary or terminal, ca. 25 cm or much longer; rachis nodes with 2 or 3 fascicled flowers. Pedicel 2–3 mm, puberulent. Flowers 1–1.2 cm. Calyx campanulate, 2–3 mm, appressed yellowish puberulent; teeth obscure. Corolla reddish, glabrous, ca. 5 × as long as calyx; standard orbicular. Ovary pubescent. Legume oblong, 6–9 × ca. 3 cm, thin, glabrous; abaxial suture with a 0.5–1 mm wide wing, adaxial suture with a 3–5 mm wide wing. Seeds 1 or 2 per legume. Fl. May, fr. Aug–Sep.

- Valleys in mountains, scrub; 1400–2500 m. Xizang, Yunnan.

11. *Derris tonkinensis* Gagnepain, Notul. Syst. (Paris) 2: 349. 1913.

东京鱼藤 *dong jing yu teng*

Trees or climbing shrubs. Branches brown to red, glabrous. Leaves 5(or 7)-foliolate; rachis 4–8 cm, including petiole 1.5–6 cm; leaflet blades ovate-lanceolate or broadly ovate to ovate-oblong, 3–10 × 1.5–4 cm, firm in texture, glabrous, base rounded but apical one cuneate, apex shortly acuminate to obtuse. Pseudoracemes axillary or terminal, lax or somewhat congested, 7–10 × ca. 5 cm, sometimes paniculate with 1 to many 3–4 cm slender branches, thinly reddish pilose; rachis nodes with 4–6 flowers congested and fascicled or lax and borne on 1.5–2 cm branchlets. Pedicel 6–7 mm, appressed reddish pilose. Flowers 1–1.2 cm. Calyx cup-shaped, 2.5–3 mm, appressed reddish pilose; teeth obscure. Corolla whitish to pink; petals all clawed; standard elliptic, 10–12 × ca. 6 mm, reflexed, base abruptly attenuate. Ovary slightly pilose. Legume ellipsoid, 8–11 × ca. 2.5 cm, flat, glabrous, finely veined, both ends obtusely attenuate; abaxial suture with a 1–2 mm wide wing, adaxial suture with a ca. 5 mm wide wing. Seed 1(or 2) per legume. Fl. Mar–Jun, fr. May–Nov.

Scrub or sparse forests on mountain slopes. Guangdong, Guangxi, Guizhou [Vietnam].

- 1a. Leaves 5-foliolate; leaflet blades ovate-lanceolate, 3–6 cm; inflorescences with 1–3 or more branches; flowers lax on 1.5–2 cm branchlets 11a. var. *tonkinensis*
- 1b. Leaves 5(or 7)-foliolate; leaflet blades broadly ovate to ovate-oblong, 5–10 cm; inflorescences with many branches; flowers congested and fascicled 11b. var. *compacta*

11a. *Derris tonkinensis* var. *tonkinensis*

东京鱼藤(原变种) *dong jing yu teng* (*yuan bian zhong*)

Leaves 5-foliolate; leaflet blades ovate-lanceolate, 3–6 cm. Inflorescences with 1–3 branches. Flowers lax on 1.5–2 cm branchlets. Corolla whitish to pink. Fl. Mar–Jun, fr. May–Oct.

- Guangxi, Guizhou [Vietnam].

11b. *Derris tonkinensis* var. *compacta* Gagnepain in Lecomte, Fl. Indo-Chine 2: 458. 1916.

大叶东京鱼藤 *da ye dong jing yu teng*

Leaves 5(or 7)-foliolate; leaflet blades broadly ovate to ovate-oblong, 5–10 cm. Inflorescences with many branches.

Flowers congested and fascicled. Corolla pink. Fl. Apr–May, fr. Oct–Nov.

- Guangdong, Guangxi.

12. *Derris fordii* Oliver, Hooker's Icon. Pl. 18: t. 1771. 1888.

中南鱼藤 *zhong nan yu teng*

Lianas. Leaves 5- or 7-foliolate; rachis 15–28 cm, including petiole 3–8 cm; leaflet blades ovate-elliptic, ovate-oblong, or elliptic, 3–13 × 1.5–6 cm, thickly papery to thinly leathery, both surfaces glabrous, reticulate veins slightly prominent or obscure, base rounded, apex acuminate to slightly obtuse. Inflorescences and pedicels sparsely yellowish brown hispidulous or densely brownish pubescent. Pseudopanicles axillary, slightly shorter than leaves; rachis nodes with several fascicled flowers on short branchlets. Pedicel 3–5 mm. Flowers 1.2–1.3 cm. Calyx campanulate, 2–3 mm, sparsely pubescent; teeth orbicular to deltoid, short. Corolla whitish, ca. 1 cm; standard obovate-elliptic, claw short. Ovary sessile, whitish villous. Legume oblong to ligulate-oblong, 4–10 × 1.5–2.3 cm, compressed, swollen or not when mature, thinly leathery, glabrous; abaxial suture wing up to 1.5 mm wide, adaxial suture with a 2–3 mm wide wing. Seeds 1–4 per legume. Fl. Mar–May, fr. Jun–Nov.

- Mountain valleys, scrub, sparse to dense forests, mountain slopes, near trails; 500–1600 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Yunnan, Zhejiang.

- 1a. Leaflet blades 4–13 × 2–6 cm, reticulate veinlets slightly prominent; inflorescences and pedicels sparsely yellowish brown hispidulous; legume slightly thick, swollen when mature, abaxial suture with a less than 1 mm wide obscure wing .. 12a. var. *fordii*
- 1b. Leaflet blades 3–8 × 1.5–3 cm, reticulate veinlets obscure; inflorescences and pedicels densely brownish pubescent; legume thin, not swollen when mature, abaxial suture with a 1–1.5 mm wide distinct wing 12b. var. *lucida*

12a. *Derris fordii* var. *fordii*

中南鱼藤(原变种) *zhong nan yu teng* (*yuan bian zhong*)

Derris rubromaculata Chun & F. C. How.

Leaflet blades 4–13 × 2–6 cm, reticulate veinlets slightly prominent. Inflorescences and pedicels sparsely yellowish brown hispidulous. Legume slightly thick, swollen when mature, abaxial suture with a less than 1 mm wide obscure wing. Fl. Apr–May, fr. Oct–Nov.

- Mountain valleys, scrub, sparse forests, mountain slopes, near trails. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Yunnan, Zhejiang.

12b. *Derris fordii* var. *lucida* F. C. How, Acta Phytotax. Sin. 3: 218. 1954.

亮叶中南鱼藤 *liang ye zhong nan yu teng*

Leaflet blades 3–8 × 1.5–3 cm, adaxially shiny, reticulate

veinlets obscure. Inflorescences and pedicels densely brownish pubescent. Legume thin, not swollen when mature, abaxial suture with a 1–1.5 mm wide distinct wing. Fl. Mar–Apr, fr. Jun–Aug.

• Dense or sparse forests on rocky mountain slopes. Guangdong, Guangxi, Guizhou, Yunnan.

13. *Derris alborubra* Hemsley, Bot. Mag. 131: t. 8008. 1905.

白花鱼藤 bai hua yu teng

Lianas, 6–7 m, evergreen. Leaves (3 or)5-foliolate; rachis 5–14 cm, including petiole 2.5–3.5 cm; leaflet blades elliptic, oblong, or obovate-oblong, 5–8(–15) × 2–5(–7) cm, leathery, glabrous, base broadly cuneate to rounded, apex obtuse and slightly emarginate. Inflorescence rachis and pedicels thinly puberulent; pseudopanicles terminal or axillary, 15–30 cm, narrow; rachis nodes with up to 15 flowers on short filiform branchlets. Pedicel ca. 1 cm. Flowers 1–1.2 cm. Calyx red, obliquely campanulate, ca. 4.5 mm, appressed pubescent but glabrescent. Corolla whitish, 1–1.2 cm; standard suborbicular, puberulent, apex emarginate. Ovary sessile, yellowish pubescent. Legume obliquely ovoid to obliquely oblong, 2–5 × 2.2–2.5 cm, compressed, glabrous; abaxial suture with a ca. 1 mm wide wing, adaxial suture with a 3–4 mm wide wing. Seeds 1 or 2 per legume. Fl. Apr–Jun, fr. Jul–Oct.

Sparse forests or thickets on mountain slopes. Guangdong, Guangxi, Hainan [Cambodia, Laos, Vietnam].

Derris alborubra is represented in China by the typical variety. Another variety, *Derris alborubra* var. *honheoensis* P. K. Lóc, is endemic to Vietnam.

14. *Derris marginata* (Roxburgh) Benth in Miquel, Pl. Jungh. 252. 1852.

边莱鱼藤 bian jia yu teng

Dalbergia marginata Roxburgh, Fl. Ind., ed. 1832, 3: 230. 1832.

Lianas, glabrous except for pilose calyces and ovaries. Leaves 5- or 7-foliolate; rachis 13–25 cm, including petiole (3.5–)5–10 cm; leaflet blades obovate-elliptic to obovate, 5–15 × 2.5–6 cm, subleathery, secondary veins 6–8(–10) on each side of midvein and slightly prominent, base rounded, apex shortly and obtusely acuminate. Pseudopanicles axillary, 6–20 cm, with few branches, glabrous; rachis nodes with 1–3 fascicled flowers. Pedicel 5–12 mm. Flowers 1–1.2 cm. Calyx shallowly cup-shaped, 2–3 mm. Corolla whitish to pale red, 8–10(–12) cm, glabrous; standard broadly ovate. Ovary sessile, glabrescent. Legume ligulate-oblong, 7–10(–15) × 2–4 cm, thin, glabrous, reticulate veined; abaxial suture with a 2–3 mm wide wing,

adaxial suture with a 6–8 mm wide wing. Seeds 1(or 2) per legume. Fl. Apr–May, fr. Nov–Jan.

Open or dense forests, mountain slopes; 400–600 m. Guangdong, Guangxi, Guizhou, Yunnan [Bangladesh, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

The place of publication of the basionym is often given incorrectly. Roxburgh used the epithet “marginata” in Flora Indica for distinct species in two genera. Both were treated by Benth as species of *Derris*. In making the transfer of *Dalbergia marginata*, Benth cited the wrong page number. See R. Geesink (Leiden Bot. Ser. 8: 110. 1984) for discussion.

15. *Derris laxiflora* Benth, J. Proc. Linn. Soc., Bot. 4(Suppl.): 105. 1860.

疏花鱼藤 shu hua yu teng

Lianas, glabrous except for pilose calyces. Leaves 5- or 7-foliolate; rachis 6–9(–12) cm, including petiole 3–6 cm; leaflet blades elliptic, 5–8 × 2.5–4 cm, subleathery, base broadly cuneate, apex obtuse. Pseudopanicles terminal, 15–30 cm, laxly flowered, basal branch elongated but others short; rachis nodes with 2 or 3 fascicled flowers. Pedicel 6–8 mm. Flowers ca. 1.2 cm. Calyx broadly campanulate, ca. 2 mm. Corolla whitish, 7–9 mm; petals all clawed; standard suborbicular, base broadly cuneate. Ovary glabrous. Legume ellipsoid, 5–8 × 1.5–2.5 cm, flattened, glabrous; abaxial suture with a distinct but narrow wing, adaxial suture with a ca. 3 mm wide wing. Seeds 1–3 per legume. Fl. Apr–Jun, fr. Jul–Oct.

• Semi-open areas, thicket margins; below 1000 m. Taiwan.

16. *Derris palmifolia* Chun & F. C. How, Acta Phytotax. Sin. 2: 68. 1952.

掌叶鱼藤 zhang ye yu teng

Lianas, glabrous except for pubescent young branchlets and flower buds. Leaves subpalmately pinnate, 5–7 cm, with 5 closely inserted leaflets on an abbreviated rachis; leaflet blades ovate-elliptic to oblong, basal pair each 2–3.5 × 1.3–1.5 cm, remaining pairs each 4–5 × ca. 1.5 cm but sometimes apical one larger, secondary veins 6–9 on each side of midvein and very slender, base cuneate to slightly subrounded, apex shortly acuminate. Flowers unknown. Infructescences axillary, 2–3 × as long as leaves, broadly paniculate, with few elongated spreading branches. Legume oblong-ligulate, 4–7 × 1.3–1.7 cm, reticulate veined when dry, base rounded to truncate, apex obliquely pointed; abaxial suture with a less than 1 mm wide wing, adaxial suture with a ca. 2 mm wide wing. Seed 1(or 2) per legume. Fr. Sep.

• Mountain valleys; ca. 1700 m. Yunnan.

66. PARADERRIS (Miquel) R. Geesink, Leiden Bot. Ser. 8: 109. 1984.

拟鱼藤属 ni yu teng shu

Chen Dezha (陈德昭 Chen Te-chao); Les Pedley

Derris sect. *Paraderris* Miquel, Fl. Ned. Ind. 1: 145. 1855.

Lianas. Stipules small. Leaves imparipinnate; stipels much reduced or absent. Flowers in axillary pseudoracemes, occasionally

aggregated into pseudopanicles. Brachyblasts rather thin, with (1 or)2 or 3(–5) flowers. Bracts shorter than corresponding flower buds. Bracteoles present. Calyx with 5 short lobes. Corolla white to rose-red; standard blade elliptic to suborbicular, reflexed at base; basal calluses distinct, large; wings and keel petals \pm equally long. Stamens monadelphous; upper staminal filament adnate to other 9; anthers usually with trichomes. Disk distinct, flat to slightly hollow. Ovary with trichomes; ovules 1–7. Legume indehiscent, woody to thickly woody; either both sutures with a longitudinal wing or winged only on adaxial suture. Seeds 1 to several per legume, lens-shaped; radicle folded.

About 15 species: through SE Asia to New Guinea, absent from Australia and Pacific islands; six species (three endemic, two introduced) in China.

- 1a. Flowers in pseudopanicles; leaflets 9–15.
 2a. Leaflet blades subleathery, apex obtuse to acute; flowers less than 1.2 cm; legume ca. 3 cm 3. *P. canarensis*
 2b. Leaflet blades membranous, apex caudate-acuminate to acuminate; flowers 1.5–1.8 cm; legume more than 4 cm.
 3a. Leaflets 9–13, blades abaxially glaucous when dry; branchlets yellowish pubescent; corolla rose-red; pedicel 0.8–1 cm 1. *P. glauca*
 3b. Leaflets 13 or 15, blades abaxially olive-green when dry; branchlets glabrous; corolla whitish; pedicel 1–2 cm 2. *P. hainanensis*
 1b. Flowers in pseudoracemes; leaflets 5–13.
 4a. Leaflets 9–13, blades abaxially sericeous; corolla standard sericeous outside 4. *P. elliptica*
 4b. Leaflets 5–9, blades abaxially glabrous; corolla standard glabrous outside.
 5a. Leaflet blades papery, 5–9 cm, apex shortly and obtusely acuminate; rachis of inflorescences puberulent 5. *P. hancei*
 5b. Leaflet blades subleathery, 10–15 cm, apex caudate-acuminate; rachis of inflorescences glabrous; cultivated 6. *P. malaccensis*

1. *Paraderris glauca* (Merrill & Chun) T. C. Chen & Pedley, **comb. nov.**

粉叶鱼藤 fen ye yu teng

Basionym: *Derris glauca* Merrill & Chun, Sunyatsenia 2: 246. 1935.

Lianas. Branches and young shoots yellowish pubescent; branchlets tuberculate, very sparse pilose or glabrescent. Leaves 9–13-foliolate; rachis 7–14 cm, including petiole 3–7 cm; leaflet blades obovate-oblong, 5–7 \times 2–3.5 cm, membranous, abaxially greenish white when young but glaucous when old, base cuneate to broadly cuneate, apex caudate-acuminate. Cymose pseudopanicles 10–15 \times 6–8 cm; rachis nodes usually with 3 fascicled flowers at apex of a 8–10 mm branchlet. Pedicel 8–10 mm, slender. Flowers 1.6–1.8 cm. Calyx reddish brown, broadly cup-shaped, 6–7 mm in diam., mouth yellowish pubescent. Corolla rose-red; standard broadly ovate, 1.6–1.7 \times ca. 1.2 cm, apex emarginate. Ovary yellowish puberulent on basal part. Legume oblong to ligulate, 4–8 \times 1.5–2.5 cm, thin, base attenuate to obtuse, apex acuminate; abaxial suture with a 1–2 mm wide wing, adaxial suture with a 3–4 mm wide wing. Seeds 1–3 per legume. Fl. Apr–May, fr. Jul–Aug.

- Forests in mountains; below 700 m. S Guangxi, Hainan.

2. *Paraderris hainanensis* (Hayata) Adema, Blumea 48: 138. 2003.

海南鱼藤 hai nan yu teng

Derris hainanensis Hayata, Icon. Pl. Formosan. 3: 77. 1913.

Lianas. Branches terete, glabrous, with scattered elliptic lenticels. Stipules oblong-triangular, pilose, apex acute. Leaves 13- or 15-foliolate; rachis 8–15 cm, including petiole (4.5–)6–8 cm; leaflet blades obovate to long elliptic, 4–7 \times 1.8–3.5 cm,

membranous, both surfaces glabrous, abaxially olive-green and slightly whitish green, base broadly cuneate to sometimes subrounded, apex caudate-acuminate to cuneate. Cymose pseudopanicles axillary, 10–15 cm. Pedicel 1–2 cm. Calyx campanulate, ca. 4 \times 7 mm, subglabrous. Corolla whitish; standard suborbicular, ca. 1.5 cm, claw ca. 3 mm, limb base cordate and with 2 triangular calluses, apex emarginate. Ovary linear, hirsute. Legume oblong to ligulate, 4.5–10 \times ca. 2 cm; abaxial suture with a 1–2 mm wide wing, adaxial suture with a 3–4 mm wide wing. Seeds 1 or 2 per legume. Fl. Apr–Jun, fr. Jul–Oct.

- Open forests, scrub on mountain slopes. Hainan.

3. *Paraderris canarensis* (Dalzell) Adema, Blumea 48: 137. 2003.

兰屿鱼藤 lan yu yu teng

Pongamia canarensis Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 37. 1850; *Derris oblonga* Bentham.

Lianas. Branches subglabrous. Leaves 9–15-foliolate; rachis to 30 cm, including petiole 4–6 cm; leaflet blades oblong to oblanceolate-oblong, 4–6 \times 1–2 cm, subleathery, both surfaces \pm glabrous, abaxially glaucous, apex obtuse to acute. Pseudopanicles much shorter than leaves, rachis short, branches densely compact. Pedicel 3–4 mm, grayish velutinous. Flowers ca. 1.2 cm. Calyx ca. 5 mm. Corolla white or light purple, ca. 1.2 cm; standard ca. 1 cm wide, reflexed, glabrous. Legume broadly oblong, ca. 3 \times 2 cm, glabrous; adaxial suture with a wing ca. 2 mm wide. Seed 1 per legume. Fl. Apr, fr. Jun–Jul.

Coastal forest margins; below 100 m. Taiwan (Lan Yu) [Philippines].

4. *Paraderris elliptica* (Wallich) Adema, Thai Forest Bull., Bot. 28: 11. 2001.

毛鱼藤 mao yu teng

Pongamia elliptica Wallich, Pl. Asiat. Rar. 3: 20. 1832; *Derris elliptica* (Roxburgh) Benth; *Galedupa elliptica* (Wallich) Roxburgh.

Lianas, 7–10 m, robust. Young branchlets, leaf rachises, petioles, and petiolules densely brown pubescent. Branches glabrous when old, scattered with brown lenticels. Leaves 9–13-foliolate; rachis 20–35 cm, including petiole 4–8 cm; leaflet blades oblong, obovate-oblong, or oblanceolate, 6–15 × 2–4 cm, thickly papery, abaxially greenish white and finely brown sericeous, adaxially glabrous or only pubescent along veins, base cuneate to broadly cuneate, apex shortly obtusely acuminate. Pseudoracemes axillary, 15–25 cm, rachis densely pubescent; rachis nodes with 3 or 4 flowers fascicled on short branchlets; peduncle 8–12 cm or much longer, densely pubescent. Pedicel 6–8 mm, densely pubescent. Flowers ca. 2 cm. Calyx shallowly cup-shaped, ca. 4 × 6–7 mm, densely sericeous. Corolla pink to whitish, 1.5–1.8 cm; standard suborbicular, 1.2–1.5 cm wide, outside brown pubescent, apex emarginate. Ovary densely pubescent. Legume oblong, 3.5–8 × 1.7–2 cm, compressed, pubescent when young, glabrescent; abaxial suture with a ca. 0.5 mm wide wing, adaxial suture with a ca. 2 mm wide wing. Seeds 1–4 per legume. Fl. Apr–May, fr. Jun.

Cultivated in Guangdong, Guangxi, Hainan, Taiwan, and Yunnan [native to Cambodia, India, Indonesia, Laos, Malaysia, Philippines, Thailand, and Vietnam].

This species is cultivated for use as an insecticide.

5. *Paraderris hancei* (Hemsley) T. C. Chen & Pedley, comb. nov.

粤东鱼藤 yue dong yu teng

Basionym: *Derris hancei* Hemsley, Bot. Mag. 131: t. 8008. 1905.

Lianas. Leaves (5 or) 7- or 9-foliolate; rachis 12–17 cm, including petiole 4.5–9 cm; leaflet blades obovate-oblong, 5–9 × 2–3.5 cm, papery, both surfaces glabrous, abaxially greenish

white and midvein conspicuously prominent, base cuneate, broadly cuneate, or slightly rounded, apex shortly and obtusely acuminate. Pseudoracemes axillary, 7–12 cm, narrow, scattered puberulent. Pedicel slender, 3–5 mm. Flowers 1.1–1.3 cm. Calyx purplish red, 3–4 mm, subtruncate, outside glabrous, inside with a ring of pubescence around mouth. Corolla white tinged with red outside, 1–1.2 cm; standard suborbicular, apex emarginate. Ovary sericeous. Legume obliquely ovoid to narrowly ovoid, 2.5–4 × 1.5–1.8 cm, glabrous, with transverse reticulate veins when mature; both sutures with a 1–1.5 mm wide wing. Seeds 1 (or 2) per legume. Fl. Apr–Aug, fr. Jul–Jan.

• Along trails, near pond banks. Guangdong, Guangxi.

6. *Paraderris malaccensis* (Benth) Adema, Thai Forest Bull., Bot. 28: 11. 2001.

异翅鱼藤 yi chi yu teng

Derris cuneifolia Benth var. *malaccensis* Benth, J. Proc. Linn. Soc., Bot. 4(Suppl.): 112. 1860; *D. malaccensis* (Benth) Prain.

Lianas, 10–15 m, glabrous except ovaries and mouth of calyces. Leaves 5- or 7(or 9)-foliolate; rachis 20–30 cm, including petiole 3–7 cm; leaflet blades elliptic, 10–15 cm, subleathery, base rounded, apex caudate-acuminate. Pseudoracemes shorter than leaves; rachis nodes with flowers often on short branchlets. Flowers ca. 1.7 cm. Calyx pink, campanulate, ca. 3 mm, apical margin sinuate and ciliate. Corolla rose-red, pink, or whitish, 1.3–1.4 cm; standard orbicular, apex truncate or emarginate. Ovary velutinous. Legume oblong, 5–8 cm; both sutures winged, abaxial suture with wing 1 mm wide or less. Seeds 1–4 per legume. Fl. Feb–May, fr. Apr–Aug.

Cultivated in Guangdong (Guangzhou) and Hainan [native to Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, and Vietnam].

Adema (Blumea 48: 139. 2003) synonymized *Paraderris malaccensis* under *P. montana* (Benth) Adema (*Derris montana* Benth).

67. AGANOPE Miquel, Fl. Ned. Ind. 1: 151. 1855.

双束鱼藤属 shuang shu yu teng shu

Chen Dezha (陈德昭 Chen Te-chao); Les Pedley

Lianas, woody, or sprawling trees. Leaflets (sub)opposite, papery to subleathery; stipules caducous; stipels caducous or absent. Inflorescences terminal or supra-axillary in well-developed pseudopanicles; bracts shorter than corresponding buds; bracteoles caducous. Calyx with cupular or campanulate tube, subtruncate or with distinct teeth. Petals glabrous or slightly pubescent; standard truncate to subcordate, with or without calluses; wings free from keel at least proximally. Stamens diadelphous, vexillary stamen free from other 9. Disk present; ovary with 1–10 ovules. Legumes compressed, woody; abaxial or both sutures with longitudinal wing. Seeds 1 to several per legume; hilum eccentric; radicle short, straight.

About seven species: tropical and subtropical Africa, Asia, and Pacific islands; three species (one endemic) in China.

- 1a. Trees; panicles glabrous; leaflets 5 or 7 1. *A. latifolia*
 1b. Lianas or scandent shrubs; panicles pilose or pubescent; leaflets 5–9.
 2a. Calyx ca. 3 mm, sparsely pilose; flowers ca. 0.8 cm; legume 5–10 cm 2. *A. thyrsoflora*
 2b. Calyx ca. 6 mm, densely pubescent; flowers 1.5–1.7 cm; legume 10–15 cm 3. *A. dinghuensis*

1. *Aganope latifolia* (Prain) T. C. Chen & Pedley, comb. nov.

大叶鱼藤 da ye yu teng

Basionym: *Derris latifolia* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 67: 288. 1898.

Trees. Leaves 5- or 7-foliolate; rachis 45–60 cm, including

petiole 9–15 cm; leaflet blades ovate-oblong to ovate-lanceolate, 14–25 × 7–10 cm, thickly papery, both surfaces glabrous, midvein abaxially conspicuously raised and adaxially impressed, base broadly cuneate to subrounded, apex acuminate. Pseudopanicles axillary, copious, 50–65 cm, glabrous; branches 5–10 cm; branchlet nodes close together, with 1 flower. Pedicel ca. 2 mm. Flower ca. 6.5 mm. Calyx broadly campanulate, ca. 2.5 × 3 mm, glabrous, apex subtruncate. Corolla standard erect, orbicular, ca. 7.5 mm in diam., without basal calluses. Legume woody, 9–11 × ca. 3.5 cm, thin, smooth, glabrous, without reticulate veins; both sutures with a 3–5 mm wide wing. Seed 1 per legume. Fl. unknown, fr. Jan.

Open forests on mountain slopes; 600–1200 m. Guangxi, Yunnan [N Myanmar].

2. *Aganope thyrsoflora* (Benth) Polhill, Kew Bull. 25: 268. 1971.

密锥花鱼藤 mi zhui hua yu teng

Millettia thyrsoflora Benth in Miquel, Pl. Jungh. 249. 1852; *Derris thyrsoflora* (Benth) Benth.

Lianas or scandent shrubs. Branchlets glabrous or very sparsely pilose. Leaves 5–9-foliolate; rachis 30–45 cm, including petiole 8–14 cm; leaflet blades oblong to oblong-lanceolate, 10–15 × 3.5–7 cm, subleathery, both surfaces glabrous, secondary veins 5–7 on each side of midvein, base rounded, apex shortly acuminate to sometimes obtuse. Pseudopanicles axillary or terminal, narrowly pyramidal, 12–35 cm, compact, brown or reddish pilose; branches numerous, ascending or spreading; branchlet nodes with several close but not fascicled flowers on a short branchlet. Pedicel very short. Flowers ca. 8 mm. Calyx campanulate, ca. 3 mm, very sparsely pilose, apex truncate or obscurely deltoid toothed. Corolla whitish to purplish red, 8–10 mm; standard orbicular, with calluses cordate at

base, emarginate at apex. Ovary pilose. Legume oblong, 5–10 × 2.5–3(–4) cm, thin, glabrous, with conspicuous reticulate veins; both sutures with a 3–8 mm wide wing. Seeds 1–3 per legume, oblong-reniform. Fl. May–Jun, fr. Aug–Nov.

Scrub by streams in mountains; low elevations but to ca. 2000 m in Yunnan. Guangdong, S Guangxi, Hainan, S Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; Pacific islands].

3. *Aganope dinghuensis* (P. Y. Chen) T. C. Chen & Pedley, **comb. nov.**

鼎湖鱼藤 ding hu yu teng

Basionym: *Derris dinghuensis* P. Y. Chen, Acta Phytotax. Sin. 22: 81. 1984.

Lianas. Branches brownish when dry, sparsely rust-colored pubescent, scattered with brownish oblong to orbicular lenticels. Leaves 9-foliolate; rachis 35–50 cm, including petiole 10–12 cm; leaflet blades oblong to broadly oblong-ovate, 10–18 × 7–11 cm, thickly papery, both surfaces glabrous, midvein abaxially conspicuously raised and adaxially slightly impressed, secondary veins 6–8 on each side of midvein, base rounded, apex shortly and obtusely acuminate. Pseudopanicles axillary, ca. 20 cm, densely brownish pubescent, only basal part of rachis with few branches. Pedicel 3–5 mm, densely brownish pubescent. Flowers 1.5–1.7 cm. Calyx broadly campanulate, ca. 6 × 8 mm, densely brownish pubescent; teeth obscure. Corolla whitish, 1.5–1.7 cm; standard orbicular, without basal calluses. Ovary puberulent. Legume ligulate-oblong, 10–15 × 3–3.5 cm, glabrous, conspicuously veined, base narrowed, apex shortly acuminate; both sutures with a 5–8 mm wide wing. Seed 1 per legume, reniform, ca. 2.5 × 1.3 cm. Fl. Jan–Jul, fr. Nov–Dec.

• Forests, low-elevation mountains. Guangdong (Dinghu Shan).

68. ANTHEROPORUM Gagnepain, Notul. Syst. (Paris) 3: 180. 1915.

肿荚豆属 zhong jia dou shu

Wei Zhi (韦直); Les Pedley

Trees, evergreen. Stipules and stipels absent. Leaves imparipinnate; petiole and petiolules often basally thickened; leaflet blades (sub)opposite. Inflorescences terminal and with racemes in groups of 2–5 in axils of leaves at tips of branches; bracts longer than corresponding buds and covering them, soon caducous. Calyx cup-shaped; teeth inconspicuous. Petals ± equal, all long clawed, glabrous; standard curved upward, without basal calluses; wings partly fused to keel. Stamens monadelphous; anthers orbicular, dehiscing by a short slit at tip. Ovary stipitate or subsessile, with trichomes, with 2–6 ovules; style subulate, short. Legume inflated, not winged, dehiscent; valves woody, vacuous inside. Seeds 1(or 2), compressed globose, shiny; hilum round, ca. 3 mm in diam.

Five species: S China, Thailand, Vietnam; two species in China.

- 1a. Branchlets and leaves glabrous; inflorescences tawny pubescent; petiolules blackened when dry; leaflet blades broadly elliptic-ovate, abaxially glaucous, base tapering to petiolule 1. *A. glaucum*
 1b. Branchlets, leaves, and inflorescences with yellowish trichomes; petiolules with grayish trichomes; leaflet blades oblong, abaxially densely appressed sericeous, base rounded, asymmetric 2. *A. harmandii*

1. *Antheroporum glaucum* Z. Wei, Acta Phytotax. Sin. 19: 351. 1981.

粉叶肿荚豆 fen ye zhong jia dou

Trees, glabrous except tawny pubescent inflorescences. Branchlets olive-green becoming gray, smooth. Leaves 7-folio-

late; rachis 30–35 cm, including petiole 6–7 cm; petiolules 5–10 mm, blackened when dry; leaflet blades broadly elliptic-ovate, 12–22 × 4–7 cm, abaxially glaucous, adaxially shiny, secondary veins 8–10 on each side of midvein, base tapering, apex acuminate to caudate. Racemes axillary, usually 2–5 apically on branchlets, 7–10 cm; rachis nodes congested, with 1 or

2 flowers; peduncle variable in length. Pedicel ca. 3 mm, slender. Flower ca. 1 cm. Calyx ca. 5 × 2.5 mm. Corolla white, ca. 1 cm; standard suborbicular, base tapering into a long claw. Ovary linear, with trichomes, with 2–4 ovules. Legume oblong-rhomboid. Fl. Mar–Aug, fr. Jun–Aug.

Seasonal rain forests; 500–1300 m. S Yunnan [Thailand].

2. *Antheroporum harmandii* Gagnepain, Notul. Syst. (Paris) 3: 181. 1915.

肿荚豆 *zhong jia dou*

Trees, to 10 m tall. Branchlets yellowish velutinous, with scattered minute lenticels. Leaves 7- or 9(-13)-foliolate; rachis 30–40 cm, including petiole 6–8 cm; petiolules 6–9 mm,

grayish velutinous; leaflet blades oblong, 11–18 × 3–5 cm, leathery, abaxially densely sericeous, adaxially shiny, secondary veins 5–8 on each side of midvein, base rounded and asymmetric, apex acute. Racemes axillary, usually 2–5 congested apically on branches to form a large panicle, 7–15 cm, velutinous. Pedicel ca. 3 mm, slender. Flowers ca. 8 mm. Calyx ca. 4 × 3 mm, puberulent. Corolla pale pink; standard obcordate. Ovary with trichomes, with 2 ovules. Legume oblong-rhomboid, ca. 8 × 3.5 cm, densely yellow velutinous, apex shortly straight beaked. Seed chestnut-brown, ca. 1.8 × 1.4 cm, shiny. Fl. Mar–Oct, fr. Jul–Nov.

Mixed woodlands in valleys; 200–1000 m. W Guangxi, SW Guizhou, SE and SW Yunnan [Vietnam].

69. *AFGEKIA* Craib, Bull. Misc. Inform. Kew 1927: 376. 1927.

猪腰豆属 *zhu yao dou shu*

Wei Zhi (韦直); Les Pedley

Shrubs, scandent. Stipules caducous. Leaves imparipinnate; stipels present; leaflets opposite. Inflorescences axillary or cauliflorous racemes or elongated panicles, with large imbricate-tailed sericeous bracts covering flower buds, caducous. Bracteoles minute. Calyx shortly 5-toothed. Corolla standard basally with 2 curved laminar calluses; wings and keels equal in length, both clawed. Stamens diadelphous; vexillary stamen free from other 9. Ovary stipitate, with trichomes, with 2 ovules. Legume inflated, tardily dehiscent; valves thickly woody. Seeds 1[or 2] per legume, ellipsoid, shiny; hilum ca. 1/2 as long as seed.

Three species: SW China, Myanmar, Thailand; one species in China.

1. *Afgekia filipes* (Dunn) R. Geesink, Leiden Bot. Ser. 8: 77. 1984.

猪腰豆 *zhu yao dou*

Shrubs, scandent. Bark yellow, split longitudinally. Stems to 20 m, terete, sericeous and scarlet strigose when young, glabrescent. Stipules narrowly triangular, ca. 6 mm. Leaves (13–)17- or 19-foliolate; rachis 25–35 cm, including petiole 5–8 cm; stipels filiform, caducous; petiolules 3–4 mm; leaflet blades oblong, 6–10 × 2–3.5 cm, papery or leathery, both surfaces silvery pubescent but glabrescent or abaxially densely bright brown hirsute and adaxially rough, secondary veins 7–9 on each side of midvein, base rounded and asymmetric. Panicles cauliflorous, rough with scars of fallen bracts; bracts ca. 2 cm, membranous, sericeous. Pedicel ca. 2 cm. Flowers ca. 2.5 cm. Calyx cup-shaped, with trichomes, adaxial pair of teeth connate. Corolla lilac, abaxially puberulent. Legume spindle-shaped, ca. 17 × 9 cm, velutinous, indehiscent, persistently hanging on trunk. Seed 1 per legume, dark brown, reniform, ca. 8 × 4.5 cm, smooth, shiny; hilum 3.5–4 cm. Fl. Jul–Aug, fr. Sep–Nov.

Sparse thickets, evergreen broad-leaved forest margins; 200–1300 m. Guangxi, S Yunnan [Laos, Myanmar, Thailand, Vietnam].

- 1a. Leaflet blades papery, both surfaces silvery pubescent but glabrescent 1a. var. *filipes*
1b. Leaflet blades leathery, abaxially

densely bright brown hirsute,
adaxially rough 1b. var. *tomentosa*

1a. *Afgekia filipes* var. *filipes*

猪腰豆(原变种) *zhu yao dou* (*yuan bian zhong*)

Adinobotrys filipes Dunn, Bull. Misc. Inform. Kew 1911: 195. 1911; *Padbruggea filipes* (Dunn) Craib; *Whitfordiodendron filipes* (Dunn) Dunn.

Leaflet blades papery, both surfaces silvery pubescent but glabrescent.

Sparse thickets; 200–1300 m. W Guangxi, S Yunnan [Laos, Myanmar, Thailand, Vietnam].

1b. *Afgekia filipes* var. *tomentosa* (Z. Wei) Y. F. Deng & H. N. Qin, Ann. Bot. Fenn. 42: 133. 2005.

毛叶猪腰豆 *mao ye zhu yao dou*

Whitfordiodendron filipes var. *tomentosum* Z. Wei, Acta Phytotax. Sin. 27: 75. 1989.

Leaf rachises, petiolules, and leaflet blades abaxially densely bright brown hirsute. Leaflet blades leathery, adaxially rough and dark green.

• Evergreen broad-leaved forest margins; 1100–1300 m. Guangxi, S Yunnan.

70. *SARCODUM* Loureiro, Fl. Cochinch. 2: 425, 461. 1790.

耀花豆属 *yao hua dou shu*

Sun Hang (孙航); Les Pedley

Lianas. Apical vegetative bud dormant during anthesis and fruit set. Stipules and stipels persistent. Racemes in axil of terminal

leaves forming a leafy panicle; bracts longer than corresponding flowers, caducous. Bracteoles present. Calyx campanulate, subtruncate, bilabiate. Corolla standard reflexed at base, calluses absent; wings and keel \pm equally long; wings free from keel. Stamens diadelphous, vexillary staminal filament distinct from other 9. Ovary glabrous, with 9–12 ovules. Legume linear, cylindrical, raised over seeds, dehiscing along adaxial suture; exocarp fleshy but papery when dry; endocarp thin, leathery, lining seed cavity. Seeds ellipsoid; hilum rather elongated, surrounded by prominent rim; radicle folded.

Three species: SE Asia, Pacific islands (Solomon Islands); one species in China.

Sarcodum is here recognized as a genus distinct from *Clianthus* Solander ex Lindley. *Clianthus* is now considered to be a genus with one or two species restricted to New Zealand, and the Australian species formerly recognized in *Clianthus* are referred to *Swainsona* Salisbury.

1. *Sarcodum scandens* Loureiro, Fl. Cochinch. 2: 462. 1790.

耀花豆 yao hua dou

Clianthus scandens (Loureiro) Merrill.

Lianas. Branchlets villous with long spreading trichomes, glabrescent. Stipules 1–1.5 cm. Leaves 19–35-foliolate; rachis 10–25 cm, including petiole 1.5–3 cm; stipels 4–5 mm; leaf blade oblong, 2.3–3.3 \times 0.7–1.2 cm, papery, abaxially pubescent with appressed trichomes, adaxially sprinkled with whitish appressed trichomes, base rounded, apex rounded to obtuse and mucronate. Racemes 5–10 cm; bracts lanceolate-caudate,

slightly keeled, 1.6–2 cm. Pedicel 7–10 mm; bracteoles 2–4 mm. Calyx 3–4 mm, with dense brown appressed trichomes. Corolla purplish; standard elliptic, 1.5–1.7 \times ca. 1.1 cm, base subcordate, apex rounded. Ovary linear, ca. 1 cm, stipitate, with 6–10 ovules, glabrous. Legume 7–9 cm \times 4–9 mm, 6–10-seeded, slightly constricted between seeds; stipe ca. 5 mm. Seeds bright blackish, ca. 6 \times 3.5 mm; hilum broadly ovoid. Fl. Apr–May, fr. Jul–Aug.

Valleys, escarpment forests, climbing in trees. C and S Hainan [Indonesia (Maluku Islands), Philippines, Vietnam].

71. FORDIA Hemsley, J. Linn. Soc., Bot. 23: 160. 1886.

干花豆属 gan hua dou shu

Wei Zhi (韦直); Les Pedley

Imbralyx R. Geesink.

Shrubs. Supra-axillary buds covered with many conspicuous subulate cataphylls. Stipules present, persistent or caducous. Leaves spirally arranged, imparipinnate; stipels filiform in Chinese species, persistent; leaflets opposite, rather larger pairs at middle of leaf rachis, basal 1 or 2 pairs rather smaller. Pseudoracemes cauliflorous or axillary on branchlets of previous year. Bracts shorter than corresponding flower buds. Calyx indistinctly 5-toothed. Petals clawed, sericeous at basal and apical margins; standard reflexed at base, without basal calluses. Stamens diadelphous; vexillary stamen free from other 9. Ovary sessile, with trichomes, with 2(or 3) ovules. Legume clavate, flat, thinly woody, without wings. Seeds 1 or 2 per legume, lenticular, smooth; radicle folded.

Eight species: SE Asia; two species (both endemic) in China.

- 1a. Stipules falcate, persistent; leaves (19–)23- or 25-foliolate; leaflet blades oblong, 4–12 \times 2.5–3 cm; pseudoracemes 15–40 cm; flowers 1.1–1.3 cm; legume 7–10 \times 2–2.5 cm 1. *F. cauliflora*
 1b. Stipules triangular-lanceolate, caducous; leaves 17–21-foliolate; leaflet blades ovate-lanceolate, 2.5–6 \times ca. 1.5 cm; pseudoracemes 8–13 cm; flowers 0.8–1 cm; legume 3.5–6 \times ca. 1.5 cm 2. *F. microphylla*

1. *Fordia cauliflora* Hemsley, J. Linn. Soc., Bot. 23: 160. 1886.

干花豆 gan hua dou

Millettia cauliflora (Hemsley) Gagnepain.

Shrubs, 2–4 m tall. Stems rusty tomentose, glabrescent, rough with round traces of fallen leaves. Buds covered with many subulate 1.3–1.9 cm cataphylls. Stipules falcate, 2–2.5 cm, persistent. Leaves (19–)23- or 25-foliolate; rachis to 50 cm, including petiole ca. 10 cm; stipels subulate 2–2.5 cm; leaflet blades oblong to ovate-oblong, 4–12 \times 2.5–3 cm, abaxially densely pubescent, base rounded, apex acuminate. Pseudoracemes 15–40 cm, thick, straight, usually 2 or 3 together; branchlet nodes wartlike, with 3–6(–10) flowers; bracts and bracteoles minute. Flowers 1.1–1.3 cm. Corolla roseate to purple. Legume clavate, 7–10 \times 2–2.5 cm, glabrescent, apex shortly beaked. Seeds 1 or 2 per legume, dark brown, orbicular, ca. 1 cm. Fl. May–Sep, fr. Jun–Dec. $2n = 22^*$.

• Thickets on hills; near sea level to 500 m. Guangdong, Guangxi, SW Guizhou.

2. *Fordia microphylla* Dunn ex Z. Wei, Acta Phytotax. Sin. 27: 75. 1989.

小叶干花豆 xiao ye gan hua dou

Shrubs, to 2 m tall, erect. Stems yellowish tomentose. Stipules triangular-lanceolate, caducous. Leaves gathered at top of branchlets, 17–21-foliolate; rachis 15–20 cm, including petiole 3–5 cm; stipels filiform, ca. 1.5 mm; leaflet blades ovate-lanceolate, 2.5–6 \times ca. 1.5 cm, abaxially densely pubescent to tomentose. Pseudoracemes at base of branchlets of previous year, 8–13 cm; branchlet nodes obscure, with 2–5 flowers. Flowers 8–10 mm. Corolla mauve to purple. Legume clavate, 3.5–6 \times ca. 1.5 cm, flat, glabrescent, dehiscent. Seeds 1(or 2) per legume, brown, orbicular, flattened, smooth. Fl. Apr–Jun, fr. Jul–Dec.

• Rocky slopes in valleys; 800–2000 m. Guangxi, Guizhou, Yunnan.

72. MILLETTIA Wight & Arnott, Prodr. Fl. Ind. Orient. 263. 1834, nom. cons.

崖豆藤属 ya dou teng shu

Wei Zhi (韦直); Les Pedley

Trees, shrubs, or lianas. Stipules present, persistent or caducous. Leaves imparipinnate; stipels present or absent; leaflet blades opposite or rarely subalternate. Inflorescence a pseudoraceme, unbranched (but branched in *Millettia ichthyochtona*), rachis with lateral flowering branchlets reduced to knobs or short spur at each node, flowers 2–5 in a clusters or fascicles per node; bracts and bracteoles present. Calyx tube broad, shortly 5-toothed; adaxial 2 teeth ± connate. Corolla standard large, with or without basal lobes. Vexillary stamen free in bud sometimes and becoming adherent to other 9 when mature. Ovary linear; style straight or inflexed. Legume 2-valved, flat, sometimes cylindrical or inflated only around ellipsoid seeds, tardily dehiscent, not winged or with 2 wings perpendicular to abaxial or both sutures. Seeds 1 to several per legume, lenticular or globose; funicle fleshy, swelling at adaxial side, surrounding and clasping hilum as a short ringlike aril.

About 100 species: subtropical and tropical Africa, Asia, and Australia; 18 species (six endemic) in China.

Many species are used in China as medicinal drugs, insecticide, or fish poison. A few species are cultivated as ornamentals.

- 1a. Petals outside glabrous (but not always explicitly stated in description; corolla unknown in *M. entadoides*).
- 2a. Leaf rachis and leaflet blades glabrous.
- 3a. Leaflets subalternate, blades obliquely ovate, base asymmetric; legume stipitate 1. *M. ichthyochtona*
- 3b. Leaflets opposite, blades oblong-lanceolate, oblanceolate, or oblong, base symmetric; legume sessile.
- 4a. Leaflet blades 12–25 cm, secondary veins 11–13 on each side of midvein; seeds thickly lenticular; trees 3. *M. leptobotrya*
- 4b. Leaflet blades 9–12 cm, secondary veins 9–12 on each side of midvein; seeds reniform; lianas 13. *M. entadoides*
- 2b. Leaf rachis and leaflet blades at least abaxially with trichomes.
- 5a. Leaflets 13–17, blades abaxially brown sericeous; legume inflated, rough with dense warts; lianas 12. *M. pachycarpa*
- 5b. Leaflets 7–11 (or 13), blades abaxially yellow tomentose, scarlet strigose on midvein and margins, or pilose on midvein; legume flat, without warts; trees.
- 6a. Leaflet blades abaxially yellow tomentose; legume sutures both with 2 ca. 1 cm wide woody wings 2. *M. tetraptera*
- 6b. Leaflet blades abaxially scarlet strigose on midvein and margins or pilose on midvein; legume sutures both only thickened.
- 7a. Leaflet blades abaxially scarlet strigose on midvein and margins; pseudoracemes erect 4. *M. erythrocalyx*
- 7b. Leaflet blades abaxially pilose on midvein; pseudoracemes pendulous 5. *M. leucantha*
- 1b. Petals outside pubescent.
- 8a. Stipels absent.
- 9a. Leaflet blades broadly elliptic, membranous, both surfaces pubescent, apex acute; legume flat 6. *M. pubinervis*
- 9b. Leaflet blades oblong-elliptic to lanceolate-elliptic or lanceolate to oblong-lanceolate, glabrous or sparsely pilose adaxially, apex caudate; legume inflated.
- 10a. Leaflet blades oblong-elliptic to lanceolate-elliptic, papery, abaxially brown tomentose, adaxially shiny and sparsely pilose 11. *M. sapindifolia*
- 10b. Leaflet blades lanceolate to oblong-lanceolate, subleathery, abaxially sparsely strigose and adaxially glabrous 7. *M. austroyunnanensis*
- 8b. Stipels present.
- 11a. Leaflets 13–19.
- 12a. Stipules ca. 8 mm, persistent; branchlets reddish brown tomentose 8. *M. cubittii*
- 12b. Stipules 1–3 mm, caducous; branchlets yellow tomentose or grayish yellow pubescent.
- 13a. Pseudoracemes 20–25 cm; flowers 1.3–1.6 cm; corolla white or lilac; legume tomentose; trees 8–15 m tall 16. *M. velutina*
- 13b. Pseudoracemes 6–15 cm; flowers 0.9–1.2 cm; corolla pale red to scarlet; legume gray pubescent but glabrescent; erect shrubs or trees 3–8 m tall 17. *M. pulchra*
- 11b. Leaflets (5 or) 7–13 (or 15).
- 14a. Leaf rachis 15–20 cm; leaflet blades 4–5.5 cm 18. *M. oraria*
- 14b. Leaf rachis 25–40 cm; leaflet blades 7–18 cm.
- 15a. Leaflets 5; stems slender, without lenticels 9. *M. lantsangensis*
- 15b. Leaflets 7–13; stems thick, with scattered lenticels.
- 16a. Leaflet blade secondary veins 13–17 on each side of midvein; lianas 10. *M. pachyloba*
- 16b. Leaflet blade secondary veins 7–10 on each side of midvein; trees or erect shrubs.

- 17a. Leaflet blades abaxially glabrescent; inflorescences longer than subtending leaf; flowers ca. 1.8 cm; trees 14. *M. macrostachya*
 17b. Leaflet blades abaxially densely brown pubescent especially on veins; inflorescences shorter than subtending leaf; flowers ca. 1 cm; erect shrubs 15. *M. griffithii*

1. *Millettia ichthyochtona* Drake, J. Bot. (Morot) 5: 188. 1891.

闹鱼崖豆 *nao yu ya dou*

Trees, 10–15 m tall. Branchlets flexuous, with longitudinal ridges, glabrous. Buds rounded; scales 6–8, broadly ovate. Leaves 5–9-foliolate; rachis 12–17 cm, including petiole 2–3 cm; leaflet blades subalternate, obliquely ovate, 5–8 × 1.5–2.5 cm, papery, base cuneate and asymmetric, apex acuminate. Pseudoracemes axillary, main axis often repeatedly branched, with white crisped trichomes. Pedicel 1–1.5 cm, slender. Flowers ca. 1.5 cm. Calyx 5–6 mm; teeth triangular. Corolla white; standard broadly ovate, without basal calluses. Stamen monadelphous. Ovary stipitate, glabrous, with 2 ovules. Legume falcate-oblongate, 11–14 × 2–3 cm, flat, thinly woody, smooth, apex shortly beaked; stipe ca. 1 cm. Seeds 1 or 2 per legume, pale brown, ellipsoid, ca. 1.3 × 1 cm, flat, shiny; hilum white. Fl. Feb–Apr, fr. year-round.

Sandy riverbanks; 100–800 m. SE Yunnan [Vietnam].

The pale, nearly white wood is used for construction. The seeds are used as a fish poison. The stems or roots are soaked in water and applied to relieve itching.

2. *Millettia tetraptera* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 69. 1873.

四翅崖豆 *si chi ya dou*

Trees, 15–26 m tall. Branchlets grayish yellow, rough, yellowish tomentose, glabrescent. Leaves 7–11 (or 13)-foliolate; rachis 15–30 cm, including petiole 2–3 cm; stipels absent; leaflet blades elliptic-obovate, 8–13 × 2.5–3.5 cm, papery, abaxially yellow tomentose, base rounded to subcordate, apex obtuse, acute, or retuse. Pseudoracemes axillary at top of branchlets; rachis nodes with clusters of 2–5 flowers. Pedicel ca. 7 mm. Flowers 0.9–1.1 cm. Calyx 2–2.5 mm; teeth shortly triangular. Corolla lilac; standard broadly orbicular, basally thickened and emarginate. Stamens monadelphous. Ovary villous, with 4 ovules. Legume linear to oblong, 15–27 × 3–3.5 cm, flat, base tapering; stipe ca. 2 cm; both sutures with 2 ca. 1 cm wide woody wings perpendicular to them. Seeds 1 or 2 per legume, black, orbicular, ca. 1 cm in diam. Fl. May–Jun, fr. Sep–Jan.

Seasonal rain forests; 700–800 m. S Yunnan [Myanmar].

3. *Millettia leptobotrya* Dunn, J. Linn. Soc., Bot. 41: 189. 1912.

思茅崖豆 *si mao ya dou*

Fordia leptobotrya (Dunn) Schot, Dasuki & Buijsen.

Trees, 18–25 m tall. Bark gray, rough. Branchlets brown pubescent, brittle, glabrescent. Leaves 7- or 9-foliolate; rachis 20–50 cm, including petiole 5–6 cm; leaflet blades oblong-lanceolate, 12–25 × 5–8 cm, papery, secondary veins 11–13 on each side of midvein, base cuneate to obtuse, apex acuminate. Pseudoracemes axillary, 35–50 cm, straight, brown pubescent;

rachis nodes with 2–5 flowers. Pedicel ca. 2 mm. Flowers 1.1–1.3 cm. Calyx ca. 5 mm, pubescent. Corolla white; standard orbicular, without basal calluses. Stamens monadelphous. Ovary sericeous, with 3–5 ovules. Legume linear-oblong, 7–20 × 3.5–4 cm, flat, base obtuse, apex beaked; valves leathery; both sutures obscure. Seeds 1–3 per legume, pale yellow, thickly lenticular, shiny. Fl. Apr, fr. Oct–Jan.

Woodlands on slopes; 300–1000 m. S Yunnan [Laos, Vietnam].

Millettia leptobotrya is represented in China by the typical variety. Another variety, *Millettia leptobotrya* var. *macrocarpa* P. K. L c, is endemic to Vietnam.

4. *Millettia erythrocalyx* Gagnepain, Notul. Syst. (Paris) 2: 356. 1913.

红萼崖豆 *hong e ya dou*

Trees. Bark gray. Branchlets rusty strigose, glabrescent, spotted lenticels prominent. Leaves 7–11-foliolate; rachis ca. 25 cm, including petiole ca. 8 cm; leaflet blades ovate-lanceolate to elliptic-lanceolate, 3–6 × 1.5–2 cm, papery, abaxially scarlet strigose on midvein and margins, adaxially glabrous and shiny, base narrowly cordate, apex caudate. Pseudoracemes axillary near apex of branchlets, 6–7 cm, densely dark brown strigose; rachis nodes with 2 or 3 flowers. Pedicel ca. 3 mm. Flowers ca. 9 mm. Calyx dark red, ca. 3 mm, with sparse trichomes; teeth truncate, ciliate. Corolla lilac; standard glabrous, basally with 2 minute calluses, base rounded. Ovary villous, with 4 or 5 ovules. Legume linear-oblong, 9–10 × ca. 2 cm, flat, slightly curved, brown tomentose when young, glabrescent, base tapered; sutures thickened; valves woody, spirally twisted. Seeds 2 or 3 per legume, chestnut-brown, lenticular, ca. 1.3 × 1 cm, smooth. Fl. Mar–Jun, fr. year-round.

Evergreen broad-leaved forests; 600–700 m. S Yunnan [Cambodia, Laos, Thailand, Vietnam].

5. *Millettia leucantha* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 68. 1873.

垂序崖豆 *chui xu ya dou*

Millettia pendula Bentham ex Baker, nom. illeg. superfl.

Trees, 6–7 m tall. Bark gray. Branchlets smooth, striate, rusty pilose when young, gradually glabrescent, scattered with minute, smooth lenticels. Leaves (5 or) 7- or 9-foliolate; rachis 15–50 cm, including petiole 4.5–14 cm, rusty pilose; stipels aciculate, ca. 1 mm, caducous; petiolules densely pubescent, 5–6 mm; leaflet blades lanceolate to oblong, 8–30 × 2.5–6 cm, papery, abaxially appressed puberulent, pilose along midvein, adaxially sparsely appressed puberulent except along midvein, secondary veins 6–10 on each side of midvein, base rounded or broadly cuneate, apex caudate or long caudate. Pseudoracemes axillary or terminal, pendulous, slender, (15–)25–45 cm, brown pubescent; peduncle 1–4 cm, densely rusty scabrous; rachis nodes with 2–5 flowers. Pedicel 1–3 mm. Flowers 1.1–1.3 cm.

Calyx 5–6 mm, densely brown pubescent; teeth shorter than tube, apex cuspidate. Corolla white; standard broadly orbicular, glabrous, base auriculate, with 2 minute calluses and claw ca. 2.5 mm. Ovary ca. 6 mm, densely sericeous, with (3 or) 4 ovules. Legume oblong, flat, 10–17 × 2.7–3.5 cm, woody, brown tomentose, apex obtuse, with a beak. Seeds (3 or) 4 per legume, orbicular, ca. 1.5 × 6 mm. Fl. Mar–Apr, fr. Jun–Nov.

Sparse woodlands; ca. 1100 m. S Yunnan (Jiangcheng) [Laos, Myanmar, Thailand].

This species was first recorded from China by Y. Y. Qian (Acta Phytotax. Sin. 39: 464–465. 2001, as *Millettia pendula*).

6. *Millettia pubinervis* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 68. 1873.

薄叶崖豆 bao ye ya dou

Trees, to 8 m tall. Bark gray, rough. Branchlets pubescent, glabrescent. Leaves 7–11-foliolate; rachis 20–25 cm, including petiole 8–12 cm; stipels absent; leaflet blades broadly elliptic, 6–14 × 3–5 cm, membranous, both surfaces appressed pubescent but adaxially sparsely so, base broadly cuneate, apex acute. Pseudoracemes axillary or supra-axillary, 10–15 cm; rachis nodes with 1 or 2 flowers on a ca. 1 mm spur; peduncle 4–5 cm. Pedicel filiform, 4–5 mm. Flowers ca. 1 cm. Calyx ca. 3 mm, densely brown pubescent. Corolla pale red; standard orbicular, without basal calluses, outside finely woolly, base auriculate. Ovary pubescent, with 2–6 ovules. Legume linear, 9–12 × 1.3–2 cm, flat, yellow tomentose, base rounded, apex abruptly beaked; valves thinly leathery, twisted. Seeds 1–3 per legume, dark brown, oblate when immature but unknown when mature. Fl. Apr–Aug, fr. Sep.

Thickets at forest margins; 500–800 m. S Yunnan [Laos, Myanmar, Thailand, Vietnam].

7. *Millettia austroyunnanensis* Y. Y. Qian, Acta Phytotax. Sin. 35: 183. 1997.

滇南崖豆 dian nan ya dou

Trees, 4–6 m tall. Bark gray, rough. Branchlets pubescent. Leaves 7- or 9-foliolate; rachis 20–40 cm, including petiole 3.5–8 cm; stipels absent; leaflet blades lanceolate to oblong-lanceolate, 4–20 × 1.3–5 cm, subleathery, abaxially sparsely strigose, adaxially glabrous, secondary veins 7–11 on each side of midvein, base cuneate, apex caudate. Pseudoracemes axillary, 4–14 cm; rachis nodes with 1 or 2 flowers. Pedicel 1–2 mm. Flowers 1–1.5 cm. Calyx 5–6 mm, densely yellow pubescent. Corolla white; standard orbicular, without basal calluses or auricles, outside puberulent. Ovary stipitate, villous, with 7–9 ovules. Legume linear, 10–15 × 1.8–2.8 cm, woody, inflated, stipitate, gray tomentose, apex beaked. Seeds 3–5 per legume, narrowly ovoid, 2–2.5 cm. Fl. Apr, fr. Sep–Dec.

• Sparse woodlands; ca. 2000 m. S Yunnan.

8. *Millettia cubittii* Dunn, J. Linn. Soc., Bot. 41: 188. 1912.

红河崖豆 hong he ya dou

Trees, 8–10 m tall. Branchlets ridged, reddish brown tomentose, with evident leaf traces. Stipules subulate, ca. 8 mm, sturdy and straight, persistent. Leaves 13–17-foliolate; rachis

25–35 cm, including petiole 7–9 cm; stipels present; leaflet blades oblong-lanceolate, 8–11 × 2.2–3 cm, subleathery, both surfaces appressed brown pubescent on midvein, base rounded and asymmetric, apex acuminate. Pseudoracemes axillary, gathered apically on branchlets, 15–25 cm; rachis nodes laxly arranged, with 2–4 flowers. Pedicel ca. 1 cm. Flowers ca. 2.2 cm. Calyx 6–7 mm. Corolla purple; standard orbicular, outside puberulent, base auriculate and with 2 columnar calluses near claw. Ovary densely red villous, with numerous ovules. Legume linear-oblong, 18–22 × 2.5–3 cm, flat, brown tomentose; valves woody. Seeds ca. 5 per legume, mature ones unknown. Fl. Apr–Jun, fr. Jan.

Woodlands by river margins; 300–1000 m. S Yunnan [Myanmar, Vietnam].

9. *Millettia lantsangensis* Z. Wei, Acta Phytotax. Sin. 23: 277. 1985.

澜沧崖豆藤 lan cang ya dou teng

Callerya lantsangensis (Z. Wei) H. Sun.

Lianas, 2–4 m. Young branchlets, leaf rachises, and inflorescences yellowish green and appressed retrorse hirsute. Branches soft, ridged longitudinally, without lenticels. Stipules linear, ca. 4 mm, apex acuminate. Leaves 5-foliolate; rachis 25–35 cm, including petiole 8–13 cm; stipels acicular, ca. 4 mm; leaflet blades rhombic-ovate, 8–18 × 3.5–6 cm, papery, abaxially densely hirsute, adaxially pilose on midvein, base broadly cuneate and asymmetric, apex acuminate. Pseudoracemes axillary, 30–50 cm, slender; rachis nodes with 3 or 4 clustered flowers densely gathered at apical part; peduncle 6–10 cm. Pedicel ca. 1 mm. Flowers ca. 8 mm. Calyx ca. 6 × 4 mm, densely hirsute; teeth longer than tube, adaxial pair connate. Corolla pale pink; standard orbicular, without basal calluses, outside densely sericeous, base with a short claw. Vexillary stamens free. Ovary shortly stipitate, sericeous, with 10–12 ovules. Legume rhomboid-oblong to clavate, ca. 7 × 3 cm, inflated, brown tomentose, base tapering to short stipe, apex beaked. Seed usually 1 per legume, dark brown, ellipsoid, ca. 2.5 × 2 cm, shiny. Fl. May, fr. Jul.

• Thickets on slopes; 1200–1600 m. SW Yunnan.

10. *Millettia pachyloba* Drake, J. Bot. (Morot) 5: 187. 1891.

海南崖豆藤 hai nan ya dou teng

Callerya pachyloba (Drake) H. Sun; *Derris lasiopetala* Hayata; *Millettia lasiopetala* (Hayata) Merrill; *M. obovata* Gagnepain; *M. pachyloba* var. *lasiopetala* (Hayata) P. K. Lôt.

Lianas, to 20 m. Bark yellow, splitting longitudinally. Branches straight, hollow, densely brown sericeous, glabrescent, sparsely scattered with large lenticels. Leaves 9-foliolate; rachis 25–35 cm, including petiole 6–8 cm; stipels acicular, ca. 3 mm; leaflet blade elliptic-oblong to obovate-oblong, 7–17 × 3–5.5 cm, papery, abaxially yellow sericeous, secondary veins 13–17 on each side of midvein, base rounded, apex acute to obtuse and sometimes emarginate. Pseudoracemes axillary near apex of branchlets, 20–30 cm, brown sericeous; rachis nodes with 3–7 flowers clustered on a 4–5 mm spur. Pedicel 2–3 mm. Flowers 1.2–1.5 cm. Calyx ca. 3 × 4–5 mm, sericeous. Corolla

lilac; standard without basal calluses, outside sericeous. Ovary sericeous, with 4–6 ovules. Legume rhomboid-oblong, 5–8 × 3–4 cm, inflated, woody, yellow tomentose, base rounded, apex beaked. Seeds 1–4 per legume, dark brown, ovoid, shiny, 1.8–2 × ca. 1.5 cm. Fl. Apr–Jun, fr. Jul–Nov.

Evergreen broad-leaved forests in valleys; below 1500 m. Guangdong, Guangxi, SW Guizhou, Hainan, SW Hunan, Yunnan [Vietnam].

Millettia pachyloba is represented in China by the typical variety. Another variety, *Millettia pachyloba* var. *spireana* (Gagnepain) P. K. Lóc, occurs in Cambodia, Laos, Thailand, and Vietnam.

11. *Millettia sapindifolia* T. C. Chen, Acta Phytotax. Sin. 3: 361. 1954.

无患子叶崖豆藤 wu huan zi ye ya dou teng

Lianas. Branchlets yellow tomentose. Leaves 7–11-foliolate; rachis 25–30 cm, including petiole 3.5–5.5 cm; stipels absent; leaflet blades oblong-elliptic to lanceolate-elliptic, 6.5–11 × 2.8–3.5 cm, papery, abaxially brown tomentose, adaxially shiny and sparsely pilose, secondary veins 9–12 on each side of midvein, base broadly cuneate, apex caudate. Pseudoracemes axillary near apex of branchlets, 15–27 cm, yellow tomentose; rachis nodes with 3–5 flowers clustered on a 2–3 mm spur. Pedicel 2–3 mm. Flowers ca. 1.2 cm. Calyx ca. 5 mm. Corolla white; standard obovate, outside brown sericeous, apex emarginate. Vexillary stamen free. Ovary shortly stipitate, sericeous, with 3 or 4 ovules. Legume (immature) oblong, inflated, densely yellow villous, base tapering to stipe, apex beaked. Mature seeds unknown. Fl. Jun–Jul, fr. Jul–Aug.

• Thickets on slopes; 1100–1200 m. Guangxi, Guizhou.

12. *Millettia pachycarpa* Benth in Miquel, Pl. Jungh. 250. 1852.

厚果崖豆藤 hou guo ya dou teng

Millettia dumii Merrill; *M. fooningensis* Hu; *M. taiwaniana* (Hayata) Hayata; *Pongamia taiwaniana* Hayata; *Whitfordiodendron taiwaniana* (Hayata) Ohwi.

Lianas, to 15 m. Branchlets brown, yellow tomentose when young, glabrescent, scattered with brown lenticels. Leaves 13–17-foliolate; rachis 30–50 cm, including petiole 7–9 cm; leaflet blades elliptic-oblong to lanceolate-oblong, 10–18 × 3.5–4.5 cm, papery, abaxially brown appressed sericeous, adaxially flat and glabrous, base cuneate to rounded, apex acute. Pseudoracemes with 2–6 branches beneath new stems, 15–30 cm, brown tomentose; rachis nodes with 2–5 flowers clustered on a 1–3 mm spur. Pedicel 6–8 mm. Flowers 2.1–2.3 cm. Calyx ca. 6 mm. Corolla lilac; standard obovate, glabrous or ciliate on apical margin, without basal calluses. Ovary tomentose, with 5–7 ovules. Legume dark brown, oblong or when 1-seeded ovoid, 5–25 × ca. 4 cm, inflated, densely covered with pale yellow warts, glabrescent; valves thick, woody. Seeds 1–5 per legume, dark brown, reniform, 2.5–3.5 × ca. 2 cm. Fl. Apr–Jun, fr. Jul–Nov. $2n = 22$.

Evergreen broad-leaved forests in valleys; 100–2000 m. Fujian, Guangdong, Guangxi, Guizhou, SW Hubei, Hunan, S Jiangxi, Sichuan, Taiwan, SW Xizang, Yunnan, S Zhejiang [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

The seeds and roots are ground into a powder that is used as an insecticide. The bark fiber is used for making rough ropes.

13. *Millettia entadoides* Z. Wei, Acta Phytotax. Sin. 23: 278. 1985.

榼藤子崖豆藤 ke teng zi ya dou teng

Lianas. Branchlets yellow, trailing, glabrous, with dense prominent tiny lenticels. Leaves 7–13-foliolate; rachis 20–30 cm, including petiole 8–10 cm; leaflet blades oblanceolate to oblong, 9–12 × 2–3 cm, papery, glabrous, secondary veins 9–12 on each side of midvein, base broadly cuneate, apex caudate. Pseudoracemes axillary or cauliflorous, 12–15 cm, glabrescent; rachis nodes with 2 or 3 clustered flowers. Pedicel ca. 5 mm. Calyx ca. 4 × 5 mm; teeth obscure. Corolla unknown. Legume yellow, linear-oblong, ca. 20 × 4 cm, inflated, woody, glabrous, contracted between seeds, both ends rounded; sutures thickened. Seeds 2–4 per legume, dark brown, reniform, ca. 3 × 2.6 cm. Fl. Apr, fr. Aug–Nov.

• Thickets on upland slopes; 1500–2600 m. SW Yunnan.

14. *Millettia macrostachya* Collett & Hemsley, J. Linn. Soc., Bot. 28: 41. 1890.

大穗崖豆 da sui ya dou

Millettia macrostachya var. *multifoliolata* Y. Y. Qian.

Trees, to 10 m tall. Branchlets dark brown, ridged, glabrous, scattered with fine lenticels. Leaves 7–11 (or 13)-foliolate; rachis 30–40 cm, including petiole 8–9 cm; stipels present; leaflet blades broadly oblong to obovate-elliptic, 8–16 × 4–8 cm, papery, both surfaces glabrescent, secondary veins 8–10 on each side of midvein, base broadly cuneate and slightly asymmetric, apex acute. Pseudoracemes axillary, 35–50 cm, longer than subtending leaf, thick, straight, slightly puberulent; rachis nodes ± whorled with 3–7 flowers clustered on a 2–4 mm spur. Pedicel 4–5 mm, brown puberulent. Flowers ca. 1.8 cm. Calyx ca. 7 mm. Corolla pale red to lilac; standard orbicular, without basal calluses, outside puberulent, base auriculate, apex purple striped. Ovary with trichomes, with numerous ovules. Legume linear, 8–22 × ca. 1.5 cm, leathery, apex beaked; sutures thickened. Seeds 5–8 per legume, olive-green, ellipsoid, ca. 1.5 × 8 mm. Fl. Mar, fr. Jun–Aug.

Thickets on slopes; 800–900 m. S Yunnan [Myanmar].

This species occasionally is cultivated in courtyards.

15. *Millettia griffithii* Dunn, J. Linn. Soc., Bot. 41: 146. 1912.

孟连崖豆 meng lian ya dou

Shrubs, erect. Branchlets grayish brown, yellow pubescent when young, glabrescent, scattered with lenticels. Leaves 7–13-foliolate; rachis 25–40 cm, including petiole 4–8 cm; stipels present; leaflet blades oblong-lanceolate, 7–16 × 4–5 cm, papery, abaxially densely brown pubescent especially on veins, adaxially glabrescent, secondary veins 8–10 on each side of midvein, base cuneate, apex acute. Pseudoracemes axillary, gathered apically on branchlets, ca. 20 cm, shorter than subtending leaf; rachis nodes sparse, with 1–3 flowers clustered on a short spur. Pedicel 1.5–2 mm, finely puberulent. Flowers ca. 1

cm. Corolla pale pink; standard orbicular, outside apically puberulent. Ovary stipitate, with trichomes, with 3 ovules. Legume linear, 9–10 × ca. 1.5 cm, flat, appressed cream-colored pubescent, apex rounded and with a short beak; valves thinly leathery, twisted; suture conspicuously thickened. Seeds ca. 3 per legume, oblate when immature, unknown when mature. Fl. May–Jul, fr. Aug–Nov.

Sparse woodlands on slopes, near villages; ca. 1100 m. S Yunnan [Myanmar].

16. *Millettia velutina* Dunn, J. Linn. Soc., Bot. 41: 149. 1912.

绒毛崖豆 rong mao ya dou

Millettia yunnanensis Pampanini var. *robusta* Pampanini.

Trees, 8–15 m tall. Bark grayish brown, rough. Branchlets yellow tomentose, gradually glabrescent, scattered with minute prominent lenticels. Leaves 15–19-foliolate; rachis 25–30 cm, including petiole 5–7 cm; stipels ca. 1.5 mm, caducous; leaflet blades oblong-lanceolate to oblong, 4–9 × 1.5–2.5 cm, papery, abaxially yellow velutinous especially on veins, adaxially finely appressed pubescent, secondary veins 7 on each side of midvein, base obtuse to broadly cuneate, apex acute. Pseudoracemes axillary, 20–25 cm, shorter than subtending leaf; rachis nodes with 4 or 5 flowers clustered on a short decumbent spur; peduncle 3.5–8 cm, yellow tomentose. Pedicel 4–5 mm. Flowers 1.3–1.6 cm. Calyx ca. 5 mm; teeth longer than tube, cuspidate. Corolla white or lilac; standard broadly orbicular, outside apically sparsely puberulent. Ovary densely sericeous, with 6 or 7 ovules. Legume linear, 9–14 × 1.3–1.6 cm, flat, thinly leathery, brown tomentose, apex truncate and with a beak; suture prominent. Seeds 3–5 per legume, chestnut-brown, oblong, ca. 12 × 8 mm, compressed. Fl. May–Aug, fr. Jul–Nov.

• Thickets, woodlands, evergreen broad-leaved forests; 500–1900 m. N Guangdong, N Guangxi, S Guizhou, S Hunan, SW Sichuan, Yunnan.

17. *Millettia pulchra* (Benth) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 69. 1873.

印度崖豆 yin du ya dou

Shrubs or trees, 3–8 m tall. Branchlets and inflorescences grayish yellow pubescent, glabrescent. Leaves 13–19-foliolate; rachis 8–20 cm, including petiole 3–4 cm; stipels acicular, 1–3 mm, caducous; petiolules ca. 2 mm, with trichomes; leaflet blades lanceolate, elliptic-lanceolate, narrowly elliptic, oblong, or ovate, 1.2–10 × 0.7–4 cm, papery to stiffly papery, abaxially pale green, adaxially dark green, base attenuate, cuneate, or subcordate and symmetric or slightly asymmetric, apex acute to attenuate. Pseudoracemes axillary, 6–15 cm; rachis nodes with 3 or 4 clustered flowers. Pedicel 3–4 mm. Flowers 0.9–1.2 cm. Calyx ca. 4 mm; teeth triangular, shorter than tube. Corolla pale red to scarlet; standard oblong, distally outside somewhat pubescent, apex retuse. Ovary pubescent, with 5 ovules. Legume linear, 5–10 × 1–1.5 cm, flat, gray pubescent but glabrescent; valves subleathery. Seeds 2–4 per legume, brown, ellipsoid, ca. 1 cm. Fl. Apr–Aug, fr. Jun–Oct.

Open places of lowland woodlands, thickets, grasslands, sparse or mixed woodlands, woodland margins; near sea level to 1700 m. Fujian,

Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, S Taiwan, Yunnan [India, Laos, Myanmar, Vietnam].

- 1a. Leaflet blades adaxially glabrous but pilose on midvein and margins when young.
- 2a. Leaflet blades ovate, 1.2–1.8 cm, base subcordate and asymmetric 17f. var. *parvifolia*
- 2b. Leaflet blades elliptic, 2–6 cm, base cuneate-rounded and symmetric 17g. var. *microphylla*
- 1b. Leaflet blades adaxially pubescent or villous.
 - 3a. Leaflet blades 2–3.5(–6) cm.
 - 4a. Leaflet blades lanceolate, midvein adaxially flat, secondary veins 5 or 6 on each side of midvein 17a. var. *pulchra*
 - 4b. Leaflet blades narrowly elliptic, midvein adaxially sunken, secondary veins 8 or 9 on each side of midvein 17c. var. *chinensis*
 - 3b. Leaflet blades 3.5–10 cm.
 - 5a. Leaflet blades oblong, base conspicuously asymmetric 17e. var. *yunnanensis*
 - 5b. Leaflet blades lanceolate-elliptic, base symmetric or only slightly asymmetric.
 - 6a. Leaflet blades abaxially appressed pilose 17b. var. *laxior*
 - 6b. Leaflet blades abaxially gray tomentose 17d. var. *tomentosa*

17a. *Millettia pulchra* var. *pulchra*

印度崖豆(原变种) yin du ya dou (yuan bian zhong)

Mundulea pulchra Benth in Miquel, Pl. Jungh. 248. 1852; *Tephrosia tutcheri* Dunn.

Leaves and inflorescences gathered near apex of branchlets. Leaflet blades lanceolate, 2–3.5(–6) × 0.7–1.5 cm, abaxially appressed pubescent, adaxially sparsely puberulent, midvein adaxially flat, secondary veins 5 or 6 on each side of midvein, base attenuate to cuneate, apex acuminate.

Open places of lowland woodlands; near sea level to 1200 m. Guangxi, Guizhou, Hainan, Yunnan [India, Laos, Myanmar].

17b. *Millettia pulchra* var. *laxior* (Dunn) Z. Wei, Acta Phytotax. Sin. 23: 280. 1985.

疏叶崖豆 shu ye ya dou

Millettia pulchra f. *laxior* Dunn, J. Linn. Soc., Bot. 41: 151. 1912.

Leaves and inflorescences scattered on branches rather than near apex of branchlets. Leaflet blades oblong-elliptic, 3.5–10 × 1.5–4 cm, abaxially pale green and finely appressed pilose, adaxially pubescent, secondary veins 6 or 7 on each side

of midvein, base symmetric or only slightly asymmetric, apex acute.

Thickets on riverbanks; 200–1100 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Yunnan [India].

17c. *Millettia pulchra* var. *chinensis* Dunn, J. Linn. Soc., Bot. 41: 152. 1912.

华南小叶崖豆 *hua nan xiao ye ya dou*

Millettia chenkangensis Hu.

Leaflet blades narrowly elliptic, 2–3.5(–6) cm, adaxially pubescent but glabrescent, midvein adaxially sunken, secondary veins 8 or 9 on each side of midvein and curved toward apex, both ends acute but sometimes apex retuse, margins slightly revolute. Calyx teeth cuspidate.

• Grasslands, sparse woodlands; 800–1500 m. Guangxi, Yunnan.

17d. *Millettia pulchra* var. *tomentosa* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 358. 1897.

绒叶印度崖豆 *rong ye yin du ya dou*

Leaflet blades 3.5–10 cm, abaxially gray tomentose, adaxially villous but become sparsely so with age, base symmetric or only slightly asymmetric. Calyx with dense trichomes.

Thickets on dry slopes; 100–800 m. Guangxi, Yunnan [India, Myanmar].

17e. *Millettia pulchra* var. *yunnanensis* (Pampanini) Dunn, J. Linn. Soc., Bot. 41: 152. 1912.

云南崖豆 *yun nan ya dou*

Millettia yunnanensis Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 26. 1910.

Leaflet blades oblong, 3.5–10 cm, adaxially pubescent, secondary veins 6 or 7 on each side of midvein, adaxially sunken, and densely yellow villous, base conspicuously asymmetric, apex acute.

Thickets, sparse woodlands; 500–1200 m. Yunnan [Myanmar].

17f. *Millettia pulchra* var. *parvifolia* Z. Wei, Acta Phytotax. Sin. 23: 281. 1985.

景东小叶崖豆 *jing dong xiao ye ya dou*

Leaflet blades ovate, 1.2–1.8 cm, adaxially glabrous but pilose on midvein and margin when young, base subcordate and asymmetric.

• Thickets, woodland margins; ca. 1700 m. S Yunnan.

17g. *Millettia pulchra* var. *microphylla* Dunn, J. Linn. Soc., Bot. 41: 512. 1912.

台湾小叶崖豆 *tai wan xiao ye ya dou*

Leaflet blades elliptic, 2–6 cm, abaxially gray villous especially on margins, secondary veins 4 or 5 on each side of midvein but obscure, base cuneate-rounded and symmetric. $2n = 22^*$.

• Thicket margins; below 200 m. S Taiwan.

18. *Millettia oraria* (Hance) Dunn, J. Linn. Soc., Bot. 41: 149. 1912.

香港崖豆 *xiang gang ya dou*

Tephrosia oraria Hance, J. Bot. 24: 17. 1886.

Shrubs or trees, to 5 m tall, erect. Bark smooth, dark gray. Branchlets ridged, tomentose, scattered with prominent lentils. Stipules lanceolate, 2–3 mm. Leaves (7 or)9–13(or 15)-foliolate; rachis 15–20 cm, including yellow tomentose petiole 3.5–4.5 cm; stipels present; leaflet blades broadly ovate to elliptic, 4–5.5 × 2–3 cm, papery, abaxially tomentose, adaxially densely pubescent, secondary veins 6 or 7 on each side of midvein and reaching to margins, base rounded to subcordate, apex rounded. Pseudoracemes axillary, gathered near apex of branchlets, shorter than subtending leaf, yellow tomentose. Flowers 8–11 mm. Calyx ca. 3 mm. Corolla purple; standard suborbicular, outside puberulent. Ovary sericeous, with 2–4 ovules. Legume linear, 5–9 × 1–1.5 cm, flat, brown tomentose, somewhat glabrescent. Seeds 2 or 3 per legume, orange, oblate, ca. 7 mm. Fl. May–Jul, fr. Nov–Dec.

• Thickets; 300–800 m. Guangdong, S Guangxi.

73. CALLERYA Endlicher, Gen. Pl., Suppl. 3: 104. 1843.

鸡血藤属 *ji xue teng shu*

Wei Zhi (韦直); Les Pedley

Marquartia Vogel, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 35. 1843, non Hasskarl (1842); *Adinobotrys* Dunn; *Padbruggea* Miquel; *Whitfordia* Elmer (1910), not Murrill (1908); *Whitfordiodendron* Elmer.

Lianas, scandent shrubs, or rarely trees. Stipules glabrous, mostly deciduous. Leaves imparipinnate; stipels narrowly triangular, persistent or deciduous; leaflets (sub)opposite. Flowers neither paired nor clustered, in axillary or terminal racemes, sometimes forming axillary or terminal panicles; bracts shorter or longer than corresponding flower, usually deciduous; bracteoles on calyx or rarely on distal part of pedicel, persistent or not. Calyx usually truncate with short teeth. Corolla standard glabrous to densely sericeous outside, Chinese taxa with or without basal calluses, basally reflexed; wings and keel petals ± equally long; wings often partially adnate to keel. Stamens diadelphous; vexillary filament free from other 9. Ovary sometimes stipitate. Legume indehiscent or tardily dehiscent, thin to thickly woody, flat or inflated; sutures not winged, sometimes thickened. Seeds 1–9 per legume, roundish; radicle folded.

About 30 species: S and SE Asia, Australia, New Guinea; 18 species (ten endemic) in China.

- 1a. Standard outside glabrous.
- 2a. Calyx densely sericeous, hirsute, or tomentose; ovary sericeous or tomentose.
- 3a. Leaflets 7, blades 4–8 × 1–2 cm, apex acuminate to caudate; flowers ca. 1.8 cm; corolla yellow 3. *C. fordii*
- 3b. Leaflets 7–13, blades 4–13 × 1–4 cm, apex acute; flowers 2.5–3.5 cm; corolla white, creamy, pale pink, or lilac.
- 4a. Leaflet blades shiny, glabrous on adaxial surface, rusty pubescent and glabrescent on abaxial surface; ovules numerous; standard with 2 basal calluses 1. *C. speciosa*
- 4b. Leaflet blades villous on both surfaces; ovules 4–6; standard without basal calluses 2. *C. bonatiana*
- 2b. Calyx sparsely pubescent; ovary glabrous.
- 5a. Stipules inserted at tip of persistent gibbosity on stem.
- 6a. Calyx pubescent; legume carmine when dry, oblong, 10–11 cm, convex, suture thickened; panicles ca. 30 cm 4. *C. eurybotrya*
- 6b. Calyx glabrescent; legume blackened when dry, linear, ca. 15 cm, flat, suture not thickened; panicles 10–20 cm 5. *C. reticulata*
- 5b. Stipules not inserted at tip of persistent gibbosity on stem.
- 7a. Panicle terminal, branchlets ascending; corolla yellowish white with a pink halo; leaf blade glabrous and shiny, abaxially pale green when dry, secondary and tertiary veins distinct and raised on both surfaces, apex acuminate to caudate 6. *C. championii*
- 7b. Racemes axillary, pendulous; corolla white or purple; leaf blade flat and rough, abaxially dull grayish green when dry, secondary and tertiary veins indistinct, apex acute 7. *C. kiangsiensis*
- 1b. Standard outside densely sericeous.
- 8a. Leaflets 3(or 5).
- 9a. Stipels absent; leaflet blades subleathery 8. *C. tsui*
- 9b. Stipels present; leaflet blades papery 13. *C. sphaerosperma*
- 8b. Leaflets 5 or 7 (3 or 5 in *C. dorwardii*).
- 10a. Legume flat, not distinctly contracted between seeds; seeds lenticular.
- 11a. Panicles straight, branchlets contiguous, flowers closely arranged.
- 12a. Corolla violet to purple; legume stipitate, brown tomentose; leaflet blades ovate-lanceolate or oblong, subleathery; stipels subulate, ca. 2 mm 16. *C. nitida*
- 12b. Corolla white or pale pink; legume sessile, gray hirsute; leaflet blades broadly elliptic to ovate, papery; stipels filiform, 5–6 mm 17. *C. congestiflora*
- 11b. Panicles spreading, branchlets slender, flowers laxly arranged.
- 13a. Leaflets (5 or)7, blades caudate at apex; panicles long pedunculate 15. *C. longipedunculata*
- 13b. Leaflets 5, blades acute at apex; panicles subsessile 18. *C. dielsiana*
- 10b. Legume inflated, usually distinctly contracted between seeds; seeds globose or reniform.
- 14a. Branchlets, leaf rachises, and leaflet blades abaxially with dense trichomes, not glabrescent; legume densely brown tomentose.
- 15a. Leaflet blades 4–8 cm wide, abaxially brown velutinous; legume 2–2.5 cm wide 9. *C. oosperma*
- 15b. Leaflet blades 1.8–3 cm wide, abaxially rusty tomentose; legume ca. 1.5 cm wide 14. *C. sericosema*
- 14b. Branchlets, leaf rachises, and leaflet blades abaxially with sparse trichomes or glabrescent; legume gray pubescent, yellow tomentose, or gray tomentose.
- 16a. Panicles compact, branchlets congested; legume not contracted between seeds 12. *C. dorwardii*
- 16b. Panicles lax, branchlets spread out; legume contracted between seeds.
- 17a. Floriferous branchlets slender; leaflet blades obovate; petiolules ca. 4 mm; stipels ca. 4 mm 10. *C. cinerea*
- 17b. Floriferous branchlets straight; leaflet blades oblong; petiolules 2–3 mm; stipels ca. 1 mm 11. *C. gentiliana*

1. *Callerya speciosa* (Champion ex Bentham) Schot, *Blumea* 39: 32. 1994.

美丽鸡血藤 mei li ji xue teng

Millettia speciosa Champion ex Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 73. 1852.

Lianas, 1–3 m. Bark brown. Branchlets brown tomentose, glabrescent. Leaves 13-foliolate; rachis 15–25 cm, including petiole 3–4 cm; leaflet blades oblong-lanceolate to elliptic-lanceolate, 4–8 × 2–3 cm, papery, abaxially rusty pubescent, gla-

brscent, and reddish brown when dry, adaxially glabrous and shiny but glaucous when dry, base rounded, margins slightly revolute, apex acute and with a short tip. Racemes axillary, usually congested near apex of branchlets to form large panicles, ca. 30 cm, brown tomentose. Pedicel and calyx tomentose. Flowers 2.5–3.5 cm, fragrant. Corolla white, creamy, or pale pink; standard orbicular, glabrous, with 2 basal calluses. Ovary tomentose, with numerous ovules. Legume linear, 10–15 × 1–2 cm, flat, brown tomentose, base tapering to a short stipe, apex beaked; valves woody. Seeds 4–6 per legume, black, ovoid, ca. 10 × 8 mm. Fl. Jul–Sep, fr. Aug–Oct.

Open places, sparse woodlands; 200–1700 m. Fujian, Guangdong, Guangxi, S Guizhou, Hainan, S Hunan, Yunnan [Vietnam].

The roots are rich in starch and used to make a tonic wine.

2. *Callerya bonatiana* (Pampanini) P. K. Lôc, Bot. Zhurn. (Moscow & Leningrad) 81(10): 99. 1996.

滇桂鸡血藤 dian gui ji xue teng

Millettia bonatiana Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 24. 1910.

Lianas, to 10 m. Branchlets ridged, densely yellow pubescent, gradually glabrescent. Leaves 11- or 13-foliolate; rachis 25–30 cm, including petiole 2–3 cm; stipels absent; leaflet blades ovate to ovate-elliptic, 6–10 × 3–4 cm, papery, both surfaces villous but especially dense abaxially, secondary veins 4 or 5 on each side of midvein, base rounded to subcordate, apex acute. Pseudoracemes axillary, 8–12 cm, yellow pubescent. Pedicel ca. 1 cm. Flowers ca. 2.5 cm. Calyx ca. 1.2 cm, densely sericeous. Corolla lilac; standard oblong, without a basal callus, outside densely yellow sericeous, apex retuse. Ovary stipitate, sericeous, with 4–6 ovules. Legume linear-oblong, 10–11 × ca. 1.8 cm, leathery, with a ca. 1 cm stipe, grayish brown tomentose. Seeds ca. 4 per legume, brown, oblate, ca. 1.1 cm. Fl. Apr–Jun, fr. Jun–Oct.

Thickets in valleys; ca. 1000 m. Guangxi, Yunnan [Laos].

The plants are poisonous but used medicinally in small amounts.

Although P. K. Lôc made the necessary transfer to *Callerya*, a note by the same author in Fl. Cambodge, Laos & Vietnam (30: 43. 2001) suggests that the author saw only one incomplete specimen from that Flora region and that more material in flower and fruit would be required to confirm its identity.

3. *Callerya fordii* (Dunn) Schot, Blumea 39: 23. 1994.

广东鸡血藤 guang dong ji xue teng

Millettia fordii Dunn, J. Linn. Soc., Bot. 41: 156. 1912.

Lianas, 1–2 m. Stems dark brown, terete, slender, soft. Branchlets yellow pubescent when young, glabrescent. Leaves 7-foliolate; rachis 10–20 cm, including petiole 2–4 cm; leaflet blades linear-lanceolate, 4–8 × 1–2 cm with terminal one largest, papery, both surfaces slightly shiny and blackened when dry, base rounded to cordate, apex acuminate to caudate. Racemes axillary, 5–7 cm, shorter than subtending leaf, yellow tomentose. Flowers ca. 1.8 cm. Calyx ca. 8 mm, hirsute. Corolla yellow; standard broadly ovate, glabrous, with 2 basal calluses. Ovary stipitate, tomentose, with numerous ovules. Legume linear, 10–12 × ca. 1 cm, flat, brown tomentose, apex cuspidate. Seeds 4–8 per legume, brown, ovoid, ca. 7 × 6 mm, smooth. Fl. Jun–Oct, fr. Oct–Jan.

Sparse woodlands on slopes; ca. 500 m. Guangdong, Guangxi [Vietnam].

4. *Callerya eurybotrya* (Drake) Schot, Blumea 39: 22. 1994.

宽序鸡血藤 kuan xu ji xue teng

Millettia eurybotrya Drake, J. Bot. (Morot) 5: 187. 1891.

Shrubs, scandent, 4–10 m. Bark smooth. Branchlets pale

yellow, ridged, appressed pubescent, glabrescent, with scattered obscure lenticels. Leaves (5 or)7-foliolate; rachis 20–25(–40) cm, including petiole (3–)5–6(–7) cm; leaflet blades ovate-oblong to elliptic-lanceolate, 6–16 × 2.5–8 cm, papery, both surfaces dark green and glabrous, base broadly cuneate to rounded, apex acute. Panicles terminal, ca. 30 cm; flowering branchlets 8–10 cm, spreading, yellowish brown tomentose. Flowers 1.4–1.5 cm. Calyx pubescent. Corolla purple, with yellow-green spots in center; standard orbicular, without basal calluses, base tapering into a claw. Ovary glabrous, with numerous ovules. Legume carmine when dry, oblong, 10–11 × 2–3 cm, inflated, woody, contracted between seeds; suture thickened. Seeds 2–7 per legume, brown, ellipsoid, ca. 2 cm; hilum white. Fl. Jul–Aug, fr. Sep–Nov.

Thickets in valleys or ravines; 100–1200 m. N Guangdong, NW Guangxi, S Guizhou, S Hunan, S Yunnan [Laos, Thailand, Vietnam].

The plants are poisonous and also used medicinally.

5. *Callerya reticulata* (Benth) Schot, Blumea 39: 29. 1994.

网络鸡血藤 wang luo ji xue teng

Lianas, 2–10 m. Stems thick, many branched, thinly ridged, brown pubescent, glabrescent. Leaves (5 or)7- or 9-foliolate; rachis 10–20 cm, including petiole 2–5 cm; leaflet blades ovate-elliptic, oblong, linear, or narrowly lanceolate, (3–)5–6(–8) × (0.5–)1.5–4 cm, papery, both surfaces glabrous or rarely sparsely puberulent, base rounded, tapering, or cuneate, apex obtuse, acuminate, or retuse. Panicles terminal or axillary near apex of branchlets, 10–20 cm, often pendulous, brown pubescent; flowering branchlets densely congested. Pedicel 3–5 mm. Flowers 1.3–1.7 mm. Calyx 3–4 × ca. 5 mm, glabrescent; teeth short, margin yellow ciliate. Corolla purple; standard ovate-oblong, glabrous, without basal calluses, base shortly clawed. Ovary glabrous, with numerous ovules. Legume blackened when dry, linear, ca. 15 × 1–1.5 cm, flat, thinly leathery; suture not thickened. Seeds 3–6 per legume, black, oblong, ca. 11 × 7 mm. Fl. Apr–Aug, fr. Jun–Nov.

Thickets on slopes or in valleys, thickets by streams; 100–1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [N Vietnam].

- 1a. Leaflet blades ovate-elliptic to oblong, 1.5–4 cm wide, base rounded 5a. var. *reticulata*
- 1b. Leaflet blades linear to narrowly lanceolate, 0.5–1.2 cm wide, base tapering to cuneate 5b. var. *stenophylla*

5a. *Callerya reticulata* var. *reticulata*

网络鸡血藤(原变种) wang luo ji xue teng (yuan bian zhong)

Millettia reticulata Benth in Miquel, Pl. Jungh. 249. 1852; *M. cognata* Hance.

Leaflet blades ovate-elliptic to oblong, 5–6(–8) × 1.5–4 cm, base rounded. $2n = 48$.

Thickets on slopes or in valleys; 100–1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [N Vietnam].

5b. *Callerya reticulata* var. *stenophylla* (Merrill & Chun) X. Y. Zhu in X. Y. Zhu et al., *Legumes China*, 455. 2007.

线叶鸡血藤 xian ye ji xue teng

Millettia reticulata var. *stenophylla* Merrill & Chun, *Sunatsenia* 5: 83. 1940.

Leaflet blades linear to narrowly lanceolate, (3–)3.5–5 × 0.5–1.2 cm, base tapering to cuneate.

- Thickets by streams; 200–1200 m. Hainan.

6. *Callerya championii* (Benth) X. Y. Zhu in X. Y. Zhu et al., *Legumes China*, 450. 2007.

绿花鸡血藤 lü hua ji xue teng

Millettia championii Benth, Hooker's J. Bot. Kew Gard. Misc. 4: 74. 1852; *Callerya reticulata* (Benth) Schot var. *championii* (Benth) H. Sun.

Lianas, to 2 m, glabrous except inflorescences. Stems reddish brown, with scattered lenticels. Leaves 5(or 7)-foliolate; rachis 10–20 cm, including petiole 3–5 cm; leaflet blades ovate to ovate-oblong, (3–)4–6 × 1.5–2(–3) cm, papery, both surfaces glabrous and shiny, pale green when dry, secondary and tertiary veins distinct and raised on both surfaces, base rounded, apex acuminate to caudate. Panicles terminal, 15–20 cm; flowering branchlets 6–8 cm, ascending, straight and solid, nodes congested. Flowers ca. 1.2 cm. Corolla yellowish white with a pink halo; standard orbicular, glabrous, without basal calluses. Ovary glabrous, with numerous ovules. Legume linear, 6–12 × 0.5–1.2 cm, flat; valves thin. Seeds 2 or 3 per legume, lenticular when immature. Fl. May–Aug, fr. Jul–Nov.

- Thickets by ravines of rocky valleys; 200–800 m. Fujian, Guangdong, Guangxi.

The stems and roots are poisonous but also used medicinally.

Although P. K. Lóc made the combination *Callerya championii* (Bot. Zhurn. (Moscow & Leningrad) 81(10): 97. 1996), it was not validly published because he did not provide a full bibliographic reference to the basionym (*Vienna Code*, Art. 33.4).

7. *Callerya kiangsiensis* (Z. Wei) Z. Wei & Pedley, **comb. nov.**

江西鸡血藤 jiang xi ji xue teng

Basionym: *Millettia kiangsiensis* Z. Wei, *Acta Phytotax. Sin.* 23: 283. 1985; *M. kiangsiensis* f. *purpurea* Z. H. Cheng.

Lianas. Stems reddish brown, terete, slender, with dense minute lenticels. Leaves 7- or 9-foliolate; rachis 6–18 cm, including petiole 2–3 cm; leaflet blades ovate, (1.5–)3–5(–6) × 1–2.5 cm, papery, both surfaces glabrous, abaxially dull grayish green when dry, adaxially dark green, secondary and tertiary veins indistinct, base rounded, apex acute. Racemes axillary, 8–12 cm, as long as subtending leaf, puberulent. Flowers 1.2–1.5 cm. Corolla white or purple, apically slightly roseate at margin; standard oblong, glabrous, without basal calluses. Ovary stipitate, glabrous, with numerous ovules. Legume linear, ca. 10 × 1.2 cm, flat, straight, base tapering to a ca. 3 mm stipe, apex with a short hooked beak. Seeds 5–9 per legume, black, lenticular, ca. 7 × 5 mm. Fl. Jun–Aug, fr. Sep–Oct.

- Sparse thickets, thickets on slopes; 200–600 m. S Anhui, N Fujian, SE Hubei, E Hunan, Jiangxi, W Zhejiang.

8. *Callerya tsui* (F. P. Metcalf) Z. Wei & Pedley, **comb. nov.**

喙果鸡血藤 hui guo ji xue teng

Basionym: *Millettia tsui* F. P. Metcalf, *Lingnan Sci. J.* 19: 554. 1940.

Lianas, 3–10 m. Stems dark brown, terete, straight, fine ridged, brown tomentose, glabrescent, without lenticels. Leaves 3(or 5)-foliolate; rachis 12–28 cm, including petiole 5–8 cm; stipels absent; leaflet blades broadly elliptic to elliptic, (6–)10–18 × 5–8 cm, subleathery, both surfaces glabrous and shiny, reticulate veins prominent, base obtuse to broadly cuneate, apex rounded and with a cusp. Panicles terminal, 15–30 cm; flowering branchlets spreading, often leafy at base, brown tomentose, nodes congested. Flowers 1.5–2.5 cm. Corolla pale yellow flushed with red or lilac; standard oblong, without basal calluses, outside densely sericeous. Ovary stipitate, sericeous, with 4–7 ovules. Legume ellipsoid when 1-seeded and ca. 5.5 × 4 cm, linear-oblong when 2- or 3-seeded and ca. 7 × 3 cm, inflated but contracted between seeds, brown tomentose but generally glabrescent, base tapering to 5 mm stipe, apex with a hard hooked beak. Seeds 1–3 per legume, dark brown, subglobose to oblatly spheroid, 2–2.5 × 1–2.5 cm. Fl. Jul–Sep, fr. Oct–Dec.

- Thickets, woodlands in valleys; 200–1600 m. Guangdong, Guangxi, S Guizhou, Hainan, S Hunan, S Yunnan.

The stem and root are used medicinally. The bast fibers are rather tough and used for making rope. The seeds are edible after stewing.

9. *Callerya oosperma* (Dunn) Z. Wei & Pedley, **comb. nov.**

皱果鸡血藤 zhou guo ji xue teng

Basionym: *Millettia oosperma* Dunn, *J. Linn. Soc., Bot.* 41: 157. 1912.

Lianas, to 20 m. Stem brown, terete, strong and ridged, brown tomentose, generally glabrescent. Leaves 5-foliolate; rachis 20–40 cm, including petiole 6–11 cm; leaflet blades elliptic-lanceolate to ovate-oblong, 8–20 × 4–8 cm with basal pair usually smallest, papery, abaxially densely brown velutinous, adaxially glabrous or sparsely villous, base cuneate to rounded, apex obtuse to sometimes retuse. Panicles terminal, 10–20 cm, brown tomentose; flowering branchlets spreading. Flowers 1.5–2 cm. Corolla scarlet; standard broadly ovate, with 2 basal calluses and also auriculate, outside densely sericeous. Ovary densely sericeous, with 5 or 6 ovules. Legume ovoid when 1-seeded, cylindrical when several seeded, 6–13 × 2–2.5 cm, inflated but contracted between seeds, brown tomentose, tardily dehiscent, apex beaked. Seeds (1 or)2–4 per legume, tawny, ovoid, 2–3 cm in diam. Fl. May–Jul, fr. Aug–Nov.

- Sparse woodlands in valleys; 200–1700 m. SW Guangdong, Guangxi, Guizhou, Hainan, SW Hunan, Yunnan [Vietnam].

The seeds are poisonous and used as an insecticide.

10. *Callerya cinerea* (Benth) Schot, *Blumea* 39: 17. 1994.

灰毛鸡血藤 hui mao ji xue teng

Millettia cinerea Benth in Miquel, *Pl. Jungh.* 249. 1852.

Shrubs, scandent, to 6 m. Stems terete, rough, ridged, glabrescent. Leaves 5-foliolate; rachis 15–25 cm, including petiole 3–4 cm; stipels ca. 4 mm; petiolules ca. 4 mm; leaflet blades obovate-elliptic, basal pair ca. 5.5 × 3 cm, lateral pair and terminal one ca. 15 × 7 cm with laterals rather smaller than terminal, papery, abaxially sparsely hirsute and particularly evident on veins, adaxially glabrous except midvein, base broadly cuneate, rounded, or rarely subcordate, apex acute. Panicles terminal, 10–15 cm; flowering branchlets spreading to 6 cm, with dense appressed trichomes. Flowers 1.2–1.6 cm. Corolla red to mauve; standard ovate, outside rusty sericeous, basally thickened and emarginate. Ovary shortly stipitate, tomentose, with 5–7 ovules. Legume linear-oblong, ca. 13 × 2 cm, inflated but contracted between seeds, densely gray pubescent. Seeds 1–4 per legume, dark violet, ellipsoid, 1.4–1.8 cm. Fl. Feb–Jul, fr. Aug–Nov.

Secondary evergreen broad-leaved forests by ravines; 500–1200 m. SW Sichuan, SE Xizang, S Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Thailand].

11. *Callerya gentiliana* (H. Léveillé) Z. Wei & Pedley, *comb. nov.*

黔滇鸡血藤 qian dian ji xue teng

Basionym: *Millettia gentiliana* H. Léveillé, Fl. Kouy-Tchéou, 239. 1914–1915 [“*Gentiliniana*” with “*n*” deleted].

Lianas, 1.5–3 m. Stems grayish brown, rough, gray puberulent, glabrescent. Leaves 5-foliolate; rachis 12–18 cm, including petiole 3–5 cm; stipels ca. 1 mm; petiolules 2–3 mm; leaflet blades ovate-elliptic to oblong-elliptic, lateral pairs 6–8(–10) × 2–3(–4) cm, terminal one ca. 18 × 8 cm, papery, with sparse trichomes or glabrescent, base cuneate to subcordate, apex acute to obtuse. Panicles terminal, 8–15 cm; flowering branchlets spreading, straight, brown tomentose. Flowers 1.5–2 cm. Corolla purple; standard obovate, without basal calluses, outside densely sericeous. Ovary velutinous, with numerous ovules. Legume linear, 8–15 × 1.5–2 cm, inflated, shortly stipitate, yellow tomentose, contracted between seeds, apex with a curved beak. Seeds 5 or 6 per legume, dark brown, ovoid, ca. 2 × 1.5 cm; hilum in middle. Fl. Jun–Jul, fr. Oct–Nov.

• Sparse woodlands of mountains, especially in limestone valleys; 1200–2500 m. Guizhou, S Sichuan, Yunnan.

12. *Callerya dorwardii* (Collett & Hemsley) Z. Wei & Pedley, *comb. nov.*

滇缅鸡血藤 dian mian ji xue teng

Basionym: *Millettia dorwardii* Collett & Hemsley, J. Linn. Soc., Bot. 28: 40. 1890 [“*dorwardi*”]; *M. shunningensis* Hu.

Lianas, to 6 m. Stems brown, rough, without lenticels. Branchlets yellowish white pubescent, generally glabrescent. Leaves 3- or 5-foliolate; rachis 12–25(–35) cm, including petiole (4–)6–7(–9) cm; leaflet blades broadly ovate to elliptic, 8–15(–22) × 3.5–6(–10) cm with basal pair usually smallest, papery, abaxially with yellow or white scattered trichomes but glabrescent when mature, adaxially glabrous or with sparse trichomes on veins, base cuneate, rounded, or rarely cordate, apex acute. Panicles axillary, strong, 12–18 cm, densely pubescent;

flowering branchlets short. Flowers 1.8–2.3 cm. Corolla lilac to mauve; standard orbicular, with 2 basal calluses, outside densely sericeous, base shortly clawed. Ovary tomentose, with 5 ovules. Legume oblong, ca. 9 × 3 cm, inflated, yellow tomentose, apex beaked. Seeds 1 or 2 per legume, pale brown, broadly ovoid, ca. 2.5 × 2 cm. Fl. Apr–May, fr. Sep–Oct.

Thickets on slopes; 800–1900 m. Guizhou, Yunnan [Myanmar, Thailand].

13. *Callerya sphaerosperma* (Z. Wei) Z. Wei & Pedley, *comb. nov.*

球子鸡血藤 qiu zi ji xue teng

Basionym: *Millettia sphaerosperma* Z. Wei, Acta Phytotax. Sin. 23: 285. 1985.

Shrubs, scandent. Bark pale yellow. Stems puberulent when young, glabrescent, sparsely scattered with minute lenticels, basally brown and peeled off. Leaves 3-foliolate; rachis 15–25 cm, including petiole 4–6 cm; stipels ca. 2 mm; leaflet blades elliptic-lanceolate, lateral ones 9–12 × 3.5–5 cm, terminal one 11–18 × 6–9 cm, papery, abaxially straw-green with prominent veins, adaxially dark green and flat. Panicle terminal 12–15 cm; flowering branchlets spreading, puberulent. Flowers ca. 1.5 cm. Corolla red to purple; standard oblong, without basal calluses, outside densely sericeous. Ovary sericeous, with 6–8 ovules. Legume globose, 5–6.5 × ca. 3 cm, leathery, brown tomentose, apex beaked; suture evident. Seeds 1 or 2 per legume, dark brown, broadly ovoid. Fl. Jun–Aug, fr. Oct–Nov.

• Shady ravines; ca. 1000 m. Guangxi, Guizhou.

14. *Callerya sericosema* (Hance) Z. Wei & Pedley, *comb. nov.*

锈毛鸡血藤 xiu mao ji xue teng

Basionym: *Millettia sericosema* Hance, J. Bot. 20: 259. 1882; *M. bodinieri* H. Léveillé.

Shrubs, scandent, 1.5–2 m. Branchlets brown, terete, rusty tomentose, glabrescent. Leaves 5-foliolate; rachis 13–18 cm, including petiole 3–6 cm; leaflet blades broadly lanceolate, 6–10 × 1.8–3 cm with basal pair smallest, papery, abaxially rusty tomentose, adaxially appressed pubescent and rather densely so on midvein and margin, base obtuse, apex acute to acuminate. Panicles terminal, 8–10 cm; flowering branchlets straight, rusty tomentose, nodes congested. Flowers ca. 1.7 cm. Corolla lilac to pale pink; standard ovate, without basal calluses, outside densely sericeous. Ovary yellow tomentose, with 5 or 6 ovules. Legume linear, 4–10 × ca. 1.5 cm, inflated, brown tomentose, apex beaked. Seeds 1–4 per legume, brown, ovoid to oblate. Fl. Jun–Aug, fr. Aug–Oct.

• Open places or sparse thickets in river valleys; 500–1300 m. Guangxi, Guizhou, W Hubei, Hunan, Sichuan, NE Yunnan.

15. *Callerya longipedunculata* (Z. Wei) X. Y. Zhu in X. Y. Zhu et al., Legumes China, 453. 2007.

长梗鸡血藤 chang geng ji xue teng

Millettia longipedunculata Z. Wei, Acta Phytotax. Sin. 23: 287. 1985; *Callerya cinerea* (Benth) Schot var. *longipedunculata* (Z. Wei) H. Sun.

Lianas. Branchlets brown, smooth and slender, yellow tomentose, glabrescent, without lenticels. Leaves (5 or)7-foliolate; rachis 30–35 cm, including petiole 5–7 cm; leaflet blades lanceolate, basal pair 4–8 × 2.5–3.5 cm, lateral pairs and terminal one 12–20 × 3.5–6 cm with terminal one largest, papery, abaxially densely villous, adaxially appressed pubescent, base broadly cuneate to narrowly subcordate, apex caudate. Panicles terminal, 20–40 cm, slender; flowering branchlet nodes scattered; peduncle rather long, yellow tomentose. Flowers 1.5–1.7 cm. Corolla red; standard obovate, outside densely sericeous. Ovary tomentose, with 6 ovules. Legume rhomboid to oblong, 3.5–8 × ca. 2.2 cm, dark brown tomentose, gradually glabrescent, slightly contracted between seeds, apex with a hooked beak. Seeds 1–3 per legume, reddish brown, oblate, ca. 1.5 × 2 cm. Fl. May–Aug, fr. Jul–Oct.

• Evergreen broad-leaved forests in shady places in valleys; ca. 1400 m. NW Guangxi, SW Guizhou, E Yunnan.

16. *Callerya nitida* (Benth) R. Geesink, *Leiden Bot. Ser.* 8: 83. 1984.

亮叶鸡血藤 liang ye ji xue teng

Shrubs, scandent, 2–10 m. Stems rusty brown, finely puberulent, glabrescent. Leaves 5-foliolate; rachis 15–20 cm, including petiole 3–6 cm; leaflet blades lanceolate, oblong, or ovate, 3.5–9(–11) × 2–4 cm, papery, secondary veins 5 or 6 on each side of midvein, curved apically near margins, and prominent on both surfaces, base obtuse to rounded, apex cuspidate, acute, or acuminate. Panicles terminal, 10–12 cm, thick, rusty tomentose; flowering branchlets 6–10 cm, straight. Flowers 1.6–2.4 cm. Pedicel and calyx tomentose. Corolla violet to purple; standard oblong, with 2 basal calluses, outside densely sericeous. Ovary stipitate, tomentose, with 4–8 ovules. Legume linear-oblong, 10–14 × 1.5–2 cm, stipitate, flat, brown tomentose, apex beaked. Seeds 4 or 5 per legume, chestnut-brown, obliquely oblong, ca. 1 × 1.2 cm. Fl. May–Sep, fr. Jul–Nov.

• Thickets, lowland sparse woodlands, forest margins, open places on slopes; near sea level to 1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

- 1a. Leaflet blades 5–9(–11) × 3–4 cm, abaxially glabrous or sparsely puberulent, adaxially glabrous and shiny but sometimes sparsely puberulent on midvein, apex acute to cuspidate; flowers 2.2–2.4 cm 16a. var. *nitida*
- 1b. Leaflet blades 3.5–5.5 × 2–3 cm, both surfaces glabrous or glabrescent or abaxially densely reddish brown hirsute becoming blackened when dry and adaxially opaque and rough, apex acuminate or cuspidate; flowers 1.6–1.8 cm.
- 2a. Leaflet blades lanceolate, both surfaces glabrous or glabrescent, apex acuminate 16b. var. *minor*
- 2b. Leaflet blades ovate, abaxially densely reddish brown hirsute becoming blackened when dry, adaxially opaque and rough, apex cuspidate 16c. var. *hirsutissima*

16a. *Callerya nitida* var. *nitida*

亮叶鸡血藤(原变种) liang ye ji xue teng (yuan bian zhong)

Millettia nitida Benth, *London J. Bot.* 1: 484. 1842; *M. kueichouensis* Hu.

Leaflet blades lanceolate to oblong, 5–9(–11) × 3–4 cm, abaxially glabrous or sparsely puberulent, adaxially glabrous and shiny but sometimes sparsely puberulent on midvein, apex acute to cuspidate. Flowers 2.2–2.4 cm. $2n = 32^*$.

• Coastal thickets, lowland sparse woodlands; near sea level to 800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Taiwan.

16b. *Callerya nitida* var. *minor* (Z. Wei) X. Y. Zhu in X. Y. Zhu et al., *Legumes China*, 454. 2007.

峨眉鸡血藤 e mei ji xue teng

Millettia nitida var. *minor* Z. Wei, *Acta Phytotax. Sin.* 23: 288. 1985.

Leaf rachis slender; leaflet blades lanceolate, 3.5–5.5 × 2–3 cm, both surfaces glabrous or glabrescent, apex acuminate. Flowers 1.6–1.8 cm.

• Thickets, forest margins; 800–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Sichuan, Yunnan, Zhejiang.

16c. *Callerya nitida* var. *hirsutissima* (Z. Wei) X. Y. Zhu in X. Y. Zhu et al., *Legumes China*, 454. 2007.

丰城鸡血藤 feng cheng ji xue teng

Millettia nitida var. *hirsutissima* Z. Wei, *Acta Phytotax. Sin.* 23: 288. 1985.

Leaflet blades ovate, 3.5–5.5 × 2–3 cm, abaxially densely reddish brown hirsute becoming blackened when dry, adaxially opaque and rough, apex cuspidate. Flowers 1.6–1.8 cm.

• Thickets and open places on slopes; 500–1000 m. Fujian, Guangdong, Guangxi, Hunan, Jiangxi.

The stem and roots are used medicinally for improving blood circulation.

17. *Callerya congestiflora* (T. C. Chen) Z. Wei & Pedley, **comb. nov.**

密花鸡血藤 mi hua ji xue teng

Basionym: *Millettia congestiflora* T. C. Chen, *Acta Phytotax. Sin.* 3: 362. 1955.

Lianas, to 5 m. Stems yellowish brown, terete, ridged, densely villous, glabrescent. Leaves 5-foliolate; rachis 15–30 cm, including petiole 4.5–8.5 cm; leaflet blades broadly elliptic to ovate, 11–13 × 6–8 cm with basal pair smallest, papery, abaxially sparsely villous, adaxially glabrous except midvein, base obtuse to broadly cuneate, apex acute. Panicles terminal, 14–16 cm; flowering branchlets grouped in twos or threes, densely yellow villous, nodes crowded. Flowers ca. 1.6 cm. Calyx outside densely sericeous. Corolla white or pale pink; standard broadly ovate, without basal calluses, outside densely sericeous abaxially. Ovary densely villous, with 6 or 7 ovules. Legume linear, 10–12 × 1.2–1.4 cm, flat, densely brown sericeous,

contracted between seeds, base tapering, apex with a prolonged hooked beak. Seeds 3–6 per legume, chestnut-brown and oblong when immature. Fl. Jun–Aug, fr. Sep–Oct.

• Mountain woodlands; 500–1200 m. S Anhui, W Fujian, Guangdong, Guizhou, Hubei, Hunan, Jiangxi, Sichuan.

18. *Callerya dielsiana* (Harms) P. K. Lôt ex Z. Wei & Pedley, *comb. nov.*

香花鸡血藤 *xiang hua ji xue teng*

Shrubs, scandent, 2–5 m. Stems grayish yellow, splitting, glabrous or puberulent. Leaves 5-foliolate; rachis 15–30 cm, including petiole 5–12 cm; leaflet blades lanceolate, oblong, or narrowly oblong, 5–15 × 1.5–6 cm, abaxially grayish glabrous, sparsely puberulent, or yellow hirsute, adaxially glabrous, midvein abaxially raised and adaxially sunken, secondary veins 6–9 on each side of midvein, reticulate veins evident on both surfaces or only abaxially, base rounded or sometimes subcordate, apex acute, acuminate, or rarely obtuse. Panicles terminal, 10–25(–40) cm, yellow puberulent; flowering branchlets 6–15 cm, spreading, nodes close together. Flowers 1.2–2.4 cm. Corolla purple; standard broadly ovate, without basal calluses, outside silvery to rusty sericeous, base subcordate. Ovary linear, tomentose, with 8 or 9 ovules. Legume linear to oblong, 7–12 × 1.5–2 cm, flat, gray tomentose; valves thin or woody. Seeds 3–5 per legume, tawny, oblong or subglobose, ca. 8 × 6 mm. Fl. May–Sep, fr. Jun–Nov.

• Mixed woodlands and thickets on slopes, thickets in river valleys, open places at forest margins; 300–2500 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, S Shaanxi, Sichuan, Yunnan, Zhejiang.

- 1a. Leaflet blades abaxially grayish yellow
hirsute 18c. var. *solida*
1b. Leaflet blades abaxially glabrous or sparsely
puberulent.
2a. Leaflet blades lanceolate to narrowly
oblong, adaxially shiny and without
prominent reticulate veins; valves
subwoody; seeds oblong 18a. var. *dielsiana*
2b. Leaflet blades oblong, adaxially
rough with prominent reticulate
veins; valves thinly leathery;
seeds subglobose 18b. var. *heterocarpa*

18a. *Callerya dielsiana* var. *dielsiana*

香花鸡血藤(原变种) *xiang hua ji xue teng* (*yuan bian zhong*)

Basionym: *Millettia dielsiana* Harms, Bot. Jahrb. Syst. 29:

412. 1900; *M. argyraea* T. C. Chen; *M. blinii* H. Léveillé; *M. champotongensis* Hu; *M. cinerea* Benth var. *yunnanensis* Pampanini; *M. duclouxii* Pampanini; *M. dunniana* H. Léveillé; *M. fragrantissima* H. Léveillé; *M. obtusifoliolata* Hu.

Leaflet blades lanceolate to narrowly oblong, 5–10(–12) × 1.5–3.5 cm, papery, abaxially glabrous or sparsely puberulent, adaxially glabrous and shiny. Panicles 10–15 cm. Flowers 1.2–1.8 cm. Legume linear, 7–9 × ca. 1.5 cm, valves subwoody. Seeds oblong.

• Mixed woodlands and thickets on slopes; 800–2500 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, S Shaanxi, Sichuan, Yunnan, Zhejiang.

Although P. K. Lôt attempted to make the combination *Callerya dielsiana* (Bot. Zhurn. (Moscow & Leningrad) 81(10): 99. 1996), it was not validly published because he did not provide a full bibliographic reference to the basionym (*Vienna Code*, Art. 33.4). Consequently (Art. 43.1), the two varietal combinations made below were not validly published by X. Y. Zhu (in X. Y. Zhu et al., Legumes China, 452. 2007).

18b. *Callerya dielsiana* var. *heterocarpa* (Chun ex T. C. Chen) X. Y. Zhu ex Z. Wei & Pedley, *comb. nov.*

异果鸡血藤 *yi guo ji xue teng*

Basionym: *Millettia heterocarpa* Chun ex T. C. Chen, Acta Phytotax. Sin. 3: 364. 1955; *M. dielsiana* var. *heterocarpa* (Chun ex T. C. Chen) Z. Wei.

Leaflet blades oblong, 7–9(–13) × 3–4.5 cm, papery, abaxially sparsely puberulent, adaxially glabrous, rough, and with reticulate veins prominent. Panicles 12–20 cm. Flowers 1.2–1.8 cm. Legume oblong, 7–11 × ca. 2 cm, valves thinly leathery. Seeds subglobose.

• Thickets in river valleys; 300–1900 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi.

18c. *Callerya dielsiana* var. *solida* (T. C. Chen ex Z. Wei) X. Y. Zhu ex Z. Wei & Pedley, *comb. nov.*

雪峰山鸡血藤 *xue feng shan ji xue teng*

Basionym: *Millettia dielsiana* var. *solida* T. C. Chen ex Z. Wei, Acta Phytotax. Sin. 23: 289. 1985.

Leaflet blades oblong, 9–15 × 4–6 cm, papery, abaxially grayish yellow hirsute, reticulate veins prominent. Panicles 15–25(–40) cm. Flowers 1.8–2.4 cm. Legume oblong, 8–12 × ca. 2 cm, valves leathery. Seeds subglobose.

• Open places at forest margins; 600–1400 m. Guangxi, W Hunan.

74. PONGAMIA Adanson, Fam. Pl. 2: 322, 593. 1763 [“*Pongam*”], nom. cons.

水黄皮属 *shui huang pi shu*

Zhang Dianxiang (张奠湘); Les Pedley

Trees. Stipules caducous. Leaves imparipinnate; stipels absent. Inflorescences axillary, racemose; bracts small, caducous. Calyx campanulate to calathiform, apex truncate. Corolla longer than sepals; standard orbicular, with 2 calluses on claw, basally auriculate; wings oblong, oblique, auriculate; keels falcate, apically adherent, apex truncate. Stamens 10, diadelphous; vexillary stamen free from other 9; anthers basifixed. Ovary sessile, with 2 ovules; style inflexed, glabrous; stigma capitate. Seed 1 per legume.

One species: pantropical and extending into subtropics.

1. *Pongamia pinnata* (Linnaeus) Merrill, *Interpr. Herb. Amboin.* 271. 1917.

水黄皮 *shui huang pi*

Cytisus pinnatus Linnaeus, *Sp. Pl.* 2: 741. 1753; *Derris indica* (Lamarck) Bennet; *Galedupa indica* Lamarck; *G. pinnata* (Linnaeus) Taubert; *Millettia pinnata* (Linnaeus) Panigrahi; *Pongamia glabra* Ventenat; *P. mitis* (Linnaeus) Kurz; *Robinia mitis* Linnaeus.

Trees, 8–15 m tall. Branchlets sometimes tomentose, glabrescent, with dense minute cinereous lenticels. Leaves 5- or 7-foliolate; rachis 20–26 cm, including petiole 5–6 cm; petiolules 6–8 mm; leaflet blades ovate, broadly elliptic, or oblong, 5–10 × 4–8 cm, leathery, base rounded, broadly cuneate, or truncate, apex rounded to acuminate. Inflorescences axillary, racemose, 15–20 cm, rachis nodes usually with 2 flowers. Pedicel 5–8 mm; bracteoles 2, inserted at base of calyx, ovate. Calyx cam-

panulate to calathiform, ca. 3 mm, outside sparsely yellowish pubescent; teeth obscure. Corolla white or pink, 1.2–1.4 cm; standard orbicular, outside thinly sericeous, base auriculate, claw 2-callose; wings oblong, oblique, base auriculate; keels falcate, apically adherent, apex truncate. Stamens 10, vexillary stamen distinct, others connate; anthers basifixed. Ovary subsessile, with 2 ovules; style inflexed, glabrous; stigma capitate. Legume ellipsoid to oblong, flat, 4–5 × 1.5–2.5 cm, indehiscent, covered with obscure warts, apex shortly beaked. Seed reniform. Fl. May–Jun, fr. Aug–Oct. $2n = 22$.

Coastal areas along beaches or riverbanks, thickets; near sea level. Fujian, Guangdong, Hainan, Taiwan [Bangladesh, India, Indonesia, Japan, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; C Africa, Australia, Central America, Pacific islands].

Pongamia pinnata is represented in China by the typical variety. Another variety, *Pongamia pinnata* var. *xerocarpa* (Hasskarl) Alston, occurs in S and SE Asia.

75. WISTERIA Nuttall, *Gen. N. Amer. Pl.* 2: 115. 1818, nom. cons.

紫藤属 *zi teng shu*

Wei Zhi (韦直); Les Pedley

Phaseoloides Duhamel; *Rehsonia* Stritch.

Lianas, deciduous. Winter buds ovoid; scales 3–5. Stipules present. Leaves imparipinnate; leaflet blades opposite, margin entire; stipels present. Racemes terminal, elongate, pendulous; nodes scattered on rachis, with 1 flower. Flowers 1.5–2.5 cm. Corolla standard orbicular, large, reflexed, glabrous or outside with some trichomes at base, with 2 basal calluses; wings free from keel. Stamens diadelphous; vexillary stamen distinct from other 9 or slightly connate at middle of sheath. Ovary stipitate, with trichomes, with 5–16 ovules. Legume linear to oblanceolate, leathery, convex over seeds. Seeds 1–3[or more] per legume, reniform to lenticular, without a strophiole; radicle folded.

About six species: E Asia, North America; four species (three endemic) in China.

The Japanese species *Wisteria floribunda* (Willdenow) Candolle is commonly cultivated as a garden plant in China.

- 1a. Mature leaflet blades glabrescent or with sparse trichomes; corolla purple, occasionally white.
 - 2a. Flowers 2–2.5 cm; pedicel 2–3 cm; corolla standard glabrous, apex truncate; abaxial calyx tooth longer than others 1. *W. sinensis*
 - 2b. Flowers ca. 1.5 cm; pedicel 0.6–1.2 cm; corolla standard outside sparsely villous, apex emarginate; abaxial calyx tooth as long as others 2. *W. brevidentata*
- 1b. Mature leaflet blades with trichomes on both surfaces but abaxially especially dense; corolla violet or white.
 - 3a. Racemes 30–35 cm, densely gray villous; flowers 2.2–2.5 cm, blooming in sequence from base to apex along raceme rachis; corolla violet; leaflet blades villous but abaxially especially dense 3. *W. villosa*
 - 3b. Racemes 10–20 cm, yellow tomentose; flowers ca. 2 cm, blooming almost at same time along whole raceme rachis; corolla white; leaflet blades abaxially sericeous, adaxially appressed pubescent 4. *W. venusta*

1. *Wisteria sinensis* (Sims) Sweet, *Hort. Brit.* 121. 1826.

紫藤 *zi teng*

Glycine sinensis Sims, *Bot. Mag.* 46: t. 2083. 1819; *Wisteria alba* Lindley; *W. praecox* Handel-Mazzetti; *W. sinensis* f. *alba* (Lindley) Rehder & E. H. Wilson; *W. sinensis* var. *albiflora* Lemaire.

Lianas, to 25 m. Stems twined leftward, white villous when young, soon glabrescent. Leaves 7–13-foliolate; rachis 15–25 cm, including petiole 3–5 cm; leaflet blades elliptic-ovate to lanceolate-ovate, 5–8 × 2–4 cm with basal pair smallest and becoming larger apically, both surfaces appressed pubescent when young but glabrescent, base rounded to cuneate and some-

what asymmetric, apex attenuate to caudate. Racemes terminal or axillary from branchlets of previous year, 15–30 × 8–10 cm, white villous. Pedicel 2–3 cm, slender. Flowers 2–2.5 cm, fragrant. Calyx with adaxial tooth longer than others. Corolla purple or occasionally white; standard orbicular, sometimes retuse, glabrous, apex truncate. Ovary tomentose, with 6–8 ovules. Legume oblanceolate, 10–15 × 1.5–2 cm, tomentose, hanging on branches persistently. Seeds 1–3 per legume, brown, thickly lenticular, ca. 1.5 cm in diam., shiny. Fl. Apr–May, fr. May–Aug. $2n = 16$.

Mountain forests; 500–1800 m. Anhui, Fujian, NE Guangxi, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, S Shanxi, Zhejiang [Japan].

This species is cultivated extensively in areas beyond its native range.

2. *Wisteria brevidentata* Rehder, *J. Arnold Arbor.* 7: 163. 1926.

短梗紫藤 duan geng zi teng

Lianas. Stems appressed villous, glabrescent and grayish yellow in second year. Leaves 9- or 11(or 13)-foliolate; rachis 13–17 cm, including petiole 3–4 cm; petiolules sparsely hirsute; leaflet blades elliptic to ovate-oblong, 2.5–5 × 1–1.8 cm, both surfaces sparsely hirsute especially on midvein, base broadly cuneate to rounded, apex obtuse and apiculate. Racemes 10–18 cm. Pedicel 6–12 mm, villous. Flowers ca. 1.5 cm. Calyx with abaxial tooth as long as others. Corolla purple; standard suborbicular, outside sparsely villous, base subcordate, apex emarginate. Ovary tomentose. Legume and seeds not seen.

- Hill slopes and river valleys, cultivated. Fujian, Yunnan.

The status of this species is uncertain, and it may be just a variant of *Wisteria sinensis*. Collections are known from both cultivated and wild plants, but it is uncertain whether or not the wild plants had escaped from cultivation.

3. *Wisteria villosa* Rehder, *J. Arnold Arbor.* 7: 162. 1926.

藤笏 teng luo

Lianas. Stems thick, densely gray villous. Leaves 9- or 11-foliolate; rachis 15–32 cm, including petiole 2–5 cm; leaflet blades ovate-oblong to elliptic-oblong, 5–10 × 2.5–3.5 cm, gradually decreasing in size from basal to apical pair, abaxially densely white villous, adaxially sparsely white villous, trichomes persistent on both surfaces, base broadly cuneate to rounded, apex acute to acuminate. Racemes terminal, 30–35 ×

8–10 cm. Pedicel 1.5–2.5 cm, straight. Flowers 2.2–2.5 cm, fragrant. Calyx violet, both surfaces tomentose. Corolla violet; standard orbicular, glabrous. Ovary tomentose, with 5 ovules. Legume oblanceolate, 18–24 × ca. 2.5 cm, brown tomentose. Seeds ca. 3 per legume, dark brown, flat and orbicular, ca. 1.5 cm in diam. Fl. Apr–May, fr. Jul–Oct.

- Thickets and trailsides on slopes. Henan, Shaanxi.

This species is cultivated in Anhui, Jiangsu, and Shandong.

4. *Wisteria venusta* Rehder & E. H. Wilson in Sargent, *Pl. Wilson.* 2: 514. 1916.

白花藤笏 bai hua teng luo

Wisteria brachybotrys Siebold & Zuccarini var. *alba* W. Miller.

Lianas, 2–10 m. Stems densely appressed yellow pubescent when young, glabrescent. Leaves 9- or 11-foliolate; rachis 18–35 cm, including petiole 3–5 cm; leaflet blades ovate-oblong to lanceolate-oblong, 6–10 × 2.5–5 cm with pair at middle of rachis somewhat larger than others, both surfaces appressed pubescent but abaxially more densely so especially on midvein and margin, base truncate to subcordate and asymmetric, apex acute. Racemes terminal, emerged at same time as leaves, ca. 15 × 10 cm, yellow tomentose. Pedicel 2.5–3(–3.5) cm, straight. Flowers ca. 2 cm. Corolla white; standard suborbicular, apex truncate and cuspidate. Ovary with trichomes, with 12 ovules. Legume oblanceolate, flat, yellow tomentose. Seeds brown, round, ca. 1.2 cm in diam. Fl. Apr–Jun, fr. Aug–Sep.

- Mountain valleys. Hebei, Henan, Shandong, Shanxi.

This species usually is cultivated as an ornamental in shade.

76. CRASPEDOLOBIUM Harms, *Repert. Spec. Nov. Regni Veg.* 17: 135. 1921.

巴豆藤属 ba dou teng shu

Wei Zhi (韦直); Les Pedley

Shrubs, scandent. Stipules present. Leaves pinnately 3-foliolate; stipels present. Pseudoracemes terminal or axillary near branchlet apex, elongated; flowering branchlet nodes with flowers in fascicles; bracts and bracteoles minute. Pedicel short. Calyx teeth 5, ± equal in length. Corolla red; petals equal in length; standard orbicular, shortly clawed, without basal calluses. Stamens diadelphous; vexillary stamen free from other 9. Ovary stipitate, with trichomes, with 5–8 ovules. Legumes flat, with a narrow wing on adaxial suture, dehiscent. Seeds with folded radicle.

One species: SE Asia and China.

1. *Craspedolobium unijugum* (Gagnepain) Z. Wei & Pedley, *comb. nov.*

巴豆藤 ba dou teng

Basionym: *Millettia unijuga* Gagnepain, *Nutl. Syst.* (Paris) 2: 365. 1913; *Callerya unijuga* (Gagnepain) H. Sun; *Craspedolobium schochii* Harms.

Shrubs, scandent, to 3 m. Stems dark brown, pithy, ridged, appressed puberulent when young, glabrescent when mature, with dense brown lenticels. Leaves 3-foliolate; stipels acicular; leaflet blades obovate to broadly elliptic, 5–9 × 3–6 cm, both surfaces appressed puberulent but abaxially especially dense on veins, adaxially sometimes glabrescent, base broadly cuneate to rounded and asymmetric on lateral ones, apex obtuse and cuspi-

date. Pseudoracemes usually congested near apex of branchlets, 15–25 cm; flowering branchlet nodes with 3–5 fascicled flowers. Pedicels, calyces, and bracteoles yellow sericeous. Corolla red, 0.9–1.1 cm, glabrous. Legume linear, 6–9 × ca. 1.2 cm, flat, papery, brown tomentose, base rounded, apex acute and shortly beaked; abaxial suture narrowly winged, continuous within. Seeds 3–5(–7) per legume, reniform, lenticular. Fl. Jun–Sep, fr. Sep–Oct.

Sparse woodlands in moist soil, along trails; 600–2000 m. NW Guangxi, SW Guizhou, S Sichuan, Yunnan [Laos, Myanmar, Thailand].

The record of *Millettia unijuga* as treated in FRPS (40: 160. 1994) is based on a single specimen (*P. I. Mao 6915*, 24 Oct 1955, KUN) from S Yunnan, which was used for the illustration in FRPS (t. 47, f. 1–2). This specimen may possibly represent an as yet undescribed species.

77. **TEPHROSIA** Persoon, Syn. Pl. 2: 328. 1807, nom. cons.

灰毛豆属 *hui mao dou shu*

Wei Zhi (韦直); Les Pedley

Cracca Linnaeus.

Herbs, perennial or rarely annual, often suffrutescent, usually sericeous. Stipules caducous. Leaves imparipinnate; stipels absent; leaflet blades opposite, abaxially often sericeous, secondary veins to ca. 30 on each side of midvein and closely parallel, margin entire. Pseudoracemes terminal or axillary, sometimes opposite a leaf; bracts usually caducous. Bracteoles absent. Corolla white, cream-colored, or mauve, occasionally orange or red; standard reflexed, suborbicular, outside villous or sericeous. Stamens monadelphous; vexillary stamen somewhat distinct from other 9. Ovary sessile, with trichomes, with numerous ovules. Legume flat, occasionally inflated, dehiscent, apex often beaked; valves twisted. Seeds 5–16 per legume, oblong, ellipsoid, or occasionally globose; radicle folded.

More than 400 species: tropical and subtropical regions of the world; 11 species (one endemic, three introduced) in China.

- 1a. Flowers 1–2.5 cm; legume 5.5–13 cm × 5.5–14 mm.
- 2a. Flowers 1–1.7 cm; legume 5.5–6 cm; leaflet blades obovate-elliptic, narrowly elliptic, linear-oblong-lanceolate, or oblong-oblong-lanceolate.
- 3a. Inflorescences 3–7 cm, with congested flowers; corolla white; leaflet blades abaxially velutinous, secondary veins 15–20 on each side of midvein 4. *T. vestita*
- 3b. Inflorescences to 25 cm, with scattered flowers; corolla red; leaflet blades abaxially silvery sericeous, secondary veins 9 or 10 on each side of midvein 5. *T. coccinea*
- 2b. Flowers 2–2.5 cm; legume 8–13 cm; leaflet blades oblong-elliptic, lanceolate-elliptic, oblong, or oblong-lanceolate.
- 4a. Pedicel 2–2.3 cm, densely rusty villous; legume 10–13 cm × ca. 14 mm, densely creamy villous 1. *T. vogelii*
- 4b. Pedicel 0.5–1 cm, densely white villous or sericeous; legume 8–10 cm × 6–8.5 mm, brown tomentose or yellow sericeous.
- 5a. Calyx teeth ca. 1 mm, apex rounded; leaflet blades 0.6–1.4 cm in width, oblong, secondary veins 30–50 on each side of midvein; pedicel ca. 10 mm, villous; corolla white, rarely yellow or pale pink; legume brown tomentose 2. *T. candida*
- 5b. Calyx teeth ca. 5 mm, apex acute; leaflet blades 1.5–2 cm in width, oblong-lanceolate, secondary veins 20 on each side of midvein; pedicel ca. 5 mm, sericeous; corolla red; legume yellow sericeous 3. *T. kerrii*
- 1b. Flowers ca. 1 cm; legume 2–5 cm × 3.5–5(–6) mm.
- 6a. Inflorescences 10–25 cm (but only ca. 2 cm in *T. purpurea* var. *glabra*), flowers scattered.
- 7a. Calyx teeth ± equal; legume with sparse appressed trichomes, ca. 6-seeded 6. *T. purpurea*
- 7b. Calyx teeth unequal, most abaxial tooth longer and narrow, other ones shorter and broad; legume densely brown tomentose, 7–9-seeded 7. *T. noctiflora*
- 6b. Inflorescences 1–5 cm, flowers congested.
- 8a. Legume with 7–14 seeds.
- 9a. Inflorescences with 1–3 flowers; legume apex with curved or hooked beak 8. *T. pumila*
- 9b. Inflorescences with 4–8 flowers; legume apex with a short straight beak 9. *T. luzonensis*
- 8b. Legume with 5–7 seeds.
- 10a. Leaves 13–17-foliolate; leaflet blades oblanceolate, abaxially sparsely pubescent, secondary veins ca. 9 on each side of midvein, mauve, conspicuous; legume slightly curved at tip, 3.5–4 cm 10. *T. ionophlebia*
- 10b. Leaves 11- or 13-foliolate; leaflet blades obovate, both surfaces densely sericeous, secondary veins 5–8 on each side of midvein, almost inconspicuous; legume straight, 2–2.5 cm 11. *T. obovata*

1. *Tephrosia vogelii* J. D. Hooker in Hooker, Niger Fl. 296. 1849.

西非灰毛豆 *xi fei hui mao dou*

Herbs, perennial, erect, many branched. Stems tomentose with short and long white and yellow trichomes, trichomes ca. 1.5 mm. Leaves 13–29-foliolate; rachis 10–25 cm, including petiole 1–3 cm; leaflet blades oblong-elliptic to lanceolate-elliptic, 3–7 × 0.9–1.8 cm, abaxially densely mixed white and yellow tomentose, adaxially appressed white sericeous, secondary veins 12–15 on each side of midvein. Pseudoracemes terminal

or axillary near apex of branchlets, 10–15 cm, rusty tomentose, long pedunculate. Pedicel 2–2.3 cm, rusty villous. Flowers ca. 2.5 cm. Calyx ca. 1.2 × 1 cm, brown tomentose; teeth oblong, ca. 1 cm, apex rounded but adaxial one narrowly acute. Corolla white or occasionally violet; standard orbicular, sericeous. Ovary sericeous, with numerous ovules. Legume linear, 10–13 cm × 12–14 mm, straight, yellowish white tomentose, rusty on suture, apex beaked. Seeds 12–16 per legume, black, broadly ovoid, ca. 7 × 4.5 mm, smooth. Fl. and fr. year-round. $2n = 22$.

Cultivated in S Guangdong, Hainan, and Taiwan [native to tropical Africa].

This species is grown as a green mulch.

2. *Tephrosia candida* Candolle, Prodr. 2: 249. 1825.

白灰毛豆 bai hui mao dou

Robinia candida (Candolle) Roxburgh.

Herbs, perennial, suffrutescent, 1–3.5 m tall. Stems ridged, grayish white tomentose, trichomes ca. 1 mm. Leaves 17–25-foliolate; rachis 15–25 cm, including petiole 1–3; leaflet blades oblong, 3–6 × 0.6–1.4 cm, abaxially densely sericeous, adaxially glabrous, secondary veins 30–50 on each side of midvein. Pseudoracemes terminal or lateral, 15–20 cm. Pedicel ca. 1 cm, densely white villous. Flowers ca. 2 cm. Calyx ca. 5 × 5 mm; teeth equal, ca. 1 mm, apex rounded. Corolla white, rarely yellow or pale pink; standard densely sericeous. Ovary tomentose, with numerous ovules. Legume linear, 8–10 cm × 7.5–8.5 mm, straight, brown tomentose with a mixture of long and short trichomes, apex truncate and with a straight ca. 1 cm beak. Seeds 10–15 per legume, olive-green with dark patches, ellipsoid, ca. 5 × 3.5 mm, smooth. Fl. Oct–Nov, fr. Dec. $2n = 22, 24$.

Cultivated or escaped, grasslands, open places, slopes. Fujian, Guangdong, Guangxi, Taiwan, Yunnan [native to India; widely cultivated and escaped elsewhere].

This species is grown as a green mulch.

3. *Tephrosia kerrii* J. R. Drummond & Craib, Bull. Misc. Inform. Kew 1912: 149. 1912.

银灰毛豆 yin hui mao dou

Herbs, perennial, to 3 m tall, densely yellow spreading villous. Stems erect, sturdy, ridged, apically branched. Leaves 11–17-foliolate; rachis 9–15 cm, including petiole ca. 5 mm; leaflet blades oblong-lanceolate, 5–8 × 1.5–2 cm, abaxially densely silvery sericeous, adaxially olive-green and glabrous, secondary veins 20 on each side of midvein and conspicuous, base obtuse to cuneate, apex acute and cuspidate. Pseudoracemes terminal, when immature cone-shaped and covered by bracts, elongated to ca. 10 cm at anthesis. Pedicel ca. 5 mm, densely white sericeous. Flowers ca. 2.2 cm. Calyx ca. 8 × 6 mm; teeth narrowly triangular, most abaxial one longest and ca. 5 mm, apex acute. Corolla red; standard obovate, yellow sericeous. Ovary sericeous, with numerous ovules. Legume linear, 8–10 cm × 6–8 mm, straight, spreading and slightly nodding, yellow sericeous, apex with a ca. 1 cm slightly ascending beak. Seeds 10–12 per legume but characters unknown. Fl. Oct, fr. Dec.

Moist places in valleys, open places, along trails; 700–1000 m. S Yunnan [Laos, Thailand, Vietnam].

4. *Tephrosia vestita* Vogel, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 15. 1843.

黄灰毛豆 huang hui mao dou

Herbs, perennial, suffrutescent, 1–2 m tall, many branched, yellowish white velutinous. Stems zigzag ascending, ridged. Leaves 7–11(or 13)-foliolate; rachis ca. 10 cm, including petiole 1–1.5 cm; leaflet blades obovate-elliptic to narrowly elliptic, 2–4 × 1–1.8 cm, abaxially velutinous, adaxially rough and glabrous, secondary veins 15–20 on each side of midvein, base cu-

neate, apex rounded to retuse. Pseudoracemes terminal or opposite leaf near apex of branchlets, 3–7 cm, with congested flowers. Pedicel ca. 2 mm. Flowers ca. 1.7 cm, fragrant. Calyx ca. 3 × 4 mm. Corolla white; standard suborbicular, yellow velutinous. Ovary sericeous, with numerous ovules. Legume linear, 5.5–6 cm × ca. 5 mm, straight, flat, densely yellow velutinous, apex abruptly pointed and with a ca. 1 cm beak. Seeds 10–12 per legume, black, reniform, ca. 3 × 2.5 mm. Fl. Jun–Oct, fr. Jul–Nov.

Sparse woodlands, open places, grasslands. Guangdong, Guangxi, Hainan, Jiangxi [Cambodia, Indonesia, Laos, Malaysia, Papua New Guinea, Philippines, Thailand, Vietnam].

5. *Tephrosia coccinea* Wallich var. *stenophylla* Hosokawa, Trans. Nat. Hist. Soc. Formosa 32: 195. 1942.

狭叶红灰毛豆 xia ye hong hui mao dou

Herbs, perennial, suffrutescent, 40–50 cm tall, many branched. Stems woody, terete; young branchlets 4-sided, silvery or white appressed sericeous. Leaves subsessile, 5- or 7(or 9)-foliolate; rachis 6–10 cm; leaflet blades linear-oblongate to oblong-oblongate, 4–6 × ca. 1 cm with basal pair smallest and terminal one longest, abaxially silvery sericeous, secondary veins 9 or 10 on each side of midvein. Pseudoracemes terminal or opposite a leaf, ca. 25 cm, with scattered flowers. Pedicel 3–6 mm. Flowers ca. 1 cm. Calyx ca. 5 mm. Corolla red; standard orbicular, outside sericeous, inside glabrous. Ovary stipitate, sericeous, with 10–12 ovules. Legume linear, ca. 6 cm × 7–8 mm, flat, tomentose. Seeds 8–12 per legume, black, reniform, ca. 8 × 5 mm. Fl. and fr. Dec–Feb.

- Sandy fields in open areas. Hainan.

Tephrosia coccinea var. *coccinea* occurs in India, Laos, Myanmar, and Vietnam.

6. *Tephrosia purpurea* (Linnaeus) Persoon, Syn. Pl. 2: 329. 1807.

灰毛豆 hui mao dou

Herbs, perennial, 30–60(–150) cm tall, many branched, puberulent, densely spreading villous, or glabrescent. Stems nearly erect to spreading, with a woody base, ridged. Leaves 9–17(–21)-foliolate; rachis 7–15 cm, including petiole ca. 1 cm; leaflet blades oblong-elliptic, oblanceolate-elliptic, or obovate-elliptic, 1.5–3.5(–4.5) × 0.4–1.5 cm, secondary veins 7–12 on each side of midvein, base narrowly rounded, apex obtuse, truncate, or retuse and cuspidate. Pseudoracemes terminal, opposite to a leaf or axillary near apex of branchlets, ca. 2 or 10–15 cm. Pedicel 2–4 mm, slender, slightly elongate in fruit. Flowers ca. 8 mm. Calyx 2–4 × ca. 3 mm; teeth equal. Corolla mauve; standard orbicular, white puberulent. Ovary with trichomes, with 5–8 ovules. Legume linear, 3–5 cm × 3.5–4(–6) mm, with sparse appressed trichomes, apically slightly curved. Seeds ca. 6 per legume, grayish brown, ellipsoid, ca. 3 × 1.5 mm, with or without spots, smooth or rough. Fl. Mar–Oct, fr. Sep–Dec.

Open places, slopes, sandy grasslands by oceans, grasslands by river margins; near sea level to 700 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam].

- 1a. Plants glabrescent; inflorescences ca. 2 cm; legume ca. 3 cm × 3.5 mm, glabrous 6b. var. *glabra*
- 1b. Plants ± pubescent or densely spreading villous; inflorescences 10–15 cm; legume 4–5 cm × 4(–6) mm, with trichomes.
- 2a. Plants puberulent; stipules ca. 4 mm; leaflet blades abaxially appressed pubescent, adaxially glabrous; seeds grayish brown, spotted, smooth 6a. var. *purpurea*
- 2b. Plants densely spreading villous; stipules ca. 12 mm; leaflet blades with both surfaces villous but abaxially more densely so especially on midvein and margin; seeds rough, without spots 6c. var. *yunnanensis*

6a. *Tephrosia purpurea* var. *purpurea*

灰毛豆(原变种) hui mao dou (yuan bian zhong)

Cracca purpurea Linnaeus, Sp. Pl. 2: 752. 1753; *Galega purpurea* (Linnaeus) Linnaeus; *Glycyrrhiza mairei* H. Léveillé.

Plants ± pubescent. Stipules ca. 4 mm. Leaflet blades oblong-elliptic to oblanceolate-elliptic, 1.5–3.5 × 0.4–1.4 cm, abaxially appressed pubescent, adaxially glabrous. Racemes ca. 10 cm, slender. Legume 4–5 cm × 4(–6) mm, with trichomes. Seeds grayish brown, spotted, smooth. $2n = 22, 44$.

Open places, slopes. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Cambodia, India, Laos, Malaysia, Nepal, Sri Lanka, Vietnam].

6b. *Tephrosia purpurea* var. *glabra* Hosokawa, J. Soc. Trop. Agric. 4: 200. 1932.

秃净灰毛豆 tu jing hui mao dou

Herbs suffrutescent, glabrescent. Leaves 13-foliolate. Racemes ca. 2 cm, shorter than subtending leaf. Legume ca. 3 cm × 3.5 mm, glabrous.

- Sandy grasslands by oceans; near sea level. S Taiwan.

6c. *Tephrosia purpurea* var. *yunnanensis* Z. Wei, Acta Phytotax. Sin. 27: 76. 1989.

云南灰毛豆 yun nan hui mao dou

Plants densely spreading villous. Stipules ca. 1.2 cm. Leaflet blades obovate-elliptic, 1.5–2(–4.5) × 0.6–1.5 cm, both surfaces villous but abaxially more densely so especially on midvein and margin. Racemes 10–15 cm. Legume 4–5 cm × 4(–6) mm, with trichomes. Seeds rough, without spots.

- Grasslands by river margins; ca. 700 m. Sichuan, Yunnan.

7. *Tephrosia noctiflora* Bojer ex Baker, Fl. Trop. Afr. 2: 112. 1871.

长序灰毛豆 chang xu hui mao dou

Tephrosia hookeriana Wight & Arnott var. *amoena* Prain.

Herbs, perennial, suffrutescent, 0.5–1.5 m tall. Stems terete, with dense spreading trichomes. Stipules narrowly tri-

angular, 6–11 mm, persistent, apex acuminate. Leaves 15–25-foliolate; rachis 7–11 cm, including petiole 0.7–1.3 cm; leaflet blades oblong-oblanceolate, 2.2–3.2 × 0.5–0.8 cm with terminal one slightly larger than others, abaxially densely appressed sericeous, adaxially glabrous, secondary veins 9–11 on each side of midvein, base cuneate, apex rounded to retuse and cuspidate. Pseudoracemes terminal, 15–25 cm, rigid and straight, with scattered flowers. Pedicel 2–4 mm. Flowers ca. 1 cm. Calyx ca. 5 × 5 mm, densely brown pubescent; teeth unequal, most abaxial one 4–6 mm and narrow, other ones short and broad. Corolla yellow, violet, or white; standard orbicular, brown sericeous. Ovary sericeous, with numerous ovules. Legume linear, 4.5–5 cm × ca. 5 mm, straight, densely brown pubescent, apex ascending curved. Seeds 7–9 per legume, black, reniform, ca. 4 × 2.5 mm, usually transversely rugose. Fl. and fr. Nov–Jan. $2n = 22$.

Introduced and escaped in ravines near shorelines, coastal grasslands; below 100–700 m. Guangdong, Taiwan, Yunnan [native to tropical Africa].

8. *Tephrosia pumila* (Lamarck) Persoon, Syn. Pl. 2: 330. 1807.

矮灰毛豆 ai hui mao dou

Galega pumila Lamarck, Encycl. 2: 599. 1788.

Herbs, annual or perennial, procumbent or straggling, 20–30 cm tall. Stems thin and hard, ridged, densely spreading strigose. Stipules 3–4 mm. Leaves 7(–13)-foliolate; rachis 2–4 cm, including petiole 3–10 mm; leaflet blades narrowly obovate to oblanceolate, 1.2–2 × 0.4–0.8 cm, abaxially strigose, adaxially appressed pubescent, secondary veins 6 or 7 on each side of midvein and obscure, base cuneate, apex truncate to obtuse and cuspidate. Pseudoracemes terminal or opposite a leaf, ca. 2 cm, strigose, with 1–3 flowers. Pedicel 2.5–4 mm. Flowers ca. 6 mm. Calyx ca. 3 × 2 mm. Corolla white, yellow, or rarely pale pink; standard orbicular, pilose. Ovary with trichomes, with numerous ovules. Legume linear, 3.5–4 cm × ca. 4 mm, shortly strigose, apex slightly ascending curved and with a beak; style remnant sharply reflexed. Seeds 8–14 per legume, brown, oblong-rhomboid, ca. 4 × 3 mm, mottled. Fl. and fr. year-round. $2n = 22, 44$.

Sunny places on slopes or trailsides; ca. 500 m. Guangdong [tropical Africa, Asia, and N Australia].

9. *Tephrosia luzonensis* Vogel, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 15. 1843.

西沙灰毛豆 xi sha hui mao dou

Herbs, annual, 10–15(–100) cm tall, many branched, white spreading pilose. Stems erect, procumbent, or ascendant, base slightly woody. Stipules ca. 4 mm. Leaves (5–)9–13(–21)-foliolate; rachis 5–10 cm, including petiole ca. 1 cm; leaflet blades narrowly oblong to oblanceolate, 1–3 × 0.3–0.7 cm, abaxially densely gray pubescent, adaxially appressed puberulent, secondary veins 10 on each side of midvein, base cuneate, apex rounded or retuse and cuspidate. Pseudoracemes axillary, with 4–8 flowers gathered on apical half of rachis. Pedicel 3–4 mm. Flowers ca. 7 mm. Corolla pale red flushed with purple. Legume linear, 2.5–3.5 cm × ca. 4 mm, slightly curved, strigose,

apex with a straight beak. Seeds 7–12 per legume, black, subglobose, ca. 2 mm. Fl. and fr. year-round.

Open sandy seashores; near sea level. Guangdong (Xisha Qundao: Yongxing Dao) [Indonesia, Philippines, Thailand].

10. *Tephrosia ionophlebia* Hayata, Icon. Pl. Formosan. 9: 21. 1920.

台湾灰毛豆 tai wan hui mao dou

Herbs, perennial, suffrutescent. Stems erect or ascendant, appressed yellow puberulent. Stipules 3–6 mm, abaxially strigose, apex acuminate. Leaves 13–17(–21)-foliolate, sometimes with axillary cataphylls; rachis 6–8 cm, including petiole 1–1.5 mm; leaflet blades oblong-ob lanceolate, 15–18 × ca. 5 mm with largest at middle of rachis, abaxially sparsely strigose, adaxially glabrescent, secondary veins ca. 9 on each side of midvein, reticulate veins clearly marked and purplish red especially abaxially, base broadly cuneate, apex rounded to retuse and cuspidate. Pseudoracemes terminal or opposite a leaf, 2–5 cm, straight, strigose, elongated in fruit. Pedicel ca. 4 mm, slender. Flowers ca. 1 cm. Calyx ca. 5 × 3 mm. Corolla red; standard broadly orbicular, outside pubescent. Ovary linear, with numerous ovules. Legume linear, 3.5–4 cm × ca. 4 mm, strigose, apically slightly curved. Seeds 5–7 per legume, pale brown, ellipsoid, ca. 3 × 1.5 mm, scabrous. Fl. and fr. Sep–Dec.

• Open places or wastelands. Taiwan.

This species was treated as *Tephrosia purpurea* in Fl. Taiwan (ed. 2, 3: 371. 1993).

11. *Tephrosia obovata* Merrill, Philipp. J. Sci., C, 5: 69. 1910.

卵叶灰毛豆 luan ye hui mao dou

Herbs, perennial, small. Stems straggling, appressed pubescent, base woody. Stipules subulate, 2–4 mm. Leaves (9 or) 11- or 13-foliolate; rachis ca. 5 cm, including petiole ca. 1.5 cm; leaflet blades obovate, ca. 1.4 × 0.6 cm, both surfaces appressed sericeous but abaxially especially dense, secondary veins 5–8 on each side of midvein and obscure, base rounded-cuneate, apex emarginate and cuspidate. Pseudoracemes terminal or axillary, short. Flowers ca. 1 cm. Calyx campanulate, ca. 3 mm. Corolla red; standard orbicular, outside pubescent. Ovary with trichomes. Legume linear, 2–2.5 cm × ca. 4 mm, straight, densely velutinous. Seeds 6 or 7 per legume, pale brown, ellipsoid, ca. 2.5 × 2.2 mm. Fl. and fr. Mar–Aug.

Sandy or rocky areas; near sea level. Taiwan [Philippines].

The report (FRPS 40: 222. 1994) of *Tephrosia filipes* Benth from Taiwan is most likely a misidentification of this species and is based on a single specimen from the Hengchun peninsula of S Taiwan in the Herbarium of the Shanghai Museum of Natural History (SHM) collected at “Ma-lan-bi” on cliffs.

18. Tribe ABREAE

相思子族 *xiang si zi zu*

Bao Bojian (包伯坚); Michael G. Gilbert

Shrubs or shrublets, often climbing. Leaves paripinnate; leaflets many paired; rachis terminated by a bristle; stipels absent. Racemes terminal or subterminal. Flowers fasciculate on rachis. Calyx truncate with short teeth. Corolla papilionaceous, claw of standard ± adnate to staminal sheath. Stamens 9; filaments connate into a sheath split above (adaxially); vexillary stamen absent; anthers uniform. Ovary with numerous ovules; style glabrous. Legumes compressed, 2-valved, subseptate but not breaking up into separate joints. Seeds subglobose or ellipsoid, shiny, sometimes brightly colored.

One genus and 17 species: one in SW Asia, two in tropical Asia, one in Africa and Asia, seven in Africa only, five in Madagascar, and one pan-tropical; two species in China.

78. ABRUS Adanson, Fam. Pl. 2: 327, 511. 1763.

相思子属 *xiang si zi shu*

Morphological characters and geographic distribution are the same as those of the tribe.

Apart from *Abrus precatorius*, the species are not well defined, and one author (Breteler, Blumea 10: 607–624. 1960) has suggested a considerable reduction in the number of species recognized. See, however, Verdcourt (Kew Bull. 24: 235–252. 1970) who is followed here.

- 1a. Seeds conspicuously glossy black and red, subglobose; legume 2–3.5 cm, apex emarginate below style 1. *A. precatorius*
1b. Seeds uniformly dark brown to almost black, compressed; legume (3–)5–6.5 cm, apex slightly acuminate 2. *A. pulchellus*

1. *Abrus precatorius* Linnaeus, Syst. Nat., ed. 12, 2: 472. 1767.

相思子 *xiang si zi*

Glycine abrus Linnaeus, Sp. Pl. 2: 753. 1753.

Lianas. Stem slender, much branched, sparsely white strigose. Leaves paripinnate; leaflets 8–13-paired, opposite; petiolule short; blades suboblong, 1–2 × 0.4–0.8 cm, membranous, sparsely white strigose abaxially, glabrous adaxially, rounded at base, truncate and with mucro at apex. Racemes axillary, 3–8 cm. Flowers small, dense. Calyx campanulate, 4-toothed, white strigose. Corolla purple; standard with triangular claw; wings and keels narrower. Stamens 9. Ovary hairy. Legumes oblong, 2–3.5 × 0.5–1.5 cm, leathery, dehiscent, with 2–6 seeds. Seeds lustrous, black in lower part, red in upper part, subglobose. Fl. Mar–Jun, fr. Sep–Oct.

Hill forests. Guangdong, Guangxi, Taiwan, Yunnan [widespread in the tropics].

The hard and very colorful seeds are often used in necklaces. They are dangerously toxic if ingested when the seed coat is not intact (e.g., if drilled for a necklace).

2. *Abrus pulchellus* Wallich ex Thwaites, Enum. Pl. Zeyl. 91. 1859.

美丽相思子 *mei li xiang si zi*

Lianas, climbing. Stem slender, sparsely yellow strigose or villous. Leaves paripinnate, alternate; leaflets 6–10-paired, opposite; petiolule short; blades suboblong, oblong, or obovate-oblong, 0.5–3 × 0.3–1 cm, membranous, sparsely white strigose or densely white villous abaxially, glabrous or pilose adaxially, rounded or subcordate at base, truncate and with mucro at apex. Racemes axillary, 3–10 cm. Flowers dense, 3–9 mm. Calyx campanulate, 4-toothed, white strigose or densely gray villous. Corolla pink, purple, or purple-red. Stamens 9. Legumes ob-

long, (2–)5–6.5 × 0.8–1.5 cm, densely white hairy, dehiscent, with 4–12 seeds. Seeds black-brown or black, lustrous to slightly lustrous, elliptic or ovoid, compressed.

Forests, hill slopes; 200–3000 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

- 1a. Indumentum usually at least partly ferruginous, mostly erect, but often gray on leaves, or if indumentum gray then leaflets ca. 3 cm and legume 3.5–4.9 cm 2b. subsp. *mollis*
1b. Indumentum sparse and grayish, not ferruginous, adpressed (rarely petiole appearing brown but hairs always pale).
2a. Leaflets 0.7–4 cm, base rounded; legume 3.2–9 cm 2a. subsp. *pulchellus*
2b. Leaflets mostly ca. 1 cm, base distinctly subcordate; legume 2–3.3 cm 2c. subsp. *cantoniensis*

2a. *Abrus pulchellus* subsp. *pulchellus*.

美丽相思子(原亚种) *mei li xiang si zi (yuan ya zhong)*

Lianas, climbing. Stem sparsely yellow strigose. Leaflets suboblong, 0.7–4 × 0.4–1 cm, sparsely white strigose abaxially, glabrous adaxially, rounded at base, truncate and with mucro at apex. Flowers 6–8 mm. Calyx white strigose. Corolla pink or purple. Legumes 3.2–9 × 0.8–1.5 cm, densely white hairy, dehiscent, with 6–12 seeds. Seeds black-brown, lustrous, elliptic.

Valley forests; 400–3000 m. Guangxi, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

2b. *Abrus pulchellus* subsp. *mollis* (Hance) Verdcourt, Kew Bull. 24: 248. 1970.

毛相思子 mao xiang si zi

Abrus mollis Hance, J. Bot. 9: 130. 1871.

Lianas; indumentum usually at least partly ferruginous, mostly erect. Stem sparsely yellow villous. Leaflets oblong, 1–3 × 0.5–1 cm, densely white villous abaxially, pilose adaxially, rounded at base, truncate and with mucro at apex. Rachis 2–4 cm, yellow villous. Flowers 3–9 mm, 4–6-fascicled at nodes. Calyx densely gray villous. Corolla pink or light purple. Legumes flat, 3–5(–6) × 0.8–1 cm, densely white villous, beaked at apex, with 4–9 seeds. Seeds black or dark brown, slightly lustrous, ovoid, flat. Fl. Aug, fr. Sep.

Forests at roadsides or in valleys; 200–1700 m. Fujian, Guangdong, Guangxi, Hainan [Cambodia, Indonesia, Laos, Malaysia, Thailand, Vietnam].

2c. *Abrus pulchellus* subsp. *cantoniensis* (Hance) Verdcourt, Kew Bull. 24: 248. 1970.

广州相思子 guang zhou xiang si zi

Abrus cantoniensis Hance, J. Bot. 6: 112. 1868.

Lianas, climbing, 1–2 m tall. Branches slender, smooth, white hairy, caducous when old. Leaflets oblong or obovate-oblong, 0.5–1.5 × 0.3–0.5 cm, strigose abaxially, pilose adaxially, distinctly subcordate at base, truncate or slightly retuse with mucro at apex. Flowers ca. 6 mm, fascicled at short rachis; pedicel short. Corolla purple-red or light purple. Legumes flat, 2–3.3 × ca. 1.3 cm, beaked at apex, sparsely white strigose, with 4 or 5 seeds. Seeds black-brown. Fl. Aug.

Forests, hill slopes; ca. 200 m. Guangdong, Guangxi, Hunan [Thailand, Vietnam].

19. Tribe PHASEOLEAE

菜豆族 cai dou zu

Sa Ren (萨仁), Wu Delin (吴德邻 Wu Te-lin), Chen Dezha (陈德昭 Chen Te-chao),
Zhang Dianxiang (张奠湘), Sun Hang (孙航), Huang Puhua (黄普华 Huang Pu-hwa);
Michael G. Gilbert, Mats Thulin, C. Melanie Wilmot-Dear, Hiroyoshi Ohashi

Herbs, erect, twining, or prostrate, rarely trees. Leaves pulvinate, usually pinnately 3-foliolate, rarely 1- or 5–7-foliolate; leaflets entire or lobed, sometimes gland-dotted; stipules and stipels present. Inflorescence mostly axillary, racemelike, with fascicles of flowers scattered along an axis, sometimes reduced to solitary flowers or expanded into panicles, often with swollen nodes; bracts usually small, very caducous, rarely densely imbricate. Calyx 4- or 5-toothed, rarely truncate. Corolla papilionaceous; petals normal or keel long beaked or spirally twisted. Stamens diadelphous (9+1); vexillary filament usually free, or partly or completely connate with others into an adaxially split sheath; anthers usually uniform. Ovary with 1 to many ovules; style bearded lengthwise on adaxial side, or pilose only around stigma. Legumes 2-valved, partitioned or not between seeds, but not jointed. Seeds strophiolate or not.

About 90 genera and ca. 1,570 species: throughout the tropics and warm-temperate regions of the world, more numerous in drier regions; 37 genera (seven introduced) and 169 species (43 endemic, 15 introduced) in China.

Modern investigations strongly suggest that the Phaseoleae in the traditional sense as followed here is not natural with some genera, including *Canavalia*, *Galactia*, and *Ophrestia* in this account, which are more closely related to the Millettieae and Abreae than to the other genera in the tribe and with the Desmodieae and Psoraleae embedded within the Phaseoleae proper (Schrire in Lewis et al., *Legumes World*, 393–394. 2005).

Physostigma venenosum Balfour, native to tropical W Africa, is cultivated in China.

This tribe includes species of great importance as food plants, cover crops, forage, green manure, ornamentals, medicine, dyes, etc.

- 1a. Leaflets abaxially and calyx generally with colored sessile glands; bracteoles absent; inflorescence nodes not swollen, 1-flowered (subtribe Cajaninae).
- 2a. Legumes 3- or more seeded.
 - 3a. Legumes not depressed between seeds 93. *Dunbaria*
 - 3b. Legumes depressed between seeds 94. *Cajanus*
- 2b. Legumes 1- or 2-seeded.
 - 4a. Leaves 1-foliolate; seeds with funicle attached at end of linear hilum 92. *Eriosema*
 - 4b. Leaves 3-foliolate, or simple (not 1-foliolate); seeds with funicle attached at middle of hilum.
 - 5a. Twining herbs or shrublets; leaves clearly pinnately 3-foliolate; legumes compressed 91. *Rhynchosia*
 - 5b. Erect shrubs or prostrate herbs (*F. procumbens*); leaves apparently digitately 3-foliolate or simple; legumes tergid 95. *Flemingia*
- 1b. Leaflets and calyx without glands; bracteoles often present; inflorescence nodes often swollen, bearing more than 1 flower.
 - 6a. Style flattened, thickened or twisted, mostly bearded, if not bearded and terete, then standard and keels with minute appendages; hilum usually covered with spongy strophiole (subtribe Phaseolinae).
 - 7a. Style flattened laterally 110. *Lablab*
 - 7b. Style terete or flattened dorsiventrally.
 - 8a. Hooked hairs present on vegetative parts 115. *Phaseolus*
 - 8b. Hooked hairs absent.
 - 9a. Petal wings longer than standard; style twice ca. 90° incurved 114. *Macroptilium*
 - 9b. Petal wings shorter than standard; style various but not as above.
 - 10a. Legumes 4-winged 98. *Psophocarpus*
 - 10b. Legumes not 4-winged.
 - 11a. Stigma lateral or oblique; stipules produced below point of attachment (except in *V. adenantha*) 113. *Vigna*
 - 11b. Stigma terminal; stipules not produced below point of attachment.
 - 12a. Standard appendages absent; corolla purple-blue 97. *Dysolobium*
 - 12b. Standard appendages present; corolla white, violet, or yellowish.
 - 13a. Standard appendages short; corolla white or violet 111. *Dolichos*
 - 13b. Standard appendages long and narrow; corolla yellowish 112. *Macrotyloma*
 - 6b. Style generally terete and unbearded (sometimes a few hairs below stigma), occasionally coiled (in Erythrinae), sometimes bearded or flattened (in Clitoriinae); hilum rarely covered with spongy tissue (some *Erythrina* excepted).
 - 14a. Flowers generally resupinate; calyx naked inside; style narrowed, penicillate or bearded distally; corolla often hairy; leaflets 1, 3, or 5–9, with minute hooked hairs (subtribe Clitoriinae).

- 15a. Standard without spur on back 82. *Clitoria*
 15b. Standard with a conspicuous spur on back 83. *Centrosema*
- 14b. Flowers not resupinate, or if resupinate then differing from above in other respects.
- 16a. Standard silky hairy outside, rather small, without appendages inside; seeds smooth, with a prominent aril; inflorescence not or only slightly nodose (subtribe Ophrestinae) 81. *Ophrestia*
- 16b. Standard glabrous, or if hairy then inflorescence generally nodose or flowers much modified.
- 17a. Flowers mostly adapted to birds or bats for pollination, petals generally unequal in length, sometimes with small bee-type flowers but then either coiled (*Apios*, *Cochlianthus*) or flowers in extensive panicles and legume samaroid (*Spatholobus*) (subtribe Erythrinae).
- 18a. Trees or shrubs; stems with prickles; keels much shorter than standard 96. *Erythrina*
- 18b. Climbers, rarely trees (*Butea monosperma*); stems without prickles; keels usually largest petals.
- 19a. Style spirally coiled.
 20a. Leaves (3 or)5- or 7(or 9)-foliolate, green when dried 84. *Apios*
 20b. Leaves 3-foliolate, black when dried 85. *Cochlianthus*
- 19b. Style not spirally coiled.
 21a. Legume with many seeds, 2-valved; irritant hairs usually present 88. *Mucuna*
 21b. Legume samaroid with 1 apical seed, empty below; irritant hairs absent.
 22a. Flowers purple, rose, or white, 0.5–1 cm 89. *Spatholobus*
 22b. Flowers yellow to scarlet, 1.5–8 cm 90. *Butea*
- 17b. Flowers mostly adapted to bees for pollination, or if bird-type flowers then petals subequal in length.
- 23a. Inflorescences generally with nodes swollen; seeds diverse, with short to long hilum (subtribe Diocleinae).
 24a. Stigma lateral to subterminal; ovary hirsute, hairs extending up style, forming a false beard 100. *Pachyrhizus*
 24b. Stigma terminal; style naked.
 25a. Calyx 2-lipped, upper lip large, entire or 2-lobed, lower lip small; stamens monadelphous; legumes ligulate to oblong 79. *Canavalia*
 25b. Calyx not strongly 2-lipped; stamens diadelphous; legumes linear.
 26a. Upper calyx lobes completely united (calyx appearing 4-lobed) 80. *Galactia*
 26b. Upper calyx lobes \pm separate (calyx 5-lobed) 99. *Calopogonium*
- 23b. Inflorescences with nodes not or only slightly swollen; seeds smooth or granular, with short hilum (subtribe Glycininae).
 27a. Legumes indehiscent.
 28a. Bracts caducous; fruit many seeded; seeds with filiform funicle 87. *Mastersia*
 28b. Bracts enlarging after anthesis, leaflike, boat-shaped; fruit 1-seeded; seeds without filiform funicle 109. *Phyllacium*
- 27b. Legumes dehiscent.
 29a. Anthers alternately small and sterile or large and fertile; legume with persistent style forming a hook 107. *Teramnus*
 29b. Anthers all similar, fertile; legume without hooked style.
 30a. Stems strongly 4-angled, angles with descending brown hairs; flowers 5–7 mm 101. *Teyleria*
 30b. Stems not strongly 4-angled, angles without brown hairs; flowers mostly longer than 7 mm.
 31a. Leaves 1-foliolate 104. *Nogra*
 31b. Leaves 3-foliolate.
 32a. Claws of wings and keel longer than blade; seeds smooth, without a scarious strophiole; ovary walls often transparent.
 33a. Calyx truncate, lobes \pm obsolete; flowers yellow 102. *Dumasia*
 33b. Calyx lobes distinct, triangular; flowers usually red-purple, purple, blue, or white, never yellow.
 34a. Legumes septate between seeds; bracteoles present; bracts rather large and persistent 86. *Shuteria*
 34b. Legumes not septate; bracteoles absent 106. *Amphicarpaea*
- 32b. Claws of wings and keel shorter than blade; seeds usually rough; hilum often with a scarious strophiole; ovary walls opaque.
 35a. Flowers 2 or more per node of inflorescence 103. *Pueraria*
 35b. Flowers 1 per node of inflorescence.
 36a. Flowers 12 mm or more 105. *Sinodolichos*
 36b. Flowers 9 mm or less 108. *Glycine*

79. CANAVALIA Adanson, Fam. Pl. 2: 325, 531. 1763 [*“Canavali”*], nom. cons.

刀豆属 dao dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Herbs, annual or perennial. Stems twining, prostrate, or suberect. Leaves pinnately 3-foliolate; stipules small, wartlike or inconspicuous; stipels present, deciduous. Racemes axillary; bracts and bracteoles minute, deciduous. Flowers purple-violet, rose, or whitish, solitary or 2–6 clustered at swollen nodes. Calyx campanulate, 2-lipped, upper lip larger, truncate or 2-lobed, lower lip small or minute, entire or 3-toothed. Corolla longer than calyx; petals shortly clawed; standard large, suborbicular, reflexed; wings narrow, falcate, sometimes slightly twisted, free; keel broader than wings, incurved, obtuse or beaked, beak inflexed or spirally twisted, shorter than standard. Stamens monadelphous; anthers uniform. Ovary shortly stipitate, many ovuled; style incurved, beardless. Legumes large, ligulate or linear-oblong to oblong, compressed or slightly turgid, with prominent rib along ventral suture and extra ribs parallel and close to it, dehiscent by twisting of valves. Seeds 10–15, elliptic or oblong; hilum linear.

About 50 species: distributed in tropical and subtropical regions; five species (two introduced) in China.

- 1a. Plants subshrubby, erect or almost so; calyx upper lip subequal to calyx tube; seeds white 1. *C. ensiformis*
 1b. Plants twining; calyx upper lip shorter than calyx tube; seeds brown or red.
 2a. Leaflets with acuminate apex; legumes 20–35 × 3.5–6 cm; seeds ca. 3.5 cm 2. *C. gladiata*
 2b. Leaflets with acute, truncate, or rounded apex; legumes 6–12 × 2–4.5 cm; seeds 1.3–1.8 cm.
 3a. Upper lobes of calyx with apiculate apex 3. *C. lineata*
 3b. Upper lobes of calyx without apiculate apex.
 4a. Leaflets with acute or rounded apex, not emarginate; legumes oblong, 7–9 × 3.5–4.5 cm; seeds brown-black, ca. 1.8 cm 4. *C. cathartica*
 4b. Leaflets with rounded or truncate apex, often emarginate, rarely acuminate; legumes linear-oblong, 8–12 × 2–2.5 cm; seeds brown, 1.3–1.5 cm 5. *C. rosea*

1. *Canavalia ensiformis* (Linnaeus) Candolle, Prodr. 2: 404. 1825.

直生刀豆 zhi sheng dao dou

Dolichos ensiformis Linnaeus, Sp. Pl. 2: 725. 1753.

Herbs, annual, subshrubby, 0.6–1(–2) m, wholly pubescent or glabrescent. Stipules small, deciduous; leaflets thin, ovate or elliptic, 8–18 × 5–8 cm, base cuneate or rounded, apex acute. Racemes solitary, 15–25(–40) cm including peduncle. Flowers 1–5 at nodes of rachis. Calyx ca. 1.5 cm, upper lip truncate, as long as calyx tube, lower lip with deltoid lobes. Corolla purplish or white and purple; standard ca. 2.2 cm in diam., base with 2 semiorbicular, reflexed auricles, claw flat and broad, ca. 5 mm; wings obovate-oblong; keel auriculate and clawed. Legumes thickly leathery, ligulate, 20–30 × 2.5–4 cm, each valve with extra rib ca. 5 mm from sutural rib. Seeds white, elliptic, ca. 3 × 2 cm; hilum not more than 1.5 cm. Fl. May–Jul, fr. Oct.

Cultivated. Guangdong, Hainan, Taiwan [native to Central America and West Indies; widely cultivated in tropical and subtropical regions].

This species is used as a green manure and forage.

2. *Canavalia gladiata* (Jacquin) Candolle, Prodr. 2: 404. 1825.

刀豆 dao dou

Dolichos gladiatus Jacquin, Collectanea 2: 276. 1788; *Canavalia ensiformis* (Linnaeus) Candolle var. *gladiata* (Jacquin) Kuntze; *C. gladiolata* Sauer.

Herbs, climbing, several meters tall. Leaflets ovate, 8–20 × 8–12 cm, sparsely whitish or brown pubescent on both surfaces, base rounded or cuneate, apex acuminate. Racemes 10–20-flowered; peduncles 20–25 cm. Flowers 2 or 3 clustered at

each node. Calyx 15–16 mm, slightly pubescent, upper lip rounded, lower lip with 3 acute teeth. Corolla white or pink, 3–3.5 cm; petals clawed and auriculate; standard broadly elliptic, 3–3.5 × ca. 2.5 cm, emarginate; wings and keel oblong, incurved, smaller than standard. Legumes linear-oblong, slightly curved, 20–35 × 3.5–6 cm, thickly leathery, each valve with extra rib ca. 5 mm from sutural rib. Seeds reddish brown, elliptic-oblong, ca. 3.5 × 2 cm; hilum ca. 1.5 cm. Fl. Jul–Sep, fr. Oct.

Widely cultivated in areas S of the Chang Jiang [domesticated in Asia; widely cultivated in the tropics].

Originally cultivated in E Asia and now widely cultivated in the tropics, this plant is not known out of cultivation, except as an escape.

The legumes and seeds are edible. It is also grown as a green manure and forage.

3. *Canavalia lineata* (Thunberg ex Murray) Candolle, Prodr. 2: 404. 1825.

狭刀豆 xia dao dou

Dolichos lineatus Thunberg ex Murray, Syst. Veg., ed. 14, 658. 1784.

Herbs, perennial, twining. Leaflets ovate or obovate, 6–14 × 4–10 cm, sparsely pubescent on both surfaces, base truncate or cuneate, apex rounded or cuspidate. Racemes axillary. Calyx ca. 12 mm, pubescent, upper lip broadly 2-lobed and lobes apiculate at apex, lower lip 3-lobed, small, subtruncate. Corolla purplish red; standard broadly ovate, ca. 2.5 cm, emarginate, base with 2 thickenings, auriculate; wings linear-oblong, slightly falcate; keel obovate-oblong. Legumes oblong, compressed, 6–10 × 2.5–3 cm, each valve with extra rib ca. 3 mm from sutural rib. Seeds brown, 2 or 3, ovate, ca. 1.7 × 0.7 cm, blotched. Fl. and fr. Jun–Oct.

Sandy beaches. Fujian, Guangdong, Guangxi, Taiwan, Zhejiang [Cambodia, Indonesia, Japan, Korea, Philippines, Vietnam].

4. *Canavalia cathartica* Thouars, J. Bot. Agric. 1: 81. 1813.

小刀豆 xiao dao dou

Canavalia ensiformis (Linnaeus) Candolle var. *turgida* (Graham ex A. Gray) Baker; *C. microcarpa* (Candolle) Piper; *C. turgida* Graham ex A. Gray; *Lablab microcarpus* Candolle.

Herbs, biennial, robust, twining. Stems and branches sparsely pubescent. Leaflets ovate, 6–10 × 4–9 cm, sparsely white pubescent on both surfaces, base broadly cuneate, truncate, or rounded, apex acute or rounded. Racemes with 1–3 flowers at each node of rachis. Calyx ca. 12 mm, pubescent, upper lip with rounded lobes, shorter than tube, lower lip with 3 teeth. Corolla pink or purplish, 2–2.5 cm; standard orbicular, ca. 2 × 2.5 cm, with 2 thickenings near base, clawed, apex emarginate; wings and keel curved, ca. 2 cm. Legumes oblong, 7–9 × 3.5–4.5 cm, turgid, apex rostrate. Seeds brownish black, elliptic, ca. 18 × 12 mm, hard and smooth; hilum 10–14 mm. Fl. and fr. Apr–Oct.

Seashores, riverbanks. Guangdong, Hainan, Taiwan [widely distributed in tropical Asia and some areas of Africa and Australia].

5. *Canavalia rosea* (Swartz) Candolle, Prodr. 2: 404. 1825.

海刀豆 hai dao dou

Dolichos roseus Swartz, Prodr. 105. 1788; *Canavalia maritima* Thouars; *C. obcordata* (Roxburgh) Voigt; *C. obtusifolia* (Lamarck) Candolle; *D. maritimus* Aublet; *D. obcordatus* Roxburgh; *D. obtusifolius* Lamarck.

Herbs, robust, twining. Stems sparsely puberulent. Leaflets obovate, ovate, elliptic, or suborbicular, 5–8(–14) × 4.5–6.5(–10) cm, pilose on both surfaces, base cuneate to rounded, apex rounded, truncate, emarginate, or mucronate. Racemes axillary, to 30 cm including peduncle. Flowers 1–3 clustered at each node. Calyx 1–1.2 cm, pubescent, upper lip semiorbicular, 3–4 mm. Corolla purple; standard orbicular, ca. 2.5 cm, apex emarginate; wings falcate, auriculate; keel oblong, curved, auriculate. Legumes linear-oblong, 8–12 × 2–2.5 cm, apex rostrate, each valve with extra rib ca. 3 mm from sutural rib. Seeds brown, elliptic, 13–15 × ca. 10 mm; hilum ca. 10 mm. Fl. Jun–Jul.

Sandy beaches. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Zhejiang [tropical coastal areas].

For the nomenclature of *Canavalia rosea*, see Aymard in Ernstia (8: 19–25. 1998).

80. GALACTIA P. Browne, Civ. Nat. Hist. Jamaica, 298. 1756.

乳豆属 ru dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Herbs or subshrubs, prostrate or twining. Leaves pinnately 3-foliolate, rarely 1–7-foliolate; stipules small, deciduous or persistent; stipels persistent. Racemes axillary; rachis with remote and slightly swollen nodes; bracts small, setaceous; bracteoles minute. Flowers solitary, paired, or several clustered at nodes of rachis. Calyx lobes linear or lanceolate, upper 2 entirely connate into 1, lateral slightly smaller, lowest often longest. Corolla slightly exerted; petals subequal in length; standard orbicular, ovate, or obovate-orbicular, margin slightly inflexed or appendaged; wings narrow or obovate, adherent to keel; keel obtuse and almost straight, subequal to or longer than wings. Stamens diadelphous; vexillary stamen free or connate from middle downward; anthers uniform. Ovary sessile; ovules numerous; style filiform, glabrous; stigma small, capitate, terminal. Legumes linear, compressed, straight or slightly incurved, ± septate between seeds. Seeds small, compressed, estrophiolate.

About 60 species: tropical and subtropical Asia, Africa, and America; two species in China.

- 1a. Leaflets thicker, subleathery, broadly elliptic or broadly obovate to suborbicular, midrib and lateral veins impressed adaxially, veinlets obscure 1. *G. tashiroi*
 1b. Leaflets thinner, papery, elliptic or lanceolate, midrib and lateral veins slightly raised adaxially, veinlets conspicuous 2. *G. tenuiflora*

1. *Galactia tashiroi* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 31: 34. 1886.

琉球乳豆 liu qiu ru dou

Herbs, perennial, trailing or climbing. Stems densely whitish villous. Petiolules 1.5–2 mm, hairy; stipels minute and obscure; leaflets broadly elliptic or broadly obovate to suborbicular, 1.3–2.7 × 1–1.8 cm, thick, subleathery, adpressed whitish villous abaxially, glabrous adaxially, lateral veins 3–5 pairs, together with midrib raised abaxially, impressed adaxially, veinlets reticulate, obscure, base rounded, apex rounded or emarginate. Racemes axillary, 1–4 cm, nodes slightly swollen. Calyx 4–5 mm, densely villous. Corolla red; standard ca. 10 mm. Legumes linear, compressed, ca. 3 × 0.6–0.7 cm. Fr. Aug–Sep.

Open forests. Taiwan [Japan (Ryukyu Islands)].

This species is used for herbage and also grown for erosion control.

2. *Galactia tenuiflora* (Klein ex Willdenow) Wight & Arnott, Prodr. Fl. Ind. Orient. 206. 1834.

乳豆 ru dou

Glycine tenuiflora Klein ex Willdenow, Sp. Pl. 3: 1059. 1802; *Galactia elliptifoliola* Merrill; *G. formosana* Matsumura; *G. lanceolata* Hayata.

Herbs, perennial, climbing. Stems puberulent to densely villous with grayish white or grayish yellow hairs. Petiolules ca. 2 mm; stipels subulate, 1–1.5 mm; leaflets elliptic, oblong, or

lanceolate, 2–7 × 1.3–4 cm, papery, sparsely puberulent to densely villous abaxially, sparsely puberulent to subglabrous adaxially, lateral veins 4–8 pairs, slender, slightly raised on both surfaces, veinlets reticulate, conspicuous on both surfaces, base and apex rounded, apex sometimes emarginate, mucronate. Racemes axillary; rachis slender, 2–20 cm. Flowers solitary or often 2–4 clustered at nodes of rachis. Calyx ca. 7 mm, subglabrous to pubescent, tube ca. 3 mm, lobes narrowly lanceolate, apex acuminate. Corolla light blue or pink; standard obovate, ca. 10.5 × 7 mm, base attenuate, with 2 small auricles,

apex rounded; wings oblong, ca. 9 × 2 mm, base with a pointed auricle; keel as long as or longer than wings, slightly curved on back, base with a small auricle. Legumes linear-oblong, 2–6.5 × 0.6–0.7 cm, puberulent to villous at first, glabrescent. Seeds brown, reniform, slightly compressed, 2–3.5 × 3–5 mm, smooth. Fl. and fr. Jul–Dec.

Forests, scrub, hillsides. Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, Yunnan [India, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; Africa].

81. OPHRESTIA H. M. L. Forbes, *Bothalia* 4: 1003. 1948.

拟大豆属 ni da dou shu

Sa Ren (萨仁); Michael G. Gilbert

Perennial herbs, subshrubs, or shrubs, twining or rarely erect. Leaves pinnately (1–)3–9-foliolate; stipules linear, small; stipels small or absent. Inflorescence axillary, racemose, solitary, paired, or clustered. Bracts styliiform or linear. Calyx membranous, campanulate, sometimes cylindrical-campanulate, 5-lobed; lobes subequal, all shorter than tube, upper 2 ± connate. Corolla longer than calyx; standard pandurate, sometimes reniform, ovate-oblong, or almost circular, silky hairy outside, base acuminate to wide and short stipe; wings usually narrowly elliptic, with stipe and auricles; keels oblong or obovate, equal to or shorter than wings. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile; ovules 2–8; style thick; stigma small, capitate. Legume oblong or linear-oblong, dehiscent, oblate, margins slightly thickened, 2–5-seeded. Seeds oblong-ovate, smooth; hilum short, central; aril spongy, with strophiole.

About 13 species: tropical Africa, Asia; one species in China.

1. *Ophrestia pinnata* (Merrill) H. M. L. Forbes, *Bothalia* 4: 1003. 1948.

羽叶拟大豆 yu ye ni da dou

Glycine pinnata Merrill, *Lingnan Sci. J.* 14: 15. 1935; *Cruddasia pinnata* (Merrill) Niyomdham; *Paraglycine pinnata* (Merrill) F. J. Hermann.

Vines. Stems twining, herbaceous or almost woody, hirsute. Leaves pinnately 5–7-foliolate, 10–15 cm; stipules lanceolate; petiole 3–6 cm; stipels filiform, ca. 1 mm, deciduous; petiolules 1–2 mm; leaflets oblong or elliptic, 2.5–7(–9) × 1.4–3.8 cm, papery, abaxial surface densely clothed with white coarse hairs, adaxial surface glabrous or sparsely clothed with coarse adpressed hairs, lateral veins 5 or 6 pairs, base rounded,

apex obtuse to acuminate, sometimes with mucro. Raceme axillary, 4–10 cm; peduncles 6–10 mm. Flowers small, solitary or paired, ca. 6 mm; bracts filiform, ca. 1 mm, persistent; bracteoles filiform or linear, ca. 1 mm. Calyx membranous, 2.5–3.5 mm, 5-lobed, upper 2 lobes connate to broadly triangular, lower lanceolate, all shorter than tube. Corolla purple to pink; standard pandurate, 5.5–6 mm; wings usually narrowly elliptic, with auricles and stipe; keels oblong, equal to wings, with auricles and stipe. Ovary 2–8-ovuled. Legume oblong, 2.5–4 × 6–8 cm, compressed, apex with short beak, densely hirsute, reflexed after dehiscence. Seeds 2–5, brown or black, suborbicular, compressed, ca. 4.5 mm in diam.; strophiole dry membranous, scalelike. Fl. Jul–Aug, fr. Aug–Sep.

Open scrub; below 1200 m (in Vietnam). Hainan [Vietnam].

82. CLITORIA Linnaeus, *Sp. Pl.* 2: 753. 1753.

蝶豆属 die dou shu

Sa Ren (萨仁); Michael G. Gilbert

Perennial herbs or subshrubs, twining. Leaves pinnately 3–7-foliolate; stipules and stipels persistent. Inflorescence axillary, 1- or 2-flowered. Flowers large and beautiful; bracts paired, stipulelike, persistent; bracteoles similar to bracts or slightly larger, or sometimes leaflike. Calyx membranous, tubular, 5-lobed; lobes lanceolate or triangular, equal to or shorter than tube. Corolla longer than calyx; standard large, almost applanate or sometimes cucullate, abaxially minutely hairy, base clawed, without auricles; wings and keels much shorter. Stamens diadelphous; vexillary stamen free, or ± connate; anthers uniform. Ovary with stipe, with sheathing disk at base; ovules many; style complanate, long, curved, interior with beard. Legume stipitate, linear or linear-oblong, dehiscent, compressed or inflated, filled with soft tissue but not septate. Seeds subglobose or ellipsoid, compressed; hilum small, central or subcentral, strophiole absent.

About 70 species: tropics and subtropics of the world; five species (one introduced) in China.

- 1a. Leaves 5–7-foliolate; bracteoles almost circular, membranous 1. *C. ternatea*
 1b. Leaves 3-foliolate; bracteoles ovate-lanceolate or elliptic, leathery.

- 2a. Erect or almost erect shrublets; petiole 0.5–2.5 cm.
 3a. Lateral veins of leaflet 5–7 pairs; legume inflated, each valve with a raised midrib; corolla light purple ... 2. *C. laurifolia*
 3b. Lateral veins of leaflet 9–12 pairs; legume compressed, without ribs; corolla white or light yellow 3. *C. hanceana*
 2b. Climbing shrublets or vines; petiole (1.5–)2–11.5 cm.
 4a. Corolla light blue; legume without ribs 4. *C. mariana*
 4b. Corolla often absent, when present white; legumes longitudinally ribbed 5. *C. falcata*

1. *Clitoria ternatea* Linnaeus, Sp. Pl. 2: 753. 1753.

蝶豆 die dou

Herbs. Stems twining, slender, densely deciduous adpressed shortly villous. Leaves 2.5–5 cm, pinnately 5–7-foliolate, usually 5-foliolate; stipules small, linear, 2–5 mm; petiole 1.5–3 cm; stipels small, bristlelike; petiolules 1–2 mm; leaflets broadly elliptic or almost ovate, 2.5–5 × 1.5–3.5 cm, thinly papery or almost membranous, adpressed shortly villous or sometimes glabrous on both surfaces, lateral veins 4 or 5 pairs, base obtuse, apex obtuse, slightly emarginate, usually with mucro. Flowers large, solitary in axil; bracteoles green, small, suborbicular or obovate, membranous, with obvious reticulate veins. Calyx membranous, 1.5–2 cm, 5-lobed; lobes lanceolate, less than 1/2 of tube, apex acuminate. Corolla sky blue, pink, or white, to 5.5 cm; standard faintly white or orange in middle, broadly obovate, ca. 3 cm, base shortly clawed; wings and keels much shorter than standard, both clawed; wings obovate-oblong; keels elliptic. Ovary villous. Legume brown, linear-oblong, 5–11 × 0.7–1 cm, compressed, with long beak. Seeds 6–10, black, oblong, ca. 0.6 × 0.4 cm, with obvious strophiole. Fl. and fr. Jun–Nov. $2n = (14, 15), 16$.

Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; Africa, Americas, SW Asia, Australia, Indian Ocean islands, Pacific islands].

This species is grown as a green manure and as an ornamental. It is very widely distributed throughout the tropics such that the native distribution is now obscure.

2. *Clitoria laurifolia* Poiret, Encycl., Suppl. 2: 301. 1811.

棱荚蝶豆 leng jia die dou

?*Clitoria cajanifolia* Benth.

Shrublets, erect or almost erect, 0.8–1 m tall. Branchlets subterete, densely pubescent, glabrescent. Leaves pinnately 3-foliolate; stipules ovate to ovate-lanceolate, pubescent; petiole 2–7 mm, pubescent; stipels small, bristlelike; petiolules 2–3 mm, pubescent; leaflets obovate-oblong to oblong, 4.5–7 × 1.5–2.8 cm, almost leathery, abaxially densely adpressed pubescent, adaxially glabrous, lateral veins 5–7 pairs, obvious, reticulate veins dense, visible, base rounded or cuneate, apex rounded, slightly emarginate. Raceme axillary, 2.5–5 cm, sparsely shortly villous; peduncle ca. 3 cm; bracts small, ovate. Flowers large, ca. 4 cm, usually paired; bracteoles 2, elliptic, 7–8 mm. Calyx membranous, 5-lobed; lobes ovate, much shorter than tube. Corolla light purple, 2 × or more as long as calyx; standard almost orbicular, base clawed, apex emarginate; wings rhomboid, base long clawed with small auricles; keels semicircular, base long clawed. Legume brown or light brown, linear-ellipsoid, 3–4 cm, inflated, with short beak, near ventral suture with 1 longi-

tudinal rib at each side, clothed with micro-villous hairs. Seed dark brown, suborbicular. Fl. Jul, fr. Aug–Dec.

Below 600 m. Guangdong [India, Indonesia, Malaysia, Myanmar, Singapore, Sri Lanka, Thailand, Vietnam; Africa, Americas].

This species has been grown as a green manure and as an ecological plant for soil restoration.

3. *Clitoria hanceana* Hemsley, J. Linn. Soc., Bot. 23: 187. 1887.

广东蝶豆 guang dong die dou

Shrublets, with several succulent fusiform roots. Stems cylindrical, slightly zigzag, internode short, pubescent. Leaves pinnately 3-foliolate; stipules ovate or ovate-lanceolate to oblong, ca. 1 cm, pubescent; petiole 0.5–2.5 cm, villous; stipels linear-lanceolate, 5–6 mm; petiolules ca. 2 mm, villous; leaflets subequal to each other or terminal larger, oblong, 6.5–14 × 2.8–5.5 cm, papery or almost leathery, adaxially glabrous, lateral veins 9–12 pairs, base obtuse or almost cuneate, apex acute or sometimes rounded, usually with mucro, villous. Raceme axillary, 1–2.5 cm, (1 or)2- or 3-flowered, villous; peduncle 0.5–2.5 cm; bracts ovate, 3–5 mm. Flowers ca. 3 cm; bracteoles ovate-lanceolate, 4–5 mm. Calyx membranous, ca. 2 cm, 5-lobed; lobes lanceolate, subequal to tube, hairy, apex acuminate. Corolla white or pale yellow, ca. 3 cm; standard obovate, densely pubescent; wings and keels small, with claws. Ovary with short stipe, hairy, many ovuled. Legume light brown, linear-oblong, 3.5–6 × ca. 0.6 cm, glabrous or pubescent, apex long beaked, shortly stipitate. Seeds 2–7, black, elliptic, ca. 4 × 3 mm. Fl. Apr–Oct.

Deserts, wastelands on slopes, roadsides. Guangdong, Guangxi [Cambodia, Laos, Thailand, Vietnam].

Hance (J. Bot. 16: 9. 1878) applied the name "*Clitoria macrophylla* Wallich" to this species, but that name is a nomen nudum and was therefore not validly published.

This species is used medicinally.

4. *Clitoria mariana* Linnaeus, Sp. Pl. 2: 753. 1753.

三叶蝶豆 san ye die dou

Herbs, 45–60 cm tall. Stems lianescent, sparsely villous. Leaves pinnately 3-foliolate; stipules ovate-lanceolate or ovate-triangular, 5–13 mm; petiole 2.8–11.5 cm; stipels linear or linear-lanceolate, 3–7 mm; petiolules short, 1–2 mm; leaflets elliptic to ovate-elliptic, 2.5–11 × 1.5–5 cm, thinly papery, abaxially sparsely villous or sometimes glabrous, adaxially glabrous, lateral veins 7–11 pairs, obviously convex abaxially, base rounded, apex obtuse or acute, rarely acuminate, with mucro. Peduncle with 4 or 5 or more bracts at base; bracts ovate to ovate-lanceolate, 2–4 mm. Flowers axillary, usually solitary, 2.5–5 cm; bracteoles similar to bracts but larger, 4–8 mm. Calyx large,

tubular, membranous, usually glabrous, 5-lobed; lobes lanceolate to ovate-lanceolate, ca. 1/4 as long as to equal to tube, apex acuminate. Corolla light blue or purple, 2.5–5 cm; standard broadly elliptic or almost obovate, base acuminate; wings and keels similar and subequal, much shorter than standard, with slender claws. Ovary and style villous. Legume linear-oblong, 2.5–10 × 0.5–0.8 cm, apex beaked, both ventral and dorsal sutures with ribs. Seeds 2 to many, dark brown, almost cylindrical or reniform. Fl. May–Sep, fr. Sep–Jan.

Shrubs, roadsides, forests; 100–2000 m. Guangxi, Yunnan [Bhutan, India, Laos, Myanmar, Thailand, Vietnam; North America].

5. *Clitoria falcata* Lamarck, Encycl. 2: 51. 1786.

镰刀荚蝶豆 lian dao jia die dou

Herbs. Stems twining, ca. 2 mm thick, pubescent. Leaves imparipinnately 3-foliolate; stipules broadly ovate, 3–3.5 × ca. 2 mm, pubescent; petiole (1.5–)2–5 cm, pubescent; stipels per-

sistent; petiolules 1–2.5 mm; leaflets oblong-elliptic to ovate, (1.8–)2–5.5(–7.5) × (0.8–)2.5–3.5 cm, abaxially pale green and densely pubescent, adaxially dark green and glabrous, lateral veins 6 or 7 pairs, base rounded, apex obtuse or slightly emarginate, mucronate. Inflorescence axillary, 1–4-flowered; peduncle 2–15 cm; bracts ca. 2 mm; bracteoles 7–17 mm. Flowers often cleistogamous. Calyx tube 3–4 mm; lobes narrowly lanceolate, 4–5 mm. Corolla often not developed [when present white, 3–4(–5) cm; standard very finely puberulent appearing glabrous; staminal sheath 20–40 mm]. Legume slightly curved, 3–4 × 0.8–1.1 cm, compressed, usually longitudinally ribbed, minutely puberulent, apex aristate. Seeds 4 or 5, dark reddish brown, ellipsoid to subglobose, ca. 3[–4] × 2 mm.

Among bushes, in open grasslands. Taiwan [native to Central and South America and West Indies; introduced elsewhere].

Clitoria falcata has been misidentified as *C. rubiginosa* Persoon. The collections from Taiwan are cleistogamous and lack any corolla, so the description of the corolla is taken from Fantz (Vulpia 4: 43. 2005).

83. **CENTROSEMA** (Candolle) Benth, Comm. Legum. Gen. 53. 1837, nom. cons.

距瓣豆属 ju ban dou shu

Sa Ren (萨仁); Michael G. Gilbert

Clitoria sect. *Centrosema* Candolle, Prodr. 2: 234. 1825.

Shrubs or herbs, procumbent or climbing. Leaves pinnately 3(–7)-foliolate; stipules striate, basifixed, persistent; stipels small. Inflorescence axillary, clustered to racemose, 1- to many flowered; bracts similar in shape to stipules; bracteoles 2, adnate to calyx, persistent, striate, larger than bracts. Calyx shortly campanulate, 5-lobed; lobes unequal. Corolla white, purple, red, or blue, longer than calyx; standard ± circular, abaxially hairy, base clawed, with short abaxial spur above claw. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile; ovules many; style compressed, spatulate at apex, pubescent or bearded at apex; stigma terminal. Legume linear, dehiscent, compressed, filled between seeds. Seeds to 20, oblong or globose; hilum linear to narrowly elliptic; strophiole small or absent.

About 45 species: worldwide but mostly in the New World; one (or possibly two) species (introduced) in China.

1. *Centrosema pubescens* Benth, Comm. Legum. Gen. 55. 1837.

距瓣豆 ju ban dou

Bradburya pubescens (Benth) Kuntze; *B. schiedeana* (Schlechtendal) Rose; *Centrosema ferrugineum* A. Richard; *C. intermedium* A. Richard; *C. molle* Martius ex Benth; *C. salzmannii* Benth; *C. schiedeana* (Schlechtendal) R. J. Williams & R. J. Clements; *Clitoria schiedeana* Schlechtendal; *Ternatea schiedeana* (Schlechtendal) Kuntze.

Herbs, perennial. Stems twining or trailing, sometimes rooting at nodes, slender, villous. Leaves pinnately 3-foliolate; stipules ovate to ovate-lanceolate, 2–3 mm, with longitudinal striations, persistent; petiole 2.5–6 cm; stipels small, setiform; petiolules short, 1–2 mm, terminal one longer; leaflets thinly papery, terminal leaflet elliptic, oblong, or subovate, 2.6–10 × 1.5–6.8 cm, sparsely villous on both surfaces, lateral veins 5–7 on each side, slender, merging near margin, base obtuse or rounded, apex acute; lateral leaflets slightly small, slightly oblique. Raceme with 2–4 flowers near apex; peduncle 2.5–7 cm; bracts similar to stipules in shape; bracteoles broadly ovate to broadly elliptic, obviously striate, adpressed to calyx, larger than bracts. Calyx 5-lobed; upper 2 lobes ± connate, lowest

longest, linear. Corolla white, pink, or light purple, 2–3 cm; standard broadly orbicular, densely villous abaxially, with short spur near base; wings falcate-obovate, one side with curved auricle, almost semicircular, each petal shortly clawed. Legume linear, 7–13 × 0.5–0.6 cm, compressed, apex acuminate, beak straight, slender, 8–15 mm; valves convex to ridge from both sutures, twisting at dehiscence. Seeds 7–15, brownish black or yellowish green with dark mottling, oblong, 4–5 mm; hilum short. Fl. Nov–Apr, fr. Jan–Jul. $2n = 22$.

Introduced forage plant; near sea level to 100 m. Guangdong, Hainan, Jiangsu, Taiwan, Yunnan [native to Central America (extending to 22° N in Mexico) and South America (Colombia)].

Fantz (Sida 17: 321–332. 1996) showed that the material widely used for herbage and as a green fertilizer by agronomists under the name *Centrosema pubescens* belongs to two distinct species: the majority to *C. molle* and the remainder to *C. pubescens* sensu stricto. However, because the identity of the available Chinese material is not clear, the name *C. pubescens* is used here in its old, inclusive sense. Wiersma and Kirkbride (Taxon 54: 209–210. 2005) proposed conservation of the name *C. pubescens* with a conserved type. If this proposal is successful, the correct name for the taxon currently known as *C. pubescens* sensu stricto will be *C. schiedeana*, and that for *C. molle* will be *C. pubescens*. There is ongoing debate on the desirability of such a change, and

it is possible that the name *C. pubescens* might instead be rejected to avoid confusion resulting from a change in its correct usage, in which case the name *C. schiedeanum* would again be correct, while *C. molle* would remain in use. The two species may be distinguished as follows:

C. molle: bracts 4–6 × 1–2 mm, puberulous; pedicels 6–9 mm at anthesis; bracteoles 6–9 × 4–6 mm; seeds brownish black; *C. pubescens*: bracts 6–9 × 3–6 mm, sericeous; pedicels 3–6 mm at anthesis; bracteoles 10–16 × 6–9 mm; seeds yellowish green.

84. APIOS Fabricius, Enum. 176. 1759, nom. cons.

土圞儿属 tu luan er shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs, twining, with root tubers. Leaves pinnately (3 or)5- or 7(or 9)-foliolate; stipels small. Inflorescence axillary or subterminal and grouped into terminal panicle, racemelike; nodes swollen. Bracts and bracteoles small, caducous. Calyx campanulate; lobes shorter than tube, upper 2 connate, lowest 1 linear and other 2 much shorter. Standard ovate or circular, reflexed; wings obliquely obovate, shorter than standard; keels longest and inflexed or coiled. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary subsessile; ovules many, upper part reflexed, usually thickened, glabrous; stigma terminal. Legume linear, almost flat, dehiscent, compressed, 2-cleft. Seeds without strophiole.

About eight species: mostly in E Asia, two species in E North America; six species (four endemic) in China.

- 1a. Flower red, reddish purple, or orange; leaflets usually more than 5 cm 6. *A. carnea*
 1b. Flower green, yellow, or purple; leaflets usually less than 5 cm.
 2a. Leaflets 0.5–1.9 cm wide; inflorescences shorter than or subequal to leaves.
 3a. Leaflet 0.5–1.2 cm wide; flowers purple 5. *A. gracillima*
 3b. Leaflet 1.1–1.9 cm wide; flowers pale yellow 4. *A. delavayi*
 2b. Leaflets usually more than 2 cm wide; inflorescences longer than leaves.
 4a. Leaflets ovate or rhomboid-ovate, usually 3–7 1. *A. fortunei*
 4b. Leaflets usually lanceolate, narrowly lanceolate, or ovate-lanceolate, 5 or 7.
 5a. Leaflets lanceolate to ovate-lanceolate; inflorescence with 2 flowers per node 2. *A. macrantha*
 5b. Leaflets ovate-lanceolate to ovate; inflorescence with 3 or 4 flowers per node 3. *A. taiwaniana*

1. *Apios fortunei* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 18: 396. 1873.

土圞儿 tu luan er

Apios cavaleriei H. Léveillé.

Herbs, twining. Root tuber spherical or ovoid. Stems slender, sparsely hirsute. Leaves pinnately 3–7-foliolate, 10–25 cm; stipules linear-triangular, to 4 mm, very inconspicuous; petiole 3–6.6 cm, glabrous; stipels inconspicuous; petiolules sometimes hairy; leaflets ovate or rhomboid-ovate, 3–7.5 × 1.5–4 cm, papery, abaxially sparsely hirsute, adaxially glabrous, base broadly cuneate or rounded, apex acute, mucronate. Raceme axillary, 6–26 cm; bracts and bracteoles minute, lanceolate, ciliate, deciduous. Calyx bowl-like, shallowly 2-lipped. Corolla yellowish green or light green; standard orbicular, 1–1.5 cm; wings almost half as long as standard; keels much longer than standard, curled into semicircle. Ovary sparsely shortly hairy; style coiled, glabrous. Legume light brown, ca. 8 × 0.6 cm, glabrous, compressed. Fl. Jun–Aug, fr. Sep–Oct.

Mountain slopes; 300–1000 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Zhejiang [Japan].

The root tuber is a source of starch, sometimes used to make alcohol.

2. *Apios macrantha* Oliver, Hooker's Icon. Pl. 20: t. 1946. 1890.

大花土圞儿 da hua tu luan er

Vines. Stems slender, twining, glabrous or almost glabrous

except for nodes. Leaves pinnately 5- or 7-foliolate, 15–20 cm; stipules deciduous, triangular, ca. 4 mm, pilose; petiole 2.5–5.5 cm, glabrous; stipels deciduous; petiolules ca. 2 mm, hirsute; leaflets lanceolate to ovate-lanceolate, ca. 5.5 × 2.2–3.2 cm, papery, both surfaces glabrous, lateral veins ca. 5 on each side, slender, base broadly cuneate to almost rounded, apex acuminate, mucronate. Raceme longer than leaves, pedunculate, with 2 flowers per node. Upper lip of calyx entire, ovate-orbicular, apex mucronate, lateral lobes obliquely lanceolate, apex acuminate, bottom lobe ovate. Corolla yellow or light green; standard 1.7–2 cm; wings almost half as long as standard; keels longest, curved into semicircle. Ovary stipitate, pilose, 8-ovuled. Legume ca. 15 × 0.7 cm, beltlike, compressed, sparsely shortly villous. Fl. Aug–Sep, fr. Sep–Oct.

• River valleys, roadsides; 1800–2400 m. Guizhou, Sichuan, Xizang, Yunnan.

3. *Apios taiwaniana* Hosokawa, J. Soc. Trop. Agric. 4: 310. 1932.

台湾土圞儿 tai wan tu luan er

Herbs, twining, like shrublets. Stems sparsely villous. Leaves pinnately (5 or)7-foliolate; petiole 5–12 cm, glabrous; stipels 1.5–2 mm, hirsute; petiolules ca. 2 mm, with fine downy hairs; leaflets ovate or ovate-lanceolate, 4–5 × 1.5–2.2 cm, both surfaces almost glabrous, base rounded or cuneate, apex obtuse or acuminate, mucronate. Raceme to 15 cm; nodes 3- or 4-flowered. Flowers yellowish light purple, ca. 1.2 cm. Calyx lobes subequal. Standard suborbicular, ca. 1.1 cm; wings narrowly oblong; keels extending, inflexed. Ovary shortly velutinous; style twisted. Legume not seen.

- 700–1500 m. Taiwan.

4. *Apios delavayi* Franchet, Pl. Delavay. 180. 1890.

云南土圞儿 yun nan tu luan er

Herbs. Stems twining, slender, almost glabrous. Leaves pinnately 5-foliolate, 8–32 cm; stipules subulate, sparsely pubescent, 2–6 mm; petiole 2–8 cm, almost glabrous; petiolules sericeous; leaflets ± lanceolate, 2–5 × 1.1–1.9 cm, papery, both surfaces sparsely hirsute, base orbicular, margin shortly ciliate, apex acuminate, mucronate. Raceme shorter than to sometimes slightly longer than leaves, sparsely 5–10-flowered; peduncle 2.5–6 cm; nodes 1–3-flowered. Calyx broadly campanulate, ca. 1/6 as long as corolla, membranous, 2-lipped; upper 2 lobes connate into triangle, mucronate, lateral 2 lobes linear-subulate, bottom lobe broadly triangular, inflexed, mucronate. Corolla light yellow, ca. 2 cm; standard orbicular; keels narrow, slightly longer than standard. Legume to 15 cm, linear, erect, glabrous, compressed. Seeds up to 12. Fl. Jul–Aug, fr. Sep.

- Shrublands; 1300–3500 m. Sichuan, Xizang, Yunnan.

5. *Apios gracillima* Dunn, J. Linn. Soc., Bot. 35: 488. 1903.

纤细土圞儿 xian xi tu luan er

Herbs. Stems twining, slender, sometimes hairy on nodes. Leaves pinnately 5- or 7-foliolate, 5–10 cm, glabrous or shortly pubescent at base of petiole; stipules setiform, 1–3 mm, hairy; petiole 1.8–3 cm; glabrous; leaflets oblong-linear or narrowly lanceolate, 2–4.5 × 0.5–1.2 cm, membranous, both surfaces glabrous, base rounded, apex mucronate. Inflorescences shorter than leaves; peduncle 1.5–2.5 cm. Flowers at top of common

pedicel, usually paired, 1.2–1.5 cm. Lateral calyx lobes acuminate, reflexed, lower lobes almost triangular. Corolla purple; standard orbicular; keel apex inflexed. Ovary shortly villous. Fl. Aug–Oct.

- About 1500 m. Yunnan (Mengzi).

6. *Apios carnea* (Wallich) Bentham ex Baker in J. D. Hooker, Fl. Brit. India 2: 188. 1876.

肉色土圞儿 rou se tu luan er

Cyrtotropis carnea Wallich, Pl. Asiat. Rar. 1: 50. 1830.

Vines, 3–4 m. Stems twining, slender, hairy when young. Leaves pinnately 5-foliolate, 12–25 cm; stipules narrowly triangular, 2–4 mm, hairy, caducous; petiole 5–8(–12) cm, glabrous; leaflets oblong to ovate-oblong, 3.5–13 × 2–7 cm, papery, glabrous, base obliquely cuneate to nearly rounded, apex acuminate or acute, shortly caudate. Raceme 15–40 cm; peduncle 4–20 cm; nodes 2- or 3-flowered. Bracts and bracteoles small, linear, deciduous. Calyx campanulate, 2-lipped; lobes triangular, shorter than tube. Corolla red, reddish purple, or orange, ca. 2 × as long as calyx; standard longest, 1–2 cm; wings shortest, 0.6–1.2 cm; keels linear, curved to semicircular. Filament to 2 cm. Style curved to circular or semicircular. Legume linear, 8–19 × 0.6–0.7 cm, straight or slightly curved, compressed, glabrous, apex beaked. Seeds 12–21, dark brown, reniform, lustrous. Fl. Jul–Sep, fr. Aug–Nov.

Forests, riversides, roadsides, rocks; 600–2600 m. Fujian, Guangxi, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal, Thailand, Vietnam].

The seeds contain oil.

85. COCHLIANTHUS Bentham in Miquel, Pl. Jungh. 234. 1852.

旋花豆属 xuan hua dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Herbs, climbing, turning black when dry. Leaves pinnately 3-foliolate, stipellate. Racemes axillary; rachis slender, nodose. Flowers usually clustered at swollen nodes; bracts and bracteoles minute, subulate, caducous or subpersistent. Calyx campanulate, 2-lipped, upper 2 teeth connate into a larger upper lip, apex emarginate or entire, lower lip with 3 teeth, middle tooth longest, lateral 2 shorter. Petals subequal in length or standard shorter, with long or short claws; standard broadly ovate, with inflexed auricles at base; wings oblong or subspatulate, slightly longer than standard, base with long auricle; keel linear, as long as or longer than wings, coiled inward in upper part. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary shortly stipitate, many ovuled; style filiform, glabrous, upper part coiled inward into 1 or 2 circles; stigma large, peltate-dilated, terminal. Legumes linear-oblong, incurved, compressed, obscurely septate. Seeds quadrate; hilum short, estrophiolate.

Two species: S and SW China, Nepal; two species (one endemic) in China.

- 1a. Leaflets broadly ovate-rhomboid, apex broadly acute, mucronate 1. *C. montanus*
 1b. Leaflets ± narrowly ovate-rhomboid, apex caudate-acuminate 2. *C. gracilis*

1. *Cochlianthus montanus* (Diels) Harms, Repert. Spec. Nov. Regni Veg. 17: 136. 1921.

高山旋花豆 gao shan xuan hua dou

Mucuna montana Diels, Notes Roy. Bot. Gard. Edinburgh 5: 247. 1912.

Herbs, robust, twining and climbing. Stems densely villous with grayish white hairs. Terminal leaflet broadly ovate-rhomboid, symmetric, lateral ones slightly oblique, 5.5–8 ×

4.5–8 cm, densely silky pubescent on both surfaces, base rounded or broadly cuneate, apex broadly acute, mucronate. Calyx densely adpressed pubescent outside; upper 2 teeth connate to an emarginate lip, lowest tooth lanceolate, ca. 7 mm. Corolla pink or rose-red; standard broadly ovate, ca. 18 mm, shortly clawed; wings slightly longer than standard, base with auricle as long as claw; keel longest, linear, coiled inward. Legumes narrowly oblong, compressed, hirsute. Fl. Jul.

- Dry rocky scrub on mountain slopes; ca. 3000 m. Yunnan (Lijiang).

2. Cochlianthus gracilis Benth in Miquel, Pl. Jungh. 234. 1852.

细茎旋花豆 xi jing xuan hua dou

Herbs, slender, twining and climbing. Stems hairy at first, later glabrescent. Leaflets membranous or papery, strigose on both surfaces, terminal leaflet ± narrowly ovate-rhomboid, symmetric, lateral ones oblique, 5–9 × 2–6 cm, base broadly cuneate or obtuse, apex caudate-acuminate. Calyx densely hispidulous; upper 2 teeth connate into an entire or emarginate lip; lowest tooth lanceolate, 6–7 mm. Corolla pink or light purple; standard obovate-orbicular or suborbicular, ca. 2 × 1.7 cm; wings broadly spatulate, slightly longer than or as long as standard, base with auricle as long as claw, apex rounded; keel much longer than wings, upper part coiled inward, base with long claw and short auricle. Ovary with 2–4 mm stipe, with or without small cup-shaped disk at base. Style and filaments coiled inward for 1 or 2 turns in upper part. Legumes linear-oblong, densely hirsute with brownish black long hairs.

Open forests, mountain slopes, scrub, roadsides; 1400–1800 m. Sichuan, Xizang, SW Yunnan [Bhutan, Nepal].

- 1a. Upper 2 calyx teeth connate into an entire lip; stipe of ovary ca. 4 mm, with a small cup-shaped disk at base; style and filaments coiled inward for 1 turn in upper part 2a. var. *gracilis*
 1b. Upper 2 calyx teeth connate into an

emarginate lip; stipe of ovary ca. 2 mm, without disk at base; style and filaments coiled inward for 2 turns in upper part 2b. var. *brevipes*

2a. Cochlianthus gracilis var. *gracilis*

细茎旋花豆(原变种) xi jing xuan hua dou (yuan bian zhong)

Leaflets strigose on both surfaces. Upper 2 calyx teeth connate into an entire lip. Ovary with ca. 4 mm slender stipe and cup-shaped disk at base. Style and filaments coiled inward for 1 turn in upper part. Fl. Sep.

Open forests, mountain slopes; ca. 1400 m. Xizang, SW Yunnan [Bhutan, Nepal].

2b. Cochlianthus gracilis var. *brevipes* C. F. Wei, Bull. Bot. Res., Harbin 5(2): 49. 1985.

短柄旋花豆 duan bing xuan hua dou

Leaflets densely hairy. Upper 2 calyx teeth connate into an emarginate lip. Ovary with thick, short stipe, without cup-shaped disk at base. Style and filaments coiled inward for 2 turns in upper part. Fl. Aug–Sep.

• Scrub, roadsides, mountain slopes; ca. 1800 m. Sichuan (Baoping).

One of us (Thulin) has seen no material of *Cochlianthus gracilis* var. *brevipes*, but, judging from the description, it seems so different from typical *C. gracilis* that it would perhaps be better treated as a distinct species. Further study is needed.

86. SHUTERIA Wight & Arnott, Prodr. Fl. Ind. Orient. 207. Oct 1834, nom. cons., not *Shutereia* Choisy (Aug 1834).

宿苞豆属 su bao dou shu

Sa Ren (萨仁); Michael G. Gilbert

Perennial twining or climbing herbs or subshrubs. Leaves pinnately 3-foliolate; stipules and stipels deciduous or persistent; leaflets sessile or shortly petiolulate. Raceme axillary; flowers small, paired, clustered, or sparsely arranged; bracts and bracteoles 2, small, acute, persistent. Calyx campanulate; lobes shorter than tube, unequal, upper 2 connate. Corolla usually purple, light purple, or red, longer than calyx, 7–8 mm in diam.; standard ovate or broadly ovate, almost erect, without auricles, longer than other petals; wings narrow, oblique, with auricles, longer than keels and connate with them; keels straight and with blunt auricles and stipe. Stamens diadelphous; anthers small, uniform. Ovary sessile or shortly stipitate; style inflexed, filiform, glabrous; stigma terminal, capitate. Legume linear, compressed, slightly curved, 4–5 cm, shortly stipitate or sessile, 4–11-ovuled, septate. Seeds suborbicular, oblong, or reniform; hilum short, without strophiole.

About six species: tropics and subtropics of Asia; four species (one endemic) in China.

Shuteria suffulta Wallich ex Benth, native to India, Myanmar, and Thailand, has been recorded from Yunnan (Index Fl. Yunnan. 1984), but we have not seen any material.

- 1a. Leaflet apex acuminate.
 2a. Hairs on stems and leaves ± adpressed; corolla ca. 8 mm 1. *S. ferruginea*
 2b. Hairs on stems and leaves spreading; corolla 14–16 mm 2. *S. lancangensis*
 1b. Leaflet apex obtuse or slightly emarginate.
 3a. Lower part of inflorescence axis with small, sessile, rounded or reniform leaflets 3. *S. involucrata*
 3b. Lower part of inflorescence axis without sessile leaflets 4. *S. vestita*

1. Shuteria ferruginea (Kurz) Baker in J. D. Hooker, Fl. Brit. India 2: 182. 1876.

硬毛宿苞豆 ying mao su bao dou

Pueraria ferruginea Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 232. 1874; *P. anabaptis* Kurz; *Shuteria anabaptis* (Kurz) C. Y. Wu; *S. hirsuta* Baker.

Herbs, 1–3(–4) m. Stems twining, slender, many branched,

brown hirsute. Leaves pinnately 3-foliolate; stipules lanceolate, persistent; petiole 2.5–9 cm; stipels small; petiolules ca. 4 mm, hairy; leaflets ovate, 6–9 × 3.5–6 cm, membranous, both surfaces adpressed villous, base rounded, apex acuminate. Raceme axillary, axis 5.5–16 cm; peduncle 2–3 cm, densely hairy. Bracts lanceolate, 6–8 mm, hirsute, persistent; bracteoles linear, hairy, persistent. Calyx tubular, ca. 4 mm, 5-lobed, hairy; upper 2 lobes nearly connate, triangular, ca. 1.5 mm, lower 3 lanceolate, shorter than tube. Corolla light purple to purple, ca. 8 mm; standard obovate, without auricle, with stipe; wings linear, with auricles and stipe; keels slightly shorter than wings, auriculate. Ovary hairy. Legume oblong, compressed, slightly curved, 4.5–6 × 0.3–0.7 cm, densely hairy, apex rostrate, 5–11-seeded. Seeds dark brown. Fl. Jul–Dec, fr. Sep–Dec.

Mountains, forests, roadsides; 200–2300 m. Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

Shuteria ferruginea is used for food. It is more widely known as *S. hirsuta*, but that name was published three years later than *Pueraria ferruginea*.

2. *Shuteria lancangensis* Y. Y. Qian, *Guihaia* 23: 307. 2003.

澜沧宿苞豆 lan cang su bao dou

Herbs, 2–4 m. Stems twining, slender, striate, spreading villous. Leaves 3-foliolate; stipules lanceolate, 8–10 mm, persistent; petiole 4–7 cm; stipels small, subulate, ciliate; petiolules 3–5 mm, villous; leaflets broadly ovate-rhomboid, 4.5–8.5 × 3–7 cm, papery, both surfaces spreading villous, adaxial surface dark green, lateral veins 3–5 pairs, base cuneate, apex acuminate. Raceme axillary, 10–14 cm, 30–50-flowered; nodes 1–4-flowered; peduncle ca. 3 cm. Bracts linear or linear-lanceolate, 6–8 mm; pedicel ca. 3 mm; bracteoles linear, ca. 2 mm, ciliate, persistent. Calyx tubular; lobes 4, ovate, 1.5–2 mm, shorter than tube, uppermost longest. Corolla purple, 14–16 mm; standard obovate, with 2 auricles; wings oblong, auriculate; keel as long as wings, auriculate. Ovary villous. Legume oblong, 6–6.5 cm × 3–3.5 mm, compressed, apex beaked. Seeds ca. 11.

- Thickets; ca. 1900 m. Yunnan.

This species is known to us only from the protologue.

3. *Shuteria involucrata* (Wallich) Wight & Arnott, *Prodr. Fl. Ind. Orient.* 207. 1834.

宿苞豆 su bao dou

Glycine involucrata Wallich, *Pl. Asiat. Rar.* 3: 22. 1832; *Shuteria sinensis* Hemsley; *S. vestita* Wight & Arnott var. *involucrata* (Wallich) Baker.

Herbs, 1–3 m. Stems twining, slender, densely pubescent or glabrous. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, persistent; petiole 2.5–7.5 cm; stipels linear; leaflets broadly ovate, ovate, or suborbicular, 1.5–6.5 × 1.1–5.5 cm, membranous to thinly papery, base rounded, apex rounded, slightly concave, with small mucro. Raceme axillary, axis 9–15 cm, lower 2 or 3 nodes with reduced, sessile, circular or reniform leaflets; peduncle 1–2.5 cm. Flowers ca. 10 mm; bracts and bracteoles lanceolate, persistent. Calyx tubular, 4-lobed; lobes lanceolate, shorter than tube. Corolla red, purple, or light purple; standard elliptic-obovate, apex slightly obtuse, slightly emarginate; wings oblong, subequal to keels. Ovary sessile. Legume linear, compressed, 3–5 × 0.2–0.6 cm, apex beaked, dehiscent or indehiscent. Seeds 5 or 6, brown, lustrous. Fl. Sep–Mar, fr. Nov–Mar.

Mountains, roadsides, forest margins, under thickets; 900–2200(–2800) m. Guangxi, Yunnan [Bhutan, Cambodia, India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

Shuteria involucrata is used medicinally.

4. *Shuteria vestita* Wight & Arnott, *Prodr. Fl. Ind. Orient.* 207. 1834.

西南宿苞豆 xi nan su bao dou

Shuteria glabrata Wight & Arnott; *S. involucrata* (Wallich) Wight & Arnott var. *glabrata* (Wight & Arnott) H. Ohashi; *S. involucrata* var. *villosa* (Pampanini) H. Ohashi; *S. pampaniniana* Handel-Mazzetti; *S. vestita* var. *villosa* Pampanini.

Herbs, 1–3 m. Stems twining, slender, densely pubescent or glabrous. Leaves pinnately 3-foliolate; stipules lanceolate; petiole 2–4 cm; stipels small, linear; terminal leaflet elliptic to almost rhomboid, 1.5–6 cm, base rounded, apex slightly emarginate, with short mucro; lateral leaflets elliptic and slightly oblique, 2.5–5 × 1.5–4 cm, both surfaces pubescent, base rounded, apex emarginate, with small mucro. Raceme axillary, flowers clustered at base; peduncle 2.5–10 cm; bracts lanceolate; bracteoles lanceolate, persistent. Calyx tubular, lobes shorter than tube. Corolla purple to light purple, ca. 8 mm; standard obovate-elliptic, with stipe; wings and keels oblong, curved, all auriculate. Ovary hairy. Legume linear, 2–4.5 × 0.3–0.5 cm, compressed, slightly curved, 3–8-seeded. Fl. Nov–Jan, fr. Jan–Apr.

Mountains, forests, grasslands, roadsides; 500–2000 m. Guangxi, Hainan, Yunnan [Bhutan, India, Indonesia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

This plant is used medicinally.

87. MASTERSIA Bentham in Bentham & J. D. Hooker, *Gen. Pl.* 1: 535. 1865.

闭荚藤属 bi jia teng shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Woody climbers. Leaves pinnately 3-foliolate; stipules caducous; leaflets large, stipellate. Racemes axillary and terminal. Flowers borne in clusters of 2 or 3 at small nodes; bracts 2, caducous; bracteoles obovate, sheathing base of calyx, persistent. Calyx lobes longer than tube, upper 2 connate into a broad entire lip. Standard suborbicular, very shortly clawed, not auriculate; wings obliquely oblong; keel broad, slightly incurved, obtuse, subequal to wings. Stamens diadelphous; vexillary stamen free, remainder connate; anthers linear, versatile. Ovary sessile; ovules numerous; style shortly filiform, incurved, not barbate; stigma capitate. Legumes ob-

long-linear, compressed, narrowly winged along upper suture, indehiscent. Seeds numerous, oblong, transversely arranged; hilum lateral, small; funicle filiform.

Two species: Bhutan, China, India, Indonesia, Malaysia; one species in China.

1. *Mastersia assamica* Bentham, Trans. Linn. Soc. London 25: 300. 1865.

闭荚藤 *bi jia teng*

Woody climbers, young parts pubescent. Leaf rachis 6–15 cm; stipels linear, 7–8 mm; leaflets subrhombic, elliptic, or ovate, 8–14 × 6–12.5 cm, lateral ones smaller than terminal one, appressed pubescent abaxially, glabrous adaxially, base

rounded, apex acuminate. Racemes 30 cm or more. Bracts ovate-lanceolate, 7–8 mm, ciliate; bracteoles 5–7 mm. Calyx campanulate, 4-lobed; tube 4–5 mm; lobes 7–12 mm. Corolla purplish, 10–18 mm. Legumes blackish, 10–12 × 2.5–3 cm, thinly leathery, glabrous. Seeds brown, reniform, ca. 5 × 2.5 mm.

Semi-evergreen rain forests; below 900 m. SE Xizang (Médog) [Bhutan, India].

88. *MUCUNA* Adanson, Fam. Pl. 2: 325, 579. 1763, nom. cons.

豇豆属 *li dou shu*

Sa Ren (萨仁); C. Melanie Wilmot-Dear

Stizolobium P. Browne; *Zoophthalmum* P. Browne.

Vines, perennial or annual, woody or herbaceous. Leaves pinnately 3-foliolate; stipules usually caducous; stipels sometimes caducous; leaflets large. Inflorescences axillary or on old stems, condensed panicles or often compound pseudoracemes through reduction of ultimate peduncles to small knobs, usually with 3 flowers. Flowers large and beautiful; bracts small or caducous. Calyx campanulate, 5-lobed, upper 2 lobes connate into a broad lip. Corolla dark purple, red, light green, or almost white, usually dark when dry, longer than calyx; standard usually shorter than wings and keel, with stipe, with 2 auricles at base; wings oblong or ovate, inflexed, usually attached to keel; keel petals partially connate along lower margin, slightly longer than or equal to wings, apex inflexed with horny, often hooked, apical beak. Vexillary stamen free; anthers dimorphic, usually with beard, longer 5 almost basifixed, shorter 5 dorsifixed. Ovary 1- to many ovuled; style filiform, inflexed, sometimes hairy, without beard; stigma small, capitate. Legume ovoid, oblong, or linear, swollen around seeds or laterally flattened, margin often winged, surface often ribbed or ornamented with winglike lamellae sometimes simple or divided into 2 wings along their distal margins (T-shaped in cross section), often clothed with red-brown irritant bristles, dehiscent; valves thick. Seeds reniform, orbicular, or elliptic; hilum linear; strophiole absent.

About 100 species: worldwide; 18 species (nine endemic) in China, including two incompletely known taxa and one possibly extinct species (*Mucuna championii*).

Key based on flowering specimens

- 1a. Terminal leaflet broadly triangular, base ± cordate, length ca. 1.3 × width; lateral leaflets obliquely truncate-cordate 15. *M. cyclocarpa*
- 1b. Terminal leaflet broadly or narrowly ovate or rhombic, base cuneate or rounded, length 1.5–2.5 × width, lateral leaflets obliquely rounded or only outer side with truncate base.
 - 2a. Mature leaves abaxially with dense pale silky adpressed hairs, lateral veins dark and conspicuously less pubescent.
 - 3a. Terminal leaflet relatively narrow (length 2–2.5 × width), apex with conspicuous narrow acumen 10–20 mm; leaflet hairs abaxially ca. 1 mm, closely adpressed, pale and fine, giving surface a conspicuously shiny-silvery silky appearance, lateral veins more sharply curved near margin and becoming indistinct or arching and joining; lowest calyx lobe shorter than or equaling tube 5. *M. calophylla*
 - 3b. Terminal leaflet relatively broad (length 1.5–1.75 × width), apex acute or with short broad acumen to 5 mm; leaflet hairs at most half-adpressed and either much shorter, less than 0.5 mm, or coarser, yellowish orange and surface not shiny silky, lateral veins uniformly straight or slightly curved, clearly joining margin; lowest calyx lobe often to twice tube length.
 - 4a. Abaxial hairs on leaflets ca. 1 mm; lowest calyx lobe 8–10 mm, longer than tube; corolla wing ca. 4 × 1.4 cm, almost as long as keel 17. *M. incurvata*
 - 4b. Abaxial hairs on leaflets less than 0.5 mm; lowest calyx lobe (3–)5–6 mm, slightly shorter or longer than tube; corolla wing 2.5–3.3 × 0.6–0.8 cm, conspicuously shorter than keel 18. *M. bracteata*
- 2b. Mature leaves glabrous or spreading hairy, or if hairs adpressed then veins ± similarly hairy, not with conspicuously dark lines among pale pubescence.
 - 5a. Standard and wings with apical 1/4–1/3 of margin pubescent.
 - 6a. Flowers 5.5–6.5 cm, standard greenish white, wings and keel reddish or purple; wings 4–5.2(–5.6) cm 3. *M. macrocarpa*

- 6b. Flowers 7–9 cm, purple, red, and/or whitish; wings 6–7 cm.
- 7a. Stipels persistent; corolla entirely purple or standard white.
- 8a. Standard, wings, and keel purple; wing relatively broad (length:width ratio 2.5–3:1) 10. *M. macrobotrys*
- 8b. Standard white, wings and keel purple; wing often relatively narrow 3. *M. macrocarpa* (large-flowered form)
- 7b. Stipels not persistent; corolla purple, white, or bicolored.
- 9a. Leaflets abaxially glabrous or very sparsely hairy, often drying pale green; length:width ratio of terminal leaflet (2–)3–4:1; corolla greenish white 1. *M. birdwoodiana*
- 9b. Leaflets abaxially with abundant to dense often colored hairs, drying brownish green or black; length:width ratio of terminal leaflet usually 1.5–1.75:1; corolla white or partly purple.
- 10a. Indumentum of leaflets red-brown; corolla purple with whitish or greenish standard; leaflets often with less than 5 lateral veins on either side 3. *M. macrocarpa* (large-flowered form)
- 10b. Indumentum of leaflets pale; corolla usually deep purple; leaflets with 5–8 lateral veins on either side 2. *M. bodinieri*
- 5b. Standard and wings with margin not pubescent or pubescent only in basal 1/3.
- 11a. Flowers crowded in upper 2/3 of axis, lower flowerless part of axis with conspicuous bracts and scars; leaflets thickly papery or leathery, markedly discoloured, greenish gray abaxially in dry state and with lateral veins conspicuously stout, dark, prominent, less pubescent than rest of surface, \pm straight, running into margin 18. *M. bracteata*
- 11b. Flowers evenly spaced throughout inflorescence length, or if only in upper 2/3 then lower flowerless part of axis without bracts or scars; leaflets papery or membranous, not markedly discoloured, venation neither conspicuously stout nor less pubescent than surface, running into margin or not.
- 12a. Flowers crowded into upper 1/4 of axis, lower pedicels and ultimate peduncles to 2 cm, progressively shorter toward inflorescence apex, inflorescence pseudoubellate; corolla white, to 4.4 cm; calyx teeth very short, lowest (1–)2–3 mm 6. *M. gigantea*
- 12b. Flowers well spaced or crowded near apex but pedicels all of similar length, ca. 1 cm or less, ultimate peduncles knoblike or rarely to ca. 0.4 cm, inflorescence racemose; corolla purple or white, often more than 5 cm; calyx teeth mostly long, lowest 5–15 mm (3–4 mm in *M. lamellata*).
- 13a. Wing of corolla with abundant long adpressed hairs 1–2 mm in upper 2/3 of inner surface; corolla purple or reddish brown.
- 14a. Flowers 4–4.5 cm; terminal leaflet usually angular, rhombic, lateral veins straight throughout most of length and almost reaching margin 14. *M. lamellata*
- 14b. Flowers 5–5.5 cm; terminal leaflet rounded in outline, lateral veins curved, more sharply so near margin and becoming indistinct 11. *M. hirtipetala*
- 13b. Wing of corolla glabrous except for short hairs in claw region; corolla purple or white.
- 15a. Leaflets with lateral veins clearly running into margin; lateral leaflets often very asymmetric, outer half 2–3 \times as wide as inner.
- 16a. Calyx with lateral teeth ca. 6 \times 5 mm, lowest tooth relatively broad, 8–10 \times 4–5 mm, keel apex clawlike and convex, shiny on both surfaces in apical ca. 1 cm; leaflets abaxially with dense adpressed pale hairs ca. 1 mm 17. *M. incurvata*
- 16b. Calyx with lateral teeth 2–4 \times 1.5–3 mm, relatively short compared to lowest tooth, lowest tooth narrow, 6–10 \times 2–3 mm (ratio of lowest tooth to lateral teeth usually 2–3:1); keel apex less clawlike; leaflets abaxially glabrous or shortly pubescent 16. *M. pruriens*
- 15b. Leaflets with lateral veins curving and becoming indistinct or arching and joining near margin; lateral leaflets markedly asymmetric or not.
- 17a. Keel 4.8–7 cm.
- 18a. Stipels caducous; wing 2–3 \times as long as wide, wing apex \pm acute and horny, usually shiny and often pale; keel 6–7 cm; inflorescences arising from old wood; corolla purple 4. *M. sempervirens*
- 18b. Stipels persistent; wing 4–5 \times as long as wide, wing apex not horny, rarely extreme tip slightly pale, usually \pm rounded; keel to 5.7 cm; inflorescences on leafy stems; corolla purple or white.
- 19a. Wing ca. 2 cm wide; leaflets rather angular in outline, terminal leaflet rhombic-ovate or rhombic-elliptic, narrowing gradually to evenly tapering acumen and relatively broad (length:width ratio ca. 1.5:1); corolla purple 9. *M. membranacea*
- 19b. Wing to 1.3 cm wide; leaflets with very curved outline, terminal leaflet elliptic or slightly obovate, narrowing abruptly to short broadly rounded acumen and often relatively narrower (length:width ratio (1.5–)2–2.5:1); corolla pink, purple, or white.

- 20a. Hairs on inflorescence axis and calyx spreading, very short, 0.1–0.2 mm and almost velvety; corolla usually pink or purple, rarely white, 4.5–4.8 cm; bracts small, (5–)10–17 × (2–)5–7 mm, fairly early deciduous 8. *M. revoluta*
- 20b. Hairs on inflorescence axis and calyx adpressed, majority at least 0.4 mm, not velvety; corolla white or purple, usually 5–6 cm; at least lower bracts often persistent, large and broad, 20–40 × 10–20 mm.
- 21a. Calyx lobes relatively broad, apex broadly acute, lowest ca. 5 mm wide; all bracts of similar form, broadly ovate, (22–)30–40 mm; corolla always white 7. *M. interrupta*
- 21b. Calyx lobes relatively narrow and long acuminate, lowest 2–3 mm wide; bracts subtending flowers elliptic or obovate, apex broadly rounded, often hooded, 10–20 mm; corolla usually dark purple 12. *M. hainanensis*
- 17b. Keel 3.5–4.8 cm.
- 22a. Persistent stipels absent; terminal leaflet relatively narrow (length:width ratio (2–)2.5:1), apex with very marked 1–2 cm acumen 5. *M. calophylla*
- 22b. Persistent stipels present; terminal leaflet usually relatively wide (length:width ratio rarely over 1.75:1), apex shortly, or not at all, acuminate.
- 23a. Flowering pedicels 2–4 mm; pedicel and leaflet abaxially, especially on veins, with fine red-brown hairs; outer half of lateral leaflets ca. 1.5 × as wide as inner; corolla purple 13. *M. championii*
- 23b. Flowering pedicels 8–20 mm; lateral leaflets sometimes more asymmetric, outer half of lateral leaflets ca. 2 × as wide as inner; corolla purple or white.
- 24a. Corolla wings relatively wide, ca. 2 cm wide; leaflets rather angular in outline, terminal leaflet rhombic-ovate or rhombic-elliptic, narrowing gradually to evenly tapering acumen and relatively broad (length:width ratio ca. 1.5:1); lateral leaflets often quite asymmetric with ratio of widths of 2 sides ca. 2:1 9. *M. membranacea*
- 24b. Corolla wings narrow, to 1.3 cm wide; leaflets with very rounded outline, terminal leaflet elliptic or slightly obovate, narrowing abruptly to short wide rounded acumen and often relatively narrower (length:width ratio (1.5–)2–2.5:1); lateral leaflets less asymmetric with ratio of widths of 2 sides ca. 1.5:1.
- 25a. Hairs on inflorescence axis and calyx spreading, 0.1–0.2 mm, indumentum almost velvety; flowers usually pink or purple, rarely white; bracts (5–)10–17 × (2–)5–7 mm, fairly early deciduous 8. *M. revoluta*
- 25b. Hairs on inflorescence axis and calyx adpressed, majority at least 0.4 mm, indumentum not velvety; flowers purple; at least lower bracts often persistent, 20–40 × 10–20 mm 12. *M. hainanensis*

Key based on fruiting specimens (excluding *Mucuna hirtipetala* and *M. incurvata* for which no fruit was seen)

- 1a. Mature leaves abaxially with dense pale silky hairs conspicuously sparser on primary veins; legume length 4–6 × width, surface without lamellae.
- 2a. Terminal leaflet narrow (length:width ratio (2–)2.5:1), apex with very well-marked 1–2 cm acumen, ca. 2 mm wide for most of length, abaxial hairs adpressed, ca. 1 mm; legume ± woody or thickly leathery, more than 12 cm, silky hairy 5. *M. calophylla*
- 2b. Terminal leaflet relatively broad (length:width ratio 1.25–1.75:1), apex with acumen absent or rarely to 5 mm, abaxial hairs often erect, shorter; legume fleshy, less than 10 cm, with irritant bristles 18. *M. bracteata*
- 1b. Mature leaves glabrous or variously hairy with hairs at least as dense on veins; legume often relatively wider and/or with surface lamellae.
- 3a. Legume without lamellae, sometimes wrinkled on surface or with winged margins.
- 4a. Legume linear, often torulose, woody, usually at least 30 cm when mature.
- 5a. Legume margins each with a pair of thick woody wings ± evenly 3–5 mm wide and with definite edges, legume markedly torulose, each segment ± oval with rounded apex and base 1. *M. birdwoodiana*
- 5b. Legume margins not winged, at most wrinkled into irregularly thickened ridge to 2 mm wide and then legume not torulose, segments ± rectangular in outline.
- 6a. Legume glabrous, not torulose, only slightly swollen around seeds, segments ± rectangular, apical and basal edges ± straight; leaflets broadly rounded abaxially with dense short pale spreading hairs 2. *M. bodinieri*
- 6b. Legume glabrous or with dense short erect red-brown pubescence, markedly torulose, width at septa between seeds usually 1/2–2/3 width at widest point; leaflets acute or acuminate, abaxially often glabrous or sparsely hairy or with red-brown hairs.

- 7a. Mature legume without firm rounded raised margin, surface wrinkled or with coarse raised rugose-reticulate patterning, often without fine hairs; leaflets with fine reticulate venation, partially visible, clearly distinct from coarser reticulation, indumentum sometimes dense 3. *M. macrocarpa*
- 7b. Mature legume surface with firm rounded raised margin, surface with rather fine conspicuous but shallow reticulate patterning, and fine hairs; leaflets with reticulate venation fine and prominent, coarse reticulation often hardly distinct from fine, indumentum never dense 4. *M. sempervirens*
- 4b. Legume either broadly oblong or small and fleshy, or if linear and \pm woody then always less than 16 cm when mature.
- 8a. Mature legume 2–3 \times as long as wide, never less than 4 cm wide, leathery, with marginal wing 5–7 mm wide, surface glabrous or sparsely hairy with fine and regular reticulate pattern of raised lines giving a pitted appearance 6. *M. gigantea*
- 8b. Mature legume at least 4–6 \times as long as wide, fleshy or leathery, margin sometimes thickened and sometimes longitudinally ridged but never winged, surface often hidden beneath dense hairs, where visible wrinkled or with irregular much coarser patterning of raised lines, never apparently pitted.
- 9a. Mature legume \pm woody or thickly leathery, 13–15 cm, surface clearly visible beneath covering of short erect hairs and longer caducous irritant bristles; terminal leaflet 2–2.5 \times as long as wide, apex with distinct long narrow acumen 1–2 cm; lateral veins curving more sharply and becoming indistinct or looping and joining near margin 5. *M. calophylla*
- 9b. Mature legume fleshy, 5–9 cm, surface usually nearly invisible beneath dense covering of silky hairs or caducous irritant bristles; terminal leaflet usually ca. 1.5 \times as long as wide, apex acute or with short broad acumen to 0.5 cm; lateral veins uniformly straight or slightly curved, clearly reaching margin.
- 10a. Legume with pale silky hairs, not rigid or irritant; calyx with short pale hairs, rarely also with a few longer hairs but without longer irritant bristles 16. *M. pruriens*
- 10b. Legume with dense ferruginous or brown rigid caducous irritant bristles; calyx with short brown hairs and often longer irritant bristles.
- 11a. Lower 1/3 of infructescence axis always without fruit but with bract scars or with persistent bracts; leaflets quite thickly papery or \pm leathery, markedly discoloured, abaxially pale greenish gray in dry state, midrib and veins conspicuously prominent, dark and less pubescent than rest of surface 18. *M. bracteata*
- 11b. Infructescence axis either with fruit throughout length or without fruit or scars in lower part; bracts all caducous before flowers open; leaflets much thinner, papery or membranous, abaxially not or only slightly paler, veins neither prominent nor dark and less pubescent than rest of surface 16. *M. pruriens*
- 3b. Legume surfaces each with 8–16 conspicuous obliquely transverse lamellae.
- 12a. Stem (at least when young), petiole, and leaves abaxially with conspicuous soft ferruginous hairs; legume over 16 cm when mature; torulose 13. *M. championii*
- 12b. Stem, petiole, and leaves glabrous or with sparse pale hairs; legume size and shape various.
- 13a. Legume relatively small and narrow, to 10 cm, ca. 4 \times as long as wide, margins \pm parallel, marginal wings to 4 mm wide.
- 14a. Legume with septa clearly visible as marked indentations; seeds almost spherical; terminal leaflet broadly triangular-cordate, 12–15 cm, base cordate 15. *M. cyclocarpa*
- 14b. Legume with septa just visible as indefinite indentations; seeds markedly laterally flattened, to 1/2 as thick as long; terminal leaflet rhombic-ovate, 6–13 cm, base cuneate 14. *M. lamellata*
- 13b. Legume length only 2–3 \times width, or if relatively narrow then legume much larger, at least 16 cm or at least with one margin convex, or marginal wings 1 cm or more wide.
- 15a. Legume lamellae erect, 2-winged along their margins to give T-shaped cross section, all lamellae clearly interrupted along midline of legume.
- 16a. Legume (1 or)2-seeded, 6–9 \times 4–4.5 cm, lamellae 8–12 per valve, with strongly revolute apical halves, marginal wings strongly inrolled; bracts never persistent; hairs on inflorescence axis and calyx erect, very short, 0.1–0.2 mm, velvety 8. *M. revoluta*
- 16b. Legume 3-seeded, 13–14 \times 6–7 cm, lamellae ca. 18 per valve, with spreading or \pm upcurved apical halves, marginal wings \pm flat; some bracts large and conspicuous, often persistent to fruiting stage; hairs on calyx and inflorescence axis adpressed, 0.4 mm or more 7. *M. interrupta*
- 15b. Legume lamellae often partly adpressed, each a simple raised flap not dividing to give T-shaped cross section, sometimes erratically discontinuous, joined or branched near middle of legume but not creating a longitudinal midline.
- 17a. Legume to 2 \times as long as wide, oblong, usually asymmetric, often with both sides convex, never parallel.

- 18a. Legume with at least some lamellae joined or branched near middle of legume; basal and sometimes apical 1/2 of terminal leaflet with rather straight outline 9. *M. membranacea*
- 18b. Legume lamellae never branched, only a few short or discontinuous; terminal leaflet with very rounded outline 12. *M. hainanensis*
- 17b. Legume 3–4 × as long as wide, linear or slightly curved, sides ± parallel in outline (swollen around seeds or not).
- 19a. Legume 2–2.5(–3) cm or less wide; leaflets with rather straight outline, terminal leaflet rhombic or rhombic-ovate 14. *M. lamellata*
- 19b. Legume 4 cm or more wide; leaflets with rounded outline, terminal leaflet elliptic or slightly obovate.
- 20a. Wings on lower (abaxial) margin of legume 0.5(–0.8) × as wide as those of upper (adaxial) margin; terminal leaflet 13–15 × 7.5–8.5 cm 10. *M. macrobotrys*
- 20b. Wings along both margins of legume ± equal in width; terminal leaflet 4.5–10.5(–16) × 2.5–6(–9) cm 12. *M. hainanensis*

1. *Mucuna birdwoodiana* Tutcher, J. Linn. Soc., Bot. 37: 65. 1904.

白花油麻藤 bai hua you ma teng

Large woody vines. Young stems glabrous or with fine stiff adpressed pale hairs at nodes. Leaves 17–30 cm; petiole 8–20 cm, with sparse stiff spreading hairs; stipels not persistent; leaflets almost leathery, glabrous or sparsely hairy abaxially, often glossy adaxially, lateral veins 3–5 pairs, gently curved; terminal leaflet ovate, elliptic, or slightly obovate, usually long and narrow, 9–16 × 2–6 cm, base rounded or slightly cuneate, apex with ± distinct acumen 1.3–2.2 cm; lateral leaflets 9–16 cm, width ratio of abaxial to adaxial halves 1.7–2:1. Inflorescences on old branches or axillary, 20–38 cm, with 5–10 nodes spaced throughout most of length; bracts ovate, ca. 2 mm, caducous; bracteoles very early caducous; pedicels 1–1.5 cm, hairy. Calyx hairy; tube 1–1.5 × 1.5–2.5 cm; lateral lobes broadly triangular, 5–8 mm, lowest narrowly triangular, 5–15 mm, upper lip usually equal to lateral lobes. Corolla white or greenish white; standard 3.5–4.5 cm, apex with margin conspicuously brown pubescent in apical 1/3–1/2; wings 6.2–7.1 cm, margin pubescent like standard around apex; keel 7.5–8.7 cm. Legume linear but markedly constricted between seeds, 30–45 × 3.5–4.5 cm, 1–1.5 cm thick, woody, densely pubescent, young legume clothed with dense short fine spreading velvety dark or red-brown pubescence and reddish brown caducous bristles, both margins with pair of narrow woody wings 3–5 mm wide, woody septum between seeds ca. 4 mm thick. Seeds 5–13, black, almost reniform, to ca. 2.8 × 2 cm, 8–10 mm thick, usually glossy; hilum length 1/2–3/4 of seed perimeter. Fl. Apr–Jun, fr. Jun–Nov.

• Dense or open woodlands, rocky areas, moist hillsides and valleys; 800–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Sichuan.

Mucuna birdwoodiana is distinctive in its narrow leathery glossy often glabrous leaves without persistent stipels; large white, often drying pale green, flowers with conspicuously pubescent margins at their apex; and large woody narrowly linear velvety pubescent legume with narrow marginal wings. It is not easily confused with any other species.

This species is used medicinally and as a starch.

2. *Mucuna bodinieri* H. Léveillé, Bull. Soc. Bot. France 55: 408. 1908.

贵州豇豆 gui zhou li dou

Mucuna corvina Gagnepain; *M. terrens* H. Léveillé.

Large climbing woody vines. Stems with sparse short pale fine spreading hairs when young, later glabrous. Leaves 21–32 cm; petiole 7–14 cm, with sparse or abundant hairs like stem; stipels not persistent; leaflets papery or rather leathery, abaxially with dense short fine half-adpressed hairs, adaxially glabrous or with similar but sparse hairs, lateral veins 5–8 pairs, gently curved, often rather closely spaced; terminal leaflet broadly elliptic-ovate or elliptic to slightly obovate or almost rhombic, 11–14 × ca. 8 cm, base rounded or slightly cuneate, apex broadly rounded with abrupt minute acumen; lateral leaflets 10–13.5 cm, width ratio of abaxial to adaxial halves 1.6–2:1. Inflorescence on old stem, over 10 cm, with ca. 9 nodes; bracts ± ovate, ca. 2 × 1.5 mm, densely hairy, persistent. Calyx densely adpressed hairy and often with sparse caducous bristles; tube 1.1–1.4 × ca. 2 cm; lateral lobes 3–6 mm, lowest 6–10 mm, upper lip indistinct or almost equaling lateral lobes. Corolla deep purple (possibly sometimes white); standard 3.4–4 cm, margin conspicuously pale pubescent in apical 1/3; wings very narrow, 6–7 × 1.5–2 cm, margin pubescent like standard in apical 1/3; keel 7.2–7.7 × ca. 1 cm. Legume linear, slightly curved, 47–60 × 3–5 cm, ca. 1.5 cm thick, woody, margin not or only slightly constricted between seeds (segments rectangular) but internal septa visible as transverse grooves, apex acute, base without narrow neck, densely minute spreading hairy, surface with several irregular undulating interrupted longitudinal woody ridges, each margin thickened into 2 ridges up to 1 mm high with a median groove running along suture; septum thin inside, ± woody. Seeds ca. 16, dull black, oblong-disk-shaped; hilum ca. 1/3 length of seed circumference; strophiole ca. 4 mm wide.

• 1000–1500 m. Guizhou (Anshun).

Mucuna bodinieri is presumably rare, as it is known from only seven collections.

This species is distinctive in having leaflets broadly rounded, shortly acuminate, and densely softly pale hairy; stipels not persistent; large purple flowers with pubescent petal apices; and a large linear legume with rectangular segments. *Mucuna macrocarpa* has similar flowers and fruit but differs in its acute or acuminate leaflets with red-brown, often sparse, indumentum and often fewer veins.

The syntypes of *Mucuna bodinieri* and *M. terrens* were collected from adjacent localities only ca. 10 km apart. Those of *M. bodinieri* lack

fruit, but the ovary is similar; and they otherwise differ from those of *M. terrens* only in having the lowest calyx lobe longer and slightly broader and the leaflets thinner textured with a mucronate rather than shortly acuminate apex.

3. *Mucuna macrocarpa* Wallich, Pl. Asiat. Rar. 1: 41. 1830.

大果油麻藤 da guo you ma teng

Mucuna castanea Merrill; *M. collettii* Lace; *M. ferruginea* Matsumura; *M. ferruginea* var. *bungoensis* (Ohwi) Ohwi; *M. ferruginea* var. *irukanda* (Ohwi) Ohwi; *M. irukanda* Ohwi; *M. irukanda* var. *bungoensis* Ohwi; *M. subferruginea* Hayata; *M. wangii* Hu.

Large woody vines. Young stems usually with abundant fine brown adpressed or spreading hairs, later usually glabrous. Leaves 25–33 cm; petiole 8–13(–15) cm, usually hairy like stem; stipels usually not persistent even on young leaves but occasionally present, robust, 2–5 mm; leaflets papery or leathery, glabrous or with abundant light brown or reddish adpressed or spreading hairs especially on veins, lateral veins (3 or) 4–6 (or 7) pairs, gently curved; terminal leaflet ovate, elliptic, or slightly obovate, (7–)10–19 × (3–)5–10 cm, base rounded or slightly cuneate, apex broadly acute or shortly acuminate; lateral leaflets 10.5–17 cm, width ratio of abaxial to adaxial halves 2:1, base of abaxial half truncate. Inflorescence usually arising from old stems, 5–23 cm, with 5–17 nodes usually spaced throughout most of length; pedicels 8–10 mm, with dense minute brown spreading hairs and sparse fine bristles; bracts and bracteoles ovate, bracteoles 2–5 mm, shorter than calyx, caducous. Calyx with dense minute spreading hairs and pale caducous bristles; tube 8–12 × 12–20 mm; lateral lobes 3–4 mm, lowest 5–6 mm. Corolla bicolored, standard greenish or pinkish white, wings deep purple, keel lighter purple or sometimes yellowish green; flowers occasionally large with standard, wings, and keel up to respectively 4.5 cm, 6 cm, and 7 cm, but usually shorter: standard 3–3.5 cm, apex with margin conspicuously brown pubescent in apical 1/4–1/3; wings 4–5.2(–5.6) × 1.5–1.7 cm, margin around apex pubescent like standard; keel 5–6.3 cm. Legume linear, straight or slightly curved, 26–48 × 3–5 cm, 7–10 mm thick, woody, with margins often markedly constricted between seeds, base without narrow neck, with dense minute spreading hairs or partly glabrous with age, with irregular ribs and wrinkles, interior septum woody, 1–5 mm thick, margins not distinctly thickened and without median groove along suture but often with irregular woody ribs closely parallel to margin, apex acute. Seeds 6–15, dull black, disk-shaped, slightly asymmetric, laterally flattened, 2.2–3 × 1.8–2.8 cm, 5–10 mm thick; hilum deep brown or black, length ca. 3/4 of seed circumference or more. Fl. Nov–May, fr. Apr–Nov.

Evergreen or deciduous montane or riverine forests, open shrubs, dry sandy lands; 800–3000 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bhutan, India, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam].

Mucuna macrocarpa is distinctive in its leaves usually without persistent stipels, flowers usually bicolored with conspicuously pubescent petal margins at apex, and legume large and linear with thickened but unwinged margin. It is often confused in fruit with *M. sempervirens*, which differs by its indumentum sparse, pale; flowers not pubescent at

their apex; and fruit with finer, more regular, reticulate surface patterning and a distinct rounded margin along both sutures. *Mucuna bodinieri* also has similar flowers and fruit but differs markedly by its rounded leaflets with dense pale indumentum. Large-flowered forms of *M. macrocarpa* with persistent stipels can be confused in flower with *M. macrobotrys*, which is distinguished by the uniformly purple corolla, wings often relatively broader, and standard often shorter relative to keel. *Mucuna* “sp. B” of Wilmot-Dear (Kew Bull. 39: 39. 1984) is a variant of *M. macrocarpa*.

4. *Mucuna sempervirens* Hemsley, J. Linn. Soc., Bot. 23: 190. 1887.

常春油麻藤 chang chun you ma teng

?*Mucuna coriolarpa* Handel-Mazzetti; *M. japonica* Nakai; *M. mairei* H. Léveillé.

Woody vines, up to 25 m. Old stems over 30 cm in diam., young stems glabrous or rarely with sparse stiff pale hairs. Leaves 20–40 cm; petiole 7–16.5 cm, glabrous or with sparse hairs like stem; stipels not persistent; leaflets papery or thicker textured, glabrous or with fine pale stiff hairs, lateral veins 4 or 5 pairs, gently curved; terminal leaflet elliptic or elliptic-ovate, 8–15(–19) × 3.5–9 cm, base slightly cuneate, apex acuminate to 15 cm; lateral leaflets 7–14 cm, width ratio of abaxial to adaxial halves 1.25–1.5:1, abaxial half with base often truncate or slightly cordate. Inflorescences usually on old stems, 10–36 cm, with 5–10 nodes throughout length; bracts caducous, narrowly obovate, ca. 1.5 mm long and wide; bracteoles ovate or obovate, caducous; pedicels 1–2.5 cm, with stiff dark short adpressed hairs. Calyx with dense adpressed hairs on both sides and sparse caducous bristles outside; tube 8–12 × 18–25 mm; lateral lobes 5–8 mm, equaling lowest lobe or almost so, broadly triangular, upper lip often equaling lateral lobes. Corolla deep purple, black after drying; standard 3.2–4 cm; wings rather wide, 4.8–6 × 1.8–2 cm; keel 6–7 cm. Legume linear, straight or slightly curved, 30–60 × 3–3.5 cm, 1–1.3 cm thick, woody, with dense short fine red-brown hairs and sparse caducous reddish brown bristles, surface with conspicuous irregularly reticulate patterning, margins and surface constricted between seeds, base often with abrupt narrow neck, margin thickened into a well-defined smooth rounded ridge running along suture without a wing or median groove, apex acute. Seeds 4–12, shiny red, brown, or black, oblong or discoid, 2.2–3.2 × 2–2.8 cm, ca. 1 cm thick; septum woody; hilum black, length ca. 3/4 of seed circumference. Fl. Apr–May, fr. Aug–Oct. $2n = 22, 44$.

Forests, thickets, riversides; 300–3000 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [Bhutan, NE India (W Bengal, Manipur, Sikkim), Japan, Myanmar].

Mucuna sempervirens is easily distinguished in flower from most other species with large purple flowers by its leaves without persistent stipels. It is often confused in fruit with *M. macrocarpa*, which differs by its legume without a distinct rounded margin and with a coarser surface patterning, its bicolored flowers with pubescent apex, and its leaves often with reddish hairs. *Mucuna calophylla* also lacks persistent stipels but has much smaller flowers and fruit and has leaves usually densely silky hairy abaxially.

This species is used medicinally and for paper-making, starch, and oil.

5. *Mucuna calophylla* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 216. 1920.

美叶油麻藤 mei ye you ma teng

Climbing vines, 1–3 m. Stems up to 2 cm in diam., red-brown, young stems with abundant fine long adpressed hairs, later glabrous or glabrescent. Leaves 15–22 cm; petiole 4–12 cm; stipels not persistent; leaflets thinly papery or thicker textured, abaxially with dense silky hairs, adaxially with sparse adpressed long silvery hairs, rarely glabrescent with age, lateral veins 5 or 6, gently curved; terminal leaflet ovate, elliptic, or rhombic, 7–11.5 × 3–5 cm, relatively narrow, length 2–2.5 × width, base cuneate or rounded, apex caudate or abruptly broadly acuminate, 1–2 cm; lateral leaflets 7–10.5 cm, width ratio of abaxial to adaxial halves 1.5:1, base slightly cordate or truncate. Inflorescence axillary or from older stems, 3–12 cm, with up to 11 nodes spaced throughout length but more crowded near apex; bracts caducous, narrowly ovate, up to 3 mm; bracteoles caducous, elliptic, ovate, or slightly obovate, up to 6 mm; pedicels 4–5 mm, usually with abundant fine short adpressed silvery hairs. Calyx with dense light brown adpressed short hairs and sparse caducous reddish irritant bristles; tube 6–7 × 8–11 mm; lateral lobes 2–4 mm, lowest lobe 5–6 mm. Corolla reddish purple or deep crimson; standard 2–2.4 cm; wings 2.8–3.2 × ca. 1 cm; keel 3.5–4 cm. Legume linear-oblong, straight, ca. 13 × 1.8–3 cm, ca. 1.5 cm thick, ± woody or thickly leathery, indented between seeds, with dense reddish or pale long irritant bristles and short spreading hairs and with raised reticulate surface patterning; interior septum very thick, up to 2 mm, woody. Seeds ca. 7, oval in outline, flattened, not glossy, ca. 2 × 1.5 cm, ca. 1 cm thick; hilum brownish orange, length 1/2–3/4 of seed circumference.

- Forests, open thickets; 1000–3000 m. Yunnan.

This species is distinctive in its narrow leaflets without persistent stipels and usually densely silvery hairy abaxial surface, its small flowers, and its linear ± woody legume much smaller than the other *Mucuna* species with woody linear legumes. Other small linear legumes are distinguished by fleshy texture or surface lamellae.

6. *Mucuna gigantea* (Willdenow) Candolle, Prodr. 2: 405. 1825.

巨蠶豆 ju li dou

Dolichos giganteus Willdenow, Sp. Pl. 3: 1041. 1803; *Mucuna gigantea* subsp. *tashiroi* (Hayata) Hayata; *M. tashiroi* Hayata.

Large climbing woody vines. Stems glabrous or with sparse fine adpressed hairs. Leaves 12–27 cm; petiole 6–14 cm, glabrous or with fine adpressed hairs; stipels linear, 3–5 mm; leaflets thinly papery, glabrous or with sparse short adpressed hairs, lateral veins 4–6 pairs, gently curved; terminal leaflet usually elliptic-ovate, sometimes rhombic or ovate, 7–16 × 4–8.5 cm, base rounded, apex indistinctly shortly acuminate; lateral leaflets 7–11 × 4.5–8 cm, ratio of abaxial to adaxial halves ca. 2.2:1, base rounded and oblique or slightly cordate. Inflorescences axillary but usually arising from rather old stems, 8–25 cm, with up to 6 nodes all clustered in upper 1/4, lower part of inflorescence without flowers or scars; bracts lanceolate

to elliptic, 3–5 mm, caducous; bracteoles ovate-lanceolate, 16–18 × 5–7 mm, persistent to well-developed bud stage; ultimate peduncles and pedicels of varying lengths, 5–20 mm, progressively shorter near apex forming a corymb, with abundant short fine pale pubescence. Calyx with short fine pale pubescence and abundant caducous irritant bristles; tube 8–12 × 11–15 mm; lobes short and broad, lowest (1–)2–3 mm (only ca. 1/3 tube length), laterals 1–2 mm. Corolla white, tinged green, yellow, or pale pink; standard large relative to keel size, 2–3(–3.8) cm; wings 2.8–4.4 cm × 8–10 mm, slightly shorter or longer than keel; keel 3–4.2 cm. Legume oblong, 7–14 × 3–5.5 cm, ca. 5 mm thick, leathery, sparsely fine hairy and with irritant bristles, later glabrous, also ornamented with close fine raised reticulate venation giving pitted appearance, both margins thickened to prominent ribs and with pair of wings 0.5–1 cm wide. Seeds 1–3, dark brown or black, 2.3–3 × 2–2.5 cm, 8–10 mm thick; hilum black, length 2/3–3/4 of seed circumference.

Hillsides, at low elevations, often near the coast. Hainan, Taiwan [India, Japan, Malaysia, Vietnam; Australia].

Mucuna gigantea is easily distinguished from other species by the corymbose (pseudoubellate) inflorescence with long ultimate peduncles and pedicels, which are all progressively markedly shorter toward the inflorescence apex; the rather persistent bracteoles; the small white flowers with very short calyx lobes; the relatively large standard; and the broadly oblong legume with reticulate surface-patterning and wide marginal wings. White-flowered variants of *M. hainanensis* with short, few-flowered inflorescences can be confused with *M. gigantea* but are distinguished by the knoblike ultimate peduncles, the lengths and relative proportions of various flower parts, with the keel and wings (but not the standard) longer, and the much longer calyx lobes, with the lowest one equaling (rather than ca. 1/3 as long as) the tube.

7. *Mucuna interrupta* Gagnepain, Notul. Syst. (Paris) 3: 26. 1914.

间序油麻藤 jian xu you ma teng

Twining vines, ± woody. Stems glabrous or with sparse adpressed or abundant spreading fine hairs. Leaves up to 25 cm; petiole 6–9 cm usually with spreading hairs; stipels 2–4 mm; leaflets thinly papery, inconspicuously finely hairy (rarely glabrous) on both sides, lateral veins 5–7 pairs, gently curved; terminal leaflet elliptic, 9–14 × 4–8 cm, base rounded or ± cordate, apex shortly acuminate; lateral leaflets 9–12 × 5–7 cm, width ratio of abaxial to adaxial halves 1.5–2:1, base of abaxial half truncate, base of adaxial half rounded or slightly cuneate. Inflorescence axillary, 8–24 cm, with up to 6 nodes all in upper part, without flowers or scars in lower part; bracts usually persistent, broadly ovate, 2.5–4 × (0.7–)2–2.5 cm, both sides with dense fine usually adpressed short hairs; bracteoles caducous, up to 3 × 0.5 mm; pedicels 8–10 mm, with dense adpressed fine pale hairs. Calyx densely hairy; tube ca. 1 × 2 cm; lobes broadly triangular, laterals 4–6 × 4–6 mm, lowest (8–)12–14 × ca. 6 mm. Corolla white; standard 3–3.5 × 1.8–2 cm, ca. 1/2 length of keel or slightly longer; wings 5.5–6 × 0.8–1(–1.5) cm; keel equaling wings. Legume broadly oblong with rounded apex and base, 13–14 × 6–7 cm, 1.5–2 cm thick, leathery, with abundant reddish hairs and irritant bristles, both margins with a pair of wide ± flat wings 12–15 mm wide, both surfaces with 10–20 obliquely transverse erect crowded parallel lamellae completely

concealing fruit surface, each divided into 2 wings along their margin with each wing flat or upcurved and up to 7 mm wide, lamellae all interrupted along midline of legume and not extending into marginal wings of fruit. Seeds (2 or)3, reddish brown, with black striations and spots, reniform or almost discoid, ca. 3×2.5 cm, ca. 1.2 cm thick; hilum black, length slightly longer than 1/2 circumference of seed. Fl. Aug, fr. Oct.

Forest margins; 900–1100 m. Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

Mucuna interrupta is distinctive in its large fruit with flat marginal wings and wide lamellae uniformly interrupted along the midline, not extending into the winged margins, and with flat or upcurved apical halves. It is vegetatively almost identical to *M. revoluta* and *M. hainanensis*, which differ in the form of their fruit lamellae and usually have purple or reddish flowers.

8. *Mucuna revoluta* Wilmot-Dear, Kew Bull. 47: 222. 1992.

卷翅莢油麻藤 juan chi jia you ma teng

Twining vines, ± woody. Stems glabrous or with sparse adpressed fine hairs. Leaves up to 20 cm; petiole up to 9 cm, often hairy; stipels 2–4 mm; leaflets thinly papery, hairy (rarely glabrous) on both sides, lateral veins 4 or 5 pairs, gently curved; terminal leaflet elliptic or ovate, $8-10 \times 4-5.5$ cm, base narrowly rounded, apex abruptly acuminate; lateral leaflets up to 12 cm, width ratio of abaxial to adaxial halves 1.75–2:1, base of abaxial half truncate, base of adaxial half rounded to cuneate. Inflorescences (3–)8–16 cm, unbranched or once or twice branched near base, without flowers in lower 1/3 of axis, nodes 5–13; bracts caducous, widely varying in size and shape, elliptic or obovate to linear-oblong, (5–)10–17 \times (2–)5–7, with sparse minute fine spreading hairs; bracteoles similar to bracts, longer than calyx; pedicels 5–10 mm, with dense minute (0.1–0.2 mm) fine spreading velvety light brown hairs. Calyx with dense minute hairs like pedicels and irritant red bristles; tube ca. $8 \times 8-10$ mm; lobes conspicuous, laterals 4–6 mm, lowest 8–9 mm, all broadly triangular with abrupt fine acumen. Corolla deep purple or pinkish purple with paler keel (rarely all petals white); standard ca. 3×2 cm, ca. 2/3 keel length; wings $4.5-4.8 \times$ ca. 1 cm; keel equaling wings. Legume broadly oblong, sometimes asymmetric, with rounded apex and base, $6-9 \times 4-4.5$ cm, up to 2.5 cm thick, leathery, with minute spreading hairs and abundant irritant bristles, both margins with a pair of strongly inrolled wings ca. 4 mm wide, both surfaces with 8–12 thickly leathery markedly obliquely transverse crowded parallel lamellae completely concealing fruit surface, each divided along their margin into 2 wings up to 5 mm broad and strongly revolute, lamellae uniformly interrupted along midline of legume and not extending into marginal wings of fruit. Seeds (1 or)2, shiny, red-brown with black mottling, very large, $2.5-2.8 \times$ ca. 2 cm; hilum just over 1/2 circumference of seed.

Forests and disturbed vegetation, seasonal rain forests often by streams, dry evergreen forests, primary and slightly disturbed evergreen hardwood forests, swamp forests, degraded caducous forests and bamboo, scrub, roadsides; 300–800 m. W Yunnan [Cambodia, Laos, Thailand, Vietnam].

The original material of *Mucuna revoluta* was included within *M. interrupta*. *Mucuna revoluta* is distinctive in its legumes with strongly

inrolled marginal wings and rigid thick-textured lamellae, which are divided distally into 2 wings, interrupted along the midline of the legume, strongly revolute, and not extending into the legume wings, and in its minute spreading velvety pubescence on the flowering parts (in most other species hairs are at least 0.4 mm, often adpressed). *Mucuna interrupta* and *M. hainanensis* have almost identical leaves; *M. interrupta* differs by the longer usually adpressed indumentum on its flowering parts, by the flowers always white with longer wings and keel, and by the legume with thinly textured upcurved lamellae and flat or undulating marginal wings. *Mucuna hainanensis* is distinguished by the adpressed hairs on flowering parts and the fruit with simple lamellae mostly not interrupted along the midline.

9. *Mucuna membranacea* Hayata, Icon. Pl. Formosan. 3: 73. 1913.

兰屿血藤 lan yu xue teng

Mucuna iriomotensis Ohwi.

Climbing woody vines. Young stems glabrous. Leaves up to 22 cm; petiole 3–20 cm, with sparse short spreading soft pale hairs; stipels slender, 2–3 mm; leaflets membranous to papery with short fine spreading hairs on both sides, lateral veins 4–6, lower ones rather straight; terminal leaflet rhombic-elliptic or rhombic-ovate, $8-13 \times 6-8$ cm, base cuneate but at extreme base obtuse-rounded, apex obtuse with abrupt acumen to 1 cm; lateral leaflets up to 12 cm, width ratio of abaxial to adaxial halves 2:1. Inflorescence 10–12 cm, pendulous with 5 or more nodes throughout most of length; pedicels 6–10 cm, with adpressed light brown short hairs; bracts broadly ovate, boat-shaped, $12-14 \times 7-9$ mm, bracteoles narrowly ovate, all caducous before flowering. Calyx tube ca. 8×13 mm, upper lip well marked, equaling lateral and lower lobes, all 10–12 mm. Corolla deep purple; standard 3–3.5 cm, ca. 2/3 keel length; wings ca. 5×2 cm; keel ca. 5 cm. Legume asymmetric, elliptic-ovate to oblong in outline, (4–)6–9 \times 4–5 cm, 5–10 mm thick, leathery, surface with abundant very short spreading pale hairs and brown irritant bristles, apex rounded or acute, both margins with pair of sinuate wings 6–10 mm wide, both surfaces of legume with 9–12 obliquely transverse slightly undulating but well-spaced shallow lamellae of irregular height up to 5(–10) mm high and mostly interrupted along midline, some extending onto marginal wings of fruit. Seeds 1 or 2, brownish black, flattened-discoid, ca. 2 cm in diam.; hilum ca. 3/4 of seed circumference.

Forests near rivers or seacoast; sea level to near sea level. Taiwan [Japan].

Mucuna membranacea is distinctive in the rhombic-ovate leaflets with rather straight veins, the short purple flowers with wide wings equaling keel, and the short broad legume with narrow marginal wings and simple lamellae interrupted along the midline of the legume.

Records of *Mucuna nigricans* Steudel from China (Taiwan) and Japan (e.g., Fl. Taiwan 3: 343. 1977) were based on misidentifications of this species.

10. *Mucuna macrobotrys* Hance in Walpers, Ann. Bot. Syst. 2: 422. 1851.

大球油麻藤 da qiu you ma teng

Large climbing vines. Stems glabrous or with sparse red-

dish brown short hairs at nodes. Leaves 29–33 cm; petiole 6–13 cm, glabrous or with reddish brown short hairs; stipels slender 4–6 mm; leaflets thinly leathery or papery, glabrous or with reddish brown short hairs abaxially, lateral veins 4 or 5 pairs, uniformly strongly curved; terminal leaflet elliptic or elliptic-obovate, 11–15.5 × 3–8.5 cm, base rounded, apex with abrupt acumen ca. 1.5 cm; lateral leaflets 9–15 cm, width ratio of abaxial to adaxial halves ca. 1.7:1. Inflorescence ca. 15 cm, with 4 or 5 nodes spaced throughout length; bracts caducous; pedicels ca. 1 cm, with dark brown adpressed short hairs. Calyx with dark brown short adpressed hairs and red-brown caducous bristles; tube ca. 1 × 1.5 cm; lobes narrowly triangular, lowest ca. 10 mm and laterals ca. 7 mm, upper lip sometimes equaling lateral lobes. Corolla deep purple; standard 3.7–5 cm, with margin conspicuously pubescent in apical 1/3; wings 6–7 × 2–2.5 cm, ca. 2/3 of keel in length, apex with pubescent margin like standard; keel 7.5–9 cm. Legume asymmetric, oblong, 16–17 × ca. 4.5 cm, leathery, clothed with adpressed short hairs and sparse irritant bristles, with acute apex and persistent style, base rounded, both margins with a pair of wings 6–15 mm wide, both surfaces with 12–16 markedly obliquely transverse well-spaced parallel thinly textured lamellae up to ca. 6 mm high ± adpressed to surface and occasionally branching or interrupted, not extending onto marginal wings of fruit. Seeds 2 or 3. Fl. Dec, fr. Apr.

- Forests at low elevations. Guangdong, Guangxi, Yunnan.

Mucuna macrobotrys is distinctive in the large broad leaves with uniformly curved veins; the large purple flowers with petal margins pubescent around the apex, rather broad wing, and very long keel; and the oblong legume with acute apex, wide marginal wings, and narrowly oblique, occasionally interrupted, simple lamellae ± adpressed to the legume surface. Its apically pubescent-margined flowers are sometimes confused with those of *M. macrocarpa*, which differs by the bicolored corolla with usually shorter petals, the wings often relatively narrower, the standard often short relative to the keel, and the stipels rarely persistent even on very young leaves. A new species, *M. hirtipetala* (below), resembles large-leaved forms of *M. macrobotrys* in general appearance but differs by its spreading indumentum on the inflorescences, broader calyx with longer lowest tooth, and much shorter corolla without apically pubescent petals and with inner surface of the wing conspicuously long hairy.

11. *Mucuna hirtipetala* Wilmot-Dear & R. Sa, sp. nov.

毛瓣薰豆 mao ban li dou

Type: China. Yunnan: “Jenn-Yeh Hsien, Meng-Ping” [Mengla County, Mengpeng Township], Oct 1936, C. W. Wang 78923 (holotype, PE; isotype, A).

Mucunae macrobotryi similis sed corolla minore ad apicem omnino glabromarginata, carina brevior 5–5.5 cm longa alas aequante (nec 7.5–9 cm nec quam alis longiore), alis in superficie adaxiali pilos conspicuos longos per dimidium basale abundanter dispersos ferentibus et calyce pedunculoque pilos patentes (nec adpressos) ferentibus differt.

Climbing vines. Stems with sparse reddish brown short hairs. Leaves ca. 35 cm; petiole ca. 15 cm with sparse brown short spreading hairs; stipels robust, 4–6 mm; leaflets thinly leathery or papery, glabrous except for occasional hairs on veins abaxially, lateral veins 5 or 6 pairs, strongly curved; termi-

nal leaflet elliptic or elliptic-obovate, ca. 14 × 8.5 cm, base rounded, apex with abrupt acumen ca. 1 cm; lateral leaflets ca. 13 cm, width ratio of abaxial to adaxial halves ca. 1.5:1. Inflorescence ca. 10 cm, with 4 or 5 nodes spaced throughout length; bracts caducous, not seen; pedicels ca. 1 cm, with abundant golden spreading short hairs. Calyx with dark brown short spreading hairs and red-brown caducous fine long bristles; tube ca. 1 × 1.6–1.8 cm; lobes narrowly triangular, lowest ca. 12 mm and laterals ca. 7 mm, upper lip sometimes longer than laterals. Corolla deep purple (drying brownish); standard ca. 3.2 cm; wings 5–5.5 × ca. 2 cm, ca. equaling keel, inner surface with abundant long fine adpressed pale hairs in basal half. Ovules ca. 3. Mature fruit unknown.

- Dense woodlands near rivers; ca. 800 m. S Yunnan (Mengla).

This new species is *Mucuna* “sp. C” of Wilmot-Dear (Kew Bull. 39: 50. 1984). Known only from the type gathering, it is unusual in having conspicuous fine long hairs on the inner surface of the corolla wings (as in *M. lamellata*, which is otherwise very different in its smaller flowers and rhombic leaves). Its general appearance is that of *M. macrobotrys*, which differs in its mostly smaller leaves, its adpressed indumentum on the peduncles and calyx, and especially in its longer corolla with the keel longer than the wings and its standard and wings pubescent on their apical margins but not hairy on the inner surface.

12. *Mucuna hainanensis* Hayata, Icon. Pl. Formosan. 3: 72. 1913.

海南薰豆 hai nan li dou

Mucuna nigricans Steudel var. *hainanensis* (Hayata) Wilmot-Dear; *M. nigricans* var. *hongkongensis* Wilmot-Dear; *M. suberosa* Gagnepain.

Climbing vines, to 5 m. Young stems glabrous or with sparse fine adpressed hairs. Leaves widely varying in size, 7–25 cm; petiole 4.8–11.5 cm, glabrous or sparsely finely hairy; stipels 2–6 mm; leaflets papery or leathery, almost glabrous on both surfaces, lateral veins 4 or 5(–7) pairs, gently curved; terminal leaflet obovate-elliptic or elliptic, 4.5–10.5(–16) × 2.5–6(–9) cm, base rounded, apex caudate to abruptly shortly acuminate; lateral leaflets 5–8(–11) cm, ratio of abaxial to adaxial halves ca. 1.5:1. Inflorescence axillary, 6–40 cm, with 5–18 nodes, basal part without flowers but often with a few long acuminate bracts 2–3 cm; bracts at flowering nodes large, oblong or broadly ovate to elliptic with rounded often hooded apex, 1–2 cm, hairy; bracteoles linear-ovate or narrowly elliptic, to 13 × 4 mm; pedicels 8–10 mm, densely silky adpressed hairy. Calyx with dense silky short hairs and irritant bristles; tube 7–10 × 10–14 mm; lobes narrow, lowest 8–10 mm, laterals 5–6 mm. Corolla deep purple (rarely white); standard 2.5–3.5 cm; wings 4.5–5.5 × 1–1.3 cm; keel 4.8–5.7 cm. Legume asymmetrically oblong or ovate-oblong, 9–18 × 4.5–5.5 cm, ca. 1 cm thick, leathery, with red-brown irritant hairs, with narrowly rounded base and acute apex often with persistent style, both margins with pair of wings ca. 1 cm wide, both surfaces with 8–14 markedly oblique crowded winglike lamellae uniformly 4–5 mm high, mostly not interrupted nor branched, some extending onto marginal wings of fruit. Seeds 2–4, black, oblong or reniform, 1.7–2.5 × ca. 1.5 cm, 5–7 mm thick; hilum length 1/2–3/4 of seed circumference. Fl. Jan–Mar, fr. Mar–May.

Forests, thickets, valleys, mountain slopes, dry or swampy soil; sea level to low elevations, rarely to 1000 m. ?Guangdong, ?Guangxi, Hainan, Yunnan [Vietnam].

Mucuna hainanensis is distinguished by its fairly small usually purple flowers with a relatively long wing and its oblong legume with simple uninterrupted oblique lamellae of almost uniform height and sometimes running into the marginal wings. It is vegetatively almost identical to *M. interrupta* and *M. revoluta*, both of which have fruit lamellae T-shaped in cross section; *M. revoluta* also has distinctive minute spreading indumentum on the inflorescence. *Mucuna lamellata* has a similar but narrower fruit with less oblique lamellae, seeds only half the size, and rhombic-ovate leaves. *Mucuna championii* has a similar fruit and small flowers but a distinctive red indumentum. *Mucuna* "sp. D" of Wilmot-Dear (Kew Bull. 39: 57. 1984) is a white-flowered variant of *M. hainanensis*.

All of the material from the Flora area belongs to the typical subspecies. The other subspecies, *Mucuna hainanensis* subsp. *multi-lamellata* Wilmot-Dear, is found in the Philippines and the E and N Indian subcontinent and is distinguished mainly by its fruit with dense short spreading hairs and 20–25 scarcely oblique lamellae and its leaflets sometimes longer.

13. *Mucuna championii* Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 49. 1852 [*"championi"*].

港油麻藤 gang you ma teng

Tall climbing vines, to 10 m. Young stems with dense reddish crisped hairs, old stems almost glabrous. Leaves up to 15.5 cm; petiole ca. 6.5 cm, glabrous or sparsely hairy; stipels 1–2 mm; leaflets papery, adaxially clothed with sparse golden silky hairs, abaxially with dense reddish hairs on veins and golden silky hairs on surface, golden hairs becoming sparse on older leaves, lateral veins (4 or)5 or 6 pairs, slightly curved; terminal leaflet broadly ovate to rhombic-ovate, 5–9 × 3.5–5.5 cm, base broadly cuneate or rounded, apex shortly acuminate; lateral leaflets 6.5–7 × 3–5 cm, with width ratio of abaxial to adaxial halves 3:2, base rounded or slightly cordate. Inflorescences on old stems, ca. 8 cm, with up to 7 nodes; bracts and bracteoles very soon caducous; pedicels 3–4 mm, densely reddish hairy. Calyx densely softly hairy and with irritant bristles; tube 7–8 × ca. 10 mm; lateral lobes ca. 2 mm, lowest lobe broadly triangular, ca. 4 mm, upper lip as long as lateral lobes. Corolla purple; standard ca. 2.5 cm; wings ca. 4 cm × 6–8 mm; keel 4–4.2 cm. Legume asymmetric, narrowly oblong, 15–16.5 × ca. 4.5 cm, leathery, with acute apex and persistent style, when young with dense bristles gradually caducous after maturity; both margins with a pair of wings ca. 1 cm wide, both surfaces with 12–15 well-spaced obliquely transverse thinly textured winglike lamellae 3–4 mm high, mostly not interrupted nor branched, some extending onto marginal wings of fruit. Seeds reddish brown, oblong, ca. 2.5 × 2 cm, ca. 7 mm thick; hilum black, length ca. 1/2 circumference of seed. Fl. Aug.

• Among trees or shrubs in evergreen forests at low elevations. Hong Kong.

Mucuna championii is known only from the type collection and is possibly now extinct. All other records of this species are based on misidentifications of *M. hainanensis*. *Mucuna championii* is distinctive in its conspicuous soft red-brown indumentum and rather narrowly oblong fruit with oblique simple lamellae that extend to the outer edge of the marginal wings.

14. *Mucuna lamellata* Wilmot-Dear, Kew Bull. 39: 53. 1984.

褶皮蠶豆 zhe pi li dou

Climbing vines, to 5 m. Stems slightly woody, glabrous or sparsely adpressed or spreading hairy. Leaves 17–27 cm; petiole 7–11 cm with abundant hairs like on stem; stipels 2–3 mm, slender; leaflets thinly papery, adaxially glabrous or with very sparse long adpressed hairs, hairs abaxially sometimes less sparse, lateral veins 4–6 pairs, rather straight but curving near margin; terminal leaflet rhombic-ovate, 6–13 × 4–9.5 cm, base rounded or slightly cuneate, apex acuminate; lateral leaflets 8–14 cm, width ratio of abaxial to adaxial halves 2:1, base truncate. Inflorescence axillary, 7–27 cm, nodes 6–15, all crowded into upper 1/5–1/2 of inflorescence; lower part of inflorescence without bracts or scars; pedicels 7–8 mm, densely clothed with spreading reddish short fine hairs and light yellow adpressed hairs; bracts and bracteoles lanceolate, linear-lanceolate, or narrowly ovate, ca. 7 × 2 mm, hairy outside, late caducous often only shortly before flowering. Calyx densely clothed with dense pale short fine hairs inside and outside and sparse irritant reddish bristles outside; tube 5–6 × 8–10 mm; lateral lobes ca. 2 mm, lowest lobe 3–4 mm, all narrowly triangular, upper lip often indistinct. Corolla deep purple or reddish brown (often drying brown rather than black); standard broadly elliptic, 2–2.5 cm; wings oblong, 3.2–4 cm × 9–12 mm, often as long as keel, apical 2/3 of adaxial surface with abundant long fine golden hairs; keel (3.6–)4(–4.5) cm, apex sharply curved. Legume narrowly oblong, narrowing to base and apex and scarcely indented transversely between seeds, asymmetric in outline, slightly downcurved, 6.5–10 × 2–2.5(–3) cm, 5–8 mm thick, leathery, densely covered with reddish irritant bristles when young, later with pale spreading fine pubescence and sparser reddish bristles, both margins with pair of wings 2–4 mm wide but of irregular width giving slightly jagged outline, both surfaces with 12–16 well-spaced obliquely transverse narrow thinly textured winglike lamellae of irregular height to 3 mm, sometimes erratically interrupted, sometimes running into wings. Seeds 2–5, deep reddish brown or black, ca. 11 × 9 mm, markedly laterally flattened, ca. 7 mm thick, smooth; hilum black, length ca. 5/8 of circumference; aril absent. Fr. Apr–May.

• Riversides, thickets, roadsides, mountain valleys; 400–1500 m. Fujian, Guangdong, Guangxi, Hubei, Jiangsu, Jiangxi, Zhejiang.

Mucuna lamellata is distinguished by its rhombic-ovate leaves, its corolla wings with conspicuous long hairs on most of the adaxial surface, and its lamellate legume that is smaller and relatively much narrower than most lamellate-fruited species. Its fruit is similar only to *M. cyclocarpa*, which differs in the cordate leaflets, the usually larger almost spherical seeds, and the legume distinctly indented between seeds. *Mucuna hainanensis* sometimes has fairly short but always wider legumes with more markedly oblique lamellae, seeds twice the size, and ovate leaves. Flowers on dried specimens are often distinctively "dirty brown" in color.

15. *Mucuna cyclocarpa* F. P. Metcalf, Lingnan Sci. J. 19: 561. 1940.

闽油麻藤 min you ma teng

Climbing woody vines. Stems almost glabrous or with very sparse fine but rather stiff short hairs, more dense at nodes and on young stems. Leaves 26–31 cm; petiole up to 13 cm, with sparse fine stiff hairs; stipels slender, ca. 5 mm; leaflets thinly papery, adaxially almost glabrous or sparsely strigose, lateral veins 5–7 pairs, gently curved; terminal leaflet broadly ovate or triangular-cordate, 12–15 × ca. 11.5 cm, base cordate, apex acute; lateral leaflets ca. 15 × 11 cm, width ratio of abaxial to adaxial halves 1.7:1, base shallowly cordate or almost truncate. Inflorescences on old stems (flowers not known). Calyx with short dense spreading light brown stiff hairs outside. Legume narrowly oblong and slightly downcurved, narrowed to base and apex and distinctly indented transversely between seeds, ca. 9.5 × 2 cm, ca. 1 cm thick, leathery, densely pubescent like calyx on most of surface and clothed with reddish brown irritant bristles; both margins with a pair of wings up to 4 mm wide but of irregular width giving slightly jagged outline, both surfaces with 16–25 slightly obliquely transverse thinly textured winglike lamellae of irregular height up to ca. 3 mm high, sometimes interrupted or branched. Seeds ca. 5, black or brown, with irregular striations or spots, almost spherical, ca. 12 × 11 mm, ca. 9 mm thick; hilum black, length ca. 1/2 of seed circumference.

• Shrubs in rocky places; ca. 1200 m. Fujian, E Jiangxi (Wuyi Shan).

Mucuna cyclocarpa is distinctive in its large cordate leaflets and almost spherical seeds. Its small narrow legume with irregular surface lamellae resembles only that of *M. lamellata*, which differs in the markedly laterally flattened seeds, the legume scarcely indented between the seeds, and the leaflets cuneate at the base and usually smaller.

16. *Mucuna pruriens* (Linnaeus) Candolle, Prodr. 2: 405. 1825.

刺毛黧豆 ci mao li dou

Semiwoody twining vines. Stems and branchlets slender, with dense long fine hairs and often coarser longer hairs, later glabrous. Leaves up to 46 cm; petiole 8–26 cm, hairy like stem; stipels robust, tapering to tip, 4–5 mm; leaflets papery, adaxially sparsely or abundantly hairy when young, later glabrous, abaxially clothed with short white silky hairs, lateral veins 5–8 on each side, slender, straight or slightly curved, running into margin; terminal leaflet elliptic or ovate-rhombic, (3–)14–16 × (4.5–)8–10 cm, base broadly cuneate to rounded, apex rounded, acute, or shortly acuminate; lateral leaflets 7–19 cm, width ratio of abaxial to adaxial halves 2–3:1, abaxial half with base ± truncate or rarely cordate. Inflorescence axillary, long and pendulous, 15–35 cm, with (2–)5–20 nodes, all in upper 2/3 of inflorescence with no bracts or scars in lower part; pedicels 2–4(–6) mm, densely adpressed hairy and often bristly; bracts and bracteoles linear-lanceolate 6–9 mm, hairy, caducous before flowers open. Calyx with dense soft adpressed pale hairs and often irritant orange bristles; tube ca. 5 × 10 mm; lateral 2 lobes broadly triangular, 2–4 × 1.5–3(–3.5) mm, lowest narrowly triangular, 6–10 × 2–3 mm. Corolla deep purple; standard 1.6–2.5 cm, 1/2–2/3 of keel length; wings 2–4 × ca. 1.2 cm, shorter than or subequal to keel; keel 2.8–4.2(–4.5) cm. Legume linear-oblong and slightly swollen around seeds or misshapen with irreg-

ular swellings around seeds, to 9 × 1(–2) cm, ca. 5 mm thick, densely covered with soft pale hairs or orange to brown irritant caducous bristles, margin thickened, surface with or without longitudinal ridges. Seeds 3–6(–8), white to light yellow-brown, orange, brown, or black, sometimes mottled in various colors, elliptic, 0.9–1.78(–2) × 0.4–1.3 cm, (3–)4–10 mm thick; hilum 3–6 mm, ca. 1/8 of seed circumference, with aril forming a raised orange border. Fl. Sep–Jan, fr. Oct–Apr.

Forests, riversides, thickets, tall scrub, roadsides, also cultivated; below 1700 m. Guangdong, Guangxi, Guizhou, Hainan, Hubei, Sichuan, Taiwan, Yunnan [widely distributed in the tropics].

Mucuna pruriens is distinctive in its small flowers crowded along the upper part of the often very long inflorescence and is easily distinguished from all species, except *M. bracteata* and *M. incurvata*, by its ± straight lateral veins running into the leaflet margin and its small fleshy linear fruit.

One flowering specimen of uncertain identity has been seen from Ting Wu Shan, Guangdong (*Nan Z. D.* 526, MO), which differs from *Mucuna pruriens* mainly by the extremely long stipels ca. 15 mm.

- 1a. Fruit with orange or brown irritant bristles, to ca. 1 cm wide; seeds uniform in color; terminal leaflet with length 1.5–1.75 × width, lateral leaflets of similar size; calyx often with irritant bristles 16a. var. *pruriens*
- 1b. Fruit with long pale silky hairs, often misshapen, irregularly swollen around seeds, to 2 mm wide in parts; seeds often mottled or streaked in different colors; terminal leaflet broad, length less than or to 1.5 × width, lateral leaflets often much larger than terminal; calyx without irritant bristles 16b. var. *utilis*

16a. *Mucuna pruriens* var. *pruriens*

刺毛黧豆(原变种) ci mao li dou (yuan bian zhong)

Dolichos pruriens Linnaeus, Herb. Amboin. 23. 1754; *Mucuna esquirolii* H. Léveillé; *M. prurita* Wight; *Stizolobium pruriens* (Linnaeus) Medikus.

Stems with fine and coarse hairs, later glabrous. Terminal leaflet with length:width ratio 1.5–1.75:1; lateral leaflets not markedly larger, to 19 cm. Inflorescence with dense hairs and often sparse bristles. Calyx with soft hairs and often irritant bristles. Legume linear-oblong, not or slightly swollen around seeds and slightly S-shaped, to ca. 1 cm wide, densely covered with orange or brown irritant caducous bristles. Seeds 3–6, usually light yellow-brown, sometimes brown to black. Fl. Sep–Jan, fr. Oct–Apr.

Forests, riversides, thickets, tall scrub, roadsides; to 1700 m. Guizhou, Hainan, Yunnan [widely distributed in the tropics].

Mucuna pruriens var. *pruriens* is distinctive in its small linear often S-shaped fleshy legume densely covered with irritant orange-brown bristles. It is often confused with *M. bracteata*, which differs in the acute leaflets with robust prominent veins less hairy abaxially than

the leaf surface, the inflorescences with bracts or scars of flowerless nodes in lower part, and the almost straight legume.

16b. *Mucuna pruriens* var. *utilis* (Wallich ex Wight) Baker ex Burck, Ann. Jard. Bot. Buitenzorg 11: 187. 1893.

蠶豆 li dou

Mucuna utilis Wallich ex Wight, Icon. Pl. Ind. Orient. 1: 280. 1840; *Carpogon niveum* Roxburgh; *Macranthus cochinchinensis* Loureiro; *Mucuna atrocarpa* F. P. Metcalf; *M. capitata* Wight & Arnott; *M. cochinchinensis* (Loureiro) A. Chevalier; *M. deeringiana* (Bort) Merrill; *M. martini* H. Léveillé & Vaniot; *M. nivea* (Roxburgh) Candolle; *Stizolobium deeringianum* Bort.

Stems with sparse long fine spreading hairs. Terminal leaflet with length:width ratio only ca. 1.5:1; lateral leaflets often markedly larger than terminal, to 20 cm. Inflorescence with sparse or dense soft adpressed hairs. Calyx with dense long pale hairs. Young legume green, linear but irregularly swollen around seeds, to 2 cm wide in parts, densely covered with silky hairs, with 1 or 2 prominent ribs. Seeds up to 8, white, light yellow-brown, or black, sometimes with streaks or spots; hilum yellowish white, ca. 7 mm. Fl. Oct, fr. Nov.

Cultivated. Guangdong, Guangxi, Guizhou, Hainan, Hubei, Sichuan, Taiwan [probably domesticated in India; cultivated in tropics and subtropics of Asia].

Mucuna pruriens var. *utilis* is a cultivated plant very similar to *M. pruriens* var. *pruriens* but distinctive in the misshapen silky-hairy legume entirely lacking irritant bristles and the lateral leaflets, which are often much larger than the terminal one.

This taxon is used for food, herbage, and green fertilizer.

17. *Mucuna incurvata* Wilmot-Dear & R. Sa, **sp. nov.**

喙瓣蠶豆 hui ban li dou

Type: China. Yunnan, "Che Li Dist., Ban-chiou Chian" [Jinghong County], Oct 1936, C. W. Wang 79571 (holotype, PE; isotype, A).

Paratypes: C. W. Wang 79233 (A, PE).

Mucunae prurienti similis sed lobis lateralibus calycis duplo longioribus c. 6 mm (nec 2–4 mm tantum) longis atque multo latioribus 4–5 mm (nec 2–3 mm tantum) latis, calyce extus setulas multo tenuiores ferenti, carina ad apicem multo magis incurvata atque per 1 cm longitudinis indurata et foliis infra cauleque pilos longiores ferentibus differt.

Twining vines. Young stems with dense spreading or adpressed long fine golden hairs. Leaves ca. 29 cm; petiole 13–15 cm with short adpressed fine pale hairs; stipels robust, tapering to tip, 2–4 mm; leaflets thinly papery or membranous, adaxially with abundant fine short pale adpressed hairs giving shiny appearance, abaxially with similar denser longer (ca. 1 mm) hairs but with veins dark and conspicuously less pubescent, lateral veins 5 or 6 pairs, slender, straight or slightly curved, running right into margin; terminal leaflet elliptic or rhombic-ovate to rhombic-obovate, ca. 11 × 7 cm, base broadly cuneate

to rounded, apex broadly acute to broadly rounded; lateral leaflets 9.5–11.5 cm, width ratio of abaxial to adaxial halves 2–2.5:1, abaxial half with base ± truncate. Inflorescence axillary, length and number of nodes unknown; pedicels 3–4 mm, densely adpressed hairy; bracts unknown. Calyx with dense soft adpressed pale hairs and fine golden bristles; tube ca. 6 × 10 mm; lateral 2 lobes broadly triangular, ca. 6 × 4–5 mm, lowest broadly triangular, 8–10 × 4–5 mm. Corolla deep purple; standard ca. 2.2 cm, ca. 1/2 of keel length; wings ca. 4 × 1.4 cm; keel 4–4.5 cm, apex markedly incurved clawlike and horny to ca. 1 cm. Ovary narrowly cylindrical, tapering to apex; ovules ca. 4. Mature fruit unknown.

• Mixed forests; 800–900 m. S Yunnan (Jinghong).

This new species is *Mucuna* "sp. A" of Wilmot-Dear (Kew Bull. 39: 64. 1984). Known only from the two gatherings cited, it is similar to *M. pruriens* but differs in having lateral calyx lobes twice as long, all calyx lobes much broader, corolla with a much more incurved and clawlike keel, longer hairs on the stem and leaves abaxially, and much finer bristles on the calyx.

18. *Mucuna bracteata* Candolle, Prodr. 2: 406. 1825.

黄毛蠶豆 huang mao li dou

Twining vines. Stems glabrous or with dense short pale adpressed hairs. Leaves 14–30(–40) cm; petiole 6–11 cm; stipels 2–5 mm, robust; leaflets thickly papery or almost leathery, adaxially sparsely or densely hairy with hairs denser on veins, abaxially densely hairy with hairs sparser on veins, rarely glabrous on both sides, lateral veins 5–7 pairs, prominent and conspicuous, straight and running into margin; terminal leaflet rhombic or sometimes rhombic-obovate or broadly ovate, 7–14 × 5.6–11(–13) cm, base broadly cuneate to rounded, apex acute or slightly acuminate; lateral leaflets 7–14 × 4–9 cm, width ratio of abaxial to adaxial halves 2–3:1, base on abaxial side truncate. Inflorescence axillary, 18–41 cm, with usually more than 12 flowering nodes always clustered in upper 2/3 of inflorescence; lower part of inflorescence axis with many bracts or their scars; bracts and bracteoles persistent at flowering and often fruiting time, hairy, bracts obovate to lanceolate or linear-lanceolate; pedicels 4–7 mm, densely short spreading hairy and often with longer fine bristles. Calyx densely clothed with soft hairs and yellow-brown irritant bristles; tube 4–7 × 7–10 mm; lateral 2 lobes 2–4 mm, lowest 5–6 mm. Corolla deep purple; standard 1.6–2.3 cm; wings 2.5–3.3 cm × 6–8 mm; keel 2.5–4.3 cm. Legume linear, not or slightly swollen around seeds, straight or slightly downcurved, 6–9 × 1.2–1.6 cm, fleshy, clothed with dark brown irritant hairs. Seeds 3–6, brown or black, usually with pinkish brown marks, ellipsoidal, ca. 9 × 6 mm, ca. 4 mm thick; hilum ca. 5 mm.

Forests, grasslands, roadsides, by rivers; 600–2000 m. Guangdong, Hainan, Yunnan [Laos, Myanmar, Thailand, Vietnam].

This species is extremely similar to *Mucuna pruriens* and is only distinguished by the thickly textured robust-veined ovate-rhombic leaflets with indumentum abaxially conspicuously sparser on the veins than on the leaf surface, the lower part of the inflorescence with many flowerless nodes with scars or persistent bracts, and the almost straight legume.

89. SPATHOLOBUS Hasskarl, Flora 25(2, Beibl.): 52. 1842.

密花豆属 mi hua dou shu

Chen Dezhaio (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Woody climbing shrubs. Leaves pinnately 3-foliolate; stipules small, caducous; stipels persistent or deciduous. Panicles axillary or terminal. Flowers small and numerous, usually few clustered at nodes of rachis or branches; bracts and bracteoles small. Calyx campanulate or terete, usually with short teeth, 2-lipped; upper 2 teeth connate into entire or emarginate upper lip, lower lip with 3 teeth; teeth ovate, triangular, or lanceolate. Corolla exserted; petals all clawed; standard ovate or suborbicular, shorter than wings, base not appendaged, apex emarginate or lobed; wings oblong, obovate-oblong, or subspatulate, base sometimes auriculate, apex obtuse or rounded; keel shorter or longer than wings, nearly straight, base sometimes auriculate, apex obtuse. Stamens diadelphous; vexillary stamen free; anthers elliptic or suborbicular, equal in size or 5 larger and 5 smaller. Ovary shortly stipitate or sessile, 2-ovuled; style slightly incurved, glabrous or hairy; stigma small, terminal, capitate. Legumes sessile or stipitate, falcate or oblong, compressed, reticulate, densely puberulent or velutinous, thicker at top and 1-seeded, dehiscent only at seed bearing apex when mature, lower part indehiscent. Seed flat.

About 30 species: tropical Asia; ten species (seven endemic) in China.

- 1a. Anthers unequal in size, 5 larger and 5 smaller.
- 2a. Terminal and lateral leaflets equal in shape or nearly so, apex rounded or subtruncate, with short awn, lateral veins straight.
- 3a. Leaflets obovate, base broadly cuneate or obtuse; wings subspatulate, like keel auriculate on one side 7. *S. varians*
- 3b. Leaflets narrowly obovate or oblanceolate, base narrowly cuneate; wings oblong, base biauriculate; keel with an obtuse auricle 8. *S. biauritus*
- 2b. Terminal and lateral leaflets unequal in shape, apex rounded and mucronate, lateral veins slightly curved or arched.
- 4a. Rachis of panicles elongated, longer than branches; wings oblong, base obliquely truncate on both sides, with small rounded auricle on one side; keel base truncate and without auricle on lower side, upper side with small, rounded auricle at base; leaflets ca. 27 × 13.5 cm 9. *S. gengmaensis*
- 4b. Rachis of panicles not elongated, shorter than branches; wings obovate-oblong, like keel with long obtuse auricle on one side at base; leaflets 11–15 × 5–7.5 cm 10. *S. uniauritus*
- 1b. Anthers equal or nearly equal in size.
- 5a. Terminal and lateral leaflets equal in shape or nearly so, lateral ones symmetric or nearly so; corolla purplish red.
- 6a. Leaflets 5–9.5 × 2–4 cm, sparsely puberulent abaxially; petiolules strigose; wings obovate-oblong, base with an acute auricle on one side; keel shorter than wings, falcate-oblong, base truncate, without auricle 1. *S. sinensis*
- 6b. Leaflets 7.5–13 × 3–6 cm, glabrous on both surfaces or ± puberulent abaxially; petiolules glabrous or slightly puberulent; wings and keel oblong, subequal in length, base with rounded auricles on both sides 2. *S. harmandii*
- 5b. Terminal and lateral leaflets conspicuously unequal in shape, lateral ones asymmetric; corolla white, red, or purple before flowering, becoming white in full bloom.
- 7a. Calyx teeth rounded or slightly obtuse at apex, to 1 mm, 2–3 × shorter than calyx tube; leaflets often with tufts of hairs in axils of veins abaxially 3. *S. suberectus*
- 7b. Calyx teeth acute or long acuminate at apex, 2–2.7 mm, as long as or slightly shorter than calyx tube; leaflets not with tufts of hairs abaxially.
- 8a. Calyx teeth lanceolate, as long as calyx tube; corolla white; standard 2-lobed at apex 6. *S. pulcher*
- 8b. Calyx teeth triangular, slightly shorter than calyx tube; corolla red or purple before flowering, becoming pinkish white or white in full bloom; standard emarginate at apex.
- 9a. Lateral veins of leaflets usually not branched, tertiary veinlets often transverse; corolla red before flowering, becoming pinkish white or white in full bloom; standard ovate-triangular; keel shorter than standard and wings 4. *S. parviflorus*
- 9b. Lateral veins of leaflets usually branched, tertiary veinlets forming a network; corolla purple before flowering, becoming white in full bloom; standard suborbicular; keel longer than standard and wings or as long as wings 5. *S. discolor*

1. *Spatholobus sinensis* Chun & T. C. Chen, Acta Phytotax. Sin. 7: 31. 1958.

红血藤 hong xue teng

Woody climbers. Young branchlets purplish brown,

sparsely puberulent, glabrescent. Stipels subulate, 3–4 mm, persistent; petiolules densely strigose; leaflets equal in shape or nearly so, oblong-elliptic, terminal leaflet 5–9.5 × 2–4 cm, lateral smaller, leathery, sparsely puberulent abaxially, glabrous and shiny adaxially, midrib prominent, impressed adaxially,

raised and densely brownish strigose abaxially, lateral veins and veinlets slender, slightly raised on both surfaces, base rounded, apex abruptly contracted to a slightly blunt mucro. Panicles usually axillary, 5–10 cm, densely brownish strigose; bracts and bracteoles subulate, ca. 1 mm. Calyx ca. 4 mm, subequal to pedicel in length, densely strigose on both sides; teeth ovate, 1.5–2 mm, as long as tube, upper 2 teeth \pm connate. Corolla purplish red; standard orbicular, 5–5.5 \times 6–6.5 mm, apex 2-parted, claw ca. 2 mm; wings obovate-oblong, ca. 5 mm, base with short acute auricle on one side, claw ca. 2.5 mm; keel falcate, oblong, ca. 3.5 mm, apex rounded, base truncate, without auricle, claw ca. 2.5 mm. Anthers subglobose, equal in size. Ovary sessile, densely strigose along ventral suture, other parts pilose or subglabrous. Legumes obliquely oblong, 6–9 cm, 2–2.5 cm wide from middle downward, narrower in upper part, brownish villous, especially on beak and 2 sutures; stipe 1–3 mm or absent. Seeds blackish, dull, oblong, ca. 1.5 \times 0.8 cm. Fl. Jun–Jul, fr. Jan.

• Wet areas in dense forests, valleys at low elevation. S Guangdong, SW Guangxi, Hainan.

2. *Spatholobus harmandii* Gagnepain, Notul. Syst. (Paris) 2: 368. 1913.

光叶密花豆 *guang ye mi hua dou*

Woody climbers. Young branchlets puberulent, glabrescent. Stipels subulate, 2–3 mm; petiolules 3–5 mm, glabrous or sparsely hairy; leaflets equal in shape, oblong, elliptic, or broadly obovate, 7.5–13 \times 3–6 cm, leathery to thickly leathery, glabrous or \pm puberulent abaxially, glabrous and shiny adaxially, midrib raised abaxially, flat or slightly impressed adaxially, lateral veins slightly raised on both surfaces, veinlets obscure, base rounded, apex acuminate or rounded and with a short blunt mucro. Panicles axillary, solitary or 2 or 3 fascicled, sparsely brownish puberulent or glabrescent. Pedicels as long as or slightly shorter than calyx; bracteoles linear, caducous. Calyx ca. 4 mm; teeth bluntly triangular, 1.5–2 mm, sparsely puberulent outside, slightly hairy inside. Corolla purplish red; standard orbicular, 5–6 mm in diam., apex emarginate; wings and keel oblong, subequal in length, apex rounded, base with a rounded auricle on one side. Anthers equal in size. Ovary sessile, hairy. Legumes 8–9 cm, 2.2–2.5 cm wide in lower part, 1.6–1.8 cm wide in upper part, adpressed brownish puberulent, apex obtuse, without stipe. Seeds blackish, dull, oblong or narrowly elliptic, 1.9–2.9 \times 1–1.3 cm. Fl. Mar, fr. Jun–Jul.

Sparse forests, streamsides. Hainan (Baisha, Danxian) [Laos, Vietnam].

3. *Spatholobus suberectus* Dunn, J. Linn. Soc., Bot. 35: 489. 1903.

密花豆 *mi hua dou*

Woody climbers, shrubby when young. Leaves papery or subleathery; stipels subulate, 3–6 mm; petiolules 5–8 mm, puberulent or glabrous; leaflets subglabrous or slightly puberulent, with tufts of hairs in axils of veins abaxially, lateral veins 6–8 pairs, slightly curved; terminal leaflet symmetric, broadly elliptic or broadly obovate to suborbicular, 9–19 \times 5–14 cm, base broadly cuneate, apex abruptly contracted to shortly ob-

tusely caudate; lateral leaflets asymmetric, as broad as or slightly narrower than terminal one, base broadly cuneate or rounded. Panicles axillary or at apex of branchlets, to 50 cm; rachis and pedicels yellowish brown puberulent; bracts and bracteoles linear, persistent. Calyx 3.5–4 mm; teeth 2–3 \times shorter than tube, lower 3 with apex rounded or slightly obtuse, less than 1 mm, upper 2 slightly longer, \pm connate, densely yellowish brown puberulent outside, silvery gray hairy inside. Corolla whitish; standard orbicular, 4–4.5 \times 5–5.5 mm, apex emarginate, base broadly cuneate, claw 2–2.5 mm; wings obliquely cuneate-oblong, 3.5–4 mm, as keel base with an acute auricle on one side, claw 3–3.5 mm; keel obovate, ca. 3 mm. Anthers globose, equal in size or nearly so. Ovary subsessile, strigose in lower part. Legumes subfalcate, 8–11 cm, densely brownish velutinous; stipe 4–9 mm. Seeds oblong, ca. 2 \times 1 cm; testa purplish brown, thinly crustaceous, shiny. Fl. Jun, fr. Nov–Dec.

• Open or dense forests or scrub, mountain slopes, valleys; 800–1700 m. Fujian, Guangdong, Guangxi, Yunnan.

The stems are used medicinally.

4. *Spatholobus parviflorus* (Roxburgh ex Candolle) Kuntze, Revis. Gen. Pl. 1: 205. 1891.

显脉密花豆 *xian mai mi hua dou*

Butea parviflora Roxburgh ex Candolle, Prodr. 2: 415. 1825; *Spatholobus roxburghii* Benth var. *denudatus* Baker.

Woody climbers. Branchlets subglabrous. Petiole 9–13 cm, puberulent; stipels subulate, ca. 1.5 mm; petiolules 5–6 mm, thick, puberulent; leaflets leathery, slightly puberulent abaxially, glabrous adaxially, lateral veins 7–9 pairs, usually not branched, tertiary veins transverse, quaternary veins slender, reticulate; terminal leaflet obovate or broadly elliptic, 14–17 \times 9.5–12 cm, rounded at both ends or slightly narrowed at base; lateral leaflets asymmetric, broadly ovate, 12–16 \times 6.5–10 cm, base rounded, apex obtuse. Inflorescence 30–40 cm; rachis puberulent. Calyx 3–4 mm, puberulent. Corolla white or pinkish white; standard broadly ovate, 5–6 \times 5.5–8 mm, apex emarginate, base truncate, claw 2–3 mm; wings 5–7.5 mm, auriculate, claw 3–4 mm; keel 4–5 mm. Ovary tomentose. Legumes falcate-oblong, 12–14 cm, thick, subwoody, apex rounded, densely brownish velutinous; stipe terete, 1.3–1.7 cm, densely velutinous. Seeds orbicular or reniform; testa brownish red. Fr. Feb–Mar.

Slopes, open forests or thickets. W Yunnan (Luxi) [Bangladesh, Cambodia, India, Laos, Myanmar, Sri Lanka, Thailand, Vietnam].

5. *Spatholobus discolor* C. F. Wei, Bull. Bot. Res., Harbin 5(2): 49. 1985.

变色密花豆 *bian se mi hua dou*

Climbing shrubs. Branchlets blackish brown, with numerous lenticels; branchlets, petiolules, panicles, and calyces hispidulous with yellowish brown hairs. Petiole 2.5–4.5 cm, subglabrous; stipels subulate, stiff, ca. 1.5 mm; petiolules 4–5 mm, glabrescent; leaflets subleathery, yellowish brown hispidulous abaxially, subglabrous adaxially, lateral veins 5 or 6 pairs, often branched, tertiary veins often reticulate; terminal leaflet obovate or obovate-elliptic, 6–12.5 \times 4.2–9.6 cm, symmetric, base ob-

tuse, apex rounded; lateral leaflets narrowly elliptic or oblong, 6.5–11 × 4–7.3 cm, asymmetric, rounded at both ends or base slightly obtuse. Panicles terminal, 13–27 cm, many flowered; bracts narrowly triangular, 1.5–2 mm; bracteoles triangular, ca. 1 mm. Calyx 4–5 mm; teeth 1.5–2 mm, upper 2 ± connate, lower 3 triangular, apex acute, middle 1 slightly longer. Corolla purplish before flowering, becoming whitish in full bloom, membranous; standard suborbicular, 7–7.5 mm in diam., apex emarginate, claw 1–1.5 mm; wings narrowly elliptic, 7.5–8 mm, margin of lower part emarginate on one side, other side with short obtuse auricle at base, claw ca. 1.5 mm; keel obovate-oblong, 7.5–8 mm, curved in upper part, ± connate at back, apex rounded, base with acute auricle on one side, claw 2–2.5 mm. Anthers elliptic, equal in size, ca. 0.7 mm. Ovary narrowly oblong, 5–7 mm, slightly compressed, shortly stipitate. Legumes not seen. Fl. Sep.

• Mountain slopes, secondary forests or thickets; ca. 1700 m. S Yunnan (Lüchun).

6. *Spatholobus pulcher* Dunn, J. Linn. Soc., Bot. 35: 489. 1903.

美丽密花豆 mei li mi hua dou

Climbing shrubs. Branchlets blackish brown, with sparse lenticels; branchlets, petioles, petiolules, and inflorescences hirsute with ferruginous hairs. Stipels subulate, ca. 2.5 mm; terminal leaflet obovate or broadly elliptic, 3–13 × 3–8.6 cm, lateral ones slightly smaller, ovate or oblong, subleathery, ferruginous hirsute abaxially, subglabrous adaxially, lateral veins 5–7 pairs, slightly curved, veinlets reticulate, base rounded, asymmetric, apex rounded or with short blunt mucro. Panicles with congested flowers; bracts and bracteoles persistent; bracteoles narrowly lanceolate, ca. 1.5 mm. Calyx 5–5.5 mm; teeth as long as tube or nearly so, 2–2.7 mm, upper ovate, apex slightly acute, lower 3 lanceolate, apex long acuminate, middle one longest. Corolla white; standard suborbicular, ca. 5.5 × 5 mm, apex emarginate, base cuneate, claw 3–3.5 mm; wings obovate-oblong, 4.5–5 mm, base with acute auricle ca. 1 mm on one side, other side without auricle or occasionally with slightly obtuse auricle, claw 3–3.5 mm; keel oblong, ca. 4 mm, slightly curved at back, base with a broad and acute auricle ca. 0.5 mm on one side, claw ca. 3.5 mm. Anthers subglobose, equal in size. Ovary sessile, ferruginous hirsute. Legumes falcate, 7.5–9.5 cm, base rounded and incurved, upper part attenuate to a slightly curved beak. Seed oblong, immature. Fl. Jan–Feb, fr. May–Jun.

• Open forests, mountain slopes, valleys, near roads, often climbing on trees; 700–1600 m. SW Yunnan.

7. *Spatholobus varians* Dunn, J. Linn. Soc., Bot. 35: 490. 1903.

云南密花豆 yun nan mi hua dou

Climbing shrubs. Branchlets strigose when young, glabrescent. Petiole 6–9 cm; stipels subulate, 5–7 mm; petiolules 4–5 mm; leaflets subequal, obovate, 7–13 × 4–6.5 cm, leathery, puberulent and strigose along veins abaxially, sparsely strigose adaxially, lateral veins 8 or 9 pairs, straight or arched toward margin, raised on both surfaces, veinlets reticulate, base broadly cuneate or obtuse, apex subtruncate, mucronate, strigose. Pani-

cles axillary or terminal, 15–20 cm; rachis and pedicels puberulent; bracts caducous; bracteoles linear, ca. 1 mm; pedicels 3.5–4.5 mm, slightly shorter than calyx. Calyx 5–5.5 mm, puberulent on both sides; upper 2 teeth ± connate, lower 3 ovate-lanceolate, 2.5–2.7 mm. Corolla purple; standard orbicular, ca. 7 mm in diam., apex emarginate, base cuneate, claw ca. 2 mm; wings subspatulate, 5–5.5 mm, apex 3–3.5 mm wide, base with obtuse auricle on one side, claw 4.5–5 mm; keel oblong or slightly broadened in upper part, 3.5–4 mm, curved and slightly connate at back, apex rounded, with obtuse auricle on one side, claw ca. 4.5 mm. Anthers globose, 5 larger and 5 smaller. Ovary narrowly oblong, ca. 4.5 mm, puberulent; style hairy. Legumes 6–9 cm, apex slightly narrowed and curved, with short acute beak, not stipitate. Fl. spring.

Forests, mountain slopes; ca. 1600 m. Yunnan (Simao) [Myanmar, Thailand].

8. *Spatholobus biauritus* C. F. Wei, Bull. Bot. Res., Harbin 5(2): 51. 1985.

双耳密花豆 shuang er mi hua dou

Climbing shrubs. Petiole 5.5–6 cm, villous; stipels subulate, as long as or slightly shorter than petiolules; petiolules ca. 4 mm, strigose; leaflets subequal, narrowly obovate or oblanceolate, 7–9.5 × 3–4 cm, papery, puberulent and strigose along veins abaxially, sparsely strigose adaxially, lateral veins 8–10 pairs, straight or arched toward margin, raised and with conspicuously reticulate veinlets on both surfaces, base narrowly cuneate, apex rounded or subtruncate, mucronate. Panicles terminal, to 30 cm; rachis elongated; branches short and dispersed; bracts ovate-triangular, ca. 2 mm, caducous, apex acuminate; bracteoles linear, ca. 1 mm. Flowers purplish red; pedicels slightly shorter than calyx. Calyx 5–5.5 mm, hairy on both sides; teeth shorter than tube, upper 2 ± connate, lower 3 ovate, apex obtuse or slightly acute. Standard orbicular, 6–7 mm in diam., apex emarginate, base cuneate, claw ca. 4 mm; wings oblong, ca. 5.5 mm, base with a rounded auricle on upper side, with an oblong auricle on lower side, claw ca. 4 mm; keel shorter than wings, ca. 4 mm, base with an obtuse long auricle, claw 3.5–4 mm. Anthers subglobose, 5 larger and 5 smaller. Ovary narrowly oblong, 3–4 mm, subsessile. Legumes not seen. Fl. Apr.

• Forests, mountain slopes; ca. 1400 m. Yunnan (Jingdong).

9. *Spatholobus gengmaensis* C. F. Wei, Bull. Bot. Res., Harbin 5(2): 53. 1985.

耿马密花豆 geng ma mi hua dou

Climbing shrubs. Petiole terete, ca. 6.5 cm, subglabrous; stipels subulate, as long as or slightly shorter than petiolules; petiolules thick, 5–6 mm; leaflets large, terminal one obovate-oblong, ca. 27 × 13.5 cm, symmetric, lateral ones ovate-elliptic, slightly smaller than terminal, asymmetric, subleathery, glabrous abaxially, glabrous adaxially, except pilose on midrib and lateral veins, lateral veins 6 or 7 pairs, slightly curved, raised on both surfaces, apex rounded. Panicles axillary, ca. 27 cm; rachis and pedicels densely light brown puberulent; bracts narrowly lanceolate, ca. 2.5 mm; bracteoles linear, ca. 1 mm. Calyx 5–5.5 mm, puberulent on both sides; teeth 1.5–2 mm,

upper 2 ± connate, apex subtruncate or emarginate, lower 3 ovate, apex obtuse or slightly acute. Corolla red; standard suborbicular, ca. 6 mm in diam., apex emarginate, base cuneate, claw ca. 3 mm; wings oblong, 5–5.5 mm, long ciliate at base, together with keel apex rounded, base obliquely truncate on 2 sides, with a small rounded auricle on one side, claw ca. 4 mm; keel oblong, 3.5–4 mm, claw ca. 4 mm. Anthers subglobose, 5 larger and 5 smaller. Ovary narrowly oblong, ca. 4 mm, puberulent, sessile. Legumes not seen. Fl. Mar.

• Open forests or secondary forests, mountaintops. Yunnan (Gengma).

10. *Spatholobus uniauritus* C. F. Wei, Bull. Bot. Res., Harbin 5(2): 54. 1985.

单耳密花豆 dan er mi hua dou

Climbing shrubs. Branchlets terete, pilose. Petiole 5–10 cm; stipels subulate, as long as or slightly shorter than petioles; petiolules 4–5 mm; terminal leaflet elliptic or obovate-elliptic, 11–15 × 5–7.5 cm, symmetric, lateral ones as large as

terminal, narrowly ovate, asymmetric, thickly papery, puberulent and strigose along midrib and lateral veins abaxially, glabrous adaxially, lateral veins 8 or 9 pairs, raised on both surfaces, reticulate veinlets slender, conspicuous, base cuneate or subrounded, apex rounded, mucronate. Panicles axillary; rachis not elongated, shorter than branches, 5–10 cm; branches crowded, spreading, to 15 cm, densely yellowish brown puberulent. Flowers purple, crowded together. Calyx ca. 5 mm, yellowish brown puberulent on both sides; teeth 1.5–1.7 mm, upper 2 ± connate, emarginate, lower 3 ovate, apex obtuse or slightly acute. Standard suborbicular, 6–7 mm in diam., apex emarginate, base cuneate, claw ca. 2 mm; wings obovate-oblong, 5.5–6 mm, base with a long obtuse auricle on one side, claw ca. 3 mm; keel shorter than wings, nearly equal in shape, ca. 3.5 mm, base with a long obtuse auricle, claw ca. 3.5 mm. Anthers 5 larger and 5 smaller. Ovary narrow, sessile, ca. 3.5 mm. Legumes not seen. Fl. Mar.

• Dense forests in mountain regions; ca. 900 m. S Yunnan (Xishuangbanna).

90. *BUTEA* Roxburgh ex Willdenow, Sp. Pl. 3: 857, 917. 1802, nom. cons.

紫矿属 zi kuang shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Megalotropis Griffith; *Meizotropis* Voigt; *Plaso* Adanson.

Trees, climbing to erect shrubs, or perennial herbs. Leaves pinnately 3-foliolate; stipules small to medium-sized, caducous. Flowers large, orange-red or red, densely clustered in axillary or terminal racemes or panicles; bracts and bracteoles small, caducous. Calyx campanulate; teeth short, obtusely triangular, upper 2 connate into a broad entire or emarginate lip. Corolla medium-sized to large, exerted; petals subequal in size; standard ovate or lanceolate, apex acute, recurved, not appendaged; wings falcate, adherent to keel; keel longest, incurved, apex acute, back connate into a ridge. Stamens diadelphous; anthers uniform. Ovary sessile or shortly stipitate, 2-ovuled; style elongated, incurved, glabrous; stigma small, terminal. Legumes oblong, compressed, apex rounded, with 1 seed at top, empty and not dehiscent in lower part, often with stipe at base. Seed obovate; hilum small, estrophiolate.

Four or five species: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; three species (one endemic) in China.

Meizotropis, with two species, was recognized by Sanjappa (Bull. Bot. Surv. India 29: 199–225. 1989), as well as by Schrire (in Lewis et al., Legumes World, 408. 2005). A broader view of *Butea* is taken here, but the matter is in need of further study.

1a. Shrubs or perennial herbs, erect or scandent; leaflets 15–45 × 12–35 cm 3. *B. buteiformis*

1b. Trees or climbing shrubs; leaflets 6–17 × 4–15 cm.

2a. Leaflets glabrous adaxially, reticulate veins distinct; seed broadly reniform or reniform-orbicular,

ca. 2.7 cm, reddish brown; trees 1. *B. monosperma*

2b. Leaflets densely velutinous with whitish yellow hairs on both surfaces, much denser abaxially, reticulate

veins indistinct, areoles obscure; seed reniform, 2–2.2 cm, blackish brown; climbing shrubs 2. *B. braamiana*

1. *Butea monosperma* (Lamarck) Taubert in Engler & Prantl, Nat. Pflanzenfam. 3(3): 366. 1894.

紫矿 zi kuang

Erythrina monosperma Lamarck, Encycl. 2: 391. 1786;
Butea frondosa Roxburgh ex Willdenow, nom. illeg. superfl.

Trees, 10–20 m tall. Trunk to 30 cm d.b.h. Bark grayish black. Petiole ca. 10 cm, robust; stipels subulate, ca. 1.5 mm; petiolules robust, ca. 8 mm; leaflets unequal, thickly leathery, rough on both surfaces, puberulent along veins abaxially, glabrous adaxially, lateral veins 6 or 7 pairs, like midrib raised

abaxially, reticulate veins distinct and with conspicuous areoles abaxially; terminal leaflet broadly obovate or suborbicular, 14–17 × 12–15 cm, base broadly cuneate, apex rounded or emarginate; lateral leaflets narrowly ovate or oblong, 11.5–16 × 8.5–10 cm, asymmetric, base rounded, apex obtuse or emarginate. Racemes or panicles axillary or at nodes of leafless branches; rachis, pedicels, and calyx outside densely brown or blackish brown velutinous. Calyx 1–1.2 cm, densely silvery gray on both surfaces or light brown pubescent inside. Corolla orange-red, becoming yellow later, ca. 3 × as long as calyx; standard narrowly ovate, recurved, 4–4.5 cm; wings narrowly falcate, ca. 4 cm, like keel with rounded auricles at base; keel broadly falcate,

5–5.5 cm, connate into an arcuate ridge, densely silvery gray velutinous. Anthers oblong. Ovary densely velutinous. Legumes 12–15 × 3.5–4 cm, adpressed silvery gray puberulent, apex rounded; stipe 12–15 mm. Seed reddish brown, broadly reniform or reniform-orbicular, compressed, ca. 2.7 × 3.3–3.6 cm. Fl. Mar–Apr.

Forests, wet places, near roads, also cultivated. SW Guangxi (Ningming), S and SW Yunnan (Gengma, Xishuangbanna) [Bhutan, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

This species is one of the main host plants of lac insects. The red resin from the bark is used medicinally as an astringent.

2. *Butea braamiana* Candolle, Prodr. 2: 415. 1825.

绒毛紫矿^① rong mao zi kuang

Woody climbing shrubs. Old branches grayish brown, glabrous; young branchlets blackish brown, velutinous, with whitish yellow hairs. Petiole 10–13 cm; stipels subulate, ca. 3 mm, hairy; petiolules ca. 5 mm, like petiole densely velutinous with whitish yellow hairs; leaflets obovate-rhomboid, 6–8 × 4–6.5 cm, densely velutinous with whitish yellow hairs on both surfaces, especially on margin and abaxially, lateral veins 6–8 pairs, conspicuous on both surfaces, reticulate veins indistinct, areoles obscure abaxially, base rounded or broadly cuneate, apex emarginate or not; terminal leaflet (immature) ca. 6 cm from lateral ones. Racemes few flowered. Calyx light green. Legumes (immature) oblong, slightly curved, very compressed, 14–

17 × 3–4 cm, dorsal and ventral sutures densely velutinous with whitish yellow hairs; wing with reticulate veins, sparsely hairy; stipe ca. 1.5 cm, densely velutinous. Seed blackish brown, shiny, reniform, compressed, 2–2.2 × 3.3–3.5 cm. Fr. Jun–Jul.

• Yunnan (Xishuangbanna).

3. *Butea buteiformis* (Voigt) Grierson & D. G. Long, Notes Roy. Bot. Gard. Edinburgh 37: 346. 1979.

西藏紫矿^① xi zang zi kuang

Meizotropis buteiformis Voigt, Hort. Suburb. Calcutt. 239. 1845 [*"buteaeformis"*]; *Butea minor* Buchanan-Hamilton ex Baker; *B. xizangensis* X. Y. Zhu & Y. F. Du; *Megalotropis buteiformis* (Voigt) Griffith.

Shrubs or perennial herbs, up to 5 m tall. Stems erect or scandent, angular, pubescent with brownish hairs. Petioles 10–20 cm; leaflets broadly ovate-elliptic, 15–45 × 12–35 cm, sericeous with brownish hairs abaxially, appressed pubescent adaxially, lateral veins 10–12 pairs, reticulate veins distinct abaxially, base rounded or truncate, apex acute. Racemes or panicles many flowered. Calyx 6–8 mm, pubescent with brownish hairs. Corolla orange-red; standard broadly elliptic, recurved, ca. 1.5 cm; wings narrowly ovate, falcate, ca. 1.3 cm; keel ovate, ca. 1.7 cm. Legumes (4.5–)6–10 × 2–3 cm, tomentose with brownish hairs.

Dry valley slopes, open grasslands; 1800–2000 m. Xizang [Bangladesh, Bhutan, India, Myanmar, Nepal].

91. RHYNCHOSIA Loureiro, Fl. Cochinch. 2: 425, 460. 1790, nom. cons.

鹿藿属 lu huo shu

Sa Ren (萨仁); Michael G. Gilbert

Dolicholus Medikus.

Usually vines, creeping or twining, rarely erect shrubs or subshrubs. Leaves pinnately 3-foliolate; stipules usually caducous; stipels persistent or absent; leaflets usually with sessile glands abaxially. Inflorescence axillary, racemose, sometimes branched or 1-flowered. Bracts usually deciduous, rarely persistent. Calyx campanulate, 5-lobed, upper 2 lobes ± connate, lowest 1 longer. Corolla longer than calyx or short; standard circular or obovate, base with inflexed auricles, with or without appendage; wings and keels subequal, inflexed. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile or subsessile; ovules (1 or)2; style curved above middle, usually hairy at lower part; stigma terminal. Legume oblong, oblanceolate, obovoid-ellipsoid, obliquely orbicular, sickleform, or ellipsoid, dehiscent, compressed or inflated, (1 or)2-seeded, not septate, apex always beaked. Seeds (1 or)2, usually suborbicular or reniform; hilum round, funicle in middle, strophiole small or absent.

About 200 species: worldwide; 13 species (five endemic) in China.

- 1a. Legume densely green or yellowish green tomentose.
 2a. Inflorescence densely 40–80-flowered; legume both tomentose and villous 1. *R. acuminatissima*
 2b. Inflorescence sparsely ca. 20-flowered; legume densely villous 2. *R. lutea*
 1b. Legume glabrous or pubescent.
 3a. Legume oblanceolate or obovate-orbicular to ellipsoid, length:width ratio more than 2:1.
 4a. Leaflet apex acuminate or shortly acuminate.
 5a. Terminal leaflet broadly ovate or circular-rhomboid, apex acuminate; flowers lax 12. *R. himalensis*
 5b. Terminal leaflet rhomboid, apex shortly acuminate; flowers dense 13. *R. kunmingensis*
 4b. Leaflet apex rounded or obtuse.
 6a. Stem slender, glabrous or sparsely pubescent; terminal leaflet 1.5–3 cm long and wide 9. *R. minima*
 6b. Stem robust, densely hairy; terminal leaflet 2–8 × 2.5–8 cm.
 7a. Terminal leaflet reniform or obovate, base slightly cordate or almost truncate 10. *R. yunnanensis*
 7b. Terminal leaflet circular-rhomboid, base rounded 11. *R. sericea*

- 3b. Legume obliquely orbicular, oblong, or obovate, length:width ratio less than 2:1.
- 8a. Legume obliquely orbicular, inflated; seed 1 3. *R. rufescens*
- 8b. Legume oblong or obovate, compressed; seeds usually 2.
- 9a. Terminal leaflet apex obtuse, rarely acute 4. *R. volubilis*
- 9b. Terminal leaflet apex acuminate or caudate-acuminate.
- 10a. Inflorescence slender, 1–7 cm 5. *R. acuminatifolia*
- 10b. Inflorescence robust, 5–27 cm.
- 11a. Stem tomentose and sticky with gland-tipped hairs 6. *R. viscosa*
- 11b. Stem villous or pubescent, gland-tipped hairs absent.
- 12a. Terminal leaflet lanceolate to ovate-lanceolate, both sides sparsely pubescent, apex caudate-acuminate; raceme branched; legume glabrous or almost glabrous 7. *R. chinensis*
- 12b. Terminal leaflet ovate, broadly elliptic, or rhomboid-ovate, both sides densely pubescent, apex acuminate or caudate-acuminate; raceme unbranched; legume pubescent 8. *R. dielsii*

1. *Rhynchosia acuminatissima* Miquel, Fl. Ned. Ind. 1: 171. 1855.

密果鹿藿 mi guo lu huo

Rhynchosia myriocarpa Quisumbing & Merrill.

Herbs. Stems twining, densely yellow or yellow-green pubescent, spotted with black glands. Leaves pinnately 3-foliolate; stipules ovate to lanceolate, 4–6 mm; petiole 6–10(–14) cm; stipels small, pyramidal; petiolules 3–5 mm, densely pubescent; leaflets ovate to broadly ovate-rhomboid, 5.5–12 × 4.5–8.5 cm, almost membranous, base rounded, slightly cordate, or almost truncate, apex long acuminate and curved; lateral leaflets much smaller, base oblique, both surfaces pubescent, basal veins 3. Raceme 10–15 cm, hairy, densely 40–80-flowered; peduncle 1.5–3 cm. Flowers 1.1–1.3 cm, usually paired or clustered at upper part of inflorescence; pedicels slender, 4–5 mm, pubescent. Calyx ca. 5 mm; lobes acute, unequal, ca. 2 mm. Corolla light purple; standard abaxially pubescent, with obvious callosity inside; keels obtuse. Ovary villous. Legume oblong, 1.7–2 × 0.6–0.7 cm, slightly curved, slightly constricted between seeds, densely tomentose and villous. Seeds usually 2, deep blue or black, lustrous, ovate, 4–6 × 3.5–4 mm. Fl. Mar–Apr, fr. after May.

Forests, shrubs; ca. 600 m. Hainan, Yunnan [Indonesia, Malaysia, Papua New Guinea, Philippines, Vietnam; Australia, Pacific islands (Solomon Islands)].

2. *Rhynchosia lutea* Dunn, J. Linn. Soc., Bot. 35: 491. 1903.

黄花鹿藿 huang hua lu huo

Herbs. Stems twining, slender to slightly robust, pubescent. Leaves pinnately 3-foliolate; stipules small, triangular, ca. 6 mm, deciduous; petiole 4–12 cm, sparsely pubescent; stipels small, bristlelike; petiolules 3–5 mm, densely pubescent; terminal leaflet rhomboid-circular, oblate-circular, or rarely subtriangular, 5–9.5 × 4.5–10 cm, papery, pubescent, with sparse light yellow glands, basal veins 3, base almost truncate or slightly cordate, apex abruptly caudate-acuminate; lateral leaflets much smaller, obliquely ovate. Raceme axillary, to more than 20 cm, ca. 20-flowered, rachis densely villous. Flowers ca. 2 cm. Calyx campanulate, ca. 5 mm, pubescent; lobes triangular to lanceolate, unequal, lower one longest. Standard circular, with accessory substance; keels inflexed, shorter than standard and longer than wings. Ovary 2-ovuled. Legume oblong or obovate-

oblong, 2–3 × ca. 1 cm, compressed, green, apex with small curved mucro, densely villous, usually with constriction between seeds. Seeds 1 or 2, purplish black or dark brown, sub-orbicular, compressed, 5–7 mm wide; hilum short, circular. Fr. Sep–Oct.

• Rocky mountains; 1100–1300 m. Yunnan (Mengzi).

3. *Rhynchosia rufescens* (Willdenow) Candolle, Prodr. 2: 387. 1825.

淡红鹿藿 dan hong lu huo

Glycine rufescens Willdenow, Neue Schriften Ges. Naturf. Freunde Berlin 4: 222. 1803.

Shrubs, creeping, climbing or almost erect. Stems zigzag, pubescent. Leaves pinnately 3-foliolate; stipules small, linear-lanceolate, 2–4 mm, deciduous; petiole 2–4.5 cm, hairy; petiolules short, 1–2 mm; terminal leaflet ovate to ovate-elliptic, 2–5.5 × 1.2–2.5 cm, both surfaces pubescent, with dense sessile glands, basal veins 3, base rounded, apex obtuse or shortly mucronate; lateral leaflets slightly smaller, obliquely ovate. Raceme axillary, slender, 2–4 cm, 2–6-flowered, densely pubescent; bracts small, deciduous; peduncle usually 2–5 mm, hairy. Flower ca. 1 cm. Calyx green, ca. 1 cm, densely pubescent, deeply lobed to base; lobes oblong. Corolla purple to yellow, longer than calyx. Legume obliquely orbicular, inflated, equal or subequal to calyx, apex slightly curved, acute, pubescent, brown and dehiscent when mature. Seed 1, black, transversely elliptic, ca. 3.5 × 3 mm, with succulent strophiole. Fl. Apr–Oct, fr. Oct–Feb. $2n = 22$.

Valleys; 300–700 m. Guangxi, Yunnan [Cambodia, India, Indonesia, Malaysia, Sri Lanka].

4. *Rhynchosia volubilis* Loureiro, Fl. Cochinch. 2: 460. 1790.

鹿藿 lu huo

Herbs. Stems twining, ribbed, densely gray to light yellow villous. Leaves pinnately or sometimes almost digitately 3-foliolate; stipules small, lanceolate, 3–5 mm, pubescent; petiole 2–5.5 cm; petiolules 2–4 mm; leaflets papery; terminal leaflet rhomboid or obovate-rhomboid, 3–8 × 3–5.5 cm, both surfaces gray or light yellow villous, with yellow-brown sessile glands, basal veins 3, base rounded or broadly cuneate, apex obtuse or acute, usually mucronate; lateral leaflets smaller, usually oblique. Racemes 1–3 per axil, 1.5–4 cm; peduncle ca. 2 mm.

Flowers ca. 1 cm, slightly clustered. Calyx campanulate, ca. 5 mm; lobes lanceolate, exterior pubescent and with glands. Corolla yellow; standard subcircular, with wide and inflexed auricles; wings obovate-oblong, base with 1 long auricle at one side; keels beaked. Ovary hairy, with clustered glands. Legume reddish purple, oblong, 1–1.5 × ca. 0.8 cm, extremely compressed, slightly constricted between seeds, sparsely hairy to almost glabrous, apex with small beak. Seeds usually 2, black, lustrous, elliptic or subreniform. Fl. May–Aug, fr. Sep–Dec. $2n = 22$.

Mountains south of the Chang Jiang; 200–1000 m. Guangdong, Hainan, Taiwan [Japan, Korea, Vietnam].

This plant is used medicinally.

5. *Rhynchosia acuminatifolia* Makino, J. Jap. Bot. 2: 4. 1920.

渐尖叶鹿藿 jian jian ye lu huo

Rhynchosia volubilis Loureiro var. *acuminata* Maximowicz.

Herbs. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, ovate, membranous, deciduous; petiole 2.5–7 cm, pubescent; stipels bristlelike; petiolules short; terminal leaflet ovate or broadly elliptic, 4–8 × 2–5.5 cm, almost membranous, both surfaces sparsely villous, abaxial surface with sessile glands, basal veins 3, lateral veins ca. 3 pairs, base rounded, apex acuminate or long acuminate; lateral leaflets obliquely ovate, smaller. Raceme axillary, slender, usually ± as long as petiole, pubescent; peduncles slender, 5–10 mm. Flowers clustered, ca. 1 cm. Calyx campanulate, 3–5 mm; lobes triangular, much shorter than tube, lower one longer, sparsely pubescent. Corolla yellow, longer than calyx, petals subequal; standard subcircular, base with inflexed auricles; keel apex with long beak. Ovary linear, 2-ovuled; style long and curved. Legume red, oblong, compressed, 1.2–1.5 × ca. 0.9 cm, apex with small beak. Seeds 1 or 2, usually black, reniform-orbicular, ca. 5 mm in diam. Fl. and fr. Jul–Oct.

Forests. Anhui, Guizhou, Jiangsu, Zhejiang [Japan].

6. *Rhynchosia viscosa* (Roth) Candolle, Prodr. 2: 387. 1825.

粘鹿藿 nian lu huo

Glycine viscosa Roth, Nov. Pl. Sp. 349. 1821.

Herbs. Stems twining, robust and slightly woody, densely gray viscous pubescent and with sticky glandular hairs. Leaves pinnately 3-foliolate; stipules small, usually lanceolate, 5–8 mm, pubescent, always persistent; petiole 4–9 cm, densely pubescent and with sticky glandular hairs; petiolules 1.6–2.5 cm; leaflets papery; terminal leaflet broadly elliptic or rhomboid-elliptic, 5–8 × 3.5–5 cm, both surfaces villous, abaxial surface with dense small yellow-brown sessile glands, basal veins 3, lateral veins 3–5 pairs, base rounded, apex usually acute, caudate-acuminate; lateral leaflets obliquely ovate to obliquely elliptic. Racemes solitary or a few clustered in axil, 7–22 cm; peduncle 2.8–3.9 cm, densely villous and glandular hairy. Calyx ca. 8 mm, exterior with glands; upper lobes triangular. Corolla ca. 2 × as long as calyx. Legume oblong, ca. 2 × 1 cm, pubescent, straight, apex with small beak, narrowed to both ends. Seeds 2, black, reniform, ca. 5 × 4 mm. $2n = 22$.

Roadsides. Yunnan [India, Indonesia, Malaysia, Nepal, Sri Lanka, Thailand; Africa (widespread), Madagascar].

The Chinese material belongs to *Rhynchosia viscosa* var. *viscosa*. Verdcourt (Kew Bull. 25: 82–86. 1971) recognized three further varieties, all almost entirely restricted to Africa.

7. *Rhynchosia chinensis* H. T. Chang ex Y. T. Wei & S. K. Lee, Guihaia 5: 171. 1985.

中华鹿藿 zhong hua lu huo

Herbs. Stems twining or climbing, densely pubescent or sometimes sparsely villous. Leaves pinnately 3-foliolate; stipules small, ovate, ca. 4 mm, sparsely pubescent, deciduous; petiole 4–10 cm, densely pubescent; stipels bristlelike; petiolules ca. 3 mm, densely pubescent; leaflets thinly leathery; terminal leaflet lanceolate to ovate-lanceolate, 9–15 × 3.5–8 cm, sparsely pubescent, abaxial surface with yellow-brown sessile glands, basal veins 3, lateral veins 3–5 pairs, base broadly cuneate or rounded, margin slightly sinuate, apex caudate-acuminate; lateral leaflet smaller, obliquely ovate. Raceme axillary, branched, up to 27 cm; bracts ovate, ca. 4 mm, deciduous; peduncle 1–3 cm, densely pubescent. Flowers small, ca. 1.1 cm, sparse; pedicels slender, 4–7 mm, pubescent. Calyx campanulate, ca. 5 mm, 5-lobed; lobes triangular, shorter than tube, sparsely hairy or almost glabrous. Corolla yellow, petals obviously stipitate, almost glabrous; standard ovate-orbicular or almost orbicular, ca. 1 cm, base with 2 slender auricles and accessory callosity; wings extremely narrow, apex acute, base with 2 auricles, one longer; keels slightly curved, with long beak. Ovary sparsely hairy; style linear, glabrous; stigma capitate. Legume reddish purple, oblong, ca. 1.5 × 1 cm, compressed, glabrous or almost glabrous, slightly constricted between seeds, with small beak. Seeds blackish purple, suborbicular, ca. 4 mm in diam. Fl. and fr. summer and autumn. Fr. Sep.

• Mountains; ca. 600 m. Guangdong, Guangxi, Guizhou, Jiangxi.

8. *Rhynchosia dielsii* Harms, Bot. Jahrb. Syst. 29: 418. 1900.

菱叶鹿藿 ling ye lu huo

Herbs. Stems twining, slender, usually densely yellowish brown villous or sometimes pubescent. Leaves pinnately 3-foliolate; stipules small, lanceolate, 3–7 mm; petiole 3.5–8 cm, pubescent; stipels bristlelike, ca. 2 mm; petiolules 1–2 mm, pubescent; terminal leaflet ovate, ovate-lanceolate, broadly elliptic, or rhomboid-ovate, 5–9 × 2.5–5 cm, densely pubescent, abaxial surface with sessile glands, basal veins 3, base rounded, apex acuminate or caudate-acuminate; lateral leaflets smaller, obliquely ovate. Raceme axillary, unbranched, 7–13 cm, pubescent; bracts lanceolate, 5–10 mm, deciduous; peduncle 4–6 mm. Flowers sparse, 8–10 mm. Calyx 5-lobed; lobes triangular, lower one longer, densely pubescent. Corolla yellow, petals all stipitate; standard obovate-circular, base with inflexed auricles at 2 sides; wings narrowly oblong, with 2 auricles, one longer and inflexed; keels auriculate, longer than or subequal to standard. Legume oblong or obovate, 1.2–2.2 × 0.8–1 cm, compressed, reddish purple when mature, pubescent, slightly constricted between seeds. Seeds 2, suborbicular, ca. 4 mm in diam. Fl. Jun–Jul, fr. Aug–Nov.

• Mountains, roadsides; 600–2100 m. Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan.

This plant is used medicinally.

9. *Rhynchosia minima* (Linnaeus) Candolle, Prodr. 2: 385. 1825.

小鹿藿 xiao lu huo

Dolichos minimus Linnaeus, Sp. Pl. 2: 726. 1753; *Dolichos flavus* Medikus, nom. illeg. superfl.

Herbs, annual. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, lanceolate, usually 1–2 mm; petiole 1–4 cm, glabrous or sparsely pubescent; stipels extremely small; petiolules extremely short; leaflets ± membranous; terminal leaflet rhomboid-circular, 1.5–3 × 1.5–3 cm, sometimes wider than long, glabrous or sparsely villous, abaxially densely glandular, basal veins 3, apex obtuse or rounded, rarely shortly acute; lateral leaflets subequal to terminal leaflet or shorter, obliquely circular. Raceme 5–11 cm, axis slender, sparsely pubescent; bracts small, lanceolate, deciduous. Flowers 6–8 mm, slightly curved; pedicel extremely short. Calyx ca. 5 mm, sparsely pubescent; lobes lanceolate, slightly shorter than tube, lower one longer. Corolla yellow, longer than calyx, petals subequal; standard obovate-circular, base with 2 acute auricles; wings obovate-elliptic, auriculate; keels slightly curved, apex obtuse. Legume oblanceolate to ellipsoid, 1–2 × 0.4–0.5 cm, pubescent, 1- or 2-seeded. Fl. May–Oct, fr. Sep–Nov. $2n = 22$.

Forests; 900–2500 m. Sichuan, Taiwan, Yunnan [Afghanistan, Bhutan, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; thought to be native in Africa and Asia, now pantropical].

This is a very variable species that has defied attempts to divide it into more homogeneous taxa.

10. *Rhynchosia yunnanensis* Franchet, Pl. Delavay. 185. 1890.

云南鹿藿 yun nan lu huo

Vines, herbaceous or sometimes almost woody, ca. 50 cm. Stems slightly robust, densely villous or tomentose, with dark brown sessile glands. Leaves pinnately 3-foliolate; stipules lanceolate, 4–8 mm, usually persistent; petiole 2.5–6 cm; stipels absent; petiolules 1–3 mm, hairy; leaflets papery; terminal leaflet reniform or oblate, 2–3.7 × 2.5–5.3 cm, densely gray villous, with dark brown glands, basal veins 3, lateral veins 2–4 pairs, reticulate veins visible, base shallowly cordate to almost truncate, margin slightly sinuate, slightly reflexed when dried, apex rounded or almost truncate, usually with small mucro; lateral leaflets smaller, slightly oblique. Raceme axillary, rarely solitary or branched, 2–5 cm; peduncle 1–3.5 cm, densely hairy; bracts lanceolate, 4–7 mm, persistent. Flowers yellow, 1.4–2 cm; pedicel 2–8 mm. Calyx 5-lobed; lobes lanceolate, longer than tube, lower one longest. Standard subcircular or obovate-circular, 1–1.5 cm, glabrous, base with 2 auricles; wings elliptic to obovate-elliptic, 7–13 mm, auriculate on one side; keel very wide, subobovate, 7–14 mm, without auricle. Ovary densely silky hairy, sessile; ovules 1 or 2; style linear, lower part silky hairy. Legume reddish brown, obovate-orbicular to ellipsoid, 2–2.5 × 0.7–0.8 cm, sparsely pubescent, apex beaked. Seeds dark

brown, reniform or orbicular, 4–5 × 5–6 mm. Fl. May–Aug, fr. Jun–Oct.

• River valleys; 1800–2300 m. Yunnan.

11. *Rhynchosia sericea* Spanoghe, Linnaea 15: 195. 1841.

绒叶鹿藿 rong ye lu huo

Dolichos tomentosus Roth, Nov. Pl. Sp. 345. 1821, not *Rhynchosia tomentosa* (Linnaeus) Hooker & Arnott (1835); *R. rothii* Benthham ex Aitchison.

Vines, woody. Stems densely pubescent and yellow glandular. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, 8–10 × 7–8 mm; petiole 4–6 cm; terminal petiolule 15–28 mm, densely hairy, lateral petiolules 3–4 mm; leaflets circular-rhomboid, 5–8 × 5–8 cm, both surfaces densely pubescent, basal veins 3, lateral veins 3 or 4 pairs, base rounded, apex rounded to nearly truncate, shortly mucronate. Raceme 11–16 cm, robust, many flowered, clustered. Calyx ca. 6 mm, densely hairy; lobes almost triangular, apex acute or acuminate, lobes shorter than or subequal to tube. Corolla reddish; standard obovate, 1.1–1.3 cm, densely hairy, auricles acute; wings obovate-oblong, shortest; keels falcate, subequal to standard, auriculate, apex obtuse. Ovary densely hairy, stipitate. Legume oblanceolate to ellipsoid, ca. 3 cm, compressed, pubescent, apex beaked. Seeds 2, reddish brown, reniform, ca. 3 × 4 mm. Fl. Apr–Nov, fr. Sep–Feb. $2n = 22$.

Grasslands. Fujian, Taiwan [Indonesia, Japan, Malaysia, Myanmar, Nepal, Pakistan, Thailand].

12. *Rhynchosia himalensis* Benthham ex Baker in J. D. Hooker, Fl. Brit. India 2: 225. 1876.

喜马拉雅鹿藿 xi ma la ya lu huo

Herbs. Stems twining, densely pubescent and with brownish glands. Leaves pinnately 3-foliolate; stipules narrowly ovate, 4–8 mm; petiole 2–6 cm; petiolules 1–2 cm; terminal leaflet broadly ovate or circular-rhomboid, 2.5–6 × 2.5–4.5 cm, densely pubescent mixed with glandular hairs, abaxial surface with light green glands, base rounded-cuneate, margin entire, apex acuminate; lateral leaflets oblique at base. Raceme axillary, sparsely flowered; bracts elliptic, 4–8 mm, apex acuminate; peduncle 4–7 mm. Calyx 5-lobed, hairy, exterior glandular; tube 3–4 mm; upper 2 lobes connate at base, narrowly triangular, 5–7 mm. Corolla yellow with obvious purple striations, 1.3–1.5 cm; standard broadly obovate, 1.5–1.8 × 1.1–1.3 cm, glabrous, base auriculate, with adaxial callosity at base, apex emarginate; wings glabrous, clawed, 12.5–13 mm, base auriculate, apex emarginate; keel crescent-shaped, inflexed, obviously longer than wings, 14.5–16 mm, apex obtuse, not auriculate. Ovary ca. 5 mm, densely minutely villous, stipe ca. 5 mm; style 13.5–15 mm. Legume 2.5–3 × ca. 0.9 cm, densely microvillous and glandular hairy. $2n = 22$.

Forest understories, river valleys, mountains, fields; 1200–3300 m. Sichuan, Xizang, Yunnan [India, Myanmar, Nepal, Pakistan].

- 1a. Flowers more than 5; lowest calyx lobe as long as corolla 12a. var. *himalensis*
- 1b. Flowers 3–5; lowest calyx lobe shorter than corolla 12b. var. *craibiana*

12a. *Rhynchosia himalensis* var. *himalensis*

喜马拉雅鹿藿(原变种) xi ma la ya lu huo (yuan bian zhong)

Leaflets broadly ovate, 3–6 × 2.5–4.5 cm. Raceme 7–20 cm, more than 5-flowered. Lowest calyx lobe 10–15 mm, as long as corolla, linear-triangular.

Forest understories, river valleys; 1200–3300 m. Sichuan, Xizang [India, Myanmar, Nepal, Pakistan].

12b. *Rhynchosia himalensis* var. *craibiana* (Rehder) E. Peter, *Acta Horti Gothob.* 13: 448. 1940.

紫脉花鹿藿 zi mai hua lu huo

Rhynchosia craibiana Rehder in Sargent, *Pl. Wilson.* 2: 118. 1914.

Leaflets circular-ovate, 2.5–4.5 cm, length and width subequal. Raceme 6–9 cm, 3–5-flowered. Lowest calyx lobe 8–10 mm, shorter than corolla. Fl. Jul–Sep, fr. Aug–Oct.

• Forests, mountains, fields; 1300–3100 m. Sichuan, Xizang, Yunnan.

13. *Rhynchosia kunmingensis* Y. T. Wei & S. K. Lee, *Guihaia* 5: 171. 1985.

昆明鹿藿 kun ming lu huo

Vines. Stems twining, slender, pubescent and glandular hairy. Leaves pinnately 3-foliolate; stipules lanceolate, 5–7 mm, hairy; petiole slender, 2.5–4.5 cm, hairy; stipels absent; petioles ca. 2 mm, hairy; leaflets papery; terminal leaflet rhomboid, 2.5–3.5 × 1.7–2.3 cm, both surfaces pubescent and with slender glands, basal veins 3, lateral veins 2 or 3 pairs, base broadly cuneate, apex shortly acuminate; lateral leaflets subequal to terminal leaflet, ± oblique, base rounded. Raceme 7–14 cm, many flowered, densely pubescent. Legume oblanceolate to oblanceolate-ellipsoid, ca. 2.5 × 0.7 cm, sparsely pubescent, apex long beaked, valves slightly inflexed after dehiscence. Seeds 2, dark brown, reniform, ca. 3 × 5 mm. Fr. Nov.

• Yunnan (Kunming).

92. ERIOSEMA (Candolle) Desvaux, *Ann. Sci. Nat. (Paris)* 9: 421. 1826
[“*Euriosma*”], nom. cons.

鸡头薯属 ji tou shu shu

Sa Ren (萨仁); Michael G. Gilbert

Rhynchosia sect. *Eriosema* Candolle, *Prodr.* 2: 388. 1825.

Herbs or subshrubs, erect or almost erect, usually with root tubers. Leaves 1-foliolate; stipules linear or linear-lanceolate; leaflets usually with sessile glands abaxially. Inflorescence axillary, 1- or 2-flowered to racemose. Calyx campanulate, 5-lobed. Corolla usually longer than calyx; standard obovate, abaxially silky hairy, base clawed, with auricles; wings and keels usually much shorter than standard. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile; ovules 2; style filiform, glabrous; stigma small, capitate. Legume rhombic-elliptic or oblong, dehiscent, inflated, not septate. Seeds 1 or 2, oblique; hilum linear, funicle at one end.

About 130 species: worldwide; one species in China.

1. *Eriosema chinense* Vogel, *Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur.* 19(Suppl. 1): 31. 1843.

鸡头薯 ji tou shu

Crotalaria tuberosa Buchanan-Hamilton ex D. Don; *Eriosema himalaicum* H. Ohashi.

Herbs, perennial, erect, 12–50 cm tall. Root tuber fusiform to globose, succulent. Stems densely villous. Leaves 1-foliolate; stipules linear to linear-lanceolate, 4–8 mm, hairy, persistent; petiolule ± absent; blade lanceolate, 1.5–7 × 0.4–1.5 cm, abaxial surface shortly villous, adaxial surface and margins sparsely villous, base rounded or nearly cordate, apex obtuse or acute. Raceme axillary, extremely short, 1- or 2-flowered; bracts line-

ar. Calyx campanulate, 3–5 mm, 5-lobed, brown villous. Corolla pale yellow; standard obovate, base with 2 pendulous oblong auricles; wings obovate-oblong, auriculate on one side; keel shorter than wings, obovate-oblong. Ovary densely long hirsute; style inflexed, glabrous. Legume rhomboid-elliptic or oblong, 8–10 × 5–6 mm, black when mature, hirsute. Seeds 2, black, small, reniform; hilum linear, almost up to seed length; funicle at one end of hilum. Fl. May–Jul, fr. Jul–Oct.

Mountains; 300–2000 m. Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Australasia].

The roots of *Eriosema chinense* are edible and are used medicinally.

93. DUNBARIA Wight & Arnott, *Prodr. Fl. Ind. Orient.* 258. 1834.

野扁豆属 ye bian dou shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs or woody vines, prostrate or twining. Leaves pinnately 3-foliolate; stipules caducous or absent; stipels usually absent; leaflets with obvious sessile glands abaxially. Inflorescence axillary, 1-flowered to racemose. Bracts caducous or absent; bracteoles

usually absent. Calyx campanulate; lobes lanceolate or triangular, lowest one longest. Corolla \pm longer than calyx; standard almost circular, obovate or transversely elliptic, base with auricles; wings usually with auricles; keels shorter than wings, slightly curved. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary stipitate or sessile; ovules many; style filiform, introrse, glabrous; stigma small, terminal, capitate. Legume linear or linear-oblong, dehiscent. Seed hilum long or short; strophiole thin and small.

About 20 species: Asia, Oceania; eight species in China.

Dunbaria was revised by Maesen (Wageningen Agric. Univ. Pap. 98(1). 1998).

Dunbaria merrillii Elmer (usually treated as a synonym of *D. cumingiana* Benth), otherwise known from Indonesia and the Philippines, was recorded from Taiwan (Lan Yu) (Fl. Taiwan, ed. 2, 3: 275, t. 134. 1993). However, the illustration provided is more suggestive of a species of *Cajanus* as it shows a large legume, 10–12 cm, distinctly constricted between the seeds, and twisted after dehiscence.

- 1a. Terminal leaflet usually ca. $2 \times$ as long as wide; ovary and legume sessile or subsessile.
 - 2a. Leaflets ovate, ovate-lanceolate, or lanceolate, $5\text{--}9.5 \times 2.5\text{--}4$ cm; flowers in extended racemelike inflorescence, purple 1. *D. fusca*
 - 2b. Leaflets elliptic, ovate-elliptic, or oblong, $1.6\text{--}2.6 \times 0.5\text{--}0.7$ cm; flowers solitary, yellow 2. *D. debilis*
- 1b. Terminal leaflet usually about as long as wide; ovary and legume sessile, subsessile, or stipitate.
 - 3a. Ovary sessile; legume stipe absent or extremely short.
 - 4a. Terminal leaflet more than 5 cm, abaxial surface and legume tomentose; inflorescence a long, robust, many-flowered raceme; flowers purple 3. *D. incana*
 - 4b. Terminal leaflet 1.5–4 cm, abaxial surface and legume glabrous or sparsely pubescent; inflorescence a 1- to few-flowered fascicle or short raceme; flowers yellow.
 - 5a. Terminal leaflet orbicular-rhomboid; inflorescence a 1- or 2-flowered fascicle 4. *D. rotundifolia*
 - 5b. Terminal leaflet rhomboid or almost triangular; inflorescence a short raceme, few flowered 5. *D. villosa*
 - 3b. Ovary stipitate; legume stipe more than 6 mm.
 - 6a. Terminal leaflet obtriangular or obovate, both leaf surfaces and legume sparsely pubescent or glabrous; legume stipe 6–10 mm 8. *D. truncata*
 - 6b. Terminal leaflet almost rhomboid or ovate-rhomboid; legume stipe 15–20 mm.
 - 7a. Terminal leaflet usually 1.8–4 cm long and wide, apex acute, both leaf surfaces and legume densely grayish pubescent; legume stipe 15–17 mm 6. *D. podocarpa*
 - 7b. Terminal leaflet usually 5–6 cm long and wide, apex acuminate, both leaf surfaces and legume sparsely pubescent or glabrous; legume stipe ca. 20 mm 7. *D. circinalis*

1. *Dunbaria fusca* (Wallich) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 45: 225. 1877.

黄毛野扁豆 huang mao ye bian dou

Phaseolus fuscus Wallich, Pl. Asiat. Rar. 1: 6. 1830; *Atylosia crinita* Dunn.

Herbs, annual. Stems twining, up to 3 mm thick, densely pubescent. Leaves pinnately 3-foliolate; stipules absent or deciduous; petiole 3–6.5 cm, densely pubescent; petiolules 1–2 cm; leaflets papery, subequal; terminal leaflet ovate, ovate-lanceolate, or lanceolate, $5\text{--}9.5 \times 2.5\text{--}4$ cm, abaxial surface densely pubescent and with reddish glands, adaxial surface glabrous or sparsely pubescent, basal veins 3, lateral veins 3 or 4 pairs, flat or slightly convex, base rounded or subcuneate, apex acute to acuminate; lateral leaflets similar but smaller. Raceme axillary, slightly robust, 4–15 cm, glabrous or sparsely pubescent, usually several or more flowered; bracts absent. Flower ca. 1.5 cm; pedicel 2–4 mm. Calyx campanulate, 4–7 mm, hirsute, glabrescent, and with brown glands, 4-lobed; lobes triangular or almost triangular, shorter than tube, lowest longer, linear-lanceolate. Corolla purple, ca. 1.3 cm; standard transversely elliptic, base auriculate on both sides; wings oblong, auriculate on one side; keels inflexed to almost right angle. Ovary sessile, densely golden hirsute. Legume black-brown, linear-oblong, $4\text{--}6 \times 0.4\text{--}0.7$ cm, hirsute; stipe absent. Seeds 5–7, brown, semiorbicular, ca. 4×4 mm. Fl. Jul–Sep, fr. Oct–Dec.

Slopes, open grasslands; 200–1200 m. Guangdong, Guangxi, Hainan, Yunnan [India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

2. *Dunbaria debilis* Baker in J. D. Hooker, Fl. Brit. India 2: 218. 1876.

小叶野扁豆 xiao ye ye bian dou

Dunbaria parvifolia X. X. Chen; *D. singuliflora* F. Mueller.

Herbs. Stems twining, slender, pubescent. Leaves pinnately 3-foliolate; stipules lanceolate, 1.5–3 mm, pubescent; petiole slender, 0.5–2 cm, sparsely pubescent; stipules extremely small or inconspicuous; petiolules short, ca. 1 mm, pubescent; leaflets papery; terminal leaflet elliptic, ovate-elliptic, or oblong, $1.6\text{--}2.6 \times 0.5\text{--}0.7$ cm, both surfaces densely pubescent, abaxial surface with light brown sessile glands, basal veins 3, slender, base rounded, apex obtuse or almost round; lateral leaflets obliquely elliptic, $1\text{--}2.1 \times 0.5\text{--}0.8$ cm. Inflorescence 1-flowered; pedicel ca. 4 mm. Calyx campanulate, pubescent; lobes lanceolate, lowest longest, ca. 5 mm, longer than tube. Corolla yellow, 0.9–1.1 cm; standard suborbicular, base with lobed auricles on both sides, apex slightly emarginate; wings oblong, base with acute auricles; keels slightly shorter than wings, almost round. Ovary sessile, pubescent, with light brown glands; style slender; stigma small. Legume oblong, $3.5\text{--}4 \times$ ca. 0.7 cm, slightly curved, compressed, pubescent, apex beaked; stipe absent. Fl. Jun–Aug, fr. Mar–Nov.

Mountain slopes, roadsides, grasslands. Guangxi [NE India; Australia].

3. *Dunbaria incana* (Zollinger & Moritzi) Maesen, Wageningen Agric. Univ. Pap. 98(1): 61. 1998.

白背野扁豆 bai bei ye bian dou

Phaseolus incanus Zollinger & Moritzi, Syst. Verz. 4. 1846; *Dunbaria harmandii* Gagnepain; *D. nivea* Miquel.

Herbs. Stems twining, densely villous. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 4–8(–11) cm, densely tomentose; terminal leaflet rhomboid, 5–7(–9.5) × 4.5–6.5 cm, abaxial surface tomentose, with obvious dark brown sessile glands, basal veins 5, lateral veins 2–4 pairs, visible from both sides, base broadly cuneate, rounded, or nearly truncate, margin slightly sinuate, apex acuminate to acute; lateral leaflets smaller, obliquely ovate, apex mucronate. Racemes axillary or lateral, robust, 5–15 cm, densely villous; bracts ovate-lanceolate, deciduous; pedicel 2–5 mm, densely tomentose. Calyx campanulate, 5–8 mm, tomentose, with red glands; lobes triangular, unequal, lowest longest, shorter than tube. Corolla purple; standard oblate, with 2 acute auricles at base; wings obovate-oblong, base with obtuse auricles; keels curved to semicircular. Ovary sessile, filiform, villous and red glandular. Legume linear-oblong, 4–6.5 × 0.7–0.9 cm, tomentose, apex with beak 2–3 mm; stipe absent. Seeds 6–8, almost circular, ca. 5 mm in diam. Fl. Feb–Apr, fr. May–Jun.

Open forests. Hainan [Indonesia (Java), Laos, Malaysia, Thailand, Vietnam].

4. *Dunbaria rotundifolia* (Loureiro) Merrill, Philipp. J. Sci. 15: 242. 1919.

圆叶野扁豆 yuan ye ye bian dou

Indigofera rotundifolia Loureiro, Fl. Cochinch. 2: 458. 1790; *Atylosia punctata* (Wight & Arnott) Dalzell; *Dolichos punctatus* Wight & Arnott; *Dunbaria punctata* (Wight & Arnott) Benth.

Herbs, perennial. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 0.8–2.5 cm, densely pubescent; petiolules 1–2 mm, densely pubescent; leaflets papery; terminal leaflet orbicular-rhomboid, 1.5–2.7(–4) cm, slightly wider than long, sparsely pubescent or almost glabrous, with dark brown glands, basal veins 3, base rounded, margin sinuate, apex obtuse; lateral leaflets smaller, oblique. Inflorescence 1- or 2-flowered; bracts narrowly ovate, 1–2 mm. Calyx campanulate, 2–5 mm, pubescent, with dense red to dark brown glands; lobes ovate-lanceolate, shorter than tube. Corolla yellow, 1–1.5 cm; standard obovate-orbicular, base with 2 auricles, apex slightly emarginate; wings obovate-oblong, slightly curved, mucronate; keels falcate, apex obtusely beaked. Ovary sessile. Legume linear-oblong, 3–5 × ca. 0.8 cm, slightly curved, compressed, pubescent or almost glabrous, apex with needlelike beak, stipe absent. Seeds 6–8, dark brown, suborbicular, ca. 3 mm in diam. Fl. Sep–Oct, fr. Oct–Nov. $2n = 22$.

Slopes, grasslands; ca. 600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangsu, Jiangxi, Sichuan, Taiwan [Bangladesh, Cam-

bodia, India, Indonesia, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam; Australia].

5. *Dunbaria villosa* (Thunberg) Makino, Bot. Mag. (Tokyo) 16: 35. 1902.

野扁豆 ye bian dou

Glycine villosa Thunberg in J. A. Murray, Syst. Veg., ed. 14, 659. 1784.

Herbs, perennial. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, usually deciduous; petiole slender, 0.8–2.5 cm, pubescent; stipules extremely small; petiolules ca. 1 mm, densely pubescent; leaflets thinly papery; terminal leaflet larger, rhomboid or almost triangular, both surfaces sparsely pubescent, with reddish sessile glands, basal veins 3, lateral veins 1 or 2 pairs, base rounded, broadly cuneate, or almost truncate, apex acute or acuminate; lateral leaflets much smaller, oblique, 1.5–3.5 × 2–3.7 cm. Raceme or compound raceme axillary, 1.5–5 cm, densely pubescent, 2–7-flowered. Flower ca. 1.5 cm. Calyx campanulate, 5–9 mm, 4-lobed; lobes lanceolate or linear-lanceolate, unequal, usually lower one longest. Corolla yellow; standard almost orbicular or transversely elliptic, base auriculate on one side; keels similar to wings, but curved, shortly clawed, apex beaked. Ovary densely pubescent and with rubiginous glands. Legume linear-oblong, 3–5 × ca. 0.8 cm, compressed, pubescent or almost glabrous, apex beaked, stipe ± absent. Seeds 6 or 7, black, suborbicular, ca. 4 × 3 mm. Fl. Jul–Sep, fr. Aug–Oct.

Open places, roadsides; 1800–2100 m. Anhui, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [Cambodia, India, Indonesia, Japan, Korea, Laos, Philippines, Thailand, Vietnam].

6. *Dunbaria podocarpa* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 185. 1874.

长柄野扁豆 chang bing ye bian dou

Herbs, perennial, 1–4 m. Stems twining, densely pubescent. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 1.5–4 cm, densely pubescent; stipules usually absent; petiolules 1–2 mm, pubescent; terminal leaflet rhomboid, 1.8–4 × 1.8–4 cm, both surfaces densely pubescent, abaxial surface with red glands, basal veins 3, lateral veins 1–3 pairs, base obtuse, rounded, or subtruncate, apex acute; lateral leaflets smaller, obliquely ovate. Raceme axillary, 1- or 2(–4)-flowered; peduncle 0.5–1 cm, densely pubescent. Flowers 1.5–2 cm; pedicel 2–6 mm, pubescent. Calyx campanulate, pubescent, with golden yellow glands; lobes ovate-lanceolate. Corolla yellow; standard transversely elliptic, longer than wide, base with 2 auricles; wings narrowly elliptic, base with curved auricle at one side; keels very curved, without auricle, apex long beaked. Ovary filiform, pubescent, with orange glands, apex with long beak. Legume linear-oblong, 5–8 × 0.9–1.1 cm, densely pubescent, with orange glands, apex with long beak; stipe 1.5–1.7 cm. Seeds 7–11, black, suborbicular, compressed, ca. 4 mm. Fl. and fr. Jun–Nov.

Mountain slopes, roadsides, open fields; below 100–800 m. Fujian, Guangdong, Guangxi, Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

7. *Dunbaria circinalis* (Benth) Baker in J. D. Hooker, Fl. Brit. India 2: 219. 1876.

卷圈野扁豆 *juan quan ye bian dou*

Atylosia circinalis Benth in Miquel, Pl. Jungh. 244. 1852.

Vines, woody. Stems slender, pubescent when young, then glabrous to almost glabrous. Leaves pinnately 3-foliolate; stipules small, narrowly triangular, ca. 2 mm, usually deciduous; petiole 2–4 cm, pubescent; petiolules 1–2 mm, pubescent; leaflets thinly papery; terminal leaflet larger, almost rhomboid or broadly ovate-rhomboid, 5–6 × 4–5.8 cm, abaxial surface sparsely pubescent and with dense yellowish brown sessile glands, adaxial surface almost glabrous, basal veins 3, base broadly rounded or subcuneate, apex acuminate; lateral leaflets obviously small, broadly obliquely ovate. Raceme axillary, 8–13 cm, pubescent, many flowered; pedicels 1–2 mm. Calyx ca. 8 mm, 5-lobed; lower lobe longest, subequal to tube. Corolla yellow, usually longer than calyx; standard transversely elliptic, 1–1.4 × 1.5–2 cm, base with 2 auricles; wings obovate-elliptic, base long clawed with auricle at one side; keels semiorbicular, long clawed. Legume linear-oblong, 5–7.5 × 0.8–1.2 cm, pubescent when young, later glabrous, apex with small beak, stipe ca. 2 cm. Seeds 6–10, dark brown, suborbicular, ca. 4 × 5 mm, with obvious strophiole. Fl. Sep–Oct, fr. Oct–Jan.

Grassy slopes. Yunnan [India, Indonesia, Laos, Myanmar, Thailand, Vietnam].

8. *Dunbaria truncata* (Miquel) Maesen, Wageningen Agric. Univ. Pap. 98(1): 89. 1998.

鸽子豆 *ge zi dou*

Dolichos truncatus Miquel, Fl. Ned. Ind. 1: 186. 1855;
Dunbaria henryi Y. C. Wu.

Herbs. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, linear-lanceolate, ca. 3 mm, deciduous; petiole 1.1–4 cm, sparsely pubescent; petiolules ca. 1 mm, pubescent; leaflets thinly papery; terminal leaflet broadly triangular or broadly ovate, 1.8–4.5 × 1.8–4.5 cm, both surfaces pubescent, sometimes with orange sessile glands, denser abaxially, basal veins 3, lateral veins 2 or 3 pairs, base almost truncate or sometimes broadly cuneate, apex acute or acuminate; lateral leaflets smaller, broadly ovate, usually oblique. Raceme axillary, 1.5–6 cm, sparsely pubescent, 2- to several flowered. Flower 1.5–1.7 cm; pedicel ca. 2 mm, pubescent; bracteoles small, linear-lanceolate. Calyx ca. 8 mm, densely pubescent, with red glands; lobes linear-lanceolate, unequal, shorter than or subequal to tube. Corolla yellow; standard almost orbicular, longer than wide, base with 2 auricles; wings obovate, inflexed, base with curved auricles; keels slightly inflexed, semicircular. Ovary stipitate, pubescent, with glands; ovules 7–10; style slender, upper glabrous, apex slightly inflated. Legume linear-oblong, 3–6 × 0.5–0.8 mm, compressed, sparsely pubescent, acute at both sides, apex beaked, stipe 0.6–1 cm. Seeds 5–8, reddish brown, almost orbicular, 3–4.5 mm in diam. Fl. Feb–Nov, fr. Jun–Dec.

Roadsides, open fields; 100–800 m. Guangxi, Hainan [Indonesia, Myanmar, Vietnam; Australasia].

94. CAJANUS Adanson, Fam. Pl. 2: 326, 529. 1763 [“*Cajan* ”], nom. cons.

木豆属 *mu dou shu*

Sa Ren (萨仁); Michael G. Gilbert

Erect shrubs, subshrubs, or woody or herbaceous vines. Leaves pinnately or sometimes digitately 3-foliolate; stipules and stipels small or absent; leaflets usually with sessile glands abaxially. Inflorescence axillary or terminal, racemose. Bracts deciduous; bracteoles absent. Calyx campanulate, 5-lobed; lobes short, upper 2 connate or slightly lobed at apex. Standard almost circular, obovate or obovate-elliptic, base clawed, with inflexed auricles; wings narrowly to broadly elliptic, auriculate; keels obliquely circular, apex obtuse. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary almost sessile; ovules 2–6; styles long, linear, apex curved, upper part glabrous or slightly hairy; stigma terminal, small, capitate. Legume linear-oblong, dehiscent, compressed. Seeds 2–10, reniform to almost orbicular, colorful or blotched; strophiole obvious or absent.

About 30 species: tropical Asia, Madagascar, Oceania; seven species in China.

See Maesen, Wageningen Agric. Univ. Pap. 85(4): 1–225. 1985.

- 1a. Erect shrubs or subshrubs.
- 2a. Leaflets lanceolate to elliptic, 2.8–10 cm, apex acute or acuminate; mature seed without strophiole 1. *C. cajan*
- 2b. Leaflets obovate, 2.5–3.8 cm, apex rounded or acute; mature seed with conspicuous strophiole 2. *C. niveus*
- 1b. Climbing or twining vines.
- 3a. Legume 1.5–2.5 cm 7. *C. scarabaeoides*
- 3b. Legume more than 3 cm.
- 4a. Flowers 2.5–3 cm; calyx with bulbous-based hairs 6. *C. grandiflorus*
- 4b. Flowers 1.5–2.8 cm; calyx without bulbous-based hairs.
- 5a. Terminal leaflet ovate to ovate-elliptic; calyx densely yellow hirsute 3. *C. goensis*
- 5b. Terminal leaflet rhomboid-ovate, rhomboid, or obovate-rhomboid; calyx pubescent or glandular hairy.
- 6a. Leaflets leathery, terminal leaflet broader than long; legume 4–6-seeded 4. *C. volubilis*
- 6b. Leaflets papery or thickly papery, terminal leaflet longer than broad; legume 8–10-seeded 5. *C. mollis*

1. *Cajanus cajan* (Linnaeus) Huth, *Helios* 11: 133. 1893.

木豆 mu dou

Cytisus cajan Linnaeus, Sp. Pl. 2: 739. 1753; *Cajanus bicolor* Candolle; *C. cajan* var. *bicolor* (Candolle) Purseglove; *C. cajan* var. *flavus* (Candolle) Purseglove; *C. flavus* Candolle; *C. indicus* Sprengel; *C. indicus* var. *bicolor* (Candolle) Kuntze; *C. indicus* var. *flavus* (Candolle) Kuntze; *C. indicus* var. *maculatus* Kuntze.

Shrubs, erect, 1–3 m tall. Branchlets gray pubescent. Leaves pinnately 3-foliolate; stipules small, ovate-lanceolate, 0.2–3 mm; petiole 1.5–5 cm, sparsely pubescent; stipels extremely small; petiolules 1–5 mm, hairy; leaflets lanceolate to elliptic, 2.8–10 × 0.5–3.5 cm, papery, abaxial surface densely pubescent and with inconspicuous yellow glands, adaxial surface pubescent, apex acute or acuminate, usually mucronate. Raceme 3–7 cm; peduncle 2–4 cm; few flowers terminal or almost terminal; bracts ovate-elliptic. Calyx campanulate, 5–7 mm; lobes triangular or lanceolate, pubescent. Corolla yellow, ca. 3 × calyx in length; standard suborbicular, with inflexed auricle; wings slightly obovate, with short auricle; keel apex obtuse, slightly inflexed. Ovary hairy; ovules several; style long, linear, glabrous; stigma capitate. Legume linear-oblong, ± inflated, 4–8.5 × 0.6–1.2 cm, dull pubescent, apex beaked, acuminate, long mucronate. Seeds 3–6, gray, sometimes with brown spots, subspherical, ca. 5 mm in diam., slightly compressed; strophiole absent. Fl. and fr. Jan–Nov. $2n = 22$.

Roadsides, hills; 100–900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [probably originally from tropical Asia, now cultivated worldwide].

Cajanus cajan is used for food (“Pigeon Pea”), herbage, green fertilizer, and medicine. It is particularly valued in areas of low erratic rainfall.

2. *Cajanus niveus* (Wallich ex Benth) Maesen, Wageningen Agric. Univ. Pap. 85(4): 157. 1985.

白虫豆 bai chong dou

Atylosia nivea Wallich ex Benth in Miquel, Pl. Jungh. 243. 1852; *Cantharospermum niveum* (Wallich ex Benth) Raizada.

Subshrubs, erect, ca. 1 m tall. Stems pubescent. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 1.5–3 cm, densely tomentose; stipels absent; petiolules 2–5 mm, densely tomentose; leaflets leathery, with glandular spot below; terminal leaflet obovate, 2.5–3.8 cm, adaxial surface pubescent, basal veins 3, lateral veins 3–5 on each side, slightly obvious on both surfaces; lateral leaflets slightly smaller, obliquely elliptic, with black spot after drying adaxially, with fine downy hairs on abaxial surface. Raceme axillary, 3–6 cm, with a few flowers; peduncle 0.6–1.2 cm; bracts ovate. Calyx campanulate; lobes triangular, shorter than tube. Corolla yellow, 4–5 × as long as calyx; standard obovate, base auriculate; wings auriculate; keels with auricles, apex slightly inflexed. Ovary densely hairy. Legume obovate-elliptic, compressed, 3–4.5 cm, to 1.5 cm wide near top, densely pubescent, legume valve with obvious transverse constriction between seeds, apex with curved beak. Seeds 4–8, with light gray spot, ellipsoidal, ca. 5 × 4 mm, apex rounded; strophiole succulent at base. Fl. and fr. Aug–Oct.

Sunny slopes of rocky mountains; 400–1200 m. Yunnan [Myanmar].

3. *Cajanus goensis* Dalzell, Hooker’s J. Bot. Kew Gard. Misc. 2: 264. 1850.

硬毛虫豆 ying mao chong dou

Atylosia barbata (Benth) Baker; *A. calycina* (Miquel) Kurz; *A. goensis* (Dalzell) Dalzell; *A. siamensis* Craib; *Cantharospermum barbatum* (Benth) Koorders; *Dunbaria barbata* Benth; *D. calycina* Miquel; *D. stipulata* Thun; *D. thorelii* Gagnepain; *Endomallus pellitus* Gagnepain; *E. spirei* Gagnepain.

Vines, woody, twining, to several meters tall, yellow-brown villous except for corolla. Stems densely hairy when young, later glabrescent, to dark brown. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, 7–12 mm, persistent; petiole 3–7 cm; terminal leaflet ovate to ovate-elliptic, 5–10 × 3–5.5 cm, densely villous when young, later glabrescent, base rounded, apex acuminate with hard mucro. Peduncle a few centimeters; bracts ovate, densely villous. Flowers ca. 3 cm; pedicels slender, 11–15 mm. Calyx campanulate; lobes linear-lanceolate, lowest longest, ca. 2 × as long as tube. Corolla yellow; standard obovate-elliptic, ca. 2.8 cm, base with an inflexed auricle on each side, apex slightly emarginate; wings broadly elliptic, base with auricle on one side; keels sickleform, slightly shorter than wings, clawed, without auricle. Ovary linear, densely villous; style long, curved, glabrous; stigma capitate. Legume long elliptic, 4–6 × ca. 1 cm, straight, densely villous, apex beaked. Seeds 5–7, brown, subspherical, ca. 4 mm in diam., wider than long; strophiole acute and white, succulent. Fl. Jan–Feb, fr. Feb–Jul.

Roadsides, river valleys; 1000–1300 m. Yunnan [Bangladesh, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

4. *Cajanus volubilis* (Blanco) Blanco, Fl. Filip., ed. 2, 417. 1845.

虫豆 chong dou

Cytisus volubilis Blanco, Fl. Filip. 599. 1837; *Atylosia crassa* Prain ex King; *A. volubilis* (Blanco) Gamble; *Cajanus crassus* (Prain ex King) Maesen; *Cantharospermum volubile* (Blanco) Merrill.

Vines, twining. Stems robust, brown villous when young. Leaves pinnately 3-foliolate; stipules small, ovate, 2–3 mm, deciduous; petiole 2–8 cm; stipels linear, ca. 2 mm; petiolules extremely short; leaflets leathery, both surfaces pubescent, abaxial surface with sessile glands; terminal leaflet rhomboid to rhomboid-ovate, 2–9.5 × 2.7–9 cm, base rounded or shallowly cordate, apex obtuse; basal veins 3; lateral leaflets slightly smaller, obliquely ovate, 3.5–6 × 3–5 cm. Raceme axillary, robust, 3.5–6 cm, densely gray villous, each node with 1 or 2 flowers; bracts large, ovate, to 1.7 cm, membranous, minutely villous, deciduous; pedicels 3–7 mm, hairy. Calyx campanulate, 5-lobed; lobes triangular, unequal, upper 2 nearly connate, sparsely shortly villous. Corolla yellow, ca. 1.5 cm; standard obovate-orbicular, base auriculate at both sides; wings oblong, slightly shorter than standard; keels subequal to wings, with auricles, apex curved. Ovary pubescent; style filiform, long and

curved, hairy adaxially. Legume oblong, inflated, 3–5 × 0.8–1 cm, hairy, transversely constricted between seeds. Seeds 4–6, black, usually subspherical, rarely hemispherical, 3–5 mm wide; strophiole thick and succulent. Fl. Dec–Mar, fr. Feb–Apr.

Forests. Guangxi, Hainan, Yunnan [India, Indonesia, Laos, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam].

5. *Cajanus mollis* (Benth) Maesen, Wageningen Agric. Univ. Pap. 85(4): 154. 1985.

长叶虫豆 chang ye chong dou

Atylosia mollis Benth in Miquel, Pl. Jungh. 243. 1852; *Cantharospermum molle* (Benth) Taubert.

Vines, woody, twining, densely villous. Stems longitudinally ribbed. Leaves pinnately 3-foliolate; stipules lanceolate, 2–3 mm, deciduous; petiole 1–2.5(–5) cm; petiolules extremely short; leaflets papery to thickly papery, both surfaces pubescent, denser abaxially and with rosinlike glands; terminal leaflet obovate-rhomboid, 4–7 × 2–4.5 cm, base rounded to obtusate, apex acuminate; basal veins 3; lateral leaflets slightly smaller, obliquely ovate, 4–7 × 2–4.5 cm. Raceme axillary, robust, 3.5–6 cm; bracts large, ovate, to 1.7 cm, membranous, exterior with several longitudinal striae and rosinlike glands, clothed with micro-villous hairs, deciduous; pedicels 3–7 mm, hairy. Calyx campanulate, 5-lobed; lobes lanceolate, unequal, upper 2 nearly connate, sparsely pubescent. Corolla yellow, ca. 1.5 cm, persistent; standard obovate-circular, with inflexed auricles on each side; wings oblong, slightly shorter than standard; keels subequal to wings, with auricles, apex curved. Ovary densely pubescent; style filiform, apex curved. Legume oblong, inflated, 4–7 × 0.8–1 cm, hairy, transversely constricted between seeds. Seeds 8–10, ellipsoidal to oblong, ca. 3 mm in diam.; strophiole thick and succulent. Fl. Sep–Nov, fr. Nov.

Forests. Yunnan [Bhutan, India, Nepal, Pakistan].

6. *Cajanus grandiflorus* (Benth ex Baker) Maesen, Wageningen Agric. Univ. Pap. 85(4): 125. 1985.

大花虫豆 da hua chong dou

Atylosia grandiflora Benth ex Baker in J. D. Hooker, Fl. Brit. India 2: 214. 1876; *Dunbaria pulchra* Baker; *Pueraria seguinii* H. Léveillé.

Vines, woody, twining. Stems cylindric, pubescent. Leaves pinnately 3-foliolate, deciduous; petiole 3–8 cm, villous; stipules small, linear; petiolules 2–3 mm, densely pubescent; leaflets papery, with glands at adaxial surface; terminal leaflet ovate-rhomboid or rhomboid, 6–10 × 4–7 cm, pubescent, especially dense on veins abaxially, basal veins 3(or 5), base rounded, broadly cuneate to slightly cordate, apex acute and mucronate; lateral leaflets obliquely ovate. Raceme axillary, robust, to 20 cm; bracts large, ovate-elliptic, ca. 2 × 1 cm, membranous, de-

ciduous. Flower 2.5–3 cm; pedicel ca. 8 mm. Calyx with bulbous-based hairs; lobes lanceolate. Corolla yellow, glabrous; standard obovate or nearly circular, with inflexed auricles on each side and with 2 inconspicuous callosities; wings oblong, shorter than standard; keels inflexed. Ovary linear, densely yellow-brown villous. Legume oblong, 3.5–5 × ca. 1 cm, densely villous, transversely constricted between seeds. Seeds 4–7, black to pitch-black, almost spherical, ca. 3 mm wide; strophiole thick and succulent. Fl. Aug–Nov, fr. Oct–Dec.

Forest margins, roadsides; 1000–2500 m. Yunnan, Zhejiang [Bhutan, India, Myanmar].

7. *Cajanus scarabaeoides* (Linnaeus) Thouars, Dict. Sci. Nat. 6: 617. 1817.

蔓草虫豆 man cao chong dou

Dolichos scarabaeoides Linnaeus, Sp. Pl. 2: 720. 1753; *Atylosia pauciflora* (Wight & Arnott) Druce; *A. scarabaeoides* (Linnaeus) Benth; *A. scarabaeoides* var. *argyrophyllus* Y. T. Wei & S. K. Lee; *Cajanus scarabaeoides* var. *argyrophyllus* (Y. T. Wei & S. K. Lee) Y. T. Wei & S. K. Lee; *Cantharospermum pauciflorum* Wight & Arnott; *C. scarabaeoides* (Linnaeus) Baillon; *Dolichos medicagineus* Roxburgh; *D. minutus* Wight & Arnott; *Rhynchosia biflora* Candolle; *R. scarabaeoides* (Linnaeus) Candolle; *Stizolobium scarabaeoides* (Linnaeus) Sprengel.

Vines, woody, twining or trailing, to 2 m. Stems slender, ± pubescent. Leaves pinnately 3-foliolate; stipules small, ovate, hairy, usually deciduous; petiole 1–2 cm; stipules absent; petiolules extremely short; leaflets papery or nearly leathery, with glandular spots, sparsely pubescent on both surfaces, denser abaxially, basal veins 3, obviously convex below; terminal leaflet elliptic or obovate-elliptic to obovate, 1.2–4 × 0.8–1.5(–3) cm, apex obtuse or rounded; lateral leaflets smaller, obliquely elliptic to obliquely obovate. Raceme axillary, usually less than 2 cm, 1–5-flowered; peduncle 2–5 mm, densely brown to dull brown villous. Calyx campanulate, 5-lobed, or 4-lobed with upper 2 incompletely connate; lobes linear-lanceolate. Corolla yellow, ca. 1 cm, usually deciduous; standard obovate, with emarginate auricle and claw at base; wings narrowly elliptic, slightly curved, base auriculate; keels curved at apex, densely very pale brown villous. Ovules several. Legume oblong, 1.5–2.5 × 0.4–0.6 cm, leathery, densely villous, transversely constricted between seeds. Seeds 2–7, dark brown, ellipsoidal, ca. 4 mm; strophiole convex. Fl. Sep–Nov, fr. Oct–Dec.

Fields, roadsides, grassy slopes, seashores; below 100–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; Africa, Oceania].

The roots of *Cajanus scarabaeoides* are used medicinally.

95. **FLEMINGIA** Roxburgh ex W. T. Aiton, Hort. Kew., ed. 2, 4: 349. 1812, nom. cons., not Roxburgh ex Rottler (1803).

千斤拔属 qian jin ba shu

Sa Ren (萨仁); Michael G. Gilbert

Luorea Necker ex J. Saint-Hilaire; *Maughania* J. Saint-Hilaire.

Shrubs or subshrubs, rarely herbs, erect or trailing. Leaves digitately 3-foliolate or simple; stipules persistent or caducous; stipels absent; leaflets usually with sessile glands abaxially. Inflorescence axillary or terminal, racemose or compound racemose, rarely paniculate or capitate. Bracts 2-columned; bracteoles absent. Calyx 5-lobed; lobes narrow and long, lower one longest; tube short. Corolla longer than calyx or included; standard oblong or elliptic, base clawed, with auricles; wings very narrow, auriculate. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary subsessile; ovules 2; style filiform, glabrous or slightly hairy; stigma small, capitate. Legume elliptic, dehiscent, inflated, not septate. Seeds 1 or 2, almost orbicular, without strophiole.

About 30 species: tropical Asia, Africa, Oceania; 15 species (two endemic) in China.

The generic synonym *Maughania* is very often written incorrectly as "*Moghania*."

- 1a. Leaves simple.
- 2a. Inflorescence a raceme or panicle; bracts small, ovate to ovate-lanceolate 4. *F. paniculata*
- 2b. Inflorescence a thyrses of cymelets, each initially enclosed by large overlapping incurved bracts.
- 3a. Leaflets orbicular-cordate; standard with lobe as long as broad, contracted above auricles, and obovate or obcordate 1. *F. chappar*
- 3b. Leaflets ovate, narrowly ovate, elliptic, or oblong; standard with lobes not contracted above auricles, transversely elliptic or broadly orbicular; wings much narrower than keel.
- 4a. Leaves 3–7 cm wide, base rounded or slightly cordate, petiole usually 5–15 mm 3. *F. strobilifera*
- 4b. Leaves 1.5–2.5 cm wide, base cuneate, subsessile or petiole usually 1–5 mm 2. *F. fluminalis*
- 1b. Leaves digitately 3-foliolate.
- 5a. Prostrate herbs; stipules persistent; inflorescence compact.
- 6a. Leaflets 4–7 cm, elliptic or ovate-lanceolate; stipules linear-lanceolate; inflorescence 2–2.5 cm 13. *F. prostrata*
- 6b. Leaflets 1–5 cm, oblong or almost obovate; stipules ovate; inflorescence 2–10 cm 14. *F. procumbens*
- 5b. Erect shrubs; stipules usually deciduous (persistent in *F. stricta*).
- 7a. Inflorescence a long-pedunculate capitulum; bracts 1.5–2 cm, persistent 15. *F. involucrata*
- 7b. Inflorescence peduncle extremely short, racemes or panicles; bracts 0.4–1.2 cm, persistent or deciduous.
- 8a. Peduncle conspicuous, axis slender 5. *F. lineata*
- 8b. Peduncle inconspicuous, axis robust.
- 9a. Leaflets usually more than 20 cm; stipules persistent; standard strongly contracted, narrowed above auricles 6. *F. stricta*
- 9b. Leaflets less than 20 cm; stipules deciduous; standard not contracted.
- 10a. Leaflets usually 8–19 cm, lateral veins not grooved adaxially.
- 11a. Whole plant densely rusty tomentose; bracts elliptic to elliptic-lanceolate, apex obtuse 7. *F. latifolia*
- 11b. Whole plant densely gray or grayish brown pubescent or silky villous; bracts ovate to triangular.
- 12a. Petiole with narrow wings; leaflets usually glabrous except for veins; inflorescence lax 8. *F. macrophylla*
- 12b. Petiole without wings; leaflets densely pubescent, especially in lower part; inflorescence congested 9. *F. mengpengensis*
- 10b. Leaflets usually 2–10 cm, lateral veins ± grooved adaxially.
- 13a. Branchlets without obvious lenticels; leaflets abaxially glabrous or almost glabrous except for veins 12. *F. kweichowensis*
- 13b. Branchlets with obvious lenticels; leaflets abaxially densely tomentose.
- 14a. Branchlets and abaxial surface of leaflets gray to grayish brown tomentose 10. *F. wallichii*
- 14b. Branchlets and both sides of leaflets brown tomentose 11. *F. grahamiana*

1. *Flemingia chappar* Buchanan-Hamilton ex Bentham in Miquel, Pl. Jungh. 244. 1852.

墨江千斤拔 mo jiang qian jin ba

Maughania chappar (Buchanan-Hamilton ex Bentham) Kuntze.

Shrubs, erect, ca. 1 m tall. Branchlets slender, densely brown villous. Leaves simple; stipules narrowly ovate, ca. 2 mm, deciduous; petiole ca. 1.5 cm, densely deciduous brown villous; leaf blade orbicular-cordate, 4–4.5 cm, papery or thinly

leathery, glabrous or sparsely pubescent except veins, abaxial surface with dense, orange, sessile glands, basal veins 3, lateral veins 3 pairs, base slightly cordate, apex rounded or obtuse. Inflorescence an axillary or terminal thyrses; inflorescence axis 3–7 cm, densely brown hairy; cymules each enclosed by concave bract; bracts 1.5–2 × 1.8–3.8 cm, membranous, glabrous, with obvious reticulate veins, persistent, apex emarginate. Flowers 6–9 mm; pedicel 0.4–1.6 cm, densely hairy. Calyx 5-lobed, 4–5 mm, densely pubescent, with orange glands; lobes lanceolate, subequal to tube. Standard with lobe as long as broad, contracted above auricles, and obovate or obcordate; wings oblong;

keel slightly curved. Legume elliptic, 10–15 × 6–10 mm, densely brown villous. Fl. Dec–Mar, fr. Mar–May.

Forests. Yunnan [Cambodia, India, Laos, Myanmar, Nepal, Thailand].

2. *Flemingia fluminalis* C. B. Clarke ex Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 438. 1897.

河边千斤拔 he bian qian jin ba

Flemingia strobilifera (Linnaeus) W. T. Aiton var. *fluminalis* (C. B. Clarke ex Prain) Thuan; *Maughania fluminalis* (C. B. Clarke ex Prain) H. L. Li.

Shrublets, erect, ca. 0.5 m tall. Branchlets densely pubescent and tomentose. Leaves simple; stipules lanceolate, 1–2 cm, apex with long mucro, persistent or deciduous; petiole usually 1–5 mm, hairy; leaf blade narrowly oblong to lanceolate, 5–9 × 1.5–2.5 cm, pubescent on both surfaces, lateral veins 5–8 pairs, base cuneate, apex rounded-obtuse or acute. Inflorescence a terminal or axillary thyrse, sometimes branched; inflorescence axis 5–10 cm, slightly curved, densely pubescent; cymules small, each enclosed by concave bract; bracts 1–1.5 × 1.8–2.2 cm, papery, both surfaces pubescent, base slightly cordate, apex obviously emarginate. Calyx 2–3 mm, pubescent, with scattered small dark brown sessile glands; lobes ovate, equal to or shorter than tube. Corolla yellow, ca. 6 mm; standard transversely elliptic, auriculate, base shortly mucronate; wings obovate, subequal to standard, one with auricle, long mucronate; keel elliptic, slightly curved, shorter and wider than wings, ca. 4 mm, apex shortly mucronate. Legume oblong-elliptic, ca. 7 × 5 mm, densely pubescent. Fl. Jan–May, fr. Feb–Sep.

Plains, mountain slopes. Guangxi, Sichuan, Yunnan [Bangladesh, India, Laos, Myanmar, Vietnam].

Flemingia fluminalis is used medicinally. It is included within the following species, *F. strobilifera*, by some authors.

3. *Flemingia strobilifera* (Linnaeus) R. Brown in W. T. Aiton, Hort. Kew., ed. 2, 4: 349. 1812.

球穗千斤拔 qiu sui qian jin ba

Hedysarum strobiliferum Linnaeus, Sp. Pl. 2: 1053. 1753; *Flemingia bracteata* (Roxburgh) Wight; *F. fruticulosa* Wallich ex Benth; *F. strobilifera* var. *bracteata* (Roxburgh) Baker; *F. strobilifera* var. *fruticulosa* (Wallich ex Benth) Baker; *H. bracteatum* Roxburgh; *Maughania bracteata* (Roxburgh) H. L. Li; *M. fruticulosa* (Wallich ex Benth) Mukerjee; *M. strobilifera* (Linnaeus) J. Saint-Hilaire ex Kuntze; *Zornia strobilifera* (Linnaeus) Persoon.

Shrubs, erect or almost climbing, 0.3–3 m tall. Branchlets ribbed, densely gray to dull brown villous. Leaves simple; stipules linear-lanceolate, 0.8–1.8 cm, persistent or deciduous; petiole usually 0.5–1.5 cm, densely hairy; leaf blade ovate, narrowly ovate, ovate-elliptic, broadly elliptic, or oblong, 6–15 × 3–7 cm, thinly leathery, glabrous or almost glabrous except for veins, lateral veins 5–9 pairs, base rounded, slightly cordate, apex acuminate, obtuse, or acute. Inflorescence a thyrse, sometimes branched; inflorescence axis 5–11 cm, densely villous; cymules each enclosed by concave bract; bracts 1.2–3 × 2–4.4 cm, papery to almost leathery, both surfaces long hirsute,

margin ciliate, apex truncate or rounded, slightly emarginate and with slender mucro. Flowers small; pedicel 1.5–3 mm. Calyx pubescent; lobes ovate, slightly longer than tube. Corolla longer than calyx; standard broadly orbicular; wings narrower than keels. Legume elliptic, 6–10 × 4–5 mm, sparsely pubescent, inflated. Seeds 2, usually dark brown, suborbicular. Fl. Feb–Aug, fr. Apr–Nov. $2n = 22$.

Mountain slopes; 200–1600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

Flemingia strobilifera is used medicinally.

4. *Flemingia paniculata* Wallich ex Benth in Miquel, Pl. Jungh. 245. 1852.

锥序千斤拔 zhui xu qian jin ba

Maughania paniculata (Wallich ex Benth) Kuntze; *M. phursia* Kuntze.

Shrubs, erect. Branchlets slightly zigzag, pubescent and villous. Leaves simple; stipules lanceolate, hairy, deciduous; petiole 1.5–2.3 cm, sparsely villous; leaf blade ovate-cordate or broadly elliptic-cordate, 7–12 × 5–7.5 cm, papery, adaxially glabrous, abaxially glabrous except on veins, with scattered black glands, basal veins 5, lateral veins 5 or 6 pairs, margin slightly sinuate, apex mucronate. Inflorescences axillary or terminal, racemose, sometimes branched, slender, 2.5–4 cm, pubescent and villous, sparsely flowered; bracts ovate to ovate-lanceolate; peduncle short or absent. Flowers 0.6–1 cm. Calyx ca. 5 mm, densely pubescent, with yellowish glands; lobes lanceolate, longer than tube, apex long acuminate, lower one longest. Corolla purple, longer than calyx; standard circular, clawed, auriculate; wings oblong, clawed, one with toothlike auricle; keel falcate, wider than wings, clawed. Legume elliptic, ca. 10 × 6 mm, pubescent, with yellowish glands. Seeds 2, suborbicular. Fl. Jan–Apr, fr. Feb–May. $2n = ?18$.

On limestone; 1000–1400 m. Yunnan [Bangladesh, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

5. *Flemingia lineata* (Linnaeus) Roxburgh ex W. T. Aiton, Hort. Kew., ed. 2, 4: 350. 1812.

细叶千斤拔 xi ye qian jin ba

Hedysarum lineatum Linnaeus, Sp. Pl. 2: 1054. 1753; *Flemingia glutinosa* (Prain) Y. T. Wei & S. K. Lee; *F. lineata* var. *glutinosa* Prain; *F. lineata* var. *papuana* White; *F. macrophylla* (Willdenow) Merrill var. *nana* Sasaki; *Maughania lineata* (Linnaeus) Kuntze.

Shrublets, erect, many branched. Branchlets cylindrical, adpressed pubescent when young, becoming glabrous or subglabrous. Leaves digitately 3-foliolate; stipules lanceolate, 0.6–1 cm, apex long mucronate, usually persistent; petiole 0.7–3 cm, wingless, pubescent; leaflets thinly leathery; terminal leaflet obovate to obovate-oblong, 2–5.5 × 0.8–2 cm, both surfaces densely adpressed villous when young, gradually glabrescent, with sparse sessile glands, basal veins 3, lateral veins 3 or 4 pairs, base cuneate, apex obtuse with mucro; lateral leaflets smaller, obliquely elliptic, sessile or subsessile. Panicles axillary or terminal; inflorescence axis 2.5–6.5 cm, slender, villous

or clothed with glandular hairs; bracts linear, small, persistent. Flowers 5–7 mm. Calyx pubescent; lobes lanceolate, longer than tube. Corolla longer than calyx; standard almost orbicular, clawed, auriculate; wings oblong, clawed, one with auricle; keel almost semiorbicular, clawed, with inconspicuous auricle on one side, apex mucronate. Legume 8–12 × 5–8 mm, villous. Seeds 2, black, suborbicular, ca. 2 mm in diam. Fl. Dec–Feb, fr. Feb–May.

Mountain slopes, plains, roadsides. Guangxi, Taiwan, Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam; Australia].

6. *Flemingia stricta* Roxburgh ex W. T. Aiton, Hort. Kew., ed. 2, 4: 349. 1812.

长叶千斤拔 chang ye qian jin ba

Flemingia stricta var. *pteropus* Baker; *Maughania stricta* (Roxburgh ex W. T. Aiton) Kuntze; *M. stricta* var. *pteropus* (Baker) Mukerjee.

Shrubs, tall. Stems robust; young branchlets trigonous prismatic, with sparse short adpressed hairs. Leaves digitately 3-foliolate; stipules lanceolate, to 7.5 cm, apex acuminate, usually persistent; petiole 8–16 cm, wings absent or extremely narrow, pubescent; petiolules 3–8 mm, densely pubescent; leaflets oblong or lanceolate to obliquely ovate-lanceolate, 21–32.5 × 6.5–10.5 cm, thinly leathery, glabrous except veins, with scattered black glands, lateral veins 15–19 pairs, base broadly cuneate to obliquely rounded, apex acuminate. Raceme terminal or axillary, columnar-cylindric, 10–16 cm, densely pubescent; bracts ovate-lanceolate, 9–13 mm, sparsely hairy, deciduous; peduncle 1–3 mm. Flowers 1–1.5 cm, clustered. Calyx 5-lobed; lobes lanceolate, equal or subequal to tube, lower one much longer. Corolla purple, standard with darker striae, petals subequal; standard wider, oblong to almost orbicular, strongly contracted and narrowed above auricles, clawed, auriculate, glabrous, apex slightly emarginate; wings obliquely ovate, long clawed, auricle acute; keel almost semiorbicular, long clawed, apex obtuse. Ovary ovoid, pubescent, sessile; style linear, glabrous. Legume elliptic, 10–15 × 5–7 mm, pubescent, apex slightly oblique, mucronate. Seeds 2, brown or black, oblong or orbicular, ca. 2 × 3 mm. Fl. Jan–Mar, fr. Feb–Mar. *2n* = 22.

Mountain slopes, roadsides; ca. 600 m. Yunnan [Cambodia, India, Indonesia, Laos, Philippines, Thailand, Vietnam].

7. *Flemingia latifolia* Benth in Miquel, Pl. Jungh. 246. 1852.

宽叶千斤拔 kuan ye qian jin ba

Shrubs, erect. Young branchlets trigonous-prismatic. Leaves digitately 3-foliolate; stipules lanceolate, 1–3 cm, apex acuminate, deciduous; petiole 3–10 cm, robust, narrowly winged or not, pubescent; petiolules 3–6 mm, densely reddish pubescent; leaflets papery to thickly papery, with dense dark brown glands; terminal leaflet elliptic or elliptic-lanceolate, rarely obovate, 8–14 × 4–6(–8.5) cm, pubescent, basal veins 3, base broadly cuneate or rounded, apex acuminate or acute; lateral leaflets oblique, broadly lanceolate, base rounded at one side, other narrowly cuneate. Raceme terminal or 1–3 per axil, 3–11 cm, densely rusty villous; bracts elliptic or elliptic-lanceolate, 0.7–1 cm, exterior densely rusty villous, apex usually ob-

tuse; peduncle ca. 2 mm. Flowers 1–1.2 cm, clustered. Calyx ca. 10 mm; lobes 4–7 mm, lower one longest. Corolla purple or pink, longer than calyx; standard obovate or obovate-elliptic, auricles obtuse; wings oblong to obovate-oblong, slightly curved, with long slender claw, auricle decurrent; keel semi-orbicular, wider than wings, clawed, with acute auricle. Ovary elliptic, with very pale brown hairs; style slender. Legume elliptic, 12–15 × 7–8 mm, rusty villous, inflated, apex with acute beak. Seeds 2, black, suborbicular, ca. 2 mm in diam. Fl. and fr. almost year-round.

Fields, mountain slopes, forests; 500–2100(–2700) m. Guangxi, Hainan, ?Sichuan, Yunnan [Cambodia, India, Laos, Myanmar, Vietnam].

1a. Petiole narrowly winged 7a. var. *latifolia*

1b. Petiole wingless 7b. var. *hainanensis*

7a. *Flemingia latifolia* var. *latifolia*

宽叶千斤拔(原变种) kuan ye qian jin ba (yuan bian zhong)

Flemingia congesta Roxburgh ex W. T. Aiton var. *latifolia* (Benth) Baker; *Maughania latifolia* (Benth) Mukerjee.

Young branchlets densely rusty adpressed tomentose. Stipules 1–2 cm; petiole narrowly winged.

Fields, mountain slopes, forests; 500–2100(–2700) m. Guangxi, ?Sichuan, Yunnan [India, Laos, Myanmar].

7b. *Flemingia latifolia* var. *hainanensis* Y. T. Wei & S. K. Lee, Guihaia 5: 169. 1985.

海南千斤拔 hai nan qian jin ba

Whole plant densely dull brown long spreading villous. Stipules 1.5–3 cm; petiole wingless.

?Guangxi, Hainan, Yunnan [India, Myanmar, Vietnam].

This taxon was misidentified as *Maughania* (“*Moghania*”) *ferruginea* (Wallich ex Benth) H. L. Li in Fl. Hainan. (2: 311. 1965).

8. *Flemingia macrophylla* (Willdenow) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 440. 1897.

大叶千斤拔 da ye qian jin ba

Crotalaria macrophylla Willdenow, Sp. Pl. 3: 982. 1802; *Flemingia congesta* Roxburgh ex W. T. Aiton; *F. ferruginea* Wallich ex Benth; *Maughania ferruginea* (Wallich ex Benth) H. L. Li; *M. macrophylla* (Willdenow) Kuntze.

Shrubs, erect, 0.8–2.5 m tall. Young branches densely adpressed silky villous. Leaves digitately 3-foliolate; stipules lanceolate, up to 2 cm, villous, with glandular striations, apex long acuminate, usually deciduous; petiole 3–6 cm, narrowly winged; petiolules 2–5 mm, densely hairy; leaflets papery to thinly papery; terminal leaflet broadly lanceolate to elliptic, 8–15 × 4–7 cm, glabrous except for veins, abaxial surface with small dark brown sessile glands, basal veins 3, base broadly cuneate, apex acuminate; lateral leaflets smaller, oblique, base rounded at one side, cuneate on other. Racemes usually clustered at axil, 3–8 cm, with many clustered flowers; peduncle usually extremely short. Calyx campanulate, 6–8 mm, shortly very pale brown villous; lobes linear-lanceolate, ca. 2 × as long as tube, lower one

longest. Corolla purple, slightly longer than calyx; standard oblong, shortly clawed, auriculate; wings narrowly elliptic, slenderly clawed, one with auricle; keel oblong, long clawed, apex slightly curved. Ovary elliptic, with very pale brown hairs. Legume elliptic, 10–16 × 7–9 mm, sparsely pubescent, apex with small acute beak. Seeds 1 or 2, glossy black, orbicular. Fl. Jun–Sep, fr. Oct–Dec. $2n = 22$.

Disturbed meadows, roadsides, forest margins; 200–1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

The glands on the fruit are separated after drying and are used as a purple or orange dye.

9. *Flemingia mengpengensis* Y. T. Wei & S. K. Lee, *Guihaia* 5: 167. 1985.

勐板千斤拔 meng ban qian jin ba

Shrubs, erect, ca. 1 m tall. Branchlets robust, densely adpressed villous. Leaves digitately 3-foliolate; stipules lanceolate, up to 2 cm, densely adpressed villous, apex long acuminate, deciduous; petiole 6–13 cm, wingless, adpressed villous; petiolules 5–7 mm, densely hirsute; leaflets papery; terminal leaflet broadly elliptic to lanceolate, 12–19 × 5–10 cm, both surfaces densely adpressed villous, abaxial surface with sparse black sessile glands, basal veins 3, lateral veins 7–13 pairs, base rounded to broadly cuneate, apex acuminate, with slender mucro; lateral leaflets smaller, obliquely lanceolate to obliquely elliptic. Raceme axillary, in clusters of 3–6, ca. 3 cm; peduncle absent. Flowers 1.7–2.1 cm, densely clustered; bracteoles ovate to ovate-elliptic, 4–5 mm; pedicel 2–4 mm. Calyx 15–17 mm, densely hirsute; tube ca. 3 mm; lobes linear-lanceolate, lower one longest. Corolla subequal to calyx; standard suborbicular, ca. 11 mm, clawed, auriculate; wings similar to standard, ca. 9 mm, clawed, one with auricle; keel subobovate, long clawed, apex obtuse. Ovary elliptic, sparsely pubescent; style linear, glabrous. Legume obliquely elliptic, 10–12 × ca. 7 mm, apex shortly beaked, curved. Seeds 1 or 2, black, orbicular. Fl. Jan.

• Mixed forests; 500–600 m. Yunnan.

10. *Flemingia wallichii* Wight & Arnott, *Prodr. Fl. Ind. Orient.* 242. 1834.

云南千斤拔 yun nan qian jin ba

Flemingia yunnanensis Franchet; *Maughania wallichii* (Wight & Arnott) Kuntze; *M. yunnanensis* (Franchet) H. L. Li.

Shrubs, erect, ca. 1 m tall. Branchlets obviously lenticellate, densely tomentose. Leaves digitately 3-foliolate; stipules deciduous; petiole 3–7 cm, wingless or narrowly winged, pubescent or tomentose; petiolules 2–4 mm, densely gray villous; leaflets almost leathery; terminal leaflet obovate or elliptic, 7–14 × 3–4 cm, basal veins 3, lateral veins 4–8 pairs, base cuneate, apex shortly acuminate or obtuse; lateral leaflets subequal to terminal leaflet, obliquely lanceolate to obliquely elliptic. Raceme solitary or sometimes branched from base; inflorescence axis densely tomentose; bracts elliptic, 4–5 × 1–2 mm, pubescent, persistent or deciduous. Flowers 7–8 mm, clustered; pedicel 1–2 mm. Calyx 5–6 mm, densely clothed with silky hairs;

lobes lanceolate, usually slightly longer than tube. Corolla white or yellowish, longer than calyx; standard suborbicular, ca. 6 mm, extremely short clawed, with slender auricle and callosity; wings oblong, ca. 4 mm, one with short acute auricle; keel slightly curved, wider than wings. Legume obliquely elliptic, ca. 10 × 6 mm, with dense very pale brown hairs and dark brown sessile glands, apex shortly beaked. Seeds usually 2, black, orbicular. Fl. and fr. Jan–Apr.

Mountain slopes, roadsides, forests; 1600–1900 m. Yunnan [India, Laos, Myanmar, Vietnam].

11. *Flemingia grahamiana* Wight & Arnott, *Prodr. Fl. Ind. Orient.* 242. 1834.

绒毛千斤拔 rong mao qian jin ba

Flemingia pycnantha Bentham; *F. rhodocarpa* Baker; *F. sericans* Kurz; *Maughania grahamiana* (Wight & Arnott) Kuntze; *M. rhodocarpa* (Baker) Hauman.

Shrubs, erect, usually many branched. Branchlets obviously lenticellate, densely tomentose. Leaves digitately 3-foliolate; stipules lanceolate or elliptic-lanceolate, ca. 1 cm, deciduous; petiole 1.5–6 cm; petiolules 1–3 mm; leaflets papery; terminal leaflet elliptic, elliptic-lanceolate, or rarely obovate, 2–6 × 1.5–2.5 cm, densely hairy, lateral veins flat or sometimes slightly concave, base cuneate, apex acuminate, acute, or sometimes obtuse with slender mucro; lateral leaflets smaller, obliquely lanceolate to obliquely elliptic, base obliquely rounded, apex obtuse or acuminate. Raceme axillary or terminal, simple or branched, 1–3.5 cm; inflorescence axis densely gray villous. Flowers 0.6–1 cm, clustered; pedicel 1–2 mm. Standard oblong, ca. 8 mm, base with claw and auricles; wings narrow, long and curved, slightly shorter than standard, slenderly clawed, auriculate; keel falcate, clawed, apex obtuse. Ovary elliptic, subsessile; style long, linear. Legume elliptic, ca. 10 × 6 mm, sparsely pubescent and with dense dark red glands, apex oblique, with small acute mucro, usually with persistent corolla. Seeds 1 or 2, black, suborbicular, ca. 2 mm in diam. Fl. Feb–Apr, fr. Feb–Oct.

Forests, mountain slopes; 900–1600 m. Yunnan [India, Laos, Myanmar, Vietnam; Africa, SW Asia (Yemen)].

The glands on the fruit are separated after drying and used as a purple or orange dye.

12. *Flemingia kweichowensis* Tang & F. T. Wang ex Y. T. Wei & S. K. Lee, *Guihaia* 5: 165. 1985.

贵州千斤拔 gui zhou qian jin ba

Shrubs, erect. Branchlets obviously ribbed, densely clothed with adpressed hairs. Leaves digitately 3-foliolate; stipules ovate-lanceolate, ca. 2 cm, adpressed hairy, apex long acuminate, deciduous; petiole 2.5–4.5 cm, narrowly winged, adpressed hairy; petiolules 1–2 mm, densely hairy; leaflets papery, subequal; terminal leaflet oblong to oblong-lanceolate, 6.5–10 × 1.8–3.5 cm, abaxial surface with black sessile glands, glabrous or almost glabrous except for veins, basal veins 2, lateral veins 7–9 pairs, base unequal at 2 sides, apex acuminate. Raceme axillary, 3–5.5 cm; bracts lanceolate, 6–8 mm, deciduous; peduncle ca. 1.5 mm. Flowers clustered. Calyx 5-lobed, densely

adpressed hairy; lobes linear-lanceolate, much longer than tube, densely covered with black glands, lower one longest, ca. 1 cm. Corolla yellowish green, petals subequal; standard oblong, ca. 8 mm, base acuminate, auricles toothlike; wings narrowly elliptic, long clawed, one with acute auricle; keel elliptic, slightly curved, wider than wings, long clawed, apex obtuse. Legume elliptic, purple, ca. 8 × 6 mm, pubescent, inflated, with dense black glands. Seeds 1 or 2, black, suborbicular, ca. 1.5 mm in diam. Fl. and fr. Sep–Oct.

• Roadsides, disturbed slopes. Guizhou, Yunnan.

13. *Flemingia prostrata* Roxburgh, Fl. Ind., ed. 1832, 3: 338. 1832.

千斤拔 qian jin ba

Flemingia philippinensis Merrill & Rolfe; *Maughania philippinensis* (Merrill & Rolfe) H. L. Li; *M. prostrata* (Roxburgh) Mukerjee.

Subshrubs, erect. Young branchlets trigonous-prismatic, densely pubescent. Leaves digitately 3-foliolate; stipules linear-lanceolate, 0.6–1 cm, hairy, deciduous; petiole 1.5–2.5 cm, densely pubescent; petiolules extremely short, densely pubescent; terminal leaflet oblong or ovate-lanceolate, 4–7 × 1.5–3 cm, thickly papery, sparsely pubescent, basal veins 3, base rounded, apex obtuse, sometimes with small mucro; lateral leaflets slightly smaller, oblique. Raceme axillary, usually 2–2.5 cm, densely pale villous; bracts narrowly ovate-lanceolate; peduncle short. Flowers clustered. Calyx lobes lanceolate, much longer than tube. Corolla purple, subequal to calyx; standard oblong, shortly clawed, inconspicuously auriculate; wings falcate, clawed, both auriculate; keel elliptic, slightly curved, clawed, with acute auricle on one side. Ovary hairy. Legume elliptic, 6–8 × 5–6 mm, pubescent, compressed. Seeds 2, black, suborbicular. Fl. Mar–Jun, fr. May–Oct.

Open fields, grasslands; below 100–300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Bangladesh, India, Japan (Ryukyu Islands), Myanmar].

Flemingia prostrata is used medicinally.

14. *Flemingia procumbens* Roxburgh, Fl. Ind., ed. 1832, 3: 338. 1832.

矮千斤拔 ai qian jin ba

Flemingia vestita Baker; *Maughania procumbens* (Roxburgh) Mukerjee; *M. vestita* (Baker) Kuntze.

Herbs, perennial; roots tuberous. Stems prostrate, to 60 cm, densely pubescent. Leaves digitately 3-foliolate; stipules ovate, 4–8 mm, persistent; petiole 1–2 cm, wingless, pubescent;

petiolules short, densely hairy; leaflets papery; terminal leaflet oblong or nearly obovate, 1–5 × 0.5–2.5 cm, both surfaces sparsely pubescent or almost glabrous, abaxial surface with dense dark red glands, basal veins 3, lateral veins 3–5 pairs, apex and base rounded or almost so; lateral leaflets obliquely elliptic, slightly smaller. Raceme axillary or terminal, 2–10 cm, densely pubescent; bracts lanceolate, ca. 5 mm, striate. Flowers ca. 6 mm, clustered; pedicel ca. 1 mm. Calyx 5-lobed; lobes linear-lanceolate, lower one longest, longer than tube. Corolla slightly longer than calyx; standard elliptic, base with claw and auricles at 2 sides; wings narrowly oblong, base with claw and auricle at one side; keels falcate, clawed. Ovary elliptic, sparsely hairy; style linear, glabrous. Legume elliptic, ca. 5 × 4 mm, sparsely shortly villous and black glandular. Fl. Aug–Sep.

Mountain slopes. Sichuan, Yunnan [India, Laos, Nepal, Philippines, Vietnam].

Flemingia procumbens is cultivated as a minor root tuber crop in India.

15. *Flemingia involucrata* Benth in Miquel, Pl. Jungh. 246. 1852.

总苞千斤拔 zong bao qian jin ba

Flemingia capitata Zollinger; *Maughania involucrata* (Benth) Kuntze.

Shrubs, erect, 0.6–1.2 m tall. Branchlets slightly robust, almost cylindric, sometimes zigzag, usually densely densely villous. Leaves digitately 3-foliolate; stipules 0.5–1.5 cm, dry membranous, brown, deciduous; petiole 5–15 mm, wingless, densely villous; petiolules 1–2 mm, hairy; leaflets oblong to lanceolate, 4–8.5 × 1–3.5 cm, papery or almost leathery, glabrous or sometimes sparsely villous, abaxial surface with black glands, lateral veins 8–12 pairs, almost parallel, obviously convex abaxially, base cuneate or slightly oblique, apex shortly acuminate to acute. Inflorescence axillary or terminal, congested into head, 2–3 cm in diam., enclosed by involucre of bracts; bracts many, lanceolate or ovate-lanceolate, 1.5–2 × ca. 0.5 cm, leathery, whitish villous, apex acuminate. Pedicel extremely short. Calyx 12–15 mm, densely whitish villous; tube extremely short; lobes linear-lanceolate, apex long acuminate. Corolla purple to pale blue, included; standard obovate-elliptic, villous, shortly clawed, with auricles at 2 sides; wings small, obovate-oblong, clawed; keel slightly curved, long clawed. Ovary elliptic, hairy; style glabrous. Legume yellowish green, elliptic. Seed usually 1. Fl. Dec–May.

Slopes, disturbed grasslands; 500–1000 m. Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam; Australia].

96. *ERYTHRINA* Linnaeus, Sp. Pl. 2: 706. 1753.

刺桐属 ci tong shu

Sa Ren (萨仁); Michael G. Gilbert

Trees or shrubs [or perennial herbs], branches with prickles. Leaves pinnately 3-foliolate; stipules small; stipules fleshy and glandular; leaflets sometimes with stellate hairs. Inflorescence axillary or terminal, racemelike, noded, 2- or more flowered. Flowers conspicuous; bracts and bracteoles mostly deciduous. Calyx spathaceous, campanulate, or turbinate, truncate or 2-lobed. Corolla

often red or orange, usually longer than calyx; petals extremely unequal; standard large, rounded or oblong, often folded longitudinally, erect or spreading, subsessile or long clawed, without appendages; wings short, sometimes absent; keels much shorter than standard. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary stipitate; ovules 2 to many; style inflexed; stigma small, terminal. Legume stipitate, mostly linear-oblong, often curved, dehiscent along ventral suture, rarely indehiscent, mostly leathery or woody, often constricted between seeds, not septate. Seeds 1–14, white, gray, or brown, rarely red with dark spots, ovoid; hilum lateral, oblong, without strophiole.

More than 100 species: tropics and subtropics; four species in China.

Erythrina corallodendron Linnaeus and *E. crista-galli* Linnaeus, and to a lesser extent *E. caffra* Thunberg, *E. humeana* Sprengel, *E. lysistemon* Hutchinson, and *E. speciosa* Andrews, have been introduced into China as ornamentals.

1a. Calyx spathaceous, splitting on one side.

2a. Keels and wings subequal; stem prickles minute, usually black 3. *E. variegata*

2b. Keels much longer than wings; stem prickles whitish 4. *E. stricta*

1b. Calyx campanulate or turbinate, lobes truncate or 2-lobed.

3a. Keels subequal to wings; legume with seeds only toward apex 2. *E. subumbrans*

3b. Keels longer than wings; legume with seeds uniformly distributed along length.

4a. Leaflets 8–20(–25) cm; terminal leaflet usually reniform 1. *E. arborescens*

4b. Leaflets 5–15 cm; terminal leaflet not reniform.

5a. Leaflets rhomboid-ovate; seed red with black spots *E. corallodendron*

5b. Leaflets ovate or lanceolate-elliptic; seed gray or bright brown *E. crista-galli*

1. *Erythrina arborescens* Roxburgh, Pl. Coromandel 3: 14. 1811.

鹦哥花 ying ge hua

Corallodendron arborescens (Roxburgh) Kuntze.

Trees. Trunk and branches with prickles. Stipules small; petiole longer than leaflets, without or with a few prickles; terminal leaflet reniform, 8–20(–25) cm, both surfaces glabrous, base truncate or almost cordate, margin entire, apex acute; lateral leaflets obliquely broadly cordate. Raceme solitary in axil of terminal leaf, erect, longer than leaves. Flowers in clusters of 3, red, pendulous; bract 1, ovate. Calyx turbinate, truncate or unequally 2-lobed. Corolla red; standard subovate, boat-shaped, ca. 3.2 cm; wings obliquely ovate, shorter than keels; keels ca. 1/2 as long as stamens. Filament slightly shorter than standard, connate near base. Ovary long stipitate; style as long as stamens. Legume curved, 12–19 × 2–3 cm, with obvious beak and stipe. Seeds 5–10, white or brown, reniform, ca. 2 cm. Fl. Jul–Sep, fr. Aug–Feb. $2n = 42$.

Mountain valleys, grassy slopes; 400–2100 m. Guizhou, Hainan, Sichuan, Xizang, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Thailand].

Erythrina arborescens is used for ornament, timber, and medicine.

“*Erythrina tienensis*” (F. T. Wang & Tang, Ill. Treatm. Princ. Pl. China, 654. 1995) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

2. *Erythrina subumbrans* (Hasskarl) Merrill, Philipp. J. Sci., C, 5: 113. 1910.

翅果刺桐 chi guo ci tong

Hypaphorus subumbrans Hasskarl, Hort. Bogor. Descr. 198. 1858; *Erythrina secundiflora* Hasskarl (1848), not Brotero (1824); *H. subumbrans* var. *aculeata* Hasskarl; *H. subumbrans* var. *inermis* Hasskarl.

Trees, 12–15 m tall. Trunk up to 60 cm d.b.h., with robust prickles. Leaves pinnately 3-foliolate; stipules ovate, deciduous;

petiole 10–12 cm, without prickles; petiolules ca. 7 mm; leaflets ovate-triangular, 10–15 cm × 7–10 mm, membranous, both surfaces glabrous, lateral veins 7 on each side, obviously convex abaxially, base rounded or broadly cuneate, margin entire, apex acuminate. Raceme 7–10 cm. Flowers ca. 4 cm. Calyx campanulate, 2-lobed, silky hairy. Standard scarlet, elliptic, 5–6 cm, apex obtuse, shortly clawed; wings obovate; keels subequal to wings. Ovary glabrous. Legume ca. 15 × 2.5 cm, with seeds restricted to apical part, indehiscent. Seeds 1–3, black. Fl. Aug–Oct, fr. to next Mar.

Forests; 300–600 m. Yunnan [East Timor, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; Indian Ocean islands (Mauritius)].

This plant is used for ornament, food, and green fertilizer.

3. *Erythrina variegata* Linnaeus, Herb. Amboin. 10. 1754.

刺桐 ci tong

Corallodendron orientale (Linnaeus) Kuntze; *Erythrina corallodendron* Linnaeus var. *orientalis* Linnaeus; *E. indica* Lamarck; *E. loureiroi* G. Don [“*loureiri*”]; *E. orientalis* (Linnaeus) Murray; *E. variegata* var. *orientalis* (Linnaeus) Merrill.

Trees, up to 20 m tall. Bark dark brown. Branches with obvious, black, straight and minute prickles; core pulpy. Leaves pinnately 3-foliolate, usually clustered at branch tip; stipules lanceolate, deciduous; petiole 10–15 cm, usually without prickles; leaflets broadly ovate or rhomboid-ovate, 15–30 × 15–30 cm, membranous, both surfaces glabrous, basal veins 3, lateral veins 5 pairs, base broadly cuneate or truncate, margin entire, apex acuminate to obtuse; base of leaflet with a pair of glands similar to stipules. Raceme terminal, 10–16 cm; peduncle robust, woody, 7–10 cm, pubescent; flowers paired. Calyx spathe-like, 2–3 cm, mouth oblique, split on one side. Corolla red, 6–7 cm; standard elliptic, 5–6 × ca. 2.5 cm, apex obtuse, shortly clawed; wings and keels subequal; keel petals separate. Ovary micro-villous; style glabrous. Legume black, reniform, ca. 1.5 × 1 cm. Seeds puniceous, oblong or oblong-ellipsoid. Fl. Feb–May, fr. Apr–Aug. $2n = 42$.

Fujian, Guangdong, Guangxi, Hainan, Taiwan [Bangladesh, Cambodia, India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands; introduced to Africa and Central and South America].

Erythrina variegata is used as an ornamental and for timber and medicine.

4. *Erythrina stricta* Roxburgh, Fl. Ind., ed. 1832, 3: 251. 1832.

劲直刺桐 jin zhi ci tong

Trees, 7–12 m tall. Trunk straight. Branches with short whitish prickles. Leaves pinnately 3-foliolate; stipules deciduous; petiole 12–15 cm, rarely with prickles; terminal leaflet broadly triangular, almost rhomboid, or broadly reniform-oblate, 7–19 × 7–24.5 cm, both surfaces glabrous, lateral veins 5–8 pairs, base nearly cordate, truncate, or broadly cuneate, margin entire, apex acute or caudate with mucro 10–15 mm. Raceme ca. 15 cm, flowers in clusters of 3 or 4. Calyx spathe-like, undivided or apex slightly 2-lobed. Corolla red; standard elliptic-lanceolate or ovate-triangular, erect, 3–4.5 cm, subsessile; wings subobovate, 6–8 mm, shorter than calyx; keels much longer than wings. Ovary hairy, stipitate; style narrow, glabrous. Legume 7–12 × 0.7–1.5 cm, glabrous. Seeds 1–3 or more, light or dark brown, reniform. Fl. Mar–Jul, fr. Apr–Sep. $2n = 42$.

Forests by rivers, mountain slopes; ca. 1400 m. Guangxi, Xizang, Yunnan [Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

- 1a. Prickles usually dense; leaflet 7–15 cm long and wide 4a. var. *stricta*

- 1b. Prickles usually sparse; leaflet 17–19 × 21–24.5 cm 4b. var. *yunnanensis*

4a. *Erythrina stricta* var. *stricta*

劲直刺桐(原变种) jin zhi ci tong (yuan bian zhong)

Micropteryx stricta (Roxburgh) Duchassaing & Walpers.

Trees, 7–12 m tall. Branches with many prickles. Terminal leaflet broadly triangular or almost rhomboid, 7–15 × 7–15 cm, both surfaces glabrous, lateral veins 5 or 6 pairs, base truncate or nearly cordate, margin entire, apex acute. Raceme with flowers in clusters of 3. Seeds light brown. $2n = 42$.

Sparse forests by rivers. Guangxi, Xizang, Yunnan [Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

4b. *Erythrina stricta* var. *yunnanensis* (T. S. Tsai & T. T. Yu ex S. K. Lee) R. Sa, Novon 16: 267. 2006.

云南刺桐 yun nan ci tong

Erythrina yunnanensis T. S. Tsai & T. T. Yu ex S. K. Lee, Guihaia 13: 101. 1993.

Trees, ca. 7 m tall. Branches with few prickles. Terminal leaflet broadly reniform-oblate, 17–19 × 21–24.5 cm, lateral veins 7 or 8 pairs and convex, base broadly cuneate, apex caudate, mucro 10–15 mm; petiolules 11–15 cm; lateral leaflets oblate, 17–18 × 7–21 cm, base almost truncate to broadly cuneate, apex with short mucro. Raceme with flowers in clusters of 3 or 4. Legume compressed, without obvious constriction between seeds. Seeds dark brown.

- Mountain slopes; ca. 1400 m. Yunnan.

97. DYSOLOBIUM (Benth) Prain, J. Asiat. Soc. Bengal, Pt. 2., Nat. Hist. 66: 425. 1897.

镰瓣豆属 lian ban dou shu

Sa Ren (萨仁); Michael G. Gilbert

Phaseolus sect. *Dysolobium* Benth in Miquel, Pl. Jungh. 239. 1852.

Herbs or woody vines, twining. Leaves pinnately 3-foliolate, stipulate. Inflorescence axillary, racemose; nodes swollen. Calyx campanulate, 4-lobed; lowest lobe lanceolate, longer than others, shorter than tube, upper 2 connate. Corolla usually purple with reddish or blue striations; standard usually large, circular, base clawed; wings almost equal to applanate part of keels, obovate or elliptic, upper auricle longer, lower short, stipe slender; keels sometimes obviously curved upward, beaked. Stamens diadelphous; vexillary stamen free. Ovary sessile, with silky hairs; stigma slender, curved upward, with perichaetial cirrus at base. Legume slender, dehiscent along sutures, woody, slightly compressed, tomentose, obliquely septate between seeds. Seeds pitch-black or black, oblong or orbicular, glabrous or shortly villous; hilum oblong; aril with 2 unequal valvules.

About four species: India and SE Asia; two species in China.

- 1a. Woody vines; terminal leaflet suborbicular to rhomboid-ovate; corolla ca. 3 cm 1. *D. grande*
1b. Herbaceous vines; terminal leaflet narrowly ovate or triangular-ovate; corolla less than 1.5 cm 2. *D. pilosum*

1. *Dysolobium grande* (Wallich ex Benth) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 427. 1897.

镰瓣豆 lian ban dou

Phaseolus grandis Wallich ex Benth in Miquel, Pl. Jungh. 239. 1852; *Canavalia grandis* (Wallich ex Benth) Kurz; *Mucuna chienkweiensis* G. Z. Li [“*ckienkweiensis*”].

Vines, woody, twining, up to 5 m. Leaves pinnately 3-

foliolate; stipules lanceolate, ca. 6 mm, densely villous; petiole 9–12 cm; terminal petiolule ca. 7 mm, densely white villous; leaflets subequal, both surfaces sparsely minutely villous, lateral veins 4–6 pairs; terminal leaflet suborbicular to rhomboid-ovate, 12–19.5 × 9–16 cm, base rounded to obtuse, apex acute; lateral leaflets subequal at both sides, oblique, base nearly truncate, apex shortly acuminate. Raceme axillary, up to 40 cm, shortly villous, upper part with many flowers. Flowers solitary or 2 or 3 clustered; bracteoles subtriangular, ca. 4 mm

long and wide, deciduous. Calyx campanulate, exterior densely pubescent, 5-lobed; upper 2 lobes connate, middle lower lobe ca. 6 mm, laterals small; tube ca. 8 mm. Corolla purplish blue; standard broadly ovate, ca. 3 × 2.6 cm, apex emarginate, slightly reflexed, shortly clawed and with auricle at base; wings obovate, ca. 2 × 1.2 cm, apex obtuse, base acuminate, with auricles, ca. 2 mm; keels falcate, subovate, base wider, upper acuminate, near base with a triangular dentiform auricle, clawed. Stamens subequal, ca. 5 cm. Style ca. 2 cm; stigma hairy at base. Legume succulent, 12–16 × ca. 2 cm, densely shortly gray villous, apex shortly beaked, slightly jointed between seeds, dehiscent along 2 sutures. Seeds 2–10, dark brown, oblong, ca. 10 × 6 mm; hilum oblong, ca. 0.3 × 0.2 cm. Fl. Jul–Oct, fr. Aug–Nov.

Hill slopes, mountain valleys, damp land, forest margins, riversides; 300–500 m. Guizhou, Yunnan [India, Myanmar, Nepal, Thailand].

2. *Dysolobium pilosum* (Klein ex Willdenow) Maréchal, Bull. Jard. Bot. Natl. Belg. 47: 483. 1977.

毛镰瓣豆 mao lian ban dou

Dolichos pilosus Klein ex Willdenow, Sp. Pl. 3: 1043. 1800; *D. rhombifolius* (Hayata) Hosokawa; *Dolichovigna formosana* Hayata; *D. pilosa* (Klein ex Willdenow) Niyomdham;

D. rhombifolia Hayata; *Vigna pilosa* (Klein ex Willdenow) Baker.

Vines, herbaceous, twining. Leaves pinnately 3-foliolate; stipules deciduous; petiole 1.5–6 cm; terminal petiolule 5–12 mm, densely white villous; leaflets subequal, both surfaces villous, lateral veins 3 or 4 pairs; terminal leaflet narrowly ovate or triangular-ovate, 4–16 × 2–6 cm, base obtuse, apex acuminate; lateral leaflets subequal at both sides, oblique, base almost truncate, apex acuminate. Raceme axillary, 2–7 cm, upper part with many flowers. Calyx broadly campanulate, exterior densely pubescent, 5-lobed; upper 2 lobes connate, middle lower lobe ca. 4 mm, laterals small; tube ca. 4 mm. Standard broadly ovate, ca. 1.4 × 1.6 cm, apex emarginate, slightly reflexed, shortly clawed and with auricle at base; wings obovate, ca. 2 × 1.2 cm, apex obtuse, emarginate, base clawed, with auricles, ca. 1 mm; keels falcate, base wider, upper acute, near base with a triangular dentiform auricle, clawed. Stamens subequal, ca. 1.8 cm. Style ca. 1 cm. Legume 7–13 × 0.6–0.8 cm, leathery, densely brown villous, apex beaked, dehiscent along 2 sutures. Seeds 5–12, black, oblong, 5–6 × 3–4 mm; hilum oblong. Fl. Sep–Oct, fr. Oct–Nov.

Open forests; near sea level to 700 m. Taiwan [Bhutan, Cambodia, India, Laos, Philippines, Thailand, Vietnam].

98. PSOPHOCARPUS Necker ex Candolle, Prodr. 2: 403. 1825, nom. cons.

四棱豆属 si leng dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Botor Adanson.

Herbs, climbing or prostrate, rarely erect, with tubers. Leaves pinnately 3-foliolate; stipules produced below point of insertion; leaflets stipellate. Flowers solitary or in axillary racemes with swollen nodes. Bracts small, very caducous; bracteoles larger, membranous, persistent for a time. Calyx 5-toothed, 2 upper teeth connate into entire or bifid lip. Corolla lilac or violet, exserted from calyx; standard suborbicular, appendaged with basal auricles; wings obliquely obovate; keel incurved at apex, obtuse. Vexillary stamen free at base, connate with tube in middle; anthers uniform, 5 basifixed alternating with 5 dorsifixed. Ovary shortly stipitate; ovules 3–21; style incurved; stigma globose, densely penicillate-villous. Legumes oblong, 4-winged lengthwise, septate between seeds. Seeds ovate or oblong-elliptic, with or without aril.

About 10 species: distributed in tropical regions of the Old World; one species (introduced) in China.

1. *Psophocarpus tetragonolobus* (Linnaeus) Candolle, Prodr. 2: 403. 1825.

四棱豆 si leng dou

Dolichos tetragonolobus Linnaeus, Syst. Nat., ed. 10, 2: 1162. 1759; *Botor tetragonolobus* (Linnaeus) Kuntze.

Herbs, annual or perennial, climbing, with tubers. Stems 2–3 m or more, glabrous. Stipules dorsifixed, ovate to lanceolate, 0.8–1.2 cm; petiole sulcate; leaflets ovate-deltoid, 4–15 × 3.5–12 cm, base truncate or rounded, apex acute or acuminate. Racemes axillary, 1–10 cm, 2–12-flowered; peduncles 5–15 cm; bracteoles suborbicular, 2.5–4.5 mm in diam. Calyx cam-

panulate, ca. 1.5 cm. Standard green outside, pale blue inside, ca. 3.5 cm in diam., base appendaged, apex emarginate; wings pale blue, ca. 3 cm, with T-shaped auricle at middle of claw; keel white tinged with pale blue, slightly incurved with rounded auricle at base. Legumes yellow-green or green, sometimes with red spots, tetragonal, 10–25(–40) × 2–3.5 cm, wings 0.3–1 cm wide with serrate margins. Seeds 8–17, white, yellow, brown, black, or variegated, subglobose, 0.6–1 cm in diam., shining, margin arillate. Fr. Oct–Nov.

Cultivated. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [native perhaps to tropical Asia; cultivated throughout the tropics].

This species is used for food; parts are eaten as vegetables.

99. CALOPOGONIUM Desvaux, Ann. Sci. Nat. (Paris) 9: 423. 1826.

毛蔓豆属 mao man dou shu

Sun Hang (孙航); Mats Thulin

Herbs, twining or procumbent. Stems somewhat woody at base. Leaves pinnately 3-foliolate, stipulate; leaflets stipellate. Ra-

cemes axillary. Flowers small or moderately large, clustered at nodes of inflorescence rachis. Pedicels very short; bracts and bracteoles small, deciduous. Calyx campanulate or tubular; teeth 5, upper 2 ± connate. Corolla blue or purple; standard obovate, with 2 incurved auricles at base; wings narrow, auriculate, adnate to keel; keel shorter than wings, blunt and slightly curved. Stamen opposite to standard, free, others connate. Ovary sessile, many ovuled; style filiform; stigma capitate, small and terminal. Legumes linear or oblong, dehiscent, slightly compressed or biconvex, transversely corrugated between seeds. Seeds rounded, slightly compressed, without strophiole.

Five or six species: tropical and subtropical America and the Antilles; one species (introduced) in China.

1. Calopogonium mucunoides Desvaux, Ann. Sci. Nat. (Paris) 9: 423. 1826.

毛蔓豆 mao man dou

Herbs, twining or procumbent, densely hirsute with spreading fulvous hairs. Stipules triangular-lanceolate, 4–5 mm; petiole 4–12 cm; stipels subulate; terminal leaflet ovate-rhombic, lateral ones obliquely ovate, 4–10 × 2–5 cm, broadly cuneate to rounded at base, acute or blunt at apex. Inflorescences 1–10 cm; flowers 5 or 6, clustered at nodes of rachis; bracts and

bracteoles linear-lanceolate, ca. 5 mm. Calyx tube glabrescent; lobes longer than tube, linear-lanceolate, densely appressed hirsute, long acuminate at apex. Corolla purplish; wings obovate-oblong; keel straight, with short auricles. Ovary densely hirsute. Legumes linear-oblong, 2–4 cm × ca. 4 mm, straight or slightly curved, with appressed long brown bristles, 5- or 6-seeded. Seeds ca. 2.5 × 2 mm. Fl. Oct.

Cultivated. S Guangdong, S Guangxi, Hainan, Taiwan, Yunnan (Xishuangbanna) [native to tropical America].

100. PACHYRHIZUS Richard ex Candolle, Prodr. 2: 402. 1825, nom. cons.

豆薯属 dou shu shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Cacara Thouars.

Vines, perennial, twining or erect, with fleshy tubers. Leaves pinnately 3-foliolate, stipulate; leaflets large, stipellate, ovate or rhomboid, entire or sinuately lobed. Racemes or panicles axillary, rachis often nodose. Bracts caducous; bracteoles small, subsistent or minute and caducous. Calyx 2-lipped, upper lip emarginate, lower 3-toothed. Corolla violet or white, exerted from calyx; standard broadly obovate, appendaged with 2 inflexed auricles; wings oblong or falcate, often adherent to middle of keel; keel sometimes beaked, subequal to wings. Stamens diadelphous; vexillary stamen free at base, connate with tube in middle; anthers uniform. Ovary many ovuled, hirsute, hairs extending up style, forming a false beard; style filiform, inflexed adaxially; stigma lateral to subterminal. Legumes linear-oblong, constricted between seeds. Seeds compressed, suborbicular or transversely oblong.

Five species: distributed in tropical America; one species (introduced) in China.

1. Pachyrhizus erosus (Linnaeus) Urban, Symb. Antill. 4: 311. 1905.

豆薯 dou shu

Dolichos erosus Linnaeus, Sp. Pl. 2: 726. 1753; *Pachyrhizus angulatus* Richard ex Candolle, nom. illeg. superfl.

Vines, robust, twining. Root tubers 10–20 cm in diam. Leaflets rhombic or ovate, 4–18 × 4–20 cm, upper margin often somewhat dentate or lobed, lateral ones very oblique, sparsely pubescent abaxially. Racemes axillary, 15–30 cm; flowers 3–5

at thickened nodes. Calyx campanulate, 9–11 mm, adpressed pilose. Corolla purplish or pink; standard suborbicular, 15–20 mm, with yellow-green spot and 2 thickenings near base; wings falcate, auriculate; keel subfalcate, 15–20 mm. Ovary yellowish hirsute; style curved. Legumes 7.5–13 × 1.2–1.5 cm, compressed, hirsute. Seeds 8–10, subsquare. Fl. Aug, fr. Nov.

Cultivated. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Sichuan, Taiwan, Yunnan [native to tropical America; widely cultivated in tropical regions].

This species is used as a vegetable.

101. TEYLERIA Backer, Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 107. 1939.

琼豆属 qiong dou shu

Sun Hang (孙航); Mats Thulin

Herbs, perennial, twining. Stems 4-angled, angles with descending brown hairs. Leaves pinnately 3-foliolate; stipules ovate, tapering, longitudinally striate, persistent; stipels small, persistent. Flowers small, arranged in axillary racemes, with irregular branches at lower part of inflorescence; bract at base of pedicel persistent, lanceolate; bracteoles at base of calyx persistent. Calyx membranous, campanulate, 5-lobed; calyx teeth lanceolate, equal to calyx tube or slightly longer, upper pair often connate. Corolla slightly exerted; standard obovate, large, shortly clawed, not auriculate; wings narrowly oblong, with long claw, adnate to keel; keel blunt, with long beak at apex, with long claw at base, subequal to wings. Stamens monadelphous. Ovary sessile, 6–8-ovuled; style short, curved; stigma small, capitate. Legumes linear, flattened, slightly curved, shortly beaked at apex; valves transversely impressed between seeds. Seeds 4–8, strophiolate.

Three species: China, Indochina, Indonesia, Philippines; one species in China.

1. *Teyleria koordersii* (Backer ex Koorders-Schumacher) Backer, Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 108. 1939.

琼豆 qiong dou

Glycine koordersii Backer ex Koorders-Schumacher, Syst. Verz. 1(Fam. 128): 59. 1911.

Herbs, twining. Stems striate. Petiole 4–6 cm, grooved, strigose, glabrescent; stipels subulate; petiolule 3–4 mm, hirsute; leaflets papery, green or yellowish green after drying, terminal leaflet ovate, 6–14 × 2.5–7 cm, lateral leaflets smaller, obliquely ovate, 6–9 cm, tapering or acute at apex, often rounded at base, both surfaces glabrous or sparsely appressed hirsute, lateral

veins 3 or 4 pairs. Racemes axillary; peduncle 5–18 cm, angulate, retrorsely strigose. Flowers 5–20, congested; bracts lanceolate, 3–4 mm, crested; pedicel 1–2 mm, glabrescent, sometimes inflated at tip; bracteoles subulate, 2.5–3.5 mm, strigose. Calyx longitudinally striate, 5–5.5 mm; teeth narrowly lanceolate, equal to calyx tube or slightly longer, glabrous. Corolla white, 6–7 mm; wings and keel slightly purple at tip, not auriculate. Legumes linear, 3–3.5 cm × 3–4 mm, segments thinly leathery, appressed hirsute. Seeds brown, nearly square, ca. 3 mm long and wide, with short strophiole, scarious and ligulate. Fl. Nov–Dec.

Shrublands, open forests. Hainan [Indonesia (Java)].

102. *DUMASIA* Candolle, Ann. Sci. Nat. (Paris) 4: 96. 1825.

山黑豆属 shan hei dou shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs or climbing subshrubs, twining. Leaves pinnately 3-foliolate; stipules and stipels persistent. Inflorescence axillary, racemose; flowers medium-sized. Bracts and bracteoles small. Calyx tubular, mouth obliquely truncate, lobes inconspicuous or absent. Corolla yellow or light yellow, longer than calyx; petals all long clawed; standard usually obovate, rarely oblong or broadly elliptic, glabrous, with auricles; wings falcate-oblong, oblong, oblong-elliptic, or elliptic; keels usually slightly shorter than wings. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary shortly stipitate, linear; ovules 4 to many; style filiform, dilated and hollow near middle, apical part cylindrical, not barbate; stigma terminal, capitate. Legume linear, dehiscent, compressed, constricted between seeds, not septate, with persistent, membranous, cylindrical calyx at base. Seeds usually black or blue, subglobose; hilum short, central; aril not developed.

About ten species: S Africa, Asia; nine species (five endemic) in China.

- 1a. Leaflets almost cordate or reniform, base truncate to shallowly cordate; stem very slender 1. *D. cordifolia*
 1b. Leaflets ovate to almost orbicular, elliptic, oblong, or triangular, base broadly cuneate to nearly truncate; stem slender or robust.
 2a. Stems glabrous.
 3a. Leaflets abaxially gray adpressed hairy; raceme 5–13 cm 8. *D. nitida*
 3b. Leaflets abaxially glabrous; raceme 1–4 cm.
 4a. Raceme 1–4 cm, densely flowered 5. *D. truncata*
 4b. Raceme 5–8 cm, loosely flowered 9. *D. miaoliensis*
 2b. Stems hairy.
 5a. Stems and leaflets with dense long branched hairs; legume not constricted between seeds 2. *D. hirsuta*
 5b. Stems and leaflets with adpressed unbranched hairs; legume sometimes constricted between seeds.
 6a. Bracts and bracteoles lanceolate, 4–7 mm; leaflets ovate, obovate, or suborbicular, sometimes broader than long 3. *D. forrestii*
 6b. Bracts and bracteoles setiform, 1–2 mm; leaflets distinctly longer than broad.
 7a. Leaflets adaxially densely adpressed villous; raceme 4–11(–15) cm 4. *D. villosa*
 7b. Leaflets adaxially glabrous; raceme 1–4 cm.
 8a. Petiolules 2–3 mm; leaflets 2.3–3.5 cm wide, abaxially glabrous 5. *D. truncata*
 8b. Petiolules ca. 1 mm; leaflets 1–2.3 cm wide, abaxially adpressed hairy.
 9a. Calyx glabrous or sparsely pubescent 6. *D. yunnanensis*
 9b. Calyx densely adpressed pubescent 7. *D. henryi*

1. *Dumasia cordifolia* Bentham ex Baker in J. D. Hooker, Fl. Brit. India 2: 183. 1876.

心叶山黑豆 xin ye shan hei dou

Herbs twining. Stems slender, 1–3 m, pubescent when young. Stipules small, lanceolate, 1–2 mm; petiole 0.2–2.6 cm; stipels small, setiform; petiolules slender, extremely short, absent on uppermost leaves, glabrous or pubescent; leaflets mem-

branous, almost cordate to reniform, 1–3 × 1.2–2.8 cm, abaxially glabrous or sparsely pubescent on midrib, reticulate veins slender, ± visible, base truncate or very shallowly cordate, apex subrounded or slightly concave, usually mucronate. Raceme axillary, slender, 2–7 cm, sparsely hairy or glabrous, 2- to many flowered; pedicels slender. Calyx ca. 5 mm, glabrous. Corolla light yellow, stipitate; standard obovate, auricles obtuse; wings and keels subequal. Ovary stipitate, glabrous; style enlarged,

compressed; stigma capitate. Legume oblanceolate to oblong, slightly curved, ca. $3 \times 0.4\text{--}0.6$ cm, shortly stipitate. Seeds 3–5, brown-black, reniform, ca. 3 mm. Fl. Aug–Sep, fr. Oct–Dec. $2n = 22$.

Sunny mountain slopes; 1200–2800 m. Sichuan, Xizang, Yunnan [E India].

2. *Dumasia hirsuta* Craib in Sargent, Pl. Wilson. 2: 116. 1914.

硬毛山黑豆 ying mao shan hei dou

Herbs twining. Stems 1–3 m, densely long hirsute. Stipules lanceolate, 4–6 mm, striate; petiole 4–9 cm, hirsute; petiolules 2–3 mm, ± hairy; stipels small, setiform; leaflets papery or herbaceous, almost ovate to broadly ovate, 4–6(–9) \times 2.7–7 cm, abaxially glabrous or hirsute, adaxially glabrous, lateral veins 4–6 pairs, base almost truncate, broadly cuneate, or almost rounded, margin slightly sinuate, apex obtuse, with slender mucro; lateral leaflets oblique. Raceme axillary, 5–7 cm, usually glabrous, terminally 2–4-flowered; bracts small, setiform. Flowers 1.4–1.8 cm; pedicel 1–2 mm. Calyx 5–7 mm, glabrous or sparsely adpressed hairy. Corolla yellow or light yellow; standard ca. 11×9 mm, claw ca. 7 mm; wings ca. 7 mm; keels ca. 5.5 mm. Ovary linear; ovules 4–7. Legume linear, compressed, ca. 6×1 cm, glabrous, base stipitate, with persistent calyx, apex with long beak. Seeds 4–7. Fl. and fr. Jun–Aug.

• Wet places, valleys; 700–1700 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan.

3. *Dumasia forrestii* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 247. 1912.

小鸡藤 xiao ji teng

Herbs twining. Stems glabrous, obviously ribbed. Stipules linear-lanceolate, 4–7 mm; petiole 2–11 cm; leaflets almost papery, equal or subequal, ovate, broadly ovate, or almost orbicular, 2–5 \times 2–4.8 cm, glabrous or with sparse short adpressed hairs, lateral veins 4–6 pairs, slender, apex rounded or cuneate, usually slightly concave or with mucro. Raceme axillary, 3–12 cm, glabrous or sparsely hairy, densely flowered; peduncle 2–6 cm; bracts 2, similar to stipules. Flowers 1.5–1.8 cm; bracteoles 2, similar to stipules, persistent; pedicel 1–3 mm. Calyx 5–8 mm. Corolla light yellow; wings falcate-oblong; keels similar to wings, with claw, auricle absent. Ovary stipitate, base with sheathing floral disk; style long and curved, upper part enlarged, glabrous; stigma capitate. Legume linear-oblong, slightly curved, 3–4 \times ca. 0.6 cm, glabrous, base acuminate, apex acuminate. Seeds usually 1 or 2. Fl. Aug–Sep, fr. after Oct.

• Mountain slopes; 1800–3200 m. Sichuan, Xizang, Yunnan.

Dumasia forrestii is used medicinally.

4. *Dumasia villosa* Candolle, Ann. Sci. Nat. (Paris) 4: 97. 1825.

柔毛山黑豆 rou mao shan hei dou

Apios martini H. Léveillé; *Dumasia bicolor* Hayata; *D. glaucescens* Miquel; *D. leiocarpa* Benth; *D. pubescens* Candolle; *D. villosa* var. *arunachalensis* Predeep & M. P. Nayar; *D. villosa* subsp. *bicolor* (Hayata) Hayata; *D. villosa* var. *leiocarpa* (Benth) Baker; *Erythrina mairei* H. Léveillé.

Herbs twining. Stems villous. Stipules small, linear-lanceolate or setiform, 2–3 mm, densely villous; petiole 3–5(–9.5) cm, densely hairy; petiolules 2–3 mm, hairy; leaflets papery; terminal leaflet ovate to broadly ovate, 3.5–5(–9) \times 2–3(–5) cm, both surfaces densely adpressed villous, lateral veins 4–6 pairs, base rounded, almost truncate or broadly cuneate, apex obtuse or slightly concave, with mucro; lateral leaflets slightly smaller and oblique. Raceme axillary, 4–11(–15) cm, flowers clustered or slightly sparse; peduncle obvious; bracts and bracteoles small, setiform. Flowers 1.5–1.8 cm; pedicel short, ca. 2 mm, pubescent. Calyx ca. 10 mm, glabrous or sparsely adpressed hairy. Corolla yellow; petals subequal, with obvious claws; standard obovate; wings and keels oblong-elliptic, with long claws, auricles absent. Style long, hairy, compressed near top; stigma capitate. Legume oblong, constricted between seeds, 2–3 \times ca. 0.5 cm, densely yellow villous. Seeds 1–4, black or blue. Fl. Sep–Oct, fr. Nov–Dec. $2n = 20$.

Mountain valleys, riversides; 400–2500 m. Guangxi, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australasia, Madagascar].

The seeds of *Dumasia villosa* contain oil.

5. *Dumasia truncata* Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 119. 1843.

山黑豆 shan hei dou

Herbs climbing and twining. Stems slender, 1–3 m, usually glabrous. Stipules small, linear-lanceolate, 2–4 mm, 3-veined; petiole slender, 3–7 cm, glabrous; petiolules 2–3 mm, glabrous; stipels setiform, ca. 1 mm; leaflets membranous, triangular or ovate-triangular, usually 3–6 \times 2.3–3.5 cm, both surfaces usually glabrous or sparsely hirsute abaxially, base truncate or rounded, apex ± rounded, sometimes slightly emarginate with mucro; lateral leaflets slightly smaller, base slightly oblique. Raceme axillary, slender, 1–4 cm, usually glabrous; peduncle short; bracts and bracteoles small. Flowers 1.2–2 cm; pedicel 1–3 mm. Calyx ca. 6 mm, glabrous. Corolla yellow or light yellow; standard elliptic to slightly obovate; wings and keels almost elliptic, slightly curved, slightly shorter than standard, with long claws, with a small auricle at base of one side. Ovary linear-oblong, glabrous; ovules 3–5; style slender, glabrous. Legume oblanceolate to lanceolate-elliptic, ca. 4×0.9 cm, slightly inflated, base acuminate, apex with beak. Seeds usually 2–5, blue, compressed, globose, 4–6 mm in diam. Fl. Aug–Sep, fr. Oct–Nov.

Mountain roadsides, wet places; 300–1000(–2300) m. Anhui, Fujian, Guangdong, Henan, Hubei, Jiangxi, Shaanxi, Zhejiang [Japan].

6. *Dumasia yunnanensis* Y. T. Wei & S. K. Lee, Guihaia 5: 159. 1985.

云南山黑豆 yun nan shan hei dou

Herbs perennial, twining. Stems slender, hirtellous. Petiole 1–8 cm, glabrous or sparsely pubescent; petiolules extremely short; stipels small, setiform; leaflets membranous or thinly papery, elliptic to elliptic-ovate, 2–4 \times 1.3–2.5 cm, abaxial surface with short adpressed hairs, adaxial surface almost glabrous, base broadly cuneate, rounded, or subtruncate, apex obtuse

or subrounded, slightly concave, with mucro. Raceme axillary, 1–3.5 cm, hirtellous, 3–6-flowered, rarely more; peduncle short; bracts and bracteoles extremely short, setiform; pedicel 1–2 mm. Calyx 5–8 mm, glabrous or sparsely pubescent. Corolla yellow; petals subequal; standard oblong; wings and keels elliptic, with long claws. Legume narrowly falcate, compressed, 3–5 × 0.3–0.6 cm, glabrous, apex with beak. Seeds 3 or 4. Fl. Aug–Oct.

- Mountains, roadsides, valleys; 1300–2500 m. Sichuan, Yunnan.

7. *Dumasia henryi* (Hemsley) R. Sa & M. G. Gilbert, **comb. nov.**

长圆叶山黑豆 chang yuan ye shan hei dou

Basionym: *Rhynchosia henryi* Hemsley, J. Linn. Soc., Bot. 23: 196. 1887; *Dumasia oblongifoliolata* F. T. Wang & Tang ex Y. T. Wei & S. K. Lee.

Herbs perennial, twining, all parts except leaves densely gray pubescent. Stipules coniform, ca. 2 mm; petiole 1.5–4 cm; stipels coniform, ca. 1 mm; petiolules ca. 1 mm; leaflets papery, oblong or oblong-ovate, 3–5 × 1–2.3 cm, abaxial surface densely gray adpressed hairy, adaxial surface glabrous, lateral veins 4–7 per side, base rounded, sometimes slightly oblique, apex rounded, slightly emarginate, with small mucro. Raceme axillary, 2–4 cm; peduncle densely gray pubescent. Flowers ca. 1.5 cm; bracts and bracteoles extremely short, ca. 1 mm, persistent; pedicel ca. 1 mm. Calyx 6–8 mm, densely adpressed pubescent. Corolla yellow; petals subequal; standard broadly oblong to obovate; wings oblong, with claw; keels elliptic, slightly curved. Fl. Oct.

- Hubei, Sichuan.

8. *Dumasia nitida* Chun ex Y. T. Wei & S. K. Lee, *Guihaia* 5: 161. 1985.

瑶山山黑豆 yao shan shan hei dou

Dumasia nitida var. *kurziana* Predeep & M. P. Nayar.

Herbs perennial, twining, all parts glabrous. Stems slender. Stipules small, linear, ca. 2 mm; petiole slender, 2–8 cm; stipels

small, linear; petiolules ca. 2 mm; leaflets membranous, ovate or oblong-ovate, 2.5–6 × 1.4–3 cm, midrib convex on both surfaces, lateral veins 5–9 per side, base truncate or broadly cuneate, apex obtuse or almost round, with small mucro. Raceme axillary, slender, 5–13 cm, few flowered; peduncle 1.5–6 cm; bracts and bracteoles short; pedicel 2–3 mm. Calyx ca. 8 mm. Corolla light yellow; standard oblong, 10–15 mm; wings and keels oblong, slightly curved, subequal to standard, with claw and auricle at one side of base. Ovary linear to linear-oblancoelate; ovules 1 or 2; style linear. Legume oblong to oblancoelate, 3–4 × ca. 1 cm, apex with beak. Seeds 1 or 2. Fl. and fr. Sep–Oct.

Thickets along mountain roadsides; 1200–1500 m. Guangxi, Yunnan [Myanmar].

9. *Dumasia miaoliensis* Y. C. Liu & F. Y. Lu, *Quart. J. Chin. Forest.* 10(3): 87. 1977.

苗栗野豇豆 miao li ye jiang dou

Herbs twining. Stems slender, glabrous. Leaves pinnately 3-foliolate; stipules 2–2.5 mm; stipels subulate ca. 1 mm; petiolules 1–2 mm, glabrous; leaflets membranous, ovate-lanceolate, glabrous on both surfaces, midrib prominent abaxially, slightly elevated adaxially, lateral veins 4 or 5 per side, veinlets distinctly reticulate, base truncate, margin entire, apex obtuse, emarginate, apiculate at summit; terminal leaflets with blades 3–5 × 1.5–2.5 cm. Raceme axillary, loosely flowered, 5–8 cm; bracteoles subulate, ca. 1 mm; pedicel 3–4 mm. Calyx membranous, tubular, 5–7 mm, glabrous, gibbous and with an oblique subtruncate mouth. Corolla whitish yellow, exerted 12–15 mm; petals subequal; standard auriculate at both sides; wings and keels all clawed ca. 1 mm. Ovary stipitate. Legume elliptic, compressed, falcate, ca. 3 cm including stalk, glabrous, dehiscent. Seeds usually 2, rarely 1–3, black.

- Open roadsides; 1000–1500 m. C Taiwan.

The hybrid *Dumasia miaoliensis* × *D. villosa* has been reported from Taiwan (Fl. Taiwan, ed. 2, 3: 272. 1993). It differs from normal *D. miaoliensis* by the less compressed legumes with shorter stalks.

103. PUERARIA Candolle, *Ann. Sci. Nat. (Paris)* 4: 97. 1825.

葛属 ge shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Neustanthus Benth.

Twining herbs or shrubs. Roots sometimes tuberous. Stipules sometimes produced below point of insertion. Leaves pinnately 3-foliolate; leaflets large, stipellate, ovate or rhomboid, entire or sinuately lobed. Inflorescences axillary, racemose or paniculate with an elongated peduncle, or several racemes aggregated at tip of branchlets. Bracts usually small or narrow, very caducous; bracteoles small, subsistent or minute and caducous. Flowers blue or purplish, usually several flowers clustered at each node of rachis. Calyx campanulate, 2 upper teeth connate into entire or bifid lip. Corolla exceeding calyx; standard with 2 inflexed auricles; wings narrowly oblong or obovate-falcate, often adherent to middle of keel; keel sometimes beaked, subequal to wings. Vexillary stamen free at base, connate in middle with others, rarely quite free; anthers uniform. Ovary sessile, many ovuled; style filiform, inflexed above; stigma small, capitate. Legumes linear or cylindrical, continuous within or filled or septate between seeds. Seeds compressed, suborbicular or transversely oblong.

About 20 species: distributed in tropical and E Asia; ten species (three endemic) in China.

- 1a. Stipules basifixed.
- 2a. Legumes ca. 4 mm wide, with 15–20 seeds; standard suborbicular 1. *P. phaseoloides*
- 2b. Legumes 6–12 mm wide, with 4–10 seeds; standard obovate.
- 3a. Shrubs, erect or climbing; standard 5–8 mm 2. *P. stricta*
- 3b. Twining herbs; standard 12–14 mm.
- 4a. Leaflets ovate or obliquely ovate, densely hirsute on both surfaces; corolla white; standard ca. 14 mm; legumes 5–8 cm × 6–8 mm 3. *P. peduncularis*
- 4b. Leaflets obovate, sparsely pubescent abaxially; corolla reddish; standard ca. 12 mm; legumes 7.5–12.5 cm × 6–12 mm 4. *P. wallichii*
- 1b. Stipules dorsifixed.
- 5a. Stipules not 2-lobed at base.
- 6a. Lowest calyx lobe distinctly longer than lateral ones, acuminate; keel petals larger than wings 5. *P. montana*
- 6b. Lowest calyx lobe slightly longer than lateral ones, acute; keel petals equal to wings.
- 7a. Leaflets to 14.5 × 12 cm, lateral ones entire; inflorescences to 17 cm, axis with retrorse hairs; keel petals not auriculate 9. *P. bouffordii*
- 7b. Leaflets to 8 × 6.5 cm, all 3-lobed; inflorescences to 48 cm, branched, axis without retrorse hairs; keel petals auriculate at base 10. *P. xyzhui*
- 5b. Stipules 2-lobed at base, sagittate.
- 8a. Bracts longer than flower buds, hirsute; standard to 1.5 cm 6. *P. alopecuroides*
- 8b. Bracts shorter than flower buds, glabrous or thinly pubescent; standard over 1.8 cm.
- 9a. Leaflets suborbicular, usually entire or lateral leaflets irregularly 5–7-lobed; calyx 11–15 mm 7. *P. calycina*
- 9b. Leaflets broadly ovate, 3-lobed or lateral leaflets 2-lobed; calyx 4–7 mm 8. *P. edulis*

1. *Pueraria phaseoloides* (Roxburgh) Benth, J. Linn. Soc., Bot. 9: 125. 1865.

三裂叶野葛 san lie ye ye ge

Dolichos phaseoloides Roxburgh, Fl. Ind., ed. 1832, 3: 316. 1832; *Neustanthus phaseoloides* (Roxburgh) Benth.

Herbaceous vines. Stem slender, 2–4 m, brownish hirsute. Stipules basifixed, ovate-lanceolate, 3–5 mm; stipels linear, 2–3 mm; leaflets broadly ovate, rhomboid, or ovate-rhomboid, terminal one broader, 6–10 × 4.5–9 cm, lateral ones smaller, oblique, entire or 3-lobed, abaxially densely white hirsute, adaxially adpressed hirsute. Racemes solitary, 8–15 cm or more. Bracts and bracteoles linear-lanceolate, 3–4 mm, hirsute. Flowers with short pedicels, clustered at slightly distant nodes. Calyx ca. 6 mm, pilose; lower tooth as long as tube, apex hirsute, others deltoid, shorter than tube. Corolla bluish or lilac; standard suborbicular, 8–12 mm, base with 2 incurved auricles; wings obovate-oblong, slightly longer than keel, one side of base with rounded auricle, claw slender; keel falcate, apex with short beak, base truncate, clawed. Ovary linear, thinly hairy. Legumes subcylindric, 5–8 cm × ca. 4 mm, first adpressed hirsute, later subglabrous. Seeds 15–20, oblong-elliptic, subtruncate at both ends, ca. 4 mm. Fl. Aug–Sep, fr. Oct–Nov.

Thickets of mountainous and hilly areas. Guangdong, Guangxi, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Laos, Malaysia (Peninsular), Myanmar, Nepal, Thailand, Vietnam; widely cultivated elsewhere in the tropics].

This species is used as a cover plant, forage, and green manure.

2. *Pueraria stricta* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 254. 1874.

小花野葛 xiao hua ye ge

Galactia simaoensis Y. Y. Qian; *Pueraria brachycarpa* Kurz; *P. colletii* Prain; *P. hirsuta* Kurz; *P. longicarpa* Thuan; *P. siamica* Craib.

Shrubs, erect or rarely climbing. Stem 1–2.5 m tall. Branches striate, gray pubescent when young, glabrous when old. Stipules triangular-ovate, ca. 7 mm, gray pubescent; terminal leaflet rhombic to ovate, 11–24 × 4–12 cm, lateral ones obliquely ovate, gray pubescent on both surfaces. Racemes usually unbranched. Bracts lanceolate, 2–3 mm, pubescent with ± hooked hairs; bracteoles ca. 1 mm. Flowers 4–6(–8) aggregated at nodes. Calyx tube 1.5–2.5 mm; teeth 0.5–1.5 mm, gray pubescent. Corolla white, pink, purple, blue, or yellow; standard obovate, 5–8 × 4.5–7 mm, apex emarginate, base clawed, auricles inflexed, without callosities; wings and keel nearly as long as standard, all clawed. Vexillary stamen joined to middle. Ovary silky pubescent along suture; ovules ca. 10. Legumes brownish, oblong, 3.5–6 × 0.5–0.7 cm, flattened, glabrous to thinly pubescent, with oblique stripes, suture thickened. Seeds 5–10, brown or black, ovate, ca. 4 × 3 mm, tuberculate. Fl. May–Jun, fr. Sep–Oct.

Forests, among grasses. Yunnan [Myanmar, Thailand].

3. *Pueraria peduncularis* (Graham ex Benth) Benth, J. Linn. Soc., Bot. 9: 124. 1865.

苦葛 ku ge

Neustanthus peduncularis Graham ex Benth in Miquel, Pl. Jungh. 232. 1852; *Derris bonatiana* Pampanini; *Pueraria peduncularis* var. *violacea* Franchet; *P. yunnanensis* Franchet.

Twining herbs, thinly or densely hirsute. Stipules basifixed, lanceolate, caducous; petiole 4–12 cm; stipels small, bristly; leaflets ovate or obliquely ovate, 5–12 × 3–8 cm, hirsute on both surfaces, rarely glabrous adaxially, base acute to truncate, margin entire, apex acuminate. Racemes slender, 20–40 cm. Bracts and bracteoles caducous. Flowers white, 3–5 clustered at nodes of rachis; pedicels slender, 2–6 mm. Calyx ca. 5 mm, villous; upper lobes very broad, lower ones slightly acute, shorter than tube. Standard obovate, ca. 1.4 cm, base attenuate, with narrow auricles, without callosities; wings slightly longer

than keel; keel apex incurved, widened, more pale in color. Vexillary stamen broader, first adherent to others but not connate. Legumes linear, 5–8 cm × 6–8 mm, straight, valves subpapery, subglabrous or thinly pubescent. Fl. Aug, fr. Oct.

Forests. Guangxi, Guizhou, Sichuan, Xizang, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan].

Pueraria yunnanensis was treated as a separate species by Z. F. Le and X. Y. Zhu (Ann. Bot. Fenn. 46: 419–424. 2009).

4. *Pueraria wallichii* Candolle, Ann. Sci. Nat. (Paris) 4: 97. 1825.

须弥葛 *xu mi ge*

Shrubs, sometimes climbing. Branches slender, thinly pubescent or glabrescent. Stipules basifixed, lanceolate, caducous; stipels small, bristly; terminal leaflet obovate, 10–13 cm, abaxially with few adpressed hairs, adaxially green, glabrescent, base deltoid, margin entire, apex caudate-acuminate. Racemes up to 15 cm, often fascicled or paniculate; peduncle long, slender. Pedicels slender, clustered at nodes of rachis. Calyx ca. 4 mm, subglabrous; teeth obscure or very broad, lower ones broader. Corolla white to reddish; standard obovate, ca. 1.2 cm, base narrowed into a short claw, without auricles; wings slightly shorter than curved keel; keel equal to standard. Vexillary stamen only free at base, other part joined with filament tube. Legumes straight, 7.5–12.5 cm × 6–12 mm, glabrous. Fl. Sep–Oct.

Hill slopes in forests or thickets. Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

5. *Pueraria montana* (Loureiro) Merrill, Trans. Amer. Philos. Soc., ser. 2, 24(2): 10, 210. 1935.

葛 *ge*

Robust climbers, with tuberous roots. Stems to 8 m, woody at base, hirsute with yellowish hairs in all parts. Stipules dorsifixed, ovate-oblong, striate; stipels linear-lanceolate, equal to petiolules or longer; leaflets 3-lobed, rarely entire, terminal one broadly ovate, 7–15(–19) × 5–12(–18) cm, apex acuminate, lateral ones obliquely ovate, smaller, with yellowish adpressed hairs adaxially, more densely hairy abaxially. Racemes 15–30 cm. Flowers 2 or 3 aggregated at nodes. Bracts linear-lanceolate to linear, shorter or longer than bracteoles, caducous; bracteoles ovate, less than 2 mm. Calyx 7–20 mm, villous with yellow-brown hairs; lobes lanceolate, acuminate, slightly longer than tube. Corolla purple; standard obovate, 8–18 mm, auriculate and with yellow callosities at base, shortly clawed; wings falcate, narrower than keel, base with linear auricles; keel falcate-oblong, with very small and acute auricles. Vexillary stamen free in upper part. Ovary linear, hairy. Legumes long elliptic, 4–14 cm × 6–13 mm, flattened, brown hirsute. Fl. Jul–Oct, fr. Oct–Dec.

Mountain forests, thickets, open places. Everywhere in China except Qinghai, Xinjiang, and Xizang [SE Asia to Australia].

This plant is commonly known as kudzu vine.

1a. Bracts shorter than bracteoles; calyx 7–8 mm; standard ca. 8 mm in diam.; legumes 4–9 cm × 6–8 mm 5a. var. *montana*

1b. Bracts longer than bracteoles; calyx 8–20 mm; standard 10–18 mm; legumes 5–14 cm × 8–13 mm.

2a. Calyx 8–10 mm; standard obovate, 10–12 mm; wings subequal to keel; legumes 5–9 cm × 8–11 mm 5b. var. *lobata*

2b. Calyx to 20 mm; standard suborbicular, 16–18 mm; wings slightly shorter than keel; legumes 10–14 cm × 10–13 mm 5c. var. *thomsonii*

5a. *Pueraria montana* var. *montana*

葛(原变种) *ge (yuan bian zhong)*

Dolichos montanus Loureiro, Fl. Cochinch. 2: 440. 1790; *Glycine javanica* Linnaeus (1753), not *Pueraria javanica* (Benth) Benth (1865); *P. lobata* (Willdenow) Ohwi var. *montana* (Loureiro) Maesen; *P. thunbergiana* (Siebert & Zuccarini) Benth var. *formosana* Hosokawa; *P. tonkinensis* Gagnepain.

Bracts shorter than bracteoles. Calyx 7–8 mm. Standard ca. 8 mm in diam. Legumes 4–9 cm × 6–8 mm. Fl. Jul–Sep, fr. Oct–Dec.

Open places, thickets, forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Laos, Myanmar, Philippines, Thailand, Vietnam].

5b. *Pueraria montana* var. *lobata* (Willdenow) Maesen & S. M. Almeida ex Sanjappa & Predeep in Sanjappa, Legumes India, 288. 1992.

葛麻姆 *ge ma mu*

Dolichos lobatus Willdenow, Sp. Pl. 3: 1047. 1802; *D. hirsutus* Thunberg; *Neustanthus chinensis* Benth; *Pachyrhizus thunbergianus* Siebold & Zuccarini; *Pueraria argyi* H. Léveillé & Vaniot; *P. bodinieri* H. Léveillé & Vaniot; *P. caerulea* H. Léveillé & Vaniot; *P. koten* H. Léveillé & Vaniot; *P. lobata* (Willdenow) Ohwi; *P. lobata* var. *chinensis* (Benth) Ohwi; *P. montana* var. *chinensis* (Benth) Maesen & S. M. Almeida ex Sanjappa & Predeep; *P. thunbergiana* (Siebold & Zuccarini) Benth.

Calyx 8–10 mm. Standard obovate, 10–12 mm; wings subequal to keel. Legumes 5–9 cm × 8–11 mm.

Mountain forests or cultivated. Everywhere in China except Qinghai, Xinjiang, and Xizang [SE Asia to Australia; also introduced in Africa, America, and Europe].

This taxon is used medicinally and as edible tubers, a cover crop, and fodder.

5c. *Pueraria montana* var. *thomsonii* (Benth) M. R. Almeida, Fl. Maharashtra 2: 122. 1998.

粉葛 *fen ge*

Pueraria thomsonii Benth, J. Linn. Soc., Bot. 9: 122. 1865 [“*thomsonii*”]; *P. lobata* subsp. *thomsonii* (Benth) H. Ohashi & Tateishi; *P. lobata* var. *thomsonii* (Benth) Maesen.

Calyx to 20 mm. Standard suborbicular, 16–18 mm; wings slightly shorter than keel. Legumes 10–14 cm × 10–13 mm. Fl. Sep, fr. Nov.

Thickets, open forests, or cultivated. Guangdong, Guangxi, Hainan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Laos, Myanmar, Philippines, Thailand, Vietnam].

This taxon is used as a vegetable and for extracting starch.

6. *Pueraria alopecuroides* Craib, Bull. Misc. Inform. Kew 1910: 276. 1910.

密花葛 mi hua ge

Woody climbers. Branches hispid with ferruginous hairs. Stipules dorsifixed, sagittate, ca. 2.2 cm × 8 mm, striate; petiole 10–20 cm, sparsely hispid with ferruginous hairs; stipels linear-lanceolate, slightly longer than petiolules, striate; terminal leaflet broadly ovate, 10–15 × 6.5–12 cm, sparsely pubescent on both surfaces, lateral veins 6–8 pairs, conspicuous on both surfaces, base rounded, margin crenate, apex caudate-acuminate, mucronate or acute when young; lateral leaflets smaller, oblique. Inflorescences paniculate, very dense before flowering, ca. 22 cm, branches ca. 10 cm. Bracts lanceolate or linear-lanceolate, ca. 1.3 cm, longer than flower bud, ferruginous hispid; bracteoles ca. 5.5 mm. Pedicels ca. 5 mm. Calyx puberulent and ferruginous pilose; tube ca. 3 mm; lobes lanceolate, 4–6 mm, upper 2 connate. Standard white, suborbicular, ca. 1 cm in diam., emarginate, with yellow spot at base, with incurved auricles and callosities, claw ca. 2.5 mm; wings oblong, longer than keel, with long appendage; keel purple, ca. 1 cm, obtuse. Vexillary stamen free at base. Ovary sessile, ca. 7 mm, sparsely villous.

Mixed forests, among grasses. S Yunnan [Myanmar, Thailand].

7. *Pueraria calycina* Franchet, Pl. Delavay. 181. 1890.

黄毛萼葛 huang mao e ge

Pueraria forrestii W. E. Evans.

Woody climbers. Stem base bulbous; branches villous with brownish hairs, glabrescent when old. Stipules dorsifixed, sagittate, striate, pubescent, upper part ovate, 1–2 cm, base 2-lobed, lobes 5–10 mm; petiole 5–12 cm; stipels lanceolate, 5–10 mm; leaflets suborbicular, 7–16 × 6–14 cm, terminal one broader, lateral ones oblique, margin irregularly 5–7-lobed, apex mucronate, brownish villous on both surfaces. Racemes 10–25 cm, villous. Bracts ovate-lanceolate to lanceolate, 5–10 mm, sparsely villous; bracteoles ovate-lanceolate, 2–3 mm. Flowers 2 at each node. Calyx ferruginous hispid; tube 3–5 mm; lobes 4, lanceolate, 11–15 mm, upper one bifid. Corolla purplish red; standard obovate, ca. 1.6 × 1.3–1.5 cm, apex emarginate, shortly clawed, auricles reflexed; wings oblong, 1.5–1.7 cm, base auriculate; keel as long as wings, oblique, clawed. Vexillary stamen free, joined with others at middle. Ovary stipitate, silky pubescent. Legumes oblong, 7–8 × 8–12 cm, flattened, yellow-brown hirsute. Seeds red or brown, reniform, 7–9 × 5–6 mm, compressed. Fl. Jul–Aug.

• Mountain thickets; 2000–2600 m. Yunnan.

8. *Pueraria edulis* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 28. 1910.

食用葛 shi yong ge

Pueraria bicalcarata Gagnepain; *P. edulis* var. *likiangensis* P. C. Li.

Twining herbs, with tuberous roots. Stems sparsely hirsute with brown hairs. Stipules dorsifixed, sagittate, upper lobes 5–11 mm, basal 2 lobes 3–8 mm, striate and ciliate; petiole 3.5–16 cm; stipels lanceolate, 5–7 mm; terminal leaflet ovate, 9–15 × 6–10 cm, 3-lobed to entire, lateral ones obliquely broadly ovate, smaller, ± 2-lobed, base cuneate or rounded, apex shortly acuminate, pubescent on both surfaces. Racemes up to 30 cm, simple or once branched. Bracts ovate, 4–6 mm, glabrous or ciliate; bracteoles 2–3 mm, glabrous or sparsely hirsute. Flowers 3 at each node of rachis; pedicels slender, up to 7 mm, glabrous. Calyx hairy on both surfaces or glabrous outside; tube 3–5 mm; lobes 4, lanceolate, 4–7 mm, subequal, upper one broader. Corolla purple or pink; standard suborbicular, 14–17 mm, apex emarginate, base auriculate and with callosities, claw ca. 3.5 mm; wings obovate, ca. 16 mm, clawed and auriculate; keel oblique. Ovary shortly hirsute, subsessile. Legumes linear-oblong, 5.5–6.5(–9) × ca. 1 cm, very sparsely hirsute with yellowish hairs, suture thickened, densely hairy. Seeds 9–12, reddish-brown, ovate, flattened, ca. 4 × 2.5 mm. Fl. Sep, fr. Oct.

Forests; 1000–3200 m. Sichuan, Yunnan [Bhutan, India].

9. *Pueraria bouffordii* H. Ohashi, J. Jap. Bot. 80: 9. 2005.

贵州葛 gui zhou ge

Twining herbs. Stems densely adpressed sericeous. Stipules unknown; petiole 9–10 cm; stipels linear, ca. 4 mm; terminal leaflet broadly ovate, up to 14.5 × 12 cm, shallowly 3-lobed, lateral ones oblique, slightly smaller, entire, base rounded, apex acute, sericeous abaxially, sparsely adpressed sericeous adaxially. Inflorescences branched, up to 17 cm, densely sericeous with reflexed hairs. Bracts narrowly ovate, ca. 1.5 mm; bracteoles 1–1.5 mm. Pedicels 3–4 mm. Calyx densely adpressed sericeous; tube ca. 2.5 mm; upper 2 lobes connate, ca. 3 mm, lateral lobes ca. 2 mm, lowest lobe 2.5–3 mm. Corolla white with tips of wings and keel purple; standard broadly elliptic, 11–12 × 10–11 mm, apex emarginate, base slightly auriculate and with callosities, claw ca. 1 mm; wings oblong, ca. 12.5 mm, clawed and slightly auriculate; keel ca. 12 mm, clawed, not auriculate. Vexillary stamen free at base. Ovary sessile, adpressed sericeous. Legumes unknown.

• Riverbanks; 700–1000 m. Guizhou.

10. *Pueraria xyzhui* H. Ohashi & Iokawa, J. Jap. Bot. 81: 27. 2006.

云南葛 yun nan ge

Twining herbs. Stems densely adpressed sericeous with reflexed hairs. Stipules dorsifixed, 3–4 mm wide; petiole 7–8 cm; stipels narrowly ovate-triangular, 4–5 mm; terminal leaflet broadly ovate, to 8 × 6.5 cm, 3-lobed, lateral ones oblique, almost as large as terminal one, 3-lobed, base rounded, apex acute, sericeous abaxially, adpressed sericeous with short hairs on veins adaxially. Inflorescences branched, up to 48 cm, densely adpressed sericeous. Bracts deciduous; bracteoles ca. 3 mm. Pedicels 3–4 mm. Calyx densely adpressed sericeous; tube ca. 2 mm; upper 2 lobes connate, ca. 4.5 mm, lateral lobes ca. 4

mm, lowest lobe ca. 4.5 mm. Standard suborbicular, ca. 11 × 13 mm, apex ± emarginate, base slightly cordate, with callosities, claw ca. 2 mm; wings elliptic, ca. 12.5 mm, clawed and slightly auriculate; keel ca. 12 mm, clawed, auriculate. Vexillary stamen

free at base. Ovary sessile, adpressed sericeous. Legumes unknown.

- Mountain regions; ca. 1500 m. Yunnan.

104. **NOGRA** Merrill, Trans. Amer. Philos. Soc., ser. 2, 24(2): 201. 1935.

土黄芪属 tu huang qi shu

Chen Dezhaio (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Prostrate or climbing herbs. Leaves 1-foliolate; stipules very caducous; stipels persistent. Racemes axillary or in a few-branched terminal panicle. Flowers solitary, paired or clustered at nodes of rachis of inflorescence; bracts deciduous or persistent; bracteoles persistent. Calyx tube campanulate, 5-toothed; upper 2 teeth connate from middle downward. Corolla exerted; petals subequal in length, clawed; standard obovate, elliptic, or suborbicular, with 2 minute, inflexed basal auricles; wings falcate or obovate-oblong, slightly adherent to keel at base; keel falcate or narrowly oblong, incurved, without auricle or nearly so. Stamens diadelphous, vexillary stamen free; anthers uniform, dorsifixed. Ovary sessile or subsessile; ovules numerous; style incurved, glabrous; stigma small, capitate. Legumes narrowly oblong or linear, compressed, septate between seeds. Seeds orbicular or oblong, with a thick strophiole at small hilum.

About four species: China, India, Thailand; one species (endemic) in China.

1. **Nogra guangxiensis** C. F. Wei, Guihaia 5: 351. 1985.

广西土黄芪 guang xi tu huang qi

Climbing herbs, sparsely hirsute. Leaves 1-foliolate; petiole 1.5–3.5 cm; stipels subulate, as long as petiolules; petiolules 3–4 mm; leaflets papery, narrowly oblong or narrowly lanceolate, 12–19 × 2.3–3 cm, rough on both surfaces, base rounded or slightly cordate, margin slightly revolute, apex acuminate or obtuse; midrib elevated abaxially, prominent adaxially, lateral veins 9–15 pairs, raised on both surfaces, at an angle of 50–60°, veinlets reticulate, slightly prominent on both surfaces. Racemes axillary, 5–15 cm, sometimes forming panicles with 1 or 2 branches. Flowers pedicellate, solitary or paired; bracts small, caducous; bracteoles ovate-lanceolate. Calyx ca. 7 mm; teeth

narrowly lanceolate, upper 2 as long as tube, lower 3 slightly longer. Corolla light yellow; standard broadly elliptic, ca. 10.5 × 8 mm, apex emarginate, with 2 inflexed, short basal auricles, claw ca. 2 mm; wings obovate-oblong, ca. 9 × 4 mm, apex obtuse or rounded, with long, acute basal auricle, claw ca. 3 mm; keel falcate, ca. 8 × 2.5 mm, arcuate and ± connate on back, apex slightly acute, base without auricle, claw ca. 4 mm. Anthers broadly oblong, ca. 0.5 mm. Ovary narrowly oblong, slightly compressed, hirsute. Legumes narrowly oblong or linear, compressed, 4.5–5 × 0.5–0.6 cm, base rounded, apex with a 2–3 mm beak, valves sparsely hirsute. Seeds 6–8, blackish brown, shiny, orbicular, ca. 3 mm in diam. Fl. Aug.

- Mountain slopes, thick grass, near roads. E and NW Guangxi (Mengshan, Tian'e), SE Yunnan.

105. **SINODOLICHOS** Verdcourt, Kew Bull. 24: 398. 1970.

华扁豆属 hua bian dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Perennial twining herbs. Leaves pinnately 3-foliolate; stipules deltoid, basifixed, late deciduous; stipels linear, persistent. Racemes axillary; peduncles short, or flowers clustered. Bracts ovate, apex caudate; bracteoles late deciduous. Calyx campanulate, hirsute with white or yellow hairs, 2-lipped, upper lip bifid, lower lip 3-lobed. Corolla glabrous, petals clawed; standard orbicular or oblong, base with short auricles, without appendages; wings and keel obovate-oblong, with narrow auricles; keel obtuse. Stamens diadelphous; filaments unequal; anthers uniform. Ovary linear, subsessile, ca. 10-ovuled; disk present; style linear; stigma funnel-shaped. Legumes linear-oblong, flattened, not septate, densely bristly-pilose with yellowish hairs. Seeds 3–10, oblong, without aril; hilum central.

Two species: China, Malaysia (Sarawak), Myanmar, Thailand; one species in China.

1. **Sinodolichos lagopus** (Dunn) Verdcourt, Kew Bull. 24: 398. 1970.

华扁豆 hua bian dou

Dolichos lagopus Dunn, J. Linn. Soc., Bot. 35: 490. 1903.

Stems and petiole densely pubescent with yellow hairs. Stipules ca. 3 mm; petiole 4–10 cm; leaflets papery, ovate or rhombic, 4–10 × 2.5–7 cm, hirsute on both surfaces, veins

elevated adaxially, base obtuse, apex acuminate. Racemes axillary, shorter than petiole. Calyx ca. 1 cm, hirsute with gray or yellow hairs; lobes linear-lanceolate, ca. 6 mm. Corolla purple; standard suborbicular, ca. 1.3 cm (including claw); wings and keel as long as standard. Filament tube ca. 1 cm. Legumes 5.5–6.5 × ca. 0.6 cm, densely pilose with yellowish bristly hairs. Seeds 3–10, black, ca. 4 × 3 mm.

- Forests, thickets; 100–1700 m. Guangxi, Hainan, Yunnan [Malaysia (Sarawak), Thailand].

106. AMPHICARPAEA Elliot ex Nuttall, Gen. N. Amer. Pl. 2: 113. 1818
[“*Amphicarpa*”], nom. cons.

两型豆属 liang xing dou shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs, twining. Leaves pinnately 3-foliolate. Inflorescence axillary, racemose, sometimes with apetalous cleistogamous flowers at base or 1–3 in axils of lower leaves, nodes not swollen but sometimes more than 1-flowered. Bracts persistent or deciduous. Calyx tubular, 4- or 5-lobed. Corolla longer than calyx; petals subequal; standard obovate or obovate-elliptic, glabrous, base clawed, with inconspicuous auricles; keels slightly curved. Stamens diadelphous; vexillary stamen free; cleistogamous flowers with only 3–5 anthers. Ovary sessile or subsessile, with sheathing disk at base; ovules many; style glabrous; stigma small, terminal. Legumes of 2 types: normal and underground; normal legumes linear-oblong, dehiscent, compressed, unjointed, few seeded; underground legumes usually orbicular or ellipsoidal, indehiscent, 1-seeded. Seeds subglobose or ovoid; hilum short, lateral; aril not developed.

About five species: tropical Africa, E Asia, North America; three species (two endemic) in China.

- 1a. Perennial herbs; stipules 6–8 mm; leaflets papery or thickly papery 2. *A. ferruginea*
1b. Annual herbs; stipules 3–5 mm; leaflets membranous or nearly so.
2a. Bracts ovate or elliptic to broadly elliptic; terminal leaflet rhomboid-ovate or oblate-ovate, apex obtuse, sometimes with mucro 1. *A. edgeworthii*
2b. Bracts linear; terminal leaflet ovate to broadly ovate, apex acute 3. *A. linearis*

1. *Amphicarpaea edgeworthii* Benth in Miquel, Pl. Jungh. 231. 1852.

两型豆 liang xing dou

Amphicarpaea bracteata (Linnaeus) Fernald subsp. *edgeworthii* (Benth) H. Ohashi; *A. edgeworthii* f. *aidzuensis* Matsuda; *A. edgeworthii* var. *japonica* Oliver; *A. japonica* (Oliver) H. Ohashi; *A. trisperma* (Miquel) Baker; *Falcata comosa* (Linnaeus) Kuntze var. *japonica* (Oliver) Makino; *F. edgeworthii* (Benth) Kuntze; *F. japonica* (Oliver) Komarov; *Shusteria trisperma* Miquel.

Herbs, annual, 0.3–1.3 m tall. Stems slender. Stipules lanceolate or ovate-lanceolate, 3–4 mm, densely pubescent; petiole 2–5.5 cm; stipels extremely small, usually deciduous, narrowly triangular; petiolules usually 2–3 mm; leaflets papery or almost membranous; terminal leaflet rhomboid-ovate or oblate-ovate, 2.5–5.5 × 2–5 cm, both surfaces sparsely yellowish brown villous, base rounded, broadly cuneate or nearly truncate, apex obtuse or sometimes with mucro; lateral leaflets usually obliquely ovate or ovate-rhombic, dimorphic. Upper inflorescences axillary, shortly racemose; bracts almost membranous, ovate to elliptic, 3–5 mm. Cleistogamous flowers often present. Normal flowers: pedicel 1–2 mm. Calyx tubular, 5–7 mm, 5-lobed; lobes unequal, sparsely pubescent, apex acuminate. Corolla purplish or white; petals subequal; standard obovate, 1–1.7 cm; wings oblong, with long stipes and acute auricles at base; keels similar to wings. Ovary hairy. Cleistogamous flowers underground, sessile; style curved. Legumes dimorphic: those of normal flowers oblong or obovate-oblong, 2–3.5 × ca. 0.6 cm, compressed, 2–5-seeded; legumes of cleistogamous flowers elliptic or suborbicular, 1–4-seeded. Seeds reniform-orbicular, 2–4 × 2–3 mm; hilum short. Fl. and fr. Aug–Nov. $2n = 40$.

Mountain slopes, roadsides, fields, grasslands; 300–3000 m. Anhui, Fujian, Gansu, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Russia, Vietnam].

2. *Amphicarpaea ferruginea* Benth in Miquel, Pl. Jungh. 231. 1852.

锈毛两型豆 xiu mao liang xing dou

Amphicarpaea edgeworthii Benth var. *rufescens* Franchet; *A. ferruginea* f. *pauciflora* Pampanini; *A. rufescens* (Franchet) Y. T. Wei & S. K. Lee.

Herbs, perennial. Stems almost robust. Stipules oblong to broadly ovate, 6–8 mm, hairy; petiole 4–12 cm; stipels obvious, linear; petiolules 2–5 mm, densely yellowish brown villous; leaflets papery or thickly papery; terminal leaflet usually ovate or ovate-elliptic to broadly elliptic, 3.5–8.5 × 2–4 cm, both surfaces densely yellowish brown villous, basal veins 3, lateral veins 4–6 on each side, slender, base rounded or broadly cuneate, apex with mucro; lateral leaflets obliquely ovate. Cleistogamous flowers not recorded. Racemes 3–7 cm, pubescent; flowers 2–5 clustered; bracts elliptic, deciduously pubescent. Flower 1.5–2 cm; pedicels 2–4 mm, minutely villous. Calyx tubular, 6–8 mm, 5-lobed; lobes unequal, apex with mucro or shortly acuminate, pubescent. Corolla red or purple; petals subequal; standard obovate-elliptic, ca. 1.2 cm, with short stipe; wings elliptic, base with long stipes and acute auricles, apex obtuse; keels similar to wings. Ovary linear, stipitate, with sheathlike disk at base, 2- or 3-ovuled; style glabrous; stigma capitate. Legume elliptic, 2–3 × 0.6–0.9 cm, slightly inflated, clothed with yellowish brown pubescence, base acuminate, apex beaked. Seeds (1 or) 2 or 3, blackish gray, reniform, ca. 5 × 3 mm. Fl. and fr. Aug–Oct.

• Roadsides, open fields; 2300–3000 m. Sichuan, Yunnan.

3. *Amphicarpaea linearis* Chun & T. C. Chen, Acta Phytotax. Sin. 7: 23. 1958.

腺毛两型豆 xian mao liang xing dou

Herbs, annual. Stems slender, densely hirsute, glabrescent. Stipules linear to linear-lanceolate, 4–5 mm; petiole 4.5–8 cm; stipels small, subulate; petiolules 2–3 mm, hirsute; leaflets membranous or nearly membranous; terminal leaflet ovate to

broadly ovate, 4.5–6 × 3–3.5 cm, both surfaces sparsely adpressed deciduous hirsute, basal veins 3, lateral veins 4 or 5 on each side, slender, base rounded or nearly truncate, rarely broadly cuneate, apex with acute mucro; lateral leaflets obliquely ovate, much smaller. Cleistogamous flowers not recorded. Racemes axillary, 3–7.5 cm; peduncle 1.5–3 cm; bracts linear, 4–5 mm, hairy. Pedicels short, ca. 1 mm. Bracteoles ca.

1.5 mm. Calyx tubular-campanulate, almost glabrous, 5–6 mm, 5-lobed; lobes unequal, lowest one longest. Corolla blue; standard ca. 1 cm; wings and keels with long slender stipes. Anthers small, almost orbicular. Ovary linear, 9-ovuled. Fruit not seen. Fl. Jan.

- Roadsides, open fields. Hainan, Yunnan.

107. TERAMNUS P. Browne, Civ. Nat. Hist. Jamaica, 290. 1756.

软荚豆属 ruan jia dou shu

Sun Hang (孙航); Mats Thulin

Perennial twining herbs. Leaves pinnately 3-foliolate; stipules and stipels deciduous. Flowers small, in axillary clusters or racemes; bracts small, linear, persistent; bracteoles linear, longitudinally striate. Calyx membranous, campanulate, 4- or 5-lobed. Corolla slightly exserted; standard obovate, narrow at base, clawed, without auricles; wings narrow, adnate to blunt, straight, and shorter keel. Stamens monadelphous, only 5 longer developed, 5 shorter sterile or lacking. Ovary sessile, many ovuled; style short, curved, glabrous; stigma capitate. Legumes linear, flattened, persistent style base forming upcurved beak at apex, sometimes transversely impressed between seeds. Seeds numerous.

About eight species: tropics of both hemispheres; one species in China.

1. *Teramnus labialis* (Linnaeus f.) Sprengel, Syst. Veg. 3: 235. 1826.

软荚豆 ruan jia dou

Glycine labialis Linnaeus f., Suppl. Pl. 325. 1782.

Stems slender, to 4 m, angular, densely appressed yellow tomentose. Stipules lanceolate; petiole 1.5–4 cm; stipels linear, ca. 3 mm; leaflets membranous, terminal leaflet oblong or long ovate, 2.5–6 × 1–2.2 cm, abaxially densely hairy, adaxially glossy and appressed scattered yellow pubescent, lateral veins 5 or 6 pairs, base rounded, apex acute. Racemes axillary, 2.5–4 cm, with 6–10 flowers, appressed hairy; peduncle ca. 2 cm;

bracts lanceolate; pedicels ca. 5 mm; bracteoles at base of calyx, similar to bracts. Calyx 3–4 mm, appressed pubescent, 5-lobed; teeth ovate-lanceolate and shorter than calyx tube. Corolla white, changing to pink or purple; standard ca. 4 mm; wings oblong, truncate at base; keel rhombic. Ovary hairy. Legumes linear, ca. 4 cm × 3.5–4 mm, nodding, pubescent, hooked at apex. Seeds 5–9, oblong-ellipsoid, ca. 4 × 2 mm. Fl. Jun–Jul, fr. Sep–Oct.

Sparse bushlands, wastelands; low to middle elevations. Hainan, S Taiwan [Cambodia, India, Indonesia, Laos, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America, West Indies].

108. GLYCINE Willdenow, Sp. Pl. 3: 854, 1053. 1802, nom. cons., not Linnaeus (1753).

大豆属 da dou shu

Sa Ren (萨仁); Michael G. Gilbert

Leptocymus Benthams; *Leptolobium* Benthams (Jun 1837), not Vogel (Apr–May 1837); *Soja* Moench.

Annual or perennial herbs, twining, climbing, creeping or erect. Roots herbaceous or almost woody, usually with nodules. Leaves pinnately 3(–7)-foliolate; stipules small, free, usually deciduous. Inflorescence axillary, racemose; flowers solitary or clustered at nodes. Bracts small, at peduncle base; bracteoles paired, at calyx base. Calyx membranous, campanulate, hairy, deeply 2-lipped; upper 2 lobes connate, lower 3 lanceolate to setiform. Corolla usually purple, light purple, or white, slightly longer than calyx, glabrous; petals long clawed; standard large, subcircular or obovate, with inconspicuous auricles; wings narrow, slightly connate with keels; keels shorter than wings, obtuse, apex untwisted. Stamens diadelphous; vexillary stamen partly joined to others; anthers uniform. Ovary subsessile; ovules many; style ± filiform, slightly inflexed, glabrous or shortly pubescent; stigma terminal, capitate. Legume stipitate, linear or oblong, straight or curved, dehiscent, valves coiling after dehiscent, compressed or slightly inflated, septate between seeds. Seeds 1–5, ovoid-oblong, almost oblate-tetragonal, oblate, or orbicular.

About nine species: tropics, subtropics, and temperate region of E Hemisphere; six species (two endemic, one introduced) in China.

1a. Raceme longer than leaves, 4–8 cm.

2a. Leaflets elliptic to ovate, tomentose; stems twining or climbing 5. *G. tomentella*

2b. Leaflets lanceolate to linear, sparsely strigose; stems procumbent 4. *G. tabacina*

1b. Raceme shorter than leaves, usually 1–3 cm.

3a. Perennial herbs; root almost woody 6. *G. dolichocarpa*

3b. Annual herbs; root leathery.

4a. Stem erect; cultivated 1. *G. max*

4b. Stem twining or creeping; wild.

- 5a. Stem slender, twining; legume 17–23 × 4–5 mm; seed 2.5–4 × 1.8–2.5 mm 2. *G. soja*
 5b. Stem robust, twining or creeping; legume 30–60 × 5–7 mm; seed 5–6 × 4–4.5 mm 3. *G. gracilis*

1. *Glycine max* (Linnaeus) Merrill, Interpr. Herb. Amboin. 274. 1917.

大豆 da dou

Phaseolus max Linnaeus, Sp. Pl. 2: 725. 1753; *Dolichos soja* Linnaeus; *Glycine angustifolia* Miquel; *G. hispida* (Moench) Maximowicz; *Soja angustifolia* Miquel; *S. hispida* Moench; *S. japonica* Savi; *S. max* (Linnaeus) Piper; *S. viridis* Savi.

Herbs annual, 0.3–0.9 m tall. Stems robust, erect, sometimes ± twining at apex, ± ribbed, densely brown hirsute. Leaves usually pinnately 3-foliolate; stipules broadly ovate, 3–7 mm, acuminate, densely yellow villous; petiole 2–20 cm, sparsely pubescent or hirsute when young; stipels lanceolate, 1–2 mm; petiolules 1.5–4 mm, hirsute; leaflets papery, broadly ovate, almost circular, or elliptic-lanceolate, terminal one larger, 5–12 × 2.5–8 cm, base broadly cuneate or rounded, apex acuminate or ± rounded, mucronate; lateral leaflets smaller, obliquely ovate. Raceme short or long; peduncle 1–3.5 cm; bracts lanceolate, 2–3 mm, strigose. Flowers few to many, those on lower part of stem sometimes solitary or 1 pair between 2 axils; bracteoles lanceolate, 2–3 mm, hirsute. Calyx 4–6 mm, densely long hirsute and strigose, usually 2-lipped; lobes 5, lanceolate, upper 2 connate to above middle, lower 3 separate, all densely white villous. Corolla purple, light purple, or white, 4.5–8(–10) mm; standard obovate-suborbicular, base clawed, apex slightly emarginate and usually reflexed; wings crenate, base narrow, with claws and auricles; keels obliquely obovate, with short claws. Ovary with undeveloped glands at base, hairy. Legume succulent, oblong, slightly curved, pendulous, 40–75 × 8–15 mm, densely silky hairy. Seeds 2–5, elliptic, suborbicular, or ovate to oblong, ca. 10 × 5–8 mm, many colored; testa smooth; hilum obvious, elliptic. Fl. Jun–Jul, fr. Jul–Sep. $2n = 40$.

Cultivated throughout China [now cultivated throughout temperate and tropical regions].

It has been estimated that *Glycine max*, soybean, provides ca. 35% of human protein (X. Bao et al., FAO/IBPGR Plant Genetic Resources Newsletter 94/95: 1–3. 1993). It is also an important source of oil and used extensively industrially.

There seems very little doubt that *Glycine max*, not known as a wild plant, has been selected from the following species, *G. soja*. It has been confused nomenclaturally with that species.

2. *Glycine soja* Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 119. 1843.

野大豆 ye da dou

Glycine formosana Hosokawa; *G. gracilis* Skvortsov var. *nigra* Skvortsov; *G. max* (Linnaeus) Merrill subsp. *formosana* (Hosokawa) Tateishi & H. Ohashi; *G. max* subsp. *soja* (Siebold & Zuccarini) H. Ohashi; *G. soja* var. *albiflora* P. Y. Fu & Y. A. Chen; *G. soja* f. *angustifolia* P. Y. Fu & Y. A. Chen; *G. soja* subsp. *formosana* (Hosokawa) W. Liu & X. Y. Zhu; *G. soja* f. *lanceolata* (Skvortsov) P. Y. Fu & Y. A. Chen; *G. soja* var.

lanceolata Skvortsov; *G. soja* f. *linearifolia* L. Z. Wang; *G. soja* f. *maximowiczii* (Enken) L. Z. Wang; *G. soja* var. *maximowiczii* Enken; *G. soja* f. *nigra* (Skvortsov) X. Y. Zhu & W. Liu; *G. soja* f. *ovata* (Skvortsov) L. Z. Wang; *G. soja* var. *ovata* Skvortsov; *G. ussuriensis* Regel & Maack; *G. ussuriensis* var. *angustata* Komarov; *G. ussuriensis* var. *brevifolia* Komarov & Alissova-Klobukova; *Rhynchosia argyi* H. Léveillé.

Herbs annual, 1–4 m. Stems slender, twining, hirsute. Leaves pinnately 3-foliolate, to 14 cm; stipules ovate-lanceolate, 1–2 mm, acute, densely yellow villous; petiole 1.5–3.5 cm, densely pubescent; stipels linear, ca. 1 mm; terminal leaflet ovate-circular to ovate-lanceolate, 3.5–6 × 1.5–2.5 cm, both surfaces silky strigose, base subrounded, margin entire, apex acute to obtusely rounded; lateral leaflets obliquely ovate-lanceolate. Raceme usually short, rarely up to 13 cm; peduncle 0.3–0.8 cm, densely hirsute; bracts lanceolate; flowers densely arranged on upper part of inflorescences. Flowers ca. 5 mm. Calyx campanulate, densely long hairy; lobes 5, triangular-lanceolate, apex acute. Corolla reddish purple or white; standard suborbicular, base with short claw, apex slightly emarginate; wings obliquely obovate, with obvious auricles; keels shorter than standard and wings, densely hairy. Style short and inclined to one side. Legume oblong, slightly curved and compressed, constricted between seeds, 17–23 × 4–5 mm, densely hirsute, dehiscent when dry. Seeds 2 or 3, brown to black, elliptic, slightly compressed, 2.5–4 × 1.8–2.5 mm. Fl. Jul–Aug, fr. Aug–Oct. $2n = 40$.

Fields, valleys, beaches, marshes, seashores, islands, ?cultivated; near sea level to 2700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Afghanistan, Japan, Korea, Russia].

Plants from Henan with cleistogamous flowers 2.5–3(–3.5) mm with only (2 or)3 or 4(or 5) fertile stamens have recently been described as *Glycine soja* var. *cleistogama* C. S. Zhu & S. X. Zhu (J. Wuhan Bot. Res. 26: 361. 2008).

Glycine soja is protected in China because of its importance as the wild progenitor of *G. max* and thus its potential for further plant breeding. It is used as a food and fodder plant.

3. *Glycine gracilis* Skvortsov, Publ. Manckur. Res. Soc., Nat. Hist. Sec. Ser. A, 22: 8. 1927.

宽叶蔓豆 kuan ye man dou

Glycine soja Siebold & Zuccarini var. *gracilis* (Skvortsov) L. Z. Wang.

Herbs annual. Stems robust, twining or creeping, densely hirsute. Leaves pinnately 3-foliolate; stipules lanceolate to linear, villous; petiole 3–13 cm, pale yellow villous; rachis ca. 5 cm; stipels lanceolate, 1.5–2 mm; petiolules ca. 10 mm, pubescent; leaflets ovate-lanceolate to elliptic-lanceolate, 5–8(–9) × 2–4(–5) cm, abaxial surface more densely hairy, adaxial surface more sparsely hairy, lateral veins 5 pairs, obvious, base rounded, margin entire, apex acuminate, shortly acute to obtuse. Raceme usually short, with small lanceolate bracts, hairy;

peduncle ca. 1.5 mm. Flowers ca. 7 mm; bracteoles lanceolate, densely villous. Calyx campanulate, membranous, densely hairy. Corolla purple, light purple, or white; standard suborbicular, base with short claw, apex slightly emarginate; wings obovate, apex slightly acute, base acuminate, with auricles and short claws; keels small, with long claws. Ovary hairy. Legume yellow to brown, succulent, 30–60 × 5–7 mm. Seeds many colored, usually not shiny, elliptic, suborbicular, or almost oblong, 5–6 × 4–4.5 mm. Fl. Jul–Aug, fr. Sep–Oct. $2n = 40^*$.

- Field sides, by villages, roadsides. Heilongjiang, Jilin, Liaoning.

Glycine gracilis is sometimes treated as a synonym of *G. max*.

4. *Glycine tabacina* (Labille) Benth., Fl. Austral. 2: 244. 1864.

烟豆 yan dou

Kennedyia tabacina Labille, Sert. Austro-Caledon. 70. 1824; *Glycine koidzumii* Ohwi; *G. membranacea* Ohwi; *G. pescadrensis* Hayata; *G. tabacina* var. *uncinata* Benth.; *Leptocyanus elongatus* (Benth.) Benth.; *Leptolobium elongatum* Benth.; *L. tabacinum* (Labille) Benth.

Herbs perennial. Stems slender, procumbent, usually curved, many branched at base, nodes obvious, sparsely pubescent. Leaves pinnately 3-foliolate; stipules lanceolate, ca. 2 mm, villous; petiole 2–3 cm, sparsely strigose; stipels linear, ca. 1 mm, hairy; leaflets at lower part of stem obovate or ovate to oblong, 0.7–1.2 × 0.4–0.8 cm, both surfaces adpressed white villous, denser abaxially, lateral veins 5–7 pairs, curved, reticulate veins visible, base rounded, apex obtusely rounded, truncate or slightly emarginate, mucronate; leaflets at upper part of stem ovate-lanceolate, narrowly elliptic-oblong, or linear, 1.2–3.2 cm × 5–8 mm. Raceme slender and spreading, 1–5.5 cm; peduncle 3–7.5 cm; bracts linear, villous; flowers sparse, usually 1 per bract or 2 or 3 clustered at lower part of rachis. Flowers 7–9 mm; pedicel ca. 2 mm; bracteoles slender. Calyx membranous, campanulate, densely strigose; lobes 5, triangular, longer than tube, upper 2 connate to middle. Corolla purple or light purple; standard orbicular, ca. 15 mm in diam., with claw; wings and keels smaller, with auricles and claws. Ovary with short stipe, many ovuled. Legume oblong, straight, not constricted between seeds, 20–25 × ca. 2 mm, adpressed white villous, stipe short, apex with beak ca. 2 mm. Seeds 2–5, dark brown, cylindrical, truncate at 2 ends, ca. 2.5 × 2 mm; testa not shiny, with granular small nodules. Fl. Mar–Jul, fr. May–Oct. $2n = 40, 80$.

- Fujian, Guangdong, Taiwan [Japan; Australia, Oceania].

The Chinese record of *Glycine clandestina* J. C. Wendland (FRPS 41: 239. 1995) is based on a misidentification, probably of *G. tabacina*. True *G. clandestina* is endemic to Australia.

5. *Glycine tomentella* Hayata, Icon. Pl. Formosan. 9: 29. 1920.

短绒野大豆 duan rong ye da dou

Glycine tomentosa Benth. (1864), not Linnaeus (1753); *Leptocyanus tomentosus* (Benth.) Benth.; *Leptolobium tomentosum* Benth.

Herbs annual. Stems robust, twining or climbing, base many branched, yellowish brown villous. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, 2.5–3 mm, yellow-brown tomentose; petiole ca. 1.5 cm; stipels lanceolate; leaflets papery, elliptic or ovate, 1.5–2.5 × 1–1.5 cm, abaxial surface sparsely hairy, adaxial surface densely yellow-brown tomentose, lateral veins 5 pairs, base rounded, apex obtuse-rounded, mucronate. Raceme 3–7 cm, yellowish brown villous; peduncle ca. 4 cm; bracts lanceolate; flowers solitary or 2–7(–9) clustered at top. Flowers ca. 10 mm; pedicel ca. 1 mm; bracteoles linear. Calyx campanulate, membranous, ca. 4 mm, densely pubescent; lobes 5, narrowly triangular, longer than or subequal to tube. Corolla reddish, puniceous, or purple; standard large; wings and keels smaller, clawed. Ovary with short stipe. Legume narrowly oblong, compressed, straight, dehiscent, 18–22 × 4–5 mm, yellow-brown villous; neck short. Seeds 1–4, dark brown, obovate-tetragonal, ca. 2 × 2 mm; testa with minipores and granular nodules. Fl. Jul–Aug, fr. Sep–Oct. $2n = 38, 40, 78, 80$.

By the sea, islands, dry slopes. Fujian, Guangdong, Taiwan [New Guinea, Philippines; Australia, Oceania].

6. *Glycine dolichocarpa* Tateishi & H. Ohashi, Sci. Rep. Tohoku Imp. Univ., Ser. 4, Biol. 40: 23. 1991.

扁豆荚大豆 bian dou jia da dou

Herbs. Stems terete, twining or prostrate, with dense deflexed long tawny hairs. Leaves pinnately 3-foliolate; stipules narrowly triangular, 3–4 mm, striate, densely tawny hairy; petiole 2–4.5 mm; stipels linear-subulate; petiolules 2–4 mm; leaflets papery, both surfaces with rather appressed hairs; terminal leaflet lanceolate to ovate, 3–6 cm; lateral leaflets slightly oblique, lanceolate to narrowly ovate. Raceme usually 2 or more times as long as petiole. Flowers 6–7 mm; pedicels ca. 1 mm; bracteoles subulate to lanceolate, 1.5–2 mm, densely pilose. Calyx campanulate; lobes longer than tubes. Corolla pink; standard orbicular, 8–8.5 × 7.5–8 mm, apex emarginate; wings narrowly obovate, 7–8 × 2.5–3 mm, ± constricted at middle; keels distinctly shorter than wings, elliptic, 5.5–6 × ca. 2 mm. Ovary sessile, linear, pubescent. Legume linear, compressed, straight, usually 20–30 mm, with long spreading hairs, brown when mature. Seeds 5–9.

- Coasts, wastelands, roadsides. Taiwan.

109. PHYLACIUM Bennett in Bennett & R. Brown, Pl. Jav. Rar. 159. 1840.

苞护豆属 bao hu dou shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Herbs, twining. Leaves pinnately 3-foliolate; stipules narrow. Inflorescence axillary, racemelike, sometimes 1- or 2-branched; flowers solitary or fascicled at nodes. Bracts membranous, enlarging after anthesis, leaflike, boat-shaped. Calyx membranous, 5-lobed, upper 2 lobes connate. Corolla white; petals clawed; standard nearly orbicular, with paired calluses above auricles; wings ob-

long, auriculate; keel incurved, shortly auriculate. Vexillary stamen free; anthers uniform. Ovary nearly sessile, with annular disk around base; ovule 1; style slightly thickened above. Legume broadly elliptic, indehiscent, compressed, reticulate veined. Seed 1, reniform or orbicular.

Three species: China, India, Laos, Malaysia, Myanmar, Philippines, Thailand; one species in China.

Phylacium was originally placed within the Desmodieae, largely because of the indehiscent fruit; but the twining habit is anomalous within the tribe, and the genus is now regarded as a member of the Phaseoleae.

1. *Phylacium majus* Collett & Hemsley, J. Linn. Soc., Bot. 28: 44. 1890.

苞护豆 bao hu dou

Young stem winged, long appressed hairy. Petiole 7–10 cm; leaflet blade oblong, (5–)8–13 × (2–)4–5(–6.5) cm, abaxially densely grayish yellow pubescent, adaxially glabrous, base rounded to slightly cordate, sometimes emarginate, apex obtuse. Inflorescence 10–15 cm, retrorsely strigose, ca. 14 flowers per bract; bracts boat-shaped, enlarging after anthesis, 2.5–3.8 cm,

veined, abaxially glabrous, adaxially strigose. Flowers 1.2–1.4 cm; pedicel short, 2–3 mm, retrorsely strigose. Calyx strigose, 5-lobed; lower 3 lobes ovate, upper 2 lobes connate, triangular. Corolla white, ca. 1 cm; standard nearly orbicular; wings oblong; keel nearly erect, apex obtuse. Ovary shortly stipitate, with an annular disk around base. Legume ovoid, ca. 8 × 5 mm, retrorsely strigose, apex acute. Seed brown, reniform, ca. 5 × 5 mm. Fl. and fr. Sep–Nov.

Sunny slopes, mixed forests, thickets; 200–900 m. SW Guangxi, S Yunnan [Laos, Myanmar, Thailand].

110. LABLAB Adanson, Fam. Pl. 2: 325. 1763.

扁豆属 bian dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Herbs perennial, twining or suberect. Leaves pinnately 3-foliolate; stipules basifixed, reflexed, persistent; stipels lanceolate. Racemes axillary, nodes of rachis swollen. Calyx campanulate, 2-lipped, upper lip entire or emarginate, lower 3-lobed. Corolla purple or white; standard orbicular, reflexed, auriculate at base, with 2 callosities on inner surface; wings broadly ovate; keel incurved at right angle. Stamens diadelphous; anthers uniform. Style abruptly upturned, laterally compressed, bearded in upper part; stigma terminal. Legumes obliquely oblong-falcate, compressed, with minute warts along both sutures, shallowly septate between seeds within. Seeds slightly compressed, with white aril.

One species: native to Africa, cultivated throughout the tropics including China.

1. *Lablab purpureus* (Linnaeus) Sweet, Hort. Brit. 481. 1826.

扁豆 bian dou

Dolichos purpureus Linnaeus, Sp. Pl., ed. 2, 2: 1021. 1763; *D. albus* Loureiro; *D. lablab* Linnaeus.

Herbs, twining. Stems to 6 m, usually purplish. Stipules lanceolate; leaflets deltoid-ovate, 6–10 × 6–10 cm, lateral ones oblique, base subtruncate, apex acute or acuminate. Racemes axillary, erect, 15–25 cm. Flowers 2–5 clustered at each node. Calyx ca. 6 mm, upper 2 teeth wholly connate, lower 3 sub-

equal. Corolla white or purple; standard orbicular, ca. 12 mm; wings with blade ca. 10 mm; keel base attenuate. Ovary linear; style longer than ovary. Legumes oblong-falcate, 5–7 × 1.4–1.8 cm, compressed, straight or slightly curved, beaked. Seeds 3–5, white, purple, or purple-black, oblong; hilum linear. Fl. Apr–Dec.

Widely cultivated in China [native to Africa; cultivated throughout the tropics].

This species is edible and is used medicinally.

111. DOLICHOS Linnaeus, Sp. Pl. 2: 725. 1753, nom. cons.

镰扁豆属 lian bian dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Herbs or shrubs, erect, climbing or prostrate, sometimes with carrotlike woody rhizomes. Leaves pinnately 3-foliolate, subdigitate, or 1-foliolate; stipules basifixed; stipels present. Racemes axillary or terminal, sometimes subumbellate, or flowers solitary, axillary. Calyx 5-toothed, 2-lipped, upper lip entire or bifid, lower lip 3-toothed. Corolla white or purple; petals clawed; standard suborbicular, often with inflexed auricles and appendages at base; wings obovate or oblong, ± adherent to keel; keel incurved, often beaked but not twisted. Vexillary stamen free, remainder connate into an open sheath; anthers uniform. Ovary 3–12-ovuled; disk present; style swollen and ± twisted toward base or narrowed from base to tip, glabrous or shortly pubescent all over, or with a ring of hairs around terminal capitate stigma. Legumes straight or arcuate, flattened, not septate. Seeds ± flattened, arillate or strophiolate; hilum short, usually central.

About 60 species: distributed in Africa and Asia; four species in China.

- 1a. Leaves glabrous or almost so on both surfaces 1. *D. trilobus*
 1b. Leaves hairy on both surfaces or abaxially.
 2a. Standard up to 1.2 cm 2. *D. tenuicaulis*
 2b. Standard 1.5 cm or more.
 3a. Leaflets ovate-rhombic, 6–7 × 4–6 cm, apex acuminate and apiculate; corolla white with purple striae 3. *D. thorelii*
 3b. Leaflets broadly rhombic-ovate or ovate, 10–11 × 9–9.5 cm, apex acute or slightly obtuse; corolla purple 4. *D. junghuhnianus*

1. *Dolichos trilobus* Linnaeus, Sp. Pl. 2: 726. 1753.

镰扁豆 lian bian dou

Dolichos falcatus Klein ex Willdenow; *D. koryuensis* Hosokawa; *D. trilobus* var. *koryuensis* (Hosokawa) H. Ohashi & Tateishi.

Twining herbs. Stems slender, glabrous or subglabrous. Leaves pinnately 3-foliolate; stipules ovate, ca. 3 mm, veins conspicuous; petiole 2–3 cm; stipels linear; leaflets rhombic or ovate-rhombic, 2–6 × 2–4.5 cm, glabrous or almost so on both surfaces, base broad and obtuse, apex acute or acuminate. Racemes axillary, slender, 1–4-flowered; peduncles equal to or longer than petiole. Bracts and bracteoles with conspicuous veins. Calyx broadly campanulate, ca. 3 mm, glabrous; teeth triangular. Corolla white, 10–20 mm; standard orbicular, base with 2 triangular appendages, without auricles; wings obovate, slightly longer than standard; keel base truncate, clawed. Ovary sessile. Legumes linear-oblong, ca. 6 × 0.8 cm, slightly curved, compressed. Seeds 6 or 7. Fl. Oct–Mar.

Thickets. Hainan, Taiwan [tropical Africa and Asia].

2. *Dolichos tenuicaulis* (Baker) Craib, Contr. Fl. Siam, Dicot. 66. 1912.

丽江镰扁豆 li jiang lian bian dou

Phaseolus tenuicaulis Baker in J. D. Hooker, Fl. Brit. India 2: 201. 1876; *Dolichos appendiculatus* Handel-Mazzetti.

Twining herbs. Stems slender, over 1 m, sparsely pubescent with yellowish hairs. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, ca. 6 mm, ciliate, 7-veined; stipels lanceolate, ca. 2 mm, densely hirsute; leaflets broadly rhombic-ovate, 2.5–4.8 × 2.5–4.5 cm, lateral ones more narrow, oblique, white strigose on both surfaces, especially on veins abaxially, 3-veined, base broadly cuneate, apex acute. Racemes axillary; peduncles equal in length to petiole; rachis ± densely hirsute with short curved hairs. Pedicels 2.5–4 mm; bracts and bracteoles lanceolate, 1.5–2 mm. Calyx tube obliquely cup-shaped, 1–1.5 mm, puberulent or subglabrous; teeth broadly triangular, upper 2 connate for ca. 2/3 of length. Corolla violet, ca. 1.2 cm; standard suborbicular, slightly emarginate, base attenuate into a claw, with appendages and auricles; wings oblong-obovate, as long as standard, clawed and with auricles; keel ca. 8 mm, slightly curved, margin rough. Ovary stipitate, sparsely hairy; style glabrous; stigma brush-shaped. Legumes linear-oblong, 6–8 × ca. 0.8 cm, slightly curved, compressed. Seeds 6–8. Fl. Aug.

In grass; 2000–2300 m. Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Thailand].

3. *Dolichos thorelii* Gagnepain, Notul. Syst. (Paris) 3: 191. 1915.

海南镰扁豆 hai nan lian bian dou

Twining herbs. Stems angular, pubescent. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, striate; stipels linear, 3–5 mm; leaflets ovate-rhombic, 6–7 × 4–6 cm, appressed pubescent on both surfaces, 3-veined from base, base rounded or broadly cuneate, apex acuminate and apiculate. Racemes axillary, 7–14 cm, densely pubescent, with flowers in upper 2–3 cm; peduncles 5–11 cm. Bracts ovate, striate, caducous; bracteoles ovate, ca. 5 mm. Calyx ca. 5 mm; teeth very short, upper 2 nearly wholly connate. Corolla white with purple striae, 16–18 mm; standard below middle with 2 appendages; wings obovate-oblong, with round auricles at top of claw; keel falcate, apex obtuse. Ovary linear, slightly pubescent; style glabrous; stigma brush-shaped. Legumes linear, ca. 6 × 0.7 cm, compressed, pubescent. Seeds 7. Fl. Dec.

Thickets, open forests. Hainan [Laos, Vietnam].

4. *Dolichos junghuhnianus* Benth in Miquel, Pl. Jungh. 240. 1852.

滇南镰扁豆 dian nan lian bian dou

Dolichos henryi Harms.

Twining herbs. Stems densely pilose or subglabrous. Leaves pinnately 3-foliolate; stipules broadly lanceolate; stipels linear-lanceolate; leaflets broadly rhombic-ovate or ovate, 10–11 × 9–9.5 cm, sparsely pilose, base rounded or obtuse to broadly cuneate, apex acute or slightly obtuse or with very short acumen. Racemes pubescent, with flowers paired at swollen nodes of axis; peduncles 4–7 cm. Bracteoles 7–8 mm. Calyx 7–8 mm; teeth short, upper 2 nearly wholly connate. Corolla purple, glabrous; standard suborbicular, ca. 15 mm, below middle with 2 callosities, base with inflexed auricles, claw curved; wings obliquely oblong, 16–17 mm; keel dorsally curved, apex obtuse. Ovary linear, shortly stipitate, very shortly tomentose; style glabrous, thickened; stigma brush-shaped. Legumes tomentose when young, glabrescent when mature.

S Yunnan [Indonesia, Thailand].

112. MACROTYLOMA (Wight & Arnott) Verdcourt, Kew Bull. 24: 322. 1970, nom. cons.

硬皮豆属 ying pi dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Dolichos sect. *Macrotyloma* Wight & Arnott, Prodr. Fl. Ind. Orient. 248. 1834.

Climbing, prostrate or erect herbs. Leaves pinnately 3-foliolate or sometimes 1-foliolate; stipules basifixed; stipels present. Flowers usually in axillary clusters or pseudoracemes. Calyx campanulate, 4- or 5-lobed; upper 2 lobes \pm connate. Corolla yellow to light yellowish green, rarely becoming reddish, exserted, glabrous; standard orbicular or elliptic, usually with auricles and 2 long, linear, flat appendages; wings narrow; keel not twisted. Stamens diadelphous; anthers uniform. Ovary 3–13-ovuled; style slender, not thickened upward, bearded around stigma; stigma terminal, capitate. Legumes straight or recurved, linear or linear-oblong, compressed, not septate. Seeds compressed; hilum short, central.

About 25 species: Africa, Asia; one species in China.

1. *Macrotyloma uniflorum* (Lamarck) Verdcourt, Kew Bull. 24: 322. 1970.

硬皮豆 ying pi dou

Dolichos uniflorus Lamarck, Encycl. 2: 299. 1786.

Perennial or annual, climbing herbs, to 60 cm tall. Stems clothed with whitish hairs. Stipules lanceolate, 4–8 mm; petiole 0.8–6.8 cm; leaflets 3, thin, ovate-rhomboid, obovate, or elliptic, oblique, 1–8 \times 0.7–7.8 cm, glabrous or puberulent or rarely velutinous on both surfaces, base rounded, apex rounded or slightly acute. Flowers (1 or)2 or 3(–5) clustered in axils of

leaves; peduncle and rachis of inflorescence 0–1.5 cm; bracts linear, ca. 2 mm. Calyx tube ca. 2 mm; lobes triangular-lanceolate, 3–8 mm. Standard yellow or light yellowish green, with a purple spot in middle, obovate-oblong, 6–12 \times 4–7 mm; wings and keel light yellowish green. Legumes linear-oblong, 3–5.5 \times 0.4–0.8 cm, puberulent or subglabrous. Seeds light or deep reddish brown, oblong or orbicular-reniform, 3–4.2 \times 2.8–3.5 mm.

Scrub, dry places. S Taiwan (Pingdong) [Bhutan, India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka; Africa, Australia].

This species is widely cultivated in the tropics as green manure and forage.

113. VIGNA Savi, Nuovo Giorn. Lett. 8: 113. 1824, nom. cons.

豇豆属 jiang dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Candelium Medikus.

Twining or erect herbs, rarely subshrubs. Leaves pinnately 3-foliolate; stipules peltate or basally spurred, 2-lobed, cordate, or truncate. Racemes axillary or terminal, nodes of rachis often thickened and glandular. Bracts and bracteoles deciduous. Calyx 5-toothed, 2-lipped. Corolla yellow, blue, or purple; standard suborbicular, base appendaged; wings shorter than standard; keel subequal to wings, incurved, not beaked or produced into an incurved or spirally twisted beak. Stamens diadelphous; anthers uniform. Ovary sessile; style filiform, upper part thickened, bearded or hirsute lengthwise inside; stigma oblique. Legumes linear or linear-oblong, terete or flat. Seeds reniform or subquadrate; hilum short or elongate, with or without aril.

About 100 species: distributed in tropical regions; 14 species (one introduced) in China.

According to molecular evidence (Thulin et al., Syst. Bot. 29: 903–920. 2004), *Vigna adenantha* belongs to a group of neotropical species of *Vigna* that is not closely related to the Old World species otherwise present in China. Pending a new classification of the New World species, *V. adenantha* is here retained in *Vigna*.

Phaseolus anguinus Bunge (Enum. Pl. Chin. Bor. 20. 1833), described from near Beijing, is probably a species of *Vigna*. No type material has been seen, but the name may well be a synonym of *V. radiata*.

- 1a. Stipules truncate at base and not prolonged below point of insertion 3. *V. adenantha*
 1b. Stipules 2-lobed, cordate, or spurred at base, or peltate.
 2a. Stipules 2-lobed or cordate at base.
 3a. Keel prolonged into a conspicuous beak incurved through 180° 4. *V. vexillata*
 3b. Keel without conspicuous incurved beak.
 4a. Corolla 0.5–1 cm; legumes 1–2 cm 1. *V. hosei*
 4b. Corolla 1.2–3 cm; legumes 3.5–8 cm.
 5a. Leaflets rounded or obtuse at apex; legumes glabrous when ripe 2. *V. marina*
 5b. Leaflets acute or acuminate at apex; legumes pubescent 5. *V. luteola*
 2b. Stipules spurred at base, or peltate.
 6a. Stipules spurred at base; keel without a pocket 12. *V. unguiculata*
 6b. Stipules peltate; keel with a distinct pocket on left-hand side.
 7a. Corolla less than 10 mm; leaflets 3–5-lobed.
 8a. Lobes of leaflets linear-lanceolate; stems 60–130 cm 6. *V. aconitifolia*
 8b. Lobes of leaflets \pm broadly spatulate; stems 30–60 cm 7. *V. trilobata*
 7b. Corolla 10 mm or more; leaflets mostly entire.
 9a. Legumes hispid with brownish hairs; corolla usually tinged with pink 8. *V. radiata*
 9b. Legumes glabrous or almost so; corolla all yellow.

- 10a. Stipules 4–6 mm.
 11a. Stipules lanceolate; racemes 3- or 4-flowered 9. *V. minima*
 11b. Stipules ovate; racemes 5–8-flowered 10. *V. riukiensis*
 10b. Stipules 8 mm or more.
 12a. Stipules 10–15 mm; plants twining 11. *V. umbellata*
 12b. Stipules 8–10 mm; plants often erect.
 13a. Leaves sparsely pilose; seeds 5–6 × 4–5 mm 13. *V. angularis*
 13b. Leaves hispid; seeds ca. 3 × 2 mm 14. *V. reflexopilosa*

1. *Vigna hosei* (Craib) Backer in Backer & Slooten, Geill. Handb. Jav. Theonkr. 153. 1924.

和氏豇豆 he shi jiang dou

Dolichos hosei Craib, Bull. Misc. Inform. Kew 1914: 76. 1914; *Vigna oligosperma* Backer; *V. parkeri* Baker subsp. *acutifoliola* Verdcourt.

Perennial herbs, twining or creeping, often forming a thick ground cover. Stipules 2-lobed at base; petiole 2–5 cm; leaflets ovate-elliptic or obliquely ovate, 3–7.5 × 2–5 cm, thinly hairy on both surfaces, base rounded, apex obtuse to acute. Racemes axillary; peduncles 1.5–7 cm; pedicels 1.7–2.2 mm, appressed pubescent. Calyx tube 1.7–2.2 mm; upper teeth connate into a triangular lip of ca. 1.2 mm. Corolla yellow; standard 6–12 mm in diam.; keel not or slightly longer than wings, not beaked. Ovary densely adpressed villous. Legumes black, oblong, 1–2 cm × 4–4.5 mm, hairy, 1–4-seeded.

In grass at roadsides, wastelands; below 500 m. Taiwan [Indonesia, Japan (Ryukyu Islands), Malaysia, New Guinea, Sri Lanka; E Africa, Australia, North and South America].

2. *Vigna marina* (Burman) Merrill, Interpr. Herb. Amboin. 285. 1917.

滨豇豆 bin jiang dou

Phaseolus marinus Burman, Index Alt. Herb. Amboin. 18. 1769.

Perennial herbs, prostrate or climbing. Stems up to several meters, glabrescent when old. Stipules 2-lobed at base, ovate, 3–5 mm; leaflets ovate-orbicular or obovate, 3.5–9.5 × 2.5–7.5 cm, very shortly setose to subglabrous on both surfaces, base broadly cuneate or narrowly rounded, apex rounded, obtuse, or emarginate. Racemes axillary, 2–4 cm; peduncles 3–13 cm. Calyx 2.5–3 mm; teeth deltoid, 1–1.5 mm, upper 2 connate. Corolla yellow; standard broadly obovate, 1.2–1.3 × ca. 1.4 cm; wings and keel ca. 1 cm. Legumes linear-oblong, 3.5–6 × 0.8–0.9 cm, pubescent when young, later glabrous, slightly constricted between seeds. Seeds 2–6, yellow-brown or red-brown, oblong, 5–7 × 4.5–5 mm; hilum oblong. Fr. Oct.

On sandy beaches. Hainan, Taiwan [widely distributed in tropical regions].

This species is edible and is used medicinally.

3. *Vigna adenantha* (G. Meyer) Maréchal, Mascherpa & Stainier, Taxon 27: 202. 1978.

腺药豇豆 xian yao jiang dou

Phaseolus adenanthus G. Meyer, Prim. Fl. Esseq. 239. 1818.

Perennial herbs, twining. Stipules truncate at base and not produced below point of insertion, lanceolate, 3–5 mm; petiole 3.5–5(–9) cm; terminal leaflet rhomboid-ovate, 7–8 × 5–6.5 cm, nearly glabrous, base obtuse, apex acute; lateral leaflets somewhat oblique. Racemes axillary, 9–17 cm including peduncle; pedicels 2–3 mm. Bracteoles ovate, ca. 4 mm, caducous. Calyx lobes acuminate. Corolla purple, 1.8–3 cm; standard orbicular; wings oblong, inconspicuously auriculate; keel spirally incurved for ca. 3 turns. Ovary glabrous. Legumes linear, 9–14 × 0.8–1.4 cm, glabrous, 11–15-seeded. Seeds dark brown, reniform, ca. 7 × 5 mm.

At roadsides. Taiwan [pantropical].

4. *Vigna vexillata* (Linnaeus) A. Richard, Hist. Fis. Cuba, Bot. 10: 191. 1845.

野豇豆 ye jiang dou

Phaseolus vexillatus Linnaeus, Sp. Pl. 2: 724. 1753; *Vigna vexillata* var. *pluriflora* Franchet; *V. vexillata* var. *yunnanensis* Franchet.

Perennial herbs, twining. Root woody, fusiform. Stems with spreading brown bristly hairs, glabrescent. Stipules ovate to ovate-lanceolate, 3–5 mm, cordate or auriculate at base, ciliate; petiole 1–11 cm; leaflets membranous, variable in shape, ovate to lanceolate, 4–9(–15) × 2–5(–8) cm, brown or gray pubescent on both surfaces, base rounded to cuneate, margin entire, sometimes slightly 3-lobed, apex acute or acuminate. Racemes axillary, 2–6-flowered, subumbellate; peduncles 5–20 cm. Bracteoles subulate, ca. 3 mm, caducous. Calyx with brown or white bristly hairs, rarely glabrescent; tube 5–7 mm; lobes linear or linear-lanceolate, 2–5 mm, upper 2 connate at base. Standard pink, purple, or partly yellow, sometimes with yellow or purple spots inside at base, 2–3.5 × 2–4 cm, emarginate; keel whitish or purplish, falcate, with beak incurved through 180°. Legumes erect, linear-terete, 4–14 cm × 2.5–4 mm, bristly. Seeds 10–18, yellowish, black, or brown to scarlet with black spots, oblong or oblong-reniform, 2–4.5 mm. Fl. Jul–Sep.

Thickets, open forests. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [widely distributed in tropical and subtropical regions].

This species is used medicinally.

Vigna vexillata var. *tsusimensis* Matsumura (Bot. Mag. (Tokyo) 16: 93. 1902) differs only by having larger seeds, ca. 5 × 4 mm. It has been recorded from Taiwan (see T. C. Huang & H. Ohashi, Fl. Taiwan, ed. 2, 3: 393. 1993).

5. *Vigna luteola* (Jacquin) Benth in Martius, Fl. Bras. 15(1): 194. 1859.

长叶豇豆 chang ye jiang dou

Dolichos luteolus Jacquin, Hort. Bot. Vindob. 1: 39. 1770; *Vigna acuminata* Hayata; *V. glabra* Savi, nom. illeg. superfl.; *V. repens* (Linnaeus) Kuntze (1891), not Baker (1876); *V. repens* var. *glabra* Kuntze.

Trailing or twining herbs, 1.2–2.4 m. Stems with upper parts hairy or glabrescent. Stipules lanceolate, 3–4 × ca. 2 mm, 2-lobed at base; petiole 2–8 cm; leaflets ovate, ovate-elliptic, or ovate-lanceolate, rarely linear-lanceolate, 2.5–11 × 0.4–5 cm, sparsely pubescent on both surfaces or glabrous, base rounded or cuneate, margin entire, apex acute or acuminate. Racemes axillary; peduncles 5–40 cm; rachis 1.5–5 cm, 12–20-flowered; pedicels 4–9 mm, hirsute. Bracteoles ovate-lanceolate, 1.5–2 mm. Calyx pubescent or glabrescent; tube 3–4 mm; lobes deltoid, 2–4 mm, upper 2 wholly connate, apex acute or rarely 2-lobed. Standard yellow or greenish, sometimes tinged with red dorsally, oblate, 1.3–2.5 × 1.2–2.6 cm, glabrous, apex emarginate; wings obovate; keel shortly beaked. Legumes linear, 4–8 cm × 5–6.5 mm, pubescent, slightly constricted between seeds. Seeds dark brown or gray brown and with black spots, oblong or ovate-rhombic, 3–6 × 2–3.5 mm; hilum oblong.

In open ground near seashores; below 100 m. Taiwan [widely distributed in tropical regions].

6. *Vigna aconitifolia* (Jacquin) Maréchal, Bull. Jard. Bot. Natl. Belg. 39: 160. 1969.

乌头叶豇豆 wu tou ye jiang dou

Phaseolus aconitifolius Jacquin, Observ. Bot. 3: 2. 1768.

Annual herbs, trailing. Stems slender, 60–130 cm, angular, sparsely pubescent. Stipules peltate, lanceolate, ca. 1.2 cm; petiole 5–10 cm; leaflets deeply 3–5-lobed, 5–8 cm, lobes linear-lanceolate, ± hairy, margin entire. Racemes axillary, headlike; peduncles 5–10 cm; bracts lanceolate, ciliate; pedicels short. Flowers clustered 2–5 together. Calyx 2–3 mm; lobes 5, subequal. Corolla yellow, 5–6(–9) mm; standard cordate; wings obovate, auriculate; keel apex contorted. Legumes brown, cylindrical, 2.5–5 cm × 4–5 mm, hispidulous, with obtuse beak, 4–9-seeded. Seeds yellow, brown, or variegated with black dots, elliptic, 4–5 mm; hilum white, linear.

In grass; ca. 1000 m. Yunnan [India, Myanmar, Pakistan, Sri Lanka; cultivated elsewhere].

7. *Vigna trilobata* (Linnaeus) Verdcourt, Taxon 17: 172. 1968.

三裂叶豇豆 san lie ye jiang dou

Dolichos trilobatus Linnaeus, Mant. Pl. 1: 101. 1767; *Phaseolus trilobatus* (Linnaeus) Schreber.

Perennial or annual trailing herbs. Stems 30–60 cm, glabrous or glabrescent. Stipules peltate, ovate, 0.6–1.9 cm; petiole 5–10 cm; leaflets rhombic or ovate, 2.5–5 cm, in annual cultivated forms often shallowly 3-lobed, in perennial wild forms often deeply 3-lobed, medium lobe broadly spatulate, apex obtuse, glabrous or inconspicuously pubescent. Racemes axillary, headlike; peduncles longer than leaves; pedicels very short. Calyx campanulate; teeth deltoid, ca. 2 mm. Corolla yellow, ca. 6 mm; standard cordate; wings obovate, auriculate; keel apex contorted. Legumes cylindrical, 3–4 cm × 3–4 mm, glabrescent, 6–12-seeded. Seeds deep brown, cylindrical, very small, truncate at both ends.

Grasslands; ca. 1000 m. Taiwan, Yunnan [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Kashmir, Myanmar, Nepal, Pakistan, Sri Lanka, Vietnam].

8. *Vigna radiata* (Linnaeus) R. Wilczek, Fl. Congo Belge 6: 386. 1954.

绿豆 lü dou

Annual herbs, erect, twining, or creeping, 20–60 cm tall. Stems hispid with brown spreading hairs. Stipules peltate, ovate, 0.8–1.2 cm, ciliate; petiole 5–21 cm; leaflets ovate, 5–16 × 3–12 cm, lateral ones ± oblique, ± sparsely pilose on both surfaces, sometimes 3-veined from base, base broadly cuneate or rounded, apex acuminate or acute. Racemes axillary, 4- to several flowered (up to 25). Bracteoles linear-lanceolate or oblong, striate. Calyx tube 3–4 mm, glabrous; lobes narrowly deltoid, 1.5–4 mm, upper 2 connate into a 2-fid lip. Standard yellow-green outside, sometimes pink inside, suboblate, ca. 1.2 × 1.6 cm, apex emarginate; wings yellow, ovate; keel falcate and incurved through 180°, green tinged with pink. Legumes linear-terete, 4–9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8–14, greenish or yellow-brown, shortly cylindrical, 2.5–4 × 2.5–3 mm; hilum white. Fl. May–Jun, fr. Jun–Sep.

Open wastelands, roadsides, thicket margins, also cultivated; ca. 500 m. Taiwan; cultivated throughout China [Cambodia, India, Indonesia, Laos, Sri Lanka, Thailand, Vietnam; Africa; widely cultivated in tropical and subtropical regions].

The seeds are edible and are used medicinally.

Two varieties occur in China. In addition, *Vigna radiata* var. *glabra* (Roxburgh) Verdcourt (Kew Bull. 24: 559. 1970; *Phaseolus glaber* Roxburgh, Fl. Ind., ed. 1832, 3: 291. 1832) was said to occur in China in Fl. Cambodge, Laos & Vietnam (17: 198. 1979). This variety has almost glabrous stems, leaves, and legumes, but no specimens from China have been seen.

- 1a. Stems erect; leaflets entire, acuminate at apex 8a. var. *radiata*
 1b. Stems twining or creeping; leaflets 2- or 3-lobed, acute at apex 8b. var. *sublobata*

8a. *Vigna radiata* var. *radiata*

绿豆(原变种) lü dou (yuan bian zhong)

Phaseolus radiatus Linnaeus, Sp. Pl. 2: 725. 1753; *Azukia radiata* (Linnaeus) Ohwi; *Candelium nigrum* Medikus; *P. aureus* Roxburgh; *Rudua aurea* (Roxburgh) Maekawa.

Stems erect. Leaflets entire, acuminate at apex.

Cultivated throughout China [widely cultivated in tropical and subtropical regions].

8b. *Vigna radiata* var. *sublobata* (Roxburgh) Verdcourt, Kew Bull. 24: 559. 1970.

三裂叶绿豆 san lie ye lü dou

Phaseolus sublobatus Roxburgh, Fl. Ind., ed. 1832, 3: 288. 1832; *P. trinervius* Wight & Arnott; *Vigna stipulata* Hayata.

Stems twining or creeping. Leaflets 2- or 3-lobed, acute at apex.

Open wastelands, roadsides, thicket margins; ca. 500 m. Taiwan [Cambodia, India, Indonesia, Laos, Sri Lanka, Thailand, Vietnam; Africa].

9. *Vigna minima* (Roxburgh) Ohwi & H. Ohashi, J. Jap. Bot. 44: 30. 1969.

贼小豆 *zei xiao dou*

Phaseolus minimus Roxburgh, Fl. Ind., ed. 1832, 3: 290. 1832; *Azukia minima* (Roxburgh) Ohwi; *P. gracilicaulis* Ohwi; *P. heterophyllus* Hayata (1920), not Willdenow (1809); *P. minimus* f. *heterophyllus* Hosokawa; *P. minimus* f. *linearis* Hosokawa; *P. minimus* f. *rotundifolius* (Hayata) Hosokawa; *P. rotundifolius* Hayata; *Vigna dimorphophylla* T. L. Wu; *V. gracilicaulis* (Ohwi) Ohwi & H. Ohashi; *V. lutea* A. Gray var. *minor* Matsumura; *V. minima* f. *heterophylla* (Hosokawa) Ohwi & H. Ohashi; *V. minima* f. *linearis* (Hosokawa) T. C. Huang & H. Ohashi; *V. minima* var. *minor* (Matsumura) Tateishi.

Annual herbs, twining. Stems slender, subglabrous. Stipules peltate, lanceolate, ca. 4 mm, sparsely hirsute; leaflets variable in size and shape, oblong-ovate, suborbicular, linear, linear-lanceolate, or ovate, 2–7 × 0.5–3 cm, subglabrous or sparsely strigose on both surfaces, base rounded or broadly cuneate, apex acute to obtuse. Racemes axillary, slender, 3- or 4-flowered. Bracteoles linear or linear-lanceolate. Calyx campanulate, ca. 3 mm; teeth 5, unequal. Corolla yellow; standard suborbicular, ca. 10 × 8 mm, deflexed; keel with long and acute auricle. Legumes terete, 3.5–6.5 × ca. 0.4 cm, glabrous. Seeds 4–8, dark gray to brownish, oblong, ca. 4 × 3 mm; hilum linear. Fl. and fr. Aug–Oct.

Grasslands, thickets. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Shanxi, Taiwan, Yunnan, Zhejiang [India, Japan, Philippines].

10. *Vigna riukiensis* (Ohwi) Ohwi & H. Ohashi, J. Jap. Bot. 44: 31. 1969.

琉球豇豆 *liu qiu jiang dou*

Phaseolus riukiensis Ohwi, J. Jap. Bot. 13: 437. 1937; *Azukia riukiensis* (Ohwi) Ohwi.

Twining herbs, strigose. Stipules peltate, ovate, 4–6 mm, strigose, 5–7-veined; terminal leaflet obovate or elliptic, 2–4 × 1.2–2 cm, sparsely strigose, base cuneate or obtuse, margin entire, apex slightly acute and mucronate; lateral leaflets obliquely ovate, subequal. Racemes axillary, 5–8-flowered; peduncles 3–10 cm. Calyx obconic, ca. 2.5 mm. Corolla yellow; standard orbicular, ca. 1.2 cm wide, apex emarginate, with rectangular callosity at middle, auricles reflexed, incurved; wings obovate, ca. 1 cm, with reflexed appendage at base; keel incurved. Ovary linear, sparsely strigose. Legumes brown with white striations, subcompressed, 3.5–4.5 × ca. 0.4 cm, glabrous. Seeds dull red, elliptic, ca. 3 mm; hilum white.

Taiwan [Japan (Ryukyu Islands)].

The authors have not seen any material of this species from China, and it was not mentioned in Fl. Taiwan (ed. 2, 3. 1993). However, *Vigna riukiensis* has been recorded from Taiwan (e.g., in Tomooka et al., Genet. Res. Crop Evol. 49: 521–530. 2002). The closely related *V. nakashimae* (Ohwi) Ohwi & H. Ohashi (J. Jap. Bot. 44: 30. 1969; *Phaseolus nakashimae* Ohwi, J. Jap. Bot. 13: 436. 1937), described from Japan, with smaller and more pale yellow flowers, has also been recorded but from mainland China.

11. *Vigna umbellata* (Thunberg) Ohwi & H. Ohashi, J. Jap. Bot. 44: 31. 1969.

赤小豆 *chi xiao dou*

Dolichos umbellatus Thunberg, Trans. Linn. Soc. London 2: 339. 1794; *Azukia umbellata* (Thunberg) Ohwi; *Phaseolus calcaratus* Roxburgh; *P. chrysanthus* Savi; *P. pubescens* Blume; *Vigna calcarata* (Roxburgh) Kurz.

Annual twining herbs. Stems slender, 1 m or more, pilose with yellow hairs when young, later glabrescent. Stipules peltate, lanceolate or ovate-lanceolate, 10–15 mm; leaflets ovate or lanceolate, 10–13 × 5–7.5 cm, sparsely pubescent on veins of both surfaces, base broadly cuneate or obtuse, entire or slightly lobed, 3-veined from base, apex acute. Racemes axillary, 2- or 3-flowered; bracts lanceolate; pedicels short. Calyx campanulate, 3–4 mm; teeth deltoid. Corolla yellow; standard oblong, ca. 1.5 cm, apex emarginate; wings obovate. Legumes linear-terete, 6–10 × ca. 0.5 cm, glabrous. Seeds 6–10, dull red, brown, black, or speckled, oblong, 4–9 × 3–3.5 mm. Fl. May–Aug.

Wild or cultivated. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Japan, Korea, Philippines; SE Asia; widely cultivated in tropical regions].

12. *Vigna unguiculata* (Linnaeus) Walpers, Repert. Bot. Syst. 1: 779. 1842.

豇豆 *jiang dou*

Annual or perennial herbs, erect, trailing, or twining. Stems 1–3 m, subglabrous. Stipules lanceolate, ca. 1 cm, with a narrow spur below point of attachment; leaflets ovate-rhomboid, 5–15 × 4–6 cm, lateral ones oblique, puberulent or glabrous on both surfaces, base acute to rounded, apex acute. Racemes axillary, with 2–6 flowers clustered at top of rachis. Calyx campanulate, 6–10 mm; teeth lanceolate. Standard yellowish white or violet, suborbicular, 1.2–3.3 × 1–3.2 cm, apex emarginate; wings blue to purple, subdeltoid; keel usually white or pale, not twisted. Legumes terete, 7.5–30(–90) × 0.6–1 cm. Seeds several, dark red or black, mottled with black or brown, oblong or reniform, 6–12 mm.

Widely cultivated in China [native to Africa and Asia; widely cultivated in tropical and subtropical regions].

- 1a. Herbs twining, 2–4 m; legumes 30–80(–90) cm, pendulous, slightly fleshy and inflated when young; seeds 8–12 mm 12b. subsp. *sesquipedalis*
- 1b. Herbs erect or trailing, 15–80 cm; legumes 7.5–30 cm, more solid and not inflated when young; seeds 6–9 mm.
 - 2a. Legumes 20–30 cm, pendulous 12a. subsp. *unguiculata*
 - 2b. Legumes 7.5–13 cm, erect or spreading 12c. subsp. *cylindrica*

12a. *Vigna unguiculata* subsp. *unguiculata*

豇豆(原亚种) *jiang dou* (yuan ya zhong)

Dolichos unguiculatus Linnaeus, Sp. Pl. 2: 725. 1753; *D. sinensis* Linnaeus; *Vigna sinensis* (Linnaeus) Hasskarl.

Legumes 20–30 cm, pendulous. Fl. Jun–Jul, fr. Aug.

Widely cultivated in China [native to Africa; widely cultivated in tropical and subtropical regions].

The legumes and seeds are edible.

12b. *Vigna unguiculata* subsp. *sesquipedalis* (Linnaeus) Verd-court in P. H. Davis, Fl. Turkey 3: 266. 1970.

长豇豆 chang jiang dou

Dolichos sesquipedalis Linnaeus, Sp. Pl., ed. 2, 2: 1019. 1763; *Vigna sinensis* subsp. *sesquipedalis* (Linnaeus) Van Eseltine; *V. sinensis* var. *sesquipedalis* (Linnaeus) Körnicke ex Ascherson & Schweinfurth.

Twining herbs, 2–4 m. Legumes 30–80(–90) cm, pendulous, slightly fleshy and inflated when young. Seeds 8–12 mm. Fl. and fr. Jun–Aug.

Widely cultivated in China [native to tropical Asia; widely cultivated in tropical regions of Asia, Africa, and America].

Dolichos sesquipedalis was originally described from material of American origin, but this was presumably cultivated material originally introduced from tropical Asia as all related taxa are from the Old World.

This taxon is used as a vegetable.

12c. *Vigna unguiculata* subsp. *cylindrica* (Linnaeus) Verd-court, Kew Bull. 24: 544. 1970.

眉豆 mei dou

Phaseolus cylindricus Linnaeus, Herb. Amboin. 23. 1754; *Dolichos catjang* N. L. Burman; *Vigna catjang* (N. L. Burman) Walpers; *V. cylindrica* (Linnaeus) Skeels; *V. sinensis* var. *catjang* (N. L. Burman) Chiovenda; *V. sinensis* subsp. *cylindrica* (Linnaeus) Van Eseltine; *V. unguiculata* var. *cylindrica* (Linnaeus) H. Ohashi.

Legumes 7.5–13 cm, erect or spreading. Fl. Apr–May, fr. Sep.

Widely cultivated in China [Cambodia, Japan, Korea, Laos, Vietnam; Africa, America (cultivated)].

This taxon is used as a vegetable.

13. *Vigna angularis* (Willdenow) Ohwi & H. Ohashi, J. Jap. Bot. 44: 29. 1969.

赤豆 chi dou

Dolichos angularis Willdenow, Sp. Pl. 3: 1051. 1800; *Azuki angularis* (Willdenow) Ohwi; *Phaseolus angularis* (Willdenow) W. Wight; *P. nipponensis* Ohwi; *Vigna angularis* var. *nipponensis* (Ohwi) Ohwi & H. Ohashi.

Annual herbs, erect or twining, 30–90 cm tall. Stems angular, sparsely pilose. Stipules peltate, lanceolate, ca. 8 mm, point of attachment elongated; leaflets ovate or rhomboid-ovate, 5–10 × 5–8 cm, sparsely pilose on both surfaces, apex broadly triangular or subrounded, lateral leaflets oblique, entire or shallowly 3-lobed. Racemes axillary, 5- or 6-flowered, pedunculate. Calyx campanulate, 3–4 mm. Corolla yellow, ca. 15 mm; standard oblate or subreniform, apex emarginate; wings broader than keel, shortly clawed and auriculate; keel apex incurved for nearly a half circle, base clawed. Ovary linear; style curved. Legumes terete, 5–8 × 0.5–0.6 cm, glabrous or almost so. Seeds dull red or with various other colors, oblong, 5–6 × 4–5 mm, truncate or subrounded at both ends; hilum not impressed. Fl. Jun–Jul, fr. Sep–Oct.

Widely cultivated and also wild in China [native to Asia; introduced in America, Africa, and elsewhere].

This species is edible and is used medicinally.

14. *Vigna reflexopilosa* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 82. 1911 [“*reflexo-pilosa*”].

卷毛豇豆 juan mao jiang dou

Azuki reflexopilosa (Hayata) Ohwi; *Phaseolus reflexopilosus* (Hayata) Ohwi.

Annual herbs, erect. Stems terete, striate, hispid with reflexed yellow hairs. Stipules peltate, oblong, ca. 1 × 0.3 cm, apex acute, villous; stipels lanceolate, 2–4 mm; terminal leaflet rhomboid-ovate, ca. 8.5 × 5 cm, hispid on both surfaces, 3-veined from base, base rounded, margin entire or sinuate, apex acute; lateral leaflets slightly larger than terminal, obliquely ovate. Racemes axillary, ca. 3 cm; peduncles ca. 13 cm, pilose with reflexed hairs. Bracts similar to stipules; pedicels ca. 1 cm; bracteoles lanceolate, ca. 4.5 mm. Calyx broadly campanulate, ca. 3 mm, 2-lipped, margin denticulate-ciliate, upper lip broadest, emarginate, lower lip 3-lobed. Corolla yellow; standard suborbicular, emarginate; wings obovate, base auriculate; keel subfalcate. Legumes linear, 5–7.5 cm, glabrous or almost so. Seeds dark gray, ca. 3 × 2 mm.

Wastelands, grasslands; below 1500 m. Hainan, Taiwan [Japan; SE Asia, Australia].

114. *MACROPTILIUM* (Bentham) Urban, Symb. Antill. 9: 457. 1928.

大翼豆属 da yi dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Phaseolus sect. *Macroptilium* Bentham, Comm. Legum. Gen. 76. 1837.

Erect or climbing herbs. Stipules not produced below point of insertion, strongly striate; stipels similar but smaller; leaves pinnately 3-foliolate. Racemes long, flowers paired or several at nodes of rachis. Bracts sometimes persistent. Calyx tube narrowly campanulate or cylindrical; lobes 5, equal or unequal. Corolla white, purplish, violet, or black; standard reflexed, obovate or orbicular, with 2 small reflexed auricles at base; wings large, much longer than standard, very broad, obovate or suborbicular, erect, 2-auricled below base of limb, long clawed, claw partly adnate to staminal tube; keel twisted, long clawed. Stamens diadelphous; vexillary stamens free, remainder connate; anthers uniform. Ovary sessile, few to many ovuled; style twice ca. 90° incurved, thickened in upper part. Legumes linear, subterete or compressed, straight or falcate. Seeds numerous or few; hilum short.

About 20 species: tropical America; introduced and cultivated elsewhere; two species (both introduced) in China.

- 1a. Plants perennial, prostrate; stipules ovate, 4–5 mm; leaflets ovate to rhombic, abaxially silvery tomentose, adaxially pubescent 1. *M. atropurpureum*
 1b. Plants annual or biennial, erect, sometimes prostrate or climbing; stipules lanceolate, 5–10 mm; leaflets narrowly elliptic to ovate-lanceolate, abaxially densely pubescent or sparsely pilose, adaxially glabrous 2. *M. lathyroides*

1. *Macroptilium atropurpureum* (Mociño & Sessé ex Candolle) Urban, Symb. Antill. 9: 457. 1928.

紫花大翼豆 *zi hua da yi dou*

Phaseolus atropurpureus Mociño & Sessé ex Candolle, Prodr. 2: 395. 1825.

Perennial prostrate herbs, sometimes rooting at nodes. Stems pubescent or tomentose. Stipules ovate, 4–5 mm, pilose; petiole 0.5–5 cm; leaflets ovate to rhombic, 1.5–7 × 1.3–5 cm, sometimes lobed, lateral ones oblique, lobed on outer side, abaxially silvery tomentose, adaxially pubescent, base rounded, apex obtuse or acute. Inflorescences with peduncle 10–25 cm and rachis 1–8 cm. Calyx campanulate, ca. 6 mm, white pilose. Corolla deeply blackish purple; standard 1.5–2 cm, with long claw. Legumes linear, 5–9 cm × ca. 4 mm, apex rostrate, 12–15-seeded. Seeds marbled with brown and black striae, oblong-elliptic, ca. 4 mm.

Cultivated. Guangdong, Taiwan (also naturalized) [native to tropical America; widely cultivated and naturalized in the tropics].

This species is used for forage.

2. *Macroptilium lathyroides* (Linnaeus) Urban, Symb. Antill. 9: 457. 1928.

大翼豆 *da yi dou*

Phaseolus lathyroides Linnaeus, Sp. Pl., ed. 2, 2: 1018. 1763.

Annual or biennial herbs, erect, 0.6–1.5 m tall, sometimes prostrate or twining. Stems densely pubescent. Stipules lanceolate, 5–10 mm; petiole 0.5–5 cm; leaflets narrowly elliptic to ovate-lanceolate, 3–8 × 1–3.5 cm, abaxially densely pubescent or sparsely pilose, adaxially glabrous, sometimes slightly lobed, base cuneate, apex acute. Inflorescences with peduncles 15–40 cm, flowers paired in upper part of rachis. Calyx tubular-campanulate; teeth shortly triangular. Corolla purple-red; standard suborbicular, ca. 1.5 cm, with pale claw. Legumes linear, 5.5–10 cm × 2–3 mm, densely pubescent, 18–30-seeded. Seeds brown or with brown and black markings, obliquely oblong, ca. 3 mm.

Cultivated. Fujian, Guangdong, Taiwan (also naturalized) [native to tropical America; widely cultivated and naturalized in the tropics].

This species is used as a cover crop.

115. PHASEOLUS Linnaeus, Sp. Pl. 2: 723. 1753.

菜豆属 *cai dou shu*

Wu Delin (吴德邻 *Wu Te-lin*); Mats Thulin

Twining or erect herbs, often with hooked hairs. Stipules basifixed, persistent, not produced below point of insertion. Leaves pinnately 3-foliolate; stipules present. Racemes axillary, flowers at swollen nodes. Bracts and bracteoles persistent or deciduous. Calyx 2-lipped, upper pair of teeth connate, lower lip 3-toothed. Corolla yellow, white, red, or purple; petals clawed; standard suborbicular, reflexed, sometimes with appendages at base; wings obovate or oblong, adherent to keel; keel linear, beak long, spirally coiled through 1–5 turns. Stamens diadelphous. Style spirally coiled through at least 360°; stigma oblique. Legumes linear or oblong, subterete or compressed. Seeds 2 to many, oblong or reniform; hilum shortly linear, estrophiolate.

About 50 species: native to tropical America; three species (all introduced) in China.

- 1a. Bracteoles inconspicuous, shorter than calyx tube 3. *P. lunatus*
 1b. Bracteoles conspicuous, longer than calyx tube.
 2a. Inflorescences shorter than leaves; legumes linear-oblong, slightly curved, not broadened toward top 1. *P. vulgaris*
 2b. Inflorescences longer than leaves; legumes falcate-oblong, broadened toward top 2. *P. coccineus*

1. *Phaseolus vulgaris* Linnaeus, Sp. Pl. 2: 723. 1753.

菜豆 *cai dou*

Annual herbs, twining or suberect. Stems pubescent or glabrescent when old. Stipules lanceolate, ca. 4 mm; leaflets broadly ovate or obovate-rhombic, lateral ones oblique, 4–16 × 2.5–11 cm, pubescent, base rounded or broadly cuneate, margin entire, apex acuminate. Racemes shorter than leaves, usually several flowered at top of rachis. Bracteoles ovate, usually as long as calyx or slightly longer, persistent. Calyx cup-shaped, 3–4 mm, upper lip emarginate. Corolla white, yellow, violet, or

red; standard 9–12 mm wide; wings obovate; keel ca. 1 cm, apex spirally twisted. Ovary pubescent. Legumes linear-oblong, 10–15 × 1–1.5 cm, slightly curved and turgid, glabrous, beaked. Seeds 4–10, white, brown, blue, or variegated, oblong or ensiform, 0.9–2 × 0.3–1.2 cm. Fl. Apr–Jul.

Cultivated. Throughout China [native to tropical America; widely cultivated everywhere].

This species is used as a vegetable.

Phaseolus vulgaris var. *humilis* Alefeld is a variety frequently cultivated in Guangdong.

2. Phaseolus coccineus Linnaeus, Sp. Pl. 2: 724. 1753.

荷包豆 he bao dou

Phaseolus multiflorus Willdenow.

Perennial herbs, twining, usually annual crop in temperate zone. Stems pubescent or glabrous. Stipules small, inconspicuous; leaflets ovate or obovate-rhombic, 7.5–12.5 × 7.5–12.5 cm or more, pubescent or glabrous on both surfaces, apex acuminate or slightly obtuse. Racemes longer than leaves, several flowered at top of rachis. Bracteoles oblong-lanceolate, ca. as long as calyx or slightly longer. Calyx broadly campanulate, glabrous or sparsely pilose; teeth shorter than tube, upper lip triangular. Corolla generally scarlet, occasionally white or variegated (red and white), 1.5–2 cm. Legumes falcate-oblong, (5–)16(–30) × ca. 1.5 cm. Seeds deep purple with red spots, black, or red, rarely white, broadly oblong, 1.8–2.5 × 1.2–1.4 cm. Fl. Apr–Jul.

Cultivated. Guizhou, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Yunnan [native to tropical America; widely cultivated elsewhere].

This species is used for food and as an ornamental.

3. Phaseolus lunatus Linnaeus, Sp. Pl. 2: 724. 1753.

棉豆 mian dou

Annual or perennial herbs, twining. Stems pubescent or glabrous. Stipules triangular, 2–3.5 mm; leaflets ovate, 5–12 × 3–9 cm, lateral ones often oblique, sparsely pubescent along veins or glabrous on both surfaces, base rounded or broadly cuneate, apex acuminate or acute. Racemes axillary, 8–20 cm. Bracteoles elliptic, shorter than calyx tube, with 3 elevated veins when dry. Calyx campanulate, 2–3 mm, pubescent. Corolla white, yellowish, or reddish; standard 7–10 × 5–8.5 mm, apex emarginate; wings obovate; keel apex twisted for 1–2 turns. Ovary pubescent. Legumes falcate-oblong, 5–10 × 1.5–2.5 cm, compressed, apex beaked, 2–4-seeded. Seeds white, purple, or other color, subrhombic or reniform, 12–13 × 8.5–9.5 mm. Fl. spring to summer.

Cultivated. Fujian, Guangdong, Guangxi, Hainan, Hebei, Hunan, Jiangxi, Shandong, Yunnan [native to tropical America; widely cultivated elsewhere].

The seeds of this species are used for food.

late, lower lobes 3, upper 2 lobes connate. Corolla purple; standard broadly obovate, base cuneate, not or very shortly clawed; wings narrowly elliptic; keel slightly falcate, apex obtuse. Stamens diadelphous. Ovary linear, ca. 6-ovuled. Legume (3-)5-7-jointed; upper suture straight or slightly undulate, lower suture deeply undulate between articles.

One species: China, Indonesia, Philippines, Vietnam.

1. Trifidacanthus unifoliolatus Merrill, Philipp. J. Sci., C, 12: 269. 1917.

三叉刺 san cha ci

Desmodium horridum Steenis; *D. unifoliolatum* (Merrill) Steenis.

Shrubs, 1-2 m tall. Spines 3-5 cm. Leaves alternate; petiole 2-4 mm, pubescent; blade elliptic or oblong-elliptic to linear-oblong, 1.5-6 × 0.7-1.5 cm, nearly leathery, distinctly reticulate veined, both surfaces glabrous, apex rounded, mucronate, sometimes emarginate. Racemes ca. 3 cm, sparsely pilose;

bracts numerous around base of rachis, striate. Pedicels ca. 5 mm, often fascicled at node of rachis. Flowers ca. 1 cm. Calyx ca. 3 mm, sparsely pubescent; upper lobe triangular-ovate. Ovary slightly pubescent; style glabrous. Legume stalked, straight, flat and thin, (2-)3-4 cm, pubescent, reticulate veined; lower suture indented, upper suture straight or slightly undulate; articles 6-7 × ca. 4 mm, lateral surfaces reticulate veined. Fl. Apr-Jul, fr. Sep-Oct.

Dry thickets of savannas, sparse forests of riverbanks; ca. 200 m. Hainan [Indonesia (Lesser Sunda Islands), Philippines, Vietnam].

117. DENDROLOBIUM (Wight & Arnott) Bentham in Miquel, Pl. Jungh. 215, 216. 1852.

假木豆属 jia mu dou shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Desmodium subg. *Dendrolobium* Wight & Arnott, Prodr. Fl. Ind. Orient. 223. 1834.

Shrubs or small trees. Leaves 3-foliolate or rarely 1-foliolate, stipulate and stipellate; leaflets entire or shallowly undulate, terminal leaflet larger than lateral ones, lateral leaflets often oblique at base. Inflorescences axillary, subumbellate or umbellate to shortly racemose, densely flowered; bracts scarious, striate. Calyx campanulate or tubular, 5-lobed; upper 2 lobes connate, appearing 4-lobed or minutely 2-toothed at apex; lower lobe longer than others. Corolla white or pale yellow; standard obovate, elliptic, or nearly orbicular, clawed, not auriculate; wings narrowly oblong, clawed, auriculate or not. Stamens monadelphous. Ovary sessile, (1 or)2-8-ovuled. Legume ± moniliform, 1-8-jointed, indehiscent when mature. Seed distinctly rim-arillate; cotyledons epigeous.

Eighteen species: tropical and subtropical Asia and Australia; five species (one endemic) in China.

- 1a. Legume 1-jointed; terminal leaflet narrowly oblong to narrowly oblong-lanceolate, 2-5 × 0.9-1.9 cm 1. *D. lanceolatum*
- 1b. Legume 2-8-jointed; terminal leaflet usually elliptic-ovate to broadly elliptic-ovate, length:width ratio < 2:1.
 - 2a. Legume usually 2-jointed; terminal leaflet shorter than 3 cm; lateral veins 5-9 on each side of midvein and not reaching margin 2. *D. dispernum*
 - 2b. Legume 3-8-jointed; terminal leaflet longer than 3 cm; lateral veins 7-17 on each side of midvein and reaching margin.
 - 3a. Lower calyx lobes ca. as long as other lobes; terminal leaflet acute or obtuse at apex 4. *D. umbellatum*
 - 3b. Lower calyx lobes longer than other lobes; terminal leaflet acuminate, rounded, or sometimes acute at apex.
 - 4a. Young shoots sharply triangular; terminal leaflet narrowly obovate-elliptic, apex acuminate to long acuminate; umbels 20-30-flowered 3. *D. triangulare*
 - 4b. Young shoots terete; terminal leaflet not as above; umbels 10-20-flowered.
 - 5a. Terminal leaflet elliptic to orbicular or ovate to broadly ovate, lateral leaflets ± oblique at base; keel distinctly broader than wings 4. *D. umbellatum*
 - 5b. Terminal leaflet rhombic or obovate, lateral leaflets usually distinctly oblique at base; keel slightly broader than wings 5. *D. rugosum*

1. Dendrolobium lanceolatum (Dunn) Schindler, Repert. Spec. Nov. Regni Veg. 20: 278. 1924.

单节假木豆 dan jie jia mu dou

Shrubs, usually 1-3 m tall. Branches glabrescent. Leaves 3-foliolate; petiole 0.5-2 cm; terminal leaflet blade oblong or oblong-lanceolate, 2-5 × 0.9-1.9 cm, lateral leaflets smaller, abaxially appressed pubescent, adaxially glabrous, lateral veins 4-7 on each side of midvein, not reaching margin, both ends

obtuse or acute. Inflorescences subumbellate, 1-1.5 cm, ca. 10-flowered. Pedicel ca. 2 mm, densely appressed pubescent. Calyx ca. 4 mm; upper lobe broader, other lobes narrower. Corolla white or pale yellow; standard elliptic, 6-9 × 5-6 mm, clawed; wings narrowly oblong, 5-6 × 1.5-2 mm; keel nearly falcate, 7-9 × ca. 2.5 mm. Stamens 7-8 mm. Pistil 7-8 mm; ovary pilose; style ca. 7 mm. Legume broadly elliptic or nearly orbicular, 4-10 × 3-7 mm, sessile, 1-jointed, glabrous, distinctly reticulate veined. Seed broadly elliptic, ca. 3 × 2 mm. Fl. May-Aug, fr. Sep-Nov.

Grassy riverbanks, thickets or sparse forests on mountain slopes; 100–800 m. Fujian, Hainan [Cambodia, Laos, Thailand, Vietnam].

- 1a. Legume broadly elliptic or nearly orbicular, 8–10 × 6–7 mm 1a. var. *lanceolatum*
 1b. Legume nearly orbicular, 4–5.5 × 3–4 mm 1b. var. *microcarpum*

1a. *Dendrolobium lanceolatum* var. *lanceolatum*

单节假木豆(原变种) dan jie jia mu dou (yuan bian zhong)

Lespedeza lanceolata Dunn, J. Linn. Soc., Bot. 35: 488. 1903; *Desmodium dunnii* Merrill.

Legume broadly elliptic or nearly orbicular, 8–10 × 6–7 mm.

Grassy riverbanks, thickets or sparse forests on mountain slopes; 100–800 m. Hainan [Cambodia, Laos, Thailand, Vietnam].

1b. *Dendrolobium lanceolatum* var. *microcarpum* H. Ohashi, Ginkgoana 1: 65. 1973.

小果单节假木豆 xiao guo dan jie jia mu dou

Legume nearly orbicular, 4–5.5 × 3–4 mm.

Fujian [Thailand].

2. *Dendrolobium dispernum* (Hayata) Schindler, Repert. Spec. Nov. Regni Veg. 22: 271. 1926.

两节假木豆 liang jie jia mu dou

Desmodium dispernum Hayata, Icon. Pl. Formosan. 3: 69. 1913.

Shrubs or small trees, 2–3 m tall. Branches glabrescent. Leaves 3-foliolate; petiole 5–12 mm; terminal leaflet blade obovate or elliptic, 1.3–2.5 × 1–1.5 cm, lateral leaflets nearly equal or slightly smaller, abaxially densely appressed sericeous especially on midvein, adaxially sparsely pubescent, lateral veins 5–9 on each side of midvein, not reaching margin. Inflorescences shortly racemose, 1–2 cm, 5–7-flowered. Pedicel 2.5–5 mm. Calyx campanulate; lower lobes narrowly triangular; upper lobe broadly ovate, entire or minutely 2-toothed at apex. Corolla white; standard broadly elliptic or nearly orbicular, 8–11 × 7–9 mm; wings 7–10 × 2.5–3 mm, clawed at base; keel 8–11 × ca. 3 mm, base shortly clawed. Stamens ca. 8 mm. Pistil ca. 1 cm; ovary densely sericeous; style ca. 7 mm, glabrous. Legume narrowly oblong, 1–2 × 0.5–0.6 cm, usually 2-jointed, extremely rarely 1-jointed, densely appressed sericeous, reticulate veined. Seed elliptic, ca. 4 × 3 mm. Fl. Oct, fr. Oct–Nov.

• Thicket margins near the sea, open places; sea level to 200 m. S Taiwan.

3. *Dendrolobium triangulare* (Retzius) Schindler, Repert. Spec. Nov. Regni Veg. 20: 279. 1924.

假木豆 jia mu dou

Hedysarum triangulare Retzius, Observ. Bot. 3: 40. 1783; *Desmodium cephalotes* (Roxburgh) Wight & Arnott; *D. triangulare* (Retzius) Merrill; *H. cephalotes* Roxburgh.

Shrubs, 1–2 m tall. Young shoots sharply triangular,

densely gray sericeous. Leaves 3-foliolate; petiole 1–2.5 cm; terminal leaflet blade narrowly obovate-elliptic, 7–15 × 3–6 cm, lateral leaflets slightly smaller, abaxially long sericeous especially on veins, adaxially glabrous, lateral veins 10–17 on each side of midvein, straight, reaching margin. Umbels 20–30-flowered. Pedicels not equal, densely appressed sericeous. Calyx 5–9 mm; tube 1.8–3 mm. Corolla white or pale yellow; standard broadly elliptic, shortly clawed; wings and keel oblong, base clawed. Stamens 0.8–1.2 cm. Pistil 0.7–1.4 cm; ovary densely pubescent; style 7–12 mm. Legume 2–2.5 cm, slightly arcuate, appressed sericeous, sessile, 3–6-jointed. Seed elliptic, 2.5–3.5 × 2–2.5 mm. Fl. Aug–Oct, fr. Oct–Dec. $2n = 22^*$.

Grassy riverbanks, thickets on mountain slopes; 100–1400 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa].

The roots are used medicinally to strengthen bones and build muscle.

4. *Dendrolobium umbellatum* (Linnaeus) Benth in Miquel, Pl. Jungh. 218. 1852.

伞花假木豆 san hua jia mu dou

Hedysarum umbellatum Linnaeus, Sp. Pl. 2: 747. 1753; *Desmodium umbellatum* (Linnaeus) Candolle.

Dwarf shrubs to shrubs or small trees, to 3 m tall. Young shoots terete, densely appressed sericeous. Leaves 3-foliolate; petiole 2–5 cm; terminal leaflet blade elliptic or ovate to orbicular or broadly ovate, 5–14(–17) × 3–7(–8.5) cm, lateral leaflets slightly smaller, abaxially appressed long hairy, adaxially glabrescent, lateral veins 7–12 on each side of midvein, reaching margin. Umbels often 10–20-flowered. Pedicel 3–7 mm at anthesis, 5–12 mm in fruit. Calyx 4–5 mm, upper lobe 2-toothed at apex. Corolla white; standard broadly obovate or elliptic, 1–1.3 cm × 6–10 mm, clawed; wings narrowly elliptic, 1.1–1.2 cm × 1–2 mm, clawed; keel broader than wings, 1.1–1.2 cm × 3–5 mm, clawed. Stamens ca. 1 cm. Pistil to 1.5 cm; ovary sericeous; style ca. 1.2 cm, glabrous. Legume narrowly oblong, 2–3.5 × 0.4–0.6 cm, (3–)8-jointed; articles broadly elliptic or oblong. Seed elliptic or broadly elliptic, ca. 4 × 3 mm. Fl. Aug–Oct, fr. Nov–Mar.

Seashores. S Taiwan [Cambodia, India, Indonesia, S Japan (Ryukyu Islands), Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific islands].

5. *Dendrolobium rugosum* (Prain) Schindler, Repert. Spec. Nov. Regni Veg. 20: 279. 1924.

多皱假木豆 duo zhou jia mu dou

Desmodium rugosum Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 137. 1897.

Shrubs, to 2.5 m tall. Branches terete, glabrescent; young shoots 4–6-sided. Leaves 3-foliolate; petiole 1.5–7 cm; terminal leaflet blade rhombic to broadly obovate, 5–15(–17) × (3–)4–13 cm, lateral leaflets 3.5–13 × 2–8 cm, densely appressed tomentose on both surfaces, becoming glabrescent adaxially, lateral veins 9–15 on each side of midvein and reaching mar-

gin. Umbels often 10–20-flowered. Pedicel 2–3 mm at anthesis, afterward 3–7 mm. Calyx 5.5–6.5 mm, 4-lobed; upper lobes entire or minutely 2-toothed at apex. Corolla white; standard broadly obovate or broadly elliptic, 9–12.5 × 7.5–10.5 mm, shortly clawed; wings narrowly elliptic, 9.5–12.5 × 3–4.5 mm, base auriculate on both sides, claw 2.5–3 mm; keel 9.5–11.5 × 3.5–4.5 mm, claw 2.5–3 mm. Stamens 10–11 mm. Pistil

11–13.5 mm; ovary densely puberulent; style 9–11.5 mm, puberulent in lower half. Legume narrowly oblong, 13–27 × 4–5.5 mm, 2–5-jointed, densely appressed sericeous, both sutures undulate; articles broadly elliptic or nearly orbicular, 5–8 × 3–5 mm. Seeds transversely elliptic, 2.5–2.7 × 3.7–4 mm.

Snow-mountain ranges, streamsides; 800–2800 m. Yunnan [Cambodia, Laos, Myanmar, Thailand].

118. PHYLLODIUM Desvaux, *J. Bot. Agric.* 1: 123. 1813.

排钱树属 *pai qian shu shu*

Huang Puhua (黄普华 *Huang Pu-hwa*); Hiroyoshi Ohashi

Shrubs or subshrubs. Leaves pinnately 3-foliolate, stipulate, stipellate. Inflorescences terminal, forming a racemose panicle, each umbellate, 4–15-flowered, subtended and enclosed by a pair of persistent leaflike bracts. Calyx campanulate, pubescent, 5-lobed; lower 3 lobes usually longer than upper ones; upper 2 lobes connate and entire or minutely 2-toothed at apex. Corolla white to pale yellow or rarely purple; standard obovate or broadly obovate, clawed or tapering to base; wings narrowly elliptic, clawed and auriculate at base; keel arcuate, base long clawed, auriculate. Stamens 10, monadelphous. Gynoecium longer than androecium. Legume sessile, indehiscent; lower suture more deeply incised, upper suture shallowly undulate, (1 or)2–7-jointed. Seed distinctly rim-arillate around hilum; cotyledons epigeous.

Eight species: tropical and subtropical Asia, N Australia; four species in China.

- 1a. Terminal leaflet lanceolate or oblong, 13–20 cm, often 4–5 × as long as lateral ones 1. *P. longipes*
- 1b. Terminal leaflet ovate, elliptic, or sometimes obovate, often 5–12 cm, ca. 2 × as long as lateral ones or nearly equal.
 - 2a. Terminal leaflet slightly longer than lateral ones or nearly equal; leaflike bracts broadly elliptic or broadly ovate; legume slightly pubescent or glabrescent 2. *P. kurzianum*
 - 2b. Terminal leaflet ca. 2 × as long as lateral ones; leaflike bracts orbicular or broadly elliptic, if broadly elliptic, then legume densely silver-gray tomentose.
 - 3a. Leaflets adaxially nearly glabrous; leaflike bracts orbicular, slightly pubescent and ciliate; legume usually 2-jointed, glabrous or slightly pubescent and ciliate 3. *P. pulchellum*
 - 3b. Leaflets densely tomentose; leaflike bracts broadly elliptic, densely tomentose; legume often 3- or 4-jointed, densely silver-gray tomentose 4. *P. elegans*

1. *Phyllodium longipes* (Craib) Schindler, *Repert. Spec. Nov. Regni Veg.* 20: 270. 1924.

长叶排钱树 *chang ye pai qian shu*

Desmodium longipes Craib, *Bull. Misc. Inform. Kew* 1910: 20. 1910; *D. tonkinense* Schindler.

Shrubs, ca. 1 m tall. Branchlets densely brown pubescent. Petiole ca. 3 mm; terminal leaflet blade lanceolate or oblong, 13–20 × 3.7–6 cm, lateral ones obliquely ovate, 3–4 × 1.5–2 cm, abaxially densely brown soft hairy, adaxially sparsely pubescent or glabrescent, lateral veins 8–15 on each side of midvein, distinctly reticulate veined. Flowers (5–)9–15, enclosed by pair of leaflike bracts; bracts obliquely ovate, 2.5–3.5 × 2–2.7 cm. Pedicel 4–6 mm. Calyx 4–5 mm, white tomentose. Corolla white or pale yellow; standard obovate, 3–9 mm, clawed; wings 7–8 mm, base auriculate, clawed; keel arcuate, 8–8.5 mm. Ovary 3.5–4 mm, 7- or 8-ovuled. Legume narrowly oblong, 0.8–1.5 cm × ca. 3.5 mm, lower suture more deeply undulate, upper suture slightly undulate, both surfaces downy, 2–5-jointed; articles broadly oblong to nearly quadrangular. Seed broadly elliptic, ca. 3 × 2.3 mm. Fl. Aug–Sep, fr. Oct–Nov.

Thickets, dense forests; 900–1000 m. Guangdong, Guangxi, S Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

2. *Phyllodium kurzianum* (Kuntze) H. Ohashi, *Ginkgoana* 1: 272. 1973.

长柱排钱树 *chang zhu pai qian shu*

Meibomia kurziana Kuntze, *Revis. Gen. Pl.* 1: 197. 1891; *Desmodium grande* Kurz; *D. kurzii* Craib; *Phyllodium grande* (Kurz) Schindler; *P. kurzii* (Craib) Chun.

Shrubs, much branched, 1–2 m tall. Branchlets densely gray-yellow tomentose. Petiole 2–3 mm; terminal leaflet blade ovate or elliptic, 7–16 × 5–11 cm, lateral ones 7–11 × 5–6 cm, abaxially densely white tomentose, adaxially appressed white pubescent, lateral veins 8–10 on each side of midvein, reaching margin, both surfaces distinctly reticulate veined. Flowers 5–11, enclosed by pair of leaflike bracts; bracts broadly elliptic or broadly ovate, 2–3.5 × 1.5–2.5 cm. Pedicel 5–10 mm. Calyx 2–3.5 mm. Corolla white or pale yellow; standard ca. 10 × 5 mm, clawed; wings ca. 8 × 1.5 mm, clawed; keel ca. 9 mm, base long clawed, auriculate. Ovary 2.5–3 mm; style ca. 1 cm, slender. Legume 1–2 × 0.4–0.5 cm, slightly pubescent or glabrescent, 3- or 4-jointed; articles nearly quadrangular, reticulate veined. Seed orbicular, 2.3–2.7 mm in diam. Fl. Jul–Aug, fr. Oct–Nov.

Thickets on mountain slopes; below 1000 m. W Guangdong, S Guangxi, SW and W Yunnan [Laos, Myanmar, N Thailand, Vietnam].

3. *Phyllodium pulchellum* (Linnaeus) Desvau, J. Bot. Agric. 1: 124. 1813.

排钱树 pai qian shu

Hedysarum pulchellum Linnaeus, Sp. Pl. 2: 747. 1753; *Desmodium pulchellum* (Linnaeus) Benth; *Dicerma pulchellum* (Linnaeus) Candolle.

Shrubs, 0.5–2 m tall. Branchlets white or gray pubescent. Petiole 5–7 mm; terminal leaflet blade ovate, elliptic, or obovate, 6–10 × 2.5–4.5 cm, ca. 2 × as long as lateral leaflets, abaxially densely pubescent on veins, adaxially sparsely pubescent, lateral veins 6–10 on each side of midvein. Flowers 5 or 6, enclosed by pair of leaflike bracts; bracts orbicular, 1–1.5 cm in diam., both surfaces slightly pubescent, ciliate. Pedicel 2–3 mm, pubescent. Calyx ca. 2 mm. Corolla white or pale yellow; standard 5–6 mm, base attenuate, shortly and broadly clawed; wings ca. 5 × 1 mm, auriculate, clawed; keel ca. 6 × 2 mm, clawed, not auriculate. Pistil 6–7 mm; style 4.5–5.5 mm. Legume ca. 6 × 2.5 mm, slightly constricted on both sutures, usually 2-jointed; articles glabrous or sparsely pubescent and ciliate. Seed broadly elliptic or nearly orbicular, 2.2–2.8 × ca. 2 mm. Fl. Jul–Sep, fr. Oct–Nov. $2n = 22$.

Wastelands on hills, roadsides, sparse forests on mountain slopes; 200–2000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Jiangxi, Taiwan, S Yunnan [throughout tropical Asia to Australia and New Guinea].

The roots and leaves are used medicinally for reducing fever and as an antiphlogistic and diuretic.

4. *Phyllodium elegans* (Loureiro) Desvau, Mém. Soc. Linn. Paris 4: 324. 1826.

毛排钱树 mao pai qian shu

Hedysarum elegans Loureiro, Fl. Cochinch. 2: 450. 1790; *Desmodium blandum* Meeuwen; *D. elegans* (Loureiro) Benth (1861), not Candolle (1825); *Dicerma elegans* (Loureiro) Candolle.

Shrubs, 0.5–1.5 m tall. Branchlets and petioles densely yellow tomentose. Petiole ca. 5 mm; terminal leaflet blade ovate or elliptic to obovate, 7–10 × 3–5 cm, lateral ones obliquely ovate, ca. 1/2 as long as terminal one, both surfaces densely tomentose especially abaxially, lateral veins 9 or 10 on each side of midvein, both ends obtuse. Flowers 4–9, enclosed by a pair of leaflike bracts; bracts broadly elliptic, 1.4–3.5 × 0.9–2.5 cm, densely yellow tomentose, base oblique, apex emarginate. Pedicel 2–4 mm. Calyx campanulate, 3–4 mm. Corolla white or pale green; standard 6–7 × 3–4 mm, base attenuate; wings 5–6 × ca. 1 mm, base auriculate, clawed; keel larger than wings, 7–8 × ca. 2 mm, clawed. Pistil 8–10 mm. Legume 1–2 × 0.3–0.4 cm, densely silver-gray tomentose, lower suture undulate, upper suture straight or shallowly undulate, usually 3- or 4-jointed. Seed elliptic, ca. 2.5 × 1.8–2 mm. Fl. Jul–Aug, fr. Oct–Nov.

Plains, wastelands on hills, grasslands, sparse forests, thickets on mountain slopes; sea level to 1100 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Cambodia, Indonesia (as *Phyllodium elegans* var. *javanicum* Schindler), Laos, Thailand, Vietnam].

The roots and leaves are used medicinally for reducing fever and as an antiphlogistic and diuretic.

119. APHYLLODIUM (Candolle) Gagnepain, Notul. Syst. (Paris) 3: 254. 1916.

两节豆属 liang jie dou shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Dicerma sect. *Aphyllodium* Candolle, Prodr. 2: 339. 1825; *Dicerma* Candolle, nom. illeg. superfl.

Subshrubs or shrubs. Leaves digitately 3-foliolate; stipules united, amplexicaul, mostly 3-lobed at apex; stipules very minute. Inflorescences racemose, terminal and axillary; bracts narrowly triangular, bracteoles at base of calyx, 2–5-flowered at each node. Calyx campanulate or funnel-shaped, with appressed long hairs and minute uncinat hairs, 5-lobed; lower lobes nearly equal to or longer than upper ones, upper 2 lobes connate, entire or minutely 2-toothed at apex. Corolla red; standard narrowly obovate to obovate, not auriculate; wings narrowly oblong; keel narrowly elliptic, shorter than wings, auriculate, clawed. Stamens diadelphous (9+1). Gynoecium sessile. Legume mostly 2- or occasionally 1-jointed, both sutures deeply indented. Seeds distinctly rim-arillate around hilum.

Seven species: tropical Asia to N Australia; one species in China.

The name *Dicerma* is illegitimate because it was nomenclaturally superfluous when published. In the protologue (Candolle, Prodr. 2: 339. 1825), the earlier-named genus *Phyllodium* (1813) was included.

1. *Aphyllodium biarticulatum* (Linnaeus) Gagnepain, Notul. Syst. (Paris) 3: 254. 1916.

两节豆 liang jie dou

Hedysarum biarticulatum Linnaeus, Sp. Pl. 2: 747. 1753; *Aphyllodium australiense* (Schindler) H. Ohashi; *Desmodium biarticulatum* (Linnaeus) F. Mueller; *Dicerma biarticulatum*

(Linnaeus) Candolle; *D. biarticulatum* var. *australiense* Schindler; *Echinolobium biarticulatum* (Linnaeus) Desvau.

Subshrubs, 40–70 cm tall. Stem erect or creeping; young shoots with appressed soft hairs. Petiole 5–7 mm; leaflet blade narrowly obovate or narrowly elliptic, 1–1.8 cm × 3–8 mm, abaxially appressed pilose, adaxially glabrous, base cuneate to rounded, apex obtuse, mucronate. Inflorescences terminal or

axillary, simple, 5–15 cm. Pedicel 2–3 mm. Calyx ca. 3.5 mm; lobes lanceolate, ca. 2 × as long as tube. Standard 5–7 × 2.5–4 mm, not auriculate and clawed; wings 5–7.5 × 0.8–1.3 mm, ± auriculate, claw 1.5–2.5 mm. Ovary puberulent, 2-ovuled; style glabrous. Legume erect, ca. 1 cm, both sutures deeply indented; articles transversely broadly elliptic to orbicular, with dense ap-

pressed or spreading hairs, reticulate. Seeds transversely broadly elliptic to transversely elliptic, ca. 1 × 1.2–1.5 mm. Fl. Aug–Sep, fr. Sep–Oct. $2n = 22$.

Wastelands, grassy forest margins. Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam; N Australia].

120. OHWIA H. Ohashi, *Sci. Rep. Tohoku Imp. Univ., Ser. 4, Biol. 40: 243. 1999.*

小槐花属 xiao huai hua shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Catenaria Benth in Miquel, *Pl. Jungh.* 217, 220. 1852, not Roussel (1806), nor Sternberg (1825).

Shrubs. Leaves pinnately 3-foliolate; stipules persistent; petiole winged. Inflorescences terminal and axillary, pseudoracemose or paniculate. Calyx narrowly campanulate, 4-lobed; upper lobe bifid at apex, lowest lobe longer than lateral ones. Corolla white to pale yellow; petals slightly callose, distinctly veined; standard elliptic, clawed; keel longer than wings. Androecium diadelphous; vexillary stamen free. Disk present around base of gynoecium. Pistil stipitate; style curved upward; stigma small. Loments linear; articles narrowly elliptic. Cotyledons epigeous.

Two species: E and SE Asia; two species (one endemic) in China.

- 1a. Apices of leaflets attenuate to caudate; flowers 6–6.5 mm; corolla greenish or yellowish white 1. *O. caudata*
- 1b. Apices of leaflets obtuse; flowers ca. 9 mm; corolla pale yellow 2. *O. luteola*

1. Ohwia caudata (Thunberg) H. Ohashi, *Sci. Rep. Tohoku Imp. Univ., Ser. 4, Biol. 40: 243. 1999.*

小槐花 xiao huai hua

Hedysarum caudatum Thunberg in Murray, *Syst. Veg.*, ed. 14, 675. 1784; *Catenaria caudata* (Thunberg) Schindler; *C. laburnifolia* (Poiret) Benth; *Desmodium caudatum* (Thunberg) Candolle; *D. laburnifolium* (Poiret) Candolle; *H. laburnifolium* Poiret.

Shrubs or subshrubs, erect, 1–2 m tall, much branched. Leaves 3-foliolate; petiole 1.5–4 cm, often very narrowly winged; terminal leaflet blade lanceolate or oblong, 5–9 × 1.5–2.5 cm, lateral ones smaller, abaxially apparently glaucous and more densely hairy on raised veins, adaxially lucid and glabrescent, base cuneate, apex acuminate or acute. Racemes terminal or axillary, 5–30 cm; rachis densely pubescent intermixed with minute uncinat and appressed or spreading longer hairs, 2-flowered at each node. Pedicel 3–4 mm. Calyx 3.5–4 mm, upper 2 lobes united for 3/4 length or more. Corolla green-white or yellow-white; standard elliptic, shortly clawed; wings narrowly oblong, clawed; keel oblong, clawed. Ovary densely appressed pilose on both sutures. Legume linear, flat, 5–7 cm, sessile, 4–8-jointed; articles narrowly ellipsoidal, 9–12 × ca. 3 mm, with dense, short, brown, uncinat hairs. Fl. Jul–Sep, fr. Sep–Nov. $2n = 22^*$.

Mountain slopes, roadsides, grasslands, streamsides, forest margins; 100–1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Sri Lanka, Vietnam].

The roots and leaves are used as a pesticide and medicinally as a diuretic.

2. Ohwia luteola H. Ohashi, *Sci. Rep. Tohoku Imp. Univ., Ser. 4, Biol. 40: 244. 1999.*

淡黄小槐花 dan huang xiao huai hua

Desmodium luteolum H. Ohashi & T. Nemoto, *J. Jap. Bot.* 73: 86. 1998, not Standley (1938); *D. sinoluteolum* H. Ohashi & T. Nemoto.

Shrubs, ca. 50 cm tall. Stems glabrescent. Leaves alternate, 3-foliolate; stipules persistent, narrowly triangular, 5–7 mm; petiole slightly winged; leaflet blades narrowly elliptic, principal lateral veins looped within margin, apex obtuse; terminal leaflet stipellate, ± larger than lateral ones, 4–5 × 1.5–2 cm, abaxially appressed straight pubescent on veins, adaxially glabrous; rachis 5–8 mm, slightly winged, sulcate adaxially; lateral leaflets pulvinate, sessile, stipellate adaxially; stipels filiform, 2–4 mm. Inflorescences terminal, pseudoracemose, 5–7-flowered per node, appressed pubescent and with minute hooked hairs, ca. 19 cm when young (probably shortly paniculate at lower nodes when mature); primary bracts narrowly triangular, 3–4 mm. Flowers ca. 9 mm; pedicel 2–4 mm, pubescent; bracteoles 2 at base of calyx, ovate, ca. 0.5 mm. Calyx campanulate, symmetric to base, 5-lobed but upper 2 united near tip, outside densely appressed pubescent; tube ca. 1.5 mm; lobes ca. 2 mm, almost equal in length, lateral one narrowly triangular, lowest one slightly longer than others, inside appressed pubescent. Corolla pale yellow, distinctly veined; standard elliptic, ca. 8 × 5 mm, with a claw ca. 1 mm, slightly auriculate at base, apex slightly retuse; wings smaller than keel, ca. 7 mm, apex obtuse, lamina narrowly elliptic, ca. 5.5 × 2 mm, slightly auriculate at upper side of base, claw 1–1.5 mm; keel 8–8.5 mm, apex rounded, lamina ca. 7 × 3 mm, auriculate at upper side of base, claw 1.5–2 mm. Vexillary stamen free from stamens of both sides and with small openings (fenestrae) at both sides at

base; remaining 9 stamens connate for 4/5 or more of length. Disk present at base of pistil, ca. 0.3 mm tall. Pistil slightly S-shaped, 7.5–8 mm, stipitate; stipe ca. 0.5 mm, glabrous; ovary 4–4.5 mm, 4-ovuled, densely appressed puberulent; style

curved upward, pilose on both sutures; stigma small. Legume and seeds unknown. Fl. Sep.

- Riverside thickets; 400–500 m. NE Yunnan.

121. DESMODIUM Desvaux, J. Bot. Agric. 1: 122. 1813, nom. cons.

山蚂蝗属 shan ma huang shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Herbs, subshrubs, or shrubs. Leaves pinnately 3-foliolate or 1-foliolate by reduction of lateral leaflets, stipulate, stipellate. Flowers usually smaller, in racemes or panicles, axillary or terminal, rarely solitary or binate in leaf axils. Bracts persistent or early deciduous; bracteoles present or absent. Calyx campanulate, 4- or 5-lobed, bilabiate; upper 2 lobes connate for all or most of length, entire or 2-toothed at apex, lower lobes free, longest. Corolla white, green-white, pink, purple, or violet; standard elliptic or obovate to nearly orbicular; wings \pm adherent to keel, wholly clawed. Stamens diadelphous (9+1), rarely monadelphous. Ovary usually sessile, with several to many ovules. Legume compressed, usually indehiscent, transversely segmented, upper (adaxial) suture slightly constricted or straight, lower (abaxial) one constricted; articles mostly ellipsoidal to quadrangular. Cotyledons epigeous.

About 280 species: mostly in subtropical and tropical regions; 32 species (four endemic, three introduced) in China.

- 1a. Stamens monadelphous, axillary filament connate to other filaments above middle (only *D. sequax* to below middle).
 - 2a. Stipules linear; keel equal to wings; legume moniliform, with dense rust-colored or brown minute hooked hairs 32. *D. sequax*
 - 2b. Stipules mostly narrowly ovate; keel shorter than wings; legume not moniliform, with hooked and straight hairs or glabrous.
 - 3a. Bracteoles absent.
 - 4a. Legume densely appressed sericeous; leaflets abaxially sericeous, midvein and lateral veins conspicuous 25. *D. multiflorum*
 - 4b. Legume glabrous; leaflets abaxially velutinous, veins inconspicuous 26. *D. amethystinum*
 - 3b. Bracteoles present.
 - 5a. Terminal leaflet 5–17 cm wide.
 - 6a. Young branchlets white pubescent; terminal leaflet ovate or broadly ovate, base oblique, abaxially densely sericeous 30. *D. megaphyllum*
 - 6b. Young branchlets densely white or gray tomentose; terminal leaflet orbicular, ovate, or obovate, base not oblique, abaxially densely gray or white tomentose 31. *D. yunnanense*
 - 5b. Terminal leaflet 1–5 cm wide.
 - 7a. Terminal leaflet lanceolate or lanceolate-linear, more than 4 \times as long as wide; legume glabrous 29. *D. stenophyllum*
 - 7b. Terminal leaflet not as above, if lanceolate, then less than 2 \times as long as wide; legume hairy or subglabrous.
 - 8a. Apex of standard emarginate; keel not mucronate at apex; young branchlets pubescent 27. *D. elegans*
 - 8b. Apex of standard orbicular, not emarginate; keel mucronate at apex; young branchlets subglabrous 28. *D. callianthum*
 - 1b. Stamens diadelphous, axillary filament free from other filaments.
 - 9a. Legume linear, articles linear, oblong, or oblong-linear to narrowly obovoid, ca. 3 \times as long as wide or more.
 - 10a. Leaves 1-foliolate (*D. gracillimum* rarely 3-foliolate near base of stem).
 - 11a. Leaves 1-foliolate, leaflet blade ovate, ovate-elliptic, or lanceolate, 5–12 \times 2–5 cm; legume 8–12 cm, 6–8-jointed, articles longer than 12 mm 4. *D. zonatum*
 - 11b. Leaves often 1-foliolate, sometimes 3-foliolate near base of stem, leaflet blade broadly triangular or broadly ovate, 2–3.5 \times 1.5–2.5 cm; legume 2–3.5 cm, 3–5-jointed, articles 6–7 mm 5. *D. gracillimum*
 - 10b. Leaves 3-foliolate.
 - 12a. Terminal leaflet elliptic-oblong, 1–4 \times 0.7–2.5 cm, lateral veins 4 or 5; stipules ca. 2 mm 6. *D. scorpiurus*
 - 12b. Terminal leaflet basically ovate-elliptic, 4.5–10(–15) \times 3–6(–8) cm, lateral veins 7–12; stipules 7–10 mm.
 - 13a. Legume plicate when young; pedicels deflexed after flowering; flowers opening almost at same time; articles oblong; leaves always 3-foliolate 3. *D. hispidum*

- 13b. Legume always straight; pedicels not deflexed after flowering; flowers opening one by one; articles linear to narrowly oblong; leaves 3- or 1–3-foliolate.
 - 14a. Terminal leaflet ovate or ovate-elliptic, lateral veins 9–12; upper lobe of calyx entire or nearly so at apex 1. *D. laxiflorum*
 - 14b. Terminal leaflet rhombic-ovate or obovate, lateral veins 7–9; upper lobe of calyx 2-toothed at apex 2. *D. diffusum*
- 9b. Legume narrowly oblong, articles often orbicular, nearly oblong, or nearly quadrate, nearly as long as wide or slightly longer.
 - 15a. Leaves 1-foliolate (*D. styracifolium* sometimes 3-foliolate).
 - 16a. Leaflets orbicular to broadly obovate, reniform, or compressed rhombic.
 - 17a. Leaflets orbicular to broadly obovate, abaxially densely adpressed white sericeous, lateral veins 8–10 20. *D. styracifolium*
 - 17b. Leaflets reniform or compressed rhombic, abaxially glabrous, lateral veins 3 or 4 21. *D. renifolium*
 - 16b. Leaflets not as above, longer than wide.
 - 18a. Leaflets 1–2.2 × 0.7–1.2 cm; legume glabrous 19. *D. rubrum*
 - 18b. Leaflets longer than 3 cm; legume hairy or nearly glabrous.
 - 19a. Flowers crowded on peduncles; leaflets yellow-brown velutinous on both surfaces 14. *D. velutinum*
 - 19b. Flowers lax, scattered on peduncles; leaflets adaxially glabrous, abaxially pubescent or villous.
 - 20a. Flowering pedicel ca. 12 mm; legume subglabrous, glabrescent 13. *D. oblongum*
 - 20b. Flowering pedicel 2–5 mm; legume with hooked hairs.
 - 21a. Corolla green-white; petioles with dense straight and minute hooked hairs 11. *D. gangeticum*
 - 21b. Corolla purple; petioles sparsely villous 12. *D. flexuosum*
 - 15b. Leaves 3-foliolate (*D. dichotomum*, *D. heterophyllum*, *D. microphyllum*, *D. reticulatum*, and *D. tortuosum* sometimes mixed 1-foliolate leaves near base of stem).
 - 22a. Terminal leaflet shorter than 2.5 cm.
 - 23a. Racemes 6-flowered to numerous.
 - 24a. Leaflets obtriangular-ovate or obovate, 1–2.5 × 1–1.6 cm; branchlets spreading yellow-brown or rust-colored pubescent; seed without aril 15. *D. griffithianum*
 - 24b. Larger leaflets narrowly obovate-elliptic or narrowly elliptic, 1–1.2 × 0.4–0.6 cm, smaller leaflets obovate or elliptic, 0.2–0.6 × 0.15–0.4 cm; branchlets nearly glabrous; seed arillate 22. *D. microphyllum*
 - 23b. Flowers solitary, in pairs at axils, or 2 or 3 scattered on peduncle.
 - 25a. Terminal leaflet broadly elliptic or broadly obovate; flowering pedicel 10–25 mm; articles of legume 3.5–4 mm 23. *D. heterophyllum*
 - 25b. Terminal leaflet obcordate, obtriangular, or obovate; flowering pedicel 3–8 mm; articles of legume shorter than 2.5 mm 24. *D. triflorum*
 - 22b. Terminal leaflet usually longer than 2.5 cm.
 - 26a. Racemes shorter than 7 cm; flowers dense.
 - 27a. Rachis densely yellowish spreading hooked hairy; legume erect 16. *D. heterocarpon*
 - 27b. Rachis densely gray-white adpressed villous; legume pendent 17. *D. strigillosum*
 - 26b. Racemes longer than 10 cm; flowers slightly sparse.
 - 28a. Terminal leaflet narrowly ovate, or ovate-elliptic to narrowly elliptic, adaxially glabrous 18. *D. reticulatum*
 - 28b. Terminal leaflet elliptic, broadly elliptic, ovate, broadly ovate, or rhombic-ovate to obovate, adaxially sparsely hairy.
 - 29a. Upper suture of legume straight or slightly undulate, lower suture constricted between articles.
 - 30a. Shrubs with terete and glabrescent branches; terminal leaflet elliptic or obovate 9. *D. concinnum*
 - 30b. Prostrate or climbing herbs with triangular stems; terminal leaflet broadly ovate to rhombic, rarely elliptic 10. *D. intortum*
 - 29b. Both sutures of legume constricted between articles, moniliform.
 - 31a. Flowering pedicel 8–17 mm, with minute hooked and glandular hairs; bracts caducous; leaflets sparsely hairy on both surfaces 7. *D. tortuosum*
 - 31b. Flowering pedicel 2–5 mm, with minute hooked hairs and minute pubescence; bracts persistent; leaflets adaxially with adpressed and intermixed hooked hairs, abaxially densely adpressed hairy 8. *D. dichotomum*

1. *Desmodium laxiflorum* Candolle, Ann. Sci. Nat. (Paris) 4: 100. 1825.

大叶拿身草 da ye na shen cao

Desmodium macrophyllum Desvaux; *D. recurvatum* (Roxburgh) Graham ex Wight & Arnott; *Hedysarum recurvatum* Roxburgh.

Subshrubs or shrubs, erect, 30–120 cm tall. Young branchlets with adpressed and minute hooked hairs. Leaves 3-foliolate; petiole 1.5–4 cm; terminal leaflet blade ovate or ovate-elliptic, 9–19 × 3–8 cm, abaxially densely yellow sericeous, adaxially sparsely adpressed hairy, lateral veins 9–12, apex shortly acuminate. Racemes terminal and axillary, often 2 axillary, to 28 cm; rachis pubescent intermixed with minute hooked hairs, 2–7-flowered, fascicled. Pedicel 5–10 mm, densely hairy as rachis. Calyx densely villous; upper lobes entire or nearly so at apex. Corolla white to violet, 4–7 mm; standard broadly obovate or orbicular; wings auriculate and clawed; keel clawed. Legume linear, 2–6 cm, with dense, minute, hooked hairs, 4–12-jointed, both sutures nearly not constricted between articles; articles oblong. Fl. Aug–Oct, fr. Oct–Nov. $2n = 22$.

Secondary forest margins, thickets, grassy slopes; 200–2400 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam].

2. *Desmodium diffusum* Candolle, Ann. Sci. Nat. (Paris) 4: 100. 1825.

单序山蚂蝗 dan xu shan ma huang

Desmodium laxiflorum Candolle var. *formosense* Ohwi; *D. laxiflorum* subsp. *parvifolium* H. Ohashi & T. T. Chen; *D. unibotryosum* C. Chen & X. J. Cui; *Hedysarum diffusum* (Candolle) Roxburgh (1832), not Willdenow (1801).

Subshrubs or shrubs, nearly erect, 30–100 cm tall. Branchlets with adpressed and minute hooked hairs. Leaves 3-foliolate; petiole 1–4 cm; terminal leaflet blade rhombic-ovate or obovate, shorter than 9 cm, abaxially densely yellow sericeous, adaxially sparsely adpressed hairy, lateral veins 7–9, apex acute. Racemes solitary, often terminal, to 25 cm; rachis pubescent intermixed with minute hooked hairs. Pedicel 3–5 mm, densely hairy as rachis. Calyx densely villous; upper lobes minutely 2-toothed at apex. Corolla white to violet, 4–7 mm; standard broadly obovate or orbicular. Legume linear, 2–6 cm, with dense, minute, hooked hairs, 4–12-jointed, both sutures distinctly constricted between articles; articles oblong. Fl. and fr. Aug–Nov.

Thickets, forest margins, mountain slopes; 100–2500 m. Guangdong, Guangxi, Taiwan, Yunnan [India, Indonesia, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam].

This species has been confused with *Desmodium laxiflorum*. However, it is well distinguished from it by terminal leaflets rhombic-ovate or obovate, shorter than 9 cm, acute at apex, lateral veins often 7–9 pairs; racemes solitary; pedicel 3–5 mm; upper calyx lobe 2-toothed at apex; and both sutures of legume distinctly constricted between articles.

3. *Desmodium hispidum* Franchet, Pl. Delavay. 174. 1890.

粗硬毛山蚂蝗 cu ying mao shan ma huang

Uraria henryi Schindler; *U. hispida* (Franchet) Schindler.

Shrubs or subshrubs, erect, 0.5–1 m tall. Stems striate; branches densely yellowish villous; old branches purple, glabrous. Leaves 3-foliolate; stipules ovate or narrowly triangular-ovate, 10–15 × 3–4 mm; petiole 1–2 cm, densely yellowish villous; petiolules 4–6 mm; leaflets papery; terminal leaflet ovate to elliptic, 5–17 × 3–8 cm, abaxially yellowish villous, adaxially densely hispid, glabrescent, lateral veins 8–11 on each side of midvein, reaching margin, margin entire, midvein and lateral veins prominent on both surfaces. Inflorescences densely yellowish villous, paniculate when terminal, fasciculate with (1 or) 2–4 racemes or sometimes panicles at axils, 8–25 cm; primary bracts narrowly triangular-ovate, 4–5 × ca. 1 mm at base; secondary bracts 1.5–2.5 mm. Pedicel 4–5 mm, deflexed after flowering; bracteoles absent. Flowers 2–8 per node, fasciculate, opening almost at same time. Calyx 3–4 mm, outside densely yellowish villous, 4-lobed; lobes lanceolate, subequal. Corolla white, pale yellow, or greenish white, 4–5 mm; standard elliptic to broadly elliptic, without auricles, claw ca. 1 mm; wings elliptic, claw ca. 1 mm; keel ca. 4 mm, auriculate, claw ca. 1 mm. Androecium diadelphous. Legume sessile, 1.2–1.8 cm, with dense hooked hairs, plicate when young, straight when mature, 4–7-jointed, both sutures undulate; articles elliptic, 2.5–3 × ca. 1.5 mm. Seeds elliptic. Fl. and fr. Sep–Dec.

700–2400 m. Guizhou, Sichuan, Yunnan [India, Myanmar].

4. *Desmodium zonatum* Miquel, Fl. Ned. Ind. 1: 250. 1855.

单叶拿身草 dan ye na shen cao

Desmodium shimadae Hayata; *Meibomia zonata* (Miquel) Kuntze.

Subshrubs, erect, 30–80 cm tall. Young branches with dense, minute, hooked hairs, intermixed with sparse adpressed hairs. Leaves 1-foliolate; petiole 1–2.5 cm; blade ovate, ovate-elliptic, or lanceolate, 5–12 × 2–5 cm, abaxially densely yellow-brown pubescent, adaxially glabrous or with sparse, minute, hooked hairs on veins. Racemes usually terminal, 10–25 cm, densely hooked hairy and sparsely long straight pubescent on rachis, 2- or 3-flowered at each node. Pedicel 4–10 mm. Calyx 2.5–3 mm; lobes longer than tube. Corolla white or pink, 6–7 mm; standard obovate, attenuate to base; wings narrowly obovate-elliptic, auriculate, shortly clawed; keel curved. Legume linear, 8–12 cm, 6–8-jointed, both sutures shallowly undulate; articles oblong-linear, longer than 12 mm, with dense, yellow, minute, hooked hairs. Fl. Jun–Aug, fr. Aug–Sep.

Dense forests, forest margins; 500–1300 m. SW Guangxi, Guizhou, Hainan, Taiwan, Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

5. *Desmodium gracillimum* Hemsley, Ann. Bot. (Oxford) 9: 152. 1895.

细叶山蚂蝗 xi ye shan ma huang

Subshrubs, prostrate, 30–60 cm tall. Stems sparsely appressed pubescent and spreading minutely uncinately hairy. Leaves 1-foliolate, rarely 3-foliolate near base of stem; petiole 0.5–2 cm; blade broadly triangular or broadly ovate, 2–3.5 × 1.5–2.5 cm, abaxially appressed sericeous, intermixed with

sparse, minute, uncinata hairs, adaxially with subspreading, uncinata hairs, base cordate, apex obtuse. Racemes terminal, 8–20 cm; rachis hairy, laxly flowered, often with 3-flowered fascicles. Pedicel 4–6 mm, densely uncinata hairy. Calyx 2–2.3 mm; lobes nearly equal to tube. Corolla white-purple, 4–5 mm; standard obovate, shortly clawed; wings and keel wholly shortly clawed. Legume linear, 2–3.5 × ca. 0.2 cm, lower suture more deeply undulate, upper suture shallowly undulate, 3–5-jointed; articles narrowly elliptic, 6–7 × ca. 2 mm, with dense, spreading, minute, uncinata hairs. Fl. Sep–Nov, fr. Nov–Dec.

- Wastelands; low elevations (200–300 m). S Taiwan.

6. *Desmodium scorpiurus* (Swartz) Desvaux, J. Bot. Agric. 1: 122. 1813.

蝎尾山蚂蝗 xie wei shan ma huang

Hedysarum scorpiurus Swartz, Prodr. 107. 1788; *Desmodium akoense* Hayata.

Herbs, perennial. Stems ascending or diffuse, hooked hairy. Leaves 3-foliolate; petiole 1.5–3 cm, minutely hooked hairy; terminal leaflet blade ovate or broadly elliptic to obovate, 1–4 × 0.7–2.5 cm, lateral ones slightly smaller, both surfaces adpressed hairy, lateral veins 4 or 5, base obtuse, apex obtuse-rounded or emarginate. Racemes terminal or axillary; rachis slender, minutely hooked hairy, laxly flowered, 1- or 2-flowered at each node. Pedicel 3–7 mm, with hooked hairs, sometimes intermixed with straight hairs. Calyx campanulate, ca. 2.5 mm; upper lobes slightly 2-toothed. Corolla pink, ca. 4 mm; standard obovate; wings oblong, clawed; keel obliquely obovate, long clawed. Ovary linear, ca. 3.5 mm; style curved. Legume linear, slender, 2–5 × ca. 0.25 cm, 3–8-jointed, constricted between articles; articles 4–6 mm, 3–4 × as long as wide, hooked hairy. Fl. and fr. Aug–Oct. $2n = 22^*$.

Open dry places; low and middle elevations (sea level to 500 m). Introduced and naturalized in S Taiwan [introduced in Australia, New Guinea, Pacific islands, and Philippines; native to tropical America].

7. *Desmodium tortuosum* (Swartz) Candolle, Prodr. 2: 332. 1825.

南美山蚂蝗 nan mei shan ma huang

Hedysarum tortuosum Swartz, Prodr. 107. 1788; *Desmodium purpureum* (Miller) Fawcett & Rendle; *H. purpureum* Miller.

Herbs, perennial, erect, 50–200 cm tall. Stems with hooked hairs, sometimes intermixed with long hairs. Leaves 3-foliolate, rarely 1-foliolate; petiole 1–8 cm, hairy as stems; terminal leaflet blade elliptic or ovate, 3–8(–14) × 1.5–3(–6) cm, both surfaces sparsely hairy, base cuneate, apex obtuse. Racemes or sometimes panicles, terminal or axillary; rachis with dense minute hooked and glandular hairs, 2-flowered at each node. Pedicel filiform, to 1.7 cm at fruiting, hairy as rachis. Calyx 3–4 mm, 5-parted; lobes longer than tube. Corolla red, white, or yellow; standard obovate, 2.5–3.5 × ca. 2 mm, base attenuate, apex emarginate; wings oblong, base auriculate, shortly clawed; keel obliquely oblong, clawed. Legume narrowly oblong, 1.5–2 cm, both sutures constricted between articles, moniliform, densely gray-yellow hooked hairy, (3–)5–7-jointed. Fl. and fr. Jul–Sep.

$2n = 22$.

Wastelands, plains; low elevations. Introduced and naturalized in Guangdong [native from S United States to subtropical South America; naturalized in tropics of Old World].

8. *Desmodium dichotomum* (Willdenow) Candolle, Prodr. 2: 336. 1825.

二歧山蚂蝗 er qi shan ma huang

Hedysarum dichotomum Willdenow, Sp. Pl. 3: 1180. 1802; *Desmodium diffusum* (Willdenow) Candolle (Nov 1825), not Candolle (Jan 1825); *H. diffusum* Willdenow (1801), not (Candolle) Roxburgh (1832).

Subshrubs or diffuse herbs, 20–80 cm tall. Stems adpressed long straight hairy and spreading hooked hairy. Leaves 3-foliolate, sometimes 1-foliolate near base of stem; petiole 1.5–3.5 cm, hairy; leaflet blade elliptic or ovate to broadly elliptic or broadly ovate, 1.5–7 × 1–6 cm, abaxially densely adpressed hairy, adaxially with sparse adpressed hairs, intermixed with sparse hooked hairs. Racemes terminal or axillary or usually panicles, 5–45 cm, hooked hairy, laxly flowered, 2- or 3-flowered at each node. Pedicel 2–5 mm. Calyx 4-lobed, ca. as long as tube; upper lobes 2-toothed. Corolla purple to violet, ca. 3 mm; standard obovate or broadly obovate, base shortly clawed; wings and keel wholly shortly clawed at base. Ovary densely pubescent, 5- or 6-ovuled. Legume narrowly oblong, 1–1.8 cm × 2.5–3 mm, densely hooked hairy, 5- or 6-jointed, both sutures shallowly constricted between articles. Fl. Jun–Aug, fr. Sep–Oct. $2n = 22$.

Forests, thickets. S Yunnan [India, Indonesia, Malaysia, Myanmar].

9. *Desmodium concinnum* Candolle, Ann. Sci. Nat. (Paris) 4: 101. 1825.

凹叶山蚂蝗 ao ye shan ma huang

Desmodium barbigerum H. Léveillé.

Shrubs, 80–150 cm tall. Young branches adpressed pubescent. Leaves 3-foliolate; petiole 0.8–1.3 cm, densely gray hairy; terminal leaflet blade elliptic or obovate, 4–9 × 1.5–3 cm, both surfaces adpressed pubescent, base cuneate, apex acute to obtuse-rounded, mucronate. Racemes terminal and axillary, 20–35 cm; rachis gray puberulent and hooked hairy, 2–4-flowered at each node. Pedicel ca. 1 cm, hooked hairy. Calyx 2–3.5 mm; lobes nearly equal. Corolla purple to violet; standard broadly obovate or orbicular, 5.5–7 × 5–6 mm, clawed; wings broadly obovate, 4.5–6 × ca. 3 mm, long clawed. Ovary hairy, 5- or 6-ovuled. Legume narrowly oblong, 4–6-jointed, lower suture deeply constricted near upper suture, upper suture thickened and nearly straight or slightly undulate, sparsely minutely hooked hairy. Fl. Sep–Oct, fr. Oct.

Grasslands, mountain slopes, thickets; ca. 1300 m. Guangxi, S Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Pakistan, Vietnam].

10. *Desmodium intortum* (Miller) Urban, Symb. Antill. 8: 292. 1920.

扭曲山蚂蝗 niu qu shan ma huang

Hedysarum intortum Miller, Gard. Dict., ed. 8, *Hedysarum* no. 11. 1768; *Desmodium nantouense* Y. C. Liu & F. Y. Lu.

Herbs, perennial, scandent, to 3 m. Stems triangular, with white spongy pith, densely yellowish uncinately hispid and pilose or sometimes nearly glabrous. Leaves 3-foliolate; stipules ovate, 4–12 mm, acuminate or caudate, often persistent; petiole 3–9 cm, hairy as stems; terminal leaflet blade ovate or sometimes broadly elliptic, 5–13 × 2–7 cm, papery, both surfaces appressed pilose, base rounded to truncate, apex acute. Racemes terminal or axillary, to 30 cm; rachis with dense appressed to spreading hooked hairs, 2-flowered at each node. Pedicel filiform, 6–10 mm. Calyx 2.5–3 mm, 5-parted; lowest lobe longest. Corolla purplish red to violet becoming bluish or greenish white, 9–11 mm. Legume shortly stipitate, narrowly oblong, 2–4.5 cm × 3–4 mm, densely brownish hooked hairy, 5–10-jointed, lower suture deeply constricted, upper suture thickened, slightly sinuate; stipe ca. 2 mm; articles semicircular or rhombic, 4–5 mm. Fl. Jul–Oct, fr. Oct–Nov. $2n = 22, 24$.

100–1400 m. Introduced in Taiwan [native to Central and South America].

11. *Desmodium gangeticum* (Linnaeus) Candolle, Prodr. 2: 327. 1825.

大叶山蚂蝗 da ye shan ma huang

Hedysarum gangeticum Linnaeus, Sp. Pl. 2: 746. 1753;
Desmodium cavaleriei H. Léveillé.

Shrubs, erect or nearly so, to 1 m tall, much branched, pilose. Leaves 1-foliolate, variable in shape and size; petiole 1–2 cm; blade narrowly elliptic-ovate, sometimes ovate or lanceolate, 3–13 × 2–7 cm, abaxially sparsely gray villous, adaxially glabrous except for hairy midvein, base rounded, apex acute. Racemes terminal and axillary or sometimes panicles, 10–30 cm, 2–6-flowered at each node. Pedicel 2–5 mm, hairy. Calyx ca. 2 mm, 4-lobed; lobes slightly longer than tube. Corolla green-white, 3–4 mm; standard obovate; wings oblong, base auriculate, shortly clawed; keel narrowly obovate, not auriculate. Ovary hairy. Legume linear, slightly curved, 1.2–2 × ca. 0.25 cm, lower suture deeply undulate, upper suture slightly constricted between seeds, hooked pubescent, 6–8-jointed. Fl. Apr–Aug, fr. Aug–Sep. $2n = 22$.

Secondary forests, waste grasslands; 300–900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, SC Taiwan, S and SE Yunnan [Bhutan, Cambodia, India, Kashmir, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia, Pacific islands; naturalized in the West Indies].

12. *Desmodium flexuosum* Wallich ex Benth var. ***cordifoliolatum*** (P. C. Li) P. H. Huang, Bull. Bot. Res., Harbin 18: 6. 1998.

心叶山蚂蝗 xin ye shan ma huang

Desmodium cordifoliolatum P. C. Li, Acta Bot. Yunnan. 11: 301. 1989.

Subshrubs. Branchlets sparsely villous. Leaves 1-foliolate; stipules 5–6 mm; petiole 7–8 mm, sparsely villous; blade ovate, 2–3.5 cm, abaxially villous, adaxially glabrous. Racemes 10–15 cm; rachis sparsely villous, densely hooked pubescent, with 2–4 flowers, clustered. Pedicel ca. 2 mm. Calyx broadly campanulate, ca. 1.5 mm. Corolla purple; standard broadly obovate, 4.5–

4.7 × ca. 3.5 mm, base shortly clawed; wings oblong, ca. 3 × 1.5 mm, auriculate, clawed; keel falcate-oblong, longer than wings. Legume narrowly oblong, 0.8–1.8 cm × 2–2.5 mm, 3–7-jointed; articles broadly ovoid, hooked pubescent, reticulate veined.

• Meadows. Sichuan.

Desmodium cordifoliolatum was described from a specimen from Dechang, Sichuan. It differs from typical *D. flexuosum* in having smaller stipules, leaflets, and petioles. One of us (Ohashi) regards *D. cordifoliolatum* as a synonym of *D. gangeticum* (see J. Jap. Bot. 70: 113. 1995).

Desmodium flexuosum var. *flexuosum* occurs in Myanmar and Thailand. It is a subshrub, 30–50 cm tall, with leaves 1-foliolate, petiole 3–6 cm, blade (3–)4.5–7.5 × (2.5–)4–7.2 cm, and stipules 0.9–1.2 cm.

13. *Desmodium oblongum* Wallich ex Benth in Miquel, Pl. Jungh. 224. 1852.

长圆叶山蚂蝗 chang yuan ye shan ma huang

Shrubs, erect, 70–150 cm tall, much branched, sparsely hooked hairy. Leaves 1-foliolate; petiole 1–1.4 cm, with dense, minute, hooked and straight, appressed hairs; blade oblong or oblong-lanceolate, 7–12 × 2.5–4.5 cm, abaxially densely appressed pubescent, veins sparsely minutely hooked hairy, adaxially glabrous except for hairy veins. Panicles terminal or axillary, 10–30 cm, laxly flowered, 2-flowered at each node. Pedicel ca. 1.2 cm, elongated to 1.7 cm at fruiting. Calyx ca. 3 mm; lobes ca. as long as tube. Corolla purple or violet, 8–10 mm; standard nearly orbicular to broadly obovate, shortly clawed; wings obliquely oblong, auriculate, shortly clawed; keel clawed. Stamens monadelphous. Ovary appressed pubescent, 6–9-ovuled. Legume narrowly oblong, 1.5–3 × ca. 0.3 cm, lower suture crenate, upper suture deeply constricted, subglabrous, glabrescent, 5–7-jointed. Fl. and fr. Aug–Nov.

Broad-leaved forests or thickets; 1000–1900 m. Guangxi, Yunnan [Bhutan, Cambodia, India, Laos, Myanmar, Thailand, Vietnam].

14. *Desmodium velutinum* (Willdenow) Candolle, Prodr. 2: 328. 1825.

绒毛山蚂蝗 rong mao shan ma huang

Shrubs or subshrubs, to 150 cm tall. Young branches densely yellow-brown velutinous and shortly hooked hairy. Leaves 1-foliolate, rarely intermixed with 3-foliolate leaves; petiole 1.5–1.8 cm, densely yellow velutinous; blade ovate, ovate-lanceolate, triangular-ovate, or broadly ovate, 4–17 × 2.5–11.5 cm, both surfaces yellow velutinous, indumentum denser and longer abaxially. Inflorescences terminal and axillary, racemose or paniculate, 4–10 cm, terminal ones often broadly paniculate, to 20 cm, 2–5-flowered at each node; bracts subulate or lanceolate, 2.5–12 × 0.3–0.7 mm. Pedicel ca. 1.5 mm. Calyx 2–3 mm, 4-lobed. Corolla purple or pink, 3–5 mm; standard obovate-orbicular; wings narrowly elliptic, auriculate; keel narrow, not auriculate. Legume narrowly oblong, 1–2 cm × 2–3 mm, lower suture incised between seeds, upper suture nearly straight, with dense yellow straight hairs intermixed with short hooked hairs, 5–7-jointed. Fl. and fr. Aug–Nov. $2n = 22$.

Sunny grassy slopes, streamsides, thickets, mixed forests; 100–

1400 m. Guangdong, SW Guangxi, Guizhou, Hainan, S Taiwan, S and SW Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa; introduced in tropical Americas and Australia].

- 1a. Bracts subulate, 2.5–3.5 × ca. 0.3 mm, sparsely hirsute; terminal inflorescences racemose or paniculate, 4–10 cm 14a. subsp. *velutinum*
- 1b. Bracts lanceolate, 7–10 × ca. 0.7 mm, densely hirsute; terminal inflorescences paniculate, to 20 cm 14b. subsp. *longibracteatum*

14a. *Desmodium velutinum* subsp. *velutinum*

绒毛山蚂蝗(原亚种) rong mao shan ma huang (yuan ya zhong)

Hedysarum velutinum Willdenow, Sp. Pl. 3: 1174. 1802; *Desmodium lasiocarpum* (Beauvois) Candolle; *D. latifolium* (Roxburgh) Candolle; *D. latifolium* var. *plukenetii* Wight & Arnott; *D. latifolium* var. *virgatum* Miquel; *D. plukenetii* (Wight & Arnott) Merrill & Chun; *D. velutinum* var. *plukenetii* (Wight & Arnott) Schindler; *D. virgatum* Prain; *H. lasiocarpum* Beauvois; *H. latifolium* Roxburgh.

Shrubs or subshrubs. Leaves 1-foliolate, rarely intermixed with 3-foliolate leaves; blade ovate-lanceolate, triangular-ovate, or broadly ovate, 4–11 × 2.5–8 cm. Terminal inflorescence racemose or paniculate, 4–10 cm; bracts subulate, 2.5–3.5 × ca. 0.3 mm, sparsely hirsute. Corolla ca. 3 mm. Fl. and fr. Sep–Nov. 2n = 22.

Sunny grassy slopes, streamsides, thickets; 100–900 m. Guangdong, SW Guangxi, Guizhou, Hainan, S Taiwan, S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa; introduced in tropical Americas and Australia].

14b. *Desmodium velutinum* subsp. *longibracteatum* (Schindler) H. Ohashi, Ginkgoana 1: 194. 1973.

长苞绒毛山蚂蝗 chang bao rong mao shan ma huang

Desmodium longibracteatum Schindler, Repert. Spec. Nov. Regni Veg. 21: 7. 1925; *D. rufihirsutum* Craib; *D. velutinum* var. *longibracteatum* (Schindler) Meeuwen.

Shrubs. Leaves 1-foliolate; blade usually ovate, ca. 17 × 11.5 cm. Terminal inflorescence paniculate, to 20 cm; bracts lanceolate, 7–10 × ca. 0.7 mm, densely hirsute. Corolla ca. 5 mm. Fl. and fr. Aug–Oct.

Thickets, mixed forests; 200–1400 m. Guizhou, S and SW Yunnan [India, Indonesia, Laos, Myanmar, Thailand, Vietnam].

These subspecies were recognized at the rank of variety in FRPS (41: 29. 1995).

15. *Desmodium griffithianum* Benth in Miquel, Pl. Jungh. 222. 1852.

疏果山蚂蝗 shu guo shan ma huang

Desmodium griffithianum var. *leiocarpum* X. F. Gao & C. Chen; *D. oxalidifolium* H. Léveillé, p.p.

Subshrubs or herbs, prostrate or ascending, 30–60 cm tall. Branches spreading yellow-brown or rust-colored pubescent. Leaves 3-foliolate; petiole 0.6–2.6 cm, densely hairy as branches; leaflet blade obtriangular-ovate or obovate, 1–2.5 × 1–1.6 cm, abaxially adpressed puberulent, adaxially subglabrous, base cuneate, apex truncate. Racemes terminal, ca. 10 cm, rachis hairy as branches. Flowers dichotomous. Pedicel 3–5 mm, hairy as branches. Calyx 3–3.5 mm; tube 1–1.3 mm; lower lobes triangular, upper lobes distinctly 2-toothed at apex. Corolla purple-red, ca. 7 mm; standard nearly orbicular, clawed; wings oblong, shortly clawed; keel smaller than wings, clawed. Ovary strigose; style glabrous. Legume deflexed, nearly oblong, 1–1.5 cm × 2.5–3.5 mm, lower suture constricted, upper suture straight, 3- or 4-jointed; articles nearly quadrate, with hooked and straight rigid hairs. Fl. and fr. Aug–Sep. 2n = 22.

Grassy slopes, roadsides, *Pinus* forests; 1500–2300 m. Guizhou, Sichuan, Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

16. *Desmodium heterocarpon* (Linnaeus) Candolle, Prodr. 2: 337. 1825 [“*heterocarpon*”].

假地豆 jia di dou

Shrubs or subshrubs, erect or prostrate, 30–150 cm tall, much branched from base of stem. Leaves 3-foliolate; petiole 1–2 cm, slightly pubescent; terminal leaflet blade elliptic, narrowly elliptic, or broadly obovate, 2.5–6 × 1.3–3 cm, abaxially white adpressed pubescent, adaxially glabrous, base obtuse, apex rounded or obtuse, emarginate, mucronate. Racemes terminal or axillary, 2.5–7 cm; rachis with white, spreading, hooked hairs or yellowish or white, straight, appressed hairs, densely flowered. Pedicel 3–4 mm. Calyx 1.5–2 mm, 4-lobed; upper lobes slightly 2-toothed at apex. Corolla purple, purple-red, or white, ca. 5 mm; standard obovate-oblong, shortly clawed; wings obovate, auriculate, clawed; keel extremely curved, apex obtuse. Infructescence crowded. Legume erect, narrowly oblong, 1.2–2 cm × 2.5–3 mm, upper suture shallowly undulate, both sutures hooked hairy, 4–7-jointed; articles quadrate. Fl. Jul–Oct, fr. Oct–Dec. 2n = 22*.

Grasslands, grassy slopes, watersides, thickets, forests; 300–1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific islands].

We (Huang and Ohashi) differ in our circumscriptions of *Desmodium heterocarpon*. One of us (Ohashi) recognizes eight infraspecific taxa, including *D. heterocarpon* subsp. *angustifolium* H. Ohashi, which corresponds to *D. reticulatum* in this treatment, and *D. heterocarpon* subsp. *heterocarpon*, comprising var. *heterocarpon* and var. *strigosum* (see J. Jap. Bot. 66: 14–25. 1991).

- 1a. Rachis with white, spreading, hooked hairs 16a. var. *heterocarpon*
- 1b. Rachis with dense yellowish or white, straight, appressed hairs 16b. var. *strigosum*

16a. *Desmodium heterocarpon* var. *heterocarpon*

假地豆(原变种) jia di dou (yuan bian zhong)

Hedysarum heterocarpon Linnaeus, Sp. Pl. 2: 747. 1753;

Desmodium buergeri Miquel; *D. heterocarpon* var. *buergeri* (Miquel) Hosokawa.

Rachis with white, spreading, hooked hairs. Fl. Jul–Oct, fr. Oct–Dec.

Grasslands, watersides, thickets, forests; 300–1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific islands].

The whole plant is used medicinally for reducing fever and for treating contusions and strains.

16b. *Desmodium heterocarpon* var. *strigosum* Meeuwen, Reinwardtia 6: 95. 1961.

糙毛假地豆 cao mao jia di dou

Desmodium nervosum Vogel; *D. polycarpon* (Poiret) Candolle; *D. polycarpon* f. *hirsutum* Pampanini; *D. polycarpon* var. *trichocaulon* Baker; *D. siliquosum* (N. L. Burman) Candolle; *Hedysarum polycarpon* Poiret; *H. siliquosum* N. L. Burman.

Rachis with dense yellowish or white, straight, appressed hairs. Fl. Jul–Oct, fr. Oct–Nov.

Sparse thickets, grassy slopes, streamsides; 400–900 m. Guangdong, Guangxi, Hainan, Taiwan, S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; Africa, Australia, Pacific islands].

17. *Desmodium strigillosum* Schindler var. ***pendenticarpum*** (C. Z. Gao & Q. R. Lai) P. H. Huang, Bull. Bot. Res., Harbin 18: 6. 1998.

垂果山蚂蝗 chui guo shan ma huang

Desmodium pendenticarpum C. Z. Gao & Q. R. Lai, Bull. Bot. Res., Harbin 9(4): 41. 1989.

Subshrubs, prostrate or ascending, to 1 m tall. Young branchlets white adpressed villous. Leaves 3-foliolate; petiole 0.7–1.8 cm, villous; leaflet blade elliptic, narrowly elliptic, or obovate-elliptic, 1.7–4 × 1.1–2 cm, abaxially densely white villous, adaxially glabrous, base broadly cuneate or rounded, apex rounded or obtuse. Racemes terminal, 2.5–7.5 cm; rachis villous, densely flowered. Pedicel 2.5–3 mm. Calyx ca. 2 mm. Corolla purple, ca. 6 mm; standard broadly ovate-orbicular or orbicular; wings auriculate at base; keel nearly spatulate, curved. Legume pendent, 0.9–2 cm × ca. 2 mm, adpressed gray-white villous, conferted, lower suture undulate, upper suture straight, 3–8-jointed. Fl. Aug, fr. Oct.

- Mountain slopes; ca. 100 m. S Guangxi.

One of us (Huang) treats this taxon as a variety of *Desmodium strigillosum* on account of the difference in indumentum of the branchlets, legumes, petioles, and abaxial surface of the leaflets, as well as the difference in corolla color between both taxa. However, one of us (Ohashi) prefers to treat *Desmodium pendenticarpum* as a synonym of *D. strigillosum* (see J. Jap. Bot. 70: 115. 1995).

The typical variety occurs in Cambodia, Indonesia, Laos, Myanmar, and Vietnam, and is introduced in Australia. It is an erect shrub or subshrub, to 60 cm tall, with branchlets, petioles, and leaflets abaxially densely adpressed gray or silver silky hairy; rachis of the inflorescence

with dense adpressed white or silver silky hairs, intermixed with hooked hairs; corolla blue; and legume densely minutely hooked hairy and long straight white hairy.

18. *Desmodium reticulatum* Champion ex Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 46. 1852.

显脉山绿豆 xian mai shan lu dou

Desmodium heterocarpon (Linnaeus) Candolle subsp. *angustifolium* H. Ohashi.

Subshrubs, erect, 30–60 cm tall. Leaves 3- or sometimes 1-foliolate near lower stem; petiole 1.5–3 cm, sparsely hairy; terminal leaflet blade narrowly ovate or ovate-elliptic to narrowly elliptic, 3–5 × 1–2 cm, lucid, abaxially adpressed pilose, adaxially glabrous, base slightly cordate, both ends obtuse or apex acute. Racemes terminal, 10–15 cm or longer; rachis densely hooked hairy, remotely 2-flowered at each node. Pedicel ca. 3 mm, glabrous. Calyx 4-lobed; lobes ca. as long as tube. Corolla pink or blue, ca. 6 mm; standard ovate-orbicular; wings obovate-oblong, wings and keel distinctly curved. Legume oblong, 1–2 cm × ca. 2.5 mm, subglabrous or hooked pubescent, lower suture undulate, upper suture straight, 3–7-jointed. Fl. Jun–Aug, fr. Sep–Oct.

Thickets, grassy slopes; 200–1300 m. Guangdong, Guangxi, Hainan, S Yunnan [Myanmar, Thailand, Vietnam].

This is a species similar to *Desmodium heterocarpon* but differs by the terminal leaflets usually narrowly elliptic, narrower, thicker, lucid adaxially, and the inflorescences longer and laxly flowered. One of us (Ohashi) considers it to be a subspecies of *D. heterocarpon* due to fundamental similarity in having erect or ascending loments comprising quadrate articles of 2.5–3 mm.

19. *Desmodium rubrum* (Loureiro) Candolle, Prodr. 2: 327. 1825.

赤山蚂蝗 chi shan ma huang

Ornithopus ruber Loureiro, Fl. Cochinch. 2: 452. 1790; *Desmodium carlesii* Schindler.

Subshrubs, prostrate or erect, 30–50 cm tall, much branched. Leaves often 1-foliolate, rarely 3-foliolate; petiole 4–10 mm, densely adpressed pubescent; blade elliptic, sometimes narrowly elliptic to nearly orbicular, 1–2.2 cm × 7–12 mm, abaxially sparsely adpressed pubescent, adaxially glabrous, base narrowly cordate, both ends obtuse or apex slightly emarginate. Racemes terminal, 5–25 cm; rachis yellow hooked hairy. Flowers extremely lax. Pedicel 2–3 mm, elongated to 7 mm at fruiting. Calyx often red; lobes nearly equal. Corolla blue or pink, 5–6 mm; standard obcordate, ca. as long as keel; wings obliquely ovate, shorter, auriculate, wholly clawed. Legume narrowly oblong, ca. 2 cm, slightly curved, glabrous, lower suture constricted, upper suture straight, 2–7-jointed; articles nearly quadrate, distinctly reticulate veined. Fl. and fr. Apr–Jun.

Wastelands, sandy areas at seashores; sea level. Guangdong, Guangxi, Hainan [Cambodia, Vietnam].

Because of its long taproot system, this plant is used for protecting riverbanks.

20. *Desmodium styracifolium* (Osbeck) Merrill, Amer. J. Bot. 3: 580. 1916.

广东金钱草 *guang dong jin qian cao*

Hedysarum styracifolium Osbeck, Dagb. Ostind. Resa, 247. 1757; *Desmodium capitatum* (N. L. Burman) Candolle; *D. retroflexum* (Linnaeus) Candolle; *H. capitatum* N. L. Burman; *H. retroflexum* Linnaeus; *Nicolsonia styracifolia* (Osbeck) Desvaux; *Pseudarthria capitata* (N. L. Burman) Hasskarl; *Uraria retroflexa* (Linnaeus) Drake.

Herbs, subshrublike, erect, 30–100 cm tall, much branched. Young branches with dense, white or yellowish hairs. Leaves often 1 (or 3)-foliolate; petiole 1–2 cm, densely sericeous; blade orbicular or nearly so to broadly obovate, 2–4.5 × 2–4.5 cm, abaxially densely adpressed white sericeous, adaxially glabrous, lateral veins 8–10, base rounded or cordate, apex rounded or emarginate. Racemes short, 1–3 cm; rachis densely sericeous, densely flowered, 2-flowered at each node. Pedicel 2–3 mm, drooping at fruiting. Calyx 4-lobed; lobes nearly equal. Corolla purple-red, ca. 4 mm; standard obovate or nearly orbicular, clawed; wings obovate, shortly clawed; keel longer than wings, extremely curved, long clawed. Ovary linear, hairy. Legume 1–2 cm × ca. 2.5 mm, pubescent and minutely hooked hairy, lower suture undulate, upper suture straight, 3–6-jointed, reticulate veined. Fl. and fr. Jun–Sep.

Mountain slopes, grasslands, thickets; below 1000 m. Fujian, Guangdong, Guangxi, Hainan, Hubei, S Yunnan [Cambodia, India, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam].

The whole plant is used medicinally for curing nephritis edema, urethra inflammation, jaundice, and irritation from nettles.

21. *Desmodium renifolium* (Linnaeus) Schindler, Repert. Spec. Nov. Regni Veg. 22: 262. 1926.

肾叶山蚂蝗 *shen ye shan ma huang*

Hedysarum renifolium Linnaeus, Syst. Nat., ed. 10, 2: 1169. 1759; *Desmodium reniforme* Candolle; *H. reniforme* Linnaeus, nom. illeg. superfl.

Subshrubs, 30–50 cm tall, much branched, often glabrous. Leaves 1-foliolate; petiole 1–2 cm; blade reniform or compressed rhombic, often broader than long, 1.5–3.5 × 2.5–5 cm, lateral veins 3 or 4, both ends truncate or base broadly cuneate or apex emarginate. Panicles terminal or racemes axillary, 5–15 cm, laxly flowered, 2–5-flowered at each node. Pedicel 2–8 mm, elongated to 1.3 cm at fruiting. Calyx 4-lobed; lobes triangular, ca. as long as tube. Corolla white to pale yellow or purple, ca. 5 mm; standard obovate, base broadly shortly clawed, apex slightly emarginate; wings narrowly oblong, long clawed; keel narrowly elliptic, long clawed. Stamens monadelphous, 3.2–4.2 mm. Ovary adpressed puberulent. Legume narrowly oblong, 2–3 × 0.25–0.4 cm, puberulent, becoming glabrescent, lower suture deeply or slightly constricted, upper suture straight or slightly constricted, 2–5-jointed. Fl. and fr. Sep–Nov.

Sunny grasslands, thickets, forest margins, broad-leaved forests; 100–1000 m. Hainan, Taiwan, S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam; Australia].

22. *Desmodium microphyllum* (Thunberg) Candolle, Prodr. 2: 337. 1825.

小叶三点金 *xiao ye san dian jin*

Hedysarum microphyllum Thunberg in Murray, Syst. Veg., ed. 14, 675. 1784; *Codoriocalyx microphyllum* (Thunberg) H. Ohashi; *Desmodium microphyllum* var. *longipilum* Ohwi; *D. parvifolium* Candolle; *D. parvifolium* f. *yunnanense* Pampanini.

Herbs, erect or prostrate, perennial, nearly glabrous. Leaves 3- or sometimes 1-foliolate; petiole 2–3 mm, when 1-foliolate 3–10 mm; leaflet blade narrowly obovate-elliptic or narrowly elliptic and 1–1.2 cm × 4–6 mm, or obovate to elliptic and 2–6 × 1.5–4 mm, both ends rounded. Racemes terminal or axillary, yellow-brown spreading pubescent, 6–10-flowered. Pedicel 5–8 mm. Calyx 5-parted; lobes linear-lanceolate, 3–4 × as long as tube. Corolla pink, nearly as long as calyx; standard obovate or obovate-orbicular, below middle attenuate, shortly clawed; wings obovate, auriculate and clawed; keel narrowly elliptic, longer than wings. Stamens diadelphous. Ovary pubescent. Legume ca. 12 × 3 mm, both surfaces shallowly dentiform, (2 or) 3- or 4 (or 5)-jointed; articles nearly orbicular, flat, minutely uncinately hairy and ciliate or glabrescent, reticulate veined. Fl. May–Sep, fr. Sep–Nov. $2n = 22$.

Wastelands, grasslands, thickets; 100–2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Cambodia, India, Japan, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Australia].

The roots are used medicinally for reducing fever, relieving coughs, and dispelling phlegm.

One of us (Ohashi) considers this species as a member of *Codoriocalyx*, *C. microphyllum* (Thunberg) H. Ohashi (see J. Jap. Bot. 79: 109. 2004). This transfer is supported by molecular analysis, but here we follow the treatment in FRPS for convenience.

23. *Desmodium heterophyllum* (Willdenow) Candolle, Prodr. 2: 334. 1825.

异叶山蚂蝗 *yi ye shan ma huang*

Hedysarum heterophyllum Willdenow, Sp. Pl. 3: 1201. 1802.

Herbs, prostrate or ascending, 10–70 cm tall. Young parts spreading pubescent. Leaves 3-foliolate, often intermixed with 1-foliolate leaves on lower part; petiole 0.5–1.5 cm; terminal leaflet blade broadly elliptic or broadly elliptic-obovate, 1–3 × 0.8–1.5 cm, base obtuse, apex rounded or nearly truncate, often emarginate. Flowers solitary or binate in leaf axils or 2 or 3 scattered on rachis. Pedicel 1–2.5 cm. Calyx 5-parted; upper 2 lobes deeply incised near base, villous and minutely hooked hairy. Corolla purple-red to white, ca. 5 mm; standard broadly obovate; wings obovate or narrowly elliptic, shortly auriculate; keel slightly curved, shortly clawed. Stamens diadelphous. Ovary adpressed pubescent. Legume narrowly oblong, straight or curved, 1.2–1.8 cm × ca. 3 mm, lower suture deeply undulate, upper suture straight, 3–5-jointed, flat; articles broadly oblong or quadrate, 3.5–4 mm, glabrescent, reticulate veined. Fl. and fr. Jul–Oct. $2n = 22$.

Riversides, roadsides, field margins, grasslands; 200–500 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, Yunnan

[Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands].

24. *Desmodium triflorum* (Linnaeus) Candolle, Prodr. 2: 334. 1825.

三点金 san dian jin

Hedysarum triflorum Linnaeus, Sp. Pl. 2: 749. 1753; *Desmodium triflorum* var. *adpressum* Ohwi.

Herbs, perennial, prostrate, 10–50 cm tall, spreading pubescent. Leaves 3-foliolate; petiole ca. 5 mm; terminal leaflet blade obcordate, obtriangular, or obovate, 2.5–10 × 2.5–10 mm, base cuneate, apex truncate, slightly emarginate. Flowers solitary or 2 or 3 in leaf axils. Pedicel 3–8 mm, elongated to 1.3 cm at fruiting. Calyx densely villous, 5-parted; lobes narrowly lanceolate, longer than tube. Corolla purple-red, nearly as long as calyx; standard obcordate, base attenuate, long clawed; wings elliptic, shortly clawed; keel slightly falcate, longer than wings, curved, long clawed. Stamens diadelphous. Legume narrowly oblong, slightly falcate, flat, 5–12 × ca. 2.5 mm, lower suture undulate, upper suture straight, 3–5-jointed; articles nearly quadrate, with short, hooked hairs, reticulate veined. Fl. and fr. Jun–Oct. $2n = 22$.

Wastelands, grasslands, roadsides, riversides, sandy soils; 200–600 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, Yunnan, Zhejiang [Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; tropics of Africa, Americas, SW Asia, Australia, Pacific islands].

The whole plant is used medicinally for inducing sweat and promoting digestion.

25. *Desmodium multiflorum* Candolle, Ann. Sci. Nat. (Paris) 4: 101. 1825.

饿蚂蝗 e ma huang

Desmodium dubium Lindley; *D. floribundum* (D. Don) Sweet ex G. Don; *D. mairei* Pampanini; *D. sambuense* (D. Don) Candolle; *Hedysarum floribundum* D. Don; *H. sambuense* D. Don.

Shrubs, erect, 1–2 m tall, yellow to white pubescent, becoming glabrescent. Leaves 3-foliolate; petiole 1.5–4 cm, densely tomentose; terminal leaflet blade elliptic or obovate, 5–10 × 3–6 cm, base cuneate or nearly rounded, apex obtuse or acute, mucronate. Inflorescences to 18 cm, terminal ones mostly paniculate, axillary ones mostly racemose; peduncle with dense antrorse sericeous and minute hooked hairs, often 2-flowered at each node. Pedicel ca. 5 mm. Calyx ca. 4.5 mm, densely hooked hairy; lobes ca. as long as tube. Corolla purple; standard elliptic, 0.8–1.4 cm, clawed; claw obovate, 8–11 mm; wings narrowly elliptic, 0.8–1.4 cm, clawed; keel 7–10 mm, long clawed, not auriculate at base. Stamens monadelphous. Legume 1.5–2.4 cm, lower suture crenate, upper suture nearly straight or slightly undulate, 4–7-jointed; articles obovate, 3–4 × ca. 3 mm, densely adpressed brown sericeous. Fl. Jul–Sep, fr. Aug–Oct. $2n = 22$.

Mountain slopes, grasslands, forest margins; 500–2800 m. Fujian, N Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Kashmir, Laos, Myanmar, Nepal, Thailand, Vietnam].

The flowers and branches are used medicinally for reducing fever by inducing sweat.

26. *Desmodium amethystinum* Dunn, Gard. Chron., ser. 3, 32: 210. 1902.

紫水晶山蚂蝗 zi shui jing shan ma huang

Shrubs, to 2 m tall. Young branches angular, densely white or brown velutinous. Leaves 3-foliolate; petiole 1.5–5 cm; leaflet blade ovate or elliptic, abaxially white or brown velutinous, adaxially velutinous then becoming sparsely so, base usually cuneately obtuse, margin entire, apex acute or mucronate, terminal leaflet 5–12 × 3.5–6.5 cm, lateral veins 8–10 on each side of midvein, reaching margin. Inflorescences 15–25 cm, terminal ones paniculate, axillary ones racemose, 2(or 3)-flowered at each node. Calyx 2.5–3 mm, 4-lobed. Corolla amethyst; standard obovate, 8.5–10 mm, base cuneate, apex slightly emarginate; wings longer than keel petal, 10.5–11.5 mm, auriculate at lamina base; keel 8–10.5 mm, apex acute. Stamens 8.5–9 mm. Legume flat, linear, 18–28 × 4–7 mm, glabrous, upper suture nearly straight, lower suture indented, 6- or 7-jointed.

Mountain thickets; ca. 1800 m. Yunnan [Thailand].

27. *Desmodium elegans* Candolle, Ann. Sci. Nat. (Paris) 4: 100. 1825.

圆锥山蚂蝗 yuan zhui shan ma huang

Shrubs, much branched, 1–2 m tall. Branches glabrescent. Leaves 3-foliolate; petiole 2–4 cm; leaflet blade variable in shape and size, nearly ovate, ovate-lanceolate, ovate-elliptic, broadly ovate, rhombic, or orbicular-rhombic, 2–7 × 1.2–5 cm, base obliquely obtuse or cuneate, margin entire or shallowly undulate, apex usually acute to acuminate. Inflorescences 5–20 cm or longer, terminal ones mostly paniculate, axillary ones mostly racemose, often 2- or 3-flowered at each node. Calyx 3–4 mm, 4-lobed; lower calyx lobes longer or shorter than tube. Corolla purple or purple-red, 0.9–1.7 cm; standard broadly elliptic or obovate, base cuneate, apex slightly emarginate; wings and keel clawed, wings auriculate at base. Stamens 0.7–1.3 cm. Legume flat, linear, 3–5 × 0.4–0.5 cm, hairy, lower suture crenate, upper suture nearly straight, 4–6-jointed. $2n = 22$.

Forest margins, forests, thickets, mountain slopes, rocky places, roadsides, ditches; 1000–4000 m. Gansu, NW Guizhou, SW Shaanxi, Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, NE and SW India, Kashmir, Nepal, Pakistan].

- 1a. Leaflets densely spreading white tomentose and sericeous abaxially; legume densely hairy as leaflet abaxially 27c. var. *handellii*
- 1b. Leaflets densely or sparsely pubescent to glabrous abaxially; legume sparsely adpressed pubescent or puberulent.
 - 2a. Terminal leaflet blade ovate-elliptic, broadly ovate, rhombic, or orbicular-rhombic; pedicel 4–10 mm; lower calyx lobes shorter than tube 27a. var. *elegans*
 - 2b. Terminal leaflet blade narrowly

ovate or ovate-lanceolate; pedicel
13–22 mm; lower calyx lobes
longer than tube 27b. var. *wolohoense*

27a. *Desmodium elegans* var. *elegans*

圆锥山蚂蝗(原变种) yuan zhui shan ma huang (yuan bian zhong)

Desmodium cinerascens Franchet; *D. cinerascens* var. *longipes* Pampanini; *D. cinerascens* var. *microphyllum* Franchet; *D. elegans* f. *albiflorum* (P. C. Li) H. Ohashi; *D. elegans* var. *albiflorum* P. C. Li; *D. esquirolii* H. Léveillé; *D. forrestii* Schindler; *D. franchetii* Rehder; *D. glaucophyllum* Pampanini; *D. rhabdocladium* Franchet; *D. spicatum* Rehder; *D. tiliifolium* (D. Don) Wallich; *D. tiliifolium* var. *potaninii* Schindler; *D. tiliifolium* f. *rhabdocladium* (Franchet) Schindler; *D. tiliifolium* var. *subtomentosum* E. Peter; *Hedysarum tiliifolium* D. Don.

Terminal leaflet blade ovate-elliptic, broadly ovate, rhombic, or orbicular-rhombic, 2–7 × 1.5–5 cm, abaxially densely or sparsely pubescent to nearly glabrous. Pedicel 4–10 mm. Lower calyx lobes shorter than tube. Legume sparsely adpressed pubescent. Fl. and fr. Jun–Oct. $2n = 22$.

Margins of *Pinus-Quercus* forests, mountain slopes, roadsides, ditches; 1000–3700 m. Gansu, NW Guizhou, SW Shaanxi, Sichuan, Xizang, NW Yunnan [Afghanistan, Bhutan, NE and SW India, Kashmir, Nepal, Pakistan].

A white-flowered form has been recorded as *Desmodium elegans* f. *albiflorum* (P. C. Li) H. Ohashi (J. Jap. Bot. 70: 113. 1995; *D. elegans* var. *albiflorum* P. C. Li, Fl. Xizang, 2: 892. 1985).

27b. *Desmodium elegans* var. *wolohoense* (Schindler) H. Ohashi in H. Hara, Fl. E. Himalaya 2: 297. 1971.

川南山蚂蝗 chuan nan shan ma huang

Desmodium wolohoense Schindler, Repert. Spec. Nov. Regni Veg. 21: 1. 1925; *D. elegans* subsp. *wolohoense* (Schindler) H. Ohashi.

Terminal leaflet blade narrowly ovate or ovate-lanceolate, 3–4 × 1.2–2 cm, abaxially densely or sparsely pubescent or nearly glabrous. Pedicel 1.3–2.2 cm at anthesis, nearly glabrous. Lower calyx lobes longer than tube. Legume sparsely puberulent, glabrous at maturity.

- Forest margins, thickets; 2900–4000 m. Sichuan, NW Yunnan.

One of us (Ohashi) recognizes this taxon as a geographical subspecies (see J. Jap. Bot. 70: 113. 1995).

27c. *Desmodium elegans* var. *handelii* (Schindler) H. Ohashi in H. Hara, Fl. E. Himalaya 2: 297. 1971.

盐源山蚂蝗 yan yuan shan ma huang

Desmodium handelii Schindler, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 234. 1925.

Terminal leaflet blade ovate-elliptic, broadly ovate, or rhombic, 2–7 × 1.5–5 cm, abaxially densely spreading white tomentose and sericeous. Pedicel 4–10 mm. Lower calyx lobes longer than tube. Legume densely hairy as leaflet abaxially, ciliate.

- Mountain slopes, rocky places, forests; 1700–3100 m. Sichuan, Xizang, Yunnan.

28. *Desmodium callianthum* Franchet, Pl. Delavay. 173. 1890.

美花山蚂蝗 mei hua shan ma huang

Desmodium elegans Candolle subsp. *callianthum* (Franchet) H. Ohashi; *D. elegans* var. *callianthum* (Franchet) P. C. Li.

Shrubs, to 2 m tall, much branched, glabrescent. Leaves 3-foliolate; petiole 1–3 cm, sparsely pubescent or nearly glabrous; leaflet blade ovate-rhombic or ovate, 1.3–4 × 1–3 cm, base broadly cuneate, slightly oblique, apex obtuse-acute, mucronate. Racemes terminal or branched in panicles, 15–22 cm, 2–4-flowered at each node, internodes ca. 1 cm. Pedicel filiform, glabrous or nearly so. Calyx ca. 3 mm, 4-lobed; lobes triangular. Corolla purple or pink to white, 8–10 mm; standard elliptic, base clawed, apex rounded; wings auriculate, clawed; keel with base auriculate and clawed, apex mucronate. Stamens 7–8 mm. Pistil 8–9 mm. Legume 3–5 × ca. 0.5 cm, flat, slightly curved, nearly glabrous or puberulent, lower suture constricted and crenate, upper suture slightly constricted between articles, 5- or 6-jointed, reticulate veined. Fl. Jun–Aug, fr. Aug–Oct.

- Mountain slopes, roadsides, thickets, forests, ditches, rocky places in river valleys; 1700–3300 m. SW and W Sichuan, SE Xizang, NW Yunnan.

One of us (Ohashi, Bull. Univ. Mus. Univ. Tokyo 2: 291. 1971; J. Jap. Bot. 70: 113. 1995) recognizes this species as a subspecies of *Desmodium elegans* due to continuous ranges of variation in morphology, including the shape of the floral petals.

29. *Desmodium stenophyllum* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 15. 1910.

狭叶山蚂蝗 xia ye shan ma huang

Desmodium elegans Candolle subsp. *stenophyllum* (Pampanini) H. Ohashi; *D. tiliifolium* (D. Don) Wallich var. *stenophyllum* (Pampanini) Schindler.

Shrubs, 1–2 m tall, glabrous except for hairy petiolules. Leaves 3-foliolate; petiole 2–5 cm; leaflet blade lanceolate or lanceolate-linear, 6–13 × 1.2–3 cm, base broadly cuneate or nearly rounded, apex acuminate. Racemes terminal or at lower parts 2- or 3-branched in terminal panicles, ca. 20 cm, 1–3-flowered at each node. Pedicel 1–1.2 cm, filiform. Calyx ca. 4 mm, 4-lobed; upper lobes connate, longer than lower ones. Corolla purple or purple-red, 1.2–1.3 cm; standard elliptic or broadly elliptic, base shortly clawed, apex emarginate; wings oblong-falcate, equal to keel, auriculate and clawed. Stamens ca. 1.2 cm. Pistil ca. 1.2 cm. Legume flat, slightly curved, slightly falcate, 4.5–6.5 × ca. 0.5 cm, glabrous, lower suture constricted and crenate between articles, upper suture slightly straight, 6- or 7-jointed; articles ca. 1 cm, slightly reticulate veined. Fl. and fr. Aug–Sep.

- Mountain slopes, thickets, riversides; 2300–2700 m. Yunnan.

One of us (Ohashi, J. Jap. Bot. 70: 115. 1995) recognizes this species as a rheophyte found along streams and supposedly having evolved from *Desmodium elegans*.

30. *Desmodium megaphyllum* Zollinger & Moritz, *Natuur-Geneesk. Arch. Ned.-Indie* 3: 58. 1846.

滇南山蚂蝗 *dian nan shan ma huang*

Shrubs, 1–4 m tall. Young branches white pubescent, glabrescent. Leaves 3-foliolate; petiole 3–7 cm; terminal leaflet blade ovate or broadly ovate, occasionally rhombic or nearly orbicular, 8–15 × 6–9 cm, abaxially densely sericeous or sparsely pubescent, adaxially puberulent, base oblique, margin entire to shallowly crenate. Inflorescences 10–40 cm, terminal ones mostly paniculate, axillary ones racemose or paniculate, 2- or 3-flowered at each node; peduncle, pedicel, and calyx hairy or nearly glabrous. Pedicel 4–11 mm. Calyx 4-lobed. Corolla purple, 1–1.3 cm; standard elliptic or broadly elliptic, clawed; wings and keel long clawed; keel often hooked hairy at apex. Stamens ca. 1 cm. Ovary adpressed pubescent. Legume flat, both sutures shallowly constricted, 6–8-jointed; articles 6–7 × 5–7 mm or larger, with minute hooked hairs, sometimes intermixed with straight hairs or glabrous.

Mountain slopes, forest margins, forests; 700–1900 m. S and SE Yunnan [India (Assam), Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

- 1a. Leaflet densely sericeous abaxially; peduncle and pedicel with spreading pubescence and intermixed hooked hairs, calyx sericeous; articles 6–7 × 5–7 mm, with minute hooked hairs, sometimes intermixed with straight hairs 30a. var. *megaphyllum*
- 1b. Leaflet sparsely pubescent abaxially; peduncle, pedicel, and calyx sparsely hairy or nearly glabrous; articles 8–10 × 7–8 mm, glabrescent or glabrous 30b. var. *glabrescens*

30a. *Desmodium megaphyllum* var. *megaphyllum*

滇南山蚂蝗(原变种) *dian nan shan ma huang* (*yuan bian zhong*)

Desmodium karensium Kurz; *D. prainii* Schindler, nom. illeg. superfl.

Leaflets densely sericeous abaxially. Peduncle and pedicel with spreading pubescence and intermixed hooked hairs. Pedicel 4–10 mm. Calyx adpressed sericeous. Articles 6–7 × 5–7 mm, with minute hooked hairs, sometimes intermixed with straight hairs, nearly glabrous at maturity. Fl. and fr. Jun–Nov.

Mountain slopes, forest margins, forests; 700–1900 m. S and SE Yunnan [India (Assam), Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

30b. *Desmodium megaphyllum* var. *glabrescens* Prain, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 66: 399. 1897.

无毛滇南山蚂蝗 *wu mao dian nan shan ma huang*

Desmodium prainii var. *glabrescens* (Prain) Schindler.

Leaflets sparsely pubescent abaxially. Peduncle, pedicel, and calyx sparsely hairy or nearly glabrous. Pedicel 0.9–1.1 cm.

Articles 8–10 × 7–8 mm, glabrescent or glabrous. Fl. and fr. Jun–Nov.

Dense forests; ca. 1900 m. S Yunnan [Myanmar].

31. *Desmodium yunnanense* Franchet, *Pl. Delavay.* 172. 1890.

云南山蚂蝗 *yun nan shan ma huang*

Desmodium praestans Forrest; *D. rockii* Schindler; *D. yunnanense* subsp. *praestans* (Forrest) H. Ohashi; *D. yunnanense* var. *rockii* (Schindler) Y. C. Yang & P. H. Huang.

Shrubs, 1.2–3 m tall, much branched. Young branches densely white or gray tomentose, becoming glabrous. Leaves 3- or 1-foliolate; petiole 1–4 cm, hairy as young branches; terminal leaflet blade nearly orbicular, ovate, or obovate, 5–22 × 5–17 cm, abaxially densely gray or white tomentose, adaxially sparsely pubescent, margin entire or undulate. Panicles terminal, large, 16–27 cm; rachis shortly tomentose, 2–6-flowered at each node. Pedicel 0.6–1 cm, tomentose. Calyx 3–4.5 mm, 4-lobed; lobes ca. as long as tube or shorter. Corolla pink or purple, 1–1.3 cm; standard nearly orbicular or broadly elliptic, base shortly clawed, apex concave or emarginate; wings auriculate and clawed; keel shorter, clawed. Ovary pubescent. Legume compressed, 4–6 × ca. 0.5 cm, hairy when young, becoming glabrous, lower suture undulate, upper suture nearly straight, 4–7-jointed; articles 7–9 mm, reticulate veined. Fl. Aug–Sep, fr. Sep–Oct. $2n = 22^*$.

• Gravelly places, wastelands, grassy slopes, thickets, margins of *Pinus-Quercus* forests; 1000–2200 m. SW Sichuan, NW Yunnan.

32. *Desmodium sequax* Wallich, *Pl. Asiat. Rar.* 2: 46. 1831.

长波叶山蚂蝗 *chang bo ye shan ma huang*

Desmodium dasylobum Miquel; *D. hamulatum* Franchet; *D. sequax* var. *sinuatum* (Miquel) Hosokawa; *D. sinuatum* (Miquel) Blume ex Baker; *D. strangulatum* Wight & Arnott var. *sinuatum* Miquel; *Meibomia sinuata* (Miquel) Kuntze.

Shrubs, erect, 1–2 m tall, much branched. Young branches rust-colored pubescent, sometimes intermixed with minute hooked hairs. Leaves 3-foliolate; petiole 2–3.5 cm, hairy as young branches; terminal leaflet blade ovate-elliptic or orbicular-rhombic, 4–10 × 4–6 cm, abaxially adpressed pubescent and intermixed with minute hooked hairs, adaxially densely puberulent or glabrescent, base cuneate to obtuse, margin undulate above middle, apex acute. Racemes terminal and axillary or usually terminal panicles, to 12 cm; rachis densely spreading or upward hirsute or minutely tomentose, 2-flowered at each node. Pedicel 3–5 mm, slightly elongated at fruiting. Calyx ca. 3 mm; lobes ca. as long as tube. Corolla purple, ca. 8 mm; standard elliptic to broadly elliptic; wings narrowly elliptic, auriculate, clawed; keel long clawed. Stamens monadelphous. Legume moniliform, 3–4.5 × ca. 0.3 cm, with dense rust-colored or brown minute hooked hairs, both sutures constricted, 6–10-jointed; articles nearly quadrate. Fl. Jul–Sep, fr. Sep–Nov. $2n = 22$.

Grassy slopes, forest margins; 1000–2800 m. NW Guangdong, Guangxi, Guizhou, Hubei, Hunan, ?Jiangsu, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam].

122. HYLODESMUM H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 173. 2000.

长柄山蚂蝗属 *chang bing shan ma huang shu*

Huang Puhua (黄普华 *Huang Pu-hwa*); Hiroyoshi Ohashi

Desmodium sect. *Podocarpium* Benth in Miquel, *Pl. Jungh.* 226. 1852; *Podocarpium* (Benth) Y. C. Yang & P. H. Huang (1979), not A. Braun ex Stizenberger (1851), nor Unger (1864).

Perennial herbs or herbaceous subshrubs. Leaves pinnately compound, 3–7-foliolate; leaflets entire or slightly undulate; stipules and stipels present. Racemes terminal, or axillary and terminal, rarely lax panicles, usually 2- or 3-flowered at each node; bracts present; bracteoles often absent. Calyx broadly campanulate, 4- or 5-lobed (upper lobes fully connate when 4-lobed or minutely 2-toothed at apex when 5-lobed). Standard shortly clawed at base; wings and keel clawed. Stamens monadelphous. Ovary long stipitate or slightly shortly stipitate. Legume 2–5-jointed, lower suture very deeply incised nearly to upper one between articles, upper suture straight or shallowly undulate; articles obliquely triangular or slightly broadly subobovate. Seed without rim-aril; cotyledons hypogeous.

Fourteen species: mostly in E Asia, three in North America; ten species (three endemic) in China.

- 1a. Calyx lobes ca. as long as tube or longer; bracts ovate to broadly ovate.
 - 2a. Terminal leaflet entire along margin, base rounded 10. *H. williamsii*
 - 2b. Terminal leaflet slightly undulate or irregularly undulate along margin, base cuneate.
 - 3a. Leaflets caudate or caudate-acuminate at apex, irregularly undulate along margin; roots distinctly tuberos 8. *H. longipes*
 - 3b. Leaflets shortly acuminate at apex, slightly undulate along margin; roots not tuberos 9. *H. repandum*
- 1b. Calyx lobes shorter than tube; bracts narrowly ovate or narrowly triangular.
 - 4a. Leaves 5–7-foliolate 1. *H. oldhamii*
 - 4b. Leaves entirely 3-foliolate.
 - 5a. Stems and leaves densely white strigose 6. *H. densum*
 - 5b. Stems and leaves pubescent or glabrous.
 - 6a. Stems and leaves glabrous 3. *H. menglaense*
 - 6b. Stems and leaves pubescent or subglabrous.
 - 7a. Wings and keel petals not clawed at base; stipules linear-lanceolate, 0.5–1 mm, broadest at base 7. *H. podocarpum*
 - 7b. Wings and keel petals distinctly clawed at base; stipules triangular-lanceolate, lanceolate, or ovate-lanceolate, 2–4 mm, broadest at base.
 - 8a. Articles of legume obliquely triangular, 12–14 × 4–6 mm, stipe 10–12 mm; fruiting pedicel 11–13 mm 2. *H. leptopus*
 - 8b. Articles of legume slightly broadly subobovate, (6–)9–10 × ca. 4 mm, stipe 4–10 mm; fruiting pedicel 4–10 mm.
 - 9a. Leaves often clustered at top of stem, terminal leaflet broadly ovate or ovate; legume articles 9–10 mm, stipe ca. 10 mm 4. *H. laxum*
 - 9b. Leaves often scattered on stem, terminal leaflet lanceolate; legume articles 6–7 mm, stipe 4–6 mm 5. *H. laterale*

1. *Hylodesmum oldhamii* (Oliver) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 180. 2000.

羽叶长柄山蚂蝗 *yu ye chang bing shan ma huang*

Desmodium oldhamii Oliver, *J. Linn. Soc., Bot.* 9: 165. 1865 [“*oldhami*”]; *Podocarpium oldhamii* (Oliver) Y. C. Yang & P. H. Huang.

Herbs, perennial, 50–150 cm tall. Stems glabrescent. Leaves 5–7-foliolate; petiole ca. 6 cm, pubescent; leaflet blade lanceolate, oblong, or ovate-elliptic, 6–15 × 3–5 cm, both surfaces sparsely pubescent, base cuneate or obtuse, apex acuminate. Racemes simple or shortly branched at lowermost part, to 40 cm, uncinately pubescent and yellow pubescent, laxly flowered. Pedicel 4–6 mm, elongated to 6–11 mm at fruiting. Calyx 2.5–3 mm; upper lobes distinctly 2-toothed at apex. Corolla purplish red, ca. 7 mm; standard broadly elliptic; wings and

keel narrowly elliptic, base shortly clawed. Stamens monadelphous. Ovary linear, stipitate. Legume flat, uncinately pubescent, mostly 2-jointed, rarely 1- or 3-jointed; articles obliquely triangular, 1–1.5 cm × 5–7 mm. Seeds ca. 9 × 5 mm. Fl. Aug–Sep, fr. Sep–Oct. *2n* = 22.

Forests on mountain slopes, streamsides, thickets, rocky places; 100–1700 m. Anhui, Fujian, ?Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

The whole plant is used medicinally for diuresis. It also is used as a pesticide.

2. *Hylodesmum leptopus* (A. Gray ex Benth) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 179. 2000.

细长柄山蚂蝗 *xi chang bing shan ma huang*

Desmodium leptopus A. Gray ex Benth in Miquel, *Pl.*

Jungh. 226. 1852; *D. gardneri* Benth; *D. laxum* Candolle subsp. *leptopus* (A. Gray ex Benth) H. Ohashi; *D. tashiroi* Matsumura; *Hylodesmum laxum* (Candolle) H. Ohashi & R. R. Mill var. *leptopus* Y. C. Yang & P. H. Huang; *Podocarpium leptopus* (A. Gray ex Benth) Y. C. Yang & P. H. Huang.

Subshrubs, 30–70 cm tall. Young stems pubescent. Leaves caespitose or scattered, 3-foliolate; petiole 5–10 cm, glabrous or sparsely pubescent; leaflet blade ovate to ovate-lanceolate, 10–15 × 3.5–6 cm, abaxially sparsely pubescent, adaxially glabrous except with minute hooked hairs on midvein, base cuneate, orbicular, or oblique, apex long acuminate. Racemes terminal or laxly branched panicles, laxly flowered. Pedicel 3–4 mm, elongated to 1.1–1.3 cm at fruiting, densely hooked pubescent. Calyx 2–3 mm. Corolla pink, ca. 5 mm; standard broadly elliptic, shortly clawed; wings and keel clawed. Ovary long stipitate. Legume flat, slightly curved, minutely hooked pubescent, 2- or 3-jointed; articles obliquely triangular, 1.2–1.4 cm × 4–6 mm; stipe 1–1.2 cm; fruiting pedicel 1.1–1.3 cm. Fl. and fr. Aug–Sep.

Dense valley forests, shaded places along streams; 700–1000 m. Fujian, Guangdong, Guangxi, Hainan, ?Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, ?Zhejiang [Indonesia, Japan, Laos, Malaysia, New Guinea, Philippines, Thailand, Vietnam].

At first glance, this species is very similar to *Hylodesmum laxum*; but, upon detailed examination, they differ in the abaxial leaflet surface, the shape and size of the articles, and the length of the fruiting pedicel and stipe.

3. *Hylodesmum menglaense* (C. Chen & X. J. Cui) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 180. 2000.

勐蜡长柄山蚂蝗 meng la chang bing shan ma huang

Podocarpium menglaense C. Chen & X. J. Cui, *Acta Bot. Yunnan.* 9: 305. 1987; *Desmodium menglaense* (C. Chen & X. J. Cui) H. Ohashi.

Herbs, erect, 50–100 cm tall. Stems simple, glabrous, somewhat woody near base. Leaves 3-foliolate; petiole 6–11 cm, glabrous; terminal leaflet base broadly ovate or broadly elliptic, 13–19 × 7–10 cm, both surfaces glabrous, abaxially white spotted, base rounded or nearly cuneate, apex acuminate or caudate-acuminate; lateral leaflets slightly smaller, narrowly ovate or narrowly elliptic, base oblique. Racemes terminal and axillary. Pedicel 5–7 mm. Ovary long stipitate, stipe 0.9–1.5 cm, glabrous. Legume 4- or 5-jointed, densely hooked pubescent; articles narrowly ovoid or narrowly ellipsoid, 3.2–5.4 cm × 3.5–4 mm. Fr. Nov.

- Forest margins, streamsides; ca. 600 m. S Yunnan.

4. *Hylodesmum laxum* (Candolle) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 178. 2000.

疏花长柄山蚂蝗 shu hua chang bing shan ma huang

Herbs, erect, 30–100 cm tall. Stem woody at base. Leaves 3-foliolate, clustered at apex or scattered along stem; petiole 3–9 cm, pubescent; terminal leaflet blade broadly ovate, ovate, or lanceolate, 5–12 × 1.1–5.5 cm, both surfaces subglabrous or abaxially slightly pubescent, base orbicular, margin entire, apex acuminate. Racemes terminal or terminal and axillary, often branched, to 30 cm, laxly flowered, 2- or 3-flowered at each

node. Pedicel 3–4 mm, elongated to 4–10 mm at fruiting. Calyx ca. 2 mm; lobes shorter than tube. Corolla pink, 4–6 mm; standard elliptic, clawed; wings narrowly elliptic, auriculate and shortly clawed at base; keel obtuse, clawed, not auriculate. Legume often 2–4-jointed; articles slightly broadly subobovate, (6–)9–10 × ca. 4 mm or smaller, hooked pubescent; stipe 4–10 mm; fruiting pedicel 4–10 mm. Fl. and fr. Aug–Oct.

Broad-leaved forests on mountain slopes, grassy riversides, streamsides in forests; 700–1400 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, ?Jiangxi, Taiwan, Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Laos, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

- 1a. Leaves evergreen, adaxially lustrous, usually sparse on stem or approximate on lower parts of stem 4a. subsp. *laxum*
- 1b. Leaves probably deciduous, adaxially not lustrous, approximate at apex or upper part of stem.
 - 2a. Leaves approximate at apex of stem; terminal leaflet broadly elliptic or broadly ovate, 4–5 × 2.7–3.2 cm 4b. subsp. *falfolium*
 - 2b. Leaves approximate on upper part of stem; terminal leaflet narrowly elliptic, ca. 4.5 × 1.5 cm 4c. subsp. *lateraxum*

4a. *Hylodesmum laxum* subsp. *laxum*

疏花长柄山蚂蝗(原亚种) shu hua chang bing shan ma huang (yuan ya zhong)

Desmodium laxum Candolle, *Ann. Sci. Nat. (Paris)* 4: 102. 1825; *D. podocarpum* Candolle var. *laxum* (Candolle) Baker; *Podocarpium laxum* (Candolle) Y. C. Yang & P. H. Huang.

Leaves sparse on or clustered at lower part of stem; terminal leaflet elliptic or ovate, 5–12 × 5–5.5 cm. Legume stipe ca. 1 cm. *2n* = 22.

Broad-leaved forests on mountain slopes; 700–1400 m. Fujian, Guangdong, Guizhou, Hainan, Hubei, Hunan, ?Jiangxi, Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Laos, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

4b. *Hylodesmum laxum* subsp. *falfolium* (H. Ohashi) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 179. 2000.

湘西长柄山蚂蝗 xiang xi chang bing shan ma huang

Desmodium laxum subsp. *falfolium* H. Ohashi, *J. Jap. Bot.* 70: 146. 1995.

Leaves approximate at apex of stem; terminal leaflet broadly elliptic or broadly ovate, 4–5 × 2.7–3.2 cm. Legume stipe 1.2–1.4 cm.

- Mountain forests. W Hunan.

Only one individual was found.

4c. *Hylodesmum laxum* subsp. *lateraxum* (H. Ohashi) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 179. 2000.

黔长柄山蚂蝗 qian chang bing shan ma huang

Desmodium laxum subsp. *lateraxum* H. Ohashi, J. Jap. Bot. 70: 147. 1995.

Leaves approximate on upper part of stem; terminal leaflet narrowly elliptic, ca. 4.5 × 1.5 cm. Legume stipe 1.2–1.8 cm.

- Guizhou.

Only one individual was found.

5. *Hylodesmum laterale* (Schindler) H. Ohashi & R. R. Mill, Edinburgh J. Bot. 57: 177. 2000.

侧序长柄山蚂蝗 ce xu chang bing shan ma huang

Desmodium laterale Schindler, Repert. Spec. Nov. Regni Veg. 22: 258. 1926; *D. hainanense* Isely; *D. laxum* Candolle subsp. *laterale* (Schindler) H. Ohashi; *Podocarpium laxum* (Candolle) Y. C. Yang & P. H. Huang var. *laterale* (Schindler) Y. C. Yang & P. H. Huang.

Herbs, erect, 30–70 cm tall. Stem woody at base. Leaves 3-foliolate, scattered along stem; stipules lanceolate, 5–7 mm; petiole 3–5 cm, pubescent; terminal leaflet blade ovate or lanceolate, 5–13 × 2–4 cm, both surfaces subglabrous or pubescent, base suborbicular, margin entire, apex acuminate or acute. Racemes terminal, or terminal and axillary, to 30 cm, sometimes branched, laxly flowered, 2- or 3-flowered at each node. Pedicel 3–5 mm, elongated to 4–10 mm at fruiting. Calyx ca. 1 mm, glabrous or slightly pubescent; lobes shorter than tube. Corolla pink, 4–6 mm; standard elliptic, clawed; wings narrowly elliptic, auriculate and shortly clawed at base; keel obtuse, clawed, not auriculate. Legume 2- or 3-jointed; articles slightly broadly subobovate, 6–7 × ca. 4 mm or smaller, with hooked hairs; stipe 4–10 mm; fruiting pedicel 4–10 mm. Fl. and fr. Aug–Oct.

Broad-leaved forests; below 1400 m. Fujian, Guangdong, Guangxi, Hainan, ?Jiangxi, Taiwan [S Japan].

6. *Hylodesmum densum* (C. Chen & X. J. Cui) H. Ohashi & R. R. Mill, Edinburgh J. Bot. 57: 176. 2000.

密毛长柄山蚂蝗 mi mao chang bing shan ma huang

Podocarpium fallax (Schindler) C. Chen & X. J. Cui var. *densum* C. Chen & X. J. Cui, Acta Bot. Yunnan. 9: 306. 1987; *Desmodium densum* (C. Chen & X. J. Cui) H. Ohashi; *P. densum* (C. Chen & X. J. Cui) P. H. Huang.

Herbs, erect, 50–70 cm tall. Stem simple or with a lateral branch at base, densely white strigose. Leaves 3-foliolate; petiole 12–14 cm; terminal leaflet blade broadly ovate, 5–7 × 3.2–5 cm, both surfaces densely white strigose, base broadly cuneate-rounded, apex acuminate; lateral blade narrowly ovate, slightly smaller, base oblique. Fruiting inflorescences racemose, terminal. Legume 2-jointed; articles obliquely narrowly triangular, 8–10 × 3–4 mm, minutely hooked pubescent, base obliquely cuneate, apex concave; stipe 5–6 mm; fruiting pedicel ca. 5 mm. Fl. unknown, fr. Sep–Oct.

- Forests; 600–800 m. SW Guangxi, SE Yunnan.

This species is characterized by the obliquely narrowly triangular articles and branches at the base of the stem similar to *Hylodesmum leptopus* but easily distinguished by the feature of indumentum, shape

of terminal leaflet, shorter stipe of ovary, and shorter fruiting pedicel. The indumentum is quite distinct.

7. *Hylodesmum podocarpum* (Candolle) H. Ohashi & R. R. Mill, Edinburgh J. Bot. 57: 181. 2000.

长柄山蚂蝗 chang bing shan ma huang

Herbs, erect, 50–110 cm tall. Stem and petiole sparsely spreading pubescent or glabrous. Leaves 3-foliolate; petiole 2–12 cm; terminal leaflet blade variable in shape and size, broadly ovate, ovate, or rhombic to narrowly lanceolate. Racemes or panicles, terminal or terminal and axillary, 20–30 cm, elongated to 40 cm at fruiting, often 2-flowered at each node. Pedicel 2–4 mm, elongated to 5–6 mm at fruiting. Calyx ca. 2 mm; lobes shorter than tube. Corolla purplish red, ca. 4 mm; standard broadly obovate; wings narrowly elliptic; keel similar to wings, not clawed. Ovary stipitate. Legume ca. 1.6 cm, often 2-jointed; articles slightly broadly subobovate, 5–10 × 3–4 mm, with hooked and minute straight hairs; stipe 3–5 mm; fruiting pedicel ca. 6 mm. 2n = 22*.

Roadsides, grassy slopes, grasslands on high mountains, mountain slopes, forests, thickets, forest margins, ditches; 100–2100 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, ?Hainan, Hebei, E Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Laos, Myanmar, Nepal, Pakistan, Philippines, Russia (Far East), Vietnam].

The whole plant including the root bark is used medicinally for reducing fever and curing malaria.

The *Hylodesmum podocarpum* complex is extremely variable in the shape of the terminal leaflets, although the taxa resemble each other in having laxly flowered inflorescences, small flowers, non-clawed wings and keel petals, broadly subobovate small articles, and similar areas of distribution. The taxonomic ranks for these infraspecific taxa are somewhat confusing. Huang considers the complex to consist of one species, *Podocarpium podocarpum*, including four varieties, while Ohashi and Mill (loc. cit.) consider it to consist of *Hylodesmum podocarpum* and three subspecies, one of which contains a variety.

- 1a. Terminal leaflet broadly obovate, broadest above middle, apex abruptly acute 7a. subsp. *podocarpum*
- 1b. Terminal leaflet not as above, broadest below middle.
 - 2a. Terminal leaflet broadly ovate or ovate, apex acuminate; leaves approximate below middle 7b. subsp. *fallax*
 - 2b. Terminal leaflet ovate, rhombic-ovate, elliptic-rhombic, lanceolate-rhombic, or lanceolate, apex acute; leaves scattered or partly approximate at middle.
 - 3a. Terminal leaflet lanceolate or narrowly lanceolate, 4–6 × as long as wide 7d. subsp. *szechuenense*
 - 3b. Terminal leaflet neither lanceolate nor narrowly lanceolate, 1–3 × as long as wide 7c. subsp. *oxyphyllum*

7a. *Hylodesmum podocarpum* subsp. *podocarpum*

长柄山蚂蝗(原亚种) chang bing shan ma huang (yuan ya zhong)

Desmodium podocarpum Candolle, Ann. Sci. Nat. (Paris) 4: 102. 1825; *D. bodinieri* H. Léveillé; *Hedysarum podocarpum* (Candolle) Sprengel; *Podocarpium podocarpum* (Candolle) Y. C. Yang & P. H. Huang.

Herbs, 50–110 cm tall. Stem sparsely pubescent. Terminal leaflet broadly obovate, 4–7 × 3.5–6 cm, broadest above middle, both surfaces sparsely pubescent to glabrescent, base cuneate or broadly cuneate, apex abruptly acute; lateral blade obliquely ovate, small, base oblique. Fl. Aug–Sep. $2n = 22$.

Roadsides, grassy slopes, grasslands on high mountains, secondary forests; 100–2100 m. Anhui, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Nepal, Pakistan, Philippines, may occur in N Vietnam].

7b. *Hylodesmum podocarpum* subsp. *fallax* (Schindler) H. Ohashi & R. R. Mill, Edinburgh J. Bot. 57: 182. 2000.

宽卵叶长柄山蚂蝗 kuan luan ye chang bing shan ma huang

Desmodium fallax Schindler, Bot. Jahrb. Syst. 54: 55. 1916; *D. podocarpum* subsp. *fallax* (Schindler) H. Ohashi; *Hylodesmum podocarpum* var. *fallax* (Schindler) X. F. Gao; *Podocarpium fallax* (Schindler) C. Chen & X. J. Cui; *P. podocarpum* var. *fallax* (Schindler) Y. C. Yang & P. H. Huang.

Herbs, 70–100 cm tall. Stem pubescent. Terminal leaflet broadly ovate or ovate, 3.5–12 × 2.5–8 cm, both surfaces adpressed pubescent, base broadly cuneate or suborbicular, apex acuminate or caudate-acute. Fl. Aug–Nov. $2n = 22$.

Roadsides on mountain slopes, thickets, sparse forests, forest margins; 300–1400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, ?Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

The whole plant is used medicinally for treating dysentery and rheumatism. As well, it is used as forage for livestock.

7c. *Hylodesmum podocarpum* subsp. *oxyphyllum* (Candolle) H. Ohashi & R. R. Mill, Edinburgh J. Bot. 57: 182. 2000.

尖叶长柄山蚂蝗 jian ye chang bing shan ma huang

Desmodium oxyphyllum Candolle, Ann. Sci. Nat. (Paris) 4: 102. 1825; *D. fallax* var. *mandshuricum* (Maximowicz) Nakai; *D. mandshuricum* (Maximowicz) Schindler; *D. oxyphyllum* var. *mandshuricum* (Maximowicz) H. Ohashi; *D. podocarpum* var. *japonicum* Matsumura; *D. podocarpum* var. *mandshuricum* Maximowicz; *D. podocarpum* subsp. *oxyphyllum* (Candolle) Y. C. Yang & P. H. Huang; *D. racemosum* Candolle; *D. racemosum* var. *mandshuricum* (Maximowicz) Ohwi; *D. racemosum* var. *pubescens* F. P. Metcalf; *Hedysarum racemosum* Thunberg (1784), not Aublet (1775); *Hylodesmum oxyphyllum* (Candolle) X. F. Gao; *H. podocarpum* var. *oxyphyllum* (Candolle) H. Ohashi & R. R. Mill; *Podocarpium mandshuricum* (Maximowicz) Czerepanov; *P. podocarpum* var. *japonicum* (Matsumura) P. H. Huang; *P. podocarpum* var. *mandshuricum* (Maximowicz) P. H. Huang; *P. podocarpum* var. *oxyphyllum* (Candolle) Y. C. Yang & P. H. Huang.

Herbs, to 100 cm tall. Stem glabrous or subglabrous. Leaves scattered or approximate at middle; terminal leaflet elliptic-rhombic to lanceolate-rhombic or ovate to rhombic-ovate, 4–10 × 2–5 cm, both surfaces glabrous or subglabrous, or abaxially pubescent on veins, base cuneate or rounded, apex acuminate. Fl. Jul–Sep, fr. Aug–Nov. $2n = 22$.

Mountain slopes, slope forests, thickets, roadsides, ditches, forest margins, broad-leaved forests; 400–2100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, E Heilongjiang, Henan, ?Hubei, ?Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Sichuan, ?Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Laos, Myanmar, Nepal, Russia (Far East), Vietnam].

Plants with scattered leaves have been named *Hylodesmum podocarpum* var. *japonicum* (Matsumura) H. Ohashi (J. Jap. Bot. 77: 170. 2002). Plants with leaves at least partly approximate at middle have been named *H. podocarpum* var. *mandshuricum* (Maximowicz) H. Ohashi & R. R. Mill (Edinburgh J. Bot. 57: 183. 2000).

7d. *Hylodesmum podocarpum* subsp. *szechuenense* (Craib) H. Ohashi & R. R. Mill, Edinburgh J. Bot. 57: 185. 2000.

四川长柄山蚂蝗 si chuan chang bing shan ma huang

Desmodium podocarpum var. *szechuenense* Craib in Sargent, Pl. Wilson. 2: 104. 1914; *D. oxyphyllum* var. *szechuenense* (Craib) H. Ohashi; *D. podocarpum* subsp. *szechuenense* (Craib) H. Ohashi; *D. szechuenense* (Craib) Schindler; *Hylodesmum szechuenense* (Craib) X. F. Gao; *Podocarpium podocarpum* var. *szechuenense* (Craib) Y. C. Yang & P. H. Huang.

Herbs, to 100 cm tall. Stem pubescent. Terminal leaflet lanceolate or narrowly lanceolate, 4.2–6.8 × 1–1.3 cm, abaxially sparsely pubescent on veins, adaxially glabrescent, base cuneate, apex acute. Fl. Aug–Sep, fr. Sep–Nov.

• Ditches, roadsides, thickets, sparse forests; 300–2000 m. Gansu, N Guangdong, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

8. *Hylodesmum longipes* (Franchet) H. Ohashi & R. R. Mill, Edinburgh J. Bot. 57: 179. 2000.

云南长柄山蚂蝗 yun nan chang bing shan ma huang

Shuteria longipes Franchet, Pl. Delavay. 179. 1890; *Desmodium duclouxii* Pampanini; *D. duclouxii* var. *henryi* (Schindler) H. Ohashi; *D. henryi* Schindler; *Podocarpium duclouxii* (Pampanini) Y. C. Yang & P. H. Huang.

Herbs, perennial, erect, 20–100 cm tall. Rootstocks woody; tubers often 2, fusiform, ca. 4 cm. Leaves 3-foliolate; petiole 5–8 cm, pilose; leaflet blade rhombic-orbicular or broadly ovate, 4–6 × 4–5 cm, both surfaces sparsely adpressed villous, base broadly cuneate or oblique, margin irregularly undulate, apex caudate-acute. Racemes terminal, 20–30 cm; peduncle pubescent, intermixed with hooked hairs, 2- or 3-flowered at each node. Pedicel 1.5–2.5 cm. Calyx ca. 7 mm; lobes longer than tube, lower lobes triangular, upper lobes fully connate. Corolla yellow or pink, ca. 1.5 cm; standard elliptic, shortly clawed; wings oblong; keel subequal to wings. Legume flat, 2- or 3-jointed; articles slightly broadly subobovate, 1.1–1.6 cm × 6–7 mm, with hooked hairy stipe 4–7 mm; fruiting pedicel 1.5–2 cm or more. Fl. and fr. Aug–Nov. $2n = 22^*$.

• Waste slopes, mixed forests; 1900–2100 m. Yunnan.

The roots are used medicinally to moisten the lungs and relieve coughs. The fruits are used medicinally to stop bleeding and as an antiphlogistic.

9. *Hylodesmum repandum* (Vahl) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 185. 2000.

浅波叶长柄山蚂蝗 qian bo ye chang bing shan ma huang

Hedysarum repandum Vahl, *Symb. Bot.* 2: 82. 1791; *Desmodium repandum* (Vahl) Candolle; *D. scalpe* Candolle; *Podocarpium repandum* (Vahl) Y. C. Yang & P. H. Huang.

Subshrubs, erect, 50–150 cm tall. Stem and petiole spreading pubescent. Leaves 3-foliolate; petiole 3–9 cm; leaflet blade rhombic to ovate, 5–8 × 3.5–6 cm, both surfaces sparsely to densely adpressed hairy, more densely especially on veins abaxially, base cuneate, margin repand, apex acute to shortly acute. Racemes or sometimes panicles, terminal or often terminal and axillary, 15–30 cm. Pedicel 1.5–3 cm, with spreading straight or uncinat hairs. Calyx 2.5–3.5 mm; lobes longer than or equal to tube. Corolla red or orangish red; standard broadly elliptic, 8–10 × 7–8 mm, shortly clawed; wings narrowly elliptic, ca. 7 × 2 mm, clawed; keel ca. 10 × 3 mm, clawed. Legume often 3- or 4-jointed; articles slightly broadly subobovate, 6–3 × ca. 3 mm, densely uncinat pubescent; stipe ca. 5 mm; fruiting pedicel 2–4 cm. Fl. and fr. Jun–Nov. $2n = 22$.

Ditches, mixed forests; 1300–2000 m. ?Sichuan, S Yunnan [Bhu-

tan, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa].

10. *Hylodesmum williamsii* (H. Ohashi) H. Ohashi & R. R. Mill, *Edinburgh J. Bot.* 57: 186. 2000.

大苞长柄山蚂蝗 da bao chang bing shan ma huang

Desmodium williamsii H. Ohashi, *Ginkgoana* 1: 163. 1973; *D. williamsii* subsp. *magnibracteatum* H. Ohashi; *D. williamsii* var. *magnibracteatum* (H. Ohashi) P. C. Li; *Podocarpium williamsii* (H. Ohashi) Y. C. Yang & P. H. Huang.

Herbs, perennial, 20–70 cm tall. Stem simple or branched, white pubescent, becoming glabrous. Leaves 3-foliolate; petiole ca. 11 cm; leaflet blade broadly ovate or rhombic, 3–9 × 2.5–6 cm, both surfaces adpressed pubescent, base obtuse-rounded or often cordate, margin entire, apex acute or shortly acuminate. Racemes terminal, 10–40 cm; peduncle densely uncinat pubescent, laxly flowered, 2–4-flowered at each node. Pedicel 1–2 cm. Calyx 3–3.5 mm; lobes longer than tube. Corolla roseate or roseate-purple; standard elliptic or obovate, 1.2–1.6 cm × 7–8 mm, slightly clawed; wings and keel narrowly elliptic, 1.2–1.5 cm × 3–4 mm, shortly clawed, auriculate. Ovary stipitate. Legume 1- or 2-jointed, uncinat pubescent; fruiting pedicel 1–2 cm. Fl. and fr. Aug–Sep. $2n = 22^*$.

Ditches, grasslands, evergreen forests, limestone soils, thickets; 1400–2700 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal].

123. CODORIOCALYX Hasskarl, *Linnaea* 15(Litt.): 80. 1841.

舞草属 wu cao shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Shrubs, erect. Leaves 3-foliolate, often 1-foliolate by reduction of lateral leaflets; stipules early deciduous; stipels scarious; terminal leaflet petiolulate, much larger than lateral ones. Inflorescences terminal and axillary, paniculate or racemose; bracts deciduous; bracteole absent. Calyx membranous, broadly campanulate, 5-lobed; upper lobe distinctly 2-toothed at apex. Corolla much longer than calyx; standard often oblique, nearly orbicular, base minutely clawed, not auriculate; wings nearly half-deltoid, base auriculate, clawed; keel falcate, not auriculate. Stamens diadelphous. Gynoecium linear, 6–13-ovuled. Legume 5–9-jointed, dehiscent along lower suture, lower suture undulate, upper suture not indented, lateral surfaces not reticulate veined, with dense minute uncinat and straight hairs. Seeds obliquely transversely elliptic, arillate; cotyledons epigeous.

Two species: SE Asia; both species in China.

In the protologue, the spelling “*Codoriocalyx*” was used, although the name has usually been spelled “*Codariocalyx*.”

- 1a. Terminal leaflet narrowly elliptic or lanceolate, 5.5–10 × 1–2.5 cm; legume with sparse short hooked hairs 1. *C. motorius*
 1b. Terminal leaflet obovate or elliptic, 3.5–5 × 2.5–3 cm; legume long pilose intermixed with dense short hooked hairs 2. *C. gyroides*

1. *Codoriocalyx motorius* (Houttuyn) H. Ohashi, *J. Jap. Bot.* 40: 367. 1965.

舞草 wu cao

Hedysarum motorium Houttuyn, *Nat. Hist.* 10: 246. 1779; *Codoriocalyx gyrans* (Linnaeus f.) Hasskarl; *C. motorius* var. *glaber* X. Y. Zhu & Y. F. Du; *Desmodium gyrans* (Linnaeus f.) Candolle; *D. motorium* (Houttuyn) Merrill; *H. gyrans* Linnaeus f.

Shrubs, to 1.5 m tall. Stem simple or branched, glabrous. Leaves 3-foliolate, often 1-foliolate by reduction of lateral leaflets; petiole 1.1–2 cm; terminal leaflet blade narrowly ellip-

tic or lanceolate, 5.5–10 × 1–2.5 cm, abaxially adpressed pubescent, adaxially glabrous; lateral ones when present narrowly elliptic or linear, very small. Panicles or racemes; rachis with reflexed uncinat and straight rigid hairs. Pedicel 1–4 mm at anthesis, 3–7 mm in fruit. Calyx 2–2.5 mm; tube 1–1.5 mm; lower lobe dentate, upper lobe deeply 2-toothed at apex. Corolla purplish red; standard 7.5–10 × 7.5–10 mm; wings 6.5–9.5 × 4–5 mm; keel 9–10 × ca. 3 mm, long clawed. Stamens 8–11 mm. Gynoecium 1–1.2 cm; ovary puberulent. Legume falcate or straight, with sparse short hooked hairs, dehiscent along lower suture when mature. Seeds 4–4.5 × 2.5–3 mm. Fl. Jul–Sep, fr. Oct–Nov. $2n = 22$.

Mountain slopes, thickets; 200–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

The whole plant is used medicinally for dispelling stasis.

2. *Codoriocalyx gyroides* (Roxburgh ex Link) Hasskarl, *Flora* 25(2, Beibl.): 49. 1842.

圆叶舞草 yuán yè wú cǎo

Hedysarum gyroides Roxburgh ex Link, *Enum. Hort. Berol.* Alt. 2: 247. 1822; *Codoriocalyx conicus* Hasskarl; *Desmodium gyroides* (Roxburgh ex Link) Candolle; *D. oxalidifolium* H. Léveillé, p.p.

Shrubs, 1–3 m tall. Stem pubescent when young. Leaves 3-foliolate; petiole 2–2.5 cm; terminal leaflet blade obovate or

elliptic, 3.5–5 × 2.5–3 cm, lateral leaflets 1.5–2 × 0.8–1 cm, both surfaces appressed white pubescent, base rounded or cordate, apex obtuse to rounded or emarginate. Inflorescences 6–15 cm. Pedicel 4–9 mm, densely yellow pubescent. Calyx broadly campanulate, 2–2.5 mm; tube 1.2–1.7 mm; lower lobe broadly triangular, ca. 0.8 mm, upper lobe 2-toothed at apex, ca. 1 mm. Corolla purple; standard broadly obovate, 0.9–1.1 cm × 8.5–10.5 mm; wings 7–9 × 4–6 mm, auriculate, shortly clawed; keel 0.9–1.2 cm, long clawed. Stamens 0.9–1.1 cm. Gynoecium 1.2–1.4 cm; ovary linear, sericeous. Legume falcate, 2.5–5 × 0.4–0.6 cm, long pilose intermixed with dense short hooked hairs, dehiscent along lower suture when mature. Seeds ca. 4 × 2.5 mm. Fl. Sep–Oct, fr. Oct–Nov.

Plains, grassy riverbanks, sparse forests on mountain slopes; 100–1500 m. ?Fujian, Guangdong, Guangxi, ?Guizhou, Hainan, ?Taiwan, S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

124. PYCNOSPORA R. Brown ex Wight & Arnott, *Prodr. Fl. Ind. Orient.* 197. 1834.

密子豆属 mǐ zǐ dòu shù

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Herbs or subshrubs. Leaves pinnately 3-foliolate or sometimes only 1-foliolate, stipulate and stipellate. Inflorescences terminal, racemose; bracts scarious, deciduous. Flowers small. Calyx campanulate; lobes long, upper 2 nearly connate. Corolla pale violet, obviously exserted; petals nearly equal; standard nearly orbicular, base attenuate; wings connate; keel obtuse. Stamens diadelphous (9+1); anthers uniform. Ovary sessile, many ovuled; style filiform, incurved; stigma capitate, small. Legume oblong, turgid, not jointed, transversely veined, dehiscent, not transversely septate, 8–10-seeded.

One species: tropical Africa, Asia to E Australia.

1. *Pycnospora lutescens* (Poiret) Schindler, *J. Bot.* 64: 145. 1926.

密子豆 mǐ zǐ dòu

Hedysarum lutescens Poiret in Lamarck, *Encycl.* 6: 417. 1805; *Desmodium lutescens* (Poiret) Candolle; *D. viride* Vogel; *Phaca trifoliata* Linnaeus, nom. utique rej.; *Pycnospora hedy-saroides* R. Brown ex Wight & Arnott; *P. nervosa* Wight & Arnott.

Plants 15–60 cm tall. Stem erect or procumbent, branched from base of stem. Branchlets gray pubescent. Petiole ca. 1 cm, gray pubescent; terminal leaflet blade obovate or obovate-oblong, 1.2–3.5 × 1–2.5 cm, lateral veins 4–7 on each side of midvein, distinctly reticulate veined, both surfaces densely ap-

pressed pubescent, base cuneate or slightly cordate, apex rounded or emarginate; lateral leaflets often smaller or sometimes absent. Racemes 3–6 cm, 2-flowered at each node. Pedicel 2–4 mm, gray pubescent. Calyx ca. 2 mm; lobes narrowly triangular, pubescent. Corolla ca. 4 mm. Ovary pubescent. Legume black when mature, 6–10 mm, turgid, transversely veined, slightly hairy, lower suture distinctly prominent, along upper suture dehiscent. Seeds reniform-elliptic, ca. 2 mm. Fl. and fr. Aug–Sep.

Grassy slopes on mountains, plains; sea level to 1300 m. ?Fujian, Guangdong, Guangxi, SW Guizhou, Hainan, S Jiangxi, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Myanmar, New Guinea, Philippines, Thailand, Vietnam; E Australia].

This species is planted for soil conservation and green manure.

125. TADEHAGI H. Ohashi, *Ginkgoana* 1: 280. 1973.

葫芦茶属 hú lú chá shù

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Pteroloma Desvieux ex Benth in Miquel, *Pl. Jungh.* 217, 219. 1852, not Hochstetter & Steudel (1837).

Shrubs or subshrubs. Leaves only 1-foliolate; petiole winged. Inflorescences racemose, terminal or axillary, usually 2- or 3-flowered at each node. Calyx campanulate, 5-lobed; upper lobes 2, connate, entire or sometimes minutely 2-toothed at apex. Petals veined; standard orbicular, broadly elliptic, or obovate; wings elliptic or oblong, longer than keel, apex rounded, conspicuously auriculate and clawed; keel acute or obtuse at apex. Stamens 10, axillary ones free or slightly connate at base to others. Gynoecium sessile, distinct disks present around base of ovary. Ovary pubescent, 5–8-ovuled; style glabrous; stigma capitate. Legume usually 5–8-jointed, lower suture shallowly to deeply constricted, upper suture nearly straight or slightly undulate. Seed transversely broad to transversely elliptic, rim-arillate, concave at hilum; cotyledons epigeous.

About six species: tropical Asia, Pacific islands, N Australia; two species in China.

- 1a. Stem erect; legume densely yellowish or whitish strigose, not reticulate veined; mature leaflets 5.8–13 × 1.1–3.5 cm, usually more than 3 × as long as wide 1. *T. triquetrum*
- 1b. Stem ascending; legume densely white pubescent on both sutures, entirely glabrous and reticulate veined on lateral surfaces; mature leaflets 3–10 × 1.3–5.2 cm, usually less than 3 × as long as wide 2. *T. pseudotriquetrum*

1. *Tadehagi triquetrum* (Linnaeus) H. Ohashi, Ginkgoana 1: 290. 1973.

葫芦茶 hu lu cha

Hedysarum triquetrum Linnaeus, Sp. Pl. 2: 746. 1753; *Desmodium acrocarpum* Hance; *D. triquetrum* (Linnaeus) Candolle; *Pteroloma triquetrum* (Linnaeus) Desvaux ex Benth.

Shrubs or subshrubs. Stem erect, 1–2 m tall. Leaves 1-foliolate; petiole 1–3 cm, wing 4–8 mm wide; blade narrowly lanceolate to ovate-lanceolate, 5.8–13 × 1.1–3.5 cm, usually more than 3 × as long as wide, abaxially pubescent on midvein and lateral veins, adaxially glabrous, base rounded or shallowly cordate, apex acute or acuminate. Inflorescences 15–30 cm, 2- or 3-flowered at each node. Pedicel 2–6 mm, with spreading, minute, hooked and silky hairs. Calyx broadly campanulate, ca. 3 mm. Corolla pink to bluish or reddish purple, 5–6 mm; standard nearly orbicular, emarginate at apex; wings obovate, auriculate, clawed; keel arcuate, auriculate, clawed. Stamens diadelphous. Ovary densely puberulent except at upper part of style. Legume 5–8-jointed; articles not reticulate veined, densely yellowish or whitish strigose. Seed transversely broadly elliptic or elliptic, 2–3 × 1.5–2.5 mm. Fl. Jun–Oct, fr. Oct–Dec. *2n* = 22.

Wastelands, forest margins, roadsides; below 1400 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; ?N Australia, Pacific islands].

The whole plant is used medicinally as an antipyretic, as a diuretic, for invigorating the spleen, and for promoting digestion.

2. *Tadehagi pseudotriquetrum* (Candolle) H. Ohashi, J. Jap. Bot. 70: 116. 1995.

蔓茎葫芦茶 man jing hu lu cha

Desmodium pseudotriquetrum Candolle, Ann. Sci. Nat. (Paris) 4: 100. 1825; *D. triquetrum* (Linnaeus) Candolle subsp. *pseudotriquetrum* (Candolle) Prain; *Pteroloma pseudotriquetrum* (Candolle) Schindler; *P. triquetrum* (Linnaeus) Desvaux ex Benth. subsp. *pseudotriquetrum* (Candolle) H. Ohashi; *Tadehagi triquetrum* (Linnaeus) H. Ohashi subsp. *pseudotriquetrum* (Candolle) H. Ohashi.

Subshrubs. Stem ascending, 30–60 cm tall. Leaves 1-foliolate; petiole 0.7–3.2 cm, conspicuously winged; wing 3–7 mm wide; blade ovate, sometimes ovate-orbicular, 3–10 × 1.3–5.2 cm, usually less than 3 × as long as wide, lateral veins ca. 8 pairs, not reaching margin but arching and joining together, abaxially sparsely pubescent on veins, adaxially glabrous, base cordate, apex acute. Inflorescences to 25 cm, 2- or 3-flowered fascicles at each node. Pedicel ca. 5 mm, with minute hooked and silky hairs. Calyx ca. 5 mm; lobes lanceolate, slightly longer than tube. Corolla purplish red, ca. 7 mm; standard nearly orbicular, emarginate at apex; wings obovate, base auriculate; keel falcate, not auriculate, clawed. Ovary puberulent; style glabrous. Legume 5–8-jointed, densely white pubescent on both sutures, lateral surfaces reticulate veined, entirely glabrous. Fl. Aug, fr. Oct–Nov.

Sparse forests on mountains; 500–2000 m. ?Fujian, N Guangdong, Guangxi, Guizhou, Hunan, S Jiangxi, Sichuan, Taiwan, Yunnan, ?Zhejiang [?Bhutan, India, Nepal, Philippines].

126. MECOPUS Bennett in Bennett & R. Brown, Pl. Jav. Rar. 154. 1840.

长柄荚属 chang bing jia shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Herbs, annual. Leaves 1-foliolate, stipulate and stipellate. Racemes dense, terminal; bracts subulate, persistent. Flowers small. Pedicel apically hooked-inflexed. Calyx campanulate, membranous; lobes lanceolate, upper 2 lobes connate. Standard broad, obovate, base attenuate; wings falcate; keel incurved, apex obtuse. Stamens diadelphous (9+1); anthers uniform. Ovary 2-ovuled; style incurved; stigma capitate, small. Legume elliptic, stipitate, compressed, 1-seeded, both surfaces slightly swollen, 1- or 2-jointed, reticulate veined; fruiting pedicel long, twisted at apex, becoming looped.

One species: tropical Asia.

1. *Mecopus nidulans* Bennett in Bennett & R. Brown, Pl. Jav. Rar. 154. 1840.

长柄荚 chang bing jia

Herbs, erect, 30–40 cm tall or more. Stem and branches glabrous. Petiole ca. 1 cm; leaflet blade broadly obovate-reniform, 0.9–2 × 1–2.5 cm, lateral veins 4 or 5 on each side of midvein, both surfaces glabrous, base rounded or nearly cordate, apex truncate or emarginate. Racemes 2.5–3 cm, 2-flow-

ered at each node. Pedicel 1–1.5 cm, longer than bracts, grayish yellow pubescent. Calyx ca. 1 mm, 5-lobed. Corolla white; standard obovate, base attenuate; wings falcate; keel incurved, apex obtuse. Filaments ca. 1.5 mm. Ovary stipitate. Legume 2–2.5 cm, pubescent, base stipitate, apex rostrate; fruiting pedicel long, twisted at apex, becoming looped. Seed reniform, ca. 2 mm. Fl. Sep, fr. Sep–Oct.

Grasslands, thickets on sunny slopes; 100–1000 m. Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Thailand, Vietnam].

127. URARIA Desvaux, J. Bot. Agric. 1: 122. 1813.

狸尾豆属 li wei dou shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi, Yu Iokawa

Subshrubs, shrubs, or perennial herbs. Leaves 1-foliolate or imparipinnately 3- or 5–9-foliolate, stipulate and stipellate. Racemes or panicles, terminal or axillary. Flowers numerous, dense, small. Bracts deciduous or persistent, imbricate, 2-flowered at each bract; bracteoles absent. Pedicel elongated after anthesis, apically hooked, rarely not curved. Calyx 5-lobed, lower 3 lobes usually longer, upper 2 lobes partly connate. Standard orbicular or broadly obovate, clawed, auriculate; wings adherent to keel, shortly clawed, auriculate; keel obtuse, slightly incurved, auriculate. Stamens diadelphous (9+1); anthers uniform. Ovary sessile, 2–10-ovuled; style incurved, linear; stigma capitate. Legume small, jointed; articles 2–8, plicate or peltate, folded laterally or longitudinally, not dehiscent, with 1 seed per article.

About 20 species: mostly in tropical Africa, Asia, and Australia; seven species in China.

- 1a. Leaves 5- or 7(or 9)-foliolate, sometimes mixed with (1–)3-foliate leaves.
- 2a. Leaflets linear to narrowly oblong, adaxially usually variegated on midvein, lateral veins looped with margin; pedicel 5–6 mm during anthesis, to 8 mm in fruit; lateral and lowest calyx lobes not elongate after anthesis, 2–3 mm; leaves (1–)3-foliate on lower part of stem 1. *U. picta*
- 2b. Leaflets narrowly ovate to ovate, elliptic, or oblong, without variegated area, lateral veins extending to margin; pedicel 6–12 mm during anthesis, to 15 mm in fruit; lateral and lowest calyx lobes elongating to 5–6 mm after anthesis; leaves sometimes (1–)3-foliate on upper part of stem 2. *U. crinita*
- 1b. Leaves 3-foliate, often 1-foliate on upper part of stem.
- 3a. Inflorescences usually terminal panicles, with dense glandular hairs 1–2 mm on inflorescence rachis, pedicels, and calyx; legume shortly pubescent 5. *U. lacei*
- 3b. Inflorescences usually simple, sometimes with elongate branches but not paniculate, glandular hairs present or absent on inflorescence rachis, pedicels, and calyx; legume glabrous or pubescent.
- 4a. Lateral and lowest calyx lobes more than 2 × as long as upper lobes; inflorescences usually 3–6 cm, densely flowered; bracts persistent, spreading at apex; leaflets usually orbicular to broadly ovate 3. *U. lagopodioides*
- 4b. Lateral and lowest calyx lobes less than 2 × as long as upper lobes; inflorescences usually longer than 6 cm, densely or loosely flowered; bracts deciduous or persistent, erect along inflorescence when persistent; leaflets oblong to ovate, rarely (in *U. sinensis*) broadly obovate or obcordate, apices truncate or emarginate.
- 5a. Inflorescence rachis, pedicels, and calyx with dense, spreading glandular hairs 1–2 mm; legume glabrous; inflorescences densely flowered; bracts 9–18 mm 4. *U. neglecta*
- 5b. Inflorescence rachis, pedicels, and calyx without or with sparse glandular hairs 1–2 mm; legume shortly hairy; inflorescences ± loosely flowered; bracts usually shorter than 13 mm.
- 6a. Apex of keel obtuse; pedicel 5–6 mm, recurved after anthesis; calyx lobes narrowly triangular, acuminate; legume minutely hairy; leaflets obtuse to acute or rarely rounded at apex 6. *U. rufescens*
- 6b. Apex of keel apiculate; pedicel to 13 mm, not recurved after anthesis; calyx lobes triangular to broadly ovate, acute; legume subglabrous with long glandular hairs; leaflets obtuse to truncate or emarginate at apex 7. *U. sinensis*

1. *Uraría picta* (Jacquin) Desvaux ex Candolle, Prodr. 2: 324. 1825.

美花狸尾豆 mei hua li wei dou

Hedysarum pictum Jacquin, Collectanea 2: 262. 1788; *Doodia picta* (Jacquin) Roxburgh; *Uraría leucantha* Zippelius ex Spanoghe; *U. linearis* Hasskarl.

Subshrubs or shrubs. Stems erect, 1–2 m tall, gray strigose. Leaves imparipinnate, 5- or 7(or 9)-foliolate; petiole 4–7 cm; leaflet blades linear-oblong or narrowly lanceolate, terminal one 4.5–13 × 1–2 cm, abaxially densely hairy on veins, adaxially pubescent along midvein and basal margin, base rounded, apex narrowly acute. Racemes terminal, 10–30 cm. Pedicel 5–6 mm, elongated to 8 mm after anthesis, apically hooked. Calyx 5-parted, long hairy and ciliate; lower lobes slightly longer than upper. Corolla pink or pale blue, 5–6 mm; standard obovate, long clawed; wings auriculate, 4–7 mm, base

shortly auriculate; keel ca. as long as wings, upper parts curved. Ovary glabrous, 3–5-ovuled. Legume lead-colored, lucid, glabrous, 3–5-jointed; articles ca. 3 × 2 mm. Fl. and fr. Apr–Oct. 2n = 16, 22.

Grassy slopes; 400–1500 m. Guangxi, Guizhou, Sichuan, S Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Japan (S Ryukyu Islands), Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia].

The roots are used medicinally for invigorating the liver and spleen and as a sedative.

2. *Uraría crinita* (Linnaeus) Desvaux ex Candolle, Prodr. 2: 324. 1825.

猫尾草 mao wei cao

Hedysarum crinitum Linnaeus, Mant. Pl. 1: 102. 1767; *Doodia crinita* (Linnaeus) Roxburgh; *Hedysarum comosum*

Vahl; *Uraria comosa* (Vahl) Candolle; *U. cornosa* Spanoghe; *U. crinita* var. *macrostachya* Wallich; *U. macrostachya* (Wallich) Prain.

Subshrubs, 1–1.5 m tall. Stems erect, gray pubescent. Leaves imparipinnate; petiole 5.5–15 cm, gray-white pubescent; leaflets usually 3 on lower stem, 5 (or 7) above; leaflet blades oblong, ovate-lanceolate, or ovate, terminal one 6–15 × 3–8 cm, abaxially pubescent on veins, adaxially glabrous or slightly gray pubescent on midvein, base rounded to slightly cordate, apex slightly acute, obtuse, or rounded. Racemes terminal, 15–30 cm or longer, stout, densely gray-white hirsute. Pedicel 6–12 mm in flower, elongated to 1–1.5 cm after anthesis, hooked, with short uncinata and long white hairs. Calyx shallowly cup-shaped, long white hirsute; lower lobes ca. 3.5 mm, upper lobes ca. 3 mm. Corolla purple, 6–9 mm. Legume slightly pubescent; articles (2–)5 or 6, elliptic, reticulate veined. Fl. and fr. Apr–Sep.

Dry waste slopes, roadsides, thickets; below 900 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Japan (S Ryukyu Islands), Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam; N Australia].

The whole plant is used medicinally for stopping bleeding, reducing fever, and relieving coughs.

3. *Uraria lagopodioides* (Linnaeus) Candolle, Prodr. 2: 324. 1825 [*“lagopoides”*].

狸尾豆 li wei dou

Hedysarum lagopodioides Linnaeus, Sp. Pl. 2: 1198. 1753; *Doodia lagopodioides* (Linnaeus) Roxburgh; *Lespedeza lagopodioides* (Linnaeus) Persoon.

Herbs, prostrate or spreading, to 60 cm tall. Leaves mostly 3-foliolate, rarely 1-foliolate; petiole 1–2 cm; terminal leaflet blade nearly orbicular or elliptic to ovate, 2–6 × 1.5–3 cm, abaxially gray-yellow pubescent, base rounded or cordate, apex rounded or emarginate. Racemes terminal, 3–6 cm, densely flowered. Pedicel ca. 4 mm, sparsely white villous. Calyx 5-parted; lower lobes ca. 2 × as long as upper ones, white villous. Corolla pale purple, ca. 6 mm; standard obovate, base attenuate. Ovary glabrous, 1- or 2-ovuled. Legume enclosed by calyx, black-brown at maturity, small; articles 1 or 2, elliptic, ca. 2.5 mm, swollen, glabrous, slightly lucid. Fl. and fr. Aug–Oct. $2n = 22$.

Open waste slopes, thickets; below 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; Australia, Pacific islands].

The whole plant is used medicinally for relieving swelling. It also is used as a pesticide.

“Hedysarum lagopoides” (N. L. Burman, Fl. Indica, 168. 1768) is here treated as an orthographical variant of *H. lagopodioides* Linnaeus.

4. *Uraria neglecta* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 382. 1897.

福建狸尾豆 fu jian li wei dou

Uraria aequilobata Hosokawa; *U. fujianensis* Y. C. Yang & P. H. Huang; *U. hamosa* (Roxburgh) Wallich ex Wight & Arnott var. *formosana* Matsumura; *U. lagopus* Candolle var. *neglecta* (Prain) H. Ohashi; *U. longibracteata* Y. C. Yang & P. H. Huang.

Herbs, erect or subshrubs. Stems densely gray-yellow tomentose and spreading pubescent. Leaves pinnately 3-foliolate, sometimes 1-foliolate; petiole (1–)3–7 mm, densely hairy as stem; leaflet blades ovate, orbicular, or oblong, terminal one 1.8–6 × 1.9–4.5 cm, abaxially pubescent, adaxially pilose, lateral veins 11–14 on each side of midvein, base broadly cuneate, rounded, or slightly cordate, apex rounded or emarginate, mucronate. Racemes terminal, or sometimes terminal and axillary, sometimes with a few branches at base, 6–40 cm, densely hairy with gray-yellow spreading glandular hairs; internode 2–4 mm; bracts 9–18 mm. Pedicel 7–12 mm, densely villous, apically hooked. Calyx ca. 5 mm; lobes 5, narrowly triangular, subequal. Corolla purple, ca. 5 mm; standard obovate, ca. 5 × 3 mm, base cuneate, apex rounded; wings and keel auricular-oblong, ca. 4 × 1.5 mm. Ovary ca. 2.5 mm, glabrous; style ca. 4 mm, curved. Legume 5–7-jointed, slightly compressed, glabrous. Fl. and fr. Sep–Nov.

Mountain slopes, roadsides, field margins; below 500 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, Zhejiang [Bangladesh, India, Nepal].

5. *Uraria lacei* Craib, Bull. Misc. Inform. Kew 1910: 276. 1910.

滇南狸尾豆 dian nan li wei dou

Uraria clarkei Gagnepain; *U. guangxiensis* W. L. Sha.

Shrubs or herbs, erect, to 2 m tall. Stems stout, with brown spreading long hairs. Leaves pinnately 3-foliolate; petiole 3.5–6 cm, densely yellow-brown spreading hirsute; leaflet blades elliptic or elliptic-lanceolate, terminal one (4.5–)5.5–10(–15) × 2–5.5(–6.5) cm, abaxially densely pilose, adaxially pilose, lateral veins 11–13 on each side of midvein, both ends rounded or obtuse, apex mucronate. Panicles terminal, 13–40 cm, densely brown spreading hairy. Pedicel 3–4 mm, elongated to 1 cm at fruiting, yellow-brown pubescent. Calyx 4–5 mm, densely hairy as pedicel; lower lobes ca. 2 × as long as upper ones or more. Corolla purple or purple-brown, 8–9 mm. Ovary hairy, 6–8-ovuled. Legume brown, shortly hairy, 6–8-jointed; articles ca. 2 × 1.8 mm. Fl. and fr. Jun–Oct.

Open grassy slopes, secondary seasonal rain forests; ca. 700 m. Guangdong, Guangxi, Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

6. *Uraria rufescens* (Candolle) Schindler, Repert. Spec. Nov. Regni Veg. 21: 14. 1925.

钩柄狸尾豆 gou bing li wei dou

Desmodium rufescens Candolle, Ann. Sci. Nat. (Paris) 4: 101. 1825; *Doodia hamosa* Roxburgh; *Uraria hamosa* (Roxburgh) Wallich ex Wight & Arnott.

Subshrubs. Stems erect, 40–100 cm tall, gray-white pilose and brown hooked hairy. Leaves 3-foliolate; petiole 1–2.5 cm, hairy; leaflet blades elliptic or ovate-elliptic, 3–8 × 2–4 cm,

abaxially pilose, adaxially glabrous, lateral veins 11–13 on each side of midvein, base rounded or slightly cordate, apex rounded or sometimes emarginate. Inflorescences terminal, 10–20 cm, densely hooked hairy and pubescent. Flowers sparse. Pedicel short, initially ca. 3 mm, hairy, elongated to 5–6 mm at fruiting, apically hooked. Calyx ca. 3 mm, pubescent, 5-parted; lower lobes longer than tube, upper lobes slightly shorter. Corolla purple, 2–3 × as long as calyx. Legume 4–7-jointed; articles gray-brown, compressed, slightly reticulate veined. Fl. and fr. Oct–Nov. $2n = 22$.

Roadsides, mountain slopes; below 900 m. Guangdong, Guangxi, Hainan, Xizang, S Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam].

7. *Uria sinensis* (Hemsley) Franchet, Pl. Delavay. 172. 1890.

中华狸尾豆 zhong hua li wei dou

Uria hamosa (Roxburgh) Wallich ex Wight & Arnott

var. *sinensis* Hemsley, J. Linn. Soc., Bot. 23: 177. 1887; *Desmodium bonatianum* Pampanini.

Subshrubs, ca. 1 m tall. Stems erect, gray-yellow hispidulous. Leaves pinnately 3-foliolate; petiole 2–4 cm, gray-yellow pubescent; leaflet blades oblong, obovate-oblong, or broadly ovate, terminal one 3–7 × 2–4 cm, abaxially gray-yellow villous, adaxially pilose on veins, lateral veins 6–8 on each side of midvein. Panicles terminal, 20–40 cm, gray-yellow hairy, sparsely flowered, 1- or 2-flowered at each node. Pedicel filiform, 8–10 mm, elongated to 1.3 cm at fruiting. Calyx ca. 3 mm; lower lobes ca. as long as tube or shorter. Corolla purple, ca. 4 × as long as calyx. Ovary pilose. Legume ca. as long as pedicel, 4- or 5-jointed, subglabrous, reticulate veined. Fl. and fr. Sep–Oct.

Dry river valleys, mountain slopes, sparse forests, thickets, alpine grasslands; 500–2300 m. Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India].

128. URARIOPSIS Schindler, Bot. Jahrb. Syst. 54: 51. 1916.

算珠豆属 suan zhu dou shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi, Yu Iokawa

Shrubs or subshrubs, erect. Leaves 1-foliolate, stipulate and stipellate. Racemes terminal or axillary, rarely slightly branched panicles, 2-flowered at each bract; bracts large, early deciduous; bracteole absent. Calyx campanulate; lobes 5, upper 2 connate to apex or above middle. Standard obovate; wings auriculate at base of lamina, nearly not clawed; keel obtuse, clawed, not auriculate. Stamens diadelphous (9+1). Ovary shortly stipitate, 2- or 3-ovuled; style curved; stigma capitate; disk cylindrical. Legume usually 3- or 4-jointed; articles compressed from front to back, beadlike, easily deciduous at maturity.

Two species: Cambodia, China, India, Indonesia, Laos, Myanmar, Thailand, Vietnam; two species (one endemic) in China.

- 1a. Leaflet blade ovate or broadly ovate, apex obtuse, not mucronate; inflorescences terminal, 13–20 cm; fruiting pedicel not curved apically 1. *U. cordifolia*
 1b. Leaflet blade cordate, apex acute, mucronate; inflorescences terminal or axillary, only 4–5 cm at fruiting; fruiting pedicel distinctly curved apically 2. *U. brevissima*

1. *Urariopsis cordifolia* (Wallich) Schindler, Bot. Jahrb. Syst. 54: 51. 1916.

算珠豆 suan zhu dou

Uria cordifolia Wallich, Pl. Asiat. Rar. 1. 33. 1830.

Shrubs, erect, 0.4–1 m tall. Branches stout, densely yellow tomentose. Leaves 1-foliolate; petiole 4–5 cm, yellow tomentose; blade ovate or broadly ovate, 4–12 × 6–10 cm, both surfaces shortly tomentose, base shallowly cordate, apex obtuse, not mucronate. Racemes terminal, 13–20 cm, simple or once branched at base, densely shortly yellow tomentose. Pedicel 1–1.2 cm at fruiting, with grayish yellow spreading hairs. Calyx 4–5 mm; upper 2 lobes connate above middle. Corolla pale red or white, 5–6 mm; standard obovate; wings ca. 5 × 1–2 mm, base auriculate; keel obtuse, clawed. Ovary 2- or 3-ovuled; style enlarged from apex to middle, 8–10 × as long as ovary. Legume brown, with short hairs, 2- or 3-jointed. Seeds reniform, ca. 2 × 1.5 mm. Fl. May–Jun, fr. Aug–Sep.

Sunny slopes, roadsides, weedy places; below 1000 m. Guangxi, Guizhou, Yunnan [Cambodia, India, Indonesia, Laos, Myanmar, Thailand, Vietnam].

Two of us (Ohashi and Iokawa) prefer to treat this species as *Uria cordifolia*.

2. *Urariopsis brevissima* Y. C. Yang & P. H. Huang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 7. 1980.

短序算珠豆 duan xu suan zhu dou

Subshrubs, erect, ca. 1 m tall. Stems and branches densely yellow tomentose and sparsely spreading white pubescent. Leaves 1-foliolate; petiole hairy as stem; blade cordate, 5.5–10 × 5–8 cm, both surfaces spreading pubescent, base cordate, apex acute, mucronate. Racemes short, axillary or terminal, simple or 1-branched at base, 4–5 cm, densely yellow tomentose and spreading straight pubescent. Pedicel 1.2–1.3 cm, spreading yellow villous. Calyx lobes lanceolate; upper 2 lobes connate, villous; tube short, ca. 1.5 mm. Standard obovate, 7.5–8 mm; wings falcate-oblong, ca. 6 mm; keel falcate-oblong. Ovary ca. 3 mm, 3- or 4-ovuled; style ca. 6 mm. Legume 3- or 4-jointed; articles ca. 3 mm in diam., rugose, adpressed pubescent; fruiting pedicel distinctly curved apically. Fl. and fr. Oct–Dec.

• Dry grasslands, mountain slopes; 100–500 m. Guangdong, Guangxi, S Yunnan.

Two of us (Ohashi and Iokawa) prefer to treat this entity as conspecific with *Uria cochinchinensis* Schindler (Repert. Spec. Nov. Regni Veg. 21: 14. 1925), which occurs in Cambodia, Laos, and Vietnam.

129. CHRISTIA Moench, Suppl. Meth. 39. 1802.

蝙蝠草属 bian fu cao shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Herbs or subshrubs, erect or diffuse. Leaves pinnately 3-foliolate or only 1-foliolate, stipellate. Flower small, 3–6 mm. Panicles or racemes terminal, rarely axillary. Calyx membranous, campanulate, accrescent, 5-lobed; lobes ovate-lanceolate, ca. as long as tube and slightly broader. Corolla ca. as long as calyx or more; standard broad, base attenuate, clawed; wings adherent to keel; keel obtuse. Stamens diadelphous (9+1); anthers uniform. Ovary many ovuled; style linear, incurved; stigma capitate. Legume many jointed, articles folded, reticulate veined, enclosed by calyx.

About 13 species: tropical Asia and Australia; five species (one endemic) in China.

- 1a. Terminal leaflet much longer than broad, lateral veins 10–15 on each side of midvein; upper 2 lobes of calyx connate; articles 2–4, pubescent 1. *C. campanulata*
- 1b. Terminal leaflet much broader than long, lateral veins 2–5 on each side of midvein; upper 2 lobes of calyx free or slightly connate; articles 4 or 5, glabrous (only *C. hainanensis* with 2 or 3 articles, extremely shortly uncinately pubescent).
- 2a. Upper 2 lobes of calyx free, tube 3–4 × as long as lobes, calyx not half-hyaline, with dense uncinately hairs, small verrucae, and obscure reticulate veins; terminal leaflet obovate-rhombic, sometimes nearly square; subshrubs 2. *C. constricta*
- 2b. Upper 2 lobes of calyx slightly connate, lower lobes ca. as long as tube, calyx dry-membranous, half-hyaline, obviously reticulate veined; herbs.
- 3a. Terminal leaflet mostly rhombic or narrowly rhombic, 4–6 × broader than long 3. *C. vespertilionis*
- 3b. Terminal leaflet mostly reniform, orbicular-triangular, obovate, or nearly obtriangular, less than 3 × broader than long.
- 4a. Terminal leaflet mostly reniform, orbicular-triangular, or obovate, 5–15 × 10–20 mm; articles 4 or 5, glabrous 4. *C. obcordata*
- 4b. Terminal leaflet nearly obtriangular, 20–30 × 15–25 mm; articles 2 or 3, shortly uncinately pubescent 5. *C. hainanensis*

1. *Christia campanulata* (Benth.) Thothathri, Cur. Sci. 32: 178. 1963.

台湾蝙蝠草 tai wan bian fu cao

Lourea campanulata Benth. in Miquel, Pl. Jungh. 215. 1852; *Desmodium formosanum* Hayata; *Urania formosana* (Hayata) Hayata; *U. latispala* Hayata.

Shrubs or subshrubs. Stem erect, simple, densely hirsute or villous. Leaves pinnately 3-foliolate, rarely 1-foliolate; petiole 1.5–3 cm, with dense brown uncinately hairs; terminal leaflet blade oblong or elliptic, 5–8 × 3–5 cm, lateral ones 4–6 × 2–2.5 cm, lateral veins 10–15 on each side of midvein, abaxially densely appressed gray pubescent, adaxially appressed gray pubescent, base cuneate or slightly oblique, apex obtuse, mucronate. Inflorescences 15–20 cm, with rust-colored uncinately hairs, 1- or 2-flowered at each node of rachis. Pedicel ca. 3 mm, densely hairy as inflorescences. Calyx grayish yellow pubescent and ciliate outside; upper lobes connate. Corolla 4–6 mm; standard broadly orbicular or obovate; wings oblong; keel cymbiform. Legume 2–4-jointed; articles ellipsoidal, ca. 3 × 2 mm, slightly reticulate veined, pilose, wholly enclosed by calyx. Fl. and fr. Sep–Dec.

Waste grassy slopes, roadsides; 400–1100 m. Fujian, ?Guangdong, SW Guangxi, SW Guizhou, S Taiwan, S Yunnan [India, Myanmar, Thailand, Vietnam].

This species resembles plants in the genus *Urania*, but the calyx is accrescent and envelops the folded legume, which is characteristic of *Christia*. In *Advances Legume Syst.* (1: 299. 1981), Ohashi et al. considered this as belonging to *Urania*.

2. *Christia constricta* (Schindler) T. C. Chen, Acta Phytotax. Sin. 8: 348. 1963.

长管蝙蝠草 chang guan bian fu cao

Lourea constricta Schindler, Bot. Jahrb. Syst. 54: 64. 1916.

Subshrubs, prostrate, ca. 1 m or longer, base branched. Young parts densely grayish yellow tomentose and pubescent. Leaves 1-foliolate or 3-foliolate; petiole 0.8–1.5 cm, densely hairy as young branchlets; terminal leaflet obovate-rhombic, sometimes nearly square, 1.5–2.5 × 1.5–2.5 cm, lateral veins 4–6 on each side of midvein, both surfaces pilose, lateral ones narrowly elliptic or square and 1–1.2 × 0.9–1.1 cm, base slightly cordate, apex truncate. Inflorescences ca. 20 cm, spreading pubescent. Pedicel extremely short at anthesis, to 3–4 mm after anthesis. Calyx initially ca. 4 mm, to 8–10 mm at fruiting; lobes 5, upper 2 free, 1/4–1/3 as long as tube. Legume 4- or 5-jointed, reticulate veined, glabrous. Fl. Aug–Sep, fr. Nov.

Seasides, dry sandy soils. Guangdong, Hainan [Vietnam].

3. *Christia vespertilionis* (Linnaeus f.) Bakhuizen f. ex Meeuwen, Reinwardtia 6: 90. 1961.

蝙蝠草 bian fu cao

Hedysarum vespertilionis Linnaeus f., Suppl. Pl. 331. 1782; *Lourea vespertilionis* (Linnaeus f.) Desvaux.

Herbs, perennial, erect, 60–120 cm tall. Leaves usually 1-foliolate, rarely 3-foliolate; petiole 2–2.5 cm, pilose; terminal leaflet blade rhombic or narrowly rhombic, 0.8–1.5 × 5–9 cm,

base slightly cordate, apex broad and truncate or slightly emarginate; lateral ones obcordate or obtriangular, usually inequilateral, 0.8–1.5 × 1.5–2 cm, lateral veins 3 or 4 on each side of midvein, abaxially pilose, adaxially glabrous, base cuneate or nearly rounded, apex truncate. Inflorescences 5–15 cm, pubescent. Pedicel 2–4 mm, gray pubescent. Calyx half-hyaline, accrescent, 0.8–1.2 cm, reticulate veined, pubescent; lobes triangular, ca. as long as tube, upper 2 slightly connate. Corolla yellowish white, not exserted, ca. 6 mm. Legume 4- or 5-jointed; articles blackish brown at maturity, ca. 3 × 2 mm, reticulate veined, glabrous, wholly enclosed by calyx. Fl. Mar–May, fl. Oct–Dec.

Open grasslands, thickets, roadsides, seashores. Guangdong, Guangxi, Hainan [widespread in all tropical regions].

The whole plant is used medicinally for treating tuberculosis and snake bites. The leaves are used as a topical treatment for healing bone fractures.

4. *Christia obcordata* (Poiret) Bakhuizen f. ex Meeuwen, Reinwardtia 6: 91. 1961.

铺地蝙蝠草 pu di bian fu cao

Hedysarum obcordatum Poiret in Lamarck, Encycl. 6: 425. 1805; *Lourea obcordata* (Poiret) Desvaux.

Herbs, perennial, prostrate, 15–60 cm. Leaves often 3-foliolate, rarely 1-foliolate; petiole 8–10 mm, filiform, gray pilose; terminal leaflet blade mostly reniform, orbicular-triangular, or obovate, 0.5–1.5 × 1–2 cm, abaxially pilose, adaxially glabrous, base broadly cuneate, apex truncate and slightly emarginate; lateral ones obovate, cordate, or nearly orbicular, 6–7 × ca. 5 mm, lateral veins 3–5 on each side of midvein. Racemes

mostly terminal, 3–18 cm, 1-flowered at each node. Pedicel 2–3 mm. Calyx half-hyaline, initially ca. 2 mm, to 6–8 mm at fruiting, distinctly reticulate veined; lobes ca. as long as tube. Corolla bluish purple or roseate, 3–5 mm, slightly longer than calyx. Legume 4- or 5-jointed, wholly enclosed by calyx; articles orbicular, ca. 2.5 mm in diam., glabrous. Fl. May–Aug, fr. Sep–Oct.

Open grasslands, waste slopes, thickets; below 500 m. Fujian, Guangdong, Guangxi, Hainan, S Taiwan [Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam; N Australia].

5. *Christia hainanensis* Y. C. Yang & P. H. Huang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 5. 1980.

海南蝙蝠草 hai nan bian fu cao

Herbs, perennial. Stems erect, to 100 cm tall. Leaves 3-foliolate; petiole 1.5–2 cm, grayish yellow uncinatate and sparsely white pubescent; terminal leaflet blade nearly obtriangular, 2–3 × 1.5–2.4 cm, base broadly cuneate or nearly rounded, apex truncate or emarginate; lateral ones obovate, 1.5–2.4 × 0.9–1.4 cm, lateral veins 4 or 5 on each side of midvein, abaxially gray appressed pubescent, adaxially gray pubescent, base cuneate, apex truncate. Panicles terminal or axillary, 6–12 cm, 1- or 2-flowered at each node of rachis; internodes 5–8 mm. Pedicel 5–6 mm, densely grayish yellow uncinatate pubescent. Calyx ca. 6 mm, upper 2 lobes connate. Legume 2- or 3-jointed, wholly enclosed by calyx; articles ellipsoidal, 2.5–3 × ca. 2 mm, reticulate veined, extremely shortly uncinatate pubescent. Fl. and fr. Sep–Nov.

• Sparse forests; ca. 100 m. Hainan.

130. *ALYSICARPUS* Necker ex Desvaux, J. Bot. Agric. 1: 120. 1813, nom. cons.

链荚豆属 lian jia dou shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Herbs, perennial. Stems erect or diffuse, branched. Leaves 1-foliolate, rarely pinnately 3-foliolate, stipulate and stipellate; stipules scarious or nearly leathery, free or connate. Racemes axillary or terminal; flowers small, mostly ca. 5 mm, usually binate at each node of rachis; bracts scarious, early deciduous. Calyx 4-lobed; lobes dry, rigid, nearly equal, upper lobe 2-toothed at apex. Corolla not or slightly longer than calyx; standard broad, obovate or nearly orbicular; keel obtuse, adherent to wings. Stamens diadelphous (9+1); anthers uniform. Ovary sessile or nearly so, many ovuled; style linear, incurved; stigma capitate. Legume cylindric, swollen, many jointed, 1-seeded per article, indehiscent.

About 30 species: tropical Africa, Asia, Australia, and tropical America; five species (one endemic, one introduced) in China.

1a. Corolla pale yellow or yellow with green or white; calyx longer than first article of legume; legume glabrous.

2a. Lobes of calyx not ciliate; corolla pale yellow or yellow with green; leaflets linear to linear-lanceolate 4. *A. bupleurifolius*

2b. Lobes of calyx densely yellow ciliate; corolla white; leaflets oblong, rarely orbicular or linear-lanceolate 5. *A. rugosus*

1b. Corolla purplish blue or pinkish purple; calyx shorter than first article of legume or slightly longer; legume pubescent.

3a. Whole leaflets oblong or nearly orbicular; legume cylindric-moniliform, constricted between articles, without raised linear ridges 3. *A. yunnanensis*

3b. Upper leaflets usually ovate-oblong or lanceolate, lower ones nearly orbicular to ovate; legume compressed cylindric, not constricted between articles, with raised linear ridges.

4a. Leaflets usually uniform but variable in size, ovate, oblong, or oblong-elliptic, reticulate veinlets prominent on both surfaces; inflorescences laxly flowered; loments with septa inside and with furrows at joint; prostrate or spreading perennial herbs 1. *A. vaginalis*

- 4b. Leaflets distinctly dimorphic, lower ones orbicular to broadly oblong, upper ones lanceolate, reticulate veinlets obscure on both surfaces; inflorescences densely flowered; loment without septa inside and with ridges at joint; erect or spreading annual herbs 2. *A. ovalifolius*

1. *Alysicarpus vaginalis* (Linnaeus) Candolle, Prodr. 2: 353. 1825.

链荚豆 lian jia dou

Herbs, perennial. Stem erect or procumbent, 30–90 cm tall, glabrous or slightly pubescent. Leaves 1-foliolate; petiole 5–14 mm, glabrous; blade often ovate-oblong or oblong-lanceolate to lanceolate, to 6.5 × 1–2 cm on upper stem, cordate, nearly orbicular, or ovate, 1–3 × ca. 1 cm on lower stem, abaxially slightly pubescent, adaxially glabrous. Racemes axillary or terminal, 1.5–7 cm, 6–12-flowered, binate at each node; internodes 2–5 mm. Pedicel 3–4 mm. Calyx 5–6 mm, slightly longer than first article of legume. Corolla red, reddish purple, purplish blue, or yellow, slightly longer than calyx, ca. 5 mm; standard obovate. Ovary pubescent, 4–7-ovuled. Legume compressed, cylindric, 1.5–2.5 cm × 2–2.5 mm, pubescent, 4–7-jointed, not constricted between articles, with raised linear ridges. Seeds ellipsoidal, slightly compressed. Fl. Sep, fr. Sep–Nov. *2n* = 14, 16.

Open grassy slopes, roadsides, sandy seashores, grasslands in parks; 100–700 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Japan, Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; E and W Africa, throughout Old World tropics; introduced in the Neotropics].

It is grown for green manure and used as a forage. The whole plant is used medicinally for treating sword wounds and bone fractures.

- 1a. Corolla red, reddish purple, or purplish blue 1a. var. *vaginalis*
 1b. Corolla yellow 1b. var. *taiwanianus*

1a. *Alysicarpus vaginalis* var. *vaginalis*

链荚豆(原变种) lian jia dou (yuan bian zhong)

Hedysarum vaginale Linnaeus, Sp. Pl. 2: 746. 1753; *Alysicarpus vaginalis* var. *diversifolius* Chun.

Corolla red, reddish purple, or purplish blue; keel oblong, 0.5–0.6 cm.

Open grassy slopes, roadsides, sandy seashores; 100–700 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Japan, Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; E and W Africa, throughout Old World tropics; introduced in South America].

1b. *Alysicarpus vaginalis* var. *taiwanianus* S. S. Ying, Coloured Ill. Fl. Taiwan 2: 378. 1987.

台湾链荚豆 tai wan lian jia dou

Corolla yellow; keel oblong, 1.5–2 cm.

- Grasslands in parks, possibly naturalized. NE Taiwan.

2. *Alysicarpus ovalifolius* (Schumacher) J. Léonard, Bull. Jard. Bot. État Bruxelles 24: 88. 1954.

卵叶链荚豆 luan ye lian jia dou

Hedysarum ovalifolium Schumacher, Beskr. Guin. Pl. 359. 1827.

Herbs, annual. Stem erect or spreading, sometimes woody at base, 10–60 cm tall, puberulent, glabrescent. Leaflets usually dimorphic, elliptic or oblong in lower part and lanceolate in upper part, 1–10 × 0.6–3 cm. Inflorescences terminal or leaf-opposed, laxly flowered; bracteoles absent. Pedicel 1–2 mm, with spreading hooked hairs. Calyx glumaceous, scarious, persistent, 4-lobed, with minute spreading hooked hairs and sparsely ciliate straight hairs; lobes not imbricate, subequal, narrowly triangular-ovate, 3–4 mm, ciliate, apex acuminate. Petals pink or reddish purple, subequal with calyx at anthesis. Legume (1–)4–6(–8)-jointed, (0.5–)1.5–2.2 cm × 1.8–2.3 mm, indehiscent, with dense minute hooked hairs, mostly without septa inside and with ridges at joint. Fl. Sep–Oct, fr. Sep–Dec.

Introduced; open places, sunny grasslands along roads, riverbanks, seashores; sea level to 500 m. Taiwan [Afghanistan, India, Japan (Ryukyu Islands, introduced); tropical Africa, SW Asia, Madagascar].

3. *Alysicarpus yunnanensis* Y. C. Yang & P. H. Huang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 8. 1980.

云南链荚豆 yun nan lian jia dou

Herbs, perennial, caespitose. Stem diffuse, ca. 22 cm tall, uncinately pubescent and spreading hirsute. Leaves 1-foliolate; petiole 3–5 mm, glabrous; blade oblong or nearly orbicular, 4–13 × 3–9 mm, both surfaces puberulent, abaxially sparsely setose on veins, both ends rounded or base slightly cordate. Racemes axillary or terminal, 1.5–3 cm, 4–10-flowered, binate at each node; internodes 3–7 mm. Pedicel ca. 1 mm. Calyx ca. 4 mm, nearly as long as first article of legume. Corolla pinkish purple, ca. 5 mm; standard obovate. Ovary 2.5–3 mm (style 3–5.5 mm), uncinately pubescent, (3–)5–7-ovuled. Legume cylindrical-moniliform, 1–2 × ca. 0.2 cm, (3–)5–7-jointed, constricted between articles, without raised linear ridges, not reticulate veined, uncinately pubescent. Fl. and fr. Aug–Sep.

- Rocky riverbanks; ca. 1300 m. NW Yunnan.

4. *Alysicarpus bupleurifolius* (Linnaeus) Candolle, Prodr. 2: 352. 1825.

柴胡链荚豆 chai hu lian jia dou

Hedysarum bupleurifolium Linnaeus, Sp. Pl. 2: 745. 1753.

Herbs, perennial. Stem erect or diffuse, much branched, 25–120 cm tall, glabrous or subglabrous. Leaves 1-foliolate; petiole ca. 2 mm or leaves sessile; blade linear to linear-lanceolate, 4–7 × 0.4–0.5 cm, abaxially sparsely pubescent on midvein, adaxially glabrous, base rounded or cuneate, apex acute. Racemes terminal, 3–18 cm, 20–40-flowered, binate at each node; internodes 8–10 mm. Pedicel ca. 1 mm or flowers sessile. Calyx 6–8 mm, longer than first article of legume; lobes lanceolate, ca. 2 × as long as tube. Corolla pale yellow or yellowish green, ca. 5 mm. Legume brown at maturity, 0.6–1.5 cm × ca. 1.8 mm, higher than calyx, 3–6-jointed, constricted between articles, glabrous. Fl. and fr. Sep–Nov. *2n* = 16.

Wastelands, grasslands, field margins, sunny places in valleys;

100–1000 m. Guangdong, SW Guangxi, S Taiwan, S Yunnan [India, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Indian Ocean islands (Mauritius), Pacific islands, South America (Bolivia)].

5. *Alysicarpus rugosus* (Willdenow) Candolle, Prodr. 2: 353. 1825.

皱缩链荚豆 zhou suo lian jia dou

Hedysarum rugosum Willdenow, Sp. Pl. 3: 1172. 1802;
Alysicarpus bracteus X. F. Gao.

Herbs, perennial. Stem erect, to 1.5 m tall, glabrous or pilose. Leaves 1-foliolate; petiole 3–9 mm, glabrous or pilose;

blade oblong, rarely orbicular or linear-lanceolate, 2–6 × 0.2–1 cm, abaxially pilose and villous on veins, adaxially glabrous, base rounded, margin entire, ciliate, apex acute. Racemes terminal and axillary, 2–5 cm, 10–24-flowered, binate at each node. Pedicel 2–3 mm, pubescent. Calyx glabrous, 4–10 mm, longer than first article of legume. Corolla white, ca. 4 mm; standard obovate. Ovary glabrous, 3–5-ovuled. Legume moniliform, swollen, glabrous, 3–5-jointed; article broader than long, prominently transversely ridged, articles enclosed in calyx or slightly exerted. Fl. Sep, fr. Sep–Nov. $2n = 16^*$.

Moist places in dense valley forests, wasteland; 600–1200 m. ?Taiwan, NC and S Yunnan [India, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam; throughout Old World tropics].

131. *CAMPYLOTROPIS* Bunge, Pl. Mongholic-Chin. 6. 1835.

杭子梢属 hang zi shao shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi, Yu Iokawa

Oxyramphis Wallich ex Meisner; *Phlebosprium* Junghuhn.

Shrubs or shrublets. Leaves pinnately 3-foliolate; stipules narrowly triangular or rarely triangular to deltoid-ovate, persistent; stipels nearly always absent, or rarely always present, linear; leaflets entire. Inflorescences axillary, racemose, rarely umbellate or spicate, sometimes terminal panicle composed of several upper racemes with reduced subtending leaves, 1-flowered per bract; bracts persistent or caducous. Pedicels articulate; bracteoles 2, usually caducous before anthesis. Calyx campanulate, 4-lobed; lower lobe narrower and longer than upper and lateral ones, upper lobe minutely 2-toothed at apex. Corolla violet to pinkish white or rarely yellow; standard shortly clawed at base; wings auriculate and clawed at base; keel incurved at ca. right angle, acute at apex, auriculate, clawed at base. Stamens monadelphous; vexillary stamen connate to staminal tube for 2/3–4/5 of its length, rarely almost diadelphous. Pistil minutely stipitate; ovary 1-ovuled, superior; style filiform, incurved; stigma terminal, small, ciliate with minute hairs. Legumes compressed, lenticular, indehiscent, 1-seeded. Seeds reniform, rim-arillate with ringlike margin around hilum.

About 37 species: mostly in temperate zone of Asia; 32 species (20 endemic) in China.

Because most species tolerate arid soils, they are important for soil conservation. The branchlets can be used as knitting needles. The young shoots and leaves are used as forage for livestock and as green manure. The roots and leaves of some species are used medicinally.

- 1a. Leaves dimorphic, lower leaves petiolate with obovate leaflets and distinct rachis, upper leaves sometimes subsessile.
 - 2a. Upper leaflets deltoid 10. *C. diversifolia*
 - 2b. Upper leaflets elliptic, orbicular, or transversely elliptic 13. *C. harmsii*
- 1b. Leaves not dimorphic.
 - 3a. Leaflets consistently stipellate.
 - 4a. Glandular hairs present on pedicel, calyx, and inflorescence rachis 22. *C. polyantha*
 - 4b. Glandular hairs absent 32. *C. yunnanensis*
 - 3b. Leaflets estipellate, rarely including a few leaves with rudimentary stipels.
 - 5a. Glandular hairs present on pedicel, calyx, and inflorescence rachis.
 - 6a. Calyx lobes more than 2 × as long as tube, more than 3 mm.
 - 7a. Bracts narrowly ovate, usually shorter than 3 mm; leaflet adaxially glabrous 9. *C. delavayi*
 - 7b. Bracts linear, usually more than 3.5 mm; leaflet adaxially densely puberulent 21. *C. pinetorum*
 - 6b. Calyx lobes usually as long as tube or, if longer, less than 2 × as long as tube.
 - 8a. Leaflet adaxially ± densely puberulent with spreading, very short hairs, rarely glabrescent; branches velutinous.
 - 9a. Leaves and stems with white hairs; leaflets broadly elliptic to ovate, often more than 8 cm 17. *C. latifolia*
 - 9b. Leaves and stems with tawny to pale brown hairs; leaflets narrowly ovate to elliptic, usually less than 7 cm.
 - 10a. Racemes extended, often more than 10 cm; bracts narrowly ovate, 2–2.5 mm; bracteoles ca. 1 mm 11. *C. fulva*
 - 10b. Racemes usually less than 9 cm; bracts narrowly ovate, 3–5 mm; bracteoles ca. 2 mm 25. *C. sulcata*
 - 8b. Leaflet adaxially glabrous or ± densely pubescent; branches not velutinous.

- 11a. Flowers small; standard usually less than 9 mm.
 12a. Legumes more than 10 mm; leaflet abaxially densely white pubescent 18. *C. luhitensis*
 12b. Legumes less than 8 mm.
 13a. Leaflet abaxially with sparse appressed short hairs; legume apex obtuse 7. *C. cytisoides*
 13b. Leaflet abaxially with dense white silky hairs; legume apex rounded 28. *C. thomsonii*
- 11b. Flowers larger; standard usually more than 10 mm.
 14a. Leaflets usually less than 1 cm, obdeltoid 31. *C. wilsonii*
 14b. Leaflets usually more than 2 cm, not obdeltoid.
 15a. Bracts usually caducous before flowering 19. *C. macrocarpa*
 15b. Bracts mostly persistent until fruiting.
 16a. Inflorescence usually a panicle; bracts mostly more than 2 mm; petioles not abaxially angled.
 17a. Leaflets deltoid to ovate, lateral veins thick, prominent abaxially 15. *C. hirtella*
 17b. Leaflets obovate to oblong, lateral veins not prominent 2. *C. alopochroa*
 16b. Inflorescence not a panicle; bracts mostly less than 2 mm.
 18a. Petioles sulcate, neither abaxially angled nor winged 8. *C. decora*
 18b. Petioles abaxially angled, often slightly convex above, bisulcate and narrowly winged along both sides 14. *C. henryi*
- 5b. Glandular hairs absent from pedicel and calyx.
 19a. Petioles abaxially angled, often narrowly winged along both sides; young branches distinctly angled.
 20a. Young branches quadrangular; corolla purple 12. *C. grandifolia*
 20b. Young branches triquetrous; corolla yellow or purple 29. *C. trigonoclada*
- 19b. Petioles neither abaxially angled nor winged.
 21a. Calyx lobes ca. 3 × as long as tube; flowers subsessile, clustered at top of peduncle as an umbel; leaflet adaxially white pubescent 1. *C. alba*
 21b. Calyx lobes usually nearly equal to tube or, if longer, less than 2 × as long as tube; inflorescences not umbelliform.
 22a. Leaflet adaxially densely puberulent.
 23a. Calyx, inflorescence, young branches, and leaflets abaxially densely appressed sericeous; leaflets elliptic to oblong 3. *C. argentea*
 23b. Calyx, inflorescence, young branches, and leaflets abaxially densely white villous; leaflets obdeltoid to broadly obovate 5. *C. brevifolia*
- 22b. Leaflet adaxially glabrous, sparsely pubescent, or sericeous.
 24a. Pedicels usually less than 5 mm.
 25a. Flowers clustered at upper part of racemes.
 26a. Flowers larger; standard ca. 10 mm; pedicels more than 1.5 mm; racemes not terete 16. *C. howellii*
 26b. Flowers small; standard ca. 7 mm; pedicels less than 1.5 mm; racemes terete, very densely flowered, spikelike 27. *C. teretiracemosa*
 25b. Flowers distributed equally in racemes.
 27a. Legumes ovoid to elliptic, pubescent; inflorescences racemose 24. *C. speciosa*
 27b. Legumes narrowly ovoid to narrowly elliptic, lateral surface glabrous; inflorescences paniculate 30. *C. wenshanica*
- 24b. Pedicels usually more than 5 mm.
 28a. Flowers less than 8 per raceme.
 29a. Pedicels more than 15 mm; vexillary stamen connate to tube at base for ca. 1/6 of its length 20. *C. pauciflora*
 29b. Pedicels less than 8 mm; vexillary stamen connate to tube at base for ca. 1/3 of its length 26. *C. tenuiramea*
 28b. Flowers 10 or more per raceme.
 30a. Leaflets obdeltoid to obcordate; lateral veins dense, straight, parallel 4. *C. bonii*
 30b. Leaflets elliptic to obovate; lateral veins arcuate with net venation.
 31a. Pedicels slender, 6–20 mm; leaflets papery 6. *C. capillipes*
 31b. Pedicels stout, 4–6 mm; leaflets subleathery 23. *C. sargentiana*

1. *Campylotropis alba* Iokawa & H. Ohashi, J. Jap. Bot. 72: 139. 1997.

白花杭子梢 bai hua hang zi shao

Shrubs. Young branches densely white soft hairy. Petiole ca. 1.5 mm, white tomentose; stipels absent; leaflets broadly obovate, terminal one ca. 1 × 0.8 cm, abaxially densely pubescent, adaxially sparsely covered with ascending soft hairs, base

obtuse, apex rounded to retuse and mucronulate. Inflorescences umbel-like racemose with reduced axes; peduncles ca. 1.5 cm, densely ascending sericeous. Pedicels short, ca. 1.5 mm, ascending sericeous. Calyx deeply 4-lobed, densely ascending sericeous; tube ca. 2 mm; lobes narrowly triangular, 6–7 mm. Standard broadly obovate, ca. 9.5 mm, apex rounded; wings ca. 9.5 mm, clawed at base; keel incurved, ca. 14.5 mm, clawed at base. Gynoecium ca. 11.5 mm; ovary ca. 2.5 mm; style incurved, ca. 9 mm.

- Yunnan.

2. *Campylotropis alopochroa* H. Ohashi, J. Jap. Bot. 49: 108. 1974 [*“alopochloa”*].

西藏杭子梢 xi zang hang zi shao

Shrublets, 0.5–1 m tall. Branches densely ferruginous pubescent. Petiole 1–1.5 cm, with dense ascending hairs; stipels absent; leaflets obovate to elliptic, terminal one 2–2.5 × 1–2 cm, abaxially densely pubescent, adaxially sparsely covered with ascending short hairs, base obtuse, apex retuse and mucronulate. Racemes usually large paniculate, 6–8 cm; rachis and pedicels with dense ferruginous spreading hairs and sparse glandular hairs. Pedicels 4–5 mm. Calyx deeply 4-lobed, densely ascending sericeous with glandular hairs; tube ca. 1.5 mm; lobes narrowly triangular, 2.5–3 mm. Corolla red-purple; standard obovate or narrowly elliptic, ca. 12 mm, apex obtuse; wings 10–11 mm, shortly clawed at base; keel incurved, ca. 14 mm, clawed at base. Gynoecium ca. 13 mm; ovary ca. 2 mm; style incurved, 10.5–11 mm.

- Xizang.

3. *Campylotropis argentea* Schindler, Repert. Spec. Nov. Regni Veg. 11: 426. 1912.

银叶杭子梢 yin ye hang zi shao

Lespedeza argentea (Schindler) H. Léveillé.

Shrubs or shrublets, 0.5–1 m tall. Branches densely appressed sericeous. Petiole 1.5–4 cm, densely appressed hairy; stipels rarely present, linear, ca. 2 mm; leaflets elliptic to oblong, terminal one 1.2–3 × 0.7–2 cm, abaxially whitish or silvery with dense appressed silky hairs, adaxially puberulent, base rounded, apex retuse and mucronulate. Racemes 5–15 cm, often paniculate; rachis and pedicels with dense ascending short hairs. Pedicels 1.5–4 mm. Calyx deeply 4-lobed, with appressed short hairs; tube ca. 1.5 mm; lobes triangular to narrowly triangular, ca. 2 mm. Corolla purple; standard obovate, 9–10 mm, apex obtuse; wings ca. 10 mm, clawed at base; keel inflexed at an obtuse angle, ca. 11.5 mm, clawed at base. Ovary ca. 2.5 mm, appressed puberulent near suture and apex; style incurved, ca. 7 mm. Legume obliquely oblong, 7–9 × 3.5–5 mm, with subappressed short hairs, apex rounded. Seeds dark reddish brown, reniform, 2–2.2 × 3.5–4 mm.

- Sunny places, mountain slopes; 1300–1500 m. Yunnan.

4. *Campylotropis bonii* Schindler var. *stipellata* Iokawa & H. Ohashi, J. Jap. Bot. 79: 227. 2004.

密脉杭子梢 mi mai hang zi shao

Shrubs, to 4 m tall. Branches shortly appressed hairy. Peti-

ole 0.5–3 cm, densely appressed hairy; stipels linear; leaflets obdeltoid to obcordate, terminal one 1.5–4 × 0.8–3 cm, abaxially appressed hairy, adaxially glabrous, lateral veins dense, straight, parallel, base cuneate, apex retuse and mucronulate. Racemes densely flowered, 2–7 cm, often paniculate. Pedicels 4–8 mm, with appressed short hairs. Calyx with appressed short hairs; tube ca. 1.5 mm; lobes triangular to narrowly triangular, ca. 1 mm. Corolla pale pink or pale red-purple; standard obovate to elliptic, 8–9 mm, narrowed to a claw, obtuse at apex; wings ca. 9 mm, clawed at base; keel incurved, ca. 8.5 mm, clawed at base. Ovary puberulent. Legume obliquely oblong, 13–16 × 5–8 mm, with subappressed short hairs, apex rounded. Seeds reniform, ca. 3 × 6 mm.

- Forests, thickets, grasslands; 300–2900 m. Guangxi.

Campylotropis bonii var. *bonii* occurs in N Thailand and N Vietnam.

5. *Campylotropis brevifolia* Ricker, J. Wash. Acad. Sci. 36: 37. 1946.

短序杭子梢 duan xu hang zi shao

Campylotropis yajiangensis P. Y. Fu var. *deronica* P. Y. Fu.

Shrubs or shrublets, usually 0.8–2 m tall. Branches glabrescent, young parts densely white villous. Petiole 0.5–1 cm, densely white villous; stipels absent; leaflets obdeltoid to broadly obovate, terminal one 0.6–1.6 × 0.5–1.2 cm, abaxially densely white villous, adaxially densely puberulent, base obtuse, apex retuse and mucronulate. Racemes 1–2 cm, few flowered; rachis and pedicels with dense ascending soft hairs. Pedicels 1.5–2 mm. Calyx with dense ascending soft hairs; tube 1.5–1.8 mm; lobes triangular, nearly same length as tube. Corolla reddish purple; standard obovate, ca. 10 mm, base obtuse, apex rounded; wings ca. 9.5 mm, clawed at base; keel incurved, ca. 13.5 mm, clawed at base. Ovary ca. 2.5 mm; style incurved, ca. 8 mm. Legume obliquely obovoid, with ascending short hairs. Fl. Sep–Oct.

- Sunny grasslands, rocky mountain slopes, dry grassy slopes, thickets; 1600–3500 m. W Sichuan, E Xizang.

6. *Campylotropis capillipes* (Franchet) Schindler, Repert. Spec. Nov. Regni Veg. 11: 341. 1912.

细花梗杭子梢 xi hua geng hang zi shao

Shrubs, usually 1–2 m tall. Young branches shortly appressed hairy. Petiole 0.3–4 cm, densely shortly appressed hairy; stipels absent; leaflets obovate to oblong, terminal one 1–3 × 0.7–2 cm, both surfaces sparsely shortly appressed hairy or adaxially glabrous, base obtuse, apex retuse and mucronulate. Racemes ± densely flowered, 1.5–3(–8) cm. Pedicels slender, subfiliform, 6–20 mm, with appressed short hairs. Calyx with appressed short hairs; tube 1.8–2.7 mm; lobes triangular to narrowly triangular. Corolla purple to reddish purple; standard elliptic, 10–14 mm, apex obtuse; wings 10–14 mm, clawed at base; keel incurved, 12–16 mm, clawed at base. Ovary ca. 3.5 mm, puberulent or glabrous; style incurved, ca. 10 mm. Legume obliquely elliptic, 8–16 × 4.5–7 mm, shortly appressed hairy or glabrous, apex obtuse. Seeds reddish brown, reniform, ca. 2 × 3 mm. Fl. Sep–Nov, fr. Nov–Apr.

Forests, thickets, forest margins, valleys, mountain slopes, stream-sides; 1000–3000 m. W Guangxi, Sichuan, Yunnan [Myanmar, Thailand].

- 1a. Leaflets adaxially sparsely shortly appressed hairy; racemes short, 1.5–3 cm; calyx lobes almost as long as tube, more than 1.5 mm 6a. subsp. *capillipes*
 1b. Leaflets adaxially glabrous; racemes 2–8 cm; calyx lobes distinctly shorter than tube, 1–1.5 mm 6b. subsp. *prainii*

6a. *Campylotropis capillipes* subsp. *capillipes*

细花梗杭子梢(原亚种) xi hua geng hang zi shao (yuan ya zhong)

Lespedeza capillipes Franchet, Pl. Delavay. 165. 1890.

Leaflets adaxially sparsely shortly appressed hairy. Racemes short, 1.5–3 cm. Calyx lobes almost as long as tube, more than 1.5 mm.

- Forests, thickets; 1000–3000 m. Sichuan, Yunnan.

6b. *Campylotropis capillipes* subsp. *prainii* (Collett & Hemsley) Iokawa & H. Ohashi, J. Jap. Bot. 77: 209. 2002.

草山杭子梢 cao shan hang zi shao

Lespedeza prainii Collett & Hemsley, J. Linn. Soc., Bot. 28: 46. 1890; *Campylotropis prainii* (Collett & Hemsley) Schindler.

Leaflets adaxially glabrous. Racemes 2–8 cm. Calyx lobes distinctly shorter than tube, 1–1.5 mm. Fl. Sep–Nov, fr. Nov–Apr.

Forest margins, forests, valleys, mountain slopes, thickets, stream-sides; 1000–3000 m. W Guangxi, Yunnan [Myanmar, Thailand].

7. *Campylotropis cytisoides* Miquel, Fl. Ned. Ind. 1: 229. 1855.

小花杭子梢 xiao hua hang zi shao

Lespedeza cytisoides Benthham in Miquel, Pl. Jungh. 230. 1852, not Bertoloni (1851).

Shrubs, 1.5–3 m tall. Young branches shortly appressed hairy. Petiole 1.5–5.5 cm, with dense appressed short hairs; stipels absent; leaflets narrowly ovate to elliptic, terminal one 2.3–6.5 × 1–2 cm, abaxially with sparse appressed short hairs, adaxially glabrous, base obtuse, apex retuse and mucronulate. Racemes 4–15 cm; rachis and pedicels shortly ascending hairy mixed with sparse glandular hairs. Pedicels 2–5 mm. Calyx densely shortly ascending hairy mixed with glandular hairs; tube 1.2–1.4 mm; lobes narrowly triangular, 1.7–2.1 mm. Corolla pinkish white; standard elliptic, ca. 8 mm, apex obtuse; wings ca. 7.7 mm, clawed at base; keel incurved, ca. 10 mm, clawed at base. Ovary ca. 2 mm; style incurved, ca. 5 mm, shortly appressed hairy at basal half. Legume obliquely obovoid, 6.5–8 × 3.8–4.5 mm, shortly ascending hairy, apex obtuse. Seeds reddish brown, reniform, 2–2.2 × 3.3–3.8 mm. Fl. and fr. (Nov–)Dec–Apr.

Sparse or dense forests; 400–1500 m. S Yunnan [N Laos, Myanmar, Thailand, Vietnam].

The Chinese plants as treated here are *Campylotropis cytisoides* f. *parviflora* (Kurz) Iokawa & H. Ohashi (J. Jap. Bot. 77: 212. 2002; *Lespedeza parviflora* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 231. 1874; *C. parviflora* (Kurz) Schindler). *Campylotropis cytisoides* f. *cytisoides* occurs in Indonesia.

8. *Campylotropis decora* (Kurz) Schindler, Repert. Spec. Nov. Regni Veg. 11: 428. 1912.

华美杭子梢 hua mei hang zi shao

Lespedeza decora Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 231. 1874; *Campylotropis sericophylla* (Collett & Hemsley) Schindler; *C. sessilifolia* Schindler; *L. sericophylla* Collett & Hemsley.

Shrubs, 1–1.5 m tall. Young branches densely ascending or spreading hairy. Petiole 0.5–3.5 cm, densely ascending hairy; stipels absent; leaflets obovate to elliptic, terminal one 2–5 × 1–3.5 cm, abaxially densely appressed or ascending hairy, adaxially glabrous or pubescent, base obtuse, apex retuse and mucronulate. Racemes 2–9 cm; rachis and pedicels with ascending or spreading short hairs and dense glandular hairs. Pedicels 4–10 mm. Calyx with appressed or ascending short hairs mixed with glandular hairs; tube 1.5–2.5 mm; lobes narrowly triangular, ca. 4 mm. Corolla blue; standard elliptic, ca. 10 mm, apex obtuse; wings ca. 9 mm, clawed at base; keel incurved, ca. 14 mm, clawed at base. Ovary ca. 2 mm; style incurved, ca. 9.5 mm. Legume obliquely ovoid or obovoid, 6–7 mm, shortly ascending hairy, apex obtuse. Seeds purplish brown, reniform, ca. 2 × 3.5 mm.

S Yunnan [Laos, Myanmar, Thailand].

9. *Campylotropis delavayi* (Franchet) Schindler, Repert. Spec. Nov. Regni Veg. 11: 426. 1912.

西南杭子梢 xi nan hang zi shao

Lespedeza delavayi Franchet, Pl. Delavay. 165. 1890; *L. atrokermesina* Forrest.

Shrubs, 1–3 m tall. Young branches densely appressed whitish sericeous. Petiole 1–3 cm, densely appressed whitish sericeous; stipels absent; leaflets obovate to oblong, terminal one 1.5–7 × 1.3–5.7 cm, leathery, abaxially with dense appressed whitish sericeous hairs, adaxially glabrous, base obtuse or rounded, apex retuse and mucronulate. Racemes ± densely flowered, 2–11 cm, often paniculate; rachis and pedicels with dense spreading whitish short hairs and glandular hairs; bracts narrowly ovate, usually shorter than 3 mm. Pedicels 2–4 mm. Calyx with dense appressed whitish sericeous hairs and sparse glandular hairs; tube 1.6–2.5 mm; lobes narrowly triangular, 4.3–5.5 mm. Corolla dark purple; standard elliptic, 10–13 mm, apex obtuse; wings ca. 12.5 mm, clawed at base; keel ca. 14.5 mm, clawed at base. Ovary 2.2–2.5 mm; style incurved, 10–10.5 mm. Legume obliquely elliptic, 6–7 × 4–5 mm, shortly appressed hairy, apex obtuse. Seeds purplish brown, reniform, ca. 1.7 × 2.7 mm. Fl. Oct–Dec, fr. Nov–Dec.

- Mountain slopes, thickets, sunny grasslands; 400–2200 m. Sichuan, Yunnan.

The roots are used medicinally for reducing fevers.

10. *Campylotropis diversifolia* (Hemsley) Schindler, Repert. Spec. Nov. Regni Veg. 11: 342. 1912.

异叶杭子梢 yi ye hang zi shao

Lespedeza diversifolia Hemsley, Hooker's Icon. Pl. 27: t. 2625. 1899.

Shrubs, 1–2 m tall. Young branches sparsely shortly appressed hairy. Leaves dimorphic; lower leaves petiolate, with obovate leaflets and distinct rachis, petioles 0.5–1.2 cm, sparsely appressed shortly hairy, rachis 4–8 mm; upper leaves sessile, with deltoid leaflets and a minute rachis, rachis 0.5–4 mm; terminal leaflets 2–3.5 × 1.2–2.8 cm on lower leaves, 1.5–3 × 1.8–3 cm on upper leaves, abaxially with sparse appressed short hairs, adaxially glabrous or sparsely shortly hairy, obtuse at base and obtuse and mucronulate at apex on lower leaves, cordate or truncate at base and acuminate at apex on upper leaves; stipels absent. Racemes 2–5 cm, often paniculate. Pedicels 5–9 mm, shortly appressed hairy and also with sparse glandular hairs. Calyx with dense appressed short hairs, rarely also with glandular hairs; tube 2–2.5 mm; lobes narrowly triangular, 2–3 mm. Corolla purple; standard elliptic, 12–14 mm, apex obtuse; wings 12–13 mm, clawed at base; keel incurved, 16–18 mm, clawed at base. Ovary ca. 3 mm; style incurved, ca. 11.5 mm. Legume obliquely elliptic, 9–10 × ca. 5 mm, shortly appressed hairy, apex obtuse. Seeds brown, reniform, ca. 2.5 × 3.6 mm. Fl. Nov–Dec, fr. Jan–May.

• Mountain slopes, thickets, sparse forests, hot arid valleys; 800–1700 m. Yunnan.

11. *Campylotropis fulva* Schindler, Repert. Spec. Nov. Regni Veg. 11: 426. 1912.

暗黄杭子梢 an huang hang zi shao

Lespedeza fulva (Schindler) H. Léveillé.

Shrublets or shrubs. Young branches densely yellowish velutinous. Petiole 0.4–2 cm, densely yellowish velutinous; stipels absent; leaflets narrowly ovate to ovate or narrowly oblong to oblong, terminal one 2.5–5 × 1–2.5 cm, abaxially densely ascending hairy, adaxially with dense very minute spreading hairs (puberulent), base obtuse or rounded, apex obtuse and mucronulate. Racemes 6–12 cm, often panicle composed of several upper racemes with reduced subtending leaves; rachis with spreading short hairs and glandular hairs; bracts narrowly ovate, 2–2.5 mm; bracteoles ca. 1 mm. Pedicels ca. 3 mm, densely shortly ascending hairy mixed with glandular hairs. Calyx with dense appressed short hairs and sparse glandular hairs; tube ca. 1.5 mm; lobes narrowly triangular, ca. 2.5 mm. Corolla purple; standard elliptic, 9–9.5 mm, apex obtuse; wings ca. 8 mm, clawed at base; keel ca. 13.2 mm, clawed at base. Ovary ca. 1.5 mm; style incurved, ca. 9.2 mm. Legume obliquely elliptic, shortly appressed hairy.

• SE Yunnan.

This species is known only from the type specimen collected from Mengzi in SE Yunnan.

12. *Campylotropis grandifolia* Schindler, Repert. Spec. Nov. Regni Veg. 11: 346. 1912.

弥勒杭子梢 mi le hang zi shao

Shrubs, ca. 1.5 m tall. Young branches distinctly quadrangular, sparsely shortly appressed hairy. Petiole abaxially angled, often narrowly winged along both sides, 2–4 cm, with dense appressed short hairs; stipels absent; leaflets ovate to elliptic, terminal one 3–8 × 1.5–4.5 cm, abaxially sparsely appressed or ascending hairy, adaxially glabrous, base obtuse or rounded, apex obtuse or retuse and mucronulate. Racemes ± densely flowered, 3–5 cm, often paniculate; rachis with ± dense appressed short hairs. Pedicels 6–8 mm, with ± dense appressed or ascending short hairs. Calyx with dense appressed short hairs; tube ca. 2 mm; lobes narrowly triangular, 3–4 mm. Corolla purple; standard elliptic, 13–14 mm, apex obtuse; wings ca. 12 mm, clawed at base; keel incurved, 16–17 mm, clawed at base. Ovary ca. 2.5 mm; style incurved, 11–11.5 mm. Legume ovoid, 6–9 × 3–5 mm, appressed shortly hairy, apex obtuse.

• SE Yunnan.

This species is known only from the type specimen collected at Mile in SE Yunnan.

Although winged petioles and distinctly angled young branches are also observed in *Campylotropis trigonoclada* and *C. henryi*, this species is easily recognized by the quadrangular branches and lack of glandular hairs in the inflorescences.

13. *Campylotropis harmsii* Schindler, Repert. Spec. Nov. Regni Veg. 11: 342. 1912.

思茅杭子梢 si mao hang zi shao

Lespedeza harmsii (Schindler) H. Léveillé.

Shrubs, 1–2 m tall. Young branches ± densely ascending hairy. Leaves dimorphic; lower leaves petiolate, with obovate leaflets, petioles 1–2 cm, ± densely shortly ascending hairy; upper leaves sometimes sessile, with orbicular or transversely elliptic leaflets; terminal leaflet 1.5–3.5 × 1.3–3 cm, abaxially appressed hairy, adaxially with sparse appressed minute hairs, base cuneate to broadly cuneate, apex obtuse and mucronulate or acuminate; stipels absent. Racemes 2–3 cm, often paniculate at apex; panicle zigzag, bent at nodes; rachis and pedicels ± densely ascending hairy, rarely also with glandular hairs. Pedicels 10–14 mm. Calyx with dense ascending short hairs, rarely with glandular hairs; tube 2–2.5 mm; lobes narrowly triangular, 2–3 mm. Corolla purple; standard elliptic, 12.5–13 mm, apex obtuse; wings 12–13 mm, clawed at base; keel incurved, 15–16 mm, clawed at base. Ovary ca. 3 mm; style incurved at base, ca. 10 mm. Legume obliquely elliptic, 12–15 × 5–6 mm, shortly ascending hairy, apex acute. Seeds purplish black, reniform, ca. 3 × 6 mm.

Dense forests; 100–1300 m. S Yunnan [Thailand].

14. *Campylotropis henryi* (Schindler) Schindler, Repert. Spec. Nov. Regni Veg. 11: 347. 1912.

元江杭子梢 yuan jiang hang zi shao

Lespedeza henryi Schindler, Repert. Spec. Nov. Regni Veg. 9: 517. 1911; *Campylotropis esquirolii* Schindler.

Shrubs, 1–2 m tall. Young branches often distinctly quadrangular, sparsely shortly appressed hairy. Petiole adaxially

angled, often slightly convex above, bisulcate and narrowly winged along both sides, 1–5 cm, shortly appressed hairy; stipels absent; leaflets oblong to ovate, terminal one 3–10 × 1.5–5 cm, abaxially appressed hairy particularly on veins and margin, adaxially glabrous, base rounded, apex obtuse to rounded and retuse and mucronulate. Racemes 3–15 cm; rachis and pedicels with ± dense appressed to ascending short hairs and sparse glandular hairs. Pedicels 6–8.5 mm. Calyx with densely appressed short hairs and glandular hairs; tube 2–2.5 mm; lobes narrowly triangular, 3–4.5 mm. Corolla purple; standard elliptic, 10–13 mm, apex obtuse; wings 10–12.5 mm, clawed at base; keel incurved, 12.5–15 mm, clawed at base. Ovary 2.5–3 mm, shortly appressed hairy; style incurved, ca. 10 mm. Legume ovoid, 6–9 × 4–5.5 mm, shortly ascending hairy, apex obtuse. Seeds purplish black, reniform, ca. 2 × 4 mm. Fl. and fr. Oct–Dec.

• Mountain slopes, thickets, forests; 600–1600 m. Guizhou, Yunnan.

The wings of this species are sometimes not so prominent, especially on the petioles of small upper leaves. In such a form, this species somewhat resembles *Campylotropis polyantha*, but it is easily distinguished by the lack of stipels and longer calyx lobes (3–4.5 mm in *C. henryi* vs. 1.3–2.5 mm in *C. polyantha*).

Campylotropis henryi was recorded from Thailand (Gagnepain in Lecomte, Fl. Indo-Chine 2: 520. 1920, as *Lespedeza henryi*) and Laos (Thuan et al., Fl. Cambodge, Laos & Vietnam 23: 144. 1987), but these are *C. decora*.

15. *Campylotropis hirtella* (Franchet) Schindler, Repert. Spec. Nov. Regni Veg. 11: 428. 1912.

毛杭子梢 mao hang zi shao

Lespedeza hirtella Franchet, Pl. Delavay. 167. 1890; *L. mairei* Pampanini.

Shrublets, 0.5–1 m tall. Young branches ± densely ferruginous spreading hairy. Aerial stems annual and coming from axillary or adventitious buds at basal perennial parts of stems, usually with several withered shoots from previous year persistent at base of annual shoots. Petiole 0.1–2 cm, very short on upper leaves, densely ascending or appressed hairy; stipels absent; leaflets deltoid to ovate, terminal one 1–6 × 1–4 cm, abaxially ± densely ascending hairy, adaxially sparsely or ± densely ascending hairy, base cordate, truncate, or rounded, apex retuse and mucronulate. Racemes 4–17 cm, usually paniculate; rachis and pedicels with dense spreading short hairs and glandular hairs. Pedicels 1.5–7 mm. Calyx with ± dense ascending short hairs and glandular hairs; tube 2–2.8 mm; lobes narrowly triangular, 2.5–3.2 mm. Corolla purple; standard elliptic, 13–15 mm, apex obtuse; wings ca. 13 mm, clawed at base; keel incurved, 15.5–17 mm, clawed at base. Ovary narrowly ovoid, ca. 2 mm, shortly appressed hairy; style incurved, ca. 13 mm. Legume obliquely obovoid, 4.5–6 × 3–4 mm, shortly ascending hairy, apex obtuse. Seeds purplish brown, reniform, ca. 3.7 × 2 mm. Fl. Jun–Oct, fr. Oct–Nov.

Thickets, forest margins, streamsides, sparse forests, mountain slopes, sunny grasslands; 900–4100 m. Guizhou, Sichuan, Xizang, Yunnan [India].

16. *Campylotropis howellii* Schindler, Trans. Bot. Soc. Edinburgh 26: 285. 1914.

腾冲杭子梢 teng chong hang zi shao

Shrubs or shrublets, ca. 1 m tall. Young branches sparsely appressed or ascending shortly hairy. Petiole 0.3–2.5 cm, densely appressed or ascending hairy; stipels absent; leaflets obovate to oblong, terminal one 1.5–3 × 1–2 cm, abaxially sparsely shortly appressed hairy, adaxially glabrous, base obtuse or rounded, apex retuse and mucronulate. Racemes axillary or terminal, 2.5–11 cm, densely flowered on long peduncle; rachis and pedicels densely shortly ascending hairy. Pedicels 1.5–3 mm. Calyx with ± dense appressed short hairs; tube 2–2.5 mm; lobes narrowly triangular, 2.5–3.5 mm. Corolla purple; standard obovate, 10–10.5 mm, apex obtuse; wings ca. 10.5 mm, clawed at base; keel shallowly incurved, 12.5–13 mm, clawed at base. Ovary narrowly ovoid, ca. 2 mm, shortly appressed hairy; style incurved, ca. 7.2 mm. Legume obliquely obovoid, ca. 5.5 × 3 mm, shortly ascending hairy, apex obtuse. Seeds purplish brown, reniform.

• Sparse forests on mountain slopes; 1900–2300 m. Yunnan.

17. *Campylotropis latifolia* (Dunn) Schindler, Repert. Spec. Nov. Regni Veg. 11: 428. 1912.

阔叶杭子梢 kuo ye hang zi shao

Lespedeza latifolia Dunn, J. Linn. Soc., Bot. 35: 488. 1903.

Shrubs, usually 1–2 m tall. Young branches densely whitish velutinous. Petiole 1.5–5 cm, densely ascending whitish velutinous; stipels absent; leaflets ovate to broadly ovate or broadly elliptic, terminal one 4–10 × 2–6 cm, leathery, abaxially ± densely whitish pubescent, adaxially ± densely puberulent, rarely glabrescent, base rounded, apex retuse and mucronulate. Racemes 6–13 cm; rachis and pedicels ± densely pubescent and with glandular hairs. Pedicels 2.5–5 mm. Calyx with ± dense ascending short hairs and glandular hairs; tube 1.5–1.8 mm; lobes triangular, 1.2–1.5 mm. Corolla purple; standard obovate, ca. 12 mm, apex obtuse; wings ca. 11.5 mm, clawed at base; keel incurved, 14.5–15.5 mm, clawed at base. Ovary narrowly ovoid, ca. 2.5 mm, shortly ascending hairy; style incurved, ca. 11.5 mm. Legume obliquely oblong, 8–11 × ca. 3.5 mm, shortly spreading hairy, apex acute.

• Mountain slopes, sunny places; 1200–1400 m. Yunnan.

18. *Campylotropis luhitensis* H. Ohashi, J. Jap. Bot. 51: 345. 1976.

藏东杭子梢 zang dong hang zi shao

Shrubs. Young branches densely whitish hairy. Petiole 0.5–1.5 cm, densely pubescent; stipels absent; leaflets elliptic, terminal one 1–3.5 × 0.6–1.8 cm, abaxially densely whitish appressed pubescent, adaxially glabrous, base obtuse, apex retuse and mucronulate. Racemes usually paniculate, each raceme 2–4 cm; rachis densely spreading pubescent mixed with glandular hairs. Pedicels 5–8 mm, densely spreading pubescent mixed with glandular hairs. Calyx ± densely shortly ascending hairy; tube 1.5–2 mm; lobes narrowly triangular, 2–2.4 mm. Corolla purple; standard elliptic, 8–9.5 mm, apex obtuse; wings 7.8–9.5

mm, clawed at base; keel incurved, ca. 11 mm, clawed at base. Ovary narrowly ovoid, ca. 2.5 mm, shortly appressed hairy; style incurved, 6.5–7.5 mm. Legume obliquely ovoid, 11–14 × ca. 4 mm, densely shortly hairy. Seeds reniform, ca. 4 × 2.5 mm.

E Xizang [Myanmar].

19. *Campylotropis macrocarpa* (Bunge) Rehder in Sargent, Pl. Wilson. 2: 113. 1914.

杭子梢 hang zi shao

Shrubs, usually 1–2 m tall. Young branches appressed or ascending hairy. Petiole 1–5 cm, appressed or ascending pubescent; stipels absent, rarely rudimentarily present and linear on base of petiolule of lateral leaflet; leaflets oblong or ovate, rarely obovate, terminal one 1.2–6.5 × 0.7–3.7 cm, abaxially sparsely to densely ascending pubescent, adaxially glabrous or sparsely pubescent, base obtuse or rounded, apex retuse and mucronulate. Racemes 2.5–15 cm, sometimes paniculate; rachis and pedicels appressed or ascending pubescent mixed with glandular hairs. Pedicels 2–11 mm. Calyx ± densely appressed or ascending shortly hairy mixed with glandular hairs; tube 1.2–2 mm; lobes triangular, 0.8–3 mm. Corolla purple to pinkish white; standard elliptic, 11–12 mm, apex obtuse; wings 10–12 mm, clawed at base; keel incurved, 11.5–14.5 mm, clawed at base. Ovary 2.5–3 mm; style incurved, 8.5–9 mm. Legume obliquely obovoid to oblong, 9–15 × 3.5–6 mm, lateral surface glabrous or pubescent, apex acute. Seeds reddish brown, reniform, 2.7–5 × 1.5–3 mm.

Mountain slopes, valleys, thickets, forest margins, streamsides, forests, open places; 100–2000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, ?Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Korea].

- 1a. Lateral surface of legumes glabrous;
calyx lobes shorter than tube,
0.8–1.2 mm 19a. var. *macrocarpa*
- 1b. Lateral surface of legumes pubescent;
calyx lobes almost as long as tube,
2.2–3 mm 19b. var. *hupehensis*

19a. *Campylotropis macrocarpa* var. *macrocarpa*

杭子梢(原变种) hang zi shao (yuan bian zhong)

Lespedeza macrocarpa Bunge, Enum. Pl. China Bor. 18. 1833; *Campylotropis chinensis* Bunge, nom. illeg. superfl.; *C. gracilis* Ricker; *C. hersii* Ricker; *C. huberi* Ricker; *C. macrocarpa* subsp. *hengduanshanensis* C. J. Chen; *C. macrocarpa* f. *lanceolata* P. Y. Fu; *C. mortolana* Ricker; *C. smithii* Ricker; *L. ciliata* Benth; *L. distincta* L. H. Bailey; *L. ichangensis* Schindler; *L. rosthornii* Schindler.

Calyx lobes shorter than tube, 0.8–1.2 mm. Lateral surface of legumes glabrous. Fl. and fr. (May–)Jun–Oct.

Mountain slopes, thickets, valleys, forest margins, streamsides, forests; 100–1900 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Korea].

This variety includes two forms: *Campylotropis macrocarpa* f.

macrocarpa, with purple to pinkish white flowers, and *C. macrocarpa* f. *alba* (S. Y. Wang) Iokawa & H. Ohashi, with pure white flowers.

19b. *Campylotropis macrocarpa* var. *hupehensis* (Pampanini) Iokawa & H. Ohashi, J. Jap. Bot. 77: 272. 2002.

太白山杭子梢 tai bai shan hang zi shao

Lespedeza macrocarpa var. *hupehensis* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 399. 1910; *Campylotropis bodinieri* Schindler; *C. giraldii* (Schindler) Schindler; *C. glauca* (Schindler) Schindler; *C. longepedunculata* Ricker; *C. macrocarpa* f. *giraldii* (Schindler) P. Y. Fu; *C. macrocarpa* var. *giraldii* (Schindler) K. T. Fu ex P. Y. Fu; *C. macrocarpa* f. *hupehensis* (Pampanini) P. Y. Fu; *C. macrocarpa* f. *longepedunculata* (Ricker) P. Y. Fu; *C. macrocarpa* f. *microphylla* K. T. Fu ex P. Y. Fu; *L. bodinieri* (Schindler) H. Léveillé; *L. giraldii* Schindler; *L. glauca* Schindler; *L. macrocarpa* Franchet (1894), not Bunge (1833); *L. pseudomacrocarpa* Hayata.

Calyx lobes almost as long as tube, 2.2–3 mm. Lateral surface of legumes pubescent. Fl. and fr. Jun–Oct(–Nov).

• Mountain slopes, thickets, open places, forest margins, forests, valleys; 200–2000 m. Gansu, Guangdong, Guizhou, Hebei, Henan, Hubei, Shaanxi, Shanxi, Sichuan, Taiwan.

20. *Campylotropis pauciflora* C. J. Chen, Acta Bot. Yunnan. 10: 433. 1988.

少花杭子梢 shao hua hang zi shao

Shrubs, ca. 1 m tall. Young branches ± densely shortly appressed hairy. Petiole 0.8–1.6 cm, ascending or spreading pubescent; stipels absent; leaflets obovate, terminal one 1.3–2.4 × 0.9–1.5 cm, abaxially sparsely shortly appressed hairy, adaxially glabrous, base obtuse, apex retuse and mucronulate. Racemes few flowered, 0.6–1.4 cm; rachis and pedicels sparsely shortly appressed hairy. Pedicels 20–22 mm, capillaceous. Calyx ± densely shortly appressed hairy; tube 2–2.3 mm; lobes narrowly triangular, 2–2.3 mm. Corolla blue; standard elliptic, 11–12.5 mm, apex obtuse; wings 11–12.5 mm, clawed at base; keel incurved, 15–17 mm, clawed at base. Vexillary stamen connate to tube at base for ca. 1/6 of its length. Ovary narrowly ovoid, ca. 3 mm, shortly appressed hairy; style incurved, ca. 10 mm. Legume obliquely obovoid, shortly appressed hairy, apex acute. Fl. and fr. Aug–Oct.

• Mixed forests; ca. 2300 m. W Yunnan.

21. *Campylotropis pinetorum* (Kurz) Schindler, Repert. Spec. Nov. Regni Veg. 11: 429. 1912.

松林杭子梢 song lin hang zi shao

Lespedeza pinetorum Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 230. 1874.

Shrubs, 1–2 m tall. Branches tawny velutinous. Petiole 1–5 cm, densely velutinous; stipels absent; leaflets ovate or elliptic, terminal one 2–13 × 1–6 cm, adaxially tawny velutinous, base obtuse or rounded, apex acute. Racemes 2–10 cm, densely flowered; rachis tawny velutinous mixed with dense glandular hairs; bracts linear, usually more than 3.5 mm. Pedicels 1.5–4 mm, densely pubescent mixed with glandular hairs. Calyx ± densely shortly ascending hairy mixed with glandular hairs;

tube 1.7–2.5 mm; lobes narrowly triangular, 3–4.5 mm, upper lobe distinctly 2-toothed. Corolla pinkish white; standard elliptic, 9–10.5 mm, apex obtuse; wings 7.5–9 mm, clawed at base; keel shallowly inflexed, 10.5–12 mm, clawed at base. Ovary narrowly ovoid, ca. 2.3 mm, shortly hairy; style incurved, ca. 7.7 mm. Legume obliquely elliptic to narrowly obovoid, 6–6.5 × 3–4 mm, shortly ascending hairy sometimes mixed with glandular hairs, apex acute. Seeds purplish brown, obliquely oblong, 3.2–4 × 1.5–2 mm.

Mountain slopes, thickets, forest margins, sparse forests, open grassy slopes, streamsides; 700–2800 m. Guangxi, Guizhou, Yunnan [Laos, Myanmar, Thailand, Vietnam].

Campylotropis pinetorum subsp. *pinetorum* occurs in Laos, Myanmar, Thailand, and Vietnam. Two other subspecies occur in China.

- 1a. Branches, inflorescence rachises, calyces, and both surfaces of leaflets densely white pubescent; leaflets ovate to elliptic, acute at apex 21a. subsp. *albopubescens*
- 1b. Branches, inflorescence rachises, calyces, and abaxial surface of leaflets tawny velutinous; leaflets oblong to narrowly ovate, rounded or obtuse at apex 21b. subsp. *velutina*

21a. *Campylotropis pinetorum* subsp. *albopubescens* (Iokawa & H. Ohashi) Iokawa & H. Ohashi, J. Jap. Bot. 77: 282. 2002.

白柔毛杭子梢 bai rou mao hang zi shao

Campylotropis pinetorum var. *albopubescens* Iokawa & H. Ohashi, J. Jap. Bot. 72: 141. 1997.

Branches, inflorescence rachises, calyces, and both surfaces of leaflets densely white pubescent. Leaflets ovate to elliptic, apex acute.

- Yunnan.

21b. *Campylotropis pinetorum* subsp. *velutina* (Dunn) H. Ohashi, J. Jap. Bot. 49: 43. 1974.

绒毛叶杭子梢 rong mao ye hang zi shao

Lespedeza velutina Dunn, Hooker's Icon. Pl. 27: t. 2700. 1901; *Campylotropis velutina* (Dunn) Schindler; *Millettia cavaleriei* H. Léveillé.

Branches, inflorescence rachises, calyces, and abaxial surface of leaflets tawny velutinous. Leaflets oblong to narrowly ovate, apex rounded or obtuse. Fl. and fr. Dec–Apr.

- Mountain slopes, thickets, forest margins, sparse forests, open grassy slopes, streamsides; 700–2800 m. Guangxi, Guizhou, Yunnan.

The root is used medicinally as an astringent and pain reliever.

22. *Campylotropis polyantha* (Franchet) Schindler, Repert. Spec. Nov. Regni Veg. 11: 340. 1912.

小雀花 xiao que hua

Shrubs, 1–2 m tall. Young branches appressed or ascending hairy. Petiole 0.5–4 cm, appressed or ascending pubes-

cent; stipels present at top of petioles, linear, 1–2 mm, sometimes also present at top of rachis; leaflets oblong, obovate, or ovate to narrowly ovate, terminal one 1–4 × 0.5–2.5 cm, abaxially ± densely appressed or ascending pubescent, adaxially glabrous or sparsely pubescent, base obtuse or rounded, apex retuse and mucronulate. Racemes 2–13 cm; rachis and pedicels appressed or ascending pubescent mixed with glandular hairs. Pedicels 3–9 mm. Calyx ± densely shortly ascending hairy mixed with glandular hairs; tube 1.5–2.5 mm; lobes narrowly triangular, 1.3–2.5 mm. Corolla purple to pinkish white; standard elliptic, 10–14 mm, obtuse at apex; wings 10–13 mm, clawed at base; keel incurved, 11.3–16.2 mm, clawed at base. Ovary 2.5–4 mm; style incurved, 7.5–9 mm. Legume obliquely ovoid to elliptic or obovoid, 6–11 × 3–5 mm, apex acute. Seeds pale brown, reniform, 2.5–3.6 × 1.6–2 mm.

- Mountain slopes, sunny thickets, rocky mountains, roadsides, grasslands, streamsides, waste grasslands, valleys, forest margins, forests; 400–3200 m. Guizhou, Sichuan, E Xizang, Yunnan.

- 1a. Bracts 1–3.5 mm, caducous before flowering; pedicels 3–8 mm 22a. var. *polyantha*
- 1b. Bracts 3–5 mm, persistent until fruiting; pedicels 7–9 mm 22b. var. *neglecta*

22a. *Campylotropis polyantha* var. *polyantha*

小雀花(原变种) xiao que hua (yuan bian zhong)

Lespedeza eriocarpa Candolle var. *polyantha* Franchet, Pl. Delavay. 168. 1890; *Campylotropis muehleana* (Schindler) Schindler; *C. polyantha* f. *macrophylla* P. Y. Fu; *C. polyantha* f. *souliei* (Schindler) P. Y. Fu; *C. polyantha* var. *tomentosa* P. Y. Fu; *C. reticulata* S. S. Chien; *C. reticulineris* C. Y. Wu; *C. souliei* Schindler; *C. tomentosipetiolata* P. Y. Fu; *C. wangii* Ricker; *L. blinii* H. Léveillé; *L. dichromoxylon* H. Léveillé; *L. eriocarpa* var. *chinensis* Pampanini; *L. eriocarpa* subvar. *polyantha* (Franchet) Pampanini; *L. muehleana* Schindler; *L. polyantha* (Franchet) Schindler.

Bracts 1–3.5 mm, caducous before flowering. Pedicels 3–8 mm. Fl. and fr. Mar–Nov(–Dec).

- Mountain slopes, sunny thickets, rocky mountains, roadsides, grasslands, streamsides; 400–3200 m. Guizhou, Sichuan, E Xizang, Yunnan.

The root is used medicinally for reducing fever, promoting diuresis, expelling phlegm, and relieving pain.

This variety includes two forms: one with pubescent legumes, *Campylotropis polyantha* f. *polyantha*, and the other with glabrous lateral surfaces of legumes, *C. polyantha* f. *leiocarpa* (Pampanini) Iokawa & H. Ohashi (J. Jap. Bot. 77: 319. 2002; *Lespedeza eriocarpa* f. *leiocarpa* Pampanini, Nuovo Giorn. Bot. Ital. 17: 22. 1910; *C. polyantha* var. *leiocarpa* (Pampanini) E. Peter).

22b. *Campylotropis polyantha* var. *neglecta* (Schindler) Iokawa & H. Ohashi, J. Jap. Bot. 77: 319. 2002.

蒙自杭子梢 meng zi hang zi shao

Campylotropis neglecta Schindler, Repert. Spec. Nov. Regni Veg. 11: 340. 1912; *Lespedeza neglecta* (Schindler) H. Léveillé.

Bracts 3–5 mm, persistent until fruiting. Pedicels 7–9 mm. Lateral surface of legumes pubescent.

• Yunnan.

23. *Campylotropis sargentiana* Schindler, Repert. Spec. Nov. Regni Veg. 11: 341. 1912.

四川杭子梢 si chuan hang zi shao

Lespedeza sargentiana (Schindler) H. Léveillé.

Shrubs, 1–2 m tall. Young branches appressed hairy. Petiole 0.7–2.4 cm, with dense appressed short hairs; stipels sometimes present, linear, 0.5–1 mm; leaflets oblong to elliptic, terminal one 1.2–3 × 0.6–1.5 cm, abaxially sericeous, adaxially glabrous or sparsely pubescent, base obtuse or rounded, apex retuse and mucronulate. Racemes 2–11 cm, sometimes paniculate; rachis densely appressed or ascending shortly hairy. Pedicels 4–6 mm, densely appressed or ascending shortly hairy. Calyx densely shortly appressed hairy; tube 1.8–2 mm; lobes narrowly triangular, 2–2.2 mm. Corolla purple; standard obovate, 10–11 mm, apex obtuse; wings 9.5–10.5 mm, clawed at base; keel shallowly inflexed, 12–16 mm, clawed at base. Ovary narrowly ovoid, ca. 2.5 mm, shortly hairy; style ca. 7.5 mm. Legume obliquely elliptic, ca. 7 mm, shortly ascending hairy, acute at apex. Seeds reniform, ca. 2.7 × 2 mm.

• Sichuan.

24. *Campylotropis speciosa* (Royle ex Schindler) Schindler subsp. ***eriocarpa*** (Schindler) Iokawa & H. Ohashi, J. Jap. Bot. 77: 325. 2002.

绵毛果杭子梢 mian mao guo hang zi shao

Campylotropis eriocarpa Schindler, Repert. Spec. Nov. Regni Veg. 11: 347. 1912.

Shrubs, usually ca. 1 m tall. Young branches ± densely shortly appressed hairy. Petiole 0.5–4.5 cm, with ± dense appressed short hairs; stipels absent; leaflets obovate to oblong, terminal one 1.2–4.8 × 0.8–2.8 cm, abaxially densely sericeous, adaxially glabrous or sparsely shortly hairy, base obtuse or cuneate, apex retuse and mucronulate. Racemes 2.5–20 cm; rachis and pedicels densely appressed or ascending shortly hairy. Pedicels slender, 3–7 mm. Calyx ± densely appressed shortly hairy; tube 1.5–2.5 mm; lobes narrowly triangular, 2–3.5 mm. Corolla purple; standard obovate, 10.5–12 mm, apex obtuse; wings 9.8–11.5 mm, clawed at base; keel incurved, 12–15 mm, clawed at base. Ovary narrowly ovoid, ca. 2.5 mm, shortly hairy; style ca. 8.3 mm. Legumes obliquely obovoid, 6.5–7.5 × 3.3–4.5 mm, shortly ascending hairy. Seeds dark brown, reniform, 3–3.5 × 1.5–2 mm.

Xizang [Bhutan, India, Nepal].

Campylotropis speciosa subsp. *speciosa* (*Lespedeza speciosa* Royle ex Schindler) occurs in India and Nepal.

25. *Campylotropis sulcata* Schindler, Bot. Jahrb. Syst. 54: 65. 1916.

槽茎杭子梢 cao jing hang zi shao

Campylotropis purpurascens Ricker; *C. rockii* Schindler.

Shrubs, 1–3 m tall. Young branches multi-angular, often sulcate, with dense appressed tawny hairs. Petiole 0.5–2.5 cm, densely ascending pubescent; stipels absent or rarely present; leaflets elliptic to oblong, terminal one 2.5–9 × 1–3 cm, abaxially densely tawny sericeous, adaxially densely puberulent, base obtuse or rounded, apex retuse and mucronulate. Racemes 4–9 cm, sometimes paniculate; rachis densely ascending pubescent mixed with glandular hairs; bracts narrowly ovate, 3–5 mm; bracteoles ca. 2 mm. Pedicels 2–4 mm, densely ascending pubescent mixed with glandular hairs. Calyx densely ascending pubescent; tube 1.5–2 mm; lobes narrowly triangular, 1.5–1.6 mm. Corolla purple to rose; standard obovate, 9–10 mm, apex obtuse; wings 8.5–9 mm, clawed at base; keel incurved, 11–12 mm, clawed at base. Ovary narrowly ovoid, ca. 1.8 mm, shortly hairy; style 7.5–8 mm. Legume obliquely elliptic, 4.5–7 × 3.5–4 mm, shortly ascending hairy. Fl. and fr. Aug–Oct.

Mountain slopes, thickets, forests; 1200–2100 m. Yunnan [Thailand].

26. *Campylotropis tenuiramea* P. Y. Fu, Bull. Bot. Res., Harbin 7(4): 37. 1987.

细枝杭子梢 xi zhi hang zi shao

Shrubs, usually ca. 2 m tall. Young branches densely shortly appressed hairy. Petiole 0.1–1.8 cm, with dense ascending short hairs; stipels absent; leaflets obovate to elliptic, terminal one 0.8–3 × 0.6–2 cm, abaxially ± densely ascending sericeous, adaxially sparsely pubescent, base obtuse or rounded, apex retuse and mucronulate. Racemes 2–3 cm, several flowered at top of peduncles; rachis densely shortly appressed hairy. Pedicels 5–8 mm, densely shortly appressed hairy. Calyx densely shortly appressed hairy; tube ca. 1.5 mm; lobes narrowly triangular, 2–3 mm. Corolla purple; standard elliptic, 11.5–12 mm, apex obtuse; wings ca. 10.5 mm, clawed at base; keel incurved, 13.5–15 mm, clawed at base. Vexillary stamen connate to tube at base for ca. 1/3 of its length. Ovary narrowly ovoid, ca. 2.6 mm, shortly hairy; style ca. 9.6 mm.

• Dry slopes; ca. 1800 m. Yunnan.

27. *Campylotropis teretiracemosa* P. C. Li & C. J. Chen in C. J. Chen, Acta Bot. Yunnan. 10: 434. 1988.

柱序杭子梢 zhu xu hang zi shao

Shrubs. Young branches densely appressed or ascending yellowish pubescent. Petiole 0.2–0.8 cm, with dense appressed yellowish hairs; stipels absent; leaflets oblong to elliptic, terminal one 1.3–4.5 × 0.7–1.5 cm, abaxially densely yellowish ascending pubescent, adaxially glabrous, base obtuse, apex retuse and mucronulate. Racemes 5–10 cm, spikelike with many very small flowers on a distinct peduncle; rachis densely yellowish ascending pubescent. Pedicels very short, ca. 1 mm, densely yellowish ascending pubescent. Calyx densely yellowish pubescent; tube ca. 1.5 mm; lobes triangular, 1.3–1.7 mm. Corolla purple; standard elliptic, ca. 7 mm, apex obtuse; wings ca. 6 mm, clawed at base; keel incurved, 9–9.5 mm, clawed at base. Ovary ca. 1 mm; style incurved, ca. 6 mm. Legume obliquely obovoid, 6.5–7.5 × 3.3–4.5 mm, shortly ascending hairy. Seeds brown, oblong to ovoid, 2.2–2.5 × 1.2–1.5 mm.

- Mountain slopes; 2400–2500 m. Sichuan.

28. *Campylotropis thomsonii* (Bentham ex Baker) Schindler, Repert. Spec. Nov. Regni Veg. 11: 427. 1912.

汤姆逊杭子梢 tang mu xun hang zi shao

Lespedeza thomsonii Bentham ex Baker in J. D. Hooker, Fl. Brit. India 2: 144. 1876 [“*thomsonii*”]; *Campylotropis kingdonii* H. Ohashi; *C. rogersii* Schindler.

Shrubs. Young branches ± densely shortly appressed silky hairy. Petiole 1–3.5 cm, with dense appressed or ascending silky hairs; stipels absent; leaflets oblong to elliptic, terminal one 3–7 × 1.2–2.5 cm, abaxially densely appressed silky hairy, adaxially glabrous or ± densely pubescent, base rounded or obtuse, apex retuse and mucronulate. Racemes 5–10 cm, sometimes paniculate; rachis and pedicels with dense ascending silky hairs. Pedicels 3–10 mm. Calyx with dense appressed or ascending silky hairs; tube 1.5–2 mm; lobes narrowly triangular, 1.5–2.2 mm. Corolla purple; standard elliptic, 6.5–8.5 mm, apex obtuse; wings 6–8 mm, clawed at base; keel incurved, 9.5–11 mm, clawed at base. Ovary narrowly ovoid, ca. 2 mm, shortly hairy; style incurved, ca. 6.5 mm. Legume obliquely obovoid, 7–8 × 3.5–4 mm, shortly appressed hairy, apex rounded. Seeds blackish purple, oblong, ca. 2.5 × 1.5 mm.

Yunnan [India, Myanmar, Vietnam].

29. *Campylotropis trigonoclada* (Franchet) Schindler, Repert. Spec. Nov. Regni Veg. 11: 430. 1912.

三棱枝杭子梢 san leng zhi hang zi shao

Shrubs, usually 1–3 m tall. Young branches triquetrous, with sparse appressed short hairs or glabrous; older parts terete, glabrescent. Petiole bisulcate or convex above, often winged along both sides, ridged beneath, 0.5–6 cm, sparsely shortly appressed hairy or glabrous; stipels rarely present, linear, 1–2 mm; leaflets obovate, oblong, or ovate to narrowly ovate or elliptic, rarely linear, terminal one 1.2–5 × 0.8–3 cm, abaxially sparsely shortly appressed hairy or glabrescent, adaxially glabrous, base obtuse or cuneate, apex retuse and mucronulate. Racemes 3–26 cm, sometimes paniculate; rachis and pedicels with sparse appressed or ascending short hairs or glabrescent. Pedicels 3–10 mm. Calyx with ± dense appressed short hairs; tube 2–2.5 mm; lobes narrowly triangular, lower lobe 3–4.5 mm, longer than others, upper lobe 2–2.5 mm, lateral lobes 2–2.5 mm. Corolla yellow or purple; standard elliptic, 9–11 mm, apex obtuse; wings 9–10.5 mm, clawed at base; keel incurved, 12–15 mm, clawed at base. Ovary narrowly ovoid, 2.2–2.5 mm, shortly hairy; style 8–8.5 mm. Legumes obliquely obovoid, 6–8 × 4–4.5 mm, shortly ascending hairy, apex rounded. Seeds purplish brown, oblong, 3–3.7 × ca. 2 mm. Fl. Jul–Nov, fr. Oct–Dec.

- Mountain slopes, thickets, forest margins, forests, grasslands, roadsides; 1000–3000 m. Guangxi, Guizhou, Sichuan, Yunnan.

The whole plant is used medicinally for reducing fever and relieving coughs. The roots are used for treating mastitis and strokes.

1a. Flowers yellow; plants glabrescent
..... 29a. var. *trigonoclada*

1b. Flowers purple; young branches, abaxial surface of leaflets, and inflorescence rachis pubescent 29b. var. *bonatiana*

29a. *Campylotropis trigonoclada* var. *trigonoclada*

三棱枝杭子梢(原变种) san leng zhi hang zi shao (yuan bian zhong)

Lespedeza trigonoclada Franchet, Pl. Delavay. 167. 1890; *Campylotropis alata* Schindler; *C. balfouriana* (Diels ex Schindler) Schindler; *L. alata* (Schindler) H. Léveillé; *L. angulicaulis* Harms ex Schindler; *L. balfouriana* Diels ex Schindler; *L. trigonoclada* var. *angustifolia* Pampanini; *L. trigonoclada* f. *intermedia* Pampanini.

Plants glabrescent. Flowers yellow.

- Guangxi, Guizhou, Sichuan, Yunnan.

29b. *Campylotropis trigonoclada* var. *bonatiana* (Pampanini) Iokawa & H. Ohashi, J. Jap. Bot. 77: 339. 2002.

马尿藤 ma niao teng

Lespedeza bonatiana Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 19. 1910; *Campylotropis bonatiana* (Pampanini) Schindler; *C. franchetiana* Lingelsheim & Borza.

Young branches, abaxial surface of leaflets, and inflorescence rachis pubescent. Flowers purple. Fl. and fr. Aug–Dec.

- Mountain slopes, thickets, forest margins, forests, grasslands, roadsides; 1200–3000 m. Yunnan.

The whole plant is used medicinally for treating strokes, influenza, nephritis, and skin diseases.

30. *Campylotropis wenshanica* P. Y. Fu, Bull. Bot. Res., Harbin 7(4): 35. 1987 [“*wenshaaica*”].

秋杭子梢 qiu hang zi shao

Shrubs, ca. 2 m tall. Young branches sparsely shortly appressed hairy. Petiole 2–7 cm, sparsely shortly appressed hairy; stipels absent; leaflets broadly obovate to elliptic, terminal one 2–5 × 1.7–4 cm, abaxially sparsely shortly appressed hairy, adaxially glabrous, base obtuse, apex retuse and mucronulate. Racemes 1.5–9 cm, usually paniculate. Pedicels 3–7 mm, shortly ascending hairy. Calyx with sparse appressed short hairs; tube 2–2.2 mm; lobes narrowly triangular, 2–2.4 mm. Corolla purple; standard elliptic, ca. 10 mm, apex obtuse; wings ca. 9.5 mm, clawed at base; keel incurved, 13–14.5 mm, clawed at base. Ovary ca. 2.5 mm; style incurved, ca. 7 mm. Legume obliquely narrowly obovoid, 9–11 × 3.5–4 mm, glabrous, apex rounded.

- Yunnan.

31. *Campylotropis wilsonii* Schindler, Repert. Spec. Nov. Regni Veg. 11: 343. 1912.

小叶杭子梢 xiao ye hang zi shao

Campylotropis yajiangensis P. Y. Fu.

Shrublets, 0.3–1 m tall. Young branches sparsely shortly appressed hairy. Petiole 0.1–1.4 cm, with sparse appressed short

hairs; stipels absent; leaflets obdeltoide to obcordate or obovate, terminal one 0.4–0.9 × 0.3–0.8 cm, abaxially sparsely or ± densely shortly appressed hairy, adaxially glabrous or sparsely pubescent, base obtuse or cuneate, apex retuse and mucronulate. Racemes axillary or terminal, 1–12 cm; rachis and pedicels with sparse ascending short hairs, rarely mixed with glandular hairs. Pedicels 0.8–3 mm. Calyx ± densely shortly ascending hairy, rarely mixed with glandular hairs; tube 1.5–2 mm; lobes narrowly triangular, 1.6–2 mm. Corolla purple; standard elliptic, 11–12 mm, apex obtuse; wings 10–11 mm, clawed at base; keel incurved, 11–13 mm, clawed at base. Ovary ca. 3.5 mm, puberulent; style incurved, ca. 6.6 mm. Legume obliquely narrowly ovoid, 8–12 × 3.5–5 mm, with ascending short hairs, apex obtuse. Seeds obliquely oblong. Fl. and fr. Jun–Aug.

- Mountain slopes, rocky places; 1500–2200 m. Sichuan.

32. *Campylotropis yunnanensis* (Franchet) Schindler, Repert. Spec. Nov. Regni Veg. 11: 338. 1912.

滇杭子梢 dian hang zi shao

Shrubs, 1–2 m tall. Young branches sparsely shortly appressed hairy. Petiole 1.6–5.1 cm, glabrous or sparsely shortly appressed hairy; stipels present at top of petioles, linear, 1–3 mm, sometimes also present at top of rachis; leaflets narrowly ovate to ovate or narrowly oblong to oblong, terminal one 1.8–9 × 0.3–3 cm, abaxially glabrous or sparsely shortly appressed hairy, adaxially glabrous, base obtuse or rounded, apex retuse and mucronulate. Racemes 1.5–15 cm, sometimes paniculate at apex; rachis hairy. Pedicels 2.5–14 mm, hairy. Calyx ± densely appressed or ascending shortly hairy; tube 1.5–2.7 mm; lobes narrowly triangular, 1.2–2 mm. Corolla purple; standard elliptic, 9.5–10.5 mm, apex obtuse; wings 8.5–10.5 mm, clawed at base; keel incurved, 12.5–15.5 mm, clawed at base. Ovary 2.5–3 mm; style incurved, 7.5–9 mm. Legume obliquely oblong, 8–

12 × 4–5 mm, lateral surface glabrous, apex obtuse. Seeds reddish brown, obliquely oblong, 3.5–4.5 × 2–2.7 mm.

- Mountain slopes, valleys, thickets, forest margins; 1400–2800 m. Sichuan, Yunnan.

- 1a. Inflorescence rachis and pedicels ascending or spreading shortly hairy; pedicels 2.5–5(–7) mm 32a. subsp. *yunnanensis*
- 1b. Inflorescence rachis and pedicels sparsely shortly appressed hairy; pedicels 5–14 mm 32b. subsp. *filipes*

32a. *Campylotropis yunnanensis* subsp. *yunnanensis*

滇杭子梢(原亚种) dian hang zi shao (yuan ya zhong)

Lespedeza yunnanensis Franchet, Pl. Delavay. 166. 1890; *Campylotropis yunnanensis* var. *zhongdianensis* P. Y. Fu.

Inflorescence rachis and pedicels ascending or spreading shortly hairy. Pedicels 2.5–5(–7) mm. Fl. and fr. Jul–Dec.

- Mountain slopes, valleys, thickets, forest margins; 1400–2800 m. Yunnan.

32b. *Campylotropis yunnanensis* subsp. *filipes* (Ricker) Iokawa & H. Ohashi, J. Jap. Bot. 77: 345. 2002.

丝梗杭子梢 si geng hang zi shao

Campylotropis filipes Ricker, J. Wash. Acad. Sci. 36: 37. 1946; *C. yunnanensis* var. *filipes* (Ricker) P. Y. Fu.

Inflorescence rachis and pedicels sparsely shortly appressed hairy. Pedicels 5–14 mm.

- Mountain slopes, forest margins, thickets; 1900–2800 m. Sichuan.

132. **LESPEDEZA** Michaux, Fl. Bor.-Amer. 2: 70. 1803.

胡枝子属 hu zhi zi shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi, Tomoyuki Nemoto

Subshrubs, shrubs, or perennial herbs. Leaves pinnately compound, 3-foliolate; stipule small, subulate or linear, persistent or caducous; stipels absent; leaflets entire. Racemes axillary or flowers fasciculate; bracts persistent, 2-flowered at each bract; bracteoles 2, often persistent; flowers often dimorphic, corollate or not (cleistogamous plants). Calyx campanulate; tube short; lobes 5, upper 2 often connate at base. Corolla exserted; standard oblong or obovate; wings oblong, straight, clawed, auriculate, connivent with keel; keel obtuse and incurved. Stamens 10, diadelphous (9+1), equal. Ovary superior, 1-ovuled; style incurved; stigma terminal. Legume ovoid, obovoid, or ellipsoidal, rarely slightly globose, lenticular, indehiscent, reticulate veined, 1-seeded.

About 60 species: E Asia to India and North America, introduced from Malesia to NE Australia; 25 species (ten endemic) in China.

Because most species can tolerate arid soils, they are good for soil conservation and sand stabilization. They are also used as honey plants and for nitrogen fixation. The young shoots and leaves are used as forage for livestock and as green manure.

- 1a. Flowers all chasmogamous, usually longer than 10 mm, in compound racemes; standard usually pink to rose-purple, rarely yellowish or white; loments shortly stipitate; shrubs to subshrubs (*L.* subg. *Macrolespedeza* (Maximowicz) H. Ohashi).
- 2a. Inflorescences almost sessile, not longer than subtending leaves; lateral and lowermost calyx lobes acuminate to caudate.
 - 3a. Leaflets broadly ovate, ovate-elliptic, or obovate; bracteoles nearly 1/2 as long as calyx tube; wings longer than keels; legumes globose, less than 7 mm 1. *L. cyrtobotrya*
 - 3b. Leaflets ovate-oblong to oblong; bracteoles ca. as long as calyx tube; wings equal to keels; legumes oblong-ellipsoidal, 13–15 mm 2. *L. fordii*

- 2b. Peduncles distinct, inflorescences longer than subtending leaves; lateral and lowermost calyx lobes obtuse or acute to acuminate.
- 4a. Winter buds depressed, scales distichously arranged; leaflets sharply acute, rarely obtuse; branches woody.
- 5a. Corolla pale yellow; calyx lobes acute and not spine-tipped at apex 3. *L. buergeri*
- 5b. Corolla red-purple; calyx lobes acuminate to caudate and spine-tipped at apex.
- 6a. Leaflets acute and sharply pointed at apex; standard longer than keel 5. *L. maximowiczii*
- 6b. Leaflets obtuse to rounded or retuse at apex; standard shorter than keel 7. *L. dunnii*
- 4b. Winter buds thickened, scales spirally arranged; leaflets rounded, obtuse, or acute; branches herbaceous to herbaceous-woody.
- 7a. Lateral calyx lobes ovate or triangular to narrowly ovate, apically acute to shortly acuminate, rarely obtuse, less than 2.5 mm; keel claw nearly as long as keel lamina; legumes orbicular 8. *L. bicolor*
- 7b. Lateral calyx lobes narrowly ovate to narrowly triangular, apically acuminate, longer than 4 mm; keel claw nearly 1/2 as long as keel lamina; legumes ovoid, obovoid, or obovoid-oblong.
- 8a. Stems distinctly angled, densely spreading tomentose; leaflets thickly papery, broadly ovate-elliptic; calyx lobes long acuminate; legumes ovoid 6. *L. davidii*
- 8b. Stems terete or striate, appressed sericeous; leaflets papery, usually ovate-elliptic; calyx lobes acute to acuminate; legumes obovoid or obovoid-oblong 4. *L. thunbergii*
- 1b. Flowers chasmogamous and cleistogamous (except *L. forrestii*), usually less than 10 mm (except *L. gerardiana*), in \pm elongated racemes of chasmogamous flowers with basal fascicles of cleistogamous flowers, or composed only of fasciculate racemes of cleistogamous flowers; standard white to yellowish or purplish; loments sessile or subsessile; herbs to subshrubs (*L. subg. Lespedeza*).
- 9a. Stems procumbent to weakly ascending, spreading pilose, rarely appressed sericeous.
- 10a. Leaflets narrowly obovate; stem short, usually less than 20 cm; corolla pink to purplish red; cleistogamous flowers and legumes unknown 11. *L. forrestii*
- 10b. Leaflets broadly obovate or broadly elliptic to orbicular; stem elongated, more than 20 cm; both chasmogamous and cleistogamous flowers and legumes known.
- 11a. Corolla reddish purple; plants spreading pilose, rarely appressed sericeous 10. *L. fasciculiflora*
- 11b. Corolla yellow-white or white; plants densely spreading pilose.
- 12a. Leaflets broadly obovate or broadly elliptic to orbicular, both surfaces densely spreading pilose 9. *L. pilosa*
- 12b. Leaflets narrowly oblong, rarely elliptic to broadly elliptic, abaxially grayish white hispid, adaxially glabrous 17. *L. potaninii*
- 9b. Stems erect or strongly ascending, mostly appressed sericeous.
- 13a. Stems tomentose.
- 14a. Stems densely tomentose throughout; leaflets elliptic or ovate-oblong, 3–6 \times 1.5–3 cm, abaxially densely tomentose 14. *L. tomentosa*
- 14b. Stems tomentose at upper part, downward more sparsely so; leaflets obovate or obcordate, 1–2 \times 1–1.3 cm, abaxially densely hirsute 16. *L. mucronata*
- 13b. Stems appressed sericeous.
- 15a. Leaflets narrowly elliptic or narrowly obovate (length:width ratio 3:1–6:1) to linear (length:width ratio 12:1), without visible reticulate venation between principle lateral veins; inflorescence sessile or peduncle 2 mm or less (except *L. caraganae*).
- 16a. Leaflets narrowly obovate (length:width ratio 6:1) above middle; flowers more than 10 mm; calyx with lobes 5–6 mm; bracteoles distinct, 4–5 mm 23. *L. gerardiana*
- 16b. Leaflets \pm narrowly elliptic (length:width ratio 3:1) to linear (length:width ratio 12:1); flowers less than 10 mm; calyx with lobes less than 3 mm; bracteoles minute, less than 3 mm.
- 17a. Leaflets oblong-linear (length:width ratio 6:1); principle lateral veins reaching margin and then running upward along margin; lateral calyx lobes sharply narrowly triangular (more than 3 \times as long as tube); peduncle 2 mm or more 19. *L. caraganae*
- 17b. Leaflets narrowly elliptic to narrowly obovate (length:width ratio 3:1–6:1); principle lateral veins not reaching margin but running upward within margin; lateral calyx lobes narrowly triangular or slightly narrowly ovate (less than 3 \times as long as tube); inflorescence sessile or peduncle less than 2 mm.
- 18a. Flowers reddish purple; corolla almost or more than 2 \times as long as calyx; lateral calyx lobes narrowly ovate; abaxial surface of leaflets densely sericeous with rather thick hairs 24. *L. lichiyuniae*
- 18b. Flowers white; corolla 1.3–1.5 \times as long as calyx; lateral calyx lobes narrowly triangular.

- 19a. Abaxial surface of leaflets densely appressed or ascending pubescent; bracteoles 1.5–2.5 mm, longer than calyx tube; calyx densely pubescent, lobes with 3–5 conspicuous veins in flower; corolla 1.3–1.5 × as long as calyx 25. *L. hispida*
- 19b. Abaxial surface of leaflets sparsely appressed pubescent; bracteoles less than 1.5 mm, almost equal to or shorter than calyx tube; calyx sparsely appressed pubescent; corolla more than 1.5 × as long as calyx 20. *L. cuneata*
- 15b. Leaflets elliptic (length:width ratio 3:2) or narrowly elliptic-obovate (length:width ratio 3:1–6:1) with visible (with lens) reticulate venation or a thin central vein between principle lateral veins; peduncle usually more than 2 mm.
- 20a. Leaflets narrowly elliptic-obovate (length:width ratio 3:1–6:1); calyx lobes ca. 2 × as long as tube.
- 21a. Leaflets length:width ratio ca. 3:1, large ones more than 5 mm wide; pedicel ca. 1 mm; lateral calyx lobes narrowly acuminate ovate, distinctly veined in flower ... 22. *L. inschanica*
- 21b. Leaflets length:width ratio ca. 6:1, large ones less than 5 mm wide; pedicel 3–4 mm; lateral calyx lobes narrowly triangular, inconspicuously veined in flower 21. *L. juncea*
- 20b. Leaflets elliptic (length:width ratio ca. 3:2) to narrowly elliptic (length:width ratio 3:1); calyx lobes more than 3 × as long as tube.
- 22a. Leaflet with a thin central vein between principle lateral veins; inflorescence usually densely several to ca. 10-flowered.
- 23a. Flowers white; calyx lobes linear to narrowly triangular (length:width ratio 6:1–12:1); bracteoles longer than calyx tube; cleistogamous legumes with caudate apex 18. *L. chinensis*
- 23b. Flowers reddish purple; calyx lobes narrowly ovate (length:width ratio 6:1); bracteoles shorter than calyx tube; cleistogamous legumes with rounded apex 12. *L. floribunda*
- 22b. Leaflet with reticulate venation between principle lateral veins; inflorescence laxly few flowered or densely flowered.
- 24a. Leaflets elliptic (length:width ratio ca. 3:2); inflorescence laxly few flowered; peduncles filiform, glabrous; flowers sessile or pedicel less than 1 mm; bracteoles shorter than calyx tube 13. *L. virgata*
- 24b. Leaflets narrowly elliptic to elliptic (length:width ratio 2:1–3:1); inflorescence densely flowered; peduncles pubescent; pedicel 1–3 mm; bracteoles longer than calyx tube 15. *L. davurica*

1. *Lespedeza cyrtobotrya* Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 48. 1867.

短梗胡枝子 *duan geng hu zhi zi*

Shrubs, erect, 1–3 m tall, much branched. Branchlets adpressed pilose. Leaves 3-foliolate; petiole 1–2.5 cm; leaflets broadly ovate, ovate-elliptic, or obovate, terminal one 1.5–4.5 × 1–3 cm, abaxially adpressed pilose, adaxially glabrous, apex rounded or emarginate, apiculate. Racemes axillary, shorter than subtending leaves, rarely subequal to leaves; peduncle short or inflorescences subsessile. Pedicel short, white hairy. Calyx 2–2.5 mm, 5-lobed; lobes lanceolate. Corolla reddish purple, ca. 1.1 cm; standard obovate, base clawed; wings oblong, ca. 1/3 shorter than standard and keel, base distinctly auriculate, clawed; keel subequal to standard, base auriculate, clawed. Legume globose, slightly flat, 6–7 × ca. 5 mm, densely hairy, reticulate veined. Fl. Jul–Aug, fr. Sep. $2n = 22$.

Mountain slopes, thickets, forests; below 1500 m. Gansu, Guangdong, Hebei, Heilongjiang, Henan, Jiangxi, Jilin, Liaoning, Shaanxi, Shanxi, Zhejiang [Japan, Korea, Russia].

The branchlets are used for making baskets, and the leaves are used as forage for livestock.

2. *Lespedeza fordii* Schindler, Bot. Jahrb. Syst. 49: 586. 1913.

广东胡枝子 *guang dong hu zhi zi*

Lespedeza anhweiensis Ricker; *L. paradoxa* Ricker.

Shrubs, erect, ca. 40 cm tall. Branchlets glabrous. Leaves 3-foliolate; petiole ca. 1 cm, glabrous; leaflets ovate-oblong, obovate-oblong, or oblong, terminal one 2.5–5 × 1–2 cm, abaxially adpressed pubescent or subglabrous, adaxially glabrous, base rounded, apex rounded or emarginate, apiculate. Racemes axillary, shorter than leaves. Pedicel ca. 3.5 mm. Calyx 4–5 mm, 5-lobed to below middle, upper 2 lobes connate to middle. Corolla purplish red, 7–8 mm; standard broadly obovate, base auriculate, shortly clawed; wings narrowly oblong, shorter than standard and keel, base auriculate, clawed; keel slightly obliquely obovate, slightly longer than standard, narrowly clawed. Ovary hairy. Legume oblong-ellipsoidal, flat, ca. 1.5 cm, adpressed hairy, apiculate. Fl. Jun–Aug, fr. Aug–Oct.

• Mountain slopes, roadsides, valleys; below 800 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Zhejiang.

3. *Lespedeza buergeri* Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 47. 1867.

绿叶胡枝子 *lü ye hu zhi zi*

Lespedeza bracteolata Ricker; *L. buergeri* f. *angustifolia* Makino.

Shrubs, erect, 1–3 m tall. Branchlets sparsely hairy. Leaves 3-foliolate; petiole 2–5 cm; leaflets ovate-elliptic, terminal one 3–7 × 1.3–2.5 cm, abaxially adpressed hairy, adaxially glabrous, base slightly acute or obtuse-rounded, apex acute. Racemes axillary or in panicles at upper part of branchlets. Calyx ca. 4 mm, 5-lobed; lobes ovate-lanceolate or ovate, densely villous. Corolla pale yellowish green, ca. 1 cm; standard nearly orbicular, base auriculate, shortly clawed; wings elliptic-oblong, base auriculate, clawed, sometimes apex slightly purple; keel obovate-oblong, slightly longer than standard, base distinctly auriculate, long clawed. Ovary hairy. Legume oblong-ovoid, ca. 1.5 cm, villous, reticulate veined. Fl. Jun–Jul, fr. Aug–Sep.

Mountain slopes, forests, roadsides, ditches; below 1500 m. Anhui, Gansu, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Zhejiang [Japan].

4. *Lespedeza thunbergii* (Candolle) Nakai, *Lespedeza Japan Korea* 15. 1927.

日本胡枝子 *ri ben hu zhi zi*

Shrubs, subshrubs, or perennial herbs, erect, 1–3 m tall, much branched, pilose. Leaves 3-foliolate; petiole 1–5 cm, pubescent; leaflets elliptic, oblong-elliptic, or ovate, rarely terminal one obovate, terminal one 2.5–6 × 1–3 cm, abaxially adpressed pubescent, adaxially puberulent or glabrescent, rarely glabrous, both ends slightly acute or obtuse. Racemes simple, axillary, longer than leaves, or branched in panicles, terminal; peduncle to 10 cm, pubescent. Pedicel short, hairy. Calyx 4–7 mm, 5-lobed; lobes oblong-lanceolate, 1–4 × as long as tube. Corolla reddish purple or more rarely white, 1–1.5 cm; standard nearly orbicular or slightly long, auriculate, clawed; wings obovate-oblong, 7–8 mm, auriculate, clawed; keel longer than or equal to standard, distinctly longer than wings, auriculate, clawed. Legume obovoid or obovoid-oblong, ca. 8 × 4 mm, pilose, reticulate veined. Fl. Jul–Sep, fr. Sep–Oct. $2n = 40^*$.

Mountain slopes, forest margins, roadsides, thickets; below 2800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea].

- 1a. Corolla 3–4 × as long as calyx; lateral calyx lobes nearly equal to or slightly shorter than calyx tube 4b. subsp. *formosa*
- 1b. Corolla 2–3 × as long as calyx; lateral calyx lobes longer than or equal to calyx tube.
 - 2a. Lateral calyx lobes usually 1–1.5 × as long as calyx tube ... 4a. subsp. *thunbergii*
 - 2b. Lateral calyx lobes usually 1.5–3 × as long as calyx tube 4c. subsp. *elliptica*

4a. *Lespedeza thunbergii* subsp. *thunbergii*

日本胡枝子(原亚种) *ri ben hu zhi zi (yuan ya zhong)*

Desmodium thunbergii Candolle, Prodr. 2: 337. 1825; *D. penduliflorum* Oudemans; *Lespedeza bicolor* Turczaninow var. *velutina* Nakai; *L. formosa* (Vogel) Koehne subsp. *velutina* (Nakai) S. Akiyama & H. Ohba; *L. formosa* var. *velutina* (Nakai) S. Akiyama & H. Ohba; *L. intermedia* Nakai var.

angustifolia Nakai; *L. japonica* L. H. Bailey f. *angustifolia* (Nakai) Murata; *L. liukiensis* Hatusima; *L. penduliflora* (Oudemans) Nakai; *L. sieboldii* Miquel.

Shrubs or perennial herbs. Lateral calyx lobes usually 1–1.5 × as long as calyx tube.

Mountain slopes, forest margins, roadsides, thickets; below 2800 m. Anhui, Fujian, Gansu, Guangdong, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Zhejiang [India, Japan, Korea].

4b. *Lespedeza thunbergii* subsp. *formosa* (Vogel) H. Ohashi in Iwatsuki et al., Fl. Jap. 2b: 262. 2001.

美丽胡枝子 *mei li hu zhi zi*

Desmodium formosum Vogel, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 29. 1843; *Lespedeza albiflora* Ricker; *L. bicolor* subsp. *formosa* (Vogel) P. S. Hsu, X. Y. Li & D. X. Gu; *L. chekiangensis* Ricker; *L. formosa* (Vogel) Koehne; *L. formosa* var. *pubescens* (Hayata) S. S. Ying; *L. penduliflora* subsp. *cathayana* P. S. Hsu; *L. pubescens* Hayata; *L. viatorum* Champion ex Benth; *L. wilfordii* Ricker.

Subshrubs. Leaflets adaxially puberulent or rarely glabrescent. Lateral calyx lobes nearly equal to or slightly shorter than calyx tube. Corolla 3–4 × as long as calyx.

• Mountain slopes, forest margins, roadsides, thickets; below 2800 m. Fujian, Guangdong, Guangxi, Jiangsu, Jiangxi, Taiwan, Zhejiang.

The Chinese record of *Lespedeza patens* Nakai (Li & Chen, FRPS 41: 140. 1995) is referable to *L. thunbergii* subsp. *formosa*.

4c. *Lespedeza thunbergii* subsp. *elliptica* (Benth) ex Maximowicz) H. Ohashi, J. Jap. Bot. 84: 218. 2009.

椭圆叶胡枝子 *tuo yuan ye hu zhi zi*

Lespedeza elliptica Benth ex Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 353. 1873; *L. bicolor* subsp. *elliptica* (Benth) ex Maximowicz) P. S. Hsu, X. Y. Li & D. X. Gu; *L. formosa* subsp. *elliptica* (Benth) ex Maximowicz) S. Akiyama & H. Ohba.

Subshrubs. Lateral calyx lobes usually 1.5–3 × as long as calyx tube.

Guizhou, Hubei, Shaanxi, Sichuan, Yunnan [E India].

5. *Lespedeza maximowiczii* C. K. Schneider, Ill. Handb. Laubholz. 2: 113. 1907.

宽叶胡枝子 *kuan ye hu zhi zi*

Lespedeza buergeri Miquel var. *praecox* Nakai; *L. friebiana* Schindler.

Shrubs, erect, much branched, white pilose. Leaves 3-foliolate; petiole 1–4.5 cm, pilose; leaflets broadly elliptic or ovate-elliptic, terminal one 3–6(–9) × 2–4 cm, abaxially adpressed pubescent, adaxially sparsely pubescent, base rounded or rounded-cuneate, apex acuminate to acute, mucronate. Racemes axillary or in terminal panicles, overtopping leaves; peduncle 3–5 cm. Pedicel ca. 3 mm, pubescent. Calyx 4–5 mm, middle 4-lobed; lobes ovate-lanceolate, acuminate at apex. Corolla purplish red; standard obovate, 9–10 mm, base clawed,

apex emarginate; wings oblong, 6–8 mm, auriculate, slenderly clawed; keel slightly falcate, 8–9 mm, auriculate, slenderly clawed. Ovary hairy. Legume ovoid-elliptic, ca. 9×10 mm, pubescent, reticulate veined. Fl. Jul–Aug, fr. Sep–Oct. $2n = 20$.

Mountain slopes, forests; below 1000 m. Anhui, Henan, Zhejiang [Japan, Korea].

6. *Lespedeza davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 5: 246; Pl. David. 1: 94. 1883 [“*davidii*”].

大叶胡枝子 da ye hu zhi zi

Lespedeza davidii var. *exalata* L. H. Lou; *L. hupehensis* Ricker; *L. merrillii* Ricker.

Shrubs, erect, 1–3 m tall. Branchlets distinctly angular, densely villous. Leaves 3-foliolate; petiole 1–4 cm, densely hispidulous; leaflets broadly ovate or broadly obovate, terminal one $3.5\text{--}7(-13) \times 2.5\text{--}5(-8)$ cm, both surfaces densely yellowish white sericeous, base rounded or broadly cuneate, apex rounded or emarginate. Racemes axillary or in panicles at apex of branchlets, longer than leaves; peduncle 4–7 cm, densely villous. Calyx ca. 6 mm, 5-lobed, villous; lobes lanceolate, acuminate, more than $2 \times$ as long as tube. Corolla reddish purple; standard obovate-oblong, $1\text{--}1.1$ cm \times ca. 5 mm, auriculate, shortly clawed; wings narrowly oblong, shorter than standard and keel, auriculate, slenderly clawed; keel petals slightly falcate, subequal to standard, distinctly auriculate and clawed. Ovary densely hairy. Legume ovoid, 8–10 mm, somewhat densely sericeous, reticulate veined. Fl. Jul–Sep, fr. Sep–Oct. $2n = 22^*$.

• Arid mountain slopes, roadsides, thickets; ca. 800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, ?Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Zhejiang [naturalized in Japan].

Because this species tolerates arid soils, it is used for soil conservation.

Lespedeza merrillii was described from Zhejiang (Lingnan Sci. J. 20: 202. 1942). Its description is based on a single specimen (C. Y. Chiao 14377). Ricker said that this species is nearest to *L. davidii* but distinguished from it by the sparsely appressed, instead of velvety, pubescence of the stems and longer calyx teeth. One of us (Huang), following Li and Chen (FRPS 41: 140. 1995), retains *L. merrillii* here in synonymy due to the lack of specimens. Two of us (Ohashi and Nemoto) regard this species as merely a glabrous form of *L. davidii*.

7. *Lespedeza dunnii* Schindler, Bot. Jahrb. Syst. 49: 585. 1913.

春花胡枝子 chun hua hu zhi zi

Lespedeza metcalfii Ricker.

Shrubs, erect, much branched, puberulent or tomentose. Leaves 3-foliolate; petiole 7–10 mm, yellow or white pubescent; leaflets narrowly obovate or ovate-elliptic, terminal one $3\text{--}5.5 \times$ ca. 2 cm, abaxially villous or sericeous, adaxially pilose, base rounded, apex rounded or emarginate, mucronate. Racemes axillary, 4–5 cm, longer than leaves, densely shortly spreading tomentose. Pedicel 1–5 mm, densely hairy. Calyx 5–9 mm, 5-lobed; lobes linear-lanceolate. Corolla purplish red, ca. 1 cm; standard obovate, base shortly clawed, apex emarginate; wings oblong, slightly shorter than standard and keel, auriculate, clawed; keel obliquely obovate, subequal to standard,

clawed. Ovary densely hairy. Legume oblong-elliptic, ca. 8 mm, densely hairy, both ends acute, apex long rostrate. Fl. Apr–May, fr. Jun–Jul.

• Coniferous forests, mountain slopes, roadsides; ca. 800 m. Anhui, Fujian, ?Zhejiang.

8. *Lespedeza bicolor* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 13: 69. 1840.

胡枝子 hu zhi zi

Lespedeza bicolor var. *japonica* Nakai; *L. bicolor* f. *pendula* S. L. Tung & Z. Lu; *L. ionocalyx* Nakai; *L. veitchii* Ricker.

Shrubs, erect, 1–3 m tall, much branched. Branchlets sparsely pubescent. Leaves 3-foliolate; petiole 2–7(–9) cm; leaflets abaxially pale green, adaxially green, ovate, obovate, or ovate-oblong, terminal one $1.5\text{--}6 \times 1\text{--}3.5$ cm, abaxially pilose, adaxially glabrous, base subrounded or broadly cuneate, apex obtuse-rounded or emarginate, mucronate. Racemes axillary, longer than leaves, often branched in large lax panicles; peduncle 4–10 cm. Pedicel ca. 2 mm, densely hairy. Calyx ca. 5 mm, 5-lobed; lobes shorter than tube. Corolla reddish purple, ca. 1 cm; standard obovate, apex emarginate; wings suboblong, short, base auriculate, clawed; keel subequal to standard, base long clawed, apex obtuse. Ovary hairy. Legume obliquely obovoid, slightly flat, ca. 10×5 mm, densely pubescent, reticulate veined. Fl. Jul–Sep, fr. Sep–Oct. $2n = 22^*$.

Mountain slopes, forest margins, roadsides, thickets, forests; 100–1000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea, ?Mongolia, Russia].

The seed oil is used as a lubricant, the leaves as a tea substitute, and the branchlets for making baskets. Because this species tolerates arid soils, it is grown as a windbreak and for sand stabilization and soil conservation.

9. *Lespedeza pilosa* (Thunberg) Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 121. 1843.

铁马鞭 tie ma bian

Hedysarum pilosum Thunberg in Murray, Syst. Veg., ed. 14, 675. 1784; *Desmodium pilosum* (Thunberg) Candolle; *Lespedeza nantcianensis* Pampanini.

Herbs, perennial, densely villous throughout. Stems pro-cumbent, 60–100 cm, slender. Leaves 3-foliolate; petiole 0.6–1.5 cm; leaflets broadly obovate or obovate, terminal one $1.5\text{--}2 \times 1\text{--}1.5$ cm, base rounded or subrounded, apex rounded, subrounded, or emarginate, mucronate. Racemes axillary, shorter than leaves; peduncle short. Calyx 5-parted; lobes lanceolate, upper 2 connate at base. Corolla yellowish white or white; standard elliptic, 7–8 mm, clawed; wings shorter than standard and keel. Cleistogamous flowers often 1–3, crowded in leaf axils on upper stem, sessile or subsessile, fruit-bearing. Legume broadly ovoid, 3–4 mm, convex, both surfaces densely villous, apex acute-rostrate. Fl. Jul–Sep, fr. Sep–Oct. $2n = 20$.

Waste slopes, grasslands; below 1000 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Xizang, Zhejiang [Japan, Korea].

The whole plant is used medicinally for invigorating the stomach and as a sedative.

10. *Lespedeza fasciculiflora* Franchet, Pl. Delavay. 169. 1890.

束花铁马鞭 shu hua tie ma bian

Herbs, perennial, 60–80 cm tall. Stems much branched at base, procumbent or ascending, densely white hirsute or adpressed strigulose. Leaves 3-foliolate; leaflets obcordate or obtriangular, terminal one 4–9 × 2–7 mm, abaxially densely villous or hoary, adaxially sparsely hairy, subglabrous, or sparsely strigulose, base cuneate, apex emarginate or subtruncate, mucronate. Racemes axillary, distinctly overtopping leaves; peduncle densely hirsute. Calyx ca. 7 mm, 5-parted; lobes linear-lanceolate. Corolla pink, pale purplish red, white, or yellowish, slightly overtopping calyx; standard obovate, ca. 1.3 × 0.6 cm, claw with auriculate appendage at upper part; wings oblong, ca. 5 × 1 mm (claw ca. 2.5 mm); keel subequal to standard. Cleistogamous flowers in leaf axils, sessile, fruit-bearing. Legume narrowly ovoid, subequal to persistent calyx, densely hirsute, apex long rostrate.

• Sandy grasslands on high mountains, thickets in dry river valleys; 1600–3000 m. ?Guizhou, Sichuan, Xizang, NW Yunnan.

- 1a. Stems and branchlets densely white hirsute; leaflets obcordate, 4–9 × 4–7 mm, abaxially densely villous 10a. var. *fasciculiflora*
 1b. Stems and branchlets adpressed strigulose; leaflets obtriangular, 4–7 × 2–4 mm, abaxially densely hoary 10b. var. *hengduanshanensis*

10a. *Lespedeza fasciculiflora* var. *fasciculiflora*

束花铁马鞭(原变种) shu hua tie ma bian (yuan bian zhong)

Lespedeza floribunda Bunge var. *fasciculiflora* (Franchet) Schindler; *L. monnayeri* H. Léveillé.

Stems and branchlets densely white hirsute. Leaflets obcordate, terminal one 4–9 × 4–7 mm, abaxially densely villous, adaxially sparsely hairy or subglabrous. Corolla pink or pale purplish red. Fl. Jul–Aug, fr. Sep–Feb.

• Sandy grasslands on high mountains; 1600–3000 m. W Sichuan, Xizang, NW Yunnan.

10b. *Lespedeza fasciculiflora* var. *hengduanshanensis* C. J. Chen, Acta Phytotax. Sin. 30: 375. 1992.

横断山铁马鞭 heng duan shan tie ma bian

Stems and branchlets adpressed strigulose. Leaflets obtriangular, terminal one 4–7 × 2–4 mm, abaxially densely hoary, adaxially sparsely strigulose. Corolla white or yellowish. Fl. Aug–Sep.

• Thickets in dry river valleys; 1800–2600 m. Sichuan, Xizang.

Two of us (Ohashi and Nemoto) believe that *Lespedeza fasciculiflora* var. *hengduanshanensis* is included within the range of morphological variation of var. *fasciculiflora*.

11. *Lespedeza forrestii* Schindler, Repert. Spec. Nov. Regni Veg. 10: 406. 1912.

矮生胡枝子 ai sheng hu zhi zi

Lespedeza pampaninii H. Léveillé; *L. variegata* Cambes-sèdes var. *cinerascens* Franchet.

Subshrubs, to 20 cm tall, densely spreading white villous throughout. Rhizome creeping; stems numerous, simple, procumbent or ascending. Leaves 3-foliolate; leaflets oblong-linear, terminal one 1–2.5 × 0.3–0.6 cm, base cuneate, apex emarginate or obtuse, mucronate. Flowers 1–3, axillary. Calyx 7–8 mm, 5-parted; upper 2 lobes connate at base, free at apex. Corolla pink, with purple spots, ca. 2 × as long as calyx; standard broadly elliptic, ca. 10 × 5 mm, claw with incurved appendage at upper part; wings oblong, ca. 10 × 2.5 mm, base auriculate and long clawed, apex obtuse; keel ca. 9 × 2 mm, apex obtuse. Ovary pilose, stipitate. Fruit not seen. Fl. Jun–Sep.

• Mountain slopes, thickets; 2200–2800 m. Sichuan, Yunnan.

12. *Lespedeza floribunda* Bunge, Pl. Mongholic-Chin. 13. 1835.

多花胡枝子 duo hua hu zhi zi

Lespedeza dielsiana Schindler; *L. floribunda* var. *alopecuroides* Franchet; *L. stottsae* L. H. Bailey.

Subshrubs, small, 30–60(–100) cm tall. Branchlets grayish white tomentose. Leaves 3-foliolate; leaflets obovate, broadly obovate, or oblong, terminal one 1–1.5 × 0.6–0.9 cm, abaxially densely white adpressed pubescent, adaxially sparsely adpressed hairy, base cuneate, apex emarginate, obtuse-rounded, or subtruncate, mucronate. Racemes axillary; peduncle slender, distinctly overtopping leaves. Flowers numerous. Calyx 4–5 mm, 5-lobed; lobes lanceolate or ovate-lanceolate, upper 2 lobes connate at lower part, free above. Corolla purple, purplish red, or bluish purple; standard elliptic, ca. 8 mm, base clawed, apex rounded; wings slightly short; keel longer than standard, apex obtuse. Legume broadly ovoid, ca. 7 mm, overtopping persistent calyx, densely pubescent, reticulate veined. Fl. Jun–Sep, fr. Sep–Oct.

Rocky mountain slopes; below 1300 m. Anhui, Fujian, Gansu, Guangdong, Hebei, Henan, Hubei, Jiangsu, SW Liaoning, ?Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, ?Zhejiang [India, Pakistan; naturalized in Japan].

Following Li and Chen (FRPS 41: 148. 1995), one of us (Huang) retains *Lespedeza stottsae* (Gentes Herb. 1: 32. 1920), described from Jigong Shan, Henan, and *L. dielsiana* (Repert. Spec. Nov. Regni Veg. 10: 404. 1912), described from Sichuan, here in synonymy due to the lack of authentic specimens. Two of us (Ohashi and Nemoto) agree that these entities are conspecific with *L. floribunda*.

13. *Lespedeza virgata* (Thunberg) Candolle, Prodr. 2: 350. 1825.

细梗胡枝子 xi geng hu zhi zi

Subshrubs or perennial herbs, small, 20–50 cm tall, sometimes to 1 m. Stems branched at base; branchlets purple, thin, adpressed white pubescent. Leaves 3-foliolate; petiole 1–2 cm, adpressed white hairy; leaflets elliptic, oblong, or ovate-oblong, terminal one (0.6–)1–3.5 × 0.4–1.5 cm, abaxially densely adpressed pubescent, adaxially glabrous, base rounded, apex rounded or obtuse-rounded, sometimes emarginate, mucronate.

Racemes axillary, laxly flowered, often 3-flowered; peduncle thin, filiform or stouter, distinctly overtopping leaves, adpressed white or spreading hairy. Pedicel short. Calyx 4–7 mm. Standard white, with purple spots at base, ca. 6 mm; wings shorter; keel longer than standard or subequal. Cleistogamous flowers clustered in leaf axils, sessile, fruit-bearing. Legume nearly orbicular, often not overtopping calyx.

Rocky mountain slopes, mountain forests, roadsides, thickets; below 800 m. Anhui, Fujian, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Taiwan, Zhejiang [Japan, Korea].

- 1a. Flowering peduncles thin, filiform, adpressed white pubescent; calyx 4–6 mm; leaflets thinner, often elliptic or oblong 13a. var. *virgata*
 1b. Flowering peduncles stouter, spreading hairy; calyx ca. 7 mm; leaflets thicker, ovate-oblong 13b. var. *macrovirgata*

13a. *Lespedeza virgata* var. *virgata*

细梗胡枝子(原变种) xi geng hu zhi zi (yuan bian zhong)

Hedysarum virgatum Thunberg in Murray, Syst. Veg., ed. 14, 675. 1784; *L. swinhoei* Hance.

Leaflets often elliptic or oblong, terminal one (0.6–)1–2(–3) × 0.4–1(–1.5) cm, abaxially densely adpressed pubescent. Flowering peduncle thin, filiform, adpressed white pubescent. Calyx 4–6 mm. Fl. Jul–Sep, fr. Sep–Oct.

Rocky mountain slopes, mountain forests, roadsides, thickets; below 800 m. Anhui, Fujian, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Taiwan, Zhejiang [Japan, Korea].

13b. *Lespedeza virgata* var. *macrovirgata* (Kitagawa) Kitagawa, Lin. Fl. Manshur. 289. 1939.

大细梗胡枝子 da xi geng hu zhi zi

Lespedeza macrovirgata Kitagawa, Bot. Mag. (Tokyo) 48: 100. 1934.

Leaflets often ovate-oblong, terminal one 3–3.5 × 1–1.5 cm, abaxially spreading hairy. Flowering peduncle relatively stout, not filiform, spreading hairy. Calyx ca. 7 mm. Fl. Jul–Sep, fr. Sep–Oct.

- S Liaoning.

Two of us (Ohashi and Nemoto) regard this taxon as a hybrid between *Lespedeza tomentosa* and *L. virgata*, i.e., *L. ×macrovirgata*.

14. *Lespedeza tomentosa* (Thunberg) Siebold ex Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 376. 1873.

绒毛胡枝子 rong mao hu zhi zi

Hedysarum tomentosum Thunberg in Murray, Syst. Veg., ed. 14, 675. 1784; *Desmodium tomentosum* (Thunberg) Candolle; *H. coriaceum* Poiret; *H. villosa* Willdenow; *Lespedeza macrophylla* Bunge; *L. tomentosa* var. *globiracemosa* S. L. Tung & Z. Lu; *L. villosa* Persoon.

Subshrubs or perennial herbs, to 1 m tall, densely yellowish brown tomentose throughout. Stems simple or branched

above. Leaves 3-foliolate; petiole 2–3 cm; leaflets elliptic or ovate-oblong, terminal one 3–6 × 1.5–3 cm, margin slightly involute, apex obtuse or emarginate. Racemes terminal or axillary at upper part of stem; peduncle 4–8(–12) cm, stout. Pedicel short. Calyx ca. 6 mm, 5-parted; lobes narrowly lanceolate, ca. 4 mm. Corolla yellow or yellowish white; standard elliptic, ca. 1 cm; wings shorter, oblong; keel subequal to standard. Cleistogamous flowers in leaf axils of upper stems. Legume obovoid, 3–4 × 2–3 mm, apex shortly acute. Fl. Jul–Aug, fr. Sep–Oct.

Arid mountain slopes, grasslands, thickets; below 1000 m except in Xinjiang and Xizang. Widely distributed throughout China [India, Japan, Kashmir, Korea, Mongolia, Nepal, Pakistan, Russia].

15. *Lespedeza davurica* (Laxmann) Schindler, Repert. Spec. Nov. Regni Veg. 22: 274. 1926 [“*daurica*”].

兴安胡枝子 xing an hu zhi zi

Trifolium davuricum Laxmann, Novi Comment. Acad. Sci. Imp. Petrop. 15: 560. 1771; *Hedysarum trichocarpum* Stephan ex Willdenow; *Lespedeza davurica* subsp. *huangheensis* C. J. Chen; *L. davurica* var. *sessilis* V. N. Vassiljev; *L. davurica* var. *shimadae* (Masamune) Masamune & Hosokawa; *L. fauriei* H. Léveillé; *L. feddeana* Schindler; *L. medicaginoides* Bunge; *L. shimadae* Masamune; *L. trichocarpa* (Stephan ex Willdenow) Persoon.

Subshrubs or perennial herbs, 30–100 cm tall. Stems often ascending, simple or branched at base. Branchlets pubescent. Leaves 3-foliolate; petiole 1–2 cm; leaflets oblong or narrowly oblong, terminal one 0.8–3 × 0.4–1.6 cm, abaxially adpressed or erect pubescent, adaxially sparsely pubescent or glabrous, base rounded, apex rounded or emarginate, mucronate. Racemes axillary, shorter than or ca. as long as leaves; peduncle densely pubescent. Calyx 3–6 mm, 5-parted; lobes lanceolate. Corolla white or yellowish white; standard oblong, ca. 1 cm, mixed with purple at middle, base clawed; wings oblong, short; keel longer than wings. Cleistogamous flowers clustered in leaf axils, fruit-bearing. Legume obovoid or narrowly obovoid, 3–4 × 2–3 mm, lenticular, pubescent, apex rostrate, enclosed in persistent calyx.

Dry mountain slopes, grasslands, roadsides, sandy soils. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, ?Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan [Korea, Mongolia, Russia].

This is a good plant for livestock forage and is used as green manure.

16. *Lespedeza mucronata* Ricker, Amer. J. Bot. 33: 257. 1946.

短叶胡枝子 duan ye hu zhi zi

Subshrubs, ca. 60 cm tall. Stems erect, tomentose at upper part, downward gradually more sparsely so. Leaves 3-foliolate; petiole 5–6 mm; leaflets obovate or obcordate, terminal one 1–2 × 1–1.3 cm, abaxially densely hirsute, more densely so on midvein, adaxially sparsely adpressed hairy, base broadly cuneate, apex truncate or emarginate. Racemes axillary, few flowered. Calyx ca. 4 mm, 5-parted; lobes narrowly lanceolate, ca. 3 mm, apex aristate. Corolla yellow or white; standard ca. 6 mm,

shortly clawed; wings oblong, ca. 7 mm, clawed; keel ca. 7 mm. Cleistogamous flowers clustered in leaf axils of lower stems, fruit-bearing. Legume ovoid to broadly ovoid, 3–4 × 2–3 mm, slightly overtopping persistent calyx, apex mucronate. Fl. Aug–Sep, fr. Sep–Oct.

- Arid sandy places. Fujian, Guangdong, Jiangxi, Zhejiang.

Two of us (Ohashi and Nemoto) regard this species as conspecific with *Lespedeza chinensis*.

17. *Lespedeza potaninii* V. N. Vassiljev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 202. 1946.

牛枝子 niu zhi zi

Lespedeza davurica (Laxmann) Schindler subsp. *potaninii* (V. N. Vassiljev) C. J. Chen; *L. davurica* var. *potaninii* (V. N. Vassiljev) Y. X. Liou; *L. davurica* f. *prostrata* (W. Wang & P. Y. Fu) Kitagawa; *L. davurica* var. *prostrata* W. Wang & P. Y. Fu; *L. potaninii* f. *breviracemi* S. L. Tung & Z. Lu; *L. potaninii* var. *breviracemi* (S. L. Tung & Z. Lu) X. Y. Zhu.

Subshrubs, 20–60 cm tall. Stems procumbent or ascending, hispid, much branched at base. Leaves 3-foliolate; leaflets narrowly oblong, rarely elliptic to broadly elliptic, terminal one 0.8–1.5(–2.2) × 0.3–0.5(–0.7) cm, abaxially grayish white hispid, adaxially glabrous, base slightly oblique, apex obtuse-rounded or emarginate, mucronate. Racemes axillary; peduncle long, distinctly overtopping leaves, laxly flowered. Calyx densely villous, 5-parted; lobes lanceolate, 5–8 mm, apex long acuminate, aristate. Corolla yellowish white, slightly overtopping calyx lobes; standard mixed with purple at middle; wings short; keel mixed with purple at apex. Cleistogamous flowers axillary, sessile or subsessile. Legume obovoid, 3–4 mm, lenticular, densely hispid, enclosed in persistent calyx. Fl. Jul–Sep, fr. Sep–Oct.

- Desert steppes, sandy soils of steppe zone, rocky soils, hills, rocky slopes, foot of mountains. Gansu, Hebei, Henan, Jiangsu, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan.

This is a good plant for livestock forage. Because it can tolerate arid soils, it is grown for sand stabilization and soil conservation.

Two of us (Ohashi and Nemoto) regard *Lespedeza potaninii* as conspecific with *L. davurica*.

18. *Lespedeza chinensis* G. Don, Gen. Hist. 2: 307. 1832.

中华胡枝子 zhong hua hu zhi zi

Lespedeza canescens Ricker; *L. chinensis* var. *nokoensis* Ohwi; *L. formosensis* Hosokawa.

Subshrubs, small, to 1 m tall, adpressed white hairy throughout. Stems erect or diffuse. Leaves 3-foliolate; petiole ca. 1 cm; leaflets obovate-oblong, oblong, or ovate-obovate, terminal one 1.5–4 × 1–1.5 cm, margin slightly involute, apex truncate, subtruncate, emarginate, or obtuse, mucronate. Racemes axillary, not overtopping leaves, few flowered; peduncle short. Pedicel 1–2 mm. Calyx 5-parted; lobes narrowly lanceolate. Corolla white or yellow; standard elliptic, ca. 7 × 3 mm, clawed and with 2 auriculate appendages at base; wings narrowly oblong, ca. 6 mm, long clawed; keel ca. 8 mm. Cleistog-

amous flowers clustered in leaf axils of lower stems. Legume ovoid, ca. 4 × 2.5–3 mm, reticulate veined, densely adpressed white hairy, base slightly oblique, apex rostrate. Fl. Aug–Sep, fr. Oct–Nov.

- Thickets, forest margins, roadsides, mountain slopes, grasslands, forests; below 2500 m. Anhui, Fujian, Guangdong, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang.

19. *Lespedeza caraganae* Bunge, Pl. Mongholic-Chin. 11. 1835.

长叶胡枝子 chang ye hu zhi zi

Subshrubs or perennial herbs, ca. 50 cm tall. Stems erect, much angulate, adpressed shortly hairy. Leaves 3-foliolate; petiole 3–5 mm, adpressed shortly hairy; leaflets oblong-linear, terminal one 2–4 × 0.2–0.4 cm, abaxially adpressed hairy, adaxially subglabrous, base narrowly cuneate, margin slightly involute, apex obtuse or emarginate, mucronate. Racemes axillary; peduncle 0.5–1 cm, densely adpressed white hairy, 3–5-flowered. Pedicel ca. 2 mm. Calyx narrowly campanulate, 5-parted. Corolla white or yellow, distinctly overtopping calyx; standard broadly elliptic, ca. 8 × 5 mm; wings oblong, ca. 7 × 1 mm; keel ca. 8.5 mm, base long clawed, apex obtuse. Legume oblong-ovoid, 4.5–5 × ca. 2 mm, sparsely adpressed white hairy, apex rostrate. Legume of cleistogamous flower obovoid-orbicular, ca. 3 × 2.5 mm, apex shortly rostrate. Fl. Jun–Sep, fr. Oct.

- Mountain slopes; below 1400 m. Gansu, Hebei, Henan, Liaoning, ?Nei Mongol, Shaanxi, Shandong.

20. *Lespedeza cuneata* (Dumont de Courset) G. Don, Gen. Hist. 2: 307. 1832.

截叶铁扫帚 jie ye tie sao zhou

Anthyllis cuneata Dumont de Courset, Bot. Cult. 6: 100. 1811; *Aspalathus cuneata* (Dumont de Courset) D. Don; *Hedysarum sericeum* Thunberg (1784), not Miller (1768); *Lespedeza argyraea* Siebold & Zuccarini; *L. juncea* (Linnaeus f.) Persoon var. *sericea* Forbes & Hemsley; *L. sericea* Miquel; *L. sericea* var. *latifolia* Maximowicz.

Subshrubs or perennial herbs, to 1 m tall. Stems erect or ascending, hairy. Leaves crowded, 3-foliolate; petiole short; leaflets cuneate or linear-cuneate, terminal one 1–3 × 0.2–0.7 cm, abaxially densely adpressed hairy, adaxially subglabrous, base cuneate, apex truncate or subtruncate, mucronate. Racemes axillary, 2–4-flowered; peduncle short. Calyx narrowly campanulate, 5-lobed; lobes lanceolate. Corolla yellowish or white; standard with purple spots at base; wings subequal to standard; keel slightly long, sometimes mixed with purple at apex. Cleistogamous flowers clustered in leaf axils. Legume broadly ovoid or subglobose, 2.5–3.5 × ca. 2.5 mm, adpressed hairy. Fl. Jul–Aug, fr. Sep–Oct. $2n = 20^*$.

- Mountain slopes, roadsides; below 2500 m. ?Fujian, Gansu, Guangdong, ?Guizhou, ?Hainan, Henan, Hubei, Hunan, ?Jiangsu, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, ?Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Korea, Laos, Malaysia, Nepal, Pakistan, Philippines, Thailand, Vietnam; naturalized in North America and Australia].

21. *Lespedeza juncea* (Linnaeus f.) Persoon, Syn. Pl. 2: 318. 1807.

尖叶铁扫帚 jian ye tie sao zhou

Hedysarum junceum Linnaeus f., Dec. Pl. Horti Upsal. 1: 7. 1762; *Lespedeza cystoides* Nakai; *L. hedysaroides* (Pallas) Kitagawa; *L. hedysaroides* var. *subsericea* (Komarov) Kitagawa; *L. hedysaroides* var. *umbrosa* (Komarov) Kitagawa; *L. juncea* var. *subsericea* Komarov; *L. juncea* f. *umbrosa* Komarov; *Trifolium hedysaroides* Pallas.

Subshrubs or perennial herbs, small, to 1 m tall, adpressed hairy throughout. Leaves 3-foliolate; petiole 0.5–1 cm; leaflets oblanceolate, linear-oblong, or narrowly oblong, terminal one 1.5–3.5 × 0.2–0.7 cm, base attenuate, margin slightly involute, apex acute or obtuse-rounded, mucronate. Racemes axillary, slightly overtopping leaves, 3–7-flowered. Calyx narrowly campanulate, 5-parted; lobes lanceolate, distinctly 3-veined after fruiting. Corolla white or yellowish; standard with purple spots at base, not or rarely reflexed at fruiting; keel mixed with purple at apex; standard and wings subequal to keel, sometimes standard short. Cleistogamous flowers clustered in leaf axils, subsessile. Legume broadly ovoid, slightly overtopping persistent calyx, both surfaces adpressed white hairy. Fl. Jul–Sep, fr. Sep–Oct. $2n = 20$.

Mountain slopes, thickets; below 1500 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

22. *Lespedeza inschanica* (Maximowicz) Schindler, Bot. Jahrb. Syst. 49: 603. 1913.

阴山胡枝子 yin shan hu zhi zi

Lespedeza juncea (Linnaeus f.) Persoon var. *inschanica* Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 371. 1873; *L. cystoides* Nakai var. *inschanica* (Maximowicz) Nakai; *L. hedysaroides* (Pallas) Kitagawa var. *inschanica* (Maximowicz) Kitagawa; *L. inschanica* var. *flava* S. L. Tung & Z. Lu.

Subshrubs or perennial herbs, to 80 cm tall. Stems erect or ascending, pubescent above. Leaves 3-foliolate; petiole 3–10 mm; leaflets oblong or obovate-oblong, terminal one 1–2.5 × 1–1.5 cm, abaxially densely adpressed hairy, adaxially subglabrous, base broadly cuneate or rounded, apex obtuse-rounded or emarginate. Racemes axillary, subequal to leaves, 2–6-flowered. Calyx 5–6 mm, 5-lobed; lobes lanceolate, distinctly 3-veined and ciliate, upper 2 lobes connate above middle. Corolla white; standard suborbicular, ca. 7 × 5.4 mm, base with large purple spots, apex emarginate, reflexed at anthesis; wings oblong, 5–6 × 1–1.5 mm; keel ca. 6.5 mm, often mixed with purple at apex. Legume obovoid, ca. 4 × 2 mm, shorter than persistent calyx, densely adpressed hairy.

Arid mountain slopes. Anhui, Gansu, Hebei, Hubei, Hunan, Jiangsu, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Japan, Korea].

23. *Lespedeza gerardiana* Wallich ex Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 373. 1873.

西藏胡枝子 xi zang hu zhi zi

Subshrubs or perennial herbs, 20–30 cm tall. Stem erect or ascending, densely appressed or ascending pubescent. Leaves 3-foliolate; stipules linear-triangular, 4.8–5.5 × 0.7–1.1 mm, 3- or 4-veined; petiole 1.6–2.2 mm; leaflets narrowly obovate, terminal one 1–1.4 cm × 2.5–4.4 mm, abaxially sericeous, adaxially glabrous, base cuneate, apex mucronate. Racemes axillary, slightly longer than subtending leaves, almost sessile, 6-flowered. Pedicel 2.5–3.2 mm, densely appressed or ascending pubescent; bracteoles narrowly ovate, 4–4.8 × ca. 0.9 mm, distinctly longer than calyx tube. Calyx 7.3–9 mm, 5-parted; lobes narrowly triangular, densely appressed or ascending pubescent. Corolla pale yellow, 1.4–1.5 × as long as calyx; standard elliptic, 10.5–12.5 × 5–6 mm, clawed and with 2 auriculate appendages at base; wings obliquely narrowly elliptic, 9.5–11 × 1.5–2 mm, obtuse, slightly auriculate at base, claw ca. 3 mm; keel obliquely elliptic, 10.5–12.5 × 2.8–3.3 mm, apex obtuse. Cleistogamous flowers axillary, sessile, 6-flowered. Legumes and seeds unknown (in China). Fl. Sep.

In grass on mountain slopes, at foot of mountains. Xizang [Bhutan, India, Nepal, Pakistan].

24. *Lespedeza lichiyuniae* T. Nemoto, H. Ohashi & T. Itoh, J. Jap. Bot. 82: 223. 2007.

红花截叶铁扫帚 hong hua jie ye tie sao zhou

Subshrubs or perennial herbs, 50–120 cm tall. Stems erect or ascending, ascending or appressed pubescent. Leaves 3-foliolate; petiole (1.5–)2–15 mm; leaflets narrowly obovate, terminal one 0.7–2.8 × 0.2–0.8 cm, abaxially densely adpressed hairy, adaxially glabrous, base cuneate, apex obtuse or truncate, mucronate. Racemes axillary, peduncle short, (1 or)2–4-flowered. Calyx 3–4 mm, 5-parted; lobes appressed or ascending, lanceolate. Corolla pink or pale purple; standard broadly elliptic to circular, 7–7.5 × 5–5.5 mm, base with dark purple spots; wings pale purplish white, narrowly obovate to obovate, 6.7–7.3 × 2–2.3 mm; keel pale purplish white with dark purple tip, 7.2–7.6 × 2.2–2.7 mm. Cleistogamous flowers clustered in leaf axils, sessile. Legumes ellipsoid, ca. 2.4 × 1.7–2 mm, slightly longer than persistent calyx, densely adpressed hairy. Fl. Aug–Sep, fr. (Sep–)Oct–Nov.

• Mountain valleys, sunny mountain slopes; (200–)500–1700 (–3000) m. Anhui, Chongqing, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Yunnan [naturalized in Japan].

25. *Lespedeza hispida* (Franchet) T. Nemoto & H. Ohashi, J. Jap. Bot. 84: 156. 2009.

粗硬毛胡枝子 cu ying mao hu zhi zi

Lespedeza juncea (Linnaeus f.) Persoon var. *hispida* Franchet, Pl. Delavay. 170. 1890; *L. sericea* Miquel f. *hispida* (Franchet) Schindler.

Subshrubs or perennial herbs, to 80 cm tall. Stem erect or ascending, densely spreading or ascending pubescent. Leaves 3-foliolate; petiole 0.5–2.5 mm, densely spreading or ascending pubescent (or sericeous); leaflets narrowly obtriangular or narrowly obovate, terminal one 0.7–2.2 cm × 2.2–6.5 mm, abaxially densely adpressed or ascending pubescent, adaxially glabrous, base narrowly cuneate, apex truncate, emarginate, or ob-

tuse, mucronate. Racemes axillary, peduncle short, ca. 1 mm, 2–4-flowered. Pedicel 0.7–0.8 mm, pubescent; bracteoles (1.5–)1.7–2.5 mm, longer than calyx tube. Calyx 3.5–5 mm, 5-lobed, densely appressed or ascending pubescent. Corolla white, 1.3–1.5 × as long as calyx; standard elliptic, 5–5.7 × ca. 2.6 mm, inflexed-auriculate at base; wings narrowly or linearly elliptic, ca. 4.7 × 0.8 mm, obviously shorter than other petals;

keel obliquely obovate, ca. 6 × 1.8 mm, claw ca. 1.5 mm. Cleistogamous flowers in leaf axils. Legumes ovoid, 3.6–4 × 2.3–2.5 mm, shorter than or almost equal to calyx, densely pubescent, base truncate, apex acuminate. Cleistogamous legumes 2.7–3 × ca. 2 mm, slightly longer than calyx. Fl. Jul–Sep, fr. Oct–Nov.

Grassy slopes, sunny roadsides; 1500–2500 m. Xizang, Yunnan [India, Nepal, Pakistan].

133. KUMMEROWIA Schindler, *Repert. Spec. Nov. Regni Veg.* 10: 403. 1912.

鸡眼草属 *ji yan cao shu*

Huang Puhua (黄普华 *Huang Pu-hwa*); Hiroyoshi Ohashi, Tomoyuki Nemoto

Lespedeza subg. *Microlespedeza* Maximowicz, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 2: 346, 382. 1873; *Microlespedeza* (Maximowicz) Makino.

Herbs, annual, usually much branched. Leaves 3-foliolate; stipules membranous, large and persistent, usually longer than petiole, ciliate. Flowers 1 or 2, usually fascicled in axils of leaf, rarely 3 or more. Bracteoles 4, attached to lower part of calyx. Calyx 5-lobed. Corolla pink or purple; standard nearly equal to wings, often shorter than keel. Corolla and staminal column of perfect flowers deciduous at fruiting; corolla and staminal column of cleistogamous flowers clinging to legume and remaining until fruit matures, deciduous. Stamens diadelphous (9+1). Ovary 1-ovuled. Legume compressed, 1-jointed, indehiscent, 1-seeded.

Two species: China, Japan, Korea, and Russia; two species in China.

- 1a. Branchlets with downward-pointing hairs; leaflets with apex usually rounded; stipules long ciliate; pedicel glabrous; legume ca. 2 × as long as calyx or slightly longer 1. *K. striata*
- 1b. Branchlets with upward-pointing hairs; leaflets with apex emarginate; stipules shortly ciliate; pedicel pubescent; legume 2.5–3 × as long as calyx 2. *K. stipulacea*

1. *Kummerowia striata* (Thunberg) Schindler, *Repert. Spec. Nov. Regni Veg.* 10: 403. 1912.

鸡眼草 *ji yan cao*

Hedysarum striatum Thunberg in Murray, *Syst. Veg.*, ed. 14, 675. 1784; *Lespedeza striata* (Thunberg) Hooker & Arnott; *Microlespedeza striata* (Thunberg) Makino.

Herbs, diffuse or prostrate. Stem and branchlets with downward-pointing white hairs. Stipules ovate-oblong, 3–4 mm, longer than petiole, striate, long ciliate; petiole 1–2 mm; leaflets obovate, narrowly obovate, or oblong, terminal one 0.6–2.2 cm × 3–8 mm, lateral veins dense, base nearly rounded or broadly cuneate, apex rounded, rarely emarginate. Flowers 1–3 in upper axils of leaves. Pedicel ca. 1 cm, glabrous; bracteoles 4, attached to proximal part of calyx, 1 very small bracteole placed at article of pedicel, others larger. Calyx 5-lobed. Corolla 5–6 mm; standard elliptic, base attenuate, clawed, auriculate; keel subequaling or slightly longer than standard; wings slightly shorter than keel. Legume orbicular or obovoid, slightly compressed, 3.5–5 mm, ca. 2 × as long as calyx or slightly longer, pubescent, apex mucronate. Fl. Jul–Sep, fr. Aug–Oct. *2n* = 22*.

Sandy soils, streamsides, roadsides, grasslands; below 500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, E Russia, Vietnam; naturalized in SE United States].

The whole plant is used medicinally as a diuretic, for reducing

fever, and for treating diarrhea. It is also used for forage and green manure.

2. *Kummerowia stipulacea* (Maximowicz) Makino, *Bot. Mag.* (Tokyo) 28: 107. 1914.

长萼鸡眼草 *chang e ji yan cao*

Lespedeza stipulacea Maximowicz, *Prim. Fl. Amur.* 85. 1859; *L. striata* (Thunberg) Hooker & Arnott var. *stipulacea* (Maximowicz) Debeaux; *Microlespedeza stipulacea* (Maximowicz) Makino.

Herbs, prostrate, ascending, or erect. Stem and branches with sparse upward-pointing white hairs. Stipules ovate, 3–8 mm, longer than petiole or sometimes nearly equal, shortly ciliate; petiole short; leaflets obovate or broadly obovate, terminal one 0.5–1.8 cm × 3–12 mm, base cuneate, apex emarginate or nearly truncate. Flowers 1 or 2, axillary. Pedicel hairy. Calyx broadly campanulate; standard elliptic, shorter than keel, base attenuate, clawed, apex emarginate; wings narrowly lanceolate, nearly equal to standard; keel obtuse, with dark purple spots adaxially, intermixed with apetalous flowers. Legume ovoid or elliptic, ca. 3 mm, usually 2.5–3 × as long as calyx, slightly compressed. Fl. Jul–Aug, fr. Aug–Oct. *2n* = 20, 22*.

Roadsides, grasslands, mountain slopes, stable or semistable sand dunes; 100–1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Taiwan, Zhejiang [Japan, Korea, Russia; naturalized in SE United States].

This plant's uses are the same as those of *Kummerowia striata*.

21. Tribe PSORALEEAE

补骨脂族 bu gu zhi zu

Wei Zhi (韦直); Michael G. Gilbert

Small trees, shrubs, or subshrubs, rarely herbs, glandular-punctate. Leaves pinnate or simple or reduced to scales, entire or denticulate, alternate to distichous; stipules adnate to petiole, fused or free, amplexicaul; stipels absent. Inflorescences spicate, racemose, or capitate, or leafy-paniculate. Flowers fasciculate, 1–6 per node. Calyx campanulate, upper lobes partially fused. Corolla papilionaceous, petals free from staminal tube; standard weakly clawed, rarely with appendages; wings sculptured, lamellate; keel purple tipped. Vexillary stamen free from base or fused with others into an adaxially split sheath, rarely into a closed tube; anthers uniform, alternately versatile and basifixed. Ovary 1-ovuled, hairy or sparsely covered with recurved club-shaped glands; style upcurved, penicillate. Legumes indehiscent, usually 1-seeded. Seeds exarillate.

Nine genera and ca. 185 species: five genera in North America south to Mexico, two genera ± restricted to S Africa, one genus in the Mediterranean region, and one genus (*Cullen*) mostly in Australia; one species in China.

134. CULLEN Medikus, Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 381. 1787.

补骨脂属 bu gu zhi shu

Shrublets or herbs, with black glands, especially on calyx. Leaves digitately or pinnately 1–5-foliolate; stipules embracing stem by broad base; leaflets entire or denticulate. Inflorescences axillary, capitate, spicate, racemose, or fasciculate; bracts membranous, each often embracing 2 or 3 flowers. Calyx 5-toothed. Corolla purple, blue, or white; petals subequal in length, clawed. Stamens diadelphous; vexillary stamen free or ± connate with others. Ovary sessile or shortly stipitate, 1-ovuled. Legume ovoid, indehiscent, with persistent calyx; pericarp adhering to seed. Seed without strophiole, with very short funicle.

About 33 species: mostly in Australia (ca. 23 species), one in Indonesia, one from China through India and Oman to Somalia, three in SW Asia, two in the Mediterranean region, and about three in S Africa; one species in China.

1. *Cullen corylifolium* (Linnaeus) Medikus, Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 381. 1787.

补骨脂 bu gu zhi

Psoralea corylifolia Linnaeus, Sp. Pl. 2: 762. 1753; *Lotodes corylifolia* (Linnaeus) Kuntze; *P. pattersoniae* Schönland; *Trifolium unifolium* Forsskål.

Herbs, annual, 60–150 cm tall. Stems erect, branched, sparsely white puberulent, gland-dotted. Leaves 1-foliolate, sometimes with a much smaller lateral leaflet; stipules falcate, 7–8 mm; petiole 2–4.5 cm; leaf blade broadly ovate, 4.5–9 × 3–6 cm, both surfaces subglabrescent and black gland-dotted, base

rounded or subcordate, margin undulate or irregularly coarsely dentate, apex obtuse or acute. Inflorescence axillary, densely congested, capitate or shortly racemose, 10–30-flowered; peduncles 3–7 cm; bracts membranous. Calyx 4–6 mm. Corolla blue to yellowish; standard obovate, ca. 5.5 mm. Legume black, ovoid, ca. 5 mm, glabrous, apex with a short tip, irregularly reticulate. Seed dark brown, reniform, 3–5 × 2–4 mm. Fl. Jul–Aug, fr. Sep–Oct.

Warm valleys, cultivated in C and E China. Guizhou, Sichuan, Yunnan [Bangladesh, India, Indonesia, Malaysia, Myanmar, Pakistan, Sri Lanka; E Africa (Somalia), SW Asia (S Arabian Peninsula)].

Cullen corylifolium is used medicinally.

22. Tribe SESBANIEAE

田菁族 tian jing zu

Sun Hang (孙航); Bruce Bartholomew

Herbs, shrubs, or rarely trees, deciduous. Stipules small, caducous. Leaves paripinnate; petiole and rachis often adaxially grooved; stipels small or absent; leaflets numerous, petiolulate; leaflet blades with entire margin. Racemes axillary at apical part of branches; bracts and bracteoles subulate, caducous. Pedicel slender. Calyx broadly campanulate; teeth 5, subequal, rarely nearly 2-labiate. Corolla yellow or with spots, rarely white, red, or dark purple, exerted from calyx, glabrous; standard broad, with 2 calluses on claw; wings falcate-oblong, auriculate; keel curved, abaxial margin connate, auriculate, claw longer than standard claw. Stamens diadelphous (9+1); anthers homomorphic, dorsifixed, 2-loculed, longitudinally dehiscent, often glabrous. Ovary linear, many ovuled, stipitate; style slender and curved; stigma small, capitate, terminal. Legume often long, linear, and terete, many seeded, trabeculate between seeds, dehiscent at maturity, base with a carpopodium, apex beaked. Seeds terete; hilum rounded.

One genus and ca. 60 species: tropical, subtropical, and warm-temperate regions of Africa, America, Asia, and Australia; four species (three or four introduced) in China.

135. SESBANIA Scopoli, Intr. Hist. Nat. 308. 1777, nom. cons.

田菁属 tian jing shu

Agati Adanson; *Resupinaria* Rafinesque; *Sesban* Adanson.

Morphological characters and geographic distribution are the same as those of the tribe.

Sesbania javanica Miquel, reported from Taiwan in FRPS (40: 234. 1994), is based on a misidentification of *S. cannabina* (see T. C. Huang & H. Ohashi, Fl. Taiwan, ed. 2, 3: 362. 1993).

- 1a. Trees; leaflet blades 8–16 mm wide; flowers 7–10 cm, falcately curved in bud; legume 7–8 mm wide 4. *S. grandiflora*
1b. Herbs, annual or perennial and suffrutescent; leaflet blades 2–4(–7) mm wide; flowers usually less than 2 cm, not or only slightly falcately curved in bud; legume 2.5–4 mm wide.
2a. Leaves 20–40-foliolate; leaf rachis 4–10 cm, internodes often less than 3 cm, node often gibbous; corolla standard 1.1–1.3 cm 3. *S. sesban*
2b. Leaves 40–80-foliolate; leaf rachis 13–30 cm, internodes often more than 3 cm, node not gibbous; corolla standard 0.9–1 cm.
3a. Branchlets, leaf rachises, and flower rachises without prickles; leaflet blades adaxially ± villous when young, glabrescent; standard wider than long 1. *S. cannabina*
3b. Branchlets, leaf rachises, and flower rachises with ± projected prickles; leaflet blades usually glabrous; standard longer than wide 2. *S. bispinosa*

1. *Sesbania cannabina* (Retzius) Poiret, Encycl. 7: 130. 1806.

田菁 tian jing

Aeschynomene cannabina Retzius, Observ. Bot. 5: 26: 1789.

Herbs, annual, 3–3.5 m tall. Stems green or sometimes brown, smooth, with inconspicuous light greenish stripes, slightly glaucous, basally with many adventitious roots; young branches sparsely appressed villous, glabrescent, with white mucilage when broken. Stipules lanceolate, caducous. Leaves 40–60(–80)-foliolate; rachis 15–25 cm, sparsely appressed villous when young, glabrescent, adaxially grooved; petiolules ca. 1 mm, with sparsely appressed trichomes; stipels subulate, subequal to petiolules or shorter, persistent; leaflet blades opposite or subopposite, linear-oblong, 8–20(–40) × 2.5–4(–7) mm, smaller at both ends of rachis than in middle, both surfaces with appressed purplish glands but abaxially denser, abaxially sparsely appressed villous when young but glabrescent, adaxially glabrous, both ends asymmetric, base rounded, apex blunt to truncate and mucronate. Racemes 3–10 cm, 2–6-flowered, lax; peduncle slender, pendulous, sparsely appressed villous; bract linear-lanceolate, caducous. Pedicel slender, pendulous,

sparsely appressed villous; bracteoles 2, caducous. Calyx obliquely campanulate, 3–4 mm, glabrous; teeth triangular, with 1–3 appendages between each, inner margin white slender pilose, apex acute. Corolla yellow; standard lamina transversely ovate to suborbicular, 9–10 mm, with a ca. 2 mm claw, base subrounded and with a small pyriform callus, apex retuse to rounded; wings obovate-oblong, ± as long as standard, ca. 3.5 mm wide, with transverse corrugation, base shortly auriculate, middle with dark grayish brown spots; keel broadly triangular-ovate, shorter than wings, as long as wide, with a ca. 4.5 mm claw, apex obtuse. Anthers ovate to oblong. Pistil glabrous; stigma capitate. Legume long terete, slightly curved, 12–22 cm × 2.5–3.5 mm, dehiscent, outside with dark brown stripes, trabeculate between seeds, carpopodium ca. 5 mm, apex acute and with a 5–7(–10) mm beak. Seeds 20–35 per legume, greenish brown, terete, ca. 4 × 2–3 mm, glossy; hilum rounded, slightly oblique to one end. Fl. and fr. Jul–Dec. $2n = 24$.

Cultivated and sometimes naturalized in open wastelands and paddy field margins. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Nei Mongol, Shandong, Shanxi, Taiwan, Yunnan, Zhejiang [probably native to Australia and SW Pacific islands].

This species is widely cultivated for fibers and often naturalized in Africa, Asia, Australia, Indian Ocean Islands, and Pacific islands.

2. *Sesbania bispinosa* (Jacquin) W. Wight, U.S.D.A. Bur. Pl. Industr. Bull. 137: 15. 1909.

刺田菁 *ci tian jing*

Aeschynomene bispinosa Jacquin, Icon. Pl. Rar. 3: 13. 1792.

Herbs, perennial, suffrutescent, 1–3 m tall. Branches terete, slightly with greenish white striations, often with small sparse flattened prickles. Stipules linear-lanceolate, ca. 7 × 1 mm, caducous, glabrous, apex acuminate. Leaves 40–80-foliolate; rachis 13–30 cm, abaxially with sparse prickles, adaxially grooved; stipels acerose, slender; leaflet blades linear-oblong, 10–16 × 2–3 mm, both surfaces with dense appressed purplish brown glands and glabrous, abaxially grayish green, adaxially green, base rounded, apex obtuse and with a mucro. Racemes 5–10 cm, 2–6-flowered; peduncle often with prickles; bracts linear-lanceolate, ca. 3 mm, caducous, with sparse appressed trichomes. Flowers 0.9–1.2 cm. Pedicel 6–8 mm, slender; bracteoles 2, ovate-lanceolate, caducous, glabrous. Calyx campanulate, ca. 4 mm, glabrous; teeth 5, shortly triangular. Corolla yellow; standard subovate, ca. 1 cm, longer than wide, outside with reddish brown dots, with a triangular callus, base tapering into a claw, apex retuse; wings oblong, with long claw, auriculate at one side; keel long obovate, with a dentiform auricle at base. Stamens 0.9–1.2 cm; anthers obovoid, outer side brown. Pistil linear, as long as stamens; style slender; stigma capitate. Legume dark brown, terete, straight to slightly falcate, 15–22 cm × ca. 3 mm, trabeculate, slightly constricted and with a ca. 5 mm separation between seeds, apical beak 1–1.2 cm. Seeds numerous per legume, subterete, ca. 3 × 2 mm; hilum rounded. Fl. and fr. Aug–Dec. $2n = 12, 13, 14$.

Moist places on mountain slopes and roadsides; below ca. 2000 m. Chongqing, Guangdong, Guangxi, Hainan, SW Sichuan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Kashmir, Malaysia, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam; Africa, Indian Ocean islands, Madagascar, Pacific Ocean islands].

The original distribution is uncertain, as this species is probably naturalized rather than native in some parts of its current distribution.

3. *Sesbania sesban* (Linnaeus) Merrill, Philipp. J. Sci., C, 7: 235. 1912.

印度田菁 *yin du tian jing*

Herbs, perennial, suffrutescent, 2–4 m tall. Branches pubescent, glabrescent, internodes often 0.5–2.5 cm, nodes conspicuously gibbous. Stipules triangular-lanceolate, 3–4 mm, caducous, pubescent. Leaves 20–40-foliolate; petiole and rachis appressed pubescent, more so at petiole base; rachis 4–10 cm; petiolules appressed pubescent; stipels acerose; leaflet blades oblong to linear, 1.3–2.5 cm × 3–4(–6) mm, both surfaces with purplish black glands, abaxially sparsely appressed pubescent when young but glabrescent, adaxially glabrous or glabrescent, midvein evident on both surfaces, base obliquely rounded, apex rounded to retuse and mucronate. Racemes 4–10-flowered; peduncle 8–10 cm, slender, pubescent, glabrescent; bracts linear-lanceolate, caducous, abaxially sparsely appressed pubescent.

Pedicel ca. 8 mm, slender, pubescent when young; bracteoles smaller than bracts, caducous. Calyx campanulate; teeth shortly triangular, inside appressed pubescent to glabrescent. Corolla yellow or calyx and standard purplish black and wings and keel partly purplish black or red; standard transversely elliptic, 1.1–1.3 cm, wider than long, with a 4–5 mm claw, with a S-shaped callus ca. 2 mm, basally decurrent to lamina, widened in middle, and distinct and acuminate to obtuse at apex, base subcordate, apex emarginate; wings oblong, 1–1.2 cm, with a curved ca. 4 mm claw, base inconspicuously auriculate, apex rounded; keel nearly semicircular, 6–8 × 5–7 mm, lamina base narrower than apex and with a triangular short auricle, claw ± as long as calyx. Stamen tube 8–10 mm; anthers ellipsoid. Ovary glabrous; style ca. 5 mm, glabrous; stigma globose. Legume contorted when young but straight or slightly curved at maturity, subterete, 15–23(–30) cm × 3–4 mm, ca. 5 mm between transverse septa, base often with a marcescent calyx, apex beaked. Seeds 20–40 per legume, subterete, 3–4 × ca. 2 mm, slightly compressed; hilum rounded and concave. $2n = 12, 24$.

Cultivated and sometimes naturalized in wastelands, roadsides, riversides, mountain slopes, streamsides; below 300–1300 m. Guangdong, Hainan, Taiwan, Yunnan [origin uncertain; cultivated throughout the tropics].

- 1a. Corolla yellow; corolla standard callus acuminate at apex 3a. var. *sesban*
 1b. Calyx and standard purplish black, wings and keel partly purplish black or red; corolla standard callus blunt at apex 3b. var. *bicolor*

3a. *Sesbania sesban* var. *sesban*

印度田菁(原变种) *yin du tian jing* (yuan bian zhong)

Aeschynomene sesban Linnaeus, Sp. Pl. 2: 714. 1753.

Corolla yellow; corolla standard callus acuminate at apex.

Cultivated and sometimes naturalized in wastelands, roadsides, and riversides; below ca. 300 m. Guangdong, Hainan, Taiwan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Pakistan, Thailand, Vietnam; SW Asia, N Australia].

This taxon is probably native to tropical Asia, but its original natural distribution is uncertain due to it being widely naturalized in disturbed habitats.

3b. *Sesbania sesban* var. *bicolor* (Wight & Arnott) F. W. Andrews, Fl. Pl. Sudan 2: 232. 1952.

元江田菁 *yuan jiang tian jing*

Sesbania aegyptiaca Poiret var. *bicolor* Wight & Arnott, Prodr. Fl. Ind. Orient. 214. 1834.

Calyx and standard purplish black, wings and keel partly purplish black or red; corolla standard callus blunt at apex.

Mountain slopes, roadsides, streamsides; 300–1300 m. Naturalized in Yunnan [probably native to India].

4. *Sesbania grandiflora* (Linnaeus) Persoon, Syn. Pl. 2: 316. 1807.

大花田菁 *da hua tian jing*

Robinia grandiflora Linnaeus, Sp. Pl. 2: 722. 1753; *Resupinaria grandiflora* (Linnaeus) Rafinesque.

Trees, 4–10 m tall, d.b.h. to 25 cm. Branches terete, leaf scars and stipule scars conspicuous. Stipules obliquely lanceolate, to 8 mm, caducous. Leaves 20–40 cm, 20–60-foliolate; rachis terete, densely appressed pubescent when young, glabrescent; petiolules 1–2 mm; stipels acerose; leaflet blades oblong, 2–5 × 0.8–1.6 cm, smaller at both ends of rachis than in middle, both surfaces with or without dense appressed purplish brown glands and appressed villous but glabrescent, secondary veins 7 or 8 on each side of midvein but inconspicuous, base rounded to broadly cuneate, apex obtuse to retuse and with a mucro. Racemes 4–7 cm, pendulous, 2–4-flowered; bract and bracteoles ovate to ovate-lanceolate, 7–10 mm, caducous, both surfaces appressed pubescent. Flowers 7–10 cm, conspicuously falcately curved in bud. Pedicel 1–2 cm, densely appressed pilose. Calyx green, campanulate, 1.8–2.9 × 1.5–2 cm, sometimes with dots, often sub-bilabiate to subtruncate with adaxial 2 teeth connate, outside glabrous except for teeth apex, inside with appressed hairs. Corolla white, pink, or rosy; standard oblong-obovate to broadly ovate, 5–7.5 × 3.5–5 cm, reflexed at anthesis, callus ab-

sent, claw ca. 1.6 cm, base subcordate, apex retuse; wings falcately long ovate, asymmetric, ca. 5 × 2 cm, claw ca. 2 cm, apex obtuse; keel curved, ca. 5 cm, claw ca. 2 cm, limbs with basal abaxial edges connate, apical 1/4–1/3 free, apex obtuse. Stamens ca. 9 mm; anthers linear, 4–5 mm, dorsifixed. Pistil linear, ca. 8 cm, compressed, falcately curved, glabrous; ovary stipitate; stigma slightly turgid. Legume linear, slightly curved, nodding, 20–60 cm × 7–8 mm, ca. 8 mm thick, dehiscent, carpodium ca. 5 cm, suture angulate at maturity, apex tapering into a 3–4 cm beak. Seeds reddish brown, ellipsoid to subreniform, ca. 6 × 3–4 mm, slightly compressed, turgid, slightly glossy; hilum rounded, retuse. Fl. and fr. Sep–Apr. $2n = 24$.

Cultivated in Fujian, Guangdong, Guangxi, Hainan, Taiwan, and Yunnan [probably native to Indonesia and Malaysia].

This species is cultivated throughout the tropics. The flowers are large and beautiful, and the species is grown as an ornamental. The young leaves and flowers are edible, and the bark is used medicinally.

23. Tribe LOTEAE

百脉根族 bai mai gen zu

Wei Zhi (韦直); Tatiana E. Kramina, Dmitry D. Sokoloff

Herbs, semiwoody plants, subshrubs, shrublets, or shrubs. Leaves distichous [except in 2 Mediterranean species] usually epulvinate, imparipinnate or palmate; stipules free or adnate to petiole base, often possessing a gland or reduced to merely a gland; leaflets 3–5 to many, rarely 1 or 2, margin never serrulate or dentate [rarely leaves simple (entire, lobed, or dissected)]. Partial inflorescences usually umbels or heads, sometimes reduced to solitary flower; peduncles [except in 2 Mediterranean species] all axillary, elongate or shortened, with or without a herbaceous sterile bract. Subtending floral bracts usually small, inconspicuous, typically glandular if stipules of foliage leaves are glandular, sometimes bracts absent; bracteoles usually absent. Calyx campanulate or tubular. Standard tapering or abruptly contracted to a claw with or without thickened infolded margins. Vexillary filament free or postgenitally adnate to others to form a closed tube; filaments dilated upward; anthers uniform. Style smooth or papillose, usually glabrous along length, but sometimes with hairs surrounding stigma. Legume 2-valved [in 1 Mediterranean species opening only along a ventral suture], or indehiscent, or breaking into indehiscent or rarely dehiscent joints. Seeds estrophiolate.

About 18 genera and ca. 270 species: mostly in temperate regions, especially the Mediterranean region, N Atlantic islands, and North America (California); one genus and eight species (one to three introduced) in China.

Two other genera are represented in China by one introduced species each. *Coronilla varia* Linnaeus (Sp. Pl. 2: 743. 1753; *Securigera varia* (Linnaeus) Lassen) is cultivated in NE China for ornament and is used medicinally. This species is native to SW Asia and Europe (eastward to Iran, Turkmenistan, and SW Siberia) but is introduced in many other places. *Hippocrepis emerus* (Linnaeus) Lassen (Svensk Bot. Tidskr. 83: 86. 1989; *Coronilla emerus* Linnaeus, Sp. Pl. 2: 742. 1753) is cultivated for ornament in Shaanxi. The species is native to N Africa, SW Asia, and C and S Europe, where it contains two subspecies (*H. emerus* subsp. *emerus* and *H. emerus* subsp. *emeroides* (Boissier & Spruner) Greuter & Burdet ex Lassen). Most important generic differences between *Coronilla* and *Hippocrepis* include structure of stipules, standard claw, vexillary filament, style, ovule, fruit venation, pollen morphology, and chromosome number; in the key below, only features of the two species recorded from China are considered.

- 1a. Legume longitudinally dehiscent; peduncle with a sterile bract (usually a conspicuous leaf with 1–3(–5) leaflets)
below umbel 136. *Lotus*
- 1b. Legume indehiscent, usually breaking into joints; sterile bract absent.
- 2a. Herbs perennial; corolla pink to white *Coronilla* (see note above)
- 2b. Shrubs or shrublets; corolla yellow *Hippocrepis* (see note above)

136. LOTUS Linnaeus, Sp. Pl. 2: 773. 1753.

百脉根属 bai mai gen shu

Bonjeanea Reichenbach; *Dorycnium* Miller; *Miediega* Bubani; *Mullaghera* Bubani; *Scandalida* Adanson; *Tetragonolobus* Scopoli.

Herbs, annual or perennial, subshrubs, or rarely shrubs. Leaves pinnate or palmate, usually sessile, 3–9-foliolate; stipules absent, or reduced to small dark glands; leaflets sessile or on very short petiolules, most species with 5 leaflets, 3 crowded at apex of leaf rachis, 2 at base; basal pair similar to apical ones or often differing in shape and stipulelike. Inflorescence an axillary, pedunculate, 1- to many-flowered umbel; peduncle with a sterile bract usually represented by a conspicuous leaf with 1–3(–5) leaflets; flower-subtending bracts reduced to small dark glands (rarely with a herbaceous blade) or absent; bracteoles usually absent, when rarely present then glandular. Calyx campanulate or trumpet-shaped; teeth 5, subequal or distal longer, sometimes connate into 2 lips. Corolla yellow (often turning green in herbarium), pink, violet, brown, or white. Vexillary stamen free. Ovules numerous or several; style entire [or with a small toothlike appendage]; stigma terminal. Legume linear to ovoid, straight or incurved, terete or flattened, longitudinally dehiscent [indehiscent in 1 species outside China]. Seeds subglobose or lenticular, smooth, rarely verrucose.

About 125 species: temperate and subtropical Africa, Asia, N Atlantic islands, Australia, Europe, W Pacific islands; introduced in the Americas, New Zealand, and some other islands; eight species (one to three introduced) in China.

Sectional subdivisions are given after Kramina and Sokoloff (Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 108(5): 59–63. 2003) and Sokoloff (Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 108(3): 35–48. 2003); these are based on morphology and chromosome numbers. Molecular phylogenetic data (Degtjareva et al., Canad. J. Bot. 84: 813–830. 2006; and Wulfenia 15: 35–49. 2008) are not always consistent with this classification (e.g., *Lotus* sect. *Heinekenia* is paraphyletic), but further research is needed to see if putatively monophyletic groups can be morphologically characterized.

Species nos. 4–7 represent the *Lotus corniculatus* complex, a polyploid complex including both diploid and tetraploid taxa, which are not clearly distinguishable by morphological characters. Introduced in North and South America, Australia, and New Zealand, the taxa are native to E and N Africa, Asia, and Europe.

Lotus pedunculatus Cavanilles (Icon. Descr. 2: 52. 1793; *L. uliginosus* Schkuhr) is a widespread species of swamps, wet meadows, and other wetlands native to N Africa, SW Asia, and Europe, and introduced in S Africa, Australia, North and South America, and the Pacific islands. In view of

this broad non-native distribution, it may also be introduced in China, although no confirmed records are known to the present authors. A short description is provided here. Herbs, perennial, 30–100 cm, glabrescent or sparsely pilose, with underground off-shoots. Stem erect or ascending, subglabrous to villous, hollow. Leaflets obovate, 8–25 × 3–15 mm, often glaucous abaxially, with prominent midrib. Heads (1–)6–12(–18)-flowered; peduncle long. Calyx teeth ca. as long as tube, spreading in bud, pilose. Corolla yellow, 10–18 mm. Legume 15–35 × 1.8–2.5 mm. Seeds olive or yellowish to light brown, usually unspotted, small, ovoid, 1–1.2 mm.

- 1a. Basal leaflets of 5-foliolate sessile leaves adnate to leaf rachis; legume longitudinally 4-winged; flowers 18–28 mm; corolla deep red, purple, or brown when dry; plants annual; cultivated (*L. sect. Tetragonolobus* (Scopoli) Benth & J. D. Hooker) 8. *L. tetragonolobus*
- 1b. Leaflets never adnate to leaf rachis; legume wingless; corolla yellow, red, or white; plants perennial or annual.
 - 2a. Style smooth (except for inconspicuous papillae surrounding stigma); calyx trumpet-shaped; claw of standard less than half as long as standard; keel somewhat curved; all leaflets similar in shape (*L. sect. Bonjeanea* (Reichenbach) D. D. Sokoloff) 1. *L. strictus*
 - 2b. Style papillose along length (use magnification); calyx campanulate; claw of standard longer than above; keel bent at a 90° angle; basal 2 leaflets different in shape to distal 3.
 - 3a. Wings and standard white (occasionally pale pink or tinged with violet), keel white with reddish or pink tip; all leaflets oblanceolate or obovate, basal leaflets sometimes smaller than apical ones, but of a similar shape, with maximum width at distal or central part of a leaflet (*L. sect. Heinekenia* Webb & Berthelot) 2. *L. taitungensis*
 - 3b. Corolla yellow (then often greenish in herbarium), sometimes reddish or red; basal 2 leaflets differing in shape from apical 3 leaflets and typically having maximum width closer to leaflet base (*L. sect. Lotus*).
 - 4a. Perennials with underground off-shoots, stem hollow *L. pedunculatus* (see note above)
 - 4b. Annuals or perennials with a taproot, without underground off-shoots, sometimes with short rhizomes.
 - 5a. Stems and peduncles and often all parts of a plant with long (1–2.5 mm) spreading hairs; style 2.5–3(–3.5) mm; annual or biennial herbs (rarely short-lived perennials) 3. *L. angustissimus*
 - 5b. Plants without long spreading hairs; style more than 3 mm; perennial herbs (sometimes annuals or biennials) (*L. corniculatus* complex).
 - 6a. Leaflets of cauline leaves obovate to obovate-lanceolate, leaflet index (i.e., length to width ratio) ≤ 3.5; calyx teeth longer than tube or equaling it.
 - 7a. Flowers (9–)10–15(–18) mm; corolla yellow; style 4–6 mm; narrow part of 2 upper calyx teeth less than half their length 4. *L. corniculatus*
 - 7b. Flowers 8–10 mm; corolla yellow, becoming red or purple after pollination; style 3–4 mm; narrow part of 2 upper calyx teeth more than half their length 5. *L. krylovii*
 - 6b. Leaflets of cauline leaves oblanceolate to linear, leaflet index ≥ 3.5; calyx teeth shorter than tube or ± equaling it.
 - 8a. Corolla yellow; calyx teeth shorter than tube; terminal leaflet 1.5–3 × as long as leaf rachis; flower 8–10.5(–11) mm; style 4–5.5 mm 6. *L. tenuis*
 - 8b. Corolla yellow, usually with reddish or purple parts; calyx teeth ± equaling tube; terminal leaflet (3–)4–7 × as long as leaf rachis; flower 6–8 mm; style 3–4 mm 7. *L. schoelleri*

1. *Lotus strictus* Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 32. 1835.

直立百脉根 zhi li bai mai gen

Dorycnium strictum (Fischer & C. A. Meyer) Lassen; *Lotus albus* Janka; *L. thermalis* Boissier.

Herbs, perennial, 40–75 cm, sparsely puberulent with appressed trichomes. Stems erect, robust, branching, subglabrous. Leaf rachis very short; all leaflets similar in shape, oblong-obovate to oblong, 6–30 × 4–12 mm, sparsely puberulent abaxially. Umbels 2–10-flowered; peduncle longer than leaves. Calyx trumpet-shaped, 7–8 mm, sparsely puberulent; teeth subequal, slightly shorter than tube; upper teeth curved upward. Corolla white or pale yellow, 10–15(–20) mm; claw of standard less than half as long as standard; keel somewhat curved. Style smooth (except for inconspicuous papillae surrounding stigma). Legume cylindrical, 25–40 × 3–4 mm, straight or curved at apex.

Xinjiang [E Kazakhstan, Russia (Altai); SW Asia (Armenia, Turkey), SE Europe (Bulgaria, Greece)].

Lotus strictus was reported from Xinjiang by Chang Y. Yang (Claves Pl. Xinjiang. 3: 20. 1985). The species has a highly disjunct distribution; the localities in China, Kazakhstan, and Russia are close to each other but far away from the next-closest localities in Armenia.

2. *Lotus taitungensis* S. S. Ying, Coloured Ill. Fl. Taiwan 5: 596. 1995.

兰屿百脉根 lan yu bai mai gen

Lotus pacificus Kramina & D. D. Sokoloff.

Herbs, perennial, 50–80 cm, puberulent. Rootstock woody. Stem terete, strong, fleshy, decumbent with end ascending. Leaves sessile; stipules absent or present as inconspicuous dark glands; rachis 4–12 mm; leaflets 5(–7), all similar in shape, oblanceolate to narrowly obovate, 1–2(–4) cm, base cuneate, apex acute to almost rounded with a cusp. Heads (1 or)2–6(–8)-flow-

ered; peduncle (0.6–)2–3 cm; sterile bract with 1–3 leaflets; subtending floral bracts present, wholly glandular or rarely with a minute blade and a pair of glands; pedicels short, pubescent. Flowers (8.5–)10–14.5(–20) mm. Calyx 7–11 mm; teeth subulate, as long as or longer than tube. Corolla white, occasionally pale pink or tinged with violet, keel dark spotted with reddish or pink tip; keel incurved by acute angle, shortly rostrate. Ovary linear, glabrous; style (3–)4.5–6.5 mm. Legume cylindric, 3–5 cm × 2.7–4.4 mm, straight, valves twisted. Seeds numerous, globose, smooth. Fl. Sep–Mar.

Sandy places on seashores. Taiwan (Lan Yu and along E coast of main island) [Japan (Ryukyu Islands)].

The Chinese records of *Lotus australis* Andrews are referable to this species, which was named *L. pacificus* (Kramina & Sokoloff, Adanson, n.s., 26: 183. 2004) although *L. taitungensis* had been previously described for the same taxon. True *L. australis* is restricted to Australia. Other relatives of *L. taitungensis* are *L. anfractuosus* (E. G. Baker) Kramina & D. D. Sokoloff from New Caledonia and Vanuatu and *L. cruentus* Court from Australia.

3. *Lotus angustissimus* Linnaeus, Sp. Pl. 2: 774. 1753.

尖齿百脉根 jian chi bai mai gen

Lotus praetermissus Kuprianova.

Herbs, annual or biennial, rarely short-lived perennial, (5–)10–30(–50) cm, glabrescent or sparsely pilose, stems and peduncles and often other parts of plant with long (1–2.5 mm) spreading hairs, stems also with short (0.1–0.6 mm) semi-appressed trichomes. Stems erect, prostrate or ascending, branched, slender. Leaflets 5, acute, apical 3 elliptic to narrowly elliptic or rhombic, 7–17 × 2–6 mm, basal 2 obliquely ovate, shorter than apical ones. Umbels 1- or 2(or 3)-flowered; peduncle 0.5–4 cm; sterile bract with 1–3 leaflets. Flowers 5–8(–8.5) mm. Calyx 4–5 mm; teeth filiform, longer or shorter than tube. Corolla yellow or orange. Style 2.5–3(–3.5) mm. Legume light to dark brown, straight, cylindric, 5–28 × 1–1.5 mm, 12–28-seeded. Seeds yellow or brown, 1-colored or spotted, globose, 0.9–1.2 mm. Fl. Jun–Oct, fr. Jul–Nov.

Moist grasslands, sandy soils by margins of swamps and ravines; 500–1200 m. Xinjiang [Kazakhstan, Russia (European part, Siberia); N Africa, SW Asia, N Atlantic islands, Europe; introduced in S Africa, Australia, W North America, and Pacific islands (New Zealand)].

This is probably an introduced species in China.

4. *Lotus corniculatus* Linnaeus, Sp. Pl. 2: 775. 1753.

百脉根 bai mai gen

Herbs, perennial, 15–80 cm, with a taproot, scattered sparsely white puberulent or glabrescent. Stem cylindric to angular, solid, decumbent or ascending. Leaflets 5, apical 3 obovate to oblanceolate-obovate (lateral 2 oblique), 5–20 × 4–10 mm, papery, basal 2 stipulelike, midrib obscure. Umbels rarely more than 7-flowered; peduncle 3–10 cm; sterile bract with 1–3 leaflets, ± equal to calyx, 5–7 mm. Flowers (9–)10–18 mm. Calyx teeth almost equal in length, narrowly triangular, ± equaling, longer than, or shorter than tube. Corolla yellow or partly or wholly orange-red, often bluish black when dry. Ovary glabrous; ovules 35–40; style 4–6 mm. Legume brown, linear-cy-

lindric, 20–25 × 2–4 mm. Seeds light to dark brown, 1-colored or spotted with violet-black spots or dots, small, ovoid, 1–1.7 mm. Fl. (Jan–)Feb–Oct, fr. (Mar–)Apr–Oct.

Pinus plantations, thickets, scrub, damp meadows, alpine meadows, dry hill pastures, grassy places, rocky slopes, ravines, river valleys, banks, roadsides, abandoned fields, cultivated ground; 400–3400 m. Guizhou, Hubei, Hunan, Sichuan, Taiwan, Tianjin, Xizang, Yunnan [Afghanistan, Bhutan, India, Japan, Kashmir, Kazakhstan, Korea, Mongolia, Myanmar, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan; E and N Africa, SW Asia, Europe; introduced in Australia (including Tasmania), North, Central, and South America, and Pacific islands (New Zealand)].

- 1a. Umbels 3–7-flowered; calyx teeth equaling, shorter than, or longer than calyx tube, narrow part of 2 upper calyx teeth more than half their length 4a. var. *corniculatus*
- 1b. Umbels 1–3(or 4)-flowered; calyx teeth slightly longer than calyx tube, narrow part of 2 upper calyx teeth less than half their length 4b. var. *japonicus*

4a. *Lotus corniculatus* var. *corniculatus*

百脉根(原变种) bai mai gen (yuan bian zhong)

Plants subglabrous or scattered sparsely white puberulent on vegetative parts and calyces. Umbels 3–7-flowered. Flowers 11–18 mm. Corolla yellow or yellow with orange parts or stripes. Calyx teeth equaling, shorter than, or longer than calyx tube, narrow part of 2 upper calyx teeth more than half their length. $2n = 24$.

Moist and weak alkaline soil of fields, grasslands, and ravines. Provinces of upper and middle Chang Jiang, NW and SW China [N Africa, SW Asia, Europe; introduced in Australia and North America].

The occurrence this variety in China needs to be confirmed, because previously only diploid races of the *Lotus corniculatus* complex were reported to occur as native in E Asia (Larsen, Bot. Tidsskr. 54: 44–56. 1958; Grant, Canad. J. Bot. 73: 1787–1809. 1995). However, this variety may occur as an introduced taxon in China.

4b. *Lotus corniculatus* var. *japonicus* Regel, Index Sem. Hort. Petrop. 23. 1864.

光叶百脉根 guang ye bai mai gen

Lotus japonicus (Regel) Larsen.

Plants glabrescent or sparsely puberulent on rachis, petioles, midrib, calyces (especially on teeth margins and abaxial part of tube), and sometimes stems. Umbels 1–3(or 4)-flowered. Flowers 10–12.5(–14) mm. Corolla yellow. Calyx teeth slightly longer than tube, sometimes equaling it, narrow part of 2 upper calyx teeth less than half their length. $2n = 12$.

Grasslands, ravine slopes, mountain meadows, alongside irrigation channels and streams, rice fields, river valleys, lake banks, roadsides, rocky slopes; below 3100 m. Provinces of upper and middle Chang Jiang, C, NW, and SW China, Taiwan [Japan, Kashmir, Korea, C and W Nepal].

In FRPS (42(2): 224, 226. 1998), *Lotus alpinus* (Seringe) Schleicher ex Ramond (Mem. Mus. Hist. Nat. (Paris) 13: 275. 1825; *L.*

corniculatus var. *alpinus* Seringe in Candolle, Prodr. 2: 214. 1825) was recorded from alpine rocky slopes at 3000–3500 m in Qinghai and Xizang. One of us (Kramina) has seen no specimens similar to *L. alpinus* among the material studied from China. Probably some mountain forms or varieties of *L. corniculatus* sensu lato exist in China, but these do not seem close to those from C Europe or even Turkey, where *L. alpinus* is otherwise distributed. This problem needs additional study using both morphological and molecular-genetic methods.

5. *Lotus krylovii* Schischkin & Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1932 (7–8): 5. 1932.

中亚百脉根 zhong ya bai mai gen

Lotus confusus Sergievskaya; *L. corniculatus* Linnaeus var. *versicolor* Bongard & C. A. Meyer.

Herbs, perennial, sometimes annual, 10–45 cm, glabrous or puberulent on cauline leaves and calyces. Stem branched from base, erect or ascending. Leaflets 5, apical 3 obovate to obovate-elliptic and obovate-lanceolate, 7–13 × 4–6 mm, base cuneate, apex rounded, basal 2 obliquely ovate, acute, subglabrous on both surfaces. Umbels 1- or 2(or 3)-flowered; peduncle 2–6 cm; sterile bract with 1–3 leaflets. Flowers 8–10 mm. Calyx 5–6 mm; teeth filiform, longer than tube, narrow part of upper calyx teeth more than half their length. Corolla light yellow, then becoming purple or red. Ovary linear; ovules 30–35; style 3–4 mm. Legume cylindrical, 20–30 × 2–3 mm. Fl. May–Aug, fr. Jul–Oct.

Alkaline or saline swamps and lakeshores. Xinjiang (Junggar Pendi, Kashi Diqu), Xizang [Afghanistan, India, Kazakhstan, Kyrgyzstan, W Mongolia, Pakistan, Russia (European part, Siberia), Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran), E Europe (SE Ukraine); introduced in North America (Canada)].

The Chinese record of *Lotus frondosus* (Freyn) Kuprianova from Xinjiang (FRPS 42(2): 224, 226. 1998) is based on a misidentification of *L. krylovii*, as were the records from the former Soviet Union by Kuprianova (Fl. URSS 11: 295. 1945). *Lotus corniculatus* var. *frondosus* Freyn was described from Turkmenistan and is distributed also in Afghanistan, Pakistan, Uzbekistan, and SW Asia (Iran and Iraq).

6. *Lotus tenuis* Waldstein & Kitaibel ex Willdenow, Enum. Pl. 2: 797. 1809.

细叶百脉根 xi ye bai mai gen

Lotus corniculatus Linnaeus var. *tenuifolius* Linnaeus; *L. corniculatus* subsp. *tenuis* (Waldstein & Kitaibel ex Willdenow) Briquet; *L. glaber* Miller, nom. utique rej.; *L. tenuifolius* (Linnaeus) Reichenbach.

Herbs, perennial, 20–100 cm, with a taproot, glabrescent or sparsely puberulent with short appressed hairs. Stem slender, erect or ascending. Leaflets 5, obovate-oblongate or oblanceolate to linear, 4–18 × 1–4 mm, basal 2 shorter; terminal leaflet of a leaf 1.5–3 × as long as leaf rachis. Umbels (1 or) 2–5-flowered; peduncle 3–12 cm, slender; bracts 1–3, 1.5–2 × as long as calyx. Flowers 8–10.5(–11) mm. Calyx 4–6 mm; teeth shorter than tube, narrow part of 2 upper calyx teeth less than

half their length. Corolla yellow. Ovary linear; ovules numerous; style 4–5.5 mm. Legume straight, cylindrical, 9–25 × 1.2–2.5 mm. Seeds light brown, globose, 1.4–1.6 mm, smooth. Fl. May–Aug, fr. Jul–Sep.

Saline, poorly drained grasslands of lake or swamp shores. NW China, Tianjin [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (European part, Siberia), Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced in North America, Pacific islands (New Zealand), and South America (Argentina)].

Whether this is a native or introduced species in China needs verification.

7. *Lotus schoelleri* Schweinfurth, Bull. Herb. Boissier 4(App. 2): 231. 1896.

直根百脉根 zhi gen bai mai gen

Lotus corniculatus Linnaeus var. *eremanthus* Chiovenda; *L. elisabethae* Opperman ex Wissjulina; *L. mearnsii* De Wilde-man (1925), not (Britton) Greene (1890).

Herbs, perennial or annual, with a taproot, almost glabrous or rarely with spreading trichomes. Stem erect or ascending. Leaflets: apical 3 oblanceolate to linear, basal 2 obliquely ovate to lanceolate; terminal leaflet (3–)4–7 × as long as leaf rachis. Umbels 1–3-flowered; peduncle 1–6(–10) cm. Flower 6–8 mm. Calyx 4.5–5.8 mm; teeth ± equaling tube, narrow part of 2 upper calyx teeth less than half their length. Corolla yellow, usually with rose, red, or purple parts. Style 3–4 mm. Legume straight, almost cylindrical or slightly compressed, 15–30 × 1.5–4 mm.

Wet meadows, often on saline soils, banks of rivers, lakes, and irrigation channels. Gansu, Liaoning, Nei Mongol, Xinjiang [Afghanistan, Mongolia, Russia (Lower Volga region, S Siberia), Turkmenistan; E and N Africa, SW Asia, E Europe (E Ukraine)].

8. *Lotus tetragonolobus* Linnaeus, Sp. Pl. 2: 773. 1753.

齿荚百脉根 chi jia bai mai gen

Tetragonolobus purpureus Moench.

Herbs, annual, 15–40 cm. Stem fleshy, prostrate, ascending, or erect, branchy, ridged, usually spreading sparsely villous. Leaflets 5, sessile, apical 3 ovate-rhombic, 2–5 × ca. 3 cm, base cuneate, apex acuminate, basal 2 stipulelike, adnate to rachis, ovate, less than 1 cm, puberulent on both surfaces. Umbels 1- or 2-flowered; peduncle short; bracts 3. Flowers 18–28 mm. Calyx ca. 15 mm, pubescent, often with dark purple spots; teeth longer than tube. Corolla scarlet, mauve when dry. Ovary glabrous; ovules numerous. Legume cylindrical, (20–)30–60(–70) × 5–8 mm, tapering at both ends, margins thickened, with 4 wings by sides of both sutures, undulate, 2–4 mm in width. Seeds brown, subglobose, 3.5–4.5 mm, smooth.

Cultivated in China [native to the Mediterranean region, extending to S Ukraine and Caucasus; introduced in Australia and Pacific islands (New Zealand)].

The young tender legumes are eaten as a vegetable.

24. Tribe ROBINIEAE

刺槐族 ci huai zu

Sun Hang (孙航); Bruce Bartholomew

Trees, shrubs, or herbs, sometimes with glandular trichomes. Stipules narrow, sometimes becoming thorns or absent. Leaves pulvinate, paripinnate or imparipinnate; leaflets opposite or subopposite; stipels often present. Racemes all axillary or sometimes fasciculate at older nodes, pendulous; bracts membranous, caducous. Calyx campanulate, sometimes bilabiate, 5-toothed with adaxial 2 teeth \pm connate. Standard often with basal appendages; wings free from keel, often with corrugated venation. Stamens diadelphous (9+1); vexillary filament free or connate with others higher up into an open sheath or rarely forming a closed tube; anthers uniform or nearly so. Ovary stipitate, many to several ovuled, rarely ovules only 1 or 2. Legume woody to thinly leathery, 2-valved, continuous within or rarely septate between seeds. Seeds broadly ovoid, oblong-reniform, or oblong, flat, without strophiole.

Eleven genera and ca. 70 species: distributed in America, especially in C and W South America; one genus (introduced) and two species in China.

137. ROBINIA Linnaeus, Sp. Pl. 2: 722. 1753.

刺槐属 ci huai shu

Trees or shrubs, all parts (excluding corolla) sometimes with glandular bristles. Buds only axillary. Stipules bristlelike or spinelike. Leaves imparipinnate; leaflet blades petiolulate and stipellate, margins entire. Racemes axillary, pendulous; bracts membranous, caducous. Calyx campanulate, 5-lobed, adaxial 2 lobes subconnate into an apical lip. Corolla white, pink, or rosy; petals stipitate; standard large, retroflexed; wings curved; keel incurved, blunt. Stamens diadelphous, 1 distinct from other 9 connate ones; anthers homomorphic, 2-loculed, longitudinally dehiscent. Ovary stipitate, many ovuled; style subulate, apically piliferous; stigma small, terminal. Legume compressed, narrowly winged along ventral suture, segments often with appressed bristles. Seeds oblong or obliquely reniform, strophiole absent.

Between four and ten species: North America and Central America; two species (both introduced) in China.

- 1a. Branchlets, rachis, and pedicel with appressed adnate puberulence; stipulate spines present; leaflets oblong; corolla white; legume smooth 1. *R. pseudoacacia*
1b. Branchlets, rachis, and pedicel with appressed spiny hairs or glandular hairy; stipulate spines absent; leaflets oblong to suborbicular; corolla rosy; legume scabrous glandular hairy 2. *R. hispida*

1. *Robinia pseudoacacia* Linnaeus, Sp. Pl. 2: 722. 1753.

刺槐 ci huai

Robinia pseudoacacia var. *inermis* Candolle; *R. pseudoacacia* var. *pyramidalis* (Pepin) C. K. Schneider; *R. pseudoacacia* var. *umbraculifera* Candolle; *R. pyramidalis* Pepin.

Trees, 10–25 m tall, deciduous. Bark gray-brown to dark brown, longitudinally fissured, rarely smooth. Branchlets gray-brown, sparsely hairy, glabrescent; stipulate spines up to 2 cm; winter buds small, with hairs. Leaves 10–25(–40) cm; rachis adaxially grooved; petiolule 1–3 mm; stipel acicular; leaflets 2–12 pairs, usually opposite or subopposite; leaflet blades oblong, elliptic, or ovate, 2–5 \times 1.5–2.2 cm, abaxially grayish green and with appressed pubescence when young but glabrescent, adaxially green, base rounded to broadly cuneate, margin entire, apex rounded, retuse, and apiculate. Racemes axillary, 10–20 cm, pendulous, many flowered, fragrant; bracts caducous. Pedicel 7–8 mm. Calyx obliquely campanulate, 7–9 mm; teeth 5, triangular to ovate-triangular, densely appressed pubescent. Corolla white, stipitate; standard suborbicular, ca. 1.6 \times 1.9 cm, reflexed, inside with yellow spots, base rounded, apex with a sinus; wings obliquely obovate, subequal to standard, ca. 16 mm, one lateral auriculate rounded; keel falcate, triangular, equal to wings or slightly short, connate at leading edge, obtuse. Stamens diadelphous, one opposite to standard free. Ovary linear, ca. 1.2 cm, glabrous; stalk 2–3 mm; style subulate, ca. 8

mm, apically curved, apex piliferous; stigma terminal. Legume brown or with reddish brown stripes, linear-oblong, 5–12 \times 1–1.3(–1.7) cm, compressed, apex volute and mucronate, carpodium short, narrow wings along ventral suture; calyx persistent, 2–15-seeded. Seeds brown to dark brown, slightly glossy, sometimes with stripes, subreniform, 5–6 \times ca. 3 mm; hilum rounded, oblique to one end. Fl. Apr–Jun, fr. Aug–Sep. $2n = 20$, 22.

Cultivated in all of China except Hainan and Xizang [native to E North America; cultivated and sometimes naturalized in many parts of the world].

2. *Robinia hispida* Linnaeus, Mant. Pl. 1: 101. 1767.

毛洋槐 mao yang huai

Shrubs, 1–3 m tall, deciduous. Young branches green, densely appressed purple scabrous glandular hairy and white pilose; biennial branches dark gray-brown, densely brown bristly, 2–5 mm. Leaves 15–30 cm; rachis appressed bristly and white curled pubescent, adaxially grooved; petiolule appressed white pubescent; stipel aristiform, persistent; leaflets 5–7(or 8) pairs; leaflet blades elliptic, ovate, broadly ovate, or suborbicular, 1.8–5 \times 1.5–3.5 cm, often basal pair of leaflets on rachis smaller, glabrous, abaxially grayish green, adaxially dark red when young but later turning green, midvein abaxially with sparse appressed trichomes, base rounded, apex rounded and aristiform. Racemes axillary, all but corolla appressed purple glandular hairy and

white pubescent, 3–8-flowered; peduncle 4–8.5 cm; bracts ovate-lanceolate, 5–6 mm, caducous, sometimes apical ones 3-lobed, apex gradually caudate. Calyx purple, obliquely campanulate; tube ca. 5 mm; teeth triangular, 3–6 mm, apex caudate to subulate. Corolla red to rosy. Petals stipitate; standard sub-reniform, ca. 2 × 3 cm, apex with a sinus; wings falcate, ca. 2 cm, auriculate; keel nearly triangular, ca. 1.5 cm, apex rounded, connate at leading edge, auriculate. Stamens diadelphous, one opposite to standard free; anthers elliptic. Ovary subterete, ca.

1.5 cm, with densely appressed adense papillae, faintly pilose along sutures, many ovuled; stigma terminal. Legume linear, 5–8 × 8–12 mm, compressed, 3–5-seeded, with dense appressed bristles, carpopodium short, apex acute. Fl. May–Jun, fr. Jul–Oct.

Cultivated in at least Anhui, Hebei, Henan, Shaanxi, Shandong, Shanxi, and Zhejiang [native to C and E North America].

This species is grown as an ornamental.

25. Tribe GALEGEAE

山羊豆族 shan yang dou zu

Xu Langran (徐朗然 Xu Lang-rang), Zhu Xiangyun (朱相云), Bao Bojian (包伯坚), Zhang Mingli (张明理), Sun Hang (孙航);
Dietrich Podlech, Stanley L. Welsh, Hiroyoshi Ohashi, Kai Larsen, Anthony R. Brach

Herbs or shrubs, with simple or T-shaped hairs; glands or glandular punctae sometimes present. Leaves epulvinate or pulvinus reduced, imparipinnate or paripinnate, with many opposite to irregularly arranged or rarely conjugate leaflets, rarely 1–3-foliolate; stipules free or adnate to petiole, estipellate. Flowers in axillary racemes, spikes, or rarely solitary. Calyx campanulate to tubular; standard clawed or narrowed to base; wings auriculate; keel blunt to apiculate. Stamens diadelphous, rarely monadelphous; anthers usually uniform, but slightly dimorphic and with confluent thecae in *Glycyrrhiza*. Ovary few to many ovuled (sometimes 1-seeded); style slender, bearded or not, with a terminal or lateral stigma. Legumes compressed, angled or inflated, sometimes with sutured margins intruded or longitudinally septate, occasionally torulose, dehiscent or indehiscent. Seeds oblong-reniform, estrophiolate.

About 24 genera and 2900–3200 species: principally in Asia, Europe, and North America, but extending thinly in mountainous and/or drier places to S Africa, Australia, and temperate South America; 11 genera and 586 species (324 endemic, two introduced) in China.

Galega officinalis Linnaeus (Sp. Pl. 2: 714. 1753), probably native to SW Asia (Caucasus), is cultivated in China.

- 1a. Style bearded, sometimes just a tuft of hairs below stigma on one side; wings and keel never interlocking (subtribe Coluteinae).
 - 2a. Leaves reduced to scales; flowers solitary; legumes compressed 145. *Eremosparton*
 - 2b. Leaves imparipinnate, 7–25-foliolate; flowers in racemes; legumes inflated.
 - 3a. Flowers yellow; standard with 2 callosities above claw; shrubs 143. *Colutea*
 - 3b. Flowers red to violet, rarely yellow; standard without callosities above claw; shrubs or herbs.
 - 4a. Plants with medifixed hairs; legumes inflated subglobose 144. *Sphaerophysa*
 - 4b. Plants with basifixed hairs; legumes narrowly ellipsoid to ovoid 138. *Phyllobium*
- 1b. Style glabrous, but stigma sometimes penicillate (sometimes inner side of style upper part hairy in *Astragalus*); wings and keel mostly interlocking with bosses on keel and matching sockets on wings (indistinct only in *Gueldenstaedtia* and *Tibetia*).
 - 5a. Anther thecae confluent toward apex; leaves pulvinate, spirally arranged; some hairs glandular-peltate or -capitate (subtribe Glycyrrhizinae) 148. *Glycyrrhiza*
 - 5b. Anther thecae separate; leaf pulvinus reduced or absent; plants without peltate glandular hairs.
 - 6a. Legume nerves oblique, closely parallel, raised at maturity, confluent toward placental margin; vexillary filament connate with others; keel petals not auriculate; leaflet nerves extending to margin (subtribe Galeginae) *Galega* (see note above)
 - 6b. Legume nerves transverse, confluent over middle part of valves, fine or inconspicuous; vexillary filament generally free; keel petals generally auriculate; leaflet nerves usually looped within margin or inconspicuous (subtribe Astragalinae).
 - 7a. Calyx base usually oblique, upper side ± slightly gibbous; wings pinnately nerved; legume valves generally twisting on dehiscent.
 - 8a. Stem obvious; stipules membranous, separated from petiole; calyx campanulate 142. *Chesniella*
 - 8b. Stem abbreviated, plants appearing acaulescent; stipules herbaceous, adnate to petiole; calyx tubular 141. *Chesneya*
 - 7b. Calyx base symmetric or suboblique; wings usually palmately nerved; legume valves not twisting.
 - 9a. Keel petals half as long as wings; style shorter than or as long as ovary.
 - 10a. Style incurved; upper 2 calyx lobes free; seeds scrobiculate; stipules free and adnate to base of petiole 146. *Gueldenstaedtia*
 - 10b. Style curved in right angle; upper 2 calyx lobes connate; seeds smooth, marbled-spotted; stipules connate below apex and opposite to leaves 147. *Tibetia*
 - 9b. Keel petals subequal to or slightly shorter than wings; style longer than ovary.
 - 11a. Keel petals obtuse; legume 1-locular or with a septum intruding from abaxial suture; leaflets ± symmetric 139. *Astragalus*
 - 11b. Keel petals apiculate; legume 1-locular or with a septum intruding from adaxial suture; leaflets basally ± oblique or, if narrow, falcately incurved 140. *Oxytropis*

138. PHYILLOBIUM Fischer in Sprengel, Novi Provent. 33. 1818.

膨果豆属 peng guo dou shu

Xu Langran (徐朗然 Xu Lang-rang), Zhang Mingli (张明理); Dietrich Podlech

Perennial herbs with mostly well-developed stems, with basifixed hairs. Stipules free from petiole and from each other, very

rarely shortly connate behind stem. Racemes several, with a distinct peduncle; bracts persistent. Bracteoles present or more rarely absent. Calyx campanulate. Standard wide, mostly suborbicular to transversely elliptic, with a very short claw, emarginate at apex; keel and wing petals not interlocking due to absence of bosses on keel and matching sockets on wings. Style with a brush of straight, rigid, short hairs just below glabrous stigma. Legumes 1-locular or incompletely to completely 2-locular.

Twenty-two species: mostly in China, a small number in the Himalayas and one in Tajikistan; 21 species (17 endemic) in China.

- 1a. Plants with slender stems up to 90 cm, at least in lower 1/2 with long, horizontally spreading lateral branches; hairs slender, 0.1–0.4 mm 8. *P. eutrichus*
- 1b. Stems mostly shorter, without horizontally spreading lateral branches, if sometimes as long as above, then with other kinds of hair.
- 2a. Plants in all parts covered with bladderlike, scalelike hairs up to 0.1 mm 4. *P. chinense*
- 2b. Plants at least at calyx with slender, longer, not bladderlike hairs.
- 3a. Petals yellow, rarely with violet-tipped keel.
- 4a. Plants 30–75 cm tall; calyx 7–12 mm, teeth 4–9 mm; keel as long as wings 5. *P. dolichochaete*
- 4b. Plants 10–50 cm tall; calyx up to 10 mm, teeth up to 6 mm; keel longer than wings.
- 5a. Leaflets in 7–13 pairs, 5–16 × 1–4 mm, distinctly more than 2 × as long as wide; peduncles 3–11 cm 9. *P. flavovirens*
- 5b. Leaflets in 4–10 pairs, 5–10 × 2.5–5 mm, ca. 2 × as long as wide; peduncles 1.5–4 cm 2. *P. camptodontum*
- 3b. Petals blue or violet, rarely yellow at base only.
- 6a. Plants at least in part with spreading hairs.
- 7a. Calyx 8–10 mm, white hairy, teeth 4.5–6 mm; standard 15–19 mm; legumes with a stipe ca. 5 mm, 25–30 mm, 2-locular 21. *P. turgidocarpum*
- 7b. Calyx shorter, white and black hairy, teeth mostly shorter; standard 7–13 mm; legumes with a stipe up to 3 mm or sessile, up to 20 mm, 1-locular.
- 8a. Leaflets 8–20 mm; bracts 8–10 mm; calyx 7–8 mm, with teeth 4–5 mm 12. *P. lineariauriferum*
- 8b. Leaflets distinctly smaller; bracts at most up to 4 mm; calyx up to 6 mm with shorter teeth.
- 9a. Stipules 2.5–4.5 mm; leaflets 3–15 mm; bracts 1.5–4 mm; bracteoles 0.5–2 mm; calyx teeth 1.5–4 mm; legumes 5–6.5 mm high and wide 20. *P. tribulifolium*
- 9b. Stipules up to 2.5 mm; leaflets 2–6 mm; bracts up to 2 mm; bracteoles mostly absent, if present, then ca. 0.3 mm (in *P. milingense*); calyx teeth up to 2.5 mm; legumes either much higher than wide or much wider than high.
- 10a. Stems with appressed hairs; leaflets loosely to rather densely hairy adaxially; bracts 1.5–2 mm; legumes 15–20 mm, 8–12 mm high, strongly compressed laterally, without beak 10. *P. heydei*
- 10b. Stems with partly spreading hairs; leaflets glabrous to subglabrous adaxially; bracts 0.6–1 mm; legumes 10–15 mm, 2.5–3 mm high and 5–7 mm wide, with a short beak 13. *P. milingense*
- 6b. Plants with appressed to ascending hairs only.
- 11a. Leaflets on both surfaces loosely to densely hairy.
- 12a. Stipules 2–3 mm; bracts 4–6 mm, with spreading hairs; calyx 7–8 mm, covered with spreading white and dark brown hairs 3. *P. chapmanianum*
- 12b. Stipules 4–7 mm; bracts 6–10 mm, with appressed to ascending hairs; calyx 9–10 mm, covered with appressed to ascending white and shorter black hairs 11. *P. lasaense*
- 11b. Leaflets adaxially glabrous or rarely sparsely hairy.
- 13a. Standard up to 10 mm; bracts up to 2 mm; bracteoles absent.
- 14a. Plants up to 50 cm tall; calyx 7–8 mm; legumes 25–30 mm 17. *P. siccanum*
- 14b. Plants up to 30 cm tall; calyx up to 5.5 mm; legumes up to 13 mm.
- 15a. Stem and peduncles loosely to rather densely hairy; leaflets narrowly elliptic, 3–11 × 1–2 mm, acute; keel as long as wings 15. *P. prodigosum*
- 15b. Stem and peduncles glabrous to sparsely hairy; leaflets elliptic, 4–9 × 1.5–4 mm, obtuse; keel distinctly longer than wings 16. *P. sanbilingense*
- 13b. Standard at least 12 mm; bracts mostly distinctly longer.
- 16a. Stem, rachises, and peduncles glabrous or sparsely hairy; leaflets 10–30 × 3.5–10 mm 14. *P. pastorium*
- 16b. Stem, rachises, and peduncles loosely to rather densely hairy, sometimes only sparsely hairy; leaflets up to 12 mm.
- 17a. Stem, rachises, and peduncles covered with hairs up to 0.15 mm and also with much shorter, minute, nearly globose hairs; calyx teeth 2.5–3 mm; legumes very shortly acuminate 7. *P. enneaphyllum*
- 17b. Stems without minute subglobose hairs; at least longer calyx teeth 3.5–6 mm; legumes with a beak 2–4 mm.
- 18a. Stipules 1–3 mm, lower ones completely embracing stem but free from each other; keel shorter than wings 6. *P. donianum*

- 18b. Stipules 3–5 mm, lower ones not or up to 1/2 embracing stem; keel longer than wings.
 19a. Plants 20–40(–60) cm tall; racemes 2–7(–9)-flowered; petals violet or in lower part yellow 1. *P. balfourianum*
 19b. Plants 10–25 cm tall; stipules not embracing stem, never reflexed; racemes 1–5-flowered; petals purple or purple-red and standard in middle with a white, purple-striate spot.
 20a. Leaflets narrowly obovate, 2–3 mm wide; bracteoles 2–3(–4) mm; standard purple-red, ca. 16 mm, limb ca. 14 mm wide, transversely elliptic, in middle with a white, purple-striate spot 19. *P. tingriense*
 20b. Leaflets widely obovate, 3.3–6 mm wide; bracteoles absent or up to 1 mm; standard purple, ca. 12 mm, limb ca. 8 mm wide, suborbicular 18. *P. sichuanense*

1. *Phyllobium balfourianum* (N. D. Simpson) M. L. Zhang & Podlech, Feddes Repert. 117: 44. 2006.

长小苞膨果豆 chang xiao bao peng guo dou

Astragalus balfourianus N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 123. 1913; *A. minutebracteolatus* N. D. Simpson; *A. prattii* N. D. Simpson; *A. prattii* var. *multiflorus* K. T. Fu; *A. prattii* var. *pastorioides* K. T. Fu; *A. schneideri* Ulbrich.

Plants 20–40(–60) cm tall, with appressed hairs 0.1–0.4 mm. Stems several, (6–)20–55 cm, mostly glabrous at base, in lower part loosely and in upper part more densely white and black hairy. Leaves 2–6 cm; stipules 3–5 mm, sparsely to loosely hairy; petiole short, 0.1–1 cm, like rachis sparsely to rather densely hairy; leaflets in lower leaves mostly in 3–5 pairs, in upper leaves mostly in 5–10 pairs, 5–12(–16) × (2–)3–6 mm, abaxially subglabrous or loosely to rather densely white hairy, adaxially glabrous to very rarely sparsely appressed hairy. Racemes short, nearly capitate-umbellate, with 2–7(–9) flowers; peduncle 1–6.5 cm, loosely to rather densely predominantly black hairy; bracts 3–7 mm, sparsely hairy. Bracteoles 1–7 mm. Calyx 6–10 mm, covered loosely to rather densely with appressed, predominantly blackish hairs up to 0.3 mm; teeth 3.5–6 mm. Petals violet to purplish; standard 12.5–17.5 × 9–14 mm; wings 11–16 mm; keel 12.5–16 mm. Legumes with a stipe 2–3.5 mm, 16–18 mm, 6–7 mm high and wide, with a beak 2–4 mm, 1-locular, loosely covered with mostly dark brown appressed hairs 0.05–0.15 mm.

- 2600–4000 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

2. *Phyllobium camptodontum* (Franchet) M. L. Zhang & Podlech, Feddes Repert. 117: 46. 2006.

弯齿膨果豆 wan chi peng guo dou

Astragalus camptodontus Franchet, Pl. Delavay. 160. 1889; *A. camptodontoides* N. D. Simpson; *A. camptodontus* var. *lichiangensis* (N. D. Simpson) K. T. Fu; *A. lichiangensis* N. D. Simpson; *A. rockii* C. Marquand & Airy Shaw.

Plants 25–50 cm tall, with exception of leaflets and calyx covered with subappressed, bladderlike, minute, predominantly black hairs 0.05–0.2 mm. Stems slender, mostly glabrous at base, in middle part loosely and in upper part more densely hairy. Leaves 2–4.5 cm; stipules 2–5 mm, often reflexed, hairy mostly only at margins; petiole 0.3–0.5 cm, like rachis loosely to rather densely predominantly white hairy; leaflets in 4–10 pairs, 5–10 × 2.5–5 mm, abaxially loosely to rather densely

covered with appressed white hairs 0.2–0.35 mm, adaxially glabrous. Racemes short, with 1–6 flowers; peduncle 1.5–4 cm, loosely hairy; bracts 1.5–5 mm, white ciliate. Bracteoles 1–4 mm. Calyx 6–8 mm, covered loosely to rather densely with appressed, mostly dark brown, slender hairs 0.1–0.2 mm; teeth 2.5–5.5 mm. Petals yellow with violet-tipped keel or violet-purple; standard 13–17 × 9–13 mm; wings 11–13 mm; keel 13–14.5 mm. Legumes with a stipe 2.5–3 mm, (13–)17–21 mm, 3.5–6 mm high and wide, with a beak 2–3 mm, 1-locular, glabrous.

- 2500–3800 m. Sichuan, Xizang, Yunnan.

3. *Phyllobium chapmanianum* (Weninger) M. L. Zhang & Podlech, Feddes Repert. 117: 47. 2006.

蔓生膨果豆 man sheng peng guo dou

Astragalus chapmanianus Weninger, Mitt. Bot. Staats-samml. München 30: 108. 1992.

Plant hairs appressed to nearly spreading, white, in inflorescence predominantly dark brown. Stems 6.5–11 cm, slender, in lower parts glabrescent, in upper part rather densely white and dark brown hairy. Leaves 1–2.2 cm, sessile; stipules 2–3 mm, hairy; rachis hairy; leaflets in (2–)4–7 pairs, 4–6 × 2–3.5 mm, abaxially densely and adaxially loosely to densely covered with ± appressed hairs. Racemes 1–3-flowered; peduncle 0.8–1.5 cm, rather densely covered with ± appressed white and dark brownish hairs; bracts 4–6 mm, spreading hairy. Bracteoles 4–5 mm. Calyx 7–8 mm, rather densely covered with spreading, white and dark brown hairs; teeth ca. 4 mm. Petals violet; standard transversely elliptic, ca. 10 × 8.5 mm; wings 9.5–10 mm; keel ca. 9 mm. Ovary with a stipe ca. 0.5 mm, densely black brown and white hairy. Legumes unknown.

- 3500–4500 m. Xizang.

4. *Phyllobium chinense* Fischer in Sprengel, Novi Provent. 33. 1818.

背扁膨果豆 bei bian peng guo dou

Astragalus complanatus Bunge; *A. pratensis* Ulbrich.

Plants 30–90(–100) cm tall, covered with ± appressed, very short, scalelike, bladderlike hairs up to 0.1 mm. Stems in lower part glabrous, in upper part loosely to rather densely hairy. Leaves 4–11 cm; stipules 1–3 mm, obliquely inserted at stem and sometimes slightly clasping stem, sparsely to loosely hairy; petiole very short, rachis sparsely to loosely white hairy; leaflets in 4–10 pairs, 5–18 × 2.5–11 mm, abaxially sparsely to

loosely hairy, adaxially glabrous. Racemes 4–9 cm, remotely 2–7-flowered; peduncle 4–9 cm, sparsely to loosely white hairy; bracts 1–2.5 mm, white and black hairy. Bracteoles 0.5–1 mm. Calyx 4–7 mm, loosely to densely white or black hairy; teeth 2–3.5 mm. Petals yellow to reddish; standard orbicular or transversely elliptic, 9–11 × 8–10.5 mm; wings 8–11 mm; keel 9–10 mm. Legumes with a stipe 1–1.5 mm, 30–44 mm, 4–8 mm high, with a straight beak 3–4 mm, 1-locular, loosely to rather densely covered with appressed white or black hairs.

• 1000–1700 m. Gansu, Hebei, Henan, Jiangsu, Jilin, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

5. *Phyllobium dolichochoete* (Diels) M. L. Zhang & Podlech, Feddes Repert. 117: 48. 2006.

芒齿膨果豆 mang chi peng guo dou

Astragalus dolichochoete Diels, Notes Roy. Bot. Gard. Edinburgh 5: 245. 1912; *A. albidoflavus* K. T. Fu.

Plants 30–75 cm tall, covered with appressed to ascending hairs 0.3–0.5 mm. Stems 10–25 mm in diam., sparsely to loosely covered in lower part with white hairs, in upper part with increasingly blackish brown hairs, and in inflorescence region only with black hairs. Leaves 3.5–11.5 cm; stipules 4–6 mm, glabrous or sparsely to loosely hairy, at margins more densely hairy; petiole very short, like rachis sparsely to loosely hairy; leaflets in (4 or) 5–12 pairs, 4–21.5 × 1.5–6 mm, abaxially sparsely to loosely hairy, adaxially glabrous. Racemes 1–2 cm, densely, later somewhat more loosely, 3–11-flowered; peduncle 4–15 cm, often curved, mostly with brownish black hairs, bracts 4–8 mm, nearly glabrous to loosely or at margins more densely black hairy. Bracteoles 0.5–4 mm. Calyx 7–12 mm, sparsely to loosely or densely mostly appressed black hairy; teeth 4–9 mm, often ± strongly curved. Petals greenish yellow to sulfur-yellow; standard 14–17 × 12–15 mm; wings 12–15 mm; keel 12–15 mm. Legumes with a stipe 2–3 mm, 16–22 mm, 3.5–4.5 mm high, with a beak 2–3 mm, 1-locular, glabrous or sparsely to loosely covered with white to blackish brown hairs.

• 2700–4300 m. Sichuan, Xizang, Yunnan.

6. *Phyllobium donianum* (Candolle) M. L. Zhang & Podlech, Feddes Repert. 117: 49. 2006.

亚东膨果豆 ya dong peng guo dou

Astragalus donianus Candolle, Prodr. 2: 283. 1825; *A. monanthus* K. T. Fu; *A. prattii* N. D. Simpson var. *uniflorus* E. Peter; *A. pycnorhizus* Wallich ex Bentham; *A. yatungensis* C. C. Ni & P. C. Li.

Plants creeping to prostrate. Stems 15–44 cm, in basal part glabrous to sparsely and in upper part loosely or more rarely rather densely covered with appressed white or white and black hairs 0.1–0.2 mm. Leaves 1.5–5 cm; stipules 1–3 mm, free or in front of petiole shortly connate, lower and middle ones 1/2 to completely embracing stem but not connate, at margins and often also elsewhere loosely hairy; petiole short, rachis loosely hairy like stem; leaflets in 4–8 pairs, 2–7(–9) × 1.5–4 mm, emarginate, abaxially at first rather densely appressed hairy, becoming loosely hairy with age, hairs ca. 0.3 mm, adaxially gla-

brous. Racemes short, 1–3(–5)-flowered; peduncle 1.5–6 cm, loosely white and black hairy; bracts 1–4 mm, sparsely hairy. Bracteoles 1–3 mm. Calyx 5.5–7.5 mm, loosely to rather densely covered with ± ascending white and black hairs 0.2–0.5 mm; teeth 2–4.5 mm. Petals blue-violet to purple or dark red; standard orbicular to transversely elliptic, 13–17 × 11–13.5(–15) mm; wings 12–16 mm; keel 12–15(–16) mm. Legumes with a stipe 2–3 mm, 15–30 mm, (5–)6–8(–9.5) mm high, with a beak 2–3 mm, 1-locular, at first densely, later loosely, shortly, white and blackish or only blackish hairy.

Xizang, Yunnan [Bhutan, India, Nepal].

7. *Phyllobium enneaphyllum* (P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 51. 2006.

九叶膨果豆 jiu ye peng guo dou

Astragalus enneaphyllum P. C. Li, Acta Bot. Yunnan. 11: 289. 1989.

Plants subappressed white hairy or in inflorescence also with a few black hairs. Stems prostrate, 40–60 cm, sparsely to loosely covered with hairs up to 0.15 mm and also with much shorter, minute, nearly globose hairs. Leaves 2–4.5 cm; stipules 1.5–3 mm, subglabrous; petiole short, rachis hairy like stem; leaflets in 3 or 4 pairs, 6–11 × 3–5.5 mm, abaxially loosely covered with hairs 0.3–0.5 mm, adaxially glabrous. Racemes loosely 2–4-flowered; peduncle 2.5–3.5 cm, hairy like stem; bracts 2–3 mm, white hairy. Bracteoles not always present, 1–2 mm. Calyx 6.5–7 mm, loosely covered with appressed white hairs up to 0.5 mm and with fewer and shorter black hairs; teeth 2.5–3 mm. Petals pale blue; standard widely obovate to suborbicular, ca. 12 × 7.5–8 mm; wings ca. 11 mm; keel ca. 12 mm. Legumes with a stipe ca. 3 mm, 25–28 mm, 2.5–3 mm high and 7–8 mm wide, very shortly acuminate, 1-locular, sparsely to loosely covered with subappressed white hairs 0.1–0.25 mm.

• Yunnan.

8. *Phyllobium eutrichus* (Handel-Mazzetti) M. L. Zhang & Podlech, Feddes Repert. 117: 51. 2006.

真毛膨果豆 zhen mao peng guo dou

Astragalus complanatus Bunge var. *eutrichus* Handel-Mazzetti, Symb. Sin. 7: 553. 1933; *A. complanatus* subsp. *eutrichus* (Handel-Mazzetti) Weninger.

Plants 30–90(–100) cm tall, covered with always thin, slender hairs 0.1–0.4 mm. Stems at least in lower 1/2 with ± horizontally spreading, long lateral branches, glabrous in lower part, in upper part and lateral branches loosely appressed white hairy, in upper part with some black hairs mixed in. Leaves 2–9 cm, subsessile; stipules 2–5 mm, sparsely hairy or subglabrous; rachis loosely appressed white hairy; leaflets in 5–8 pairs, 4–8 × 2–5 mm, abaxially loosely hairy, adaxially toward margins sparsely hairy or subglabrous, apex emarginate. Racemes 2–5 cm, remotely 2–7-flowered; peduncle 2.5–6 cm, sparsely white and black hairy; bracts 1.5–2.5 mm, white and black hairy. Bracteoles sometimes present, ca. 1 mm. Calyx 5–6 mm, sparsely to very sparsely white and black hairy; teeth 2–2.5 mm. Petal color unknown; standard widely elliptic to orbicular,

12–13 × ca. 7.5 mm; wings ca. 9 mm; keel 11–12 mm. Legumes (unripe) with a stipe ca. 3 mm, narrowly ellipsoid, narrowed at both ends, straight, with a beak ca. 2 mm, when young densely covered with appressed white hairs 0.2–0.3 mm.

- 2400–3000 m. Yunnan.

9. *Phyllobium flavovirens* (K. T. Fu) M. L. Zhang & Podlech, Feddes Repert. 117: 52. 2006.

黄绿膨果豆 huang lü peng guo dou

Astragalus flavovirens K. T. Fu, Bull. Bot. Res., Harbin 2(1): 122. 1982; *A. angustifoliolatus* K. T. Fu.

Plants loosely caespitose, in vegetative parts covered with appressed white hairs 0.1–0.3 mm, in inflorescence mostly with dark brownish to blackish hairs. Stems 10–40(–60) cm, prostrate to ascending or erect, in lower part only with bractlike stipules without developed leaves, loosely hairy. Leaves 2–11 cm, nearly sessile; stipules 4–8 mm, loosely hairy or sparsely ciliate; rachis loosely hairy; leaflets in 7–13 pairs, 5–16 × 1–4(–7) mm, abaxially sparsely to loosely hairy, adaxially glabrous, mostly somewhat cucullate at apex, with a cusp up to 0.5 mm. Racemes short, densely 3–9-flowered; peduncle 3–11 cm, blackish brown hairy; bracts 5–6 mm, with blackish brown hairs. Bracteoles 1.5–4 mm. Calyx 7–9 mm, loosely covered with appressed black hairs 0.05–0.1 mm; teeth unequal, 2 upper 2–4 mm, 3 lower 4–6 mm. Petals yellowish, sometimes with purple tip; standard suborbicular, ca. 15 × 11 mm; wings ca. 12 mm; keel ca. 13 mm. Ovary with a stipe ca. 3 mm, linear, glabrous to white hairy. Legumes unknown.

- 2500–3000 m. Yunnan.

10. *Phyllobium heydei* (Baker) M. L. Zhang & Podlech, Feddes Repert. 117: 53. 2006.

毛柱膨果豆 mao zhu peng guo dou

Astragalus heydei Baker in J. D. Hooker, Fl. Brit. India 2: 118. 1876; *A. hendersonii* Baker; *A. heydei* var. *hendersonii* (Baker) H. Ohba, S. Akiyama & S. K. Wu.

Plants up to 12 cm tall, densely hairy. Stems in leafy part ca. 1 cm, sparsely to loosely covered with subappressed, flexuous, tangled, white hairs 0.1–0.2 mm. Leaves 1–2.5 cm; stipules 1–2.5 mm, shortly connate behind stem and mostly also in front of petiole, sparsely to loosely white hairy; petiole 0.2–0.6 cm, like rachis loosely to rather densely covered with subappressed to spreading, white hairs 0.2–0.4 mm; leaflets in 3–7 pairs, 2–5(–7) × 1–4 mm, both surfaces densely to rather densely covered with subappressed to ascending, partly flexuous, tangled, white hairs 0.5–0.7 mm. Racemes (1 or) 2–5-flowered; peduncle 1–4.5 cm, often curved, loosely hairy like stem in upper part; bracts 1.5–2 mm, hairy. Calyx 3–6 mm, densely to rather densely covered with ascending to spreading, flexuous, white hairs 0.5–0.7 mm, with very short, appressed, black hairs mixed in; teeth 1.5–2(–3) mm. Petals pink to pale violet; standard orbicular to transversely elliptic, 9–12 × 9–13 mm; wings 9–11 mm; keel 8–10 mm. Legumes subsessile, 15–20 mm, 8–12 mm high, compressed laterally, 1-locular, rather densely, later loosely, covered with short, appressed to ascending, white or black and white hairs.

3900–5800 m. Qinghai, Sichuan, Xinjiang, Xizang [India, Nepal].

11. *Phyllobium lasaense* (C. C. Ni & P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 54. 2006.

拉萨膨果豆 la sa peng guo dou

Astragalus lasaensis C. C. Ni & P. C. Li, Acta Phytotax. Sin. 17(2): 107. 1979.

Plants densely covered with appressed or nearly ascending hairs (0.3–)0.5–1 mm. Stems creeping, prostrate to ascending or erect, 15–30 cm, loosely to densely covered with subappressed, tangled, white and brownish black, partly very short hairs. Leaves 2.5–4 cm, nearly sessile; stipules 4–7 mm, densely white hairy; rachis densely hairy; leaflets in 4–9 pairs, 3–10 × 1.5–4 mm, abaxially densely and adaxially loosely silvery hairy. Racemes short, 2–7-flowered; peduncle 1.5–3 cm, rather densely white and black hairy; bracts 6–10 mm, white or white and black hairy. Bracteoles 4–5 mm. Calyx 9–10 mm, densely covered with tangled, subappressed to ascending, white hairs and with mostly distinctly shorter black hairs; teeth 4–5 mm. Petals purple to violet; standard orbicular to transversely elliptic, 10–12 × 8–11 mm; wings 10–11 mm; keel 8–10 mm. Legumes shortly stipitate, 6–10 mm, 3–4 mm high and wide, with a short beak, nearly fully 2-locular, loosely covered with appressed white and also some black hairs 0.1–0.2 mm.

- 4100–4700 m. Xizang.

12. *Phyllobium lineariauriferum* (P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 55. 2006 [*“lineariaurifer”*].

线耳膨果豆 xian er peng guo dou

Astragalus lineariaurifer P. C. Li, Acta Bot. Yunnan. 11: 292. 1989.

Plants 20–30 cm tall, with subappressed to spreading hairs 0.3–1 mm. Stems erect, often curved, loosely to rather densely covered with ascending to ± spreading mostly white hairs. Leaves 3–5 cm, subsessile; stipules 4–7 mm, loosely white hairy, at base also black hairy; rachis loosely covered with subappressed to spreading white and scattered black hairs; leaflets in 5 or 6 pairs, 8–20 × 2–5 mm, both surfaces loosely to rather densely subappressed hairy. Racemes loosely 4–6-flowered; peduncle 4–5 cm, loosely covered with ± spreading, mostly black hairs; bracts 8–10 mm, black hairy. Bracteoles ca. 2 mm. Calyx 7–8 mm, loosely to rather densely covered with ascending to ± spreading white and black hairs; teeth 4–5 mm. Petals ?bluish; standard widely ovate to suborbicular, 12–13 × 10–11 mm; wings 10.5–11 mm; keel 12–13 mm. Legumes (immature) with a stipe ca. 3 mm, narrowly ellipsoid, ca. 10 mm, 1-locular, densely covered with subappressed to ascending white hairs.

- Sichuan.

13. *Phyllobium milingense* (C. C. Ni & P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 56. 2006.

米林膨果豆 mi lin peng guo dou

Astragalus milingensis C. C. Ni & P. C. Li, Acta Phytotax. Sin. 17(2): 107. 1979; *A. milingensis* var. *heydeiodes* K. T. Fu.

Plants covered with mostly white hairs. Stems prostrate,

5–30 cm, often zigzaglike bent, in basal parts glabrous or sparsely hairy, in upper parts loosely to rather densely covered with appressed to spreading white or partly black and white hairs 0.2–0.3(–0.4) mm. Leaves 1–2.5 cm; stipules 1.5–2 mm, sparsely hairy; petiole 0.3–0.5 cm, like rachis loosely to rather densely hairy, hairs subappressed to spreading, white, sometimes also some black; leaflets in 3–6 pairs, 2–4 × 1–2 mm, abaxially densely to rather densely covered with ± appressed, short, white hairs, more rarely also with black hairs, adaxially glabrous or sometimes with a few appressed hairs toward base and margins. Racemes loosely 1–4-flowered; peduncle 1–2 cm, rather densely covered with mostly appressed, short, white hairs; bracts 0.6–1 mm, mostly white hairy. Bracteoles mostly absent, if present, less than 0.3 mm. Calyx 3–5 mm, rather densely covered with subappressed to ascending or even spreading, short, white hairs, sometimes also with black hairs; teeth 1.5–2.5 mm. Petals pink or purple to violet; standard orbicular, 7–10 × 6–8.5 mm; wings 7–8 mm; keel 7–8 mm. Legumes with a stipe ca. 1 mm, 10–15 mm, 2.5–3 mm high and 5–7 mm wide, with a short beak and often persistent style, 1-locular, rather densely covered with ascending white hairs 0.2–0.3 mm.

- 3000–4300 m. Gansu, Sichuan, Xizang.

14. *Phyllobium pastorium* (H. T. Tsai & T. T. Yu) M. L. Zhang & Podlech, Feddes Repert. 117: 57. 2006.

牧场膨果豆 mu chang peng guo dou

Astragalus pastorius H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 264. 1940; *A. pastorius* var. *linearibracteatus* K. T. Fu; *A. tencingensis* K. T. Fu.

Plants 25–40 cm tall, with appressed hairs 0.1–0.5 mm. Stems prostrate to ascending or erect, glabrous or sparsely to loosely or especially in upper part to rather densely covered with subappressed to ascending white and black hairs. Leaves 6–10 cm; stipules 4–7 × 3–5 mm, glabrous or with a few black hairs at margins; petiole 1–2 cm, glabrous or very sparsely furnished with short black hairs; leaflets in 2–5 pairs, 10–30 × 3.5–10 mm, abaxially sparsely to loosely covered with appressed white or black and white hairs 0.3–0.4 mm, adaxially glabrous or sparsely hairy. Racemes rather densely 4–8-flowered; peduncle (3–)4.5–10 cm, glabrous or sparsely to rather densely black hairy; bracts 4–6 mm, black hairy. Bracteoles 1–2 mm. Calyx 5–7(–10) mm, densely to rather densely covered with appressed black hairs 0.1–0.3 mm; teeth 2–3(–5) mm. Petals blue; standard suborbicular, 12–13 × 9–10 mm; wings ca. 11 mm; keel ca. 11 mm. Legumes with a stipe ca. 4 mm, 15–25 mm, ca. 5 mm high and wide, with a straight beak 1–3 mm, 2-locular, sparsely to loosely furnished with appressed black hairs 0.05–0.15 mm.

- 3000–4000 m. Sichuan, Xizang, Yunnan.

15. *Phyllobium prodigiosum* (K. T. Fu) M. L. Zhang & Podlech, Feddes Repert. 117: 58. 2006.

奇异膨果豆 qi yi peng guo dou

Astragalus prodigiosus K. T. Fu, Bull. Bot. Res., Harbin 2(1): 121. 1982; *A. milingensis* C. C. Ni & P. C. Li var. *pauci-*

jugus (K. T. Fu) K. T. Fu; *A. milingensis* var. *prodigiosus* (K. T. Fu) K. T. Fu; *A. prodigiosus* var. *paucijugus* K. T. Fu.

Plants 5–10 cm tall, covered with appressed to subappressed, short, white hairs. Stems several, prostrate to ascending or erect, 2–10 cm, loosely to densely covered with hairs 0.05–0.2 mm. Leaves 2–3.5 cm, subsessile; stipules 1.5–3 mm, sparsely hairy; rachis hairy like stem; leaflets in 3–9 pairs, 3–11 × 1–2 mm, abaxially loosely covered with appressed hairs 0.3–0.5 mm, adaxially glabrous or with a few hairs only, especially toward margins. Racemes 1–1.5 cm, 3–5-flowered; peduncle 1–3 cm, rather densely hairy like stem; bracts ca. 1 mm, hairy. Calyx 4–5.5 mm, loosely covered with appressed white hairs 0.2–0.4 mm; teeth 2–2.5 mm. Petals violet; standard transversely ovate, 8–10 × 9–12 mm; wings 7–9 mm; keel 7–9 mm. Legumes shortly stipitate, ca. 12 mm, ca. 3 mm high and ca. 5 mm wide, with a slender, slightly curved beak ca. 4 mm, 1-locular, loosely covered with appressed white hairs 0.2–0.3 mm.

- 3300–3800 m. Sichuan, Xizang.

16. *Phyllobium sanbilingense* (H. T. Tsai & T. T. Yu) M. L. Zhang & Podlech, Feddes Repert. 117: 58. 2006.

乡城膨果豆 xiang cheng peng guo dou

Astragalus sanbilingensis H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 265. 1940.

Plants ca. 30 cm tall, with only white, appressed, flattened hairs 0.02–0.3 mm. Stems glabrous to sparsely hairy. Leaves 2–3.5 cm, subsessile or petiole 0.4–0.6 cm, like rachis loosely hairy; stipules 2–2.5 mm, sparsely hairy at margins; leaflets in 7–9 pairs, 4–9 × 1.5–4 mm, abaxially loosely hairy, adaxially glabrous. Racemes loosely 2–5-flowered; peduncle 2–4 cm, sparsely hairy to glabrous; bracts ca. 2 mm, sparsely hairy. Calyx ca. 5 mm, loosely covered with appressed hairs 0.3–0.5 mm; teeth 2–2.5 mm. Petals purplish; standard orbicular, ca. 9 × 7–8 mm; wings ca. 7 mm; keel 8–8.5 mm. Legumes subsessile, 8–13 mm, ca. 2 mm high and ca. 4 mm wide, with a straight beak ca. 2 mm, 1-locular, loosely covered with short, appressed, white hairs.

- Sichuan, Yunnan.

17. *Phyllobium siccaneum* (P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 59. 2006.

耐旱膨果豆 nai han peng guo dou

Astragalus siccaneus P. C. Li, Acta Bot. Yunnan. 11: 291. 1989.

Plants 18–50 cm tall, with only white, short, ± appressed hairs up to 0.3 mm. Stem erect, sparsely to loosely covered with hairs 0.05–0.2 mm. Leaves 3–5 cm, subsessile; stipules 2–4 mm; rachis sparsely hairy; leaflets in 3–5 pairs, 4–7 × 2–4 mm, abaxially loosely hairy, adaxially glabrous. Racemes loosely 2- or 3-flowered; peduncle 3–9 cm, glabrous or sparsely hairy like stem; bracts 1.5–2 mm, sparsely hairy. Calyx 7–8 mm, loosely hairy; teeth 2–2.5 mm. Petals pink or purplish; standard transversely elliptic, ca. 10 × 10 mm; wings ca. 9 mm; keel ca. 8 mm. Legumes with a stipe ca. 3 mm, 25–30 mm, 4–5 mm high, with a beak 4–5 mm, 1-locular, loosely white hairy when young, soon glabrescent.

• Sichuan.

18. *Phyllobium sichuanense* Podlech, Feddes Repert. 120: 56. 2009.

四川膨果豆 si chuan peng guo dou

Plants ca. 15 cm tall. Stems 6–12 cm, branched at base, sparsely to loosely covered with appressed white and black hairs 0.2–0.3 mm. Leaves ca. 3 cm, subsessile; stipules 3–4 mm, free, subglabrous, sparsely ciliate; leaflets in 5–7 pairs, widely obovate, 5–9 × 3.3–6 mm, abaxially loosely covered with appressed hairs 0.4–0.5 mm, adaxially glabrous. Racemes short, 4- or 5-flowered; peduncle 2–3 cm, predominantly black hairy; bracts 3–4 mm, narrowly triangular, black hairy. Bracteoles absent or up to 1 mm. Calyx 7–8 mm, rather densely covered with subappressed black hairs 0.1–0.3 mm, with some white hairs mixed in; teeth ca. 4 mm. Petals purple; standard ca. 12 mm, limb ca. 8 mm wide, suborbicular; wings ca. 10 mm, limbs narrowly oblong, ca. 6 × 1.5 mm; keel ca. 12 mm. Legumes (unripe), with a stipe 2–3 mm, at least 10 mm, densely covered with appressed white and black hairs.

• Sichuan (Dêgê).

19. *Phyllobium tingriense* (C. C. Ni & P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 59. 2006.

定日膨果豆 ding ri peng guo dou

Astragalus tingriensis C. C. Ni & P. C. Li, Acta Phytotax. Sin. 18: 367. 1980.

Plants 10–25 cm tall. Stems prostrate to ascending, sparsely to loosely covered in basal parts with appressed to ascending, tangled, white hairs 0.2–0.5 mm, in upper part with much shorter black hairs. Leaves 2–4.5 cm, subsessile; stipules 3–4.5 mm, sparsely white hairy; rachis sparsely to loosely covered with subappressed to spreading white and black hairs 0.1–0.3 mm; leaflets in (3–)5–8 pairs, 4–8 × 2–3 mm, abaxially and at margins rather densely covered with subappressed, ± rigid, white hairs 0.2–0.3 mm, adaxially glabrous. Racemes 1–4-flowered; peduncle 2–9 cm, sparsely to loosely and below raceme often densely hairy like stem in upper part; bracts 3–5 mm, white or black hairy. Bracteoles 2–3(–4) mm, hairy. Calyx 5–6 mm, densely covered with subappressed to ascending white hairs 0.5–0.8 mm and with black hairs 0.1–0.3 mm; teeth 2–3 mm. Petals purple-red, standard in middle with a white, purplish-striate spot; standard 15–16 × 11–12 mm, limb wider than long, with a claw ca. 4 mm; wings ca. 13 mm; keel 14–15 mm. Legumes (unripe) with a stipe ca. 5 mm, at least 10 mm, ca. 3 mm high, compressed laterally, with a beak 2–2.5 mm; valves densely covered with appressed white hairs 0.1–0.2 mm.

Xizang [Nepal].

20. *Phyllobium tribulifolium* (Bentham ex Bunge) M. L. Zhang & Podlech, Feddes Repert. 117: 60. 2006.

蒺藜叶膨果豆 ji li ye peng guo dou

Astragalus tribulifolius Bentham ex Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 4. 1868; *A. chingianus* P. C. Li (1989), not E. Peter (1937); *A. tanguticus* Batalin; *A. tanguticus* f. *albiflorus* (K. T. Fu) K. T. Fu; *A. tanguticus* var. *albiflorus* K. T. Fu; *A. tribulifolius* var. *pauciflorus* C. Marquand & Airy Shaw.

Plants covered with white hairs, in inflorescence with mostly blackish hairs. Stems 6–20 cm, prostrate to ascending or erect, loosely, in upper part rather densely covered with spreading or sometimes partly appressed white or white and brownish hairs 0.2–0.3 mm. Leaves 1–5 cm, subsessile; stipules (1.5–)2.5–4.5(–5.5) mm, lower ones triangular, often semiamplexicaul, upper ones narrowly triangular, all sparsely to loosely hairy; rachis loosely to rather densely hairy; leaflets in (3 or)4–9(or 10) pairs, 3–15 × 2–5 mm, abaxially to densely and adaxially sparsely to loosely covered with subappressed to ascending hairs up to 0.5 mm, or adaxially glabrous. Racemes short, (1 or)2–10-flowered; peduncle 1–6 cm, rather densely hairy; bracts 1.5–4(–5) mm, hairy. Bracteoles 0.5–2 mm or sometimes absent. Calyx (3–)4–6(–7) mm, loosely to rather densely hairy; teeth (1–)1.5–4 mm. Petals violet, purple, or pinkish; standard orbicular to transversely elliptic, 8–12 × 8–12 mm; wings 7–9 mm; keel 7.5–11 mm. Legumes with a stipe 2–2.5 mm, 9–17 mm, 5–6.5 mm high and wide, with a beak 1–2 mm, 1-locular, loosely to rather densely covered with short, spreading or appressed, white, or white and blackish or only blackish hairs.

Dry open scrub-covered and rocky slopes; 2700–5500 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [India, Nepal, Pakistan].

21. *Phyllobium turgidocarpum* (K. T. Fu) M. L. Zhang & Podlech, Feddes Repert. 117: 62. 2006.

膨果豆 peng guo dou

Astragalus turgidocarpus K. T. Fu, Bull. Bot. Res., Harbin 2(1): 127. 1982.

Plants up to 30 cm tall, covered with only white hairs 0.02–0.3 mm. Stems 15–40 cm, diffusely prostrate to ascending, in basal part glabrous, in upper part sparsely to loosely spreading hairy. Leaves 3–5.5 cm; stipules 3–4 mm, ciliate; petiole 0.3–1 cm, with rachis hairy like stem; leaflets in 5–7 pairs, 5–9 × 2.5–5 mm, abaxially loosely covered with tangled subappressed hairs, adaxially glabrous. Racemes 2–4-flowered; peduncle 3–7 cm, hairy like stem; bracts ca. 4 mm, ciliate. Bracteoles 0.3–1 mm. Calyx 8–10 mm, sparsely to loosely hairy; teeth 4.5–6 mm. Petals purple; standard suborbicular, 15–19 × 10–13 mm; wings ca. 12 mm; keel 14–15 mm. Legumes with a stipe ca. 5 mm, 25–30 mm, ca. 5 mm high and wide, with a slender beak, 2-locular, loosely hairy.

• 900–2100 m. Gansu, Sichuan.

139. ASTRAGALUS Linnaeus, Sp. Pl. 2: 755. 1753.

黄耆属 huang qi shu

Xu Langran (徐朗然 Xu Lang-rang); Dietrich Podlech

Annual or perennial herbs, subshrubs, or shrubs, often sometimes spiny, glabrous or hairy; hairs basifixed or symmetrically or

asymmetrically bifurcate, white or black, at margins of stipules and bracts often with minute sessile glands. Leaves paripinnate or imparipinnate or leaflets rarely verticillate; stipules green or membranous, adnate to petiole or free, often vaginate-connate behind stem. Racemes axillary, sessile or pedunculate, loosely or densely few to many flowered. Flowers subsessile or with a distinct pedicel; bracteoles sometimes present. Calyx campanulate to tubular, with 5 equal or unequal teeth mostly hairy on inner side, sometimes inflated in fruit. Petals glabrous or more rarely hairy; standard mostly emarginate at apex, more rarely rounded, mostly with a \pm distinct claw; wings auriculate at limb base. Stamens diadelphous, rarely monadelphous, with uniform anthers. Ovary sessile or stipitate; style below or at capitate stigma rarely hairy or penicillate. Legumes very variable, mostly keeled ventrally and grooved dorsally, 1-locular, incompletely or completely 2-locular; walls membranous, leathery or rarely hard and legumes then nutlike. Seeds rectangular-reniform, estrophiolate.

About 3,000 species: ca. 2,500 species in the Old World, represented in nearly all parts of the N Hemisphere, ca. 500 species in the New World; 401 species (221 endemic) in 59 sections (two endemic) in China.

Several species and varieties of the genus described from China, the types of which are housed in several small herbaria, have not been seen by us. The taxonomic value of these taxa is therefore uncertain. They are treated here according to the original diagnosis only.

The measurements of legumes do not include the stipe and beak.

1a. Annual herbs.

- 2a. Legumes narrowly linear, curved, terete, 1-locular, slightly constricted between seeds; stipules minute, free; racemes sessile to subsessile, few flowered 5. *A. sect. Ophiocarpus* (p. 335)
- 2b. Legumes never linear and curved, never constricted; other characters different.
- 3a. Calyx teeth very unequal in length; keel always longer than wings.
- 4a. Petals whitish or yellowish; legumes falcate to screwlike twisted 3. *A. sect. Cycloglottis* (p. 334)
- 4b. Petals violet; legumes curved 4. *A. sect. Heterodontus* (p. 335)
- 3b. Calyx teeth \pm equal in length; keel shorter than wings.
- 5a. Standard in middle distinctly transversely dilated; legumes with a hooked or bent beak, with an indumentum of short appressed and longer spreading hairs 1. *A. sect. Ankylotus* (p. 333)
- 5b. Standard never dilated in middle; other characters different.
- 6a. Standard without distinct claw; legumes with sharp edges or wings on sides 6. *A. sect. Oxyglottis* (p. 336)
- 6b. Standard with a distinct claw; legumes without sharp edges or wings.
- 7a. Racemes elongated 2. *A. sect. Haematodes* (p. 334)
- 7b. Racemes densely capitate 7. *A. sect. Onycholobium* (p. 336)

1b. Perennial herbs or shrublets.

- 8a. Plants with medifixed or asymmetrically bifurcate hairs.
- 9a. Strongly branched, subspherical spiny shrublets 55. *A. sect. Bulimoides* (p. 443)
- 9b. Plants never spiny.
- 10a. All stipules or rarely only those of lower leaves distinctly vaginate-connate behind stem.
- 11a. Plants acaulescent or nearly so.
- 12a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated; legumes included in persistent calyx 59. *A. sect. Laguropsis* (p. 448)
- 12b. Calyx tubular up to fruiting time, ruptured by legume.
- 13a. Legumes bladderlike inflated, membranous 48. *A. sect. Cystium* (p. 428)
- 13b. Legumes not bladderlike inflated, leathery 45. *A. sect. Helmia* (p. 421)
- 11b. Plants with a well-developed stem.
- 14a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated; legumes included in persistent calyx.
- 15a. Plants shrubby to subshrubby 57. *A. sect. Cysticalyx* (p. 444)
- 15b. Plants herbaceous 58. *A. sect. Hypsophili* (p. 447)
- 14b. Calyx tubular up to fruiting time, ruptured by legume.
- 16a. Flowers in loose, rather elongated racemes.
- 17a. Petals yellowish green 36. *A. sect. Uliginosi* (p. 405)
- 17b. Petals lilac or violet.
- 18a. Calyx mostly long tubular; legumes linear 40. *A. sect. Ornithopodium* (p. 409)
- 18b. Calyx campanulate or shortly campanulate-tubular; legumes ovoid to oblong.
- 19a. Shrubby or subshrubby psammophytes; leaflets in 1–3 pairs or solitary; legumes up to 8 mm, with \pm long spreading hairs, if legumes longer and appressed hairy, then leaflets in only 1 pair or solitary 54. *A. sect. Ammodendron* (p. 442)
- 19b. Plants herbaceous; leaflets usually in at least 5 pairs, if in only 3 pairs, then legumes 11–16 mm and covered with appressed hairs 38. *A. sect. Craccina* (p. 407)
- 16b. Flowers in capitate or subumbelliform racemes, rarely elongated.

- 20a. Dwarf pulvinate plants with short, prostrate stems; flowers 1 or 2 in leaf axils, subsessile; stipules completely connate into a tubular sheath surrounding stem and base of petiole 43. *A. sect. Ammodytes* (p. 419)
- 20b. Plants with erect stems.
- 21a. Calyx tubular, at least 9–10 mm, slightly inflated after anthesis 46. *A. sect. Ammotrophus* (p. 425)
- 21b. Calyx campanulate, 5–8 mm, never inflated.
- 22a. Bracteoles present 37. *A. sect. Brachycephali* (p. 406)
- 22b. Bracteoles absent 39. *A. sect. Onobrychides* (p. 409)
- 10b. All stipules free from each other.
- 23a. Plants always with a well-developed stem (sometimes some stems of a plant short).
- 24a. All petals appressed hairy 50. *A. sect. Tanythrix* (p. 429)
- 24b. All petals glabrous.
- 25a. Legumes bladderlike inflated, valves membranous 47. *A. sect. Leucophysa* (p. 426)
- 25b. Legumes not bladderlike inflated, valves leathery.
- 26a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated 56. *A. sect. Chaetodon* (p. 443)
- 26b. Calyx tubular, unchanged until fruiting time, ruptured by peduncle.
- 27a. Ovary and legumes covered with appressed to subappressed hairs, rarely also with some ascending hairs 41. *A. sect. Xiphidium* (p. 413)
- 27b. Ovary and legumes villous with ascending to spreading hairs.
- 28a. Racemes sessile 50. *A. sect. Tanythrix* (p. 429)
- 28b. Peduncles slightly shorter to longer than leaves.
- 29a. Legumes shortly acuminate or with a beak up to 2 mm 44. *A. sect. Erioceras* (p. 419)
- 29b. Legumes with a beak ca. 10 mm 53. *A. sect. Cytisodes* (p. 441)
- 23b. Plants acaulescent or nearly so, rarely with a short stem.
- 30a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated; legumes included in persistent calyx.
- 31a. Leaves with ascending to spreading hairs 56. *A. sect. Chaetodon* (p. 443)
- 31b. Leaves with appressed hairs 59. *A. sect. Laguropsis* (p. 448)
- 30b. Calyx tubular, unchanged until fruiting time, ruptured by legume.
- 32a. Raceme ovoid to cylindric, with a long peduncle.
- 33a. Leaflets linear to very narrowly elliptic, to 3(–4) mm wide; peduncle 5–14 cm 42. *A. sect. Corethrurum* (p. 417)
- 33b. Leaflets elliptic, 4–15 mm wide; peduncle up to 30 cm 52. *A. sect. Podochreati* (p. 440)
- 32b. Raceme loosely subumbelliform or flowers subradical.
- 34a. Legumes bladderlike inflated 49. *A. sect. Paracystium* (p. 428)
- 34b. Legumes not bladderlike inflated.
- 35a. Legumes with a prominent, rigid, long beak 5–8 mm 53. *A. sect. Cytisodes* (p. 441)
- 35b. Legumes shortly acuminate or with a very short beak.
- 36a. Racemes with peduncle 3–8 cm; legumes linear, 3–4 cm 44. *A. sect. Erioceras* (*A. yangchangii*; p. 419)
- 36b. Racemes sessile or more rarely with a peduncle up to 2 cm; legumes shorter 51. *A. sect. Trachycercis* (p. 429)
- 8b. Hairs of plants simple, basifixed, or plants completely glabrous.
- 37a. Plants spiny, shrubby, mostly cushionlike; leaves paripinnate 34. *A. sect. Aegacantha* (p. 404)
- 37b. Plants herbaceous or subshrubby; leaves imparipinnate, rarely becoming spiny with age.
- 38a. Style with a distinctly hairy stigma.
- 39a. Bracteoles absent; stipules often vaginate-connate, at least lower ones 12. *A. sect. Skythropos* (p. 353)
- 39b. Bracteoles always present, at least at beginning of anthesis; stipules always free from each other.
- 40a. Bracts caducous and mostly missing at fruiting time; plants often tall with thick stems; legumes inflated 10. *A. sect. Coluteocarpus* (p. 347)
- 40b. Bracts persistent, always present at fruiting time; plants often smaller with slender stems; legumes distinctly to strongly compressed laterally 9. *A. sect. Pseudosesbanella* (p. 346)
- 38b. Style glabrous at and below stigma, rarely below stigma with a row of short hairlets, very rarely stigma very minutely hairy.
- 41a. Standard hairy.
- 42a. Inflorescence cylindric, 7–9 cm, densely many flowered 30. *A. sect. Alopecias* (p. 396)
- 42b. Inflorescence not as above, mostly loosely few flowered.
- 43a. Leaflets adaxially with long, flexuous, cottonlike hairs 33. *A. sect. Erionotus* (p. 403)
- 43b. Leaflets adaxially glabrous or appressed hairy 31. *A. sect. Myobroma* (p. 397)
- 41b. All petals glabrous.

- 44a. Leaflets verticillate in several mostly remote whorls 32. *A. sect. Gontscharoviella* (p. 402)
- 44b. Leaflets all opposite or subopposite.
- 45a. Upper edge of keel limbs for whole length or in upper part furnished with minute teeth 31b. *A. "Purpurascens group"* (p. 401)
- 45b. Margins of keel limbs entire, never furnished with minute teeth.
- 46a. Calyx at anthesis tubular to slightly ventricose, soon bladderlike inflated and distinctly netlike nerved; legumes stalked, included in calyx 35. *A. sect. Eremophysa* (p. 405)
- 46b. Calyx never inflated after anthesis, ruptured by ripe legume.
- 47a. Inflorescences large, subsessile to shortly pedunculate, ovoid to cylindrical, densely many flowered 30. *A. sect. Alopecias* (p. 396)
- 47b. Inflorescence not as above.
- 48a. Hairs mostly with a very short, subacute, basal appendix and therefore extremely asymmetrically bifurcate; leaflets 2–4 × 2–3 mm, both surfaces rather densely spotted with minute blackish dots 27. *A. sect. Irinaea* (p. 391)
- 48b. Hairs basifixed; leaflets without blackish dots.
- 49a. Plants acaulescent or subacaulescent; stems, if present, at most up to 4 cm.
- 50a. Stipules embracing stem but not connate behind it, high connate around petiole; legumes 25–50 mm, strongly compressed laterally, glabrous 15. *A. sect. Hookeriani* (p. 356)
- 50b. Stipules and legumes not as above.
- 51a. Petals pale yellowish; stipules 1–2 mm 23. *A. sect. Poliothrix (A. yangii)*, p. 381
- 51b. Petals purple to violet, yellow, or white; stipules distinctly longer.
- 52a. Stipules vaginate-connate behind stem or before petiole; petals purple to violet; ovary and legumes sessile or subsessile.
- 53a. Stipules free from petiole; racemes 1- or 2-flowered 17. *A. sect. Komaroviella (A. damxungensis)*, p. 357
- 53b. Stipules adnate to petiole; racemes with more flowers.
- 54a. Plants at most up to 10 cm tall; calyx 3–6 mm 26. *A. sect. Pseudotapinodes* (p. 390)
- 54b. Plants more than 10 cm tall; calyx 7–9 mm 12. *A. sect. Skythropos* (p. 353)
- 52b. Stipules never vaginate-connate; petals yellow or white, or if violet then ovary and legumes long stipitate.
- 55a. Ovary and legumes with a stipe at least 4 mm.
- 56a. Stipules distinctly adnate to petiole 31a. *A. "Caprini group"* (p. 397)
- 56b. Stipules free from petiole 12. *A. sect. Skythropos* (p. 353)
- 55b. Ovary and legumes sessile or subsessile.
- 57a. Plants with spreading hairs; petals white 14. *A. sect. Lithophili* (p. 355)
- 57b. Plants with appressed hairs; petals bright yellow 28. *A. sect. Lotidium* (p. 392)
- 49b. Plants distinctly caulescent.
- 58a. Stems stout, 3–10 mm or more in diam., ± erect; plants mostly tall with long erect stems.
- 59a. Stipules vaginate-connate behind stem.
- 60a. Standard 34–39 mm; legumes ± globose, 15–22 mm in diam., with very thick walls and a narrow, hollow, very densely long hairy 29. *A. sect. Lithoon* (p. 395)
- 60b. Standard up to 17 mm; legumes not as above 11. *A. sect. Chlorostachys* (p. 347)
- 59b. Stipules free from each other.
- 61a. Keel distinctly longer than wings; legumes nut-shaped, 9–14 mm, glabrous 13. *A. sect. Nuculiella* (p. 355)
- 61b. Keel shorter or at most as long as wings; legumes not nut-shaped.
- 62a. Racemes subsessile or with a short peduncle; plants densely spreading hairy all over 14. *A. sect. Lithophili* (p. 355)
- 62b. Racemes with a distinct, long peduncle; plants in most parts appressed hairy or subglabrous.
- 63a. Plants completely glabrous; stipules distinctly longitudinally nerved; ovary and legumes subsessile 31. *A. sect. Myobroma (A. luculentus)*, p. 397
- 63b. Plants in most parts appressed hairy or subglabrous; stipules not distinctly nerved; legumes mostly with a distinct to long stipe; bracteoles sometimes present.
- 64a. Legumes 1-locular; bracts persistent 8. *A. sect. Cenantrum* (p. 338)
- 64b. Legumes incompletely to completely 2-locular; bracts persistent or soon falling 11. *A. sect. Chlorostachys* (p. 347)
- 58b. Stems ± slender, at most up to 3 mm in diam., often prostrate to ascending.

- 65a. Leaves 6–10 cm, at end of vegetation period elongating up to 25 cm; petiole 1–3 cm, later up to 6 cm, like rachis slender, later thickened and hardened, persistent, glabrous or very sparsely subappressed hairy; leaflets in 13–15 pairs, often caducous 16. *A. sect. Pelta* (p. 357)
- 65b. Leaves with other characters.
- 66a. Stipules free from each other and mostly free from petiole.
- 67a. Plants with long, prostrate to erect or creeping stems; racemes subumbellate, few flowered; legumes linear, erect 28. *A. sect. Lotidium* (p. 392)
- 67b. Plants with ascending to erect stems; racemes not subumbellate; legumes of other form.
- 68a. Wing limbs with linear-acute auricle 2–4.5 mm, sometimes as long as claw.
- 69a. Plants up to 60 cm tall; stipules mostly 3–5 mm; inflorescences several on 1 stem; standard ovate or obovate, abruptly contracted at base into very short claw; legumes 8–12 mm 24. *A. sect. Chrysopteri* (p. 389)
- 69b. Plants 8–18 cm tall; stipules 6–15 mm; inflorescence solitary on 1 stem; standard widely obovate to nearly orbicular, gradually narrowed at base; legumes 15–28 mm 25. *A. sect. Ebracteolati* (p. 389)
- 68b. Auricles of wing limbs mostly shorter, never linear and acute.
- 70a. Leaves with a distinct petiole 2–4.5 cm 12. *A. sect. Skythropos* (p. 353)
- 70b. Leaves sessile, with a petiole up to 1(–2) cm.
- 71a. Plants mostly tall, conspicuously leafy; ovary and legumes with a distinct, slender stipe, often distinctly longer than 10 mm.
- 72a. Legumes 1-locular; bracts persistent; bracteoles absent 8. *A. sect. Cenantrum* (p. 338)
- 72b. Legumes 2-locular or incompletely so; bracts persistent or soon falling; bracteoles present or absent 11. *A. sect. Chlorostachys* (p. 347)
- 71b. Plants often low, not conspicuously leafy; ovary and legumes sessile or very shortly stipitate.
- 73a. Racemes long, remotely many flowered; legumes globose to subglobose 20. *A. sect. Melilotopsis* (p. 370)
- 73b. Racemes at anthesis short, dense, sometimes elongated in fruit; legumes globose to narrowly ovoid.
- 74a. Legumes globose to widely ovoid, at most up to 2 × as long as wide, often cross-wrinkled 21. *A. sect. Brachycarpus* (p. 373)
- 74b. Legumes ovoid to narrowly ovoid, at least 2 × as long as wide but mostly longer, very rarely cross-wrinkled 19. *A. sect. Oroboidei* (p. 365)
- 66b. Stipules all or at least of lower leaves distinctly vaginate-connate behind stem.
- 75a. Keel longer than (rarely as long as) wings, limbs always large, wider than those of wings 17. *A. sect. Komaroviella* (p. 357)
- 75b. Keel distinctly shorter than wings, rarely to as long as wings, with narrower limbs.
- 76a. Wing limbs distinctly emarginate to deeply bilobed.
- 77a. Ovary and legumes with a long, slender stipe 22. *A. sect. Hemiphragmium* (p. 380)
- 77b. Ovary and legumes sessile or subsessile.
- 78a. Legumes globose to widely ovoid, at most up to 2 × as long as wide, often cross-wrinkled, hairy 21. *A. sect. Brachycarpus* (p. 373)
- 78b. Legumes ovoid to narrowly ovoid, at least 2 × as long as wide but mostly longer, never distinctly cross-wrinkled, glabrous or rarely very sparsely hairy 19. *A. sect. Oroboidei* (p. 365)
- 76b. Wing limbs rounded at apex to rarely slightly emarginate.
- 79a. Inflorescence subumbellate, few flowered or a loose raceme; legumes linear, erect 28. *A. sect. Lotidium* (p. 392)
- 79b. Inflorescence at anthesis a dense, many-flowered raceme, often elongating in fruit; legumes of other form.
- 80a. Standard at least 14 mm, at base with a sometimes short, but mostly distinct, cuneate claw.
- 81a. Stems, stipules, and rachis with ± spreading hairs; ovary with a stipe 3.5–5 mm 12. *A. sect. Skythropos* (p. 353)
- 81b. Stems, stipules, and rachis with appressed to slightly ascending hairs; ovary and legumes sessile or subsessile 18. *A. sect. Glycyrrhizi* (p. 363)

- 80b. Standard 6–10 mm, rarely up to 12 mm, mostly without distinct claw.
- 82a. Inflorescence ovoid to shortly cylindrical; legumes narrowly ellipsoid to narrowly oblong, distinctly curved to sometimes semicircular curved, sessile to stipitate, 1-locular or rarely very incompletely 2-locular 23. *A. sect. Poliothrix* (p. 381)
- 82b. Inflorescence capitate to shortly ovoid; legumes globose to ovoid, sessile, 1-locular or 2-locular.
- 83a. Legumes globose to widely ovoid, at most up to 2 × as long as wide, often cross-wrinkled 21. *A. sect. Brachycarpus* (p. 373)
- 83b. Legumes ovoid to narrowly so, at least 2 × as long as wide, mostly longer, never distinctly cross-wrinkled 19. *A. sect. Oroboidei* (p. 365)

1. *Astragalus* sect. *Ankylotus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 15. 1868.

钩荚组 gou jia zu

Plants annual, with basifixed hairs. Stipules whitish membranous, shortly adnate to petiole, free from each other. Racemes mostly with a distinct peduncle, loose to rather dense. Calyx tubular. Petals unequal in length; standard in middle strongly transverse-elliptically dilated, at base with a distinct claw, toward apex abruptly tongue-like narrowed; limbs of wings incised at tip. Legumes sessile, curved, with a bent to hooked beak, obtusely keeled ventrally, deeply grooved dorsally, at least in middle part completely 2-locular; valves with a double indumentum consisting of short appressed and long spreading hairs.

Four species: Afghanistan, China, N India, Pakistan, Russia; C and SW Asia; three species in China.

- 1a. Stems densely obliquely spreading villous; racemes sessile or with a peduncle up to 3 cm; legumes with longer hairs up to 2 mm 3. *A. stalinskyi*
- 1b. Stems with appressed or more rarely ascending hairs; racemes with a peduncle 0.5–12 cm; legumes with longer hairs up to 1 mm.
- 2a. Stipules 1.5–2 mm; calyx 4–5 mm; legumes 7–15(–20) mm, with a bent beak 2. *A. gracilipes*
- 2b. Stipules 3–5 mm; calyx 5–8 mm; legumes 20–40 mm, with a hooked beak 1. *A. commixtus*

1. *Astragalus commixtus* Bunge, *Arbeiten Naturf. Vereins Riga* 1: 246. 1847.

混合黄耆 hun he huang qi

Stems 0.5–10 cm, with appressed hairs up to 1 mm. Leaves 3–7 cm; stipules 3–5 mm, white and black ciliate; petiole 1–2.5 cm, with rachis loosely to rather densely appressed to spreading hairy; leaflets in 5–7 pairs, narrowly elliptic, 3–14 × 0.5–4 mm, loosely hairy, apex rounded to slightly retuse. Racemes 1–5-flowered; peduncle 1–12 cm, appressed hairy; bracts whitish membranous, 1–2 mm, ciliate. Calyx tubular, 5–8 mm, with subappressed to ascending white hairs, toward teeth with black hairs; teeth subulate, 2–3.5 mm. Petals violet or whitish; standard 9–10 mm, limb in middle strongly dilated, 3.5–4 mm wide; wings 7–8 mm; keel 6–6.5 mm. Legumes sessile, linear, distinctly to semicircular curved, (1–)2–4 cm, 2.5–3 mm high and ca. 3 mm wide, with a hooked beak; valves thin, pale brownish, rather densely covered with appressed hairs 0.05–0.3 mm and sparsely to loosely with ascending to spreading hairs 0.4–1 mm.

Steppes, semideserts, saline soils. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Caucasus, Iran)].

2. *Astragalus gracilipes* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 15. 1868.

细柄黄耆 xi bing huang qi

Astragalus ninae Gontscharow (1947), not Pavlov (1934); *A. schuriae* Pavlov.

Stems 0.5–6(–12) cm, with appressed to ascending hairs 0.2–1.2 mm. Leaves (1.5–)3–8 cm; stipules 1.5–2 mm, ciliate; petiole (0.5–)1–3.5 cm, with rachis hairy like stem; leaflets in 4 or 5 pairs, narrowly elliptic, 3–8 × 1–4 mm, abaxially densely covered with subappressed to ascending hairs, adaxially sparsely to loosely covered, apex rounded to retuse. Racemes loosely to rather densely 1–3(or 4)-flowered; peduncle 0.5–6 cm, hairy like stem; bracts whitish membranous, triangular, 0.6–1.2 mm, ciliate. Calyx 4–5 mm, loosely to rather densely covered with appressed to ascending white hairs, toward teeth also with black hairs; teeth subulate, 1–2 mm. Petals violet or whitish; standard 7–9 mm, limb in middle strongly dilated, 3–4 mm wide; wings 6–7.5 mm; keel 5–7 mm. Legumes linear, erect, slightly curved, 0.7–1.5(–2) cm, 2.4–4 mm high and 2.5–3 mm wide, with a short, bent, straight beak; valves thin, straw-colored, rather densely covered with ascending hairs 0.1–0.3 mm and loosely with hairs 0.5–0.8(–1.2) mm and often inserted in small tubercles.

Subalpine and alpine steppes; 2900–4500 m. Xizang [Afghanistan, India, Pakistan, Tajikistan].

3. *Astragalus stalinskyi* Širjaev, *Repert. Spec. Nov. Regni Veg.* 53: 75. 1944.

矮型黄耆 ai xing huang qi

Astragalus brachymorphus Nikiforova; *A. commixtus* Bunge var. *abbreviatus* Popov.

Stems 0.5–3 cm, densely villous with ascending to spreading hairs 0.4–1 mm. Leaves 4–10 cm; stipules 4–7 mm, ciliate; petiole 1–5 cm, with rachis loosely hairy; leaflets in 4–7

pairs, narrowly elliptic, 3.5–18 × 1–4 mm, abaxially loosely to rather densely covered with ascending hairs, adaxially sparsely to loosely covered, apex narrowly rounded to emarginate. Racemes densely 1–3(–5)-flowered; peduncle nearly absent or up to 3(–4) cm, hairy like stem; bracts whitish membranous, 1–2 mm, ciliate. Calyx tubular, 5–7 mm, rather densely covered with ascending white hairs, toward teeth also with black hairs; teeth subulate, 2–3.5 mm. Petals whitish or at least standard often violet; standard 8–10 mm, limb in middle transverse-

elliptically dilated, 4–5 mm wide; wings 6.5–8 mm; keel 6–7 mm. Legumes linear, slightly curved, 1–2.5 cm, ca. 3 mm high and 3.5–4.5 mm wide, with hooked beak, incompletely 2-locular; valves subleathery, straw-colored, densely covered with appressed to ascending hairs 0.1–0.3 mm and loosely with nearly spreading hairs 1–2 mm.

Steppes, semideserts; 1000–2400 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; SW Asia (Iran)].

2. *Astragalus* sect. *Haematodes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 15. 1868.

廉莢組 *lian jia zu*

Plants annual, with basifixed hairs. Stipules shortly adnate to petiole. Inflorescence a loose raceme. Calyx campanulate or shortly tubular. Petals unequal; limbs of wings rounded to emarginate at apex. Stigma glabrous or hairy. Legumes sessile, mostly linear and curved, keeled ventrally, deeply grooved dorsally, incompletely to completely 2-locular; valves with a simple or double indumentum, in latter case longer hairs often inserted in small tubercles.

Eleven species: Afghanistan, NW China, Pakistan, Russia; N Africa, C and SW Asia, S Europe; two species in China.

- 1a. Leaflets in 4–6 pairs, linear to very narrowly elliptic, 8–10 × as long as wide, glabrous adaxially; legumes 3–5 cm 5. *A. campylorhynchus*
 1b. Leaflets in 1–3 pairs, ovate to obovate, ca. 2 × as long as wide, hairy adaxially; legumes 1–3 cm 4. *A. arpilobus*

4. *Astragalus arpilobus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 336. 1842.

廉莢黃耆 *lian jia huang qi*

Astragalus gyzensis Delile var. *arpilobus* (Karelin & Kirilov) Boissier.

Plants with white hairs 0.2–1 mm. Stems 1–30 cm, loosely to rather densely spreading hairy. Leaves 1.5–10 cm; stipules whitish to greenish, 1–3.5 mm, hairy; petiole 1–3.5 cm, with rachis hairy like stem; leaflets in 1–3(–5) pairs, ovate to obovate, 4–20 × 2–10 mm, abaxially densely covered with ascending hairs, adaxially loosely covered with appressed hairs, apex rounded, truncate, or retuse. Racemes loosely 2–7-flowered; peduncle 0.3–3.5 cm, hairy like stem; bracts 1–1.5 mm, hairy. Calyx shortly tubular, 3–4(–6) mm, rather densely appressed hairy; teeth 1–1.5 mm. Petals whitish pink or more rarely violet; standard 6–8(–10) mm, limb elliptic, 2–5 mm wide, cuneately narrowed at base, apex emarginate; wings 5–7 mm; keel 5–6 mm. Legumes linear, distinctly and to semi-circular curved, 1–3 cm, 2.5–3.5 mm high and wide, with a curved, short beak, nearly completely 2-locular; valves thin, straw-colored to pale brownish, loosely to rather densely covered with appressed hairs 0.2–0.3 mm and with ascending hairs 0.7–1.2 mm, often inserted in small tubercles.

Sandy soil, semideserts, pebbles, gypsum. Xinjiang [Afghanistan, Kazakhstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

Astragalus arpilobus subsp. *arpilobus* is the only subspecies found in China.

5. *Astragalus campylorhynchus* Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 23. 1835.

弯喙黄耆 *wan hui huang qi*

Plants with hairs 0.3–0.5 mm. Stems 7–30 cm, lower part covered with nearly spreading hairs, upper part with ± appressed hairs. Leaves 3–10 cm; stipules whitish membranous, 3–6 mm, ciliate; petiole 0.5–2.5 cm, like rachis with appressed or more rarely ascending hairs; leaflets in 3–6 pairs, remote, glaucous, linear, 5–25 × 0.5–2.5 mm, abaxially sparsely appressed hairy, adaxially glabrous, apex bilobed. Racemes remotely 1–4-flowered; peduncle 1.5–7 cm, hairy like stem; bracts 1–3 mm. Calyx campanulate, 3–5 mm, loosely covered with appressed white and black hairs; teeth 0.8–2 mm. Petals pale violet; standard narrowly rhombic, 6.5–9 × 3–3.5 mm, apex emarginate to nearly bilobed; wings 6–7.5 mm; keel 5–6 mm. Legumes linear, straight or slightly curved, 3–5(–6) cm, 2.5–4 mm high and wide, with a short uncinat beak, incompletely to nearly completely 2-locular; valves thin but tough, glabrous or loosely covered with appressed white hairs 0.1–0.3 mm.

Steppes, cultivated lands; below 2700 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Caucasus)].

3. *Astragalus* sect. *Cycloglottis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 3. 1868.

环莢組 *huan jia zu*

Plants annual, with basifixed hairs. Stipules shortly adnate to petiole. Raceme densely capitate, borne on a short peduncle. Calyx campanulate, with distinctly unequal teeth, 3 lower teeth ca. twice as long as 2 upper teeth. Keel longer than wings. Legumes sessile, linear, falcate to spirally twisted, 2-locular.

One species: scattered and rare from S Europe to W China.

6. *Astragalus contortuplicatus* Linnaeus, Sp. Pl. 2: 758. 1753.

环荚黄耆 huan jia huang qi

Plant hairs thin, often bent, white, in inflorescence also black, 1–2 mm. Stems mostly several, prostrate to ascending, 2–50 cm, spreading hairy. Leaves 5–15 cm; stipules greenish, 5–10 mm, hairy; petiole 1–2 cm, with rachis slender, often flexuous, hairy like stem; leaflets in 6–11 pairs, elliptic to obovate, 4–15 × 2–8 mm, adaxially sparsely to loosely and abaxially to densely covered with appressed to spreading hairs, apex deeply incised. Racemes 5–15(–20)-flowered; peduncle 1–4 cm, hairy like stem; bracts green, linear-acute, 2–3 mm, hairy. Flowers subsessile. Calyx 5–6.5 mm, shortly campanulate, densely

covered with white or white and black hairs; teeth very unequal, 3 lower ones filiform, 3–5 mm, 2 upper ones only 2–2.5 mm. Petals whitish or yellowish; standard elliptic, 5–7.5 × 2.5–3.5 mm, apex deeply incised; wings 4–5.5 mm; keel 5–6.5 mm. Legumes linear, strongly falcate to screwlike twisted and often forming a complete circle of less than 1 cm in diam., 1–2 cm, 3–3.5 mm high and 2.5–3 mm wide, with a minute beak, completely 2-locular; valves thinly membranous, nearly blackish brown when ripe, rugulose to pitted or warty, loosely to rather densely covered with spreading hairs.

Riversides, saline meadows. Xinjiang [Kazakhstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Azerbaijan), Europe].

4. *Astragalus* sect. *Heterodontus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 5. 1868.

异齿组 yi chi zu

Plants annual or biannual, with basifixed or subbasifixed hairs. Stipules shortly adnate to petiole, otherwise free. Racemes with a distinct peduncle, at anthesis densely flowered, later loosely flowered and strongly elongating. Calyx campanulate; teeth distinctly unequal, 3 lower teeth often more than twice as long as 2 upper teeth. Standard widely emarginate at apex; keel as long as or mostly distinctly longer than wings. Legumes stipitate, linear, curved, 2-locular.

One species: China, Korea, Mongolia, Russia.

7. *Astragalus dahuricus* (Pallas) Candolle, Prodr. 2: 285. 1825.

达乌里黄耆 da wu li huang qi

Galega dahurica Pallas, Reise Russ. Reich. 3: 742. 1776.

Plants 15–65 cm tall; hairs thin, white, in inflorescence also black. Stems simple or branched, erect, with ± appressed hairs 0.3–1 mm. Leaves 3–8 cm; stipules greenish, 4–8 mm; petiole 0.3–1.5 cm, ± appressed hairy; leaflets in 4–9 pairs, narrowly elliptic, 7–20 × 2–6 mm, abaxially sparsely to loosely covered and adaxially glabrous or sparsely covered with ± appressed hairs up to 2 mm. Racemes rather densely up to 25-flowered, elongating in fruit to 15 cm; peduncle 1–3.5 cm, hairy like stem; bracts whitish, linear, 3–4 mm, ciliate. Calyx cam-

panulate, 5–7 mm, loosely covered with appressed to spreading long hairs; teeth subulate, unequal, lower 3 teeth 3.5–5 mm, upper 2 teeth only 1.5–2 mm. Petals violet; standard elliptic, 10–15 × 6.5–9 mm, abruptly contracted into short claw, apex deeply V-like incised; wings 8–9 mm; keel 10–13 mm. Legumes with a stipe 1.5–2 mm, linear, distinctly to nearly semi-circular curved, 1.5–2.5 cm, 2–2.5 mm high and wide, keeled ventrally, deeply V-like grooved dorsally, with a beak 1.5–2 mm, completely 2-locular; valves gray-brown, loosely covered with nearly spreading hairs 0.3–1 mm.

Riversides, damp meadows, fields. Gansu, Hebei, Heilongjiang, Hunan, Jilin, Nei Mongol, Shandong, Shanxi, Sichuan [Korea, Mongolia, Russia (Far East, Siberia)].

5. *Astragalus* sect. *Ophiocarpus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 9. 1868.

蛇荚组 she jia zu

Ophiocarpus (Bunge) Ikonnikov.

Plants annual, branched at base, glabrous or with basifixed hairs. Stipules minute, free. Inflorescence sessile or very shortly pedunculate, a loose 1–5-flowered raceme. Flowers pendulous. Calyx campanulate. Petals glabrous, deciduous; standard slightly longer than wings and keel, without distinct claw. Legumes sessile, very narrowly linear, terete, curved or flexuous, somewhat constricted between seeds, 1-locular.

One species: Afghanistan, China, India, Pakistan, Tajikistan, Turkmenistan, and SW Asia (Iran, Iraq).

8. *Astragalus ophiocarpus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 10. 1868.

蛇荚黄耆 she jia huang qi

Astragalus aitchisonii Baker; *A. paulsenii* Freyn; *Ophiocarpus aitchisonii* (Baker) Podlech.

Plants branched at base, with white hairs 0.2–0.5 mm, in inflorescence also with black hairs, rarely glabrous. Stems 3–25 cm, prostrate to ascending, rather densely appressed to

spreading hairy. Leaves 1.5–4.5 cm; stipules 0.75–2 mm, ciliate; petiole 0.4–1.5 cm, like rachis hairy; leaflets in 4–8 pairs, narrowly obovate to obovate, 3–7 × 1.5–3 mm, sometimes folded, both surfaces rather densely covered with subappressed hairs, apex rounded to retuse. Racemes sessile or with a peduncle up to 0.5 cm, loosely 1–5-flowered; bracts membranous, ca. 0.5 mm. Pedicels absent or up to 0.3 mm. Calyx 2.5–3.5 mm, rather densely subappressed white hairy, more rarely also black hairy; teeth 1–1.5 mm. Petals creamy or pink to bluish suffused,

keel with violet tip; standard ovate to rhombic-ovate, 6–7 × 2.5–3 mm, apex incised; wings ca. 5 mm; keel ca. 5 mm. Legumes sessile, narrowly linear, flexuous or strongly to circular curved, terete, 3–5 cm, 1.5–2 mm thick, slightly constricted between seeds, with a hooked beak up to 3 mm, 1-locular; valves

densely covered with very short appressed hairs or rarely glabrous. Seeds oblong.

On dry sandy to loamy soil; below 100–3600 m. Xizang [Afghanistan, India, Pakistan, Tajikistan, Turkmenistan; SW Asia (Iran, Iraq)].

6. *Astragalus* sect. *Oxyglottis* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 10. 1868.

尖舌组 jian she zu

Plants annual, with basifixed hairs. Stipules shortly adnate to petiole. Inflorescences capitate, sometimes with additional whorls, or loose racemes. Flowers subsessile. Calyx shortly tubular to campanulate. Standard without distinct claw; wing limbs slightly emarginate at tip. Legumes sessile, often distinctly wider than high, keeled ventrally, widely flattened to deeply V-like grooved dorsally, with sharp edges or wings on back of valves, completely 2-locular.

Six species: Afghanistan, NW China, Pakistan, Russia; N Africa, C and SW Asia, Europe; two species in China.

- 1a. Inflorescences capitate, sometimes with additional, remote whorls; standard 5–6 mm; legumes as wide as high, with crenulate lateral edges 9. *A. oxyglottis*
 1b. Inflorescence loosely racemose; standard 6–10 mm; legumes dorsiventrally flattened, ca. 2 × wider than high, with shortly dentate lateral wings 10. *A. vicarius*

9. *Astragalus oxyglottis* Steven ex M. Bieberstein, *Fl. Taur.-Caucas.* 2: 192. 1808.

尖舌黄耆 jian she huang qi

Astragalus oxyglottis var. *psiloglottis* (Candolle) Bunge; *A. psiloglottis* Candolle.

Plants with appressed hairs 0.1–0.3 mm. Stems 2–25 cm, often glabrescent with age. Leaves 2–9 cm; stipules greenish membranous, 2–4 mm, hairy; petiole 1–2.5 cm, like rachis loosely hairy; leaflets in 4–8 pairs, cuneate-oblong to elliptic, 3–10 × 1.5–5 mm, abaxially loosely to rather densely hairy, adaxially glabrous or sparsely to loosely hairy, apex distinctly and mostly widely emarginate. Racemes sessile or with a peduncle up to 4 cm, headlike, densely 4–8-flowered, in well-developed plants often with 1 or 2 additional remote whorls of 2–4 flowers; bracts membranous, less than 0.5 mm. Calyx campanulate, 2–2.5 mm, white and black hairy; teeth 0.4–0.5 mm. Petals whitish or bluish to violet; standard elliptic, 5–6 × 2.5–3 mm, apex incised; wings 4–5 mm; keel 3–4 mm. Legumes star-like spreading or ascending, narrowly ovoid, 7–15 mm, 2.5–3.5 mm high and wide, sharply keeled ventrally and on sides of valves, grooved beside keels of valves, slightly vaulted, and with 2 shallow grooves dorsally, in cross section quadrangular, shortly acuminate; valves thin, blackish brown when ripe, at keels of valves distinctly transversely rugulose, glabrous or hairy.

Sandy, stony, and saline soils, gypsum, steppes, semideserts, fields; below 100–2600 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe (Spain, Ukraine)].

7. *Astragalus* sect. *Onycholobium* Pomel, *Bull. Soc. Sci. Phys. Algérie* 11: 189. 1874.

胡麻组 hu ma zu

Plants annual, mostly branched at base, with basifixed hairs. Stipules shortly adnate to petiole. Racemes sessile or pedunculate, ± densely capitate. Petals of unequal length. Legumes sessile, at base mostly distinctly widened to bigibbous, keeled ventrally, deeply grooved dorsally, groove often widened toward base, mostly fully 2-locular.

Twenty-four species: N Africa, SW Asia to Pakistan and China, S Europe; four species in China.

10. *Astragalus vicarius* Lipsky, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 18: 25. 1900.

替代黄耆 ti dai huang qi

Plant hairs white, at nodes and in inflorescence also black, 0.1–0.3 mm. Stems 2–40 cm, simple or branched at base, rather densely appressed to partly spreading hairy, often glabrescent with age. Leaves 3–10 cm; stipules greenish membranous, 3–6 mm; petiole 0.5–1.5 cm, like rachis with appressed to ascending hairs; leaflets in 6–9 pairs, narrowly elliptic to narrowly oblong, 4–18 × 1–5 mm, abaxially mostly loosely subappressed hairy, adaxially glabrous, apex mostly distinctly and widely emarginate. Racemes at anthesis rather densely 3–9-flowered, later strongly elongating and up to 7 cm; peduncle 3–9 cm, hairy like stem; bracts whitish membranous, 1–2 mm, hairy. Calyx campanulate, 3–4 mm, black or black and white hairy; teeth subulate, 1–1.5 mm. Petals bluish to pale violet; standard narrowly oblong to narrowly elliptic, 6–10 × 2.5–3 mm, apex distinctly incised; wings 5–7 mm; keel 4.5–6 mm. Legumes seen from adaxial side narrowly acuminate ovate, 1.5–2 cm, 3–3.5 mm high and 6–7 mm wide, keeled ventrally, widely flattened to slightly vaulted dorsally, in middle of valves (= margins of fruit) with a winglike densely and shortly dentate crest 1–2 mm wide, fruit in cross section widely triangular, 2-locular; valves thin, glabrous.

Stony and loessic soil, ephemeral steppes. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

- 1a. Stems, petiole, and rachis closely appressed hairy.
 2a. Calyx 3–4 mm; bracts 1–1.5 mm; legumes 6–10 mm, with wrinkled walls, covered with short subappressed hairs and spreading hairs up to 1.5 mm 11. *A. filicaulis*
 2b. Calyx 5.5–7 mm; bracts 2–3 mm; legumes 12–15 mm, covered with subappressed to ascending hairs up to 1.3 mm 13. *A. sesamoides*
 1b. Stems, petiole, and rachis at least in part with ascending to spreading hairs.
 3a. Calyx 2.5–3 mm; leaflets adaxially glabrous; legumes widest at base but not bigibbous 12. *A. persepolitanius*
 3b. Calyx 3–5 mm; leaflets on both surfaces densely appressed hairy; legumes at base distinctly bigibbous 14. *A. tribuloides*

11. *Astragalus filicaulis* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 336. 1842.

丝茎黄耆 si jing huang qi

Astragalus filicaulis subsp. *rytilobus* (Bunge) Popov; *A. leptodermus* Bunge; *A. rytilobus* Bunge.

Plant hairs white, at stipules and in inflorescence also black, 0.3–1.6 mm. Stems 8–27 cm, prostrate to erect, sparsely appressed hairy. Leaves 5–8 cm; stipules greenish, 2.5–4 mm, ciliate; petiole 0.5–1.2 cm, like rachis sparsely subappressed hairy; leaflets in 5–7 pairs, narrowly elliptic to narrowly oblong, 2–13 × 1–2.8 mm, subappressed hairy, apex obtuse to slightly retuse. Racemes 3–9-flowered; peduncle 1.5–6 cm, appressed hairy; bracts hyaline, 1–1.5 mm, ciliate. Calyx campanulate, 3–4 mm, covered at base mainly with appressed white hairs, toward teeth with more spreading and more black hairs; teeth subulate, 1.8–2 mm. Petals violet; standard narrowly elliptic, 6–8 × 2–2.5 mm, apex widely retuse; wings 4.5–5 mm; keel 3.5–4 mm. Legumes stellately arranged or more deflexed, oblong to narrowly ovoid, 6–10 mm, 3–4 mm high and wide, somewhat widened near base, with a short beak, incompletely 2-locular; valves thin, wrinkled, loosely covered with 2 kinds of hairs: short subappressed hairs 0.1–0.3 mm and long spreading hairs up to 1.5 mm.

Steppes, semideserts, in all kinds of soils; below 3200 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

12. *Astragalus persepolitanius* Boissier, Diagn. Pl. Orient., ser. 1, 9: 60. 1849.

沙生黄耆 sha sheng huang qi

Astragalus ammophilus Karelin & Kirilov.

Plants with mostly white hairs 0.05–0.6 mm. Stems 4–27 cm, prostrate to ascending, appressed to spreading hairy. Leaves 2–7 cm; stipules whitish or greenish, 1–2.5 mm, appressed hairy or ciliate; petiole 1–2.3 cm, sparsely spreading hairy; leaflets in 3–7 pairs, narrowly obovate to obovate, 2–8.5 × 0.8–4.5 mm, abaxially appressed hairy, adaxially glabrous, apex retuse. Racemes 3–10-flowered, sometimes with 2 superposed and remote whorls of flowers; peduncle 0.5–7 cm or sometimes absent, appressed or rarely spreading hairy; bracts hyaline, 0.8–1.2 mm, ciliate. Calyx campanulate, 2.5–3 mm, loosely to densely spreading hairy; teeth subulate, 0.8–1 mm. Petals whitish to pale violet; standard narrowly elliptic, 4.5–6 × ca. 2 mm, rounded at apex; wings 4–4.5 mm; keel 3–3.8 mm. Legumes ovoid-triangular, 6–9 mm, ca. 3 mm high and wide, widest at base, straight or slightly curved at ventral side, strongly curved at dorsal side, with a beak 0.7–1 mm; valves thin, glabrous or subappressed hairy.

From the plains up to 3000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Caucasus, Iran)].

13. *Astragalus sesamoides* Boissier, Diagn. Pl. Orient., ser. 1, 9: 59. 1849.

胡麻黄耆 hu ma huang qi

Plants with white hairs, near stipules and in inflorescence also black hairy. Stems 7–35 cm, ascending, sparsely covered with appressed hairs 0.3–1 mm. Leaves 2.5–5.5 cm; stipules whitish to greenish, 3–4 mm, ciliate or sparsely hairy; petiole 0.3–1 cm, like rachis slender, subappressed hairy; leaflets in 4–6 pairs, narrowly oblong to narrowly elliptic, 4–15 × 2–5.5 mm, abaxially somewhat densely appressed hairy, adaxially glabrous or sparsely appressed hairy, apex obtuse. Racemes 2–9-flowered; peduncle 2–6 cm, with subappressed to ascending hairs; bracts membranous, 2–3 mm, ciliate. Calyx campanulate, 5.5–7 mm, covered at base with white and black hairs up to 1 mm, toward teeth with more black and somewhat longer and more spreading hairs; teeth subulate, 3–4 mm. Petals violet; standard 5.5–7 × 2–2.5 mm, apex slightly retuse; wings 4.5–5.5 mm; keel 4–4.5 mm. Legumes erect, straight, narrowly oblong with rounded base, 1.2–1.5 cm, 3–4 mm high and wide, with a reflexed beak 1–1.5 mm; valves covered with subappressed to ascending white hairs up to 1.3 mm.

Loessic and sandy soil, in steppes and semideserts, fields. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

14. *Astragalus tribuloides* Delile, Descr. Egypte, Hist. Nat. 70. 1813.

蒺藜黄耆 ji li huang qi

Astragalus kirghisicus Stscheglejew.

Plants with appressed to ascending white hairs 0.2–1.5 mm. Stems from nearly absent to 40 cm, prostrate to ascending, hairy. Leaves 1.5–7 cm; stipules membranous, 2–3 mm, hairy; petiole 0.5–2 cm, like rachis hairy; leaflets in 4–10 pairs, narrowly elliptic, 2.5–15 × 0.8–4 mm, both surfaces sericeous with appressed hairs, apex acute. Racemes sessile, rarely with a peduncle up to 2.5 cm, (1 or) 2–8-flowered; bracts membranous, 1–3 mm. Calyx tubular, 3–5 mm, densely hairy; teeth 1–2 mm. Petals whitish or white suffused with mauve or pink; standard narrowly oblong, 4–10 × 1.2–2.5 mm, apex retuse; wings 4–6 mm; keel 3–5 mm. Legumes mostly starlike spreading, straight or slightly curved, oblong-triangular, 4–12 mm, 2.5–4 mm high and wide, distinctly bigibbous at base, acute at apex, with a deep dorsal groove widened at base; valves with short

appressed hairs 0.05–0.15 mm and with much longer appressed to subappressed hairs up to 1.5 mm.

?Xizang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia (Caucasus)].

Steppes, semideserts, from the plains up to 3000 m. Xinjiang,

The Chinese record of *Astragalus cruciatus* Link (FRPS 42(1): 242. 1993) is referable to *A. tribuloides*.

8. *Astragalus* sect. *Cenantrum* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 23. 1868.

膜荚组 mo jia zu

Astragalus sect. *Albiflori* Y. C. Ho; *A.* sect. *Cenantroides* N. D. Simpson; *A.* sect. *Monadelphica* K. T. Fu; *A.* sect. *Polyphylli* N. D. Simpson; *Neodielsia* Harms.

Plants caulescent, erect; hairs basifixed, white or black. Leaves mostly nearly sessile or with a short petiole; stipules green or greenish, rarely membranous, free from petiole and from each other, rarely lower ones connate behind stem. Racemes with a long peduncle, many flowered; bracts persistent. Bracteoles mostly absent. Flowers with a distinct pedicel. Calyx campanulate to shortly tubular, mostly laterally gibbous at base, obliquely cut at mouth. Petals mostly yellow or pale greenish yellow, often drying purple, rarely purplish from beginning; standard slightly to distinctly emarginate, rarely rounded. Stamens diadelphous or more rarely monadelphous. Style and stigma glabrous. Legumes ± long stipitate, 1-locular; valves papery, glabrous or hairy.

Forty-two species: China, Japan, Mongolia, Russia; C to S Asia, Europe; 27 species (19 endemic) in China.

- 1a. Inner side of calyx tube hairy in upper 1/2.
- 2a. Petals yellow; leaflets in 3–7 pairs, narrowly to widely elliptic; keel as long as standard 40. *A. tongolensis*
- 2b. Petals purplish; leaflets in 2–4 pairs, narrowly elliptic; keel distinctly shorter than standard, (12–)15–16 mm 30. *A. moellendorffii*
- 1b. Inner side of calyx tube glabrous.
- 3a. Ovary and legumes glabrous.
- 4a. Leaflets in (1 or) 2 pairs; calyx 4–5 mm, teeth indistinct or up to 0.3 mm; standard 8–10 mm; keel longer than wings 24. *A. henryi*
- 4b. Leaflets in at least 3 pairs but mostly more; calyx at least 5 mm but mostly distinctly longer; standard at least 13 mm but mostly longer; keel shorter than or as long as wings.
- 5a. Leaf rachis sparsely to loosely covered with appressed to spreading hairs; leaflets in 8–12 pairs 32. *A. mongholicus*
- 5b. Leaf rachis glabrous; leaflets in 3–5 pairs.
- 6a. Calyx 11–12 mm, sparsely to loosely covered with ± spreading brown or blackish hairs; bracts sparsely to loosely white and black hairy; standard limb widely ovate to orbicular, 13–16 mm wide; legumes 30–40(–50) mm, inflated ellipsoid 17. *A. bahrakianus*
- 6b. Calyx at most up to 11 mm but mostly shorter, glabrous or appressed white hairy; bracts glabrous or only white hairy; standard limb rhombic to elliptic, up to 12 mm wide; legumes 20–30 mm, strongly compressed laterally (unknown in *A. sichuanensis*).
- 7a. Racemes 6–16 cm, many flowered; bracts glabrous or sparsely ciliate; calyx 6–8 mm, often glabrous; ovary with a stipe 6–8 mm 15. *A. aksuensis*
- 7b. Racemes short, 5–10-flowered; bracts densely appressed hairy; calyx 9–11 mm, teeth very short to mostly inconspicuous; ovary with a stipe 12–14 mm 38. *A. sichuanensis*
- 3b. Ovary and legumes hairy.
- 8a. Stems in lower 1/3–1/2 without developed leaves 36. *A. przewalskii*
- 8b. Stems leafy throughout.
- 9a. Leaflets in 8–15 pairs.
- 10a. Leaflets very narrowly elliptic to narrowly elliptic, 10–17(–20) × 2–6 mm; calyx when young with long white or black hairs, therefore racemes sericeous, with age loosely to rather densely and mostly black hairy; standard 12–13 × 4–4.5 mm, narrowly oblong-elliptic, deeply incised 22. *A. floridulus*
- 10b. Leaflets relatively wider; calyx without long white or black hairs and not sericeous when young; standard elliptic to obovate, if narrowly oblong-elliptic, then rounded (in *A. degensis*).
- 11a. Leaflets adaxially sparsely and abaxially loosely hairy; petals dark purple to blackish violet; stem up to 7 mm thick 35. *A. petrovii*
- 11b. Leaflets adaxially glabrous, abaxially sparsely hairy; petals yellow or rarely pale lilac or purple; stem up to 3 mm thick.
- 12a. Calyx ca. 5 mm, white hairy; standard ca. 8 mm; legumes shortly stipitate, densely white hairy 18. *A. changduensis*
- 12b. Calyx mostly distinctly longer; standard distinctly longer, at least 11 mm; legumes with a stipe at least 4 mm but mostly longer, ± black hairy.

- 13a. Plants in vegetative parts furnished with appressed to spreading hairs 1–1.5(–2) mm; leaflets rounded to emarginate; calyx teeth 0.5–1.5 mm; standard 13–20 × 7–9 mm, widely elliptic, emarginate, at base with a long claw; legumes obliquely ellipsoid, 2–3 cm 32. *A. mongholicus*
- 13b. Plants in vegetative parts furnished with appressed hairs 0.3–0.6 mm; leaflets acute to emarginate but with a distinct cusp ca. 0.5 mm; calyx teeth ca. 3 mm; standard 11–13 × ca. 5 mm, narrowly oblong-elliptic, rounded at apex, abruptly contracted into a very short claw; legumes ellipsoid, 1.3–1.7 cm 20. *A. degensis*
- 9b. Leaflets in up to 9 pairs but often in fewer.
- 14a. Plants totally glabrous with exception of inner side of calyx teeth; rachis at insertion of leaflets often with simple or divided emergences and or with stalked glands; stamen tube monadelphous 41. *A. xitaibaicus*
- 14b. Plants at least in some parts hairy; rachis at insertion without emergences and glands; stamen tube diadelphous or monadelphous.
- 15a. Lower stipules distinctly vaginate-connate; calyx 1–1.4 cm, teeth 4–7(–8) mm; petals yellow, sometimes violet suffused when dry 27. *A. longilobus*
- 15b. All stipules free; calyx and calyx teeth distinctly shorter.
- 16a. Standard 10–12 mm.
- 17a. Leaflets glabrous or ciliate; calyx glabrous; petals yellow 19. *A. chilienshanensis*
- 17b. Leaflets and calyx hairy; petals at least partly purple or bluish.
- 18a. Stem ca. 2 mm thick; leaflets adaxially glabrous; bracts sparsely black hairy; calyx 4.5–5 mm; petals blue to blue-violet with yellowish base 33. *A. muliensis*
- 18b. Stem ca. 6 mm thick; leaflets adaxially sparsely hairy; bracts glabrous or sparsely white ciliate; calyx ca. 6 mm; petals yellow with purple-tipped standard or keel or all purplish 29. *A. minhensis*
- 16b. Standard distinctly longer, if only 10–12 mm, then stamens monadelphous.
- 19a. Leaflets 10–17 × 3–7 mm; bracteoles 0.5–1 mm, at pedicel; calyx 4(–5) mm; petals lilac to dark purple 37. *A. purpurinus*
- 19b. Leaflets at least in part distinctly longer; bracteoles absent (only in *A. arnoldianus* sometimes present); calyx at least 5 mm but mostly distinctly longer; petals yellow when alive, sometimes purple when dry.
- 20a. Bracts 3–5 mm; stems glabrous or with appressed hairs.
- 21a. Calyx hairy only at upper margins and teeth, teeth 2–3 mm; stipules 1–1.6 cm, auricle-like dilated at base; leaflets in 6–9 pairs, abaxially sparsely hairy at midrib or glabrous; peduncle glabrous 21. *A. ernestii*
- 21b. Calyx hairy also at tube, teeth only up to 1.5 mm; stipules up to 1 cm, not dilated at base, lower ones often connate around petiole up to top; leaflets in 4–6 pairs, abaxially loosely hairy; peduncle loosely hairy.
- 22a. Plants in vegetative parts with mainly black hairs; lower stipules often connate around petiole up to top; calyx ca. 9 mm; standard 16–19 mm 16. *A. arnoldianus*
- 22b. Plants in vegetative parts with mainly white hairs; all stipules free from each other; calyx 6–7 mm; standard 12–14 mm 28. *A. luteolus*
- 20b. Bracts at least 5 mm but partly distinctly longer, if sometimes only ca. 4 mm (in *A. lessertioides*), then stems with ascending to spreading hairs.
- 23a. Stamen tube closed, monadelphous.
- 24a. Leaflets glabrous or ciliate when young; racemes with flowers all around, rachis densely black hairy; calyx teeth unequal, upper ones triangular, 1–1.5 mm, lower ones narrowly triangular 1.5–3 mm; standard 16–17 × 8–11 mm, with short claw 34. *A. neomonodelphus*
- 24b. Leaflets sparsely hairy abaxially; racemes 1-sided, rachis sparsely white or black hairy; calyx teeth all subulate, 3–4 mm; standard 12–13 × 5–6 mm, with long claw 31. *A. monadelphus*
- 23b. Stamen tube diadelphous, with 1 free stamen.
- 25a. Calyx 4.5–7 mm with glabrous tube, teeth narrowly triangular-acuminate, 1.5–3 mm; petals yellow drying to brown-violet; standard 11–12 mm 26. *A. lessertioides*
- 25b. Calyx longer with tube hairy at least in upper part, teeth triangular, up to 1.5 mm; petals remaining yellow; standard distinctly longer.
- 26a. Stems and leaf rachis sparsely to loosely covered with subappressed to ascending hairs; legumes with white and black hairs 25. *A. lepsensis*
- 26b. Stems and leaf rachis glabrous or more rarely very sparsely appressed hairy; legumes with black hairs only.
- 27a. Peduncle sparsely, toward raceme more densely, black hairy, rarely subglabrous; standard 14–17 mm; legumes 1–2.5 cm, flattened dorsally and ventrally 23. *A. frigidus*

- 27b. Peduncle glabrous; standard 15–25 mm; legumes 2.5–4.5 cm, slightly keeled ventrally, slightly grooved dorsally 39. *A. tecti-mundi*

15. *Astragalus aksuensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 25. 1868.

阿克苏黄耆 a ke su huang qi

Phaca bracteosa Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 323. 1842, not *Astragalus bracteosus* Boissier & Noë (1856).

Plants 50–100 cm tall, with basifixed hairs. Stems at base 3–5(–7) mm thick, glabrous or sometimes in lower part with very short white spreading hairs. Leaves 8–12 cm, with glabrous rachis; stipules green, 10–18 mm, glabrous or ciliate; leaflets in 3 or 4(or 5) pairs, narrowly elliptic to narrowly ovate, 2–6 × 0.5–1.8 cm, glabrous on both surfaces, apex acute to obtuse. Racemes loosely many flowered, 6–16 cm; peduncle 6–20 cm, glabrous; bracts green, 8–12 mm, glabrous or very sparsely ciliate. Calyx shortly tubular, 6–8 mm, glabrous or sparsely appressed hairy; teeth unequal, 2 adaxial distant, triangular acuminate, 0.5–1(–1.5) mm, 3 abaxial close together, narrowly triangular, 1–2(–3) mm. Petals yellow; standard widely rhombic, 17–21 × 11–12 mm, ± rounded at apex; wings 16–18 mm; keel 14–16 mm. Legumes with a slender stipe 6–8 mm, narrowly ellipsoid, 2–3 cm, 7–10 mm high and 3–4 mm wide, acuminate at both ends; valves yellowish, glabrous.

Xerophytic scrub, forests, rock debris, pebbles, middle mountain zone. Sichuan, Xinjiang [Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

16. *Astragalus arnoldianus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 239. 1915.

灌县黄耆 guan xian huang qi

Astragalus simpsonii E. Peter.

Plants 30–40 cm tall, with predominantly black hairs 0.2–0.7 mm. Stems 2–3 mm thick, sparsely appressed hairy. Leaves 6–10 cm; stipules 5–8 mm, lowest high connate around suppressed petiole into a single limb, upper ones narrowly triangular, free, black and white ciliate; petiole 1.5–2.7 cm, like rachis appressed hairy; leaflets in 4–6 pairs, ovate, 8–22 × 3–12 mm, abaxially pale green and loosely appressed white hairy, adaxially dark green and glabrous, apex rounded to slightly emarginate. Racemes 2–6 cm, 8–18-flowered; peduncle 5–8.5 cm, striate-sulcate, loosely appressed black hairy; bracts whitish, 3–5 mm, black hairy. Bracteoles sometimes present, minute, whitish, up to 1 mm. Calyx tubular-campanulate, ca. 9 mm, loosely appressed hairy; teeth nearly equal, triangular, 0.5–1 mm. Petals yellow; standard obovate, 16–19 × 7–8 mm; wings 15–18 mm; keel 14–15 mm. Ovary shortly stipitate, densely black hairy. Legumes unknown.

- About 3000 m. NC Sichuan (Guanxian).

17. *Astragalus bahrakianus* Grey-Wilson, Kew Bull. 29: 45. 1974.

巴拉克黄耆 ba la ke huang qi

Plants 30–60 cm tall, subglabrous or with curly, ±

spreading hairs ca. 1 mm. Stems several, at base up to 8 mm thick, glabrous. Leaves 12–17 cm; stipules 2–4 cm, auricle-like dilated at base, glabrous; petiole ca. 2 cm, glabrous; leaflets in 3 or 4 pairs, narrowly ovate, 3.5–7 × 1.2–3 cm, abaxially or only at margin sparsely hairy, apex acute. Racemes loosely 7–10-flowered; peduncle erect, 9–20 cm, glabrous; bracts green, 1–2 cm, at margins and apex sparsely or all over loosely white and black hairy. Bracteoles sometimes present, 1–4 mm. Calyx 1.1–1.2 cm, sparsely to loosely covered with pale brown to black hairs; teeth triangular, 2–2.5 mm. Petals yellow; standard widely ovate to nearly orbicular, 20–23 × 13–16 mm, slightly emarginate; wings 18–19 mm; keel 16–18 mm. Legumes with a stipe 6–9 mm, inflated ellipsoid, 3–4(–5) cm, 1.5–2.2(–3) cm high and 1.2–1.4(–1.6) cm wide, rounded ventrally and dorsally; valves glabrous.

Wet places in *Picea* forests, alpine slopes near water; 2800–4000 m. Xinjiang (W Kunlun Shan) [NE Afghanistan].

18. *Astragalus changduensis* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 106. 1981.

昌都黄耆 chang du huang qi

Plants 70–90 cm tall. Stems erect, with ± appressed, tangled, white hairs 0.3–0.7 mm. Leaves 5–10 cm, subsessile; stipules triangular-ovate, 6–10 × 5–6 mm, sparsely white hairy; leaflets in 11–13 pairs, narrowly ovate to elliptic, 7–20 × 3–8 mm, abaxially sparsely covered with appressed to ascending short white hairs, adaxially glabrous, apex obtuse to emarginate. Racemes 4–5 cm, rather densely many flowered; peduncle 6–8 cm; bracts narrowly triangular, 5–8 mm, sparsely white or black hairy. Calyx 5–6 mm, predominantly white hairy; teeth ca. 3 mm. Petals yellowish to white; standard widely ovate to nearly orbicular, 7–9 × 5–6 mm, apex emarginate; wings ca. 7 mm; keel ca. 6 mm. Ovary with a stipe up to 4 mm, densely white hairy, without septum.

- Xizang.

19. *Astragalus chilienshanensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 51. 1980.

祁连山黄耆 qi lian shan huang qi

Plant 20–30 cm tall. Stem 4–6 cm. Leaves 4–8 cm; stipules elliptic, 5–15 × 3–7 mm, white ciliate; petiole 2–4 cm; leaflets in 4–6 pairs, ovate to elliptic, 1–2 × 0.4–1 cm, glabrous or ciliate, apex rounded or slightly emarginate. Racemes 1–2 cm, ca. 10-flowered, elongating in fruit; peduncle 15–20 cm; bracts linear-acute to narrowly ovate, 4–6 mm, sparsely white hairy. Pedicels ca. 2 mm, densely black hairy. Calyx campanulate, ca. 5 mm, glabrous; teeth narrowly triangular, ca. 2 mm, black hairy on inner side. Petals yellow, all of nearly same length; standard widely obovate, 10–12 × ca. 9 mm. Legumes with a stipe ca. 3 mm, pendulous, narrowly ellipsoid, ca. 2 cm, attenuate at both ends; valves sparsely black hairy.

- About 3500 m. Qinghai, Xizang.

20. *Astragalus degensis* Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 418. 1922.

窄翼黄耆 zhai yi huang qi

Astragalus degensis var. *rockianus* E. Peter; *A. grubovii* S. H. Cheng ex P. C. Li (1989), not Sanchir (1974); *A. guan-shuanus* P. C. Li; *A. voburus* Y. H. Xu & Q. R. Liu.

Plants 40–50(–100) cm tall, with appressed hairs 0.3–0.6(–1) mm. Stem sparsely to loosely covered with white and black or predominantly black hairs, glabrescent with age. Leaves 6–12 cm; stipules linear-subulate, 6–10 mm, spreading to reflexed, black ciliate; rachis sparsely to loosely covered with mostly black hairs; leaflets in 7–15 pairs, narrowly elliptic, 8–20(–30) × 3–8(–12) mm, abaxially ± light green and loosely appressed white hairy, adaxially dark green and glabrous, apex acute to slightly retuse with a distinct cusp ca. 0.5 mm. Racemes ca. 3 cm, densely many flowered, at fruiting time elongated and up to 6(–12) cm; rachis loosely to densely black hairy; peduncle 5–20 cm, loosely to rather densely black hairy, glabrescent with age; bracts whitish, linear-subulate, 5–7 mm, black ciliate. Calyx shortly tubular, 6–9 mm, loosely covered with white and black or only black hairs; teeth subulate, 3–5 mm. Petals yellow to greenish yellow or purplish, yellow when dry; standard oblong to elliptic, 11–13(–15) × 4–7 mm, rounded at apex; wings 10–11(–13) mm; keel 11–12(–14) mm. Legumes with a stipe 4–7 mm, erect or spreading, ellipsoid, compressed laterally, 1.3–1.7 cm, 6–8 mm high and 2.5–3 mm wide, sharply keeled ventrally, keeled to narrowly rounded dorsally, shortly acuminate at both ends; valves dirty brownish, sparsely to rather densely covered with subappressed black and white or only black hairs.

• Alpine zone; 2700–3800 m. Sichuan, Xizang, Yunnan.

21. *Astragalus ernestii* Comber, Notes Roy. Bot. Gard. Edinburgh 18: 230. 1934.

梭果黄耆 suo guo huang qi

Astragalus josephii E. Peter; *A. wilsonii* N. D. Simpson; *A. xiaojinensis* Y. C. Ho.

Plants 25–60 cm tall, with hairs up to 0.3 mm. Stems up to 7 mm thick, glabrous. Leaves 4–10 cm; stipules 1–1.6 cm, lower ones laterally widened into a wide auricle, spreading to deflexed, at base with minute glands; leaflets in 6–9 pairs, narrowly elliptic, 6–24(–40) × 2.5–10 mm, glabrous on both surfaces or loosely to sparsely covered with appressed white hairs abaxially. Racemes densely many flowered, later elongated and up to 8 cm; peduncle 5–10 cm, glabrous; bracts green, elliptic to somewhat spatulate, 3–4 mm, black or white ciliate. Calyx greenish, campanulate-tubular, 6–8 mm, deeply split on adaxial surface, tube glabrous; teeth 2–3 mm, both sides or only inner side and margins between teeth densely shortly black hairy. Petals pale yellow or purplish blue, blackish purple when dry; standard rectangular-oblong to obovate, 13–15 × 5–8 mm; wings 11–13 mm; keel 10–13 mm. Legumes with a stipe 4–11 mm, pendulous, narrowly ovoid, 1.5–2.5 cm, 4–6 mm high, sharply keeled ventrally, narrowly rounded dorsally, apex long acuminate; valves light brownish, densely covered with very short black nearly spreading hairs, loosely hairy or glabrescent

with age.

• *Abies* forests, subalpine and alpine meadows; 3500–4300 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

22. *Astragalus floridulus* Podlech, Sendtnera 1: 270. 1993.

多花黄耆 duo hua huang qi

Astragalus floridus Benthham ex Bunge (1869), not Scopoli (1787).

Plants 50–90 cm tall, with hairs 0.2–0.8(–1) mm. Stems at base up to 6 mm thick, with slender, non-flowering lateral branches out of most of leaf axils, loosely covered with ascending, mostly black hairs. Leaves on main stem 5–9 cm; stipules on main stem linear-acute, 1–1.4 cm, white ciliate, those on lateral branches 4–5 mm; rachis slender, with ascending white hairs; leaflets in 10–15 pairs, very narrowly elliptic to narrowly elliptic, 10–17(–20) × 2–6 mm, abaxially rather densely appressed white hairy, adaxially glabrous, apex acute; leaves and leaflets on lateral branches mostly distinctly smaller. Racemes densely many flowered, ovoid to capitate, later strongly elongated and in fruit up to more than 15 cm; peduncle 2–7 cm, loosely covered with ascending to spreading white and predominantly black hairs; bracts whitish membranous, linear-acute, 3.5–6 mm, black ciliate. Calyx shortly tubular, 5–6 mm, strongly obliquely cut at mouth, in lower part loosely, toward teeth rather densely, covered with longer appressed black or white hairs, young inflorescences therefore white or sometimes black sericeous; teeth slightly unequal, 2 adaxial 1–2 mm, 3 abaxial 1.5–3 mm, sometimes all teeth nearly equal, subulate, 3–4 mm. Petals pale yellow or whitish, often purplish suffused; standard 12–13 × 4–5.5 mm, narrowly oblong-elliptic; wings 11–12 mm; keel 11–12 mm. Legumes with a stipe 4–5 mm, ellipsoid, 1–1.5 cm, 4–5 mm high and 2–3 mm wide, keeled ventrally and dorsally; valves covered with subappressed to ascending black and white hairs up to 1 mm.

Subalpine to alpine zones; 2700–5200 m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, India (Sikkim)].

23. *Astragalus frigidus* (Linnaeus) A. Gray, Proc. Amer. Acad. Arts 6: 219. 1864.

广布黄耆 guang bu huang qi

Phaca frigida Linnaeus, Syst. Nat., ed. 10, 2: 1173. 1759; *A. secundus* Candolle.

Plants 8–35 cm tall, mostly nearly glabrous; hairs 0.3–0.5 mm. Stems at base 2–5 mm thick. Leaves 5–15 cm; stipules 1–2 cm; petiole 1–3 cm, like rachis glabrous or sparsely appressed white hairy; leaflets in (3 or)4–6(–8) pairs, narrowly ovate to narrowly elliptic, 15–35(–45) × 7–19 mm, abaxially light gray-green with a distinct darker net of nerves, mostly sparsely appressed hairy, adaxially dark green, mostly glabrous, apex rounded to subacute. Racemes rather densely 5–20-flowered; peduncle 5–10 cm, appressed black hairy or nearly glabrous; bracts greenish, narrowly ovate, 5–10 mm, at margins with predominantly black hairs. Calyx shortly tubular, 6–9 mm, in basal part subglabrous, toward teeth more densely hairy, sometimes only at teeth black hairy; teeth equal, triangular, 0.3–1 mm. Petals pale yellow; standard obovate to nearly orbicular, 14–17

× ca. 8 mm; wings 13–16 mm; keel 13–15 mm. Legumes with a stipe up to 8 mm, pendulous, inflated, narrowly ellipsoid, 1–2.5 cm, 3–4 mm high and 5–7 mm wide, flat ventrally and dorsally, acuminate at both ends; valves loosely or rather densely covered with very short appressed black hairs.

Forests, damp meadows, riversides; 200–3100 m. Sichuan, Xinjiang, Yunnan [Japan, Kazakhstan, Mongolia, Russia (Far East, Siberia); Europe].

24. *Astragalus henryi* Oliver, Hooker's Icon. Pl. 20: t. 1959. 1891.

秦岭黄耆 qin ling huang qi

Neodielsia polyantha Harms.

Plants 40–45 cm tall, with white hairs 0.1–0.3 mm, only at leaves 0.5–0.7 mm. Stems several, zigzaglike bent at nodes at least in upper part, slender, mostly glabrous. Leaves 6–12 cm; stipules membranous, yellowish, soon withering, narrowly oblong to narrowly triangular, 5–8(–12) mm, glabrous or sparsely ciliate; petiole 2–4 cm, like rachis sparsely appressed hairy, at insertion of leaflets mostly with a small tuft of short hairs; leaflets in (1 or) 2 pairs, with short, often undulate-winged petioles, narrowly elliptic, 1.5–4.5(–6) × 0.7–2(–2.5) cm, abaxially pale green, reticulately nerved, and loosely covered with partly spreading hairs, adaxially dark green and glabrous, apex obtuse to acute. Racemes many flowered, in fruit elongated and up to 11 cm; peduncle often branched and inflorescence therefore nearly paniculate, 1–4 cm, slender, glabrous; bracts greenish, linear, 2–4 mm, deflexed, soon falling. Calyx widely campanulate-tubular, 4–5 mm, subglabrous to loosely appressed hairy; teeth inconspicuous, less than 0.3 mm. Petals yellow; standard elliptic-oblong, 8–10 × ca. 4 mm, very slightly emarginate; wings 6–8 mm; keel 8–10 mm. Legumes with a stipe 6–8 mm, obliquely ovoid, 1–1.5 cm, 5–7 mm high, compressed laterally, apex long acuminate; valves yellowish, thinly membranous, glabrous. Seeds mostly 1.

• Hebei, Shaanxi, Shanxi, Sichuan.

25. *Astragalus lepsensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 25. 1868.

天山黄耆 tian shan huang qi

Plants 25–45 cm tall. Stems ca. 3 mm thick at base, sparsely to loosely covered with ascending to spreading white hairs 0.3–1 mm. Leaves 7–14 cm; stipules 10–20 mm, ciliate; petiole short, rachis hairy like stem; leaflets in 5–8 pairs, narrowly ovate, 15–40 × 8–17 mm, abaxially gray-green with whitish midvein, subappressed hairy, adaxially dark green and glabrous. Racemes rather densely to loosely 10–20-flowered, 1-sided, 3–7 cm; peduncle 5–9 cm, appressed hairy; bracts green, narrowly elliptic, 7–11 mm, ciliate, apex acute. Bracteoles sometimes present, linear, 1–2 mm. Calyx shortly tubular, 8–9 mm, subglabrous or in upper part with short spreading black hairs; teeth nearly equal, narrowly triangular, 0.8–1 mm. Petals yellow; standard ovate to obovate, 20–21 × ca. 8 mm; wings 19–20 mm; keel 19–20 mm. Legumes with a stipe 6–7 mm, pendulous, narrowly ellipsoid, 1.5–2.4 cm, 6–7 mm wide and 4–5 mm high, with a beak ca. 2 mm; valves membranous, rather

densely covered with very short white and black nearly appressed hairs.

Xerophytic scrub, coniferous forests, meadows, middle mountain and subalpine zones. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia].

The value of *Astragalus lepsensis* var. *leduensis* Y. H. Wu (Acta Bot. Yunnan. 20: 37. 1998) is uncertain because we have not seen any material. According to the description, it differs by its stipules 4–8 mm, leaflets sparsely hairy on both surfaces, bracts 4–7 mm, calyx 6–8 mm, and standard 15–17 mm.

26. *Astragalus lessertioides* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 24. 1868.

喜马拉雅黄耆 xi ma la ya huang qi

Astragalus levitubus H. T. Tsai & T. T. Yu.

Plants 10–30 cm tall, with soft hairs 0.5–1 mm. Stems several, slender, up to 2 mm thick, sparsely covered with ascending white hairs. Leaves 2–7 cm; stipules 6–15 mm, ciliate; petiole short, like rachis slender, glabrous or sparsely hairy; leaflets in 3–6(–8) pairs, elliptic, 4–11 × 2–6 mm, abaxially sparsely appressed white hairy at margin and especially at midvein, adaxially glabrous. Racemes densely 6–12-flowered; rachis densely black hairy; peduncle 1.5–16 cm, sparsely white hairy, toward top increasingly spreading black hairy; bracts whitish to greenish, linear-acute, 3–6 mm, black ciliate. Calyx campanulate, 4.5–7 mm, not gibbous at base, with truncate mouth, tube glabrous; teeth 1.5–3 mm, black hairy. Petals yellow or purple, often dark purplish brown when dry, all of same length; standard widely obtriangular to widely obovate, 11–12 × 6–8 mm. Legumes stipitate, narrowly ellipsoid, ca. 1.5 cm, very densely covered with appressed black hairs, acuminate at both ends.

Alpine meadows; 3500–4900 m. Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Nepal].

27. *Astragalus longilobus* E. Peter, Acta Horti Gothob. 12: 47. 1938.

长萼裂黄耆 chang e lie huang qi

Plants 30–60 cm tall, with hairs 0.5–1 mm. Stems several, 3–6 mm thick, sparsely to loosely covered with ± appressed white or sometimes also black hairs. Leaves 7–10 cm; stipules greenish, 8–20 mm, lowest ± high vaginate-connate behind stem, upper ones mostly narrowly triangular, long acuminate, free, ciliate; petiole short, like rachis sparsely to loosely covered with ± appressed white and black hairs; leaflets in 3–5 pairs, with a short petiolule often furnished with minute globose glands, narrowly ovate to narrowly elliptic, (18–)25–40(–55) × 7–15 mm, abaxially loosely to densely appressed white hairy, adaxially glabrous, apex acute and often minutely mucronulate. Racemes densely many flowered; peduncle 5–7 cm, loosely predominantly black hairy; bracts whitish, linear-acuminate, 8–10 mm, black hairy. Calyx campanulate, 10–14 mm, sparsely to loosely covered with ± appressed white and toward teeth increasingly black hairs; teeth subulate, (3–)4–7(–8) mm. Petals yellow; standard widely elliptic to widely obovate, 14–15 × 8–9 mm; wings 13–14 mm; keel 11–13 mm. Legumes with a stipe 5–6 mm, narrowly ellipsoid, 18–22 × 7–8 mm, inflated, acuminate at both ends; valves papery, densely covered with short appressed black hairs.

• Subalpine to alpine meadows, grassy slopes, riversides; 3300–4300 m. Gansu, Qinghai, Sichuan.

28. *Astragalus luteolus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 23. 1936.

淡黄花黄耆 dan huang hua huang qi

Plants 30–100 cm tall, with hairs 0.3–0.8 mm. Stem up to 5 mm thick, subglabrous at base, in upper part loosely appressed white hairy. Leaves (4–)7–10 cm; stipules narrowly triangular, (3–)6–10 mm, white or black ciliate; petiole 0.4–1.2 cm, like rachis sparsely to rather loosely covered with appressed to subappressed mostly white hairs; leaflets in (2–)4–7 pairs, narrowly ovate, 15–40 × 6–14 mm, abaxially gray-green and loosely hairy, adaxially dark green and glabrous to sparsely hairy, apex rounded to slightly emarginate. Racemes at anthesis densely 7- to many flowered, at fruiting time elongated up to 10 cm; peduncle 4–13 cm, loosely appressed, mostly white hairy; bracts whitish, linear-acute, 2–5 mm, white and blackish hairy. Calyx shortly tubular, 6–7 mm, ± densely appressed white and black hairy; teeth subulate, unequal, 1–1.5 mm. Petals yellow; standard elliptic to ovate, 12–14 × ca. 5 mm; wings 11–11.5 mm; keel 10–11 mm. Ovary with a stipe ca. 2 mm, white hairy; style with short spreading hairs just below stigma on abaxial surface. Legumes with a stipe 4–5 mm, narrowly ellipsoid, 1.8–2.5 cm × 5–7 mm, inflated, apex long acuminate; valves papery, densely covered with short, ascending black and white or only black hairs.

• Qinghai, Sichuan.

29. *Astragalus minhensis* X. Y. Zhu & C. J. Chen, Guihaia 15: 112. 1995.

民和黄耆 min he huang qi

Astragalus penduliflorus Lamarck var. *minhensis* (X. Y. Zhu & C. J. Chen) X. Y. Zhu.

Plants 60–70 cm tall. Stem in upper part white and black hairy. Leaves 5–9 cm, subsessile; stipules 4–10 mm, narrowly triangular, white ciliate; rachis white hairy; leaflets in 5–9 pairs, narrowly ovate to narrowly elliptic, 11–23 × 3–8 mm, both surfaces appressed white hairy. Racemes loosely 9–19-flowered; peduncle 6–10 cm; bracts linear-acute, 2–5 mm, glabrous or white ciliate. Calyx campanulate, ca. 6 mm, white and black hairy; teeth narrowly triangular, ca. 1 mm. Petals yellow with purple-tipped standard or keel or all purplish; standard obovate ca. 12 × 5 mm; wings ca. 11 mm; keel ca. 11 mm. Ovary with a stipe ca. 1.5 mm, loosely black and white hairy; style with shortly hairy stigma. Legumes with a stipe 2.5–3 mm, narrowly obliquely ellipsoid, 3–3.8 cm, 8–9 mm high, inflated; valves membranous, loosely white and black hairy.

• Qinghai.

30. *Astragalus moellendorffii* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 472. 1880.

边向花黄耆 bian xiang hua huang qi

Astragalus moellendorffii var. *kansuensis* E. Peter.

Plants 35–45 cm tall, vegetative parts with hairs 0.5–

0.8(–1 mm). Stems glabrous or hairy in nodal region, up to 3 mm thick. Leaves 6–10 cm; stipules 10–23 mm, ciliate; petiole 1.5–3 cm, like rachis glabrous or sparsely hairy especially at insertion of leaflets; leaflets in 2–4 pairs, narrowly elliptic to narrowly ovate, 1.5–4(–6) × 0.5–2 cm, abaxially sparsely to loosely appressed hairy, adaxially glabrous, apex rounded to subacute. Racemes densely 10- to many flowered, elongating with age; peduncle 6–22 cm, glabrous; bracts greenish, narrowly elliptic, 5–8 mm, white or black ciliate, apex acute. Calyx 6–8 mm, outside very sparsely or toward apex loosely white and more densely black hairy or nearly glabrous, inner side of tube at least in upper 1/2 densely covered with appressed black or more rarely white hairs; teeth unequal, 0.2–1.5 mm. Petals yellow or purplish; standard ovate to elliptic, 18–19 × 7–10 mm; wings 17–18 mm; keel 15–16 mm. Legumes with a black hairy stipe 6–10 mm, narrowly ellipsoid, 2–2.5 cm, ca. 4 mm high and ca. 5 mm wide, slightly keeled ventrally, widely flattened dorsally, apex long acuminate into a short hooked beak; valves papery, rather densely covered with nearly spreading, predominantly black hairs 0.1–0.2 mm.

• 1800–2600 m. Gansu, Hebei, Ningxia, Shanxi.

31. *Astragalus monadelphus* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 32. 1877.

单蕊黄耆 dan rui huang qi

Astragalus luteus Ulbrich.

Plants 20–60 cm tall, with mostly white hairs 0.4–1 mm. Stems at base 1.5–3 mm thick, glabrous or nearly so. Leaves 7–12 cm, nearly sessile; stipules 8–16 mm, often reflexed, sparsely ciliate; rachis glabrous or nearly so; leaflets in (4–)6–8 pairs, narrowly elliptic to narrowly ovate, 1.2–3.5 × 0.5–1.3 cm, abaxially gray-green and sparsely hairy, adaxially dull green and glabrous, apex rounded or shortly acuminate and minutely mucronulate. Racemes 1-sided, loosely many flowered; peduncle 6–12(–15) cm, erect, glabrous; bracts greenish, narrowly elliptic, 6–10 mm, white and black ciliate, apex acute. Calyx greenish to reddish, campanulate-tubular, 8–10 mm, tube glabrous or sometimes sparsely black hairy; teeth subulate, (2–)3–4 mm. Petals yellow; standard widely elliptic to widely obovate or nearly orbicular, (10–)12–13 × 5–6 mm; wings (10–)11–12 mm; keel 10–11 mm. Stamen tube closed, monadelphous. Legumes with a white hairy stipe 5–6 mm, inflated ellipsoid, ca. 15 mm, ca. 6 mm high and wide, keeled ventrally, flattened dorsally; valves thinly membranous, loosely covered with ascending short white and black hairs.

• Gansu, Qinghai, Shaanxi, Sichuan, Yunnan.

32. *Astragalus mongholicus* Bunge, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 7, 11(16): 25. 1868.

蒙古黄耆 meng gu huang qi

Astragalus borealimongolicus Y. Z. Zhao; *A. membranaceus* Bunge (1868), not Moench (1794); *A. membranaceus* var. *mongholicus* (Bunge) P. K. Hsiao; *A. mongholicus* var. *dahuricus* (Candolle) Podlech; *A. penduliflorus* Lamarck var. *membranaceus* Glehn; *A. propinquus* Schischkin; *A. purdomii* N. D. Simpson; *Phaca abbreviata* Ledebour; *P. alpina* Linnaeus var. *dahurica* Candolle; *P. macrostachys* Turczaninow.

Plants 25–60 cm tall, covered with hairs 1–1.5(–2) mm. Stems at base 2.5–3 mm thick, glabrous or sparsely to rarely loosely covered with \pm spreading white hairs up to 2 mm and with mostly shorter more appressed hairs. Leaves 6–15 cm, nearly sessile; stipules narrowly to very narrowly triangular, lower ones 8–10 mm, upper ones 4–5 mm, glabrous or ciliate; rachis sparsely to loosely appressed to spreading hairy; leaflets in 8–12 pairs, narrowly ovate to narrowly elliptic, 5–22 \times 3–11 mm, glabrous or on midvein abaxially and margins with nearly spreading hairs, apex widely rounded to shallowly emarginate. Racemes loosely many flowered, 4–5 cm, at fruiting time strongly elongated to 9–14 cm; peduncle 7–13 cm, sparsely white hairy; bracts greenish to whitish, narrowly triangular to linear, 3–6 mm, white and black hairy. Bracteoles sometimes present, whitish, linear, ca. 0.5 mm. Calyx campanulate-tubular, 5–9 mm, glabrous or sparsely covered with short ascending black hairs; teeth sometimes also with longer white hairs 0.5–1.5 mm. Petals yellow, rarely lilac; standard widely elliptic, 13–20 \times 7–9 mm; wings 12–17 mm; keel 11–16 mm. Legumes with a slender stipe 6–9(–15) mm, obliquely ellipsoid to nearly semicircular as seen from side, with strongly curved dorsal side and slightly curved to nearly straight ventral side, 2–3 cm, 8–12 mm high and 3–4 mm wide, sharply keeled ventrally, narrowly rounded dorsally, apex shortly acuminate; valves membranous, glabrous or loosely covered with very short appressed black or more rarely white hairs.

Steppes, meadows, xerophytic shrubs, coniferous forests, montane zone; 800–2000 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia (Far East, Siberia)].

33. *Astragalus muliensis* Handel-Mazzetti, Symb. Sin. 7: 554. 1933.

木里黄耆 mu li huang qi

Plants up to 60 cm tall, with appressed to subappressed hairs 0.2–0.3 mm. Stems several, at base ca. 2 mm thick, subglabrous or sparsely covered with mainly black hairs. Leaves 6–10 cm, upper ones nearly sessile, lower ones with petiole up to 2 cm; stipules very narrowly triangular, 5–6 mm, glabrous or ciliate; rachis sparsely subappressed hairy; leaflets in 5–8 pairs, narrowly ovate to narrowly elliptic, 10–22 \times 4–8 mm, abaxially covered sparsely to loosely with appressed hairs 0.3–0.8 mm, adaxially glabrous, apex widely rounded to shallowly notched. Racemes loosely 12–15-flowered, 3–4 cm, at fruiting time elongated; peduncle 8–15 cm, sparsely to loosely covered with appressed to ascending short black hairs; bracts whitish membranous, filiform to linear-acute, 3–4 mm, sparsely black hairy. Calyx campanulate, 4.5–5 mm, rather densely covered with subappressed black and sometimes a few white hairs; teeth slightly unequal, 1–2 mm. Petals blue or bluish violet with yellowish base; standard obovate, 10–11 \times 5–6 mm; wings 9–10 mm; keel ca. 8 mm. Legumes (unripe) with a long slender stipe, acute at both ends; valves densely brownish hairy.

• Sichuan, Xizang, Yunnan.

34. *Astragalus neomonodelphus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 263. 1940.

新单蕊黄耆 xin dan rui huang qi

Plants 25–50 cm tall, vegetative parts glabrous. Stems solitary to mostly several, ca. 3 mm thick. Leaves 5–10 cm, nearly sessile; stipules ovate, 11–15 mm; leaflets in 4–7 pairs, narrowly elliptic or rarely elliptic, (7–)10–30 \times (3–)4–10 mm, apex obtuse. Racemes densely 5–16-flowered; rachis black hairy; peduncle 4.5–12 cm, glabrous; bracts greenish, 5–9 mm, white and black ciliate. Calyx greenish, shortly tubular, 8–9 mm, glabrous; teeth unequal, 2 adaxial triangular, 1–1.5 mm, 3 abaxial narrowly triangular, 1.5–3 mm. Petals yellow, often blackish when dry; standard obovate to widely rhombic-obovate to sometimes wider than long, 16–17 \times 8–11 mm; wings 15–16 mm; keel 15–16 mm. Stamen tube closed, monadelphous. Legumes with a stipe 7–8 mm, pendulous, ellipsoid, 1.8–2.5 cm, 6–8 mm high and ca. 4 mm wide, keeled ventrally and dorsally; valves papery, rather densely covered with appressed to subappressed black hairs 0.1–0.3 mm.

• Alpine zone; 3400–4700 m. Yunnan.

35. *Astragalus petrovii* N. Ulziykhtag, Novosti Sist. Vyssh. Rast. 30: 109. 1996.

肃南黄耆 su nan huang qi

Plants 60–90 cm tall. Stems up to 7 mm thick, glabrous or with some subappressed to spreading hairs 0.8–1.5 mm. Leaves 6–8 cm, subsessile; stipules 4–11 mm, often reflexed, ciliate; rachis sparsely hairy like stem; leaflets in 8–11 pairs, narrowly ovate to narrowly elliptic, 10–15 \times 4–6 mm, abaxially loosely and adaxially sparsely covered with appressed to subappressed hairs 0.3–1 mm, apex rounded to obtuse. Racemes 3–6 cm, rather densely (10–)15–25-flowered; peduncle 6–15 cm; bracts greenish, narrowly triangular, 3–5 mm, white ciliate. Calyx campanulate, 4–6 mm, loosely, in upper margins and teeth densely, covered with appressed to subappressed predominantly black hairs 0.2–0.3 mm; teeth unequal, triangular, 0.3–1 mm. Petals dark purplish to blackish violet; standard obovate, ca. 13 \times 7 mm; wings ca. 12 mm; keel 11–11.5 mm. Legumes with a stipe 3–5.5 mm, \pm spreading, obliquely ellipsoid, 3–3.5 cm, ca. 10 mm high and ca. 4 mm wide, obtusely keeled ventrally, narrowly rounded dorsally, with a beak 1–1.5 mm; valves membranous, with very short, appressed, black or white hairs 0.05–0.08 mm.

• 2600–3100 m. Gansu.

36. *Astragalus przewalskii* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 32. 1877.

黑紫花黄耆 hei zi hua huang qi

Plants 30–80 cm tall, with subappressed hairs 0.2–0.6 mm. Stems solitary or several, 1–3 mm thick, in lower 1/2 or 2/3 leafless, loosely hairy. Leaves 5–12 cm; stipules membranous, 4–8 mm, with \pm spreading black and white hairs; petiole short, like rachis subappressed white and black hairy; leaflets in 4–8 pairs, narrowly ovate to narrowly elliptic, 8–35 \times 1–5(–8) mm, abaxially subappressed white hairy, adaxially glabrous, apex obtuse to subacute. Racemes 3–7 cm, rather densely 4–20-flowered; peduncle 4–11 cm, subappressed white and black hairy; bracts membranous, narrowly elliptic, 5–7 mm, white hairy. Calyx campanulate, 5–6 mm, densely covered with subappressed,

predominantly brownish to blackish hairs; teeth nearly equal, 1–2 mm. Petals blackish purple; standard widely rhombic-elliptic, ca. 11 × 7 mm; wings ca. 10 mm; keel ca. 9 mm. Ovary with a style shortly hairy below stigma. Legumes with a stipe 4–5 mm, ovoid to ellipsoid, 15–30 mm, 5–6 mm high and wide; valves thinly membranous, loosely covered with ascending to spreading black hairs 0.1–0.3 mm.

- Subalpine to alpine zones. Gansu, Qinghai, Sichuan, Xinjiang.

37. *Astragalus purpurinus* (Y. C. Ho) Podlech & L. R. Xu, *Novon* 14: 221. 2004.

淡紫花黄耆 dan zi hua huang qi

Astragalus membranaceus Bunge var. *purpurinus* Y. C. Ho, *Bull. Bot. Lab. N. E. Forest. Inst., Harbin* 1980(8): 54. 1980; *A. membranaceus* f. *pallidipurpureus* Y. C. Ho; *A. membranaceus* subsp. *pallidipurpureus* (Y. C. Ho) X. Y. Zhu & C. J. Chen; *A. membranaceus* f. *purpurinus* (Y. C. Ho) K. T. Fu; *A. penduliflorus* Lamarck var. *pallidipurpureus* (Y. C. Ho) X. Y. Zhu.

Plants at least 60–70 cm tall, with hairs 0.3–0.5(–1.5) mm. Stem at base up to 8 mm thick, glabrous or with scattered spreading hairs up to 1.5 mm. Leaves 5–9 cm, nearly sessile; stipules 4–10 mm, glabrous or ciliate; rachis sparsely covered with spreading hairs up to 1 mm; leaflets in 3–9 pairs, narrowly ovate to narrowly elliptic, 10–17 × 3–7 mm, both surfaces loosely covered with appressed to subappressed hairs 0.3–1 mm, apex rounded to minutely acuminate. Racemes 4–5 cm, loosely many flowered, soon elongating up to 10 cm; peduncle 5–13 cm, sparsely to loosely covered with appressed to ± spreading white hairs; bracts green, linear-subulate, 5–8 mm, mainly white ciliate. Bracteoles whitish, linear, 0.5–1 mm. Calyx campanulate, 4(–5) mm, tube loosely covered with subappressed black hairs up to 0.3 mm and with a few long white hairs; teeth 0.3–1 mm. Petals lilac or dark purplish; standard obovate, ca. 13 × 7 mm; wings ca. 13 mm; keel ca. 12 mm. Legumes (immature) with a stipe 5–6 mm, narrowly ellipsoid; valves very densely covered with subappressed white and black hairs.

- Gansu.

38. *Astragalus sichuanensis* L. Meng, X. Y. Zhu & P. K. Hsiao, *Nordic J. Bot.* 24: 419. 2007.

蜀黄耆 shu huang qi

Plants ca. 60 cm tall. Stems erect, green-blue, sometimes dark reddish, glabrous. Leaves 10–13 cm; stipules narrowly ovate, 20–26 × 5–8 mm, usually with conspicuous veins, free, glabrous; petiole 1–4 cm; leaflets in 3–5 pairs, narrowly ovate, 26–42 × 10–17 mm, sparsely appressed hairy abaxially, glabrous adaxially. Racemes 5–10-flowered; peduncle 5–7 cm; bracts 11–14 × 2.5–4 mm, densely appressed white hairy. Calyx 9–11 mm, sparsely appressed white hairy, at teeth sometimes with a few black hairs mixed in; teeth triangular, very short and nearly inconspicuous. Petals yellow; standard elliptic, 20–22 × ca. 7 mm, gradually narrowed at base, apex emarginate; wings 20–21 mm; keel 18.5–20 mm. Ovary with a slender stipe 12–14 mm, glabrous. Legumes unknown.

- Meadows along riversides and shady hillsides or wet areas near wells. Sichuan.

39. *Astragalus tecti-mundi* Freyn, *Bull. Herb. Boissier, sér. 2, 4*: 456. 1904.

屋脊黄耆 wu ji huang qi

Plants 30–90 cm tall. Stems at base 3–7 mm thick, glabrous or more rarely sparsely to very sparsely appressed hairy. Leaves 7–15 cm, nearly sessile; stipules 1.2–2 cm, glabrous or ciliate; leaflets in 4–7 pairs, narrowly ovate to ovate, 2–6 × 0.8–3.5 cm, glabrous or sparsely hairy abaxially. Racemes 6–9 cm, loosely to rather densely many flowered; peduncle 5–14 cm; bracts greenish, 6–9 mm, glabrous or sparsely ciliate, soon falling. Calyx shortly tubular, 8–11 mm, sparsely covered with very short appressed black hairs or nearly glabrous; teeth widely triangular, 0.5–1.5 mm, mostly black hairy. Petals yellow; standard obovate to widely obovate, 15–25 × 7–10 mm; wings 14–22 mm; keel 14–20 mm. Legumes with a stipe 8–10 mm, narrowly ellipsoid, 2.5–4.5 cm, 4–6 mm high and 5–8 mm wide, slightly keeled ventrally, slightly widely grooved dorsally, acuminate at both ends; valves papery, loosely covered with short appressed black hairs, rarely glabrous when fully ripe.

Wet meadows, riversides, among shrubs in the subalpine and alpine zones; 2500–4200 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Pakistan, Tajikistan].

- 1a. Leaflets larger, 4 or 5 pairs, glabrous 39a. subsp. *tecti-mundi*
- 1b. Leaflets smaller, 5–7 pairs, sparsely to loosely appressed hairy abaxially 39b. subsp. *orientalis*

39a. *Astragalus tecti-mundi* subsp. *tecti-mundi*

屋脊黄耆(原亚种) wu ji huang qi (yuan ya zhong)

Leaflets larger, 4 or 5 pairs, glabrous.

Xinjiang [Afghanistan, India, Pakistan, Tajikistan].

39b. *Astragalus tecti-mundi* subsp. *orientalis* Podlech, *Sendtnera* 7: 178. 2001.

东方屋脊黄耆 dong fang wu ji huang qi

Leaflets smaller, 5–7 pairs, sparsely to loosely appressed hairy abaxially.

Xinjiang, Xizang [India, Kashmir, Pakistan].

40. *Astragalus tongolensis* Ulbrich, *Bot. Jahrb. Syst.* 50(Beibl. 110): 12. 1913.

东俄洛黄耆 dong e luo huang qi

Astragalus potaninii Komarov; *A. tongolensis* var. *breviflorus* H. T. Tsai & T. T. Yu; *A. tongolensis* var. *glaber* E. Peter; *A. tongolensis* var. *lanceolatodentatus* E. Peter; *A. veitchianus* N. D. Simpson.

Plants 30–70(–120) cm tall, sparsely hairy. Stems several, up to 7 mm thick, glabrous. Leaves 6–15 cm; stipules 15–30 mm, sparsely ciliate; petiole 1–5 cm, like rachis glabrous or very sparsely hairy; leaflets in 3–7 pairs, narrowly elliptic to

obovate, 1–6 × 0.4–2.5 cm, glabrous on both surfaces or sometimes abaxially loosely covered with nearly spreading white hairs 0.5–1 mm, apex obtuse. Racemes rather densely 8- to many flowered, later strongly elongating; peduncle 6–25 cm, glabrous or sparsely white hairy, toward raceme also black hairy; bracts whitish or greenish, linear, 5–10 mm, black ciliate, soon falling. Calyx turbinate-tubular, 6–9 mm, glabrous or sparsely hairy outside, on inner side in upper 1/2 of tube densely appressed black hairy, rarely also in upper 1/2 of outer side rather densely black hairy; teeth triangular, 1.5–2(–3) mm. Petals yellow, all of equal length; standard oblong to slightly obovate, 18–24 × 6–8 mm, somewhat constricted in middle. Legumes with a stipe 8–10 mm, narrowly ovoid, 2–2.5 cm × 5–6 mm, keeled ventrally, flattened dorsally, apex long acuminate; valves papery, very densely black hairy.

• *Picea* forests, among shrubs, meadows; 3400–4800 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

41. *Astragalus xitaibaicus* (K. T. Fu) Podlech & L. R. Xu, *Novon* 14: 222. 2004.

9. *Astragalus* sect. *Pseudosesbanella* Podlech, Feddes Repert. 117: 230. 2006.

扁莢組 *bian jia zu*

Plants with well-developed, prostrate to erect stems, subglabrous or with basifixed hairs. Stipules free. Bracts persistent. Bracteoles present, minute. Calyx campanulate. Stigma hairy. Legumes stipitate, distinctly to strongly compressed laterally, 1-locular or incompletely to completely 2-locular.

Three species: NE Afghanistan, W China, NW India, Kashmir, N Pakistan, Tajikistan; two species in China.

1a. Plants subglabrous; leaflets in 15–20 pairs; calyx and legumes glabrous 43. *A. hoffmeisteri*
1b. Plants covered with spreading hairs; leaflets in 6–11 pairs; calyx and legumes hairy 42. *A. falconeri*

42. *Astragalus falconeri* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 4. 1868.

侧扁黄耆 *ce bian huang qi*

Astragalus badachschanicus Borissova; *A. falconeri* var. *paucistrigosus* K. T. Fu; *A. hoffmeisteri* (Klotzsch) Ali var. *pilosulus* Ali.

Plants ± densely covered with mostly spreading white hairs. Stems several to many, 15–40 cm, prostrate to ascending or erect, 1–3.5 mm thick, hairy. Leaves 1.5–5 cm, subsessile; stipules 1.5–8 mm, semicordate or orbicular, hairy on both surfaces, apex ± long acuminate; rachis hairy; leaflets in 6–11 pairs, obovate, 3–11 × 1.5–6 mm, both surfaces rather densely covered with spreading white hairs, apex retuse to emarginate. Racemes at anthesis 2–3 cm, loosely 3–14-flowered, at fruiting time up to 5 cm; peduncle 2.5–6 cm, loosely to densely hairy; bracts linear, 1–2 mm, ciliate. Bracteoles 0.25–0.5 mm, often indistinct. Calyx 4.5–6 mm, sparsely to loosely covered with ± spreading, white or mixed white and dark violet hairs; teeth unequal, 1–3 mm. Petals pale yellow, at apex often pale to dark violet, all of nearly same length; standard widely elliptic to sub-orbicular, 9.5–13 × 6.5–9 mm, apex retuse to emarginate. Style below and at stigma densely hairy. Legumes with a stipe 4–7 mm, narrowly ellipsoid, 12–18 mm, 4–7 mm high, compressed laterally, keeled ventrally, deeply grooved dorsally, incom-

西太白黄耆 *xi tai bai huang qi*

Astragalus monadelphus Bunge subsp. *xitaibaicus* K. T. Fu, *Acta Bot. Boreal.-Occid. Sin.* 1(2): 17. 1981.

Plants 12–22 cm tall, totally glabrous with exception of inner side of calyx teeth and legumes. Stems several, up to 4 mm thick. Leaves 4–8 cm; stipules greenish membranous with narrowly hyaline margins, ovate, 12–15 mm; petiole 0.7–2 cm, rachis at base of leaflets mostly with stipel-like entire or fringed linear to narrowly triangular emergences 0.5–2.5 mm and/or with distinctly stalked minute glands; leaflets in 5–7 pairs, ovate to elliptic, 10–18 × 5–9 mm, apex rounded. Racemes 8–11-flowered; peduncle 4–7.5 cm; bracts narrowly ovate, ca. 10 mm. Calyx campanulate, 7.5–9 mm; teeth subulate, 2.5–3 mm, hairy on inner side. Petals yellow; standard obovate, ca. 11 × 5–6 mm; wings ca. 11 mm; keel ca. 10 mm. Stamen tube closed, monadelphous. Legumes with a stipe 5–6 mm, narrowly ellipsoid, ca. 1.5 cm, shortly attenuate at both ends; valves hairy.

• Alpine grasslands; 2800–3300 m. Shaanxi.

pletely to nearly completely 2-locular; valves thin, densely covered with spreading white hairs, glabrescent with age.

2400–3800 m. Xizang [NE Afghanistan, Kashmir, Pakistan, Tajikistan].

43. *Astragalus hoffmeisteri* (Klotzsch) Ali, *Kew Bull.* 13: 304. 1958.

疏花黄耆 *shu hua huang qi*

Phaca hoffmeisteri Klotzsch, *Bot. Ergebn. Reise Walde-mar*, 159. 1862; *Astragalus tsataensis* C. C. Ni & P. C. Li.

Plants 30–70 cm tall, subglabrous, with few, appressed, mostly white hairs. Stems up to 5 mm thick, branched, glabrous or at base loosely hairy. Leaves 4–13 cm; stipules 3–15 mm, semicordate or obliquely ovate, glabrous or sparsely ciliate; petiole short, like rachis glabrous or sparsely hairy; leaflets in 15–20 pairs, widely obovate to obcordate, 1.5–7.5(–13) × 1–8(–12) mm, glabrous or abaxially and margins sparsely hairy, apex retuse to emarginate. Racemes at anthesis 4–10(–14) cm, very loosely 5–20-flowered, at fruiting time elongating to 14–22 cm; peduncle at anthesis (4–)6–12 cm, later strongly elongating, glabrous or sparsely hairy; bracts 1–2.5 mm, ciliate. Bracteoles 0.25–1 mm. Calyx 3.5–5 mm, glabrous; teeth unequal, 1–2 mm, sparsely white hairy. Petals pale yellow, often with violet tip when dry, nearly all of same length; standard widely obovate, 8–11 × 5.5–7 mm, apex retuse to slightly

emarginate. Stigma densely hairy. Legumes with a stipe 5–8 mm, narrowly ellipsoid, 15–22 mm, 4–5.5 mm high, strongly compressed laterally, keeled ventrally, deeply grooved dorsally,

nearly 1-locular, with a narrow septum; valves thin, glabrous.

Dry stony slopes; 2400–4600 m. Xizang [NE Afghanistan, Kashmir].

10. Astragalus sect. Coluteocarpus Boissier, Fl. Orient. 2: 11. 1872.

泡果组 pao guo zu

Astragalus sect. *Robusti* E. Peter.

Plants with a well-developed, stout stem. Stipules free from petiole and from each other but often distinctly widened at base and to nearly fully amplexicaul. Racemes with a distinct peduncle, densely many flowered; bracts soon falling. Bracteoles present. Stigma hairy, sometimes only minutely. Legumes with a long stipe, glabrous, inflated, incompletely to completely 2-locular.

Six species: Afghanistan, China, Kazakhstan, Mongolia, Pakistan, Tajikistan; two species (one endemic) in China.

1a. Plants glabrous or only with a few scattered hairs; petals yellowish white; legumes 2.5–4 cm, with short beak, strongly compressed laterally 44. *A. dschimensis*

1b. Plants in most parts at least sparsely hairy; petals violet; legumes 4–6.4 cm, with a beak 3–5 mm, inflated 45. *A. hoantchy*

44. Astragalus dschimensis Gontscharow, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 30. 1947.

乌拉特黄耆 wu la te huang qi

Astragalus hedinii Ulbrich.

边陲黄耆 bian chui huang qi

Astragalus hoantchy Franchet subsp. *dschimensis* (Gontscharow) K. T. Fu.

Plants up to 100 cm tall or more; hairs short and a few long, appressed to spreading, white, in inflorescence also dark brown. Stem 4–8 mm thick, erect, loosely to rather densely covered with ± spreading rigid hairs 0.8–2(–2.5) mm. Leaves 10–24 cm, subsessile; stipules 6–11 mm, often spreading or reflexed, with long, spreading, white or white and blackish hairs; rachis sparsely to loosely white hairy; leaflets in 7–11 pairs, widely elliptic, 7–26 × 4–20 mm, glabrous or abaxially sparsely to loosely white hairy, apex truncate to retuse, with a minute but distinct cusp. Racemes 1.5–6 cm, rather densely 10–17-flowered, elongating in fruit to 8–10 cm; peduncle at anthesis 8–12 cm, elongating up to 20 cm with age, glabrous or with hairs 1–3 mm; bracts soon falling, 4–10 mm, ciliate. Bracteoles 0.5–6 mm. Calyx 11–13 mm, at base with dark brownish hairs, in upper part nearly glabrous; teeth unequal, 2–3.5 mm. Petals purplish, pink, or violet; standard ovate or elliptic, 19–26 × 11–14 mm, apex emarginate; wings 19–26 mm; keel 17–23 mm. Stigma covered with white hairs up to 1 mm. Legumes with a stipe 10–14 mm, narrowly ellipsoid, 4.5–6.4 cm, 0.8–1.4 cm high and wide, keeled ventrally, grooved dorsally, with a beak 3–5 mm, incompletely to completely 2-locular; valves thin, glabrous.

Plants 30–65 cm tall, glabrous or with a few scattered white or black spreading hairs 1–2 mm. Stem up to 6 mm thick. Leaves 12–27 cm; stipules 6–10(–15) mm, widely triangular-ovate, at base unilaterally auriculate; petiole 0.6–3 cm; leaflets in 7–10(–14) pairs, widely elliptic to widely obovate, (5–)10–17 × (4–)8–15 mm, apex rounded to emarginate. Racemes 7–15 cm, at fruiting time up to 25 cm, loosely 6–15-flowered; peduncle 12–17 cm; bracts soon falling, whitish membranous, 5–7 mm. Bracteoles linear, 1–2 mm. Calyx 10–13 mm; teeth unequal, 3–5 mm. Petals pale yellowish white, nearly of equal length; standard widely ovate, 20–25 × 11–13 mm, apex emarginate. Style below stigma with very short white hairlets. Legumes with a stipe 10–15 mm, obliquely narrowly ellipsoid, (2.5–)3.5–4 cm, 8–10 mm high, compressed laterally, keeled ventrally, narrowly rounded dorsally, with a short beak, incompletely to nearly completely 2-locular; valves thin, glabrous.

900–2500 m. Xinjiang [Kazakhstan, Mongolia].

● 1400–2400 m. Gansu, Nei Mongol, Ningxia, Qinghai.

45. Astragalus hoantchy Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 5: 238; Pl. David. 1: 86. 1883.

11. Astragalus sect. Chlorostachys Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 27. 1868.

绿穗组 lü sui zu

Astragalus sect. *Diplothea* Bunge; *A. sect. Nigricantes* N. D. Simpson.

Plants perennial, caulescent, with ± long stems; hairs basifixed, white or dark brown to blackish brown. Leaves nearly sessile or with a short petiole; stipules free from petiole, mostly green or greenish, vaginate-connate behind stem or free from each other. Racemes mostly several in 1 stem, with a long peduncle, densely (1–)4- to many flowered; bracts persistent or early falling. Flowers pedicellate. Bracteoles often present. Calyx campanulate to shortly tubular, slightly obliquely gibbous at base, obliquely cut at mouth. Petals yellow or violet; standard rounded to emarginate; keel often longer than wings. Ovary stipitate; style and stigma glabrous. Legumes subsessile to distinctly stipitate, mostly ± keeled ventrally, rounded, obtusely keeled or grooved dorsally, 1-locular or incompletely to completely 2-locular.

Thirty-five species: Afghanistan, Bhutan, China, India, Japan, Kashmir, Myanmar, Nepal, Pakistan; 20 species (14 endemic) in China.

- 1a. Stipules 30–70 mm, behind stem connate up to top 63. *A. stipulatus*
- 1b. Stipules shorter, not connate up to top, if shortly connate, then considerably shorter.
- 2a. Stipules 10–45 mm, 2 of 1 leaf often strongly unequal 53. *A. graveolens*
- 2b. Stipules at most up to 20(–25) mm but mostly distinctly shorter, equal.
- 3a. Stipules of main stem high connate behind stem.
- 4a. Bracts 2–3 mm; calyx 8–10 mm, glabrous 61. *A. moupinensis*
- 4b. Bracts 5–6 mm; calyx 6–7 mm, loosely to densely white and black hairy 54. *A. hancockii*
- 3b. Stipules of main stem free from each other, sometimes shortly connate in leaves of lateral branches or in front of petiole.
- 5a. Leaflets hairy adaxially, sometimes in some leaves glabrous.
- 6a. Leaflets 8–10 × 4–5 mm; rachis and peduncle covered with ± spreading hairs 59. *A. matiensis*
- 6b. Leaflets distinctly larger, at least 10 mm and up to 35(–40) mm; rachis and peduncle covered with appressed to slightly ascending hairs.
- 7a. Stem 1–3 mm in diam.; calyx 4–6.5 mm, teeth 0.5–1.5 mm or sometimes indistinct 49. *A. chlorostachys*
- 7b. Stem (2–)4–6(–8) mm in diam., often hollow; calyx 6–9 mm, at least longer teeth 1.5–3 mm.
- 8a. Plants in vegetative parts with white hairs only 55. *A. khasianus*
- 8b. Plants in vegetative parts with white and black or predominantly blackish brown hairs.
- 9a. Stem unbranched; stipules all free; bracts persistent; stigma glabrous 48. *A. chengkangensis*
- 9b. Stems strongly branched; stipules in non-flowering lateral branches often connate behind stem or in front of petiole; bracts soon falling; stigma shortly papillose 50. *A. concretus*
- 5b. Leaflets of all leaves glabrous adaxially.
- 10a. Plants completely glabrous, only leaflet just after development abaxially sparsely hairy but soon also glabrous 46. *A. basiflorus*
- 10b. Plants hairy at least in parts when fully developed.
- 11a. Calyx glabrous or only between and at teeth sparsely and shortly ciliate.
- 12a. Leaflets in 5–7 pairs; peduncles 14–18 cm; calyx purple red; petals reddish brown; ovary densely black hairy 57. *A. lamalaensis*
- 12b. Leaflets in (6–)8–18 pairs; peduncles up to 4.5 cm; calyx not purple red; petals yellow to greenish yellow; legumes glabrous.
- 13a. Stipules in main stem ca. 5 mm, in lateral branches 2–3 mm; leaflets 4–7 mm, truncate to retuse; bracts 1–3 mm; calyx ca. 4 mm; standard ca. 9 × 5 mm 47. *A. brachytrichus*
- 13b. Stipules 6–16 mm; leaflets 8–15 mm, rounded; bracts 4–5 or 6–12 mm; calyx at least 4 mm but mostly longer; standard 11–13 × ca. 7 mm.
- 14a. Bracts 4–5 mm; calyx 4–6 mm, glabrous, teeth ca. 1.5 mm; legumes with a stipe ca. 4 mm, ca. 12 mm, ca. 5 mm high 58. *A. lucidus*
- 14b. Bracts 6–12 mm; calyx 6–10 mm, teeth 2–4 mm, between and at teeth shortly black ciliate; legumes with a stipe 5–11 mm, 10–20 mm, 6–12 mm high 60. *A. minshanensis*
- 11b. Calyx hairy.
- 15a. Calyx 9–11 mm, with teeth 4–5 mm; standard ca. 18 mm 65. *A. zadaensis*
- 15b. Calyx at most 9 mm but mostly distinctly shorter, teeth up to 3 mm; standard shorter, up to 15 mm.
- 16a. Bracts 1.5–3 mm; calyx 3–5 mm; bracteoles absent.
- 17a. Stems in lower parts rather densely covered with spreading white hairs 0.5–1 mm and with a few appressed black hairs 0.3–0.4 mm, partly glabrescent and in older parts to completely glabrous, in upper parts sparsely to loosely covered with short appressed black hairs 0.3–0.5 mm; petals cream, sometimes flushed with violet; standard ca. 13 × 5 mm, with slightly distinct short tongue-like tip, below middle slightly constricted 62. *A. rhododendrophilus*
- 17b. Stems glabrous at base, in upper parts rather densely covered with curly subappressed hairs 0.1–0.25 mm; petals yellow; standard 9–11 × 5.5–7.5 mm, rhombic-ovate 56. *A. kialensis*
- 16b. Bracts at least 4 mm and up to 10(–17) mm; calyx longer; bracteoles often present.
- 18a. Stems strongly branched; stipules in non-flowering lateral branches often connate behind stem or in front of petiole; bracts soon falling; stigma shortly papillose 50. *A. concretus*
- 18b. Stems not strongly branched; stipules all free from each other; stigma glabrous.
- 19a. Leaflets in 7–9 pairs; petals cream, sometimes flushed with red; stipules 5–7 mm 64. *A. tumbatsicus*
- 19b. Leaflets in at least 10 but mostly in distinctly more pairs; petals yellow; stipules 8–16 mm.
- 20a. Stems 1.5–2 mm thick; bracts glabrous; bracteoles, if present, 0.4–1 mm; stipules glabrous or very sparsely ciliate 51. *A. dumetorum*

- 20b. Stems 2–6 mm thick; bracts black hairy or white ciliate; bracteoles mostly present, 1.5–3 mm; stipules sparsely to loosely hairy or long ciliate.
- 21a. Stipules sparsely to loosely white and black hairy; leaflets in 15–19 pairs; bracts predominantly black hairy, persistent; calyx 5–6 mm; standard 10–12 mm; legumes with a short stipe 52. *A. forrestii*
- 21b. Stipules long spreading ciliate; leaflets in 10–13 pairs; bracts white ciliate, soon falling; calyx 6–8 mm; standard 13–15 mm; legumes with a stipe 5–7 mm 55. *A. khasianus*

46. *Astragalus basiflorus* E. Peter, Acta Horti Gothob. 12: 65. 1938.

地花黄耆 di hua huang qi

Plants ca. 30 cm tall, glabrous with exception of leaflets and inner side of calyx teeth. Stems ascending to procumbent, 1–1.2 mm thick. Leaves 6–11 cm; stipules 6–10 mm, free; petiole 1.5–2.5 cm; leaflets in 7–11 pairs, ± elliptic, 6–13 × 2–7 mm, when young covered abaxially with ± spreading asymmetrically bifurcate to basifixed white hairs 0.7–1.5 mm, very soon glabrescent and later completely glabrous, apex rounded to subacute, mostly with a minute cusp. Racemes densely 5–8-flowered; peduncle in axil of lower leaves only, 2.5–6 cm; bracts 6–10 mm. Bracteoles 1–2 mm, soon falling. Calyx 8–9 mm; teeth unequal, 2.5–3 mm, glabrous outside, with black basifixed hairs on inner side. Petals ?purplish; standard narrowly obovate, 13–14 × ca. 4 mm; wings 12–13 mm; keel 12–13 mm. Legumes (unripe) with a stipe ca. 10 mm, ellipsoid-curved, ca. 20 mm, ca. 6 mm high, laterally compressed, acutely keeled ventrally, deeply grooved dorsally.

- About 2300 m. Gansu, Qinghai.

This is a little known species and is provisionally assigned to this section.

47. *Astragalus brachytrichus* Podlech & L. R. Xu, Novon 17: 232. 2007.

短毛黄耆 duan mao huang qi

Plants at least 35 cm tall (basal parts missing). Stem branched, ca. 1.5 mm thick, glabrous, those of lateral branches sparsely covered with subappressed white hairs 0.15–0.3 mm. Leaves 3–7 cm; stipules ca. 5 mm, in lateral branches 2–3 mm, free, at margins and apex sparsely white and black hairy; petiole 0.5–1.5 cm, like rachis sparsely to loosely hairy; leaflets in 8–15 pairs, elliptic, 4–7 × 2–3.5 mm, abaxially sparsely appressed hairy at margins and midvein, adaxially glabrous, apex truncate to retuse. Racemes 2–3 cm, rather densely 12–15-flowered; peduncle 3–4.5 cm, sparsely hairy; bracts 1–3 mm, sparsely hairy. Calyx ca. 4 mm, glabrous or with scattered black hairs only; teeth unequal, abaxial ca. 2 mm, adaxial ca. 1 mm. Petals greenish yellow; standard obovate, ca. 9 × 5 mm, apex emarginate; wings and keel ca. 8 mm. Legumes (unripe) with a stipe 3–4 mm, obliquely ellipsoid, 10–12 mm, incompletely 2-locular; valves membranous, glabrous.

- Xizang.

48. *Astragalus chengkangensis* Podlech & L. R. Xu, Novon 17: 232. 2007.

镇康黄耆 zhen kang huang qi

Plants ca. 110 cm tall. Stem ca. 4 mm in diam., hollow,

glabrous. Leaves 10–17 cm; stipules 1–1.5 cm, free, white hairy at margins and apex; petiole 2–2.5 cm, like rachis sparsely to rather loosely covered with subappressed to ascending, white and black hairs up to 1 mm; leaflets in 8–11 pairs, narrowly elliptic, 15–30 × 5–13 mm, abaxially loosely, at margins more densely, covered with white hairs 0.2–0.5 mm, adaxially mostly sparsely appressed hairy, apex rounded, minutely mucronulate. Racemes rather densely 12–22-flowered, elongating after anthesis; peduncle 8–12 cm, hairy like rachis; bracts 7–11 mm, loosely white and black hairy, ± persistent. Bracteoles 2–3 mm. Calyx ca. 8 mm, rather densely covered with subappressed to ascending, predominantly black hairs 0.2–0.8 mm; teeth ca. 2 mm. Petals yellow; standard obovate, 16–17 × ca. 7 mm, slightly constricted below middle, claw ca. 5 mm, apex emarginate; wings and keel ca. 15 mm. Ovary with a stipe ca. 5 mm, linear, glabrous. Legumes unknown.

- About 2900 m. Yunnan (Zhenkang).

This species is in *Astragalus* sect. *Chlorostachys* provisionally because it is not clear if the fruit is 1- or 2-locular. In habit and in most characters, it resembles *A. dumetorum* in *A.* sect. *Chlorostachys*. It does not resemble any species with a glabrous ovary in *A.* sect. *Cenantrum*.

49. *Astragalus chlorostachys* Lindley, Trans. Hort. Soc. London 7: 249. 1830.

绿穗黄耆 lü sui huang qi

Astragalus bakeristrobiliferus H. Ohashi; *A. microdontus* Baker; *Hedysarum strobiliferum* Baker (1876), not Linnaeus (1753).

Plants 40–100 cm tall, with appressed to spreading, white to dark brown hairs. Stems 1–1.5 mm thick, erect, hairy, often glabrescent with age. Leaves 6–17 cm; stipules 3–13(–16) mm, narrowly triangular to ovate, mostly spreading, free or in lateral branches sometimes shortly vaginate-connate behind stem, hairy; petiole (0.4–)1.6–2.5 cm, like rachis glabrous or hairy; leaflets in 6–11(–13) pairs, elliptic, 9–40 × 4–20 mm, both surfaces loosely to rather densely covered with appressed to subappressed white or yellowish hairs, adaxially sometimes glabrescent, apex obtuse to slightly retuse. Racemes densely many flowered, later elongating to 4–11(–14) cm; peduncle 4–8 cm, elongating up to 13 cm with age, with short hairs; bracts soon falling, 3–8 mm, hairy. Bracteoles 0.25–1.5 mm, sometimes absent. Calyx 4–6.5 mm, densely covered with appressed to ascending, dark brown and white hairs; teeth mostly unequal, triangular, 0.5–1.5 mm, sometimes indistinct. Petals pale yellow, all nearly of same length; standard elliptic to rhombic-elliptic or obovate, 10–13 × 4–6(–7) mm, apex retuse to emarginate. Style with glabrous or very shortly hairy stigma. Legumes with a stipe 6–9 mm, narrowly ellipsoid to oblong, 15–31 mm, 3.5–5.5 mm high and wide, keeled ventrally and dorsally, with a beak

2–4 mm, incompletely to completely 2-locular; valves thin, glabrous.

1800–4400 m. Xizang [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan].

50. *Astragalus concretus* Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

合生黄耆 he sheng huang qi

Astragalus vicioides Baker (1876), not Ledebour (1831); *A. xiphocarpus* Bunge.

Plants 50–100 cm tall, hairy. Stems 3–8 mm thick, mostly strongly branched, covered rather densely with predominantly dark brownish hairs. Leaves 8–20 cm; stipules membranous, soon falling, 7–25 mm, in lateral branches often vaginate-connate behind stem or connate before petiole up to 10 mm, sparsely to loosely hairy or glabrous; petiole short, like rachis, with white and dark brown hairs; leaflets in 10–14 pairs, oblong to narrowly elliptic, 12–30(–40) × 4–10(–12) mm, abaxially loosely hairy, adaxially glabrous or sparsely to loosely appressed hairy, apex obtuse to slightly retuse. Racemes 2–5 cm, densely 8–32-flowered; peduncle 4–10 cm, predominantly dark brown hairy to nearly glabrous; bracts soon falling, 4–10(–17) mm, white and dark hairy. Bracteoles 1–4 mm. Calyx 6–9 mm, rather densely covered with appressed to ascending predominantly dark brown hairs; teeth mostly unequal, 1–3 mm. Petals yellow; standard obovate, 11–15 × 5–7 mm, apex indistinctly emarginate; wings 12–15 mm; keel 11–13 mm. Stigma with very short hairs. Legumes with a stipe 6–9 mm, narrowly ellipsoid, straight or distinctly curved, 25–44 mm, 3.5–6 mm high and 3–4.5 mm wide, keeled ventrally, slightly grooved dorsally, with a conspicuous beak 6–11 mm, 2-locular; valves thin, yellowish to blackish brown, glabrous.

2500–4000 m. Xizang [Bhutan, India, Nepal].

51. *Astragalus dumetorum* Handel-Mazzetti, Symb. Sin. 7: 555. 1933.

灌丛黄耆 guan cong huang qi

Plants 30–90 cm tall, very sparsely to sometimes loosely covered with subappressed hairs 0.3–0.5 mm. Stems several, 1.5–2 mm thick, ascending, simple or with short non-flowering lateral branches, glabrous or to loosely hairy. Leaves 7–17 cm; stipules 8–15 mm, glabrous or ciliate; petiole short, like rachis very sparsely white and black hairy; leaflets in 12–16 pairs, narrowly elliptic, 5–18 × 3–8 mm, abaxially hairy at margins and at midvein or all over, adaxially glabrous, apex rounded to truncate. Racemes shortly cylindric, 3–6 cm, densely many flowered, in fruit elongated up to 15 cm; peduncle 6–11 cm, sparsely white and black hairy or subglabrous; bracts 5–8 mm, glabrous. Bracteoles sometimes present, 0.4–1 mm, like bracts soon falling. Calyx ca. 6 mm, at base densely, otherwise sparsely, or all over rather densely, white or black hairy; teeth mostly unequal, 1.5–3 mm. Petals yellow; standard widely obovate, 10–11 × ca. 7 mm, emarginate; wings and keel 9–10 mm. Stigma glabrous. Legumes with a stipe 6–7 mm, obliquely ellipsoid, 11–17 mm, 7–8 mm high and 3–4 mm wide, keeled

ventrally, slightly grooved dorsally, with a curved beak 2–4 mm, 2-locular; valves thin, brown to blackish, glabrous.

• 3900–4400 m. Sichuan, Xizang, Yunnan.

52. *Astragalus forrestii* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 7: 124. 1913.

中甸黄耆 zhong dian huang qi

Plants 45–70 cm tall, with mostly ± curly hairs 0.2–0.5(–0.8) mm. Stems several, branched, to 6 mm thick, loosely to densely covered with very short black and somewhat longer white hairs. Leaves 8–15 cm, subsessile; stipules 8–12 mm, sparsely to loosely white and black hairy; rachis loosely to rather densely mostly black hairy; leaflets in 15–19 pairs, narrowly elliptic, 8–23 × 3–8 mm, abaxially loosely appressed mostly white hairy, adaxially glabrous. Racemes 4–7 cm, very densely many flowered, later elongating up to 10 cm; peduncle 3–8 cm, ± densely black hairy; bracts linear-acute, 7–10 mm, predominantly black hairy. Bracteoles sometimes present, linear, 2–3 mm. Calyx 5–6 mm, mostly glabrous at base, toward teeth with a few black hairs or all over ± loosely predominantly black hairy; teeth unequal, 1–2.5 mm. Petals green-yellow; standard rhombic-obovate, 10–12 × 6–7 mm, apex emarginate; wings and keel 9–10 mm. Legumes with a stipe up to 2 mm, 10–12 mm, inflated, 2-locular, glabrous.

• 2700–3300 m. Sichuan, W Yunnan.

53. *Astragalus graveolens* Buchanan-Hamilton ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

烈香黄耆 lie xiang huang qi

Astragalus bodinieri H. Léveillé; *A. rotundifolius* Royle ex Benth (1835), not Willdenow (1802).

Plants 60–90(–120) cm tall, very sparsely hairy. Stem 4–6.5 mm thick, erect, hollow, mostly branched, glabrous. Leaves 10–25 cm; stipules 1–4.5 cm, glabrous, 2 stipules of 1 leaf often distinctly different in form and length; petiole short, like rachis glabrous; leaflets in 4–8 pairs, ovate to obovate, 10–30 × 9–16 mm, glabrous or abaxially with a few appressed white hairs, apex obtuse to slightly retuse. Racemes at anthesis 5–10 cm, rather densely 20–50-flowered, later elongating to 15–30 cm; peduncle 5–8 cm, elongating up to 16 cm with age, glabrous; bracts narrowly triangular, soon falling, 2.5–7 mm, glabrous or ciliate. Bracteoles mostly absent, if present minute, ca. 0.5 mm. Calyx 8–10.5 mm, glabrous; teeth mostly unequal, 1–5 mm. Petals pale yellow; standard oblong or obovate, 15–19 × 5.5–8 mm, apex retuse to emarginate; wings 15–18 mm; keel 14–15.5 mm. Stigma glabrous or with a few short hairs. Legumes with a stipe 6–10 mm, narrowly ellipsoid, 2–5 cm, 4–8 mm high, compressed laterally, keeled ventrally, grooved dorsally, with a short beak, 2-locular; valves thin, glabrous.

Stony slopes, light coniferous forests; 500–2700 m. Yunnan [E Afghanistan, India, Nepal, Pakistan].

54. *Astragalus hancockii* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 471. 1880.

短花梗黄耆 duan hua geng huang qi

Astragalus saxicola Ulbrich.

Plants 20–35 cm tall, vegetative parts subglabrous, with hairs 0.3–0.5 mm. Stems at base up to 3 mm thick. Leaves 4–9 cm; lowest stipules acuminate ovate, ca. 6 mm, upper ones narrowly triangular, 8–12 mm, all or only lower ones high vaginate-connate behind stem; rachis subglabrous, only at insertion of leaflets mostly with a small tuft of short white or rarely blackish hairs; leaflets in 3–7 pairs, elliptic, 10–22 × 3–10 mm, abaxially grayish green with darker venation, adaxially dull green, apex rounded to emarginate. Racemes densely many flowered, strongly elongated, up to 12 cm in fruit; peduncle 8–14 cm, glabrous; bracts whitish, linear-acuminate, 5–6 mm, sparsely black hairy. Bracteoles sometimes present, minute. Calyx campanulate-tubular, 6–7 mm, loosely to densely covered with short blackish and whitish hairs; teeth 3–3.5 mm. Petals pale yellow to whitish or purplish; standard oblong to elliptic, 14–17 × 5–6 mm; wings 11–13 mm; keel 8–10 mm. Legumes with a stipe 5–6 mm, obliquely elliptic to nearly narrowly semicircular as seen from side, with strongly curved ventral edge and nearly straight dorsal edge, strongly compressed laterally, 10–15 mm, 5–6 mm high, sharply keeled ventrally, 1-locular; valves glabrous, brownish.

• Hebei.

55. *Astragalus khasianus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 27. 1868.

长果颈黄耆 chang guo jing huang qi

Astragalus duclouxii N. D. Simpson; *A. englerianus* Ulbrich; *A. englerianus* var. *gingdongensis* Z. G. Qian; *A. englerianus* var. *longiflorus* C. Chen & Z. G. Qian.

Plants 30–100 cm tall; hairs appressed to partly spreading, white, in inflorescence also dark brown. Stem 2–5 mm thick, branched, erect, hollow, glabrous or loosely hairy. Leaves 8–11.5 cm; stipules 8–16 mm, often nearly amplexicaul, at margins with long spreading hairs; petiole 1.4–2.6 cm, like rachis glabrous or sparsely hairy; leaflets in 10–13 pairs, narrowly elliptic, 12–28(–35) × 4–9(–12) mm, abaxially somewhat densely hairy, adaxially glabrous or sparsely to loosely hairy, apex obtuse. Racemes 4–8 cm, rather loosely 15–30-flowered; peduncle 6–18 cm, sparsely to loosely hairy; bracts soon falling, whitish membranous, 4–8 mm, white ciliate. Bracteoles subulate, 1.5–2.5 mm, soon falling. Calyx 6–8 mm, loosely to rather densely hairy; teeth unequal, 1–3 mm. Petals yellow or yellowish brown; standard oblong or elliptic, 13–15 × 6.5–7.5 mm, apex emarginate; wings 13–15 mm; keel 13–15 mm. Legumes with a stipe 5–7 mm, obliquely narrowly ellipsoid, 18–25 mm, 5–7.5 mm high, obtusely keeled ventrally, grooved dorsally, with a beak 2–4 mm, 2-locular; valves thin, glabrous.

1600–3500 m. Sichuan, Xizang, Yunnan [Bhutan, NE India, Myanmar].

56. *Astragalus kialensis* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 242. 1915.

苦黄耆 ku huang qi

Astragalus forrestii N. D. Simpson var. *minor* H. T. Tsai & T. T. Yu.

Plants 40–50 cm tall, appressed to subappressed, white

and dark brown hairy. Stem up to 2 mm thick, branched, erect, hollow, glabrous at base, upper parts rather densely covered with curly hairs 0.1–0.25 mm. Leaves 3.5–5.5 cm; stipules 3–5 mm, white and black ciliate; petiole short, rachis hairy like stem; leaflets in 10–18 pairs, narrowly elliptic, 3–8 × 1.5–3.5 mm, abaxially sparsely to loosely hairy, adaxially glabrous, apex obtuse. Racemes 2–3 cm, densely 10–15-flowered; peduncle 2–5 cm, hairy; bracts 1.5–2.5 mm, blackish brown hairy, persistent. Bracteoles subulate, 1–2 mm. Calyx 4–5 mm, with appressed blackish brown hairs; teeth unequal, 0.5–2 mm. Petals yellow; standard widely obovate, 9–11 × 5.5–7.5 mm, apex emarginate; wings 8–9 mm; keel 7.5–9 mm. Stigma glabrous. Legumes with a stipe 3–4 mm, obliquely narrowly ellipsoid, 6–13 mm, 3.5–4.5 mm high and wide, keeled ventrally, shallowly grooved dorsally, with a beak ca. 1 mm, 2-locular; valves glabrous.

• 3000–3900 m. Sichuan, Xizang, Yunnan.

57. *Astragalus lamalaensis* C. C. Ni, Acta Phytotax. Sin. 25: 232. 1987.

拉马拉黄耆 la ma la huang qi

Plants 30–40 cm tall. Stems 25–30 cm, nearly glabrous. Leaves 5–12 cm; stipules green, ovate, 8–18 × 3–7 mm, glabrous; petiole ca. 2 cm, like rachis glabrous to subglabrous; leaflets in 5–7 pairs, ovate to elliptic, 5–20 × 4–10 mm, hairy only on midvein abaxially. Racemes 5–8-flowered; peduncle 14–18 cm, glabrous; bracts narrowly triangular, black hairy. Calyx ca. 6 mm, campanulate, purple-red, nearly glabrous; teeth narrowly triangular, 2–3 mm. Petals reddish brown; standard obovate, 8–10 × ca. 6 mm, apex emarginate; wings nearly as long as standard; keel 7–9 mm. Ovary densely black hairy. Legumes unknown.

• About 4200 m. Xizang.

58. *Astragalus lucidus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 262. 1940.

光亮黄耆 guang liang huang qi

Plants 40–60 cm tall. Stem erect, up to 4 mm in diam., sparsely covered with white hairs ca. 0.3 mm or subglabrous. Leaves 6–12 cm; stipules 7–16 mm, free, glabrous; petiole 1–1.5 cm; leaflets in 9–16 pairs, narrowly elliptic to elliptic, 6–20 × 2.5–7 mm, abaxially at margin and at midvein sparsely hairy, adaxially glabrous, apex rounded. Racemes ca. 2.5 cm, 10–25-flowered; peduncle 3–4 cm; bracts membranous, narrowly elliptic, 4–5 × ca. 2 mm, sparsely hairy. Calyx 4–6 mm, glabrous or between and at teeth shortly black ciliate; teeth unequal, 1.5–3 mm. Petals greenish yellow; standard widely rhombic-obovate, ca. 11 × 7 mm, deeply incised; wings ca. 9 mm; keel ca. 8.5 mm. Legumes with a stipe 3–4 mm, obliquely ellipsoid, somewhat curved, ca. 12 mm, ca. 5 mm high and ca. 4 mm wide, incompletely 2-locular; valves thin, glabrous.

• 2700–3900 m. Sichuan, Xizang, Yunnan.

59. *Astragalus matiensis* P. C. Li, Acta Bot. Yunnan. 11: 294. 1989.

马蹄黄耆 ma ti huang qi

Plants 35–45 cm tall; hairs somewhat rigid, white, in inflorescence also black, 0.5–1 mm. Stem erect, ca. 2 mm thick, sparsely to rather densely covered with spreading hairs. Leaves 10–13 cm, subsessile; stipules 6–7 mm, free, sparsely to loosely hairy on both surfaces; rachis slender, loosely spreading hairy; leaflets in 10–12 pairs, narrowly elliptic to elliptic, 8–10 × 4–5 mm, abaxially loosely and adaxially sparsely covered with subappressed to ascending hairs, apex retuse. Racemes ca. 5 cm, rather loosely up to 20-flowered; peduncle ca. 10 cm, with spreading, white hairs; bracts green, acuminate ovate, 2–4 mm, mostly white hairy. Calyx 4–5 mm, loosely to rather densely covered with subappressed to ascending white and somewhat shorter black hairs; teeth unequal, 1.5–2.5 mm. Petals yellow or bluish purple, drying to yellowish; standard ovate, 12–14 × ca. 7 mm, apex deeply emarginate; wings 9–12 mm; keel 11–13 mm. Ovary with a stipe ca. 3 mm, densely white hairy; style and stigma glabrous. Legumes unknown.

- About 2800 m. Sichuan.

60. *Astragalus minshanensis* K. T. Fu, Acta Bot. Boreal.-Occid. Sin. 11: 341. 1991.

岷山黄耆 min shan huang qi

Astragalus xiqingshanicus Y. H. Wu.

Plants 15–20 cm tall, loosely caespitose, subglabrous, partly with scattered very short hairs. Stems several, ascending or erect, slender. Leaves 8–10 cm; stipules 8–12 mm; petiole 1.5–2.5 cm; leaflets in 13–18 pairs, narrowly elliptic to elliptic, 8–12 × 3–6 mm, abaxially sometimes at main nerves appressed hairy, ciliate, apex subobtusely. Racemes (1–)5–12-flowered; peduncle (1–)4–4.5 cm, sparsely appressed white hairy or subglabrous; bracts persistent, membranous, narrowly ovate, 6–12 mm, sparsely black ciliate. Calyx 6–10 mm, between and at teeth shortly black ciliate; teeth 2–4 mm. Flowers unknown. Legumes with a stipe 5–11 mm, obliquely inflated ellipsoid, 10–20 mm, 6–12 mm high and 5–7 mm wide, subobtusely ventrally, narrowly grooved dorsally, with a slender beak 1.5–2 mm, 2-locular; valves thinly leathery, glabrous or nearly so.

- About 4000 m. Gansu, Qinghai.

61. *Astragalus moupinensis* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 213; Pl. David. 2: 31. 1885.

天全黄耆 tian quan huang qi

Plants up to 100 cm tall, glabrous. Stem erect. Leaves 7–10 cm; stipules 10–15 mm, mostly high connate behind stem; petiole 1–2 cm; leaflets in 5–8 pairs, remote, elliptic to obovate, 7–15 × 4–7 mm, apex widely rounded. Racemes at anthesis to 5 cm, loosely 10- to many flowered, later strongly elongated; peduncle (3–)5–7 cm; bracts whitish membranous, linear-acute, 2–3 mm. Calyx 8–10 mm; teeth 2–3.5 mm. Petals pale yellowish to yellow; standard rhombic-elliptic, ca. 14 × 5 mm, apex obtuse; wings ca. 13 mm; keel ca. 11 mm. Legumes (immature) stipitate, attenuate at both ends, at least 20 mm.

- Sichuan, Yunnan.

62. *Astragalus rhododendrophilus* Podlech & L. R. Xu, Sendtnera 7: 170. 2001.

杜鹃黄耆 du juan huang qi

Plants 50–60 cm tall. Stem 1–3 mm in diam., hollow, sparsely to rather densely covered with ± spreading white hairs 0.5–1 mm and with appressed black hairs 0.3–0.4 mm, glabrescent with age. Leaves 5–8 cm, subsessile; stipules 5–9 mm, free, sparsely hairy; rachis slender, loosely covered with subappressed to ascending, predominantly black hairs 0.1–0.3 mm; leaflets in 10–14 pairs, narrowly elliptic, 5–13 × 1–3.5 mm, abaxially loosely appressed hairy, adaxially glabrous, apex rounded. Racemes 4–6 cm, loosely many flowered; peduncle 6–8 cm, predominantly black hairy; bracts whitish, ca. 3 mm, black hairy. Calyx 4–5 mm, loosely to rather densely covered with subappressed black hairs 0.3–0.6 mm and sometimes also with a few white hairs; teeth slightly unequal, 1–1.5 mm. Petals cream, sometimes flushed with violet, all of nearly same length; standard elliptic, ca. 13 × 5 mm, with a slightly to distinctly tongue-like emarginate tip. Legumes (immature) with a slender stipe ca. 5 mm, densely covered with ascending white and predominantly black hairs.

- About 4100 m. Xizang.

63. *Astragalus stipulatus* D. Don, Bot. Mag. 50: t. 2380. 1823.

大托叶黄耆 da tuo ye huang qi

Plants 60–180 cm tall, very scarcely hairy. Stem 3–8(–10) mm in diam., erect, hollow, glabrous. Leaves 20–35 cm; stipules leaflike, widely ovate, (20–)30–70 mm, behind stem connate up to top, free from petiole, glabrous or ciliate; petiole 3–5.5 cm, like rachis glabrous or sparsely white hairy; leaflets in (8–)11–20 pairs, narrowly ovate to narrowly oblong, (15–)20–55 × (4–)7–18 mm, abaxially loosely to rather densely covered with appressed to ascending white hairs, later glabrescent, adaxially glabrous, margins distinctly ciliate, apex obtuse to widely retuse. Racemes 6–25 cm, rather densely many flowered (up to more than 100); peduncle 4–10 cm, glabrous; bracts caducous, whitish membranous, 4–14 mm, hairy. Calyx 8–13 mm, glabrous or loosely to rather densely hairy; teeth unequal, 3–8 mm. Petals whitish yellow to yellow, sometimes fading violet; standard widely oblong to obovate, 12–15 × 6–8 mm, apex emarginate; wings 12.5–15 mm; keel 12–14 mm. Stigma glabrous or sparsely hairy. Legumes with a stipe 1–2 mm, narrowly ellipsoid to narrowly oblong, 18–32 mm, 4–6 mm high and wide, long acuminate, 2-locular; valves thin, yellowish to pale brown, glabrous.

- 1500–3700 m. Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

64. *Astragalus tumbatsicus* C. Marquand & Airy Shaw, J. Linn. Soc., Bot. 48: 171. 1929 [*tumbatsica*].

东坝子黄耆 dong ba zi huang qi

Plants 60–90 cm tall. Stem branched, ca. 3 mm in diam., hollow, glabrous in basal parts, otherwise sparsely covered with short appressed black hairs. Leaves on main stem 8–10 cm; stipules 5–7 mm, free, sparsely black ciliate; petiole 1–1.5 cm, like rachis sparsely to loosely appressed to spreading black hairy; leaflets in 7–9 pairs, elliptic, 10–24 × 4–9 mm, abaxially loosely and when young densely covered with short appressed white hairs, adaxially glabrous, apex rounded or slightly emar-

ginate. Racemes loosely many flowered; peduncle 6–10 cm, sparsely black hairy; bracts greenish, ovate to widely ovate, 4–7 mm, black and white hairy, very soon falling. Calyx 6–7 mm, loosely covered with short appressed to ascending black and white hairs; teeth unequal, 1–2.5 mm. Petals cream, sometimes flushed with red, all of same length; standard rectangular-oblong, 12–13 × 5–6 mm, apex incised. Ovary with a stipe 3–4 mm, spindlelike, glabrous, obviously with a narrow septum. Legumes with a slender stipe 2–5 mm, 10–12 mm, ca. 4 mm high and ca. 3 mm wide, keeled ventrally, widely and deeply grooved dorsally, with a beak 2–4 mm, nearly completely 2-locular; valves rather thin, glabrous.

3300–4100 m. Xizang, Yunnan [Bhutan, Nepal].

65. *Astragalus zadaensis* Podlech & L. R. Xu, Novon 17: 233. 2007.

札达黄耆 zha da huang qi

Plants more than 55 cm tall, vegetative parts covered with

appressed white hairs 0.2–0.5 mm. Stem erect, at base ca. 4 mm in diam., finely angular-sulcate, glabrous. Leaves 6–15 cm, nearly sessile; stipules of lower leaves unknown, of upper leaves ca. 5 mm, glabrous or very sparsely white and black hairy, soon falling; rachis glabrous or with scattered hairs only; leaflets in 6–8 pairs, elliptic, 10–20 × 5–12 mm, both surfaces glabrous or with scattered hairs only, apex acuminate-mucronulate. Racemes 5–7 cm, loosely 10–12-flowered; peduncle 7–10 cm, with scattered white and black hairs; bracts narrowly triangular to linear, ca. 2 mm, white and black hairy. Bracteoles 1–2 mm. Calyx 9–11 mm, sparsely covered with ascending to spreading black hairs 0.3–0.5 mm; teeth 4–5 mm. Petals pale lilac; standard ca. 18 × 8 mm; wings and keel ca. 17 mm. Legumes with a slender stipe 8–10 mm, narrowly ellipsoid, 20–25 mm, ca. 6 mm high, keeled ventrally, narrowly rounded dorsally, shortly acuminate, 2-locular; valves membranous, glabrous.

• About 3500 m. W Xizang (Zanda).

12. *Astragalus* sect. *Skythropos* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 255. 1915.

肾形子组 shen xing zi zu

Plants perennial, with basifixed white or dark brown to black hairs. Stems 2–10(–20) cm, rarely plants acaulescent. Leaves imparipinnate, with a distinct petiole; stipules free from petiole, lower ones sometimes shortly vaginate-connate behind stem, often scalelike and without leaves in basal parts of stems; leaflets in 4–17 pairs. Racemes with a rather long peduncle, 1–25-flowered. Bracteoles mostly absent. Petals yellow or violet. Stigma glabrous or hairy. Legumes stipitate, 1-locular.

Seven species: Bhutan, China, India, Nepal; six species (four endemic) in China.

1a. Petals yellow.

2a. Leaflets in 4–6 pairs 69. *A. nanfengensis*

2b. Leaflets in (5–)8–15 pairs.

3a. Plants mostly acaulescent, stems if present up to 1 cm; leaflets on both surfaces loosely to rather densely covered with subappressed white hairs up to 0.7 mm; bracts 3–4 mm; calyx 8–9 mm, with teeth 3–4 mm 66. *A. datunensis*

3b. Plants with stems 1–10 cm; leaflets adaxially sparsely to loosely hairy or glabrous, rarely densely hairy on both surfaces; bracts 4–10 mm; calyx 8–14.5 mm, with teeth 4–7.5 mm 71. *A. yunnanensis*

1b. Petals violet.

4a. Leaflets adaxially glabrous, abaxially sparsely hairy only at midvein and margins; calyx not violet suffused or red-brown 70. *A. skythropos*

4b. Leaflets adaxially hairy, if sometimes glabrous, then loosely to rather densely hairy abaxially; calyx violet suffused to red-brown.

5a. Stipules sparsely to loosely hairy, connate behind stem and sometimes before petiole, rarely free from each other; calyx 9–12.5 mm, strongly violet suffused to red-brown, teeth 4–7 mm; standard 16–26 mm; stigma glabrous 67. *A. kongrensis*

5b. Stipules only ciliate, all free from each other; calyx 7–9 mm, slightly violet suffused, teeth 2.5–4 mm; standard 13–16.5 mm; stigma hairy 68. *A. licentianus*

66. *Astragalus datunensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 57. 1980.

大通黄耆 da tong huang qi

Plants ca. 8 cm tall, nearly acaulescent. Stem ca. 1 cm, covered with subappressed white hairs up to 1 mm, partly glabrescent. Leaves 4–6 cm; stipules 5–8 mm, free; petiole 1–2 cm, rachis hairy like stem; leaflets in 10–13 pairs, elliptic, 4–6 × 2–4 mm, both surfaces rather densely covered with subappressed white hairs up to 0.7 mm, apex rounded to slightly

emarginate. Racemes loosely 4–6-flowered; peduncle 3–5 cm, hairy like stem; bracts narrowly elliptic, 3–4 mm, substipitate, white and black hairy. Calyx 8–9 mm, rather densely covered with white hairs up to 1.5 mm and with appressed, distinctly shorter black hairs; teeth 3–4 mm. Petals yellow; standard elliptic, ca. 15 × 7 mm, apex widely emarginate; wings ca. 14 mm; keel ca. 16 mm. Ovary with a glabrous stipe 3–4 mm, densely white and black hairy; style glabrous. Legumes (unripe) with a stipe ca. 4 mm, narrowly ellipsoid, with white hairs up to 2 mm.

• Qinghai.

67. *Astragalus kongrensis* Baker in J. D. Hooker, Fl. Brit. India 2: 120. 1876.

深紫萼黄耆 shen zi e huang qi

Plants 6–14 cm tall; hairs appressed to ± spreading, long, white, in inflorescence white and black or black. Stems often several, ascending to erect, 3–8 cm, at base 1.5–2 mm thick, branched, often zigzaglike bent, at base glabrous, in upper part loosely to rather densely hairy. Leaves 7–22 cm; stipules 4–15 mm, lower ones amplexicaul, free or behind stem and before petiole connate, upper ones narrowly triangular, sparsely to loosely spreading hairy; petiole 1.5–5 cm, like rachis, loosely to rather densely white hairy; leaflets in 7–15 pairs, elliptic to widely elliptic, 4–15 × 3–10 mm, abaxially loosely to rather densely hairy, at midvein often densely sericeous, adaxially glabrous or sparsely to loosely hairy, apex rounded to retuse. Racemes 1.5–3 cm, densely 6–16-flowered; peduncle 4–12.5 cm, appressed to ± spreading hairy; bracts narrowly triangular, 3–5 mm, loosely hairy. Calyx green, strongly violet suffused or red-brown, 9–12.5 mm, rather densely covered with long, appressed, mostly black hairs; teeth 4–7 mm. Petals (in dry state) violet to blue-violet; standard elliptic, 16–26 × 7–10 mm, apex emarginate; wings 16–20 mm; keel 16.5–19 mm. Ovary stipitate, densely white or white and black hairy; style and stigma glabrous. Legumes unknown.

Sichuan, Xizang, Yunnan [India (Sikkim)].

68. *Astragalus licentianus* Handel-Mazzetti, Oesterr. Bot. Z. 82: 247. 1933.

甘肃黄耆 gan su huang qi

Plants 10–20 cm tall; hairs appressed to ± spreading, thin, long, white, in inflorescence white and black or black. Stems mostly several, 2–5 cm, at base glabrous, in upper part covered with mostly spreading hairs. Leaves 3.5–11 cm; stipules 6–11 mm, long ciliate, basal ones vaginate-connate, leafless; petiole 1.5–3 cm, like rachis spreading hairy; leaflets in 10–16 pairs, ovate to elliptic, 5–10 × 3–6 mm, obtuse, both surfaces appressed gray sericeous. Racemes 1.5–3 cm, densely 8–18-flowered, at fruiting time elongated up to 11 cm; peduncle 4.5–10.5 cm, with white and black hairs; bracts narrowly triangular, 5–8 mm, hairy, often reflexed. Calyx 7–9 mm, rather densely covered with long, appressed to ascending, mostly black hairs; teeth 2.5–4 mm. Petals (in dry state) violet to blue-violet; standard widely elliptic, 13–16.5 × 6–8.5 mm, apex emarginate; wings 15–17 mm; keel 14–16 mm. Ovary with a stipe 3.5–4 mm, densely white or white and blackish hairy; style glabrous; stigma shortly hairy. Legumes (unripe) with a stipe 5–7 mm, more than 10 mm, densely covered with ascending black hairs ca. 0.5 mm.

• Gansu, Qinghai, Xizang.

69. *Astragalus nanfengensis* C. C. Ni, Acta Phytotax. Sin. 25: 233. 1987.

南峰黄耆 nan feng huang qi

Astragalus ludlowii Wenninger.

Plants 15–25 cm tall, with hairs 0.3–0.8(–1) mm. Stems

solitary or several, 4–20 cm, ascending to erect, loosely to rather densely covered with subappressed white hairs. Leaves 5–13 cm; stipules 10–20 × 3–8 mm, free, loosely white hairy; petiole 1.5–4 cm, like rachis loosely covered with subappressed to nearly spreading white and fewer black hairs; leaflets in 4–6 pairs, ovate to elliptic, 8–25 × 6–16 mm, abaxially pale gray-green and loosely subappressed hairy, adaxially dull green and glabrous or very sparsely hairy toward margins, apex obtuse to acute. Racemes short, 5–10-flowered, after anthesis somewhat elongating and up to 7 cm; peduncle 5–7 cm, loosely white or white and black hairy; bracts narrowly ovate, 8–15 mm, white and black hairy, apex acute. Calyx 12–16 mm, loosely covered with black hairs; teeth 3.5–6 mm. Petals yellow; standard elliptic, 20–25 × 9–10 mm, apex deeply emarginate; wings 18–22 mm; keel 17.5–20 mm. Stigma glabrous. Legumes (very young) long stipitate, ellipsoid, long acuminate at apex; valves densely covered with ascending black hairs.

• Xizang.

70. *Astragalus skythropos* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 31. 1877.

肾形子黄耆 shen xing zi huang qi

Astragalus skythropos var. *acaulis* Danguy; *A. weigoldianus* Handel-Mazzetti.

Plants 10–20 cm tall, subcaulescent; hairs white, in inflorescence also blackish brown. Stem 2–5 cm, 2–2.5 mm thick, glabrous or in upper part loosely spreading hairy. Leaves 5–16 cm; stipules 8–13 mm, lower ones vaginate-connate behind stem, without leaf, bractlike, upper ones narrowly triangular to oblong-elliptic, free, ciliate; petiole 2–4.5 cm, like rachis spreading hairy; leaflets in 7–13 pairs, ovate to elliptic, 4–12 × 3.5–9 mm, abaxially hairy only at midvein and margins, adaxially glabrous, apex acute. Racemes short, rather densely 8–13-flowered; peduncle 5–17 cm, appressed to spreading hairy; bracts 4–10 × 1–2 mm, white and black hairy. Calyx 8.5–9.5 mm, loosely covered with long, ascending, black hairs; teeth 3–5 mm, with white and black hairs. Petals bluish violet or violet; standard elliptic to ovate, 15.5–17.5 × 5.5–8 mm, slightly to deeply emarginate; wings 15.5–17.5 mm; keel 15–18 mm. Ovary with a stipe 3–5 mm, densely white or blackish brown hairy. Legumes (unripe) with a stipe 5–7 mm, more than 10 mm, densely covered with ascending black hairs ca. 0.5 mm.

• Gansu, Qinghai, Sichuan, Xinjiang, Yunnan.

71. *Astragalus yunnanensis* Franchet, Pl. Delavay. 162. 1890.

云南黄耆 yun nan huang qi

Plants 15–25 cm tall, subcaulescent to shortly caulescent; hairs spreading, white, in inflorescence also blackish brown. Stems several, 1–10 cm, 1–3 mm thick, ascending to erect, glabrous or in upper part sparsely to loosely hairy, in basal parts furnished with vaginate-connate whitish bracts. Leaves 5–16 cm; stipules 4–14 mm, lower ones widely ovate to elliptic, upper ones narrowly triangular, free, sparsely to loosely hairy; petiole 2–4.5 cm, like rachis glabrous or sparsely to loosely hairy; leaflets in 5–15 pairs, ovate to elliptic, 3–15 × 2.5–10 mm, abaxially loosely to densely villous, sometimes only at midvein and

margins, adaxially glabrous or sparsely to loosely, more rarely densely, villous, apex obtuse to acute, often with a distinct cusp 1–2 mm. Racemes 1–2.5 cm, rather densely 2–13-flowered, at fruiting time somewhat elongated up to 5 cm; peduncle 4–11 cm, mostly rather densely hairy; bracts 4–10 × 1–3 mm, mostly white hairy. Bracteoles sometimes present. Calyx 8–14.5 mm, densely hairy; teeth 4–7.5 mm. Petals pale yellow, sometimes slightly fading violet; standard widely elliptic to widely ovate, 14–21 × 7–13.5 mm, apex emarginate; wings 13–21 mm; keel 15–21 mm. Legumes with a stipe 3.5–8 mm, narrowly or widely ellipsoid, 12–23 mm, 6–8 mm high, keeled ventrally and dorsally, with a beak 2–3 mm; valves densely to rather densely covered with spreading white and black hairs.

Gansu, Henan, Qinghai, Shandong, Sichuan, Xizang, Yunnan [India, Nepal].

- 1a. Legumes narrowly ellipsoid,
15–23 mm 71a. subsp. *yunnanensis*
1b. Legumes widely ellipsoid,
12–15 mm 71b. subsp. *incanus*

71a. *Astragalus yunnanensis* subsp. *yunnanensis*

云南黄耆(原亚种) *yun nan huang qi* (*yuan ya zhong*)

Astragalus fenzelianus E. Peter; *A. tatsienensis* Bureau & Franchet; *A. tatsienensis* var. *kangrenbuchiensis* (C. C. Ni & P. C. Li) Y. C. Ho; *A. yunnanensis* f. *elongatus* N. D. Simpson; *A.*

yunnanensis var. *kangrenbuchiensis* C. C. Ni & P. C. Li; *A. yunnanensis* var. *tatsienensis* (Bureau & Franchet) P. C. Li & C. C. Li.

Leaflets abaxially loosely to densely villous, sometimes only at midvein and margins, adaxially glabrous or sparsely to loosely, more rarely densely, villous. Calyx densely hairy. Legumes with a stipe 4–8 mm, narrowly ellipsoid, 15–23 mm, 6–8 mm high.

Gansu, Henan, Qinghai, Shandong, Sichuan, Xizang, Yunnan [India, Nepal].

71b. *Astragalus yunnanensis* subsp. *incanus* (E. Peter) Podlech & L. R. Xu, *Novon* 17: 242. 2007.

灰毛云南黄耆 *hui mao yun nan huang qi*

Astragalus tatsienensis f. *incanus* E. Peter, *Acta Horti Gothob.* 12: 54. 1938; *A. tatsienensis* var. *incanus* (E. Peter) Y. C. Ho.

Leaflets villous, densely to very densely covered on both surfaces with ascending to spreading, flexuous, tangled, white hairs 0.5–1 mm. Calyx covered with ± spreading, straight, white hairs 1–2 mm and with slightly shorter black hairs. Legumes with a stipe 3.5–5 mm, widely ellipsoid, 12–15 × ca. 8 mm.

• Sichuan, Yunnan.

13. *Astragalus* sect. *Nuculiella* Gontscharow in Komarov, *Fl. URSS* 12: 876. 1946.

坚果组 *jian guo zu*

Plants perennial, with long stem, covered with basifixed white hairs. Leaves imparipinnate; stipules free, green. Bracteoles present. Calyx campanulate, glabrous. Petals soon caducous; keel longer than wings. Legumes long stipitate, inflated, 2-locular, rigidly cartilaginous-leathery, nut-shaped.

One species: China, Mongolia, Russia (Far East).

72. *Astragalus chinensis* Linnaeus f., *Dec. Pl. Horti Upsal.* 1: 5. 1762.

中国黄耆 *zhong guo huang qi*

Glycyrrhiza costulata Handel-Mazzetti.

Plants 35–55 cm tall, with hairs 0.04–0.4 mm. Stem solitary, erect, up to 5 mm thick, glabrous, branched with slender, mostly non-flowering lateral branches. Leaves 7–15 cm; stipules linear-acuminate, 6–10 mm, glabrous, with a curved short auricle at base; petiole 1–3 cm, like rachis glabrous or with a few appressed hairs; leaflets in 10–15 pairs, narrowly elliptic, 16–25 × 2–10 mm, abaxially sparsely appressed white hairy, adaxially glabrous, apex rounded and shortly mucronulate. Ra-

cemes 3.5–5 cm, loosely many flowered; peduncles numerous in upper part of stem, 3–6 cm, glabrous; bracts 3–4 mm, sparsely ciliate. Bracteoles 1–2 mm. Calyx 4–5 mm, glabrous; teeth 1–2 mm. Petals yellow or whitish yellow; standard ovate to widely ovate, 12–15 × 7–9 mm, apex emarginate; wings 9–11.5 mm; keel 13–14 mm. Legumes with a slender stipe 6–8 mm, nodding, nut-shaped, globose to obovoid, 9–14 mm, 5–6 mm high and 7–9 mm wide, with a very short slender beak, widely and deeply grooved ventrally, rounded dorsally; valves rigidly cartilaginous-leathery, transversely wrinkled-nerved, glabrous.

Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shanxi [Mongolia, Russia (Far East)].

14. *Astragalus* sect. *Lithophili* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 29. 1868 [*“Lithophilus”*].

岩生组 *yan sheng zu*

Plants perennial, acaulescent or with a well-developed stem, herbaceous, covered with long, basifixed, mostly spreading hairs. Leaves imparipinnate with marcescent rachis; stipules free or more rarely shortly adnate to petiole. Racemes subsessile or with a short peduncle, few flowered. Calyx campanulate to tubular. Legumes subsessile to stipitate, 2-locular, with thin, membranous walls.

Four species: NW and W China, N India, Kazakhstan, Kyrgyzstan, Tajikistan; three species (one endemic) in China.

- 1a. Plants acaulescent; calyx ca. 10 mm; petals white; standard ca. 12 mm; legumes sessile, ca. 10 mm 73. *A. dalaiensis*
 1b. Plants with a well-developed stem; calyx at least 20 mm; petals yellow; legumes with a stipe 4–5 mm, 15–30 mm.
 2a. Stems, rachises, and peduncles glabrous or sparsely hairy; leaflets in 12–15 pairs, ovate to elliptic, 8–15 × 4–9 mm 74. *A. lithophilus*
 2b. Stems, rachises, and peduncles densely villous; leaflets in 9–11 pairs, narrowly elliptic, 10–25 × 2–5 mm 75. *A. munroi*

73. *Astragalus dalaiensis* Kitagawa, J. Jap. Bot. 22: 172. 1948.

草原黄耆 cao yuan huang qi

Plants 10–15 cm tall, acaulescent, caespitose. Leaves 10–20 cm; stipules membranous, ovate, ca. 10 mm, shortly adnate to petiole, villous, apex long cuspidate-acuminate; petiole and rachis covered with white spreading hairs; leaflets in 6–13 pairs, elliptic, 5–15 × 3–9 mm, both surfaces subappressed hairy, apex mostly obtuse. Racemes subsessile, crowded at base of petioles. Calyx tubular, ca. 10 mm, long white hairy; teeth subulate, 2.5–3 mm. Petals white; standard ovate, ca. 12 mm, rounded at apex; wings longer than standard, ca. 16 mm; keel slightly longer than wings, ca. 17 mm. Legumes erect, ovoid-ellipsoid, ca. 10 mm, compressed laterally; valves densely white hairy.

- Nei Mongol.

74. *Astragalus lithophilus* Karelina & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 344. 1842.

岩生黄耆 yan sheng huang qi

Astragalus dicystis Bunge.

Plants 15–45 cm tall; hairs very fine, spreading, white, in inflorescence also black, 1–3(–4) mm. Stem simple or branched at base, up to 7 mm thick, often in lower part leafless and with scalelike stipules, glabrous or sparsely hairy. Leaves 9–20 cm; stipules membranous, 7–20 mm, glabrous or sparsely hairy; petiole 3–5 cm, at base up to 3 mm thick, like rachis glabrous or sparsely hairy; leaflets in 12–15 pairs, ovate to elliptic, 8–15 × 4–9 mm, glabrous on both surfaces or abaxially sparsely to loosely hairy, apex rounded to truncate. Racemes loosely 3–6-flowered; peduncle 0.5–4.5 cm, glabrous or sparsely white hairy, toward raceme increasingly black hairy; bracts whitish membranous, linear-acute, 7–13 mm, white and black hairy. Calyx 13–17 mm, loosely covered with spreading white and black

hairs 1–2 mm; teeth 7–10 mm. Petals yellow; standard obovate, 19–29 × ca. 9 mm, apex emarginate; wings 18–22 mm; keel 17–21 mm. Legumes with a curved stipe 4–5 mm, inflated ellipsoid, 20–30 mm, ca. 15 mm high and wide, grooved ventrally and dorsally, with a straight beak 2–3 mm, 2-locular; valves thin, glabrous or with scattered spreading hairs.

Steppic slopes in high mountains; 2400–3500 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

75. *Astragalus munroi* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 30. 1868.

细梗黄耆 xi geng huang qi

Astragalus longicalyx C. C. Ni & P. C. Li.

Plants 30–70 cm tall; hairs thin, mostly spreading, in vegetative parts only white, 1–4 mm. Stems in lower part often leafless, densely villous. Leaves 4–10 cm; stipules whitish membranous, linear-acute, 10–15 mm, free, hairy; petiole 1–2.5 cm, like rachis densely covered with spreading hairs 1–2 mm and with somewhat fewer hairs up to 4 mm; leaflets in 9–11 pairs, narrowly oblong to narrowly elliptic, 10–25 × 2–5 mm, abaxially loosely to rather densely covered with spreading hairs up to 4 mm, adaxially glabrous, apex rounded to subobtusely, minutely acuminate-mucronulate. Racemes loosely 3–6-flowered; peduncle 0.5–1 cm, with spreading white hairs; bracts whitish membranous, linear-acute, 10–18 mm, hairy. Calyx ca. 20 mm, covered with long, spreading, white hairs; teeth linear to subulate, 10–12 mm. Petals yellow; standard elliptic, 20–22 × 7–9 mm, apex emarginate; wings ca. 18 mm; keel ca. 19 mm. Legumes with a curved stipe 4–5 mm, inflated ellipsoid, 20–30 mm, 12–14 mm high and wide, widely grooved ventrally and dorsally, with a slightly curved beak ca. 5 mm, 2-locular; valves thin, rather densely villous, hairs very fine, tangled, ± spreading, 2–3 mm.

3000–5200 m. Xinjiang, Xizang [NW India].

15. *Astragalus* sect. *Hookeriani* Podlech, Mitt. Bot. Staatssamml. München 12: 343. 1976 [*“Hookeriana”*].

虎克组 hu ke zu

Plants perennial, acaulescent to nearly so, with basifixed white hairs. Stipules membranous, free from petiole, nearly completely embracing stem but not connate behind it, high connate around petiole. Calyx tubular, gibbous at base. Petals pale sulfur-yellow, glabrous. Legumes strongly compressed from sides, valves thin but tough, with slender, vertical nerves, nearly completely 2-locular.

One species: Bhutan, China, India (Sikkim).

76. *Astragalus acaulis* Baker in J. D. Hooker, Fl. Brit. India 2: 132. 1876.

无茎黄耆 wu jing huang qi

Astragalus litangensis Bureau & Franchet; *A. pseudoxytropis* Ulbrich.

Plants up to 15 cm tall, sparsely white hairy or sometimes

glabrous or subglabrous. Stems, if present, very short, rarely up to 3 cm, glabrous. Leaves 8–15 cm; stipules whitish membranous, free from petiole, at base nearly completely embracing stem but not connate behind it, high connate behind abaxial side of petiole, upper ones 10–12(–15) mm, connate for 1/3–2/3 of their length, lower ones mostly shorter and connate often nearly up to top, all ciliate, rarely sparsely hairy on outer side; petiole

2–6 cm, like rachis glabrous or very sparsely hairy; leaflets in 7–12 pairs, narrowly ovate, 6–8 × 2–3 mm, abaxially glabrous or sparsely hairy at margins and midvein, rarely more densely hairy, adaxially glabrous, apex acute. Racemes subsessile, 2- or 3-flowered; bracts membranous, linear, acute, 10–15 mm, glabrous or ciliate. Calyx tubular, 11–15 mm, tube glabrous or rarely sparsely hairy; teeth 3–4 mm, sometimes ciliate at margin and apex. Petals pale sulfur-yellow; standard widely obovate,

20–25 × 11–13(–16) mm, apex rounded to slightly emarginate; wings 19–24 mm; keel 19–22 mm. Legumes subsessile, erect, slightly obliquely oblong, 25–50 mm, 10–15 mm high and 3–4 mm wide, narrowly rounded ventrally and dorsally, without beak, nearly completely 2-locular; valves thin but tough, with numerous vertical fine nerves, glabrous.

High alpine regions; 3300–5400 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim)].

16. Astragalus sect. **Pelta** Podlech & I. Deml, Mitt. Bot. Staatssamml. München 6: 543. 1967.

盾叶组 *dun ye zu*

Plants shrubby or subshrubby, spiny or not, with basifixed white or partly black hairs. Leaves imparipinnate; stipules membranous, shortly adnate to petiole, otherwise free from each other or connate before abaxial side of petiole; petiole and rachis hardening with age and sometimes spiny, partly persistent, terminal leaflet then soon falling. Leaflets sometimes subpeltate or peltate. Petals glabrous, yellow. Legumes obtusely keeled ventrally, grooved dorsally, incompletely to completely 2-locular; valves thinly or rigidly membranous.

Six species: mainly in Afghanistan, one species in NE Iran, one species in C Asia including NW China.

77. Astragalus olgae Bunge, Izv. Imp. Obsc. Ljubit. Estestv. Moskovsk. Univ. 26(2): 223. 1880.

奥尔格黄耆 *ao er ge huang qi*

Astragalus chionanthus Popov.

Plants subshrubby, acaulescent or shortly caulescent, 12–30 cm tall; hairs sparse, white, in inflorescence also black. Stem 1–10 cm, glabrous or very sparsely covered with appressed to spreading hairs 0.5–1 mm, at base very densely covered with remnants of old leaves and rigid but not spiny rachises. Leaves 6–10 cm, at end of vegetation period elongating up to 25 cm; stipules whitish hyaline, lower ones 5–6 mm, upper ones up to 15 mm, shortly ciliate or rarely glabrous; petiole 1–3 cm, later up to 6 cm, like rachis slender, later thickened and hardening,

persistent, glabrous or very sparsely subappressed hairy; leaflets in 13–15 pairs, easily falling, narrowly oblong, 3–18 × 1–3 mm, glabrous or abaxially very sparsely hairy, apex rounded to incised. Racemes loosely 2–4-flowered; peduncle 1–3.5 cm, glabrous; bracts whitish membranous, linear, acute, 6–10 mm, mostly glabrous. Calyx 13–15 mm, at base nearly glabrous, upper part sparsely to very loosely black hairy; teeth 3–5.5 mm. Petals whitish or yellow; standard obovate-oblong, 25–28 × 8–13 mm, lower part slightly constricted, scarcely to distinctly emarginate; wings 23–26 mm; keel 20–22 mm. Legumes with a stipe 2–4 mm, globose to inflated ellipsoid, 10–25 mm, 10–12 mm high and 10–18 mm wide, slightly grooved ventrally and dorsally, with a beak 2–4 mm, 2-locular; valves thin, glabrous.

Stony slopes of high mountains; 3100–3900 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

17. Astragalus sect. **Komaroviella** Gontscharow in Komarov, Fl. URSS 12: 876. 1946.

短翼组 *duan yi zu*

Plants perennial, with developed stems, rarely subacaulescent, with basifixed hairs. Stipules free from petiole or nearly so, all or only lower ones connate behind stem, rarely all free from each other. Racemes borne on long peduncle, shortly ovoid to subumbellate, loose or nearly so. Bracteoles mostly absent. Flowers with a short pedicel. Calyx campanulate. Petals lilac or violet; wings shorter than keel, limbs rounded at apex; keel with large limbs, 2–3 × as long as claw. Legumes pendulous, with a stipe equaling or slightly exceeding calyx, incompletely to completely 2-locular or 1-locular; valves thin, membranous, hairy, rarely glabrous.

Twenty-four species: NE Afghanistan, China, India, Kashmir, Mongolia, Nepal, Pakistan, Russia; C and SW Asia, Europe, North America; 20 species (16 endemic) in China.

1a. Plants subglabrous; ovary and legumes glabrous.

2a. Plants 3–4 cm tall; peduncle 0.4–1 cm; bracteoles present; standard 12–13 × ca. 10 mm, limb widely

obovate to orbicular 86. *A. damxungensis*

2b. Plants 5–20 cm tall; peduncle 1.5–6 cm; bracteoles absent; standard ca. 11 × 5 mm, limb obovate 88. *A. habamontis*

1b. Plants distinctly hairy, at least in part; bracteoles rarely present; ovary and legumes hairy.

3a. Stem, rachis, and peduncle with double indumentum of very short appressed hairs ca. 0.1 mm and

fewer spreading hairs 1–1.5 mm; legumes 12–14 mm, strongly curved 96. *A. semicircularis*

3b. Stem, rachis, and peduncle with a simple indumentum; legumes mostly shorter, not strongly curved.

4a. Leaf rachis with at least partly spreading hairs.

5a. Plants up to 100 cm tall; stipules free from each other; rachis with hairs spreading, white, at

base also black, 0.2–0.3 mm; bracts 2–3 mm; limb of standard elliptic without distinct claw 84. *A. chiukiangensis*

- 5b. Plants 17–25 cm tall; at least lower stipules vaginate-connate; rachis with hairs appressed to partly spreading, white, 0.4–0.6 mm; bracts ca. 1 mm; limb of standard orbicular, at base abruptly contracted into short claw 95. *A. saxorum*
- 4b. Leaf rachis with appressed to subappressed hairs.
- 6a. Stipules 2–3 mm, glabrous or subglabrous; plants 40–60 cm tall; petals purple.
- 7a. Rachis with very short, subglobose hairs; bracteoles absent; calyx 3–3.5 mm; standard 9–10 mm, wings ca. 7 mm and keel ca. 10 mm; legumes 8–10 mm, nearly fully 2-locular 87. *A. dulungkiangensis*
- 7b. Rachis without subglobose hairs; bracteoles present, 0.5–1 mm; calyx 4–5.5 mm; standard 12–13 mm, wings 10–11 mm and keel 12–14 mm; legumes 15–18 mm, 1-locular 83. *A. changmuicus*
- 6b. Stipules mostly longer, hairy at least at margins; plants distinctly smaller, if up to 65 cm tall (in *A. leptocladus* and *A. weixinensis*), then petals yellowish to white or white with violet tip.
- 8a. Plants up to 65 cm tall; petals yellowish to white or white with violet tip.
- 9a. Leaflets in 6–9 pairs, elliptic, 5–14 × 2.5–7 mm; petals yellowish to white, standard 8–9 mm, wings ca. 7 mm, keel ca. 8 mm 97. *A. weixinensis*
- 9b. Leaflets in 10–12 pairs, narrowly elliptic, 9–20 × 2–6 mm; petals white with violet tip, standard ca. 12 mm, wings ca. 10 mm, keel ca. 11 mm 91. *A. leptocladus*
- 8b. Plants up to 25 cm tall (in *A. chagyabensis* up to 30 cm); petals purple, blue, or violet.
- 10a. Standard up to 8.5 mm; leaflets in 5–9 pairs.
- 11a. Leaflets adaxially sparsely hairy to subglabrous; calyx 4–5 mm, covered with white hairs; legumes deeply grooved dorsally, 2-locular 79. *A. aridovallicola*
- 11b. Leaflets on both surfaces loosely to rather densely hairy; calyx 2.5–3 mm, covered with black hairs 0.2–0.3 mm and sometimes with longer white hairs; legumes keeled ventrally and dorsally, 1-locular 90. *A. kuschakewiczii*
- 10b. Standard at least 9 mm but in most flowers longer, if sometimes only ca. 8 mm (*A. bouffordii*), then leaflets in 11–15 pairs.
- 12a. Bracts 3–6 mm; calyx 6–7 mm, teeth 3–4 mm.
- 13a. Stipules ciliate, otherwise glabrous; leaflets in 4–6 pairs, mostly whitish margined; limb of standard ± orbicular, ca. 9 mm wide, at base abruptly contracted into claw 92. *A. mattam*
- 13b. Stipules loosely to rather densely white hairy, glabrescent with age; leaflets in 6–9 pairs, not whitish margined; limb of standard elliptic, 5–8 mm wide, at base gradually narrowed 93. *A. oxyodon*
- 12b. Bracts distinctly shorter; calyx distinctly shorter, up to 5 mm (only in *A. alpinus* sometimes up to 6 mm), teeth mostly distinctly shorter.
- 14a. Stipules shortly vaginate-connate, upper ones free; leaflets in 4–7 pairs; calyx covered with white hairs 80. *A. batangensis*
- 14b. Stipules all distinctly to high vaginate-connate (in *A. bouffordii* upper ones sometimes free); leaflets in 5–12 pairs; calyx with black or white and black hairs.
- 15a. Plants 2–10 cm tall; leaflets 1.2–3 × 0.5–1.2 mm, on both surfaces loosely to rather densely hairy; stipules in front of petiole distinctly connate; racemes 1–7-flowered 85. *A. confertus*
- 15b. Plants mostly distinctly taller; leaflets distinctly larger, if only 3–5 mm (*A. haiyuanensis*), then adaxially glabrous or sometimes sparsely hairy; stipules in front of petiole not connate; racemes mostly with distinctly more flowers.
- 16a. Stipules ciliate or rarely very sparsely hairy (in *A. retusifolius*); rachis sparsely to loosely hairy; calyx black hairy; legumes black or more rarely white and black hairy.
- 17a. Leaflets in 6–9 pairs, 4–8 × 2–5 mm; bracts 2–3 mm; legumes narrowly oblong, slightly curved, 12–18 mm, incompletely 2-locular 94. *A. retusifolius*
- 17b. Leaflets in 7–12 pairs, 5–15(–20) × 2–5(–7) mm; bracts 0.5–2 mm; legumes narrowly ellipsoid, straight, 7–13 mm, 1-locular or nearly so 78. *A. alpinus*
- 16b. Stipules densely hairy; rachis loosely to densely hairy; calyx white and black or black hairy; ovary white hairy (legumes unknown in *A. chagyabensis*).

- 18a. Plants 20–30 cm tall; leaves 8–10 cm; leaflets 9–13 × 5–7 mm; peduncles 8–10 cm; calyx white and black hairy 82. *A. chagyabensis*
- 18b. Plants 10–20 cm tall; leaves 1–6 cm; leaflets 3–8 mm; calyx with other kind of hairs.
- 19a. Stems, rachises, and peduncles white and black hairy; leaflets in 7–10 pairs; calyx loosely black hairy; standard 9–10 mm, wings ca. 8 mm, keel 9–11 mm 89. *A. haiyuanensis*
- 19b. Stems, rachises, and peduncles only with white hairs; leaflets in 11–15 pairs; calyx densely covered with white hairs, often with some black hairs mixed in; standard 8–9 mm, wings ca. 6 mm, keel 7–7.5 mm 81. *A. bouffordii*

78. *Astragalus alpinus* Linnaeus, Sp. Pl. 2: 760. 1753.

高山黄耆 gao shan huang qi

Astragalus salicetorum Komarov.

Plants caespitose, mostly low, with ± appressed white and black hairs. Stems several to many, slender, prostrate to ascending, 1–15(–20) cm, sparsely hairy. Leaves 2–8 cm; stipules 1.5–6 mm, lower high connate behind stem, upper shortly connate or free, all ciliate; petiole 0.5–4 cm, like rachis slender, sparsely to loosely hairy; leaflets in 7–12 pairs, narrowly elliptic, 5–15(–20) × 2–5(–7) mm, abaxially somewhat densely hairy, adaxially glabrous or sparsely hairy, more rarely rather densely hairy on both surfaces, apex rounded to slightly retuse. Racemes short, densely 5–15-flowered; peduncle 3–8(–15) cm, erect, sparsely to loosely white hairy, toward raceme increasingly black hairy; bracts triangular, 0.5–2 mm, black ciliate. Calyx 4–6 mm, appressed black hairy; teeth 1–3 mm. Petals violet with whitish base, wings often whitish, often yellowish when dry but mostly with violet-tipped keel; standard rhombic-elliptic to widely elliptic, 9–13 × 6–7.5 mm, apex emarginate; wings 7–12 mm; keel 9–12 mm, limbs triangular, 6–8 × 3–3.5 mm. Legumes nodding, with a stipe 2–5 mm, ellipsoid, 7–13 mm, 3–3.5 mm high and wide, attenuate at both ends, keeled ventrally, deeply grooved dorsally, with a short beak, 1-locular or nearly so; valves thin, loosely to rather densely covered with appressed to semispreading black hairs. Seeds 2.5–3 × 2–2.5 mm, smooth.

Subarctic zone, subalpine to alpine meadows, in subarctic tundra. Xinjiang [Russia; C Asia, SW Asia (Caucasus), Europe, North America].

79. *Astragalus aridovallicola* P. C. Li, Acta Bot. Yunnan. 11: 299. 1989.

旱谷黄耆 han gu huang qi

Plants with appressed white hairs. Stems several, branched near base, slender, prostrate, up to 15 cm, sparsely covered with hairs 0.1–0.2 mm. Leaves 2.5–5 cm; stipules greenish, 2–3 mm, lower ones shortly connate behind stem, upper free, all sparsely hairy; petiole 0.5–1.5 cm, with rachis loosely to rather densely hairy like stem; leaflets in 5–7 pairs, widely obovate to suborbicular, 3–6 × 2–4 mm, abaxially loosely covered with appressed hairs 0.1–0.3 mm, adaxially sparsely hairy or with scattered hairs only, apex emarginate. Racemes loosely 3- or 4-

flowered; peduncle 1.5–4.5 cm, erect, hairy like stem; bracts whitish membranous, 0.5–0.8 mm, white hairy. Calyx 4–5 mm, sparsely to loosely hairy; teeth unequal, 1–3 mm. Petals pale purple; standard widely ovate, ca. 8 × 5 mm, apex emarginate; wings ca. 6.5 mm; keel 7–7.5 mm, limbs ca. 5.5 × 3 mm. Legumes (immature) with a stipe ca. 2 mm, obliquely narrowly ellipsoid, ca. 10 mm, 1.5–2 mm high and wide, keeled ventrally, deeply grooved dorsally, with a very short beak, 2-locular; valves thin, loosely to rather densely covered with appressed white hairs.

• Sichuan.

80. *Astragalus batangensis* E. Peter, Acta Horti Gothob. 12: 35. 1938.

巴唐黄耆 ba tang huang qi

Astragalus cinerascens H. T. Tsai & T. T. Yu (1940), not Candolle ex Steudel (1840), nor (Rydberg) Tidestrom (1937).

Plant hairs appressed to subappressed, white, in inflorescence also black, 0.3–1 mm. Stems solitary or several, branched, slender, prostrate to ascending, up to 15 cm, loosely to rather densely white hairy. Leaves 3–7 cm; stipules greenish, 3–4 mm, all shortly connate behind stem or upper free, all rather densely hairy; petiole 1–1.5 cm, like rachis loosely to rather densely hairy; leaflets in 5–7 pairs, elliptic to obovate, 4–13 × 2–8 mm, abaxially somewhat densely and adaxially sparsely to rather loosely covered with subappressed hairs up to 1 mm, apex subacute to rounded or slightly retuse. Racemes short, rather loosely 8–10-flowered; peduncle 3–8 cm, rather densely white hairy; bracts whitish membranous, 1–1.5 mm, white hairy. Calyx 3–4 mm, rather densely appressed white hairy; teeth 1–2 mm. Petals blue to violet; standard widely ovate, 8–11 × 5–8 mm, apex emarginate; wings 6–7 mm; keel 8–10 mm, limbs 6–7 × ca. 2.5 mm. Legumes with a stipe 2–5 mm, nodding, ellipsoid, 7–13 mm, 3–3.5 mm high and wide, keeled ventrally, deeply grooved dorsally, with a short beak, 1-locular or nearly so; valves thin, loosely to rather densely covered with appressed to ascending white or black hairs.

• Sichuan, Xizang, Yunnan.

81. *Astragalus bouffordii* Podlech, Feddes Repert. 120: 53. 2009.

鲍氏黄耆 bao shi huang qi

Plants 10–20 cm tall. Stems many, branched from base, loosely covered with appressed white hairs. Leaves 5–6 cm; stipules 2.5–3 mm, at least lower ones shortly vaginate-connate behind stem; petiole 1–2 cm, hairy like stem; leaflets in 11–15 pairs, elliptic, 3–8 × 1.5–3 mm, abaxially loosely appressed hairy, adaxially glabrous. Racemes rather densely 7–12-flowered; peduncle 4–7 cm, white hairy like stem; bracts 0.5–1 mm, predominantly white hairy. Calyx ca. 4 mm, densely covered with appressed white hairs 0.3–0.5 mm and often with black hairs mixed in; teeth subulate, ca. 2 mm. Petals purple, keel with darker tip; standard 8–9 × ca. 6 mm, widely elliptic, emarginate; wings ca. 6 mm; keel 7–7.5 mm. Legumes (unripe) with a stipe ca. 2 mm, ca. 6 mm, 2–2.5 mm high and wide.

- About 3400 m. E Xizang.

82. *Astragalus chagyabensis* P. C. Li & C. C. Ni, Acta Phytotax. Sin. 18: 368. 1980.

察雅黄耆 cha ya huang qi

Plants 20–30 cm tall, caespitose. Stems several, branched at base, sparsely white and black hairy. Leaves 8–10 cm; stipules narrowly triangular, ca. 5 mm, free from petiole, high connate behind stem, densely white hairy; petiole like rachis densely appressed white hairy; leaflets in 9–11 pairs, elliptic, 9–13 × 5–7 mm, abaxially densely and adaxially sparsely appressed white hairy, apex rounded. Racemes many flowered; peduncle 8–10 cm, sparsely white hairy. Calyx ca. 5 mm, loosely white and black hairy; teeth subulate, ca. 2.5 mm. Petals pale purplish; standard widely elliptic, ca. 10 mm; wings ca. 8 mm; keel ca. 10 mm. Ovary stipitate, sparsely white hairy. Legumes unknown.

- Xizang.

83. *Astragalus changmuicus* C. C. Ni & P. C. Li, Acta Phytotax. Sin. 17(2): 105. 1979.

樟木黄耆 zhang mu huang qi

Plants white hairy. Stems slender, 40–50 cm, prostrate to ascending, 1–1.5 mm thick, glabrescent in lower part, sparsely hairy in upper part. Leaves 2–4 cm, subsessile; stipules 2–3 mm, lower ones shortly connate behind stem, upper ones free, narrowly triangular, glabrescent; rachis sparsely to loosely hairy; leaflets in 8–10 pairs, narrowly elliptic, 5–9 × 3–4 mm, abaxially sparsely appressed hairy, adaxially glabrous, apex acute or shortly mucronulate. Racemes 3–5 cm, (1–)4–9-flowered; peduncle 2–4 cm, hairy; bracts ca. 2 mm, subulate, hairy. Bracteoles present, 0.5–1 mm. Calyx 4–4.5 mm, appressed black hairy; teeth ca. 2 mm. Petals purple; standard elliptic, 12–13 × 5.5–6.5 mm, apex emarginate; wings 10–11 mm; keel 12–14 mm. Legumes with a stipe 4–5 mm, narrowly ellipsoid, 15–18 mm, 1-locular; valves appressed white hairy.

- Xizang.

84. *Astragalus chiukiangensis* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 260. 1940.

侏江黄耆 qiu jiang huang qi

Plants up to 100 cm tall, furnished with white and black hairs up to 0.5 mm. Stem erect, branched, sparsely covered with

appressed to ascending white and some black hairs, those of lateral branches often with rather dense and to spreading white hairs. Leaves 8–12 cm, subsessile; stipules greenish, 3–5 mm, free, reflexed, white ciliate; rachis sparsely to loosely covered with spreading white or at base predominantly black hairs 0.2–0.3 mm; leaflets in 8–11 pairs, in lateral branches in fewer pairs, narrowly elliptic to elliptic, 10–16 × 3.5–7 mm, abaxially loosely, in young leaves also rather densely, covered with appressed to ascending white hairs 0.5–0.8 mm, adaxially glabrous or sparsely white hairy, apex subacute to obtuse. Racemes shortly cylindrical, rather densely many flowered; peduncle 3–7 cm, loosely covered with nearly spreading white hairs; bracts membranous, linear, 2–3 mm, white hairy. Calyx ca. 5 mm, sparsely to loosely subappressed white hairy; teeth 2–2.5 mm. Petals white greenish or white; standard obovate, 9–11 × ca. 5 mm, apex obtuse; wings 7–8 mm; keel 8–10 mm, limbs 5–5.5 × 2.2–2.5 mm. Legumes (unripe) nodding, with a stipe ca. 3 mm, white hairy.

- Yunnan.

85. *Astragalus confertus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 23. 1868.

丛生黄耆 cong sheng huang qi

Plants 2–10 cm tall, acaulescent to shortly caulescent, densely caespitose; hairs appressed to subappressed, in vegetative parts mostly white, 0.2–0.4 mm, sometimes mixed with black hairs. Stems mostly numerous, very short or to up to 5 cm, sparsely to loosely hairy. Leaves 1–2.5 cm; stipules 3–4 mm, free from petiole or shortly adnate, but distinctly connate before petiole, high connate behind stem, sparsely to rather densely hairy; petiole 0.5–0.8 cm, like rachis slender, loosely to rather densely covered with subappressed to ascending hairs; leaflets in 5–9 pairs, narrowly elliptic to elliptic, 1.2–3 × 0.5–1.2 mm, both surfaces loosely to rather densely covered with appressed to slightly ascending hairs 0.5–0.7 mm, apex subacute to obtuse. Racemes 1–7-flowered; peduncle 0.5–4 cm, loosely covered with appressed white hairs 0.2–0.3 mm, toward raceme increasingly black hairy; bracts ca. 2 mm. Calyx 4.5–5 mm, densely to rather densely covered with appressed, predominantly black hairs 0.1–0.3 mm; teeth 1.5–2 mm. Petals violet; standard widely elliptic to suborbicular, 10–12 × 6.5–8 mm, apex emarginate; wings 8–10 mm; keel 9–11 mm. Legumes (unripe) pendulous, with a stipe ca. 3 mm, white hairy.

- Qinghai, Xizang [India, Kashmir, Nepal].

86. *Astragalus damxungensis* Podlech & L. R. Xu, Sendtnera 7: 193. 2001.

当雄黄耆 dang xiong huang qi

Plants 3–4 cm tall, nearly acaulescent, subglabrous; hairs subappressed, black, 0.2–0.3 mm. Leaves 1.5–2.5 cm; stipules greenish to membranous, 3–4 mm, distinctly to high connate behind stem, glabrous; petiole 0.4–1 cm, like rachis glabrous or with scattered hairs; leaflets in 4–6 pairs, elliptic, 3–5 × 1–2.8 mm, glabrous or more rarely with scattered hairs abaxially, conspicuously and densely wrinkled when dry abaxially, apex obtuse to subacute. Racemes 1- or 2-flowered; peduncle 0.5–1 cm, glabrous or below raceme with scattered black hairs; bracts

whitish membranous, ca. 3 mm, glabrous. Bracteoles present, linear-subulate, 1–2 mm. Calyx ca. 6 mm, rather densely hairy; teeth 2.5–3 mm. Petals purple violet; standard widely obovate to orbicular, 12–13 × ca. 10 mm, apex emarginate; wings ca. 10 mm; keel ca. 11 mm, limbs ca. 8 × 4 mm. Ovary with a stipe ca. 1.5 mm, glabrous. Legumes unknown.

• Xizang.

87. *Astragalus dulungkiangensis* P. C. Li, Acta Bot. Yunnan. 11: 298. 1989.

独龙江黄耆 du long jiang huang qi

Plant hairs appressed to subappressed, white, in inflorescence also black, 0.1–0.3 mm or even shorter and inflated subglobose. Stem prostrate, branched, slender, 40–60 cm, loosely hairy, soon glabrescent. Leaves 3–6 cm, subsessile; stipules greenish, 2–2.5 mm, glabrous, lower ones shortly connate behind stem; rachis slender, sparsely covered with very short inflated subglobose hairs; leaflets in 7–10 pairs, elliptic, 4–9 × 2–4 mm, abaxially sparsely to loosely covered with appressed hairs, adaxially subglabrous, apex retuse to emarginate. Racemes short, rather loosely 4- or 5-flowered; peduncle 1.5–3.5 cm, loosely to densely hairy; bracts greenish membranous, ca. 1.5 mm, subglabrous. Calyx 3–3.5 mm, loosely covered with white hairs and at teeth also with black hairs; teeth 1.5–2 mm. Petals pale purplish; standard widely ovate to suborbicular, 9–10 × ca. 6 mm, apex emarginate; wings ca. 7 mm; keel ca. 10 mm, limbs ca. 5.5 × 3 mm. Legumes nodding, with a stipe ca. 3 mm, oblong, slightly curved, 8–10 mm, ca. 2 mm high and wide, keeled ventrally, deeply grooved dorsally, with a short beak, nearly fully 2-locular; valves thin, loosely to rather densely covered with very short white hairs.

• Yunnan.

88. *Astragalus habamontis* K. T. Fu, Bull. Bot. Res., Harbin 2(4): 68. 1982.

哈巴山黄耆 ha ba shan huang qi

Plants 5–20 cm tall, with appressed hairs 0.1–0.3 mm. Stems prostrate to ascending. Leaves 3–6 cm; stipules 3–4 mm, ovate, connate behind stem to middle; leaflets in 5–8 pairs, obovate, 4–7 × 1.5–4 mm, abaxially sparsely covered with appressed white hairs, adaxially glabrous. Racemes 3–5-flowered; peduncle 1.5–6 cm, sparsely black hairy; bracts narrowly triangular-subulate, 1.5–3 mm. Calyx 4–5 mm, black hairy; teeth 1.5–2 mm. Petals red or blue; standard obovate, 10–12 mm; wings slightly shorter than standard; keel slightly longer than wings. Ovary stipitate, glabrous. Legumes shortly stipitate, narrowly ovate to narrowly elliptic, ca. 10 mm, 1-locular; valves glabrous.

• Qinghai, Yunnan.

89. *Astragalus haiyuanensis* Podlech, Feddes Repert. 120: 53. 2009.

海原黄耆 hai yuan huang qi

Plants 15–20 cm tall. Stems of current year 11–13 cm, sparsely to loosely appressed white and black hairy. Leaves 2–3 cm; stipules 2.5–4 mm, high connate behind stem, lower one

white hairy, upper ones predominantly black hairy; petiole ca. 0.5 cm, with rachis hairy like stem; leaflets in 7–10 pairs, elliptic, 3–5 × 1.5–3 mm, abaxially loosely to rather densely appressed hairy, adaxially glabrous or sparsely hairy. Racemes 10–12-flowered; peduncle 3–5 cm, white and black hairy, toward raceme hairs predominantly black; bracts ca. 1.5 mm, predominantly black hairy. Calyx 4–5 mm, loosely appressed black hairy; teeth 1–2 mm. Petals violet; standard ovate, 9–10 × ca. 6 mm, apex widely emarginate; wings ca. 8 mm; keel 9–11 mm. Legumes (unripe) with a stipe ca. 4 mm, appressed white hairy.

• Ningxia.

90. *Astragalus kuschakewiczii* B. Fedtschenko ex O. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 311. 1903 [*“kuschakewiczii”*].

库萨克黄耆 ku sa ke huang qi

Astragalus eugeniae B. Fedtschenko; ?*A. hegingensis* Y. X. Liou; *A. mongutensis* Lipsky; *A. pulvinalis* P. C. Li & C. C. Ni.

Plants 7–15(–20) cm tall, densely caespitose, densely gray hairy with subappressed to ascending hairs 0.2–0.3 mm. Stems many, ascending to erect, branched from base. Leaves 1–3 cm; stipules 1.5–2.5 mm, behind stem shortly connate; petiole 0.3–0.8 cm, like rachis slender, densely to rather densely hairy; leaflets in 6–9 pairs, oblong to elliptic, 1–5 × 0.5–3 mm, both surfaces loosely to rather densely hairy, apex rounded to retuse. Racemes 1–1.5 cm, rather loosely 4–10-flowered; peduncle 1.5–4 cm, white hairy, below raceme increasingly black hairy; bracts whitish membranous, 0.5–1 mm, black and white hairy. Calyx 2.5–3 mm, loosely to rather densely covered with appressed black hairs 0.2–0.3 mm and sometimes also with somewhat longer white hairs; teeth 1–1.5 mm. Petals light blue, keel with darker tip; standard orbicular, 8–8.5 × 6–7 mm, apex retuse to emarginate; wings 6–7 mm; keel 8–8.5 mm, limbs 4.5–6 × 1.5–3 mm. Legumes spreading to pendulous, with a stipe 1–1.5 mm, obliquely ellipsoid, 5–7 mm, keeled ventrally and dorsally, minutely beaked, 1-locular; valves thin, with appressed white or white and black hairs.

Stony soil, riverbanks, ascending to 3900–4300 m. Gansu, Qinghai, Xinjiang, Xizang [Afghanistan, Kazakhstan, Tajikistan].

91. *Astragalus leptocladus* Podlech & L. R. Xu, Novon 17: 237. 2007.

细枝黄耆 xi zhi huang qi

Plants up to 65 cm tall. Stems up to 55 cm, very sparsely covered with ± appressed black hairs 0.2–0.4 mm. Leaves 8–12 cm; stipules 3–5 mm, lower ones vaginate-connate behind stem to middle, upper ones free, all sparsely covered with white and black hairs up to 1 mm; petiole 1–2 cm, rachis sparsely hairy like stem; leaflets in 10–12 pairs, narrowly elliptic, 9–20 × 2–6 mm, abaxially loosely and adaxially sparsely covered with subappressed white hairs ca. 1 mm, apex rounded to subacute, mostly very minutely mucronulate. Racemes at anthesis capitate, densely 12–15-flowered; peduncle 10–12 cm, sparsely to rather loosely only black hairy; bracts ca. 2 mm, black hairy.

Calyx ca. 5 mm, loosely to rather densely covered with subappressed black hairs 0.1–0.4 mm; teeth 2–3 mm. Petals whitish with violet tip; standard ovate, ca. 12 × 6 mm, deeply emarginate; wings ca. 10 mm; keel ca. 11 mm. Legumes spreading to nodding, with a stipe ca. 3 mm, oblong, distinctly curved, ca. 12 mm, ca. 3 mm high and ca. 2 mm wide, keeled ventrally, grooved dorsally, with a slender beak ca. 2 mm, 2-locular; valves loosely to rather densely covered with appressed to ascending or partly spreading black hairs 0.3–0.5 mm.

• Xinjiang.

92. *Astragalus mattam* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 24. 1936.

茵垫黄耆 yin dian huang qi

Plants 4–15 cm tall, densely caespitose, rather densely hairy; hairs subappressed to ascending, white, in inflorescence also black, 0.3–1 mm. Stems numerous, branched, ascending to erect, up to 5 cm, densely covered in lower parts with remnants of old leaves, hairy. Leaves 2–4 cm; stipules membranous, 5–7 mm, high connate behind stem, sometimes nearly to top, white ciliate; petiole 0.5–1.5 cm, like rachis loosely to more rarely rather densely white hairy; leaflets in 4–6 pairs, elliptic, 2–5 × 1–2.5 mm, abaxially rather densely and adaxially sparsely to loosely covered with subappressed white hairs up to 1 mm, margin mostly whitish, apex rounded or slightly retuse. Racemes short, 3–5-flowered; peduncle 1–3 cm, rather densely white hairy, toward racemes also increasingly black hairy; bracts whitish membranous, 3–9 mm, white hairy. Calyx 6–9 mm, rather densely covered with appressed white and black hairs; teeth 3–6 mm. Petals purple to blue, wings and center of standard white; standard nearly orbicular, 13–16 × 9–11 mm, apex emarginate; wings 11–13 mm; keel 13–15.5 mm, limbs ca. 9 × 4 mm. Ovary with a stipe ca. 2 mm, white hairy. Legumes unknown.

• Qinghai.

- 1a. Standard ca. 13 × 9 mm, wings ca. 11 mm, keel ca. 13 mm; calyx 6–7 mm, teeth 3–4 mm; bracts 3–6 mm 92a. var. *mattam*
 1b. Standard ca. 16 × 11 mm, wings ca. 13 mm, keel ca. 15.5 mm; calyx ca. 9 mm, teeth 5–6 mm; bracts 6–9 mm 92b. var. *macroflorus*

92a. *Astragalus mattam* var. *mattam*

茵垫黄耆(原变种) yin dian huang qi (yuan bian zhong)

Flowers smaller. Bracts 3–6 mm. Calyx 6–7 mm; teeth 3–4 mm. Standard nearly orbicular, ca. 13 × 9 mm; wings ca. 11 mm; keel ca. 13 mm.

• Qinghai.

92b. *Astragalus mattam* var. *macroflorus* Y. H. Wu, Acta Bot. Yunnan. 20: 39. 1998.

大花茵垫黄耆 da hua yin dian huang qi

Flowers larger. Bracts 6–9 mm. Calyx ca. 9 mm; teeth 5–6

mm. Standard ca. 16 × 11 mm; wings ca. 13 mm; keel ca. 15.5 mm.

• Qinghai.

We have seen no material of this taxon. It is perhaps a separate species.

93. *Astragalus oxyodon* Baker in J. D. Hooker, Fl. Brit. India 2: 125. 1876.

尖齿黄耆 jian chi huang qi

Plants 10–18 cm tall; hairs wide, often somewhat flattened, appressed to subappressed. Stems several, 4–12 cm, loosely to sometimes partly rather densely covered with appressed white hairs 0.3–0.5 mm, sometimes with some black hairs mixed in. Leaves 4–7 cm; stipules 2–7 mm, ± distinctly and sometimes high connate behind stem, loosely to rather densely white hairy, glabrescent to glabrous with age; petiole 0.3–1 cm, with rachis hairy like stem; leaflets in 6–9 pairs, elliptic, 4–8 × 2–4 mm, abaxially somewhat densely and adaxially sparsely to loosely covered with subappressed white hairs 0.5–1 mm, apex rounded to subacute. Racemes short, loosely 4–7-flowered; peduncle 2.5–8 cm, loosely covered with white and black subappressed hairs 0.2–1 mm; bracts whitish membranous, 3–4 mm, sparsely white and black hairy. Calyx 6–7 mm, loosely to rather densely covered with appressed black hairs 0.1–0.5 mm and sparsely with subappressed white hairs up to 1 mm; teeth 3–4 mm. Petals pale pinkish to deep blue; standard elliptic to widely elliptic, 10–13 × 5–8 mm, apex emarginate; wings 7–10 mm; keel 10–13 mm, limbs 7–8 × 2.5–3.8 mm. Legumes with a stipe ca. 3 mm, ellipsoid, 6–7 mm, 2–3 mm high and 3–5 mm wide, flattened or obtusely keeled ventrally, flattened to shallowly grooved dorsally, with a very short, bent beak, 1-locular; valves rather densely covered with subappressed white or white and predominantly black hairs 0.1–0.3 mm.

3500–4600 m. Xinjiang [India, Nepal, Pakistan].

94. *Astragalus retusifolius* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 114. 1981 [*“retusifolius”*].

凹叶黄耆 ao ye huang qi

Plants 10–30 cm tall, sparsely hairy. Stems several, 5–25 cm, slender, with short lateral branches, sparsely to loosely covered with partly subbasifixed, appressed, mostly white hairs 0.05–0.3 mm. Leaves 3–6 cm; stipules 2–4 mm, behind stem distinctly connate, very sparsely hairy and ciliate; petiole 0.5–1.5 cm, with rachis hairy like stem; leaflets in 6–9 pairs, elliptic, 4–8 × 2–5 mm, abaxially loosely covered with appressed white hairs 0.3–0.5 mm, adaxially glabrous or sparsely hairy, apex rounded to emarginate. Racemes rather densely 4–12-flowered; peduncle 2.5–4 cm, hairy; bracts whitish membranous, 2–3 mm, black hairy. Calyx 4–4.5 mm, loosely covered with appressed black hairs 0.2–0.3 mm and white hairs 0.4–0.6 mm; teeth 2–3 mm. Petals bluish violet but yellowish with violet-tipped keel when dry; standard widely elliptic to ovate, 10–11 × 6–7 mm, apex deeply incised; wings 8–9 mm; keel 9–11 mm, limbs 6.5–7 × 3–3.8 mm. Legumes with a stipe 3–5 mm, narrowly oblong, slightly curved, 12–18 mm, ca. 3 mm high and wide, keeled

ventrally, deeply grooved dorsally, shortly acuminate, incompletely 2-locular; valves loosely to rather densely covered with very short, appressed to ascending, black and white or only black hairs.

- Xizang, Yunnan.

95. *Astragalus saxorum* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 245. 1915.

石生黄耆 shi sheng huang qi

Plants 17–25 cm tall, with appressed to ascending or sometimes also ± spreading and with exception of legumes only white hairs 0.4–0.6 mm. Stems few to several, 15–20 cm, rather densely hairy, partly glabrescent. Leaves 2.5–6 cm; stipules whitish membranous, 2–3 mm, at least lower ones behind stem connate to middle, hairy; petiole 0.5–1.5 cm, like rachis loosely to rather densely hairy; leaflets in 7–10 pairs, obovate, 4–7 × 1.5–3 mm, both surfaces loosely to rather densely covered with ascending hairs, apex mostly retuse. Racemes subumbellate, up to 15-flowered; peduncle 2–3.5 cm, rather densely hairy; bracts ca. 1 mm, hairy. Calyx 3–4 mm, rather densely appressed hairy; teeth ca. 2 mm. Petals pale purplish; standard nearly orbicular, 6–8 × 5–6 mm, apex emarginate; wings 5–7 mm; keel 7–9 mm, limbs 4–5.5 × 2.5–3 mm. Legumes with a stipe ca. 2 mm, 8–10 mm, ca. 3 mm high and wide, nearly 1-locular; valves covered with subappressed white or white and black hairs 0.3–0.5 mm.

- Qinghai, Sichuan, Xinjiang, Yunnan.

96. *Astragalus semicircularis* P. C. Li, Acta Bot. Yunnan. 11: 297. 1989.

半圆黄耆 ban yuan huang qi

Plants ca. 15 cm tall, with appressed and spreading white hairs. Stems several, sparsely covered with white hairs ca. 0.1 mm or even shorter and subglobose and with some scattered, very fine, spreading hairs 1–1.5 mm, soon glabrescent. Leaves 2.5–5 cm; stipules green, 3–3.5 mm, behind stem connate to middle or higher up, sparsely hairy; petiole 0.5–1.5 cm, like

rachis sparsely covered with very short appressed hairs up to 1.5 mm and with fewer scattered spreading hairs; leaflets in 6–8 pairs, elliptic, 4–7 × 2–4 mm, abaxially sparsely to loosely covered with appressed hairs 0.3–0.5 mm, adaxially subglabrous, more rarely with some long ± spreading hairs especially adaxially, apex obtuse to sometimes emarginate. Racemes short, rather loosely 7–13-flowered; peduncle 2.5–5.5 cm, hairy like stem; bracts membranous, ca. 1 mm, subglabrous. Calyx 3–3.5 mm, loosely appressed white hairy; teeth ca. 1.5 mm. Petals with dark purplish hue; standard ovate, 7–7.5 × ca. 4 mm, apex emarginate; wings ca. 6 mm; keel ca. 7.5 mm, limbs ca. 5 × 2 mm. Legumes nodding, with a stipe ca. 2 mm, oblong, strongly curved, 12–14 mm, 2–3 mm high and 1.5–2 mm wide, keeled ventrally, deeply grooved dorsally, shortly acuminate, 1-locular; valves loosely covered with appressed white hairs 0.2–0.3 mm.

- Xizang.

97. *Astragalus weixinensis* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 112. 1981.

维西黄耆 wei xi huang qi

Plants up to 60 cm tall. Stem mostly several, up to 50 cm, sometimes branched, sparsely covered with appressed to subappressed or ascending mostly black hairs 0.1–0.3 mm. Leaves 4–10 cm; stipules greenish, 3–5 mm, free, white and black hairy; petiole 0.5–1.5 cm, with rachis hairy like stem; leaflets in 6–9 pairs, elliptic, 5–14 × 2.5–7 mm, abaxially loosely and adaxially sparsely covered with appressed to slightly ascending white hairs 0.8–1 mm, apex obtuse to emarginate. Racemes rather densely ca. 10-flowered; peduncle 2–6 cm, hairy like stem; bracts greenish, 1–2 mm, black hairy. Calyx ca. 5 mm, loosely covered with subappressed short black and longer white hairs; teeth 2.5–3 mm. Petals yellowish to white; standard ovate to elliptic, 8–9 × ca. 5 mm, apex emarginate; wings ca. 7 mm; keel ca. 8 mm, limbs 4.5–5 × 1.8–2.2 mm. Legumes (unripe) with a stipe 3–4 mm, narrowly ellipsoid (ca. 5 mm), densely black and white hairy.

- Yunnan.

18. *Astragalus* sect. *Glycyrrhizi* W. D. J. Koch, Syn. Fl. Germ. Helv. 182. 1836.

密花组 mi hua zu

Astragalus sect. *Hypoglottis* Bunge.

Plants perennial, with short to long stems, furnished with basifixed hairs. Stipules not or shortly adnate to petiole, ± vaginate-connate around stem. Inflorescences with a well-developed peduncle, capitate to shortly cylindric, mostly densely many flowered, more rarely only few flowered. Flowers with a short pedicel. Bracteoles absent. Calyx campanulate-tubular or tubular. Corolla purple or violet (in Chinese species) but sometimes yellowish when dry, marcescent, not persistent in fruit. Legumes sessile to subsessile, ± erect, oblong to ovoid, 2-locular or nearly so; valves firm or membranous.

Forty-four species: Afghanistan, China, India, Mongolia, Pakistan, Russia (Siberia); N Africa, C and SW Asia, Europe, North America; four species (one endemic) in China.

1a. Calyx teeth nearly as long as tube; legumes densely covered with spreading white hairs.

2a. Bracts 3–7 mm, white and black hairy; calyx covered with appressed to nearly spreading white and black hairs up to 0.9 mm; standard ovate to rhombic-ovate, at base gradually narrowed; legumes

7–10 mm 98. *A. agrestis*

2b. Bracts ca. 3 mm, only ciliate; calyx covered with short appressed black hairs; standard ± oblong,

at base somewhat abruptly contracted into a very short, indistinct claw; legumes 14–16 mm 101. *A. wulumuquianus*

- 1b. Calyx teeth distinctly shorter than tube; legumes covered with predominantly black hairs or hairs sitting on small tubercles.
- 3a. Stipules 4–10 mm; peduncle with black hairs all over; standard 16–22 mm, wing limbs distinctly obliquely emarginate; legumes with a stipe 2–4 mm, narrowly ellipsoid, 10–15 mm, ca. 3 mm high and wide, covered with predominantly black hairs 100. *A. tibetanus*
- 3b. Lower stipules ca. 2 mm, upper ones up to 5 mm; peduncle white hairy, toward raceme also black hairy; standard 14–15 mm, wing limbs rounded at apex; legumes sessile, widely ovoid, 5–7 mm, ca. 3 mm high and 4–4.5 mm wide, covered with white hairs up to 1.5 mm, sitting on small tubercles 99. *A. danicus*

98. *Astragalus agrestis* G. Don, Gen. Hist. 2: 258. 1832.

毛喉黄耆 *mao hou huang qi*

Astragalus dasyglottis Candolle; *A. hypoglottis* Linnaeus var. *dasyglottis* (Candolle) Ledebour.

Plants 10–30 cm tall, with ± appressed hairs 0.3–0.5 mm and up to 0.9 mm in leaflets and calyx. Stems few, 4–25 cm, glabrous or sparsely to loosely hairy. Leaves 2–10 cm; lower stipules 2–4 mm, whitish hyaline, high connate behind stem, glabrous, upper ones 4–6(–10) mm, shortly connate or free from each other, hairy; petiole short, like rachis hairy or subglabrous; leaflets in 6–10 pairs, narrowly elliptic, 4–18 × 1–4.5 mm, abaxially loosely hairy, adaxially glabrous or sparsely hairy, apex rounded to retuse or subacute. Racemes rather densely 5–15-flowered; peduncle 1.5–11 cm, hairy like stem; bracts membranous to partly greenish, 3–7 mm, white and black hairy. Calyx tubular, 7–11 mm, loosely to densely covered with subappressed to nearly spreading straight or curly white and black hairs; teeth 3–5 mm. Petals purplish to bluish lilac; standard ovate to rhombic-ovate, 15–22 × 5.5–8.5 mm, apex emarginate; wings 15–18.5 mm; keel 11.5–14 mm. Legumes subsessile, erect, ovoid to narrowly ellipsoid, 7–10 mm, 2.8–4.5 mm high and wide, keeled ventrally, widely and deeply grooved dorsally, acuminate, 2-locular; valves densely silky villous with straight to curly white hairs up to 1–2 mm.

Meadows, steppes, often in saline or sandy soils, from the plains up to 3200 m. NW Xinjiang [Kazakhstan, Russia (Siberia); North America].

99. *Astragalus danicus* Retzius, Observ. Bot. 3: 41. 1783.

丹麦黄耆 *dan mai huang qi*

Plants up to 30 cm tall, with ± appressed to more rarely ascending hairs 0.3–0.5 mm. Stems mostly several, slender, 4–30 cm, glabrous in lower part, toward top increasingly white hairy, below stipules mostly with spreading black hairs. Leaves 2.5–6 cm; stipules whitish membranous, high vaginate-connate behind stem, lower ones ca. 2 mm, glabrous, upper ones up to 5 mm, ciliate and sparsely hairy; petiole 0.5–1.5 cm, like rachis loosely white and black hairy; leaflets in 6–12 pairs, narrowly elliptic, 2–12 × 0.5–4 mm, both surfaces sparsely to loosely hairy or adaxially nearly glabrous, apex rounded. Racemes short, densely 3–15(–20)-flowered; peduncle 1–10(–15) cm, in lower parts sparsely white hairy, toward raceme increasingly black hairy; bracts whitish membranous, 2–3 mm, black ciliate. Calyx 7–8 mm, densely and predominantly black hairy, more rarely predominantly white hairy; teeth 1.5–3 mm. Petals violet; standard rhombic-elliptic, 14–15 × 7–8 mm, apex deeply incised to bilobed; wings 12–13 mm; keel 10.5–11 mm. Legumes

ellipsoid, slightly compressed dorsiventrally, 5–7 mm, ca. 3 mm high and 4–4.5 mm wide, ventrally and dorsally shallowly grooved, nearly completely 2-locular; valves blackish brown when ripe, densely covered with white hairs up to 1.5 mm, inserted on small tubercles.

Meadows, steppes, open forests, subarctic tundra, from plains to the mountain zone. Heilongjiang, Jilin, Nei Mongol [Kazakhstan, Russia; Europe].

100. *Astragalus tibetanus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 52. 1868.

藏新黄耆 *zang xin huang qi*

Astragalus chadjanensis Franchet; *A. narynensis* Freyn; *A. olufsenii* Freyn; *A. talievii* Širjaev; *A. tibetanus* var. *patentipilus* K. T. Fu.

Plants 4–35 cm tall, covered with hairs 0.2–0.5 mm. Stems 2–20 cm, loosely covered with appressed to ascending or even spreading white and partly also black hairs. Leaves 3–11 cm; stipules 4–10 mm, high vaginate-connate, very sparsely white and black hairy and ciliate; petiole 0.5–2 cm, like rachis loosely covered with appressed to ascending hairs; leaflets in 7–14 pairs, ± narrowly elliptic, 5–12 × 2–5 mm, abaxially loosely covered with appressed to ascending white hairs, adaxially glabrous or sparsely hairy, apex rounded to slightly retuse. Racemes rather densely 4–15-flowered; peduncle 1–10 cm, loosely to densely predominantly black hairy; bracts whitish, 2–3 mm, black hairy. Calyx 7–10 mm, loosely to rather densely appressed black hairy; teeth unequal, 0.5–3 mm. Petals blue-violet or pale lilac but often yellowish when dry; standard elliptic, 16–22 × 6–9 mm, apex incised; wings 15–20 mm; keel 12–15 mm. Legumes with a stipe 2–4 mm, narrowly ellipsoid, 10–15 mm, ca. 3 mm high and wide, obtusely keeled ventrally, widely and deeply grooved dorsally, with a beak 1–2 mm, 2-locular; valves rather densely covered with appressed to spreading mostly predominantly black hairs.

Steppes and open scrub, from the mountain zone to 3900 m. Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia)].

101. *Astragalus wulumuquianus* K. T. Fu, Bull. Bot. Res., Harbin 2(4): 71. 1982.

乌鲁木齐黄耆 *wu lu mu qi huang qi*

Plants 30–60 cm tall. Stems covered with short appressed hairs. Leaves 6–12 cm; stipules 6–7 mm, vaginate-connate in lower 1/2, ciliate; petiole short; leaflets in ca. 10 pairs, narrowly ovate, 5–19 × 2.5–6 mm, abaxially sparsely covered with short hairs, adaxially glabrous, apex rounded to slightly emarginate. Racemes ca. 3 cm, dense; peduncle 2.5–6 cm, shortly appressed

hairy; bracts membranous, linear-acute, ca. 3 mm, ciliate. Calyx campanulate, ca. 9 mm, covered with short appressed black hairs; teeth subulate, ca. 4 mm, more densely black hairy. Petals purple; standard narrowly oblong, ca. 18 × 6 mm, apex emarginate; wings ca. 15 mm; keel ca. 12.5 mm. Legumes shortly

stipitate, narrowly oblong, 14–16 mm, keeled ventrally, subtriangular in cross section; valves transversely reticulate, densely covered with spreading white hairs.

- About 900 m. Xinjiang.

19. *Astragalus* sect. *Oroboidei* A. Gray, Proc. Amer. Acad. Arts 6: 203. 1864.

裂翼组 lie yi zu

Astragalus sect. *Hemiphaca* Bunge; *A. sect. Orobella* Gontscharow.

Plants perennial, with well-developed stems, with basifixed hairs. Leaves imparipinnate with marcescent petiole; stipules free from petiole, partly connate behind stem or upper or all free from each other; leaflets adaxially glabrous or with scattered hairs toward margins only. Racemes loose or ± dense, borne on rather long axillary peduncles. Bracteoles absent. Calyx campanulate. Petals violet or blue, more rarely yellow, sometimes only when dry; wings exceeding keel, limbs bifid, emarginate or obtuse; keel shorter than wings. Legumes sessile or subsessile, rarely with a stipe up to 2 mm, small, ovoid to narrowly ovoid, at least 2 × as long as wide but mostly longer, keeled ventrally, ± grooved dorsally, completely to incompletely 2-locular or 1-locular; valves membranous, mostly smooth, glabrous or hairy.

Forty-five species: Afghanistan, China, NW India, Kashmir, Mongolia, Nepal, Pakistan, Russia; C and SW Asia, Europe; 20 species (14 endemic) in China.

- 1a. Calyx ca. 5 mm or longer.
- 2a. Leaflets touching, thickish, suborbicular to wider than long, 3–7 × 3–7 mm 104. *A. crassifolius*
- 2b. Leaflets not touching, narrowly elliptic to narrowly obovate.
- 3a. Calyx 8–9 mm; standard and wing limbs deeply cleft to 1/3 of their length 109. *A. laceratus*
- 3b. Calyx up to 7(–7.5) mm; standard emarginate, wing limbs rounded to emarginate.
- 4a. Plants 8–10 cm tall, vegetative parts covered with flattened acuminate hairs; peduncle 1.5–3.5 cm; wing limbs obtriangular, widest at deeply emarginate tip 114. *A. nigrodentatus*
- 4b. Plants distinctly taller, covered with terete hairs; peduncle at least 4 cm but mostly distinctly longer; wing limbs narrowly oblong to narrowly elliptic, rounded or slightly emarginate.
- 5a. Leaflets in 9–11 pairs, 5–10 mm; bracts ca. 2 mm, like calyx partly covered with reddish brown hairs; ovary hairy 119. *A. sedaensis*
- 5b. Leaflets in 5–9 pairs, often longer; bracts mostly longer, like calyx covered with white or black hairs; ovary and legumes glabrous or hairy.
- 6a. Calyx at least partly covered with spreading, flexuous, tangled hairs.
- 7a. Stem, rachis, and peduncle covered at least partly with spreading black hairs up to 0.7 mm, with some white hairs mixed in; calyx teeth 0.3–1 mm; ovary with a stipe ca. 1.5 mm, glabrous 108. *A. gongshanensis*
- 7b. Stem glabrous, rachis and peduncle only with appressed to slightly ascending white and black hairs up to 0.2 mm; calyx teeth 2–3 mm; ovary sessile, white hairy 115. *A. ohbanus*
- 6b. Calyx covered only with appressed to subappressed hairs.
- 8a. Petals yellowish green with violet keel; standard 10–11 mm, without distinct claw; ovary white hairy 110. *A. latiunguiculatus*
- 8b. Petals intensively blue to violet; standard 12–14 mm, with a short but distinct claw; ovary and legumes glabrous or black hairy.
- 9a. Plants covered with hairs 0.3–0.8(–1) mm; pedicels 2–5 mm; calyx teeth 0.5–2 mm, all crowded at dorsal side; legumes 10–12 mm, 5–6 mm high and wide, 2-locular, glabrous 120. *A. taipashanensis*
- 9b. Plants covered with hairs 0.2–0.3 mm; pedicels ca. 1 mm; calyx teeth 1–3 mm, not crowded at dorsal side; legumes 4–10 mm, 3.5–4 mm high, compressed laterally, black hairy 117. *A. peterae*
- 1b. Calyx up to 4 mm.
- 10a. Stipules high connate behind stem.
- 11a. Leaflets narrowly elliptic, 1.5–3.5 × 0.8–1.5 mm, adaxially hairy toward margins; standard ca. 9 mm; wing limbs obtuse; plants densely caespitose with very short non-flowering stems 107. *A. dutreuilii*
- 11b. Leaflets linear, 5–12 × 0.5–1.5 mm, glabrous adaxially; standard 7–7.5 mm; wing limbs emarginate to deeply incised; plants without short non-flowering stems 106. *A. daqingshanicus*
- 10b. Stipules free from each other or rarely very shortly connate.
- 12a. Plants covered with distinctly flattened, often curved, tangled, only white hairs 0.1–0.3 mm; leaflets in (2 or)3(or 4) pairs 116. *A. pavlovii*

- 12b. Plants with terete hairs; leaflets in more pairs.
- 13a. Petals white with bluish tips or yellow, rarely with purple keel (see also alternative when dry).
- 14a. Leaflets in 8–11 pairs; petals whitish yellow; standard ca. 7×6 mm, limb orbicular, abruptly contracted into very short claw 121. *A. tsangpoensis*
- 14b. Leaflets in fewer pairs; petals of other color; standard limb elliptic to obovate.
- 15a. Leaflets linear, $5-6 \times$ as long as wide, $8-15(-25) \times 1-3$ mm; petals white with bluish tips; legumes with a stipe ca. 2 mm 111. *A. lhorongensis*
- 15b. Leaflets elliptic to obovate, $2 \times$ as long as wide or slightly longer; petals of other color; legumes sessile.
- 16a. Petals purple or yellow with purple keel; standard 9–11 mm, rounded or retuse; legumes 7–9 mm, incompletely to completely 2-locular, glabrous 112. *A. macropterus*
- 16b. Petals greenish yellow also when dry; standard 7–8 mm, deeply incised; legumes ca. 4 mm, 1-locular, on ventral side appressed white hairy 102. *A. alaschanus*
- 13b. Petals lilac, blue, or violet (in *A. caeruleopetalinus* and *A. puberulus* sometimes drying to yellow).
- 17a. Leaflets in 13 or 14 pairs, ca. $5 \times$ as long as wide, $13-15 \times 2-3$ mm; legumes sparsely white hairy 113. *A. nangxianensis*
- 17b. Leaflets in up to 9 pairs, relatively wider; legumes (and ovary) glabrous or densely black hairy.
- 18a. Bracts 2–3 mm, subglabrous; calyx 3–4 mm; legumes with a stipe ca. 2 mm, 1-locular, densely appressed black hairy 103. *A. caeruleopetalinus*
- 18b. Bracts up to 1.5 mm, hairy; calyx at most up to 3 mm; legumes sessile or subsessile, incompletely to completely 2-locular (unknown in *A. dabanshanicus*), glabrous (including ovary).
- 19a. Leaflets in up to 6 pairs; racemes short, dense; bracts and calyx black hairy 105. *A. dabanshanicus*
- 19b. Leaflets in up to 9 pairs; racemes up to 12–15 cm, loosely many flowered; bracts and calyx white and black hairy.
- 20a. Leaflets slightly more than $2 \times$ as long as wide; petals purple or yellowish with purple keel; standard 9–11 mm 112. *A. macropterus*
- 20b. Leaflets $4-10 \times$ as long as wide; petals pale lilac, sometimes pale yellow when dry; standard 5–7 mm 118. *A. puberulus*

102. *Astragalus alaschanus* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 31. 1877.

阿拉善黄耆 *la shan huang qi*

Astragalus chingianus E. Peter.

Plants 8–20 cm tall, caespitose, covered with appressed to subappressed hairs 0.1–0.3 mm. Stems 5–10 cm, loosely to rather densely white hairy. Leaves 2–6 cm, subsessile; stipules greenish, 2–3 mm, lower ones shortly connate behind stem, upper ones mostly free, sparsely to loosely hairy or only ciliate; rachis sparsely to rather densely hairy; leaflets in (3–)5–8 pairs, elliptic to obovate, $3-7 \times 2-5$ mm, abaxially sparsely to loosely hairy, adaxially glabrous or with scattered hairs, apex rounded to retuse or slightly emarginate. Racemes up to 2 cm, rather densely up to 20-flowered; peduncle 3–4 cm, white hairy like rachis; bracts whitish membranous, 0.8–1(–2) mm, black hairy or white ciliate. Calyx 2.5–3 mm, loosely white and/or black hairy; teeth unequal, 0.3–1 mm. Petals greenish yellow (according to collector), yellowish when dry; standard obovate to widely ovate, $7-8 \times$ ca. 4 mm, apex deeply incised; wings 6–7 mm, limbs slightly emarginate; keel 4.5–5 mm. Legumes sessile, obliquely ellipsoid, ca. 4 mm, ca. 1.5 mm high and ca. 1 mm wide, keeled ventrally, rounded dorsally, with a short curved beak, 1-locular; valves covered on ventral side loosely with short appressed white hairs. Seed 1.

About 2000 m. Gansu, Nei Mongol, Ningxia, Xinjiang [Mongolia].

103. *Astragalus caeruleopetalinus* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 60. 1980.

蓝花黄耆 *lan hua huang qi*

Astragalus caeruleus H. T. Tsai & T. T. Yu (1940), not Pallas (1776).

Plants 20–25 cm tall. Stems several, up to 20 cm, ascending, sparsely to loosely covered with appressed to ascending white and blackish hairs 0.1–0.3 mm, partly subglabrous. Leaves 3–6 cm; stipules ca. 3 mm; petiole 0.5–2 cm, with rachis hairy like stem; leaflets in 4–7 pairs, ovate to elliptic, $5-10 \times 2.5-5$ mm, abaxially loosely covered with appressed hairs 0.3–0.5 mm, adaxially glabrous, apex obtuse. Racemes short, rather loosely 4–9-flowered; peduncle 4–9 cm, very sparsely to loosely white and toward raceme increasingly black hairy; bracts narrowly triangular, 2–3 mm, subglabrous. Calyx 3–4 mm, densely covered with appressed black hairs; teeth 1–1.5 mm. Petals blue, but yellowish with violet-tipped keel when dry; standard widely obovate, $8-13 \times$ ca. 5 mm, without distinct claw; wings 7–12 mm; keel 5.5–9 mm. Legumes (unripe) with a stipe ca. 2 mm, ellipsoid, 5–6 mm, ca. 4 mm high, 1-locular; valves densely covered with short subappressed black hairs.

- Alpine meadows. Sichuan, Xizang, Yunnan.

Astragalus caeruleopetalimus var. *glabricarpus* Y. C. Ho (loc. cit.) differs mainly by its glabrous legumes.

104. *Astragalus crassifolius* Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 421. 1922.

厚叶黄耆 hou ye huang qi

Plants caespitose, up to 13 cm tall, very sparsely covered with subappressed hairs 0.1–0.3 mm. Stems several, up to 6 cm, glabrous. Leaves 3–5 cm; stipules ovate to suborbicular, 3–7 mm, glabrous; petiole 1.5–2.5 cm, like rachis somewhat flattened, glabrous; leaflets thickish, in 5–9 pairs, mostly touching, suborbicular or widely cordate, 3–7 × 3–7 mm, sometimes also reniform and wider than long, glabrous on both surfaces or sparsely white hairy abaxially, base widely rounded to retuse or slightly cordate, apex widely obtuse to slightly acute. Racemes rather densely 7–12-flowered; peduncle 3–8 cm, very sparsely to loosely covered with white and toward raceme black hairs; bracts elliptic, 5–7 mm, black hairy. Calyx 6–7 mm, rather densely black hairy; teeth 3–3.5 mm. Standard suborbicular, 9–10.5 × 7–7.5 mm, apex incised; wings 9–10 mm; keel ca. 7 mm. Legumes subsessile, obliquely ovoid, 10–13 mm, 6–7 mm high and 4–6 mm wide, keeled ventrally, narrowly grooved dorsally, very shortly acuminate, nearly fully 2-locular; valves thin, membranous, sparsely covered with ascending white hairs up to 1.5 mm and very short black hairs.

- Alpine meadows; 3000–4900 m. Sichuan, Xizang, Yunnan.

105. *Astragalus dabanshanicus* Y. H. Wu, Acta Bot. Yunnan. 20: 35. 1998.

大板山黄耆 da ban shan huang qi

Plants 40–50 cm tall. Stems erect, 40–50 cm, sparsely white and black hairy or subglabrous. Leaves 5–8 cm; stipules 2–3 mm, glabrous; petiole 1–2 cm, like rachis sparsely white and black hairy; leaflets in 4–6 pairs, narrowly elliptic, 5–18 × 3–6 mm, abaxially sparsely covered with appressed short white hairs, adaxially glabrous, apex obtuse. Racemes short, densely many flowered; peduncle 6–8 cm, shortly black hairy; bracts whitish membranous, subulate, ca. 1.5 mm, black hairy. Calyx ca. 2.5 mm, sparsely shortly black hairy; teeth ca. 1 mm. Petals purple; standard elliptic, 6.5–7 × ca. 4 mm, without distinct claw; wings ca. 5 mm; keel ca. 4 mm. Ovary shortly stipitate, glabrous. Legumes unknown.

- Qinghai.

106. *Astragalus daqingshanicus* Z. G. Jiang & Z. T. Yin, Acta Phytotax. Sin. 29: 272. 1991.

大青山黄耆 da qing shan huang qi

Plants 10–20 cm tall. Stems several, sparsely white hairy. Leaves 2–5.5 cm, subsessile; stipules membranous, ca. 4 mm, connate behind stem, ciliate; leaflets in 6 or 7 pairs, narrowly oblong to very narrowly elliptic, 5–12 × 0.5–1.5 mm, abaxially hairy, adaxially glabrous, apex acuminate. Racemes 1–2.5 cm, 2–10-flowered; peduncle 6–7 cm; bracts membranous, subulate, 3–4 mm, glabrous or sparsely white hairy. Calyx 3.5–4.5 mm, white and black hairy; teeth ca. 1 mm. Petals lilac, keel purple;

standard widely elliptic, 7–7.5 × 5–5.5 mm, rounded at apex; wings ca. 7 mm, limbs deeply incised; keel ca. 5.5 mm. Legumes sessile, ovoid, ca. 11 mm, ca. 4 mm high, obtusely keeled ventrally, grooved dorsally, 2-locular; valves subleathery, glabrous. Seeds 5 or 6.

- Nei Mongol.

107. *Astragalus dutreuilii* (Franchet) Grubov & N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 27: 93. 1990.

中昆仑黄耆 zhong kun lun huang qi

Oxytropis dutreuilii Franchet, Bull. Mus. Hist. Nat. (Paris) 3: 322. 1897.

Plants 6–12 cm tall, densely caespitose, covered with appressed to subappressed hairs, with very short non-flowering stems. Flowering stems erect, 5–10 cm, slender, loosely covered with white hairs 0.3–0.4 mm, with some black hairs mixed in. Leaves 0.8–2 cm, subsessile; stipules 3–4 mm, adnate to petiole for 0.5–1 mm, high vaginate-connate behind stem, sparsely white hairy; rachis loosely appressed hairy; leaflets in 3–6 pairs, elliptic, 1.5–3.5 × 0.8–1.5 mm, abaxially all over and adaxially toward margins loosely hairy, apex obtuse to slightly retuse. Racemes short, densely 6–8-flowered; peduncle 1–4 cm, loosely white hairy, toward raceme increasingly blackish hairy; bracts membranous, 1–1.5 mm, sparsely black hairy. Calyx ca. 4 mm, loosely covered with grayish black or black hairs 0.05–0.2 mm; teeth unequal, 1–2 mm. Standard obovate to widely ovate, ca. 9 × 5 mm, deeply incised; wings ca. 8 mm, limbs obtuse at apex; keel ca. 7 mm. Ovary with a stipe ca. 1 mm, glabrous. Legumes unknown.

- Xinjiang (C Kunlun Shan).

108. *Astragalus gongshanensis* Podlech & L. R. Xu, Novon 17: 241. 2007.

贡山黄耆 gong shan huang qi

Plants ca. 30 cm tall. Stems ascending to erect, branched with short non-flowering lateral branches, sparsely to loosely covered with appressed to spreading black hairs 0.3–0.7 mm, with some white hairs mixed in. Leaves 5–8 cm; stipules greenish, 2–4 mm, linear-acute, free, sparsely hairy to subglabrous, ciliate; petiole 1–2 cm, with rachis hairy like stem; leaflets in 5–8 pairs, narrowly elliptic, 8–20 × 3–8 mm, abaxially loosely covered with subappressed white hairs 0.4–0.8 mm, adaxially glabrous, apex obtuse to retuse. Racemes loosely 12–20-flowered; peduncle 7–9 cm, loosely hairy like stem; bracts membranous, very narrowly triangular, 2–3 mm, white and black hairy. Calyx 5–6 mm, loosely, toward teeth more densely, covered with subappressed to spreading, tangled, flexuous, black and white hairs 0.1–0.5 mm; teeth unequal, upper ca. 1 mm, lower ones 0.3–0.5 mm. Petals probably yellow; standard oblong, ca. 10 × 4 mm; wings ca. 9 mm; keel ca. 8.5 mm. Ovary with a stipe ca. 1.5 mm, glabrous. Legumes unknown.

- Yunnan (Gongshan).

109. *Astragalus laceratus* Lipsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 26: 144. 1907.

裂翼黄耆 lie yi huang qi

Plants 10–40 cm tall, with subappressed hairs 0.2–0.3 mm. Stems sterile or flowering, ascending to erect, 5–30 cm, sparsely to loosely white hairy. Leaves 3–10 cm; stipules 7–12 mm, often amplexicaul but free from each other, sparsely white ciliate; petiole 0.5–1 cm, rachis sparsely to loosely hairy like stem; leaflets in 5 or 6 pairs, narrowly elliptic, 6–17(–25) × 2.5–4(–6) mm, abaxially sparsely hairy, adaxially glabrous, apex acute to subobtusate. Racemes 10–18-flowered; peduncle 5–16 cm, sparsely white hairy in lower part, densely black hairy in upper part; bracts whitish green membranous, 5–10(–14) mm, sparsely black hairy. Calyx 8–9 mm, loosely black hairy; teeth 2–3.5 mm. Petals violet; standard ovate, 13–16 × 6.5–7 mm, deeply cleft up to 1/4; wings 10–13 mm, limbs deeply bifurcate (up to 1/3 of length); keel 7–9 mm. Legumes sessile, widely inflated ovoid, 6–11 mm, slightly keeled ventrally, rounded dorsally, 1-locular; valves glabrous.

Xinjiang [Kyrgyzstan].

110. *Astragalus latiunguiculatus* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 60. 1980.

宽爪黄耆 kuan zhua huang qi

Plants 8–25 cm tall, caespitose. Stems several to many, in lower parts sparsely and in upper part to densely covered with appressed to subappressed black hairs 0.1–0.3 mm. Leaves 3–7 cm; stipules 3–5 mm, sparsely predominantly white hairy and ciliate to subglabrous; petiole 1–2 cm, with rachis sparsely to loosely hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, 5–12 × 2–4.5 mm, abaxially loosely covered with short white hairs, adaxially glabrous, apex subacute to rounded. Racemes 1.5–2.5 cm, 6–10-flowered; peduncle 5–9 cm, densely hairy like stem; bracts whitish membranous, linear, 3–4 mm, white and blackish hairy. Calyx 5–6 mm, rather densely covered with appressed blackish hairs 0.05–0.2 mm; teeth 1.5–2 mm. Petals yellowish green, keel violet; standard obovate, 10–11 × ca. 7 mm, without distinct claw; wings 9–10 mm; keel 7–8 mm. Ovary subsessile, shortly white hairy. Legumes unknown.

• Alpine slopes; 3600–4400 m. Sichuan.

111. *Astragalus lhorongensis* P. C. Li & C. C. Ni, Acta Phytotax. Sin. 18: 368. 1980.

洛隆黄耆 luo long huang qi

Plants 30–40 cm tall, covered with appressed to subappressed hairs 0.2–0.3 mm. Stems erect, branched, at base sparsely, otherwise loosely to rather densely white and black hairy. Leaves 4–10 cm; stipules 2–5 mm, free, sparsely white and black hairy; petiole 0.5–2 cm, with rachis sparsely to loosely hairy like stem; leaflets in 5–7 pairs, linear, 8–15(–25) × 1–3 mm, abaxially loosely appressed white hairy, adaxially glabrous, apex subacute. Racemes 4–6 cm, loosely many flowered, at fruiting time elongated up to 10 cm or more; peduncle 9–12 cm, sparsely to loosely hairy like stem; bracts whitish membranous, 1.5–2 mm, black hairy. Calyx 3–3.5 mm, rather densely covered with predominantly black hairs; teeth 0.5–1 mm. Petals whitish with bluish-tipped keel; standard widely rhombic-elliptic, ca. 7 × 5 mm, without distinct claw, rounded at apex; wings ca. 7 mm, limbs rounded at apex; keel ca. 5 mm. Legumes spreading to pendulous, with a stipe ca. 2 mm, oblong, 6–10

mm, ca. 3 mm high and ca. 2 mm wide, keeled ventrally, narrowly grooved dorsally, very shortly acuminate, 1-locular; valves glabrous. Seeds 2.

• 3300–3600 m. Xizang.

112. *Astragalus macropterus* Candolle, Prodr. 2: 283. 1825.

大翼黄耆 da yi huang qi

Astragalus karaculensis Ovczinnikov & Rassulova; *A. longipes* Karelin & Kirilov (1841), not Steudel (1840); *A. multicaulis* Ledebour; *A. pseudomacropterus* Karmysheva; *A. vicioides* Ledebour; *A. vicioides* var. *longipes* Trautvetter.

Plants 20–90 cm tall, covered with appressed to subappressed hairs 0.1–0.35 mm. Stems several, simple or branched, sparsely to loosely covered with white hairs, toward nodes or elsewhere with scattered black hairs, sometimes glabrescent. Leaves 4–7 cm, subsessile; stipules 3–5 mm, free, soon falling; rachis sparsely to loosely hairy; leaflets in 4–9 pairs, narrowly oblong to oblong, 3–15(–20) × 1–7 mm, abaxially sparsely to loosely hairy, adaxially glabrous, apex acute to obtuse. Racemes 3–12 cm, loosely many flowered; peduncle 5–15 cm, glabrous or sparsely to loosely hairy; bracts whitish, 1–1.5 mm, hairy, soon falling. Calyx 2.5–3 mm, loosely covered with white and predominantly black hairs; teeth 0.5–1 mm. Petals purple or yellowish with purple keel; standard elliptic, 9–11 × 4–5.5 mm, mostly without distinct claw, apex rounded to retuse or more rarely emarginate; wings nearly as long as standard, limbs obtuse to more rarely slightly incised; keel 5–6 mm. Legumes sessile, obliquely ovoid, 7–9 mm, ca. 3 mm high, keeled ventrally, widely flattened to slightly impressed dorsally, incompletely 2-locular to nearly 2-locular; valves brown, glabrous.

Steppes, stony slopes, in scrub formations; 1600–3800 m. Gansu, Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia), Tajikistan].

113. *Astragalus nangxianensis* P. C. Li & C. C. Ni, Acta Phytotax. Sin. 18: 368. 1980.

朗县黄耆 lang xian huang qi

Plants ca. 30 cm tall. Stems branched in upper part, striate, sparsely hairy, glabrescent with age. Leaves 5–7 cm; stipules ca. 4 mm, narrowly triangular, free from petiole, ciliate; petiole and rachis sparsely hairy; leaflets in 13 or 14 pairs, narrowly ovate, 13–15 × 2–3 mm, abaxially sparsely appressed hairy to subglabrous, adaxially glabrous, apex obtuse. Racemes many flowered; peduncle longer than leaves, sparsely hairy. Calyx campanulate, ca. 4 mm, covered with white and black hairs; teeth ca. 1 mm. Petals lilac; standard ca. 8 mm, limb orbicular; wings ca. 7 mm; keel ca. 6 mm. Ovary stipitate, sparsely hairy. Legumes ovoid, ca. 5 mm, ca. 2 mm high, sparsely hairy, incompletely 2-locular.

• Xizang (Nangxian).

114. *Astragalus nigrodentatus* N. Ulziykhutag ex Podlech & L. R. Xu, Novon 14: 223. 2004.

黑齿黄耆 hei chi huang qi

Plants 8–10 cm tall; hairs in vegetative parts flattened,

long acuminate, white, widest near base, elsewhere slender and black. Stems ascending, at base stolonlike, glabrous, with few, remote leafless stipules, in upper part loosely to rather densely covered with stiff, ascending to spreading, white hairs 0.6–0.8 mm, toward nodes mostly black hairy. Leaves 3–5 cm; stipules 6–7 mm, those without developed leaves connate to middle, other ones free from each other, lower ones glabrous, upper ones loosely white and black hairy; petiole 0.8–1.5 cm, with rachis loosely white hairy like stem; leaflets in 6–8 pairs, narrowly elliptic, 5–14 × 2.5–5 mm, abaxially loosely covered with appressed hairs 0.2–0.5 mm, adaxially glabrous but with densely white hairy margins, apex obtuse. Racemes short, densely many flowered; peduncle 1.5–3.5 cm, loosely to densely covered with subappressed black hairs 0.3–1 mm; bracts 4–6 mm, predominantly black hairy. Calyx ca. 5 mm, densely covered with ascending to partly nearly spreading black hairs; teeth ca. 2 mm. Petals probably violet in life, pale yellowish brown when dry; standard oblong, ca. 9 × 4 mm, without distinct claw, apex widely and deeply incised; wings ca. 7.5 mm, limbs obtriangular, widest at widely and deeply incised tip; keel ca. 6.5 mm. Ovary subsessile, ellipsoid, glabrous. Legumes unknown.

- E Xizang.

115. *Astragalus ohbanus* Podlech, Feddes Repert. 116: 56. 2005 [*“ohbaensis”*].

奥巴黄耆 ao ba huang qi

Plants 20–25 cm tall, caespitose. Stems several, below middle only with few leaves, glabrous. Leaves 3–4 cm, subsessile; stipules greenish membranous, 6–9 mm, adnate to petiole for 1–2 mm, otherwise free, glabrous; rachis glabrous or very sparsely covered with white and black ± appressed hairs 0.1–0.2 mm; leaflets in 5–7 pairs, narrowly elliptic to elliptic, 5–12 × 2–4 mm, abaxially sparsely covered with appressed white hairs up to 0.3 mm, sometimes only at margins and midvein, adaxially glabrous, apex obtuse to subacute. Racemes 1.5–2 cm, rather densely 6–10-flowered; peduncle 4.5–8 cm, sparsely covered with appressed to slightly ascending white and black hairs up to 0.3 mm; bracts whitish membranous, linear, ca. 5 mm, sparsely white and black hairy, apex acute. Calyx 6–7.5 mm, loosely to rather densely covered with subappressed to partly spreading, flexuous, tangled, predominantly black hairs 0.2–0.3 mm; teeth unequal, 2–3 mm. Petals pale blue, drying pale yellow; standard widely ovate, ca. 12 × 7 mm, deeply bilobed; wings ca. 11 mm, limbs narrowly obovate, shortly but distinctly incised; keel ca. 8 mm. Ovary subsessile, narrowly ellipsoid, very sparsely white hairy. Legumes unknown.

- Xinjiang (Kunlun Shan).

116. *Astragalus pavlovii* B. Fedtschenko & Basilevskaja, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 38: 90. 1929.

了墩黄耆 liao dun huang qi

Astragalus lioui H. T. Tsai & T. T. Yu.

Plants 10–20 cm tall; hairs appressed to subappressed, distinctly flattened, often curved, white, 0.1–0.3 mm. Stems several, 6–18 cm, rather densely hairy. Leaves 2–4 cm; stipules ca.

2 mm, free or more rarely very shortly connate behind stem, loosely to rather densely hairy; petiole 1–1.5 cm, like rachis loosely to mostly densely hairy; leaflets in (2 or)3(or 4) pairs, elliptic to obovate, 7–13 × 3–8 mm, abaxially loosely to densely hairy, adaxially glabrous or sparsely hairy, apex rounded to widely retuse or emarginate. Racemes loosely to rather densely 10–20-flowered; peduncle 1.5–4 cm, rather densely hairy; bracts 0.5–1 mm, loosely hairy. Calyx 2.5–3 mm, loosely to rather densely hairy; teeth 0.3–0.8 mm. Petals pale purplish (when dry); standard elliptic, ca. 8 × 3.5 mm, without distinct claw, apex emarginate; wings ca. 7 mm, limbs incised; keel ca. 5.5 mm. Legumes sessile, obliquely erect, narrowly oblong, 8–10 mm, ca. 3 mm high and 2–2.5 mm wide, keeled ventrally, widely grooved dorsally, very shortly acuminate, 2-locular; valves very finely reticulate veined, glabrous. Seeds mostly 2 in each locule.

Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia].

117. *Astragalus peterae* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 27. 1936.

川青黄耆 chuan qing huang qi

Astragalus abramovii Gontscharov; *A. brachytrypis* (Candolle) C. A. Meyer f. *giganteus* Lipsky; *A. pseudobrachytrypis* Gontscharov.

Plants 25–35 cm tall. Stems several, up to 30 cm, glabrous or very sparsely furnished with subappressed predominantly black hairs 0.2–0.3 mm. Leaves 5–9 cm; stipules 4–9 mm, glabrous or with few hairs; petiole 0.3–1 cm, like rachis sparsely to loosely covered with subappressed to ascending short black and white hairs; leaflets in 7–9 pairs, elliptic, 5–10 × 2.5–5 mm, apex obtuse to retuse, blades of upper leaves mostly narrower, up to 15 × 3.5 mm, apex acute or minutely mucronulate, all abaxially loosely covered with appressed white hairs, adaxially glabrous. Racemes 3–4.5 cm, rather densely many flowered; peduncle 6–11 cm, loosely or below raceme rather densely covered with subappressed black hairs; bracts whitish membranous, linear-acute, 5–10 mm, black hairy. Calyx 6–7 mm, densely subappressed black hairy; teeth 1–3 mm. Petals blue or purple; standard widely elliptic, 12–14 × 7–8 mm, apex deeply incised; wings 9–10 mm; keel 7–8 mm. Legumes subsessile, pendulous, narrowly oblong, 4–10 mm, 3.5–4 mm high and ca. 3.5 mm wide, with a beak 1–1.5 mm, incompletely 2-locular to nearly fully 2-locular; valves densely covered with ascending to spreading black hairs 0.3–0.5 mm, with scattered white hairs mixed in.

2800–3800 m. Gansu, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang [Kyrgyzstan, Mongolia, Tajikistan].

118. *Astragalus puberulus* Ledebour, Fl. Altaic. 3: 299. 1831.

茸毛黄耆 rong mao huang qi

Plants 20–45 cm tall, with appressed to subappressed hairs 0.1–0.3 mm. Stems several, erect, 15–40 cm, angular, loosely to rather densely white hairy, sometimes glabrescent with age. Leaves 2–6 cm, subsessile; stipules 1.5–3 mm, narrowly triangular, free, sparsely appressed white hairy; rachis hairy like stem; leaflets in 6–9 pairs, linear to narrowly oblong, 3–15 ×

0.5–3 mm, abaxially loosely to densely white hairy, adaxially glabrous or with scattered hairs only, apex obtuse to retuse. Racemes 3–15 cm, loosely 15–30-flowered; peduncle 3–10 cm, loosely to densely hairy like stem; bracts ca. 1 mm, white and black hairy. Calyx 2–3 mm, rather densely covered with appressed white and black hairs; teeth 0.3–0.5 mm. Petals pale lilac, sometimes pale yellow when dry; standard widely obovate, 5–7 mm, with short claw, apex retuse; wings 4–6 mm; keel 3.5–5 mm. Legumes sessile, erect, obliquely ovate as seen from side, with straight ventral side, 6–7 mm, 2.5–4 mm high, keeled ventrally, grooved dorsally, subobtusate at apex, 2-locular; valves finely cross-nerved, glabrous.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

119. *Astragalus sedaensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 64. 1980.

色达黄耆 se da huang qi

Plants 10–15 cm tall. Stems several, with short white and black hairs. Leaves 5–7 cm; stipules 2–3 mm, hairy; petiole ca. 1 cm; leaflets in 9–11 pairs, narrowly elliptic to elliptic, 5–10 × 2–4 mm, obtuse to slightly retuse, abaxially white hairy, adaxially glabrous. Racemes 2–3 cm, dense; peduncle 4–6 cm; bracts membranous, narrowly triangular, ca. 2 mm, covered with white or reddish brown hairs. Calyx ca. 5 mm, with short, ascending, reddish brown hairs; teeth ca. 1.5 mm. Petals yellow; standard obovate, ca. 12 × 6 mm; wings 9–10 mm; keel ca. 7 mm. Ovary subsessile, ovoid, hairy. Legumes unknown.

• About 4300 m. Sichuan.

120. *Astragalus taipaihanensis* Y. C. Ho & S. B. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 63. 1980.

太白山黄耆 tai bai shan huang qi

Plants 20–40 cm tall, loosely hairy. Stems ascending to erect, with appressed to subappressed white hairs 0.3–0.8(–1) mm. Leaves 3–9 cm; stipules 5–10 mm, sparsely hairy to subglabrous, ciliate; petiole 0.5–1.5 cm, with rachis hairy like stem;

leaflets in 5–9 pairs, oblong to narrowly ovate, 5–20 × 2–8 mm, abaxially especially at midrib loosely covered with subappressed white hairs 0.2–0.5 mm, adaxially glabrous or more rarely with scattered hairs only, apex obtuse to retuse. Racemes loosely 7–12-flowered; peduncle 5–7 cm, hairy like stem; bracts membranous, narrowly triangular, 2–5 mm, white and black hairy. Calyx 5–6 mm, loosely, toward teeth more densely, covered with subappressed, predominantly black hairs 0.5–0.8 mm; teeth narrowly triangular, all close together at dorsal side, 0.5–2 mm. Petals violet; standard obovate, 12–14 × ca. 6 mm; wings 10–13 mm; keel 9–11 mm. Legumes subsessile, ovoid to ellipsoid, 10–12 mm, 5–6 mm high and wide, keeled ventrally, grooved dorsally, acuminate, 2-locular; valves glabrous.

• 2400–2900 m. Gansu, Shaanxi.

121. *Astragalus tsangpoensis* Podlech & L. R. Xu, Sendtnera 7: 191. 2001.

藏布黄耆 zang bu huang qi

Plants at least 30 cm tall (basal parts missing), covered with subappressed to ascending hairs 0.3–0.7 mm. Stem branched, glabrous in basal parts, otherwise sparsely to loosely white and black hairy. Leaves 3–7 cm; stipules 3–5 mm, free, sparsely white and black hairy; petiole 0.5–1.5 cm, like rachis loosely to rather densely mostly white hairy; leaflets in 8–11 pairs, elliptic, 4–9 × 1–2.5 mm, abaxially loosely to rather densely subappressed white hairy, adaxially glabrous, apex acute. Racemes 1.5–2.5 cm, loosely 6–10-flowered; peduncle 5–6 cm, hairy like stem; bracts 1.5–2 mm, sparsely white and black hairy. Bracteoles rarely present. Calyx ca. 3 mm, loosely to rather densely covered with white or white and black hairs; teeth ca. 1 mm. Petals (in dry state) whitish yellow or very slightly pale bluish suffused; standard orbicular, ca. 7 × 6 mm, apex widely emarginate; wings ca. 6.5 mm, limbs rounded at apex; keel ca. 5 mm. Ovary sessile, ellipsoid, white hairy. Legumes unknown.

• About 3600 m. Xizang (Lhasa region).

20. *Astragalus* sect. *Melilotopsis* Gontscharow in Komarov, Fl. URSS 12: 878. 1946.

假草木樨组 jia cao mu xi zu

Plants perennial, with long, commonly branched stems. Leaves imparipinnate; stipules free. Racemes borne on long slender peduncles, from beginning of anthesis loosely many flowered. Flowers small. Calyx campanulate. Wing limbs slightly to distinctly bilobed. Legumes subsessile, small, globose to subglobose, 2-locular; valves smooth or rarely cross-wrinkled.

Eight species: China, Japan, Mongolia, Russia (Siberia); eight species (six endemic) in China.

- 1a. Racemes 28–32 cm, loosely 25–50-flowered; bracts 3–4 mm; calyx 4–5 mm; standard ca. 10 mm 125. *A. guinanicus*
 1b. Racemes mostly much shorter, sometimes up to 15 cm; bracts, calyx, and standard distinctly shorter.
 2a. Stems ± densely covered with appressed to spreading hairs; wing limbs deeply bilobed.
 3a. Rachis appressed hairy; leaflets ca. 4 × as long as wide, 5–12 × 1.5–3 mm; petals orange; legumes glabrous 124. *A. dependens*
 3b. Rachis partly with spreading hairs; leaflets ca. 2 × as long as wide, 2–4 × 1–2 mm; petals yellow; legumes very shortly white hairy 126. *A. huiningensis*
 2b. Stems glabrous or with scattered hairs only; wing limbs slightly emarginate to bilobed; legumes always glabrous.
 4a. Leaflets in 1(or 2) pairs, sometimes only terminal leaflet present, more than 10 × as long as wide 129. *A. tenuis*
 4b. Leaflets in at least 2 pairs, at most 5 × as long as wide.
 5a. Rachis sparsely to loosely covered with appressed to partly spreading hairs up to 0.5 mm; leaflets up to 10 mm; bracts 2–3 mm; calyx teeth equally distributed 122. *A. aurantiacus*

- 5b. Rachis glabrous or sparsely covered with appressed hairs up to 0.2 mm; most leaflets longer, up to 20 mm; bracts 0.5–2 mm; calyx teeth all crowded at lower side.
- 6a. Stipules 1–1.5 mm, narrowly triangular, white hairy; calyx 1.5–2 mm, loosely hairy; leaflets in 2 or 3 pairs, sublabellately crowded, narrowly obovate, 5–20(–30) × 1–4(–6) mm 127. *A. melilotoides*
- 6b. Stipules 2–3 mm, from widely triangular base somewhat abruptly subulate-acuminate, glabrous; calyx 2.5–3 mm, tube subglabrous or sparsely hairy; leaflets equally distributed.
- 7a. Leaflets in 3–7 pairs, narrowly elliptic, 7–15 × 1.5–2.5 mm; calyx teeth 0.5–1 mm, white hairy on outer and inner sides; standard ca. 5 mm, wings ca. 4.5 mm; legumes 3–3.5 mm 128. *A. satoi*
- 7b. Leaflets in (1 or)2 or 3 pairs, elliptic, 5–20 × 2.5–8 mm; calyx teeth 0.1–0.5 mm, black hairy on outer and inner sides; standard and wings ca. 6 mm; legumes 5–6 mm 123. *A. capillipes*

122. *Astragalus aurantiacus* Handel-Mazzetti, Symb. Sin. 7: 557. 1933.

橙黄花黄耆 cheng huang hua huang qi

Astragalus dependens Bunge var. *aurantiacus* (Handel-Mazzetti) Y. C. Ho; *A. dependens* var. *flavescens* Y. C. Ho; *A. dependens* var. *sericeus* K. T. Fu.

Plants up to 65 cm tall, with subappressed to nearly spreading hairs 0.1–0.5 mm. Stems erect, glabrous or with scattered hairs. Leaves 1.5–4 cm, subsessile; stipules whitish membranous, 3–4 mm, subglabrous, free from each other; rachis slender, sparsely to loosely covered with subappressed to spreading white and a few black hairs; leaflets in 3–7 pairs, narrowly elliptic, 5–10 × 1.5–3 mm, abaxially rather densely and adaxially sparsely hairy, apex rounded to retuse or slightly emarginate. Racemes at anthesis densely many flowered, later strongly elongated up to 15 cm; peduncle 6–26 cm, sparsely to loosely covered with ascending white or black hairs; bracts 2–3 mm, long subulate-acuminate, mostly black hairy. Calyx 2–2.5 mm, loosely covered with appressed black and a few white hairs 0.1–0.15 mm; teeth 0.3–0.5 mm. Petals orange; standard obovate, 5–6 × 3–4 mm, apex widely emarginate; wings 5–5.5 mm, limbs slightly obliquely incised; keel 4.5–5 mm. Legumes sessile, widely ellipsoid, ca. 4 mm, ca. 3 mm high and ca. 2 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, with a persistent style ca. 2 mm, 2-locular, glabrous. Seed 1 in each locule.

- Gansu, Nei Mongol, Qinghai, Sichuan, Xinjiang.

123. *Astragalus capillipes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 20. 1868.

草珠黄耆 cao zhu huang qi

Plants 40–50 cm tall, sparsely furnished with appressed white and black hairs 0.1–0.2 mm. Stems erect, 35–40 cm, strongly branched, glabrous. Leaves 2–5 cm; stipules membranous, from widely triangular base somewhat abruptly subulate-acuminate, 2–3 mm, nearly free from each other, glabrous; petiole 0.5–1 cm, like rachis slender, glabrous; leaflets in (1 or)2 or 3 pairs, narrowly elliptic, 5–20 × 2.5–8 mm, abaxially glabrous or to loosely covered with ± appressed white hairs, adaxially glabrous, apex rounded to retuse. Racemes 3–14(–20) cm, loosely many flowered; peduncle 2–9 cm, subglabrous or sparsely to loosely covered with very short, subappressed to ascending, mainly black hairs; bracts 0.5–2 mm, glabrous or with

a few black hairs. Calyx 2.5–3 mm, tube subglabrous or sparsely black hairy; teeth all close together at lower side, 0.1–0.5 mm, densely black hairy on outer and inner sides. Petals white, cream, orange, or red; standard suborbicular, ca. 6 × 4 mm, apex emarginate; wings ca. 6 mm; keel ca. 5 mm. Legumes with a stipe 0.5–1.5 mm, obovoid, 5–6 mm, 4–5 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, with a slender, persistent style, 2-locular; valves thin, cross-wrinkled, glabrous.

- 300–2000 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi.

124. *Astragalus dependens* Bunge, Bull. Acad. Imp. Sci. Saint-Pétersbourg 26: 471. 1880.

悬垂黄耆 xuan chui huang qi

Plants 30–35 cm tall, caespitose, with white hairs 0.1–0.3 mm, partly with some black hairs mixed in. Stems several to numerous, branched at base, rather densely covered with subappressed to spreading hairs. Leaves 3–7 cm, subsessile; stipules 2–3 mm, free, sparsely hairy; rachis slender, loosely to rather densely subappressed hairy; leaflets in 6 or 7 pairs, narrowly elliptic, 5–12 × 1.5–3 mm, abaxially loosely to rather densely subappressed hairy, adaxially glabrous, apex obtuse to slightly emarginate. Racemes 2–3 cm, densely many flowered, soon strongly elongating; peduncle 4–10 cm, loosely to rather densely covered with appressed white hairs 0.05–1.5 mm, toward raceme sometimes also with black hairs; bracts whitish membranous, 1–1.5 mm, sparsely black ciliate. Flowers subsessile. Calyx 2–2.5 mm, loosely covered with appressed black and a few white hairs 0.1–0.15 mm; teeth 0.3–0.5 mm. Petals orange; standard 5–6 mm, limb obovate, 3–3.5 mm wide, apex slightly emarginate; wings 4.5–5.5 mm, limbs oblong, very deeply incised, often more than 1/2 of length, bifurcate, lower segment filiform to linear, upper distinctly wider; keel 4–4.5 mm. Legumes sessile, widely ellipsoid, ca. 4 mm, ca. 3 mm high and ca. 2 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, with a persistent style ca. 2 mm, 2-locular; valves finely transverse-rugulose, glabrous. Seed 1 in each locule.

- 2100–2900 m. Gansu, Qinghai.

125. *Astragalus guinanicus* Y. H. Wu, Bull. Bot. Res., Harbin 17: 33. 1997.

贵南黄耆 gui nan huang qi

Plants 50–70 cm tall. Stems sparsely covered with short

black hairs. Leaves 7–10 cm, subsessile; stipules 3–4 mm, narrowly triangular, black hairy; leaflets in 8 pairs, linear, 20–30 × 1–2.5 mm, abaxially with appressed white hairs, adaxially glabrous, apex acuminate. Racemes 28–32 cm, loosely 25–50-flowered; peduncle ca. 20 cm, covered with short black hairs; bracts white membranous, 3–4 mm, black hairy. Calyx 4–5 mm, rather densely black hairy; teeth 2–2.5 mm. Petals purple; standard obovate, ca. 10 × 5.5 mm, apex obtuse to emarginate; wings 7–8 mm, limbs obtuse at apex; keel ca. 5 mm. Ovary hairy or glabrous. Legumes globose, ca. 4 mm in diam.

- About 3200 m. Qinghai (Guinan).

No material of this species could be investigated.

126. *Astragalus huiningensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 69. 1980.

会宁黄耆 *hui ning huang qi*

Astragalus huiningensis var. *psilocarpus* K. T. Fu.

Plants up to 30 cm tall; hairs subappressed to nearly spreading, tangled, white, in inflorescence also a few black, 0.1–0.3 mm. Stems many, 10–15 cm, branched, densely to rather densely hairy. Leaves 1.5–3 cm, subsessile; stipules 1–2 mm, subglabrous or sparsely to loosely hairy; rachis hairy like stem; leaflets in 5–8 pairs, narrowly elliptic to elliptic, 2–4 × 1–2 mm, abaxially loosely to rather densely hairy, adaxially glabrous or nearly so, apex rounded to emarginate. Racemes 1.5–3.5 cm, loosely 10–15-flowered; peduncle 5–15 cm, densely white hairy, partly glabrescent; bracts whitish membranous, scarcely ca. 1 mm, white and black hairy. Calyx 2–2.5 mm, loosely covered with mostly white hairs; teeth widely triangular, 0.2–0.4 mm. Petals yellow; standard obovate, ca. 5 × 3 mm, apex emarginate; wings ca. 5 mm, limbs deeply obliquely incised to bilobed; keel ca. 5 mm. Legumes sessile, ovoid, 4–5 mm, ca. 3 mm high and ca. 2.5 mm wide, slightly keeled ventrally, deeply and narrowly grooved dorsally, very shortly acuminate, 2-locular; valves with dark, cross-wrinkled and partly netlike elevated nerves, sparsely covered with very short appressed white hairs or glabrescent.

- Gansu, Ningxia, Qinghai, Shaanxi, Sichuan.

127. *Astragalus melilotoides* Pallas, Reise Russ. Reich. 3: 748. 1776.

草木樨状黄耆 *cao mu xi zhuang huang qi*

Plants 45–90 cm tall, furnished with appressed nearly only white hairs 0.05–0.2 mm. Stems 35–80 cm, strongly branched, glabrous or with a few scattered hairs. Leaves 1–4 cm, subsessile; stipules narrowly triangular, 1–1.5 mm, white hairy; rachis slender, sparsely to very sparsely hairy or glabrous; leaflets in (1 or) 2 or 3 pairs, upper 3 subflabellately crowded, linear to narrowly oblong or narrowly cuneate-obovate and then widest near apex, 5–20(–30) × 1–4(–6) mm, abaxially loosely to rather densely hairy, adaxially sparsely hairy or sometimes nearly glabrous, apex rounded to retuse. Racemes 4–8 cm, loosely many flowered, elongating in fruit up to 16 cm; peduncle 4–11 cm, sparsely to loosely hairy; bracts ca. 1 mm, glabrous. Calyx 1.5–2 mm, loosely hairy; teeth all close together at lower side, 0.3–0.5 mm. Petals white, cream, yellow, purple, or violet with dark

spots; standard suborbicular, 5–5.5 × ca. 5 mm, apex emarginate; wings 5–5.5 mm, limbs obliquely incised; keel ca. 4.5 mm. Legumes sessile, ellipsoid, ca. 4 mm, ca. 2.5 mm high and ca. 2 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, 2-locular; valves glabrous. Seed 1 in each locule.

Steppes, stony or sandy slopes; 200–2600 m. Gansu, Hebei, Heilongjiang, Hunan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Mongolia, Russia (Siberia)].

128. *Astragalus satoi* Kitagawa, Bot. Mag. (Tokyo) 48: 99. 1934.

小米黄耆 *xiao mi huang qi*

Plants 40–80 cm tall, glabrous with exception of pedicels and calyx. Stems erect, up to 70 cm, strongly branched. Leaves 3–9 cm; stipules membranous, 2–3 mm; petiole 0.3–0.7 cm, like rachis slender; leaflets in 3–7 pairs, narrowly elliptic, 7–15 × 1.5–2.5 mm, apex obtuse. Racemes 4–8 cm, loosely many flowered; peduncle 4–8 cm; bracts 0.5–2 mm. Calyx 2.5–3 mm, tube subglabrous or sparsely white hairy; teeth all close together at lower side, 0.5–1 mm, sparsely white hairy on outer and inner sides. Petals white; standard suborbicular, ca. 5 × 4 mm, apex emarginate; wings ca. 4.5 mm, limbs slightly obliquely emarginate; keel ca. 4 mm. Legumes subsessile, widely obovoid to subglobose, ca. 3.5 mm, rounded at apex, with a slender, persistent style, 2-locular; valves thin, cross-wrinkled, glabrous.

- 300–2000 m. Gansu, Nei Mongol, Shaanxi.

129. *Astragalus tenuis* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 15: 768. 1842.

细叶黄耆 *xi ye huang qi*

Astragalus melilotoides Pallas var. *tenuis* (Turczaninow) Ledebour.

Plants 20–45 cm tall, vegetative parts glabrous or very sparsely furnished with appressed nearly only white hairs 0.05–0.2 mm. Stems erect, 20–25 cm, branched, glabrous or with a few scattered hairs. Leaves 2–8 cm, subsessile or with a petiole up to 0.8 mm; stipules whitish or greenish membranous, 1–3 mm, narrowly triangular or with subulate tip; rachis slender, glabrous or very sparsely hairy; leaflets in 1(or 2) pairs, sometimes only 1 terminal leaflet present, linear, 10–30 × 0.5–1.5 mm, abaxially sparsely to rather densely covered with ± appressed to subappressed hairs, adaxially glabrous or sparsely hairy, apex rounded to retuse. Racemes 4–8 cm, loosely many flowered, elongating in fruit; peduncle 4–11 cm, glabrous; bracts 0.5–1 mm, glabrous or with a few hairs. Calyx 1.5–2 mm, loosely covered with appressed white hairs 0.05–0.1 mm; teeth all crowded at lower side, 0.3–0.5 mm. Petals white, cream, yellow, purple, or violet with dark spots; standard orbicular, 4–5.5 × ca. 5 mm, apex emarginate; wings 5–5.5 mm, limbs obliquely emarginate; keel ca. 4.5 mm. Legumes sessile, widely obliquely ellipsoid, 2.5–4 mm, 2–2.5 mm high and ca. 2 mm wide, rounded at apex, 2-locular; valves transversely rugulose, glabrous.

Hebei, Nei Mongol [Mongolia, Russia (Siberia)].

21. *Astragalus* sect. *Brachycarpus* Borissova in Komarov, Fl. URSS 12: 877. 1946.

短果组 duan guo zu

Plants perennial with a slender, mostly branched caudex, acaulescent or nearly acaulescent or with well-developed, mostly slender, prostrate to ascending stems; hairs basifixed. Leaves imparipinnate; stipules shortly adnate to petiole or free, sometimes distinctly vaginate-connate behind stem. Racemes mostly distinctly pedunculate, capitate to shortly cylindrical, densely few to many flowered, sometimes elongated in fruit. Flowers small, subsessile. Calyx campanulate to more rarely shortly tubular-campanulate. Petals violet, purplish, or yellow, glabrous; standard mostly without distinct claw; wings shorter than standard, limbs rounded or emarginate at tip; keel shorter than wings or all petals of nearly same length. Legumes small, globose to ovoid, mostly sessile, 2-locular or 1-locular, with thin walls, often distinctly cross-wrinkled. Seeds 2 or 4 or rarely few.

Thirty-six species: Afghanistan, China, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; 24 species (18 endemic) in China.

1a. Rachis at least with partly spreading hairs.

2a. Some leaflets adaxially glabrous but most of them spreading hairy on both surfaces; wing limbs obtriangular, widest below widely retuse tip, ca. 3.5×2 mm; plants 3–4 cm tall 140. *A. malcolmii*

2b. Leaflets with appressed to ascending hairs, mostly glabrous adaxially; wing limbs oblong to obovate, relatively narrower; plants mostly distinctly taller.

3a. Leaflets on both surfaces silvery hairy with ascending hairs up to 1 mm; standard ca. 8 mm 138. *A. luteiflorus*

3b. Leaflets adaxially glabrous.

4a. Bracts 1–3 mm; calyx 3–4 mm.

5a. Leaflets in 6–9 pairs, $9-27 \times 2-7$ mm, at base of petiolule with crowded, minute, sessile glands; calyx covered with ascending predominantly black hairs; standard 8–10 mm, rounded to slightly emarginate; ovary and legumes hairy 137. *A. longiracemosus*

5b. Leaflets in 4–7 pairs, $4-8 \times 1-3$ mm or $6-20 \times 1-3$ mm, mostly folded, without minute sessile glands; calyx covered with subappressed to appressed white and black hairs; standard 7–8 mm; ovary (and legumes) glabrous or sparsely hairy.

6a. Leaflets ca. $3 \times$ as long as wide, $4-8 \times 1-3$ mm; peduncles covered with spreading white hairs; wing limbs obovate, rounded 143. *A. nanshanicus*

6b. Leaflets ca. $6 \times$ as long as wide, $6-20 \times 1-3$ mm; peduncles covered with appressed and spreading predominantly black hairs; wing limbs narrowly oblong, obliquely emarginate 148. *A. pseudoversicolor*

4b. Bracts 3–6 mm; calyx at least 5 mm.

7a. Plants 15–35 cm tall; leaves 4–7 cm; leaflets ca. $5 \times$ as long as wide, $10-20 \times 2-4$ mm; calyx ca. 4 mm; wing limbs deeply obliquely incised 134. *A. handelii*

7b. Plants 5–12 cm tall; leaves up to 4 cm; leaflets ca. $3 \times$ as long as wide; calyx 5–6 mm; wing limbs truncate to retuse.

8a. Calyx covered with ascending to spreading hairs up to 1 mm; standard limb widely ovate, abruptly contracted at base into short claw; wing limbs obliquely emarginate; legumes densely covered with ascending to spreading white and black hairs up to 1 mm 142. *A. mieheorum*

8b. Calyx covered with appressed to ascending hairs 0.3–0.6 mm; standard limb obovate, somewhat abruptly to gradually passing into claw; wing limbs rounded at apex; ovary glabrous (ripe legumes unknown) 153. *A. valerii*

1b. Rachis with appressed or partly ascending hairs.

9a. Leaflets obovate or triangular-obovate, at most $2 \times$ as long as wide, apex mostly \pm deeply and widely emarginate; legumes 1-locular 141. *A. melanostachys*

9b. Leaflets at apex acute to rounded, if slightly emarginate, then distinctly more than $2 \times$ as long as wide; legumes incompletely to mostly completely 2-locular in all species with known fruits.

10a. Wing limbs distinctly asymmetrically incised near tip; stems well developed, up to 10–20 cm.

11a. Leaflets linear, $6-8 \times$ as long as wide, $8-20 \times 1.5-2.5$ mm, loosely hairy adaxially; calyx 2.5–3 mm, with partly very short (less than 0.05 mm) hairs 149. *A. rytidocarpus*

11b. Leaflets wider, $3-5 \times$ as long as wide, glabrous adaxially; calyx at least 3 mm with hairs 0.5–0.8 mm.

12a. Stem rather densely covered with hairs 0.4–0.6 mm; bracts 4–5 mm; calyx 4–4.5 mm, with appressed to ascending hairs; limb of standard rounded at apex, base somewhat abruptly contracted into short claw 150. *A. sagastaigolensis*

12b. Stem loosely covered with hairs 0.1–0.3 mm; bracts 1–3 mm; calyx 3–4 mm, with appressed to subappressed hairs; limb of standard retuse to slightly emarginate at apex, base without distinct claw 139. *A. mahoschanicus*

- 10b. Wing limbs rounded to slightly retuse at tip.
- 13a. Leaflets abaxially glabrous or only at midvein and margins with scattered hairs; stems glabrous or very sparsely hairy 152. *A. tulinovii*
- 13b. Leaflets abaxially sparsely to rather densely hairy; stems mostly distinctly hairy.
- 14a. Limb of standard elliptic to rhombic-elliptic, apex deeply and widely incised; legumes obtriangular to globose, at tip widely truncate, 3.5–4 mm, ca. 2 mm high and 4–5 mm wide, strongly compressed from dorsal side, often wider than long 151. *A. thomsonii*
- 14b. Limb of standard only slightly retuse to emarginate at apex; legumes as high as wide (in all species with known legumes).
- 15a. Petals whitish to yellowish, at least when dry (in *A. pseudojagnobicus* sometimes slightly pale violet-suffused).
- 16a. At least stipules of lower leaves high connate behind stem 146. *A. pseudojagnobicus*
- 16b. All stipules free or lower ones very shortly connate.
- 17a. Ovary and legumes hairy.
- 18a. Stems up to 20 cm, in upper part white and black hairy; rachis white and black hairy; leaflets elliptic, 15–25 × 6–13 mm; standard ca. 10 × 5–6 mm 147. *A. pseudomahoschanicus*
- 18b. Stems up to 10 cm, like rachis only white hairy; leaflets narrowly elliptic, 3–12 × 1–3 mm; standard 5–7 × up to 3.3 mm 132. *A. densiflorus*
- 17b. Ovary (and legumes) glabrous.
- 19a. All stipules ovate, black ciliate; leaflets in 4 or 5 pairs; calyx 4.5–5 mm with hairs 0.3–0.5 mm 144. *A. pishanxianensis*
- 19b. Upper stipules linear-acute, loosely white and black hairy; leaflets in 5–8 pairs; calyx 5–6 mm with hairs 0.5–1 mm 130. *A. athranthus*
- 15b. Petals violet or blue-violet also in dry state (in *A. densiflorus* sometimes pale violet or yellowish in dry state).
- 20a. Stipules glabrous or only ciliate.
- 21a. Plants 20–50 cm tall; leaves 4–9 cm; leaflets 7–20 × 2.5–6 mm; legumes smooth, covered with appressed to slightly ascending hairs 136. *A. kunlunensis*
- 21b. Plants up to 25 cm tall; leaves 2–4 cm, if up to 7 cm, then stems only 2–5 cm; leaflets 3–15 × 1–4 mm; legumes cross-wrinkled, covered with ± spreading hairs.
- 22a. Stems mostly short, 2–5(–7) cm, loosely to rather densely hairy like leaflets abaxially; bracts 2–4 mm; calyx 3–4 mm, teeth 1.5–2 mm; limb of standard elliptic, ca. 3.2 mm wide 132. *A. densiflorus*
- 22b. Stems 10–25 cm, sparsely to loosely hairy, soon glabrescent; leaflets abaxially sparsely hairy; bracts 1–2.5 mm; calyx 2–3 mm, teeth 1–1.5 mm; limb of standard suborbicular 135. *A. heterodontus*
- 20b. Stipules appressed hairy, at least those of upper leaves.
- 23a. Calyx densely covered with appressed hairs, sitting on minute tubercles, which can be easily examined only when hairs are gone; wing limbs slightly emarginate; legumes covered with appressed to nearly spreading hairs 145. *A. porphyrocalyx*
- 23b. Calyx hairs without minute tubercles, at least partly ascending or spreading; wing limbs rounded or truncate; legumes with only spreading hairs or glabrous (ovary).
- 24a. Plants 4–5 cm tall; at least lower stipules high connate behind stem; calyx ca. 3 mm, with ascending to spreading hairs; wing limbs obtriangular, widest at truncate tip 133. *A. despectus*
- 24b. Plants 6–25 cm tall; all stipules free or lowest very shortly connate; calyx mostly longer, with ascending hairs; wing limbs narrowly oblong, obtuse 131. *A. brachysemia*

130. *Astragalus athranthus* Podlech & L. R. Xu, Novon 17: 228. 2007.

黑药黄耆 *hei yao huang qi*

Plants ca. 15 cm tall. Caudex with ± elongated, slender,

branched stolons. Stems 3–10 cm, loosely to densely covered with appressed hairs 0.3–0.5 mm, basal parts and stolons glabrous. Leaves 3.5–5.5 cm; stipules adnate to petiole for 1–2 mm, those of lower leaves membranous, triangular, 3–4 mm, shortly vaginate-connate behind stem, glabrous or sparsely

hairy, those of upper leaves greenish, narrowly triangular, 5–7 mm, free from each other, loosely white and black hairy; petiole 1–1.5 cm, like rachis loosely covered with appressed to slightly ascending, tangled hairs 0.3–0.5 mm; leaflets in 5–8 pairs, narrowly elliptic, 6–18 × 2–3.5 mm, abaxially loosely to densely appressed hairy, adaxially glabrous, apex obtuse to acute. Racemes ovoid, ca. 3 cm, densely many flowered; peduncle 4–7 cm, rather densely hairy; bracts whitish membranous, 4(–5) mm, black hairy. Calyx 5–6 mm, ± densely covered with slightly ascending black hairs 0.5–1 mm; teeth 2–3 mm. Petals yellowish when dry; standard oblong-obovate, ca. 9 × 4 mm, apex emarginate; wings ca. 7 mm, limbs obovate-spatulate, truncate; keel ca. 6 mm. Ovary sessile, widely ovoid, glabrous. Legumes unknown.

• Qinghai.

131. *Astragalus brachysema* Podlech & L. R. Xu, Novon 17: 229. 2007.

短柄黄耆 *duan bing huang qi*

Plants ca. 25 cm tall. Stems 13–15 cm, rather densely covered with subappressed white hairs 0.1–0.3 mm, soon glabrescent. Leaves 4–7 cm; stipules greenish, narrowly triangular, 3.5–6 mm, very shortly adnate to petiole, otherwise free, sparsely to loosely predominantly black hairy; petiole 0.5–1 cm, like rachis loosely white or white and black hairy; leaflets in 4–6 pairs, narrowly elliptic, 10–20 × 2–5 mm, abaxially loosely covered with appressed white hairs 0.2–0.5 mm, adaxially glabrous, apex subobtuse to obtuse. Racemes cylindric, ca. 5 cm, densely many flowered; peduncle 6–8 cm, hairy like stem, toward raceme increasingly covered with more spreading black hairs; bracts whitish membranous, 2–4 mm, black hairy. Calyx ca. 4 mm, ± densely covered with ascending black hairs ca. 0.5 mm; teeth 1.5–2 mm. Petals violet, in dry state very pale lilac; standard obovate, ca. 6 × 3.5 mm, apex rounded; wings ca. 5 mm; keel ca. 4 mm. Ovary with a stipe ca. 0.5 mm, subglobose, glabrous. Legumes unknown.

• Sichuan.

132. *Astragalus densiflorus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 329. 1842.

密花黄耆 *mi hua huang qi*

Plants 7–20 cm tall. Stems 2–5(–7) cm, loosely to rather densely covered with appressed white hairs 0.4–0.5 mm. Leaves 2–7 cm; stipules 4–5 mm, ciliate, lower ones shortly vaginateconnate behind stem; petiole 0.6–2 cm, like rachis loosely to rather densely appressed white hairy; leaflets in 4–6 pairs, narrowly elliptic, 3–12 × 1–3 mm, abaxially loosely to rather densely appressed hairy, adaxially glabrous. Racemes densely many flowered; peduncle 3–10 cm, rather densely appressed white hairy, below raceme also black hairy; bracts whitish membranous, 2–4 mm, black hairy. Calyx 3–4(–5) mm, ± densely covered with ascending black hairs; teeth 1.5–2 mm. Petals violet; standard elliptic, 5–7 × up to 3.3 mm, apex slightly emarginate; wings 5.8–6 mm; keel 4–4.5 mm. Legume subsessile, globose, ca. 3 mm thick, rounded at apex without beak, 2-locular; valves cross-wrinkled, with spreading white and black hairs. Seeds 2.

Grasslands, steppes; 1500–3800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan].

133. *Astragalus despectus* Podlech & L. R. Xu, Novon 17: 229. 2007.

合托叶黄耆 *he tuo ye huang qi*

Plants small, 4–5 cm tall, subcaulescent to shortly caulescent. Stem 1–3.5 cm, lowest internodes glabrous, next internode densely covered with ascending hairs, upper ones loosely covered with appressed white hairs 0.2–0.3 mm. Leaves 2–2.5 cm; stipules ovate, ca. 5 mm, very shortly adnate to petiole, lower ones and those of leafless stolons high vaginateconnate, upper ones free from each other, sparsely white or black hairy; petiole up to 0.5 cm, like rachis loosely to rather densely covered with appressed white hairs 0.1–0.2 mm, with black hairs mixed in; leaflets in 5–8 pairs, narrowly elliptic, 3–7 × 1.5–3 mm, abaxially loosely covered with appressed white hairs 0.1–0.3 mm, adaxially glabrous, apex obtuse. Racemes globose, 1–1.5 cm in diam., densely ca. 20-flowered; peduncle 1.5–2 cm, loosely to rather densely covered with subappressed white hairs 0.1–0.2 mm, with some longer, mostly black hairs up to 0.5 mm mixed in; bracts whitish membranous, 1.5–3 mm, sparsely black hairy. Calyx ca. 3 mm, densely covered with ascending to spreading, tangled, predominantly black hairs 0.4–0.6 mm; teeth 1–1.5 mm. Petals mauve; standard suborbicular, ca. 5.5 × 3.5 mm; wings ca. 4 mm, limbs obtriangular, widest below widely truncate tip; keel ca. 4 mm. Ovary sessile, globose, glabrous. Legumes unknown.

• Xizang.

134. *Astragalus handelii* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 20. 1936.

头序黄耆 *tou xu huang qi*

Plants 15–35 cm tall, covered with hairs 0.2–0.6 mm. Stems several, glabrous in basal parts, otherwise loosely to rather densely covered with ascending white and sometimes with some black hairs. Leaves 4–7 cm, upper subsessile, lower with a petiole up to 1.5 cm; stipules 3–6 mm, shortly adnate to petiole, white and black hairy or only ciliate at margin, lower ones shortly connate behind stem, upper ones free; rachis loosely to rather densely covered with ascending to spreading predominantly white hairs; leaflets in 5–8 pairs, linear to narrowly elliptic, 10–20 × 2–4 mm, abaxially loosely to densely appressed white hairy, adaxially glabrous, apex obtuse to acute. Racemes ovoid to oblong, densely many flowered; peduncle 6–9 cm, white hairy, toward raceme also increasingly black hairy; bracts linear-acuminate, 4–6 mm, sparsely black hairy. Calyx ca. 4 mm, loosely to rather densely covered with subappressed to ascending predominantly black hairs; teeth 1.5–2.5 mm. Petals whitish yellow or yellow; standard ovate, 9–10 × 4–4.5 mm, apex emarginate; wings 7–7.5 mm, limbs widened toward widely and deeply incised tip; keel ca. 5 mm. Ovary sessile, globose, white hairy. Legumes unknown.

• 1800–3700 m. Gansu, Qinghai, Sichuan.

135. *Astragalus heterodontus* Borissova, Trudy Tadzhikistansk. Bazy 2: 161. 1936.

异齿黄耆 *yi chi huang qi*

Plants 10–25 cm tall. Stems sparsely to loosely covered with very short appressed hairs, soon glabrescent. Leaves 2–4 cm; stipules 2–4 mm, shortly ciliate at margin, lower ones shortly vaginate-connate behind stem, upper ones nearly free; petiole 0.5–2 cm, like rachis loosely covered with appressed white and sometimes also black hairs 0.1–0.25 mm; leaflets in 5–7(or 8) pairs, narrowly elliptic, 5–12 × 3–4 mm, sparsely appressed hairy abaxially, glabrous adaxially, apex obtuse. Racemes densely many flowered; peduncle 2–8 cm, in upper part loosely covered with appressed black hairs; bracts linear, 1–2.5 mm, sparsely black hairy. Calyx 2–3(–4) mm, appressed black hairy, more rarely with some white hairs; teeth unequal, 1–1.5 mm. Petals intensely violet (also in dry state); standard widely elliptic to suborbicular, 5–8 × 4–5 mm, apex rounded to slightly incised; wings 5–7 mm; keel 4–5 mm. Legumes angled-globose, 3–4 mm, rounded at apex without beak, deeply grooved dorsally, 2-locular; valves thin, cross-wrinkled, covered with spreading white and black hairs.

3500–4900 m. Qinghai, Xinjiang, Xizang [Tajikistan].

136. *Astragalus kunlunensis* H. Ohba, S. Akiyama & S. K. Wu, J. Jap. Bot. 70: 27. 1995.

昆仑黄耆 *kun lun huang qi*

Plants 20–50 cm tall, caespitose. Stems 5–30 cm, with ± long internodes, sparsely to loosely covered with appressed to subappressed white or black and white hairs 0.1–0.3 mm. Leaves 4–9 cm; stipules 3–5 mm, subglabrous, shortly to distinctly vaginate-connate behind stem; petiole 1–3.5 cm, together with rachis sparsely to loosely white hairy like stem; leaflets in 5–7(–9) pairs, elliptic to narrowly elliptic, 7–20 × 2.5–6 mm, often folded, abaxially sparsely to loosely appressed white hairy, adaxially glabrous, apex obtuse to slightly emarginate. Racemes capitate to ovoid, densely 10–30-flowered, strongly elongated at fruiting time and up to 10 cm; peduncle 5–18 cm, loosely covered with appressed to slightly ascending black and white hairs; bract ca. 2 mm, sparsely black hairy. Calyx 3.5–4 mm, loosely covered with appressed black hairs 0.05–0.2 mm; teeth ca. 1 mm. Petals purplish or white; standard widely obovate to orbicular, ca. 7 × 5–6.5 mm, apex slightly emarginate; wings 5–6 mm; keel 4–5 mm. Legumes sessile, angled-globose, 3–4 mm in diam., grooved ventrally and dorsally, rounded at apex with obliquely inserted persistent style, 2-locular; valves cross-wrinkled, loosely to rather densely covered with appressed to ascending black and white hairs 0.1–0.3 mm.

• Xinjiang (Kunlun Shan).

137. *Astragalus longiracemosus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 114. 1996.

长序黄耆 *chang xu huang qi*

Plants 20–35 cm tall. Stems several, loosely covered with spreading rigid white hairs and below nodes with black hairs 0.2–0.3 mm. Leaves 3–8 cm; stipules 3–7 mm, very shortly adnate to petiole, otherwise free, sparsely white and/or black hairy; petiole 0.3–2 cm, together with rachis white or black and white hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, (7–)9–27 × 2–7 mm, at base of petiolule with crowded, minute,

sessile glands, abaxially densely to rather densely covered with appressed to subappressed or partly ascending hairs up to 0.5 mm, adaxially glabrous, apex obtuse to subacute or sometimes slightly retuse. Racemes 2–5 cm, densely many flowered; peduncle 3–6 cm, in lower part loosely covered with spreading white and black hairs up to 0.3 mm, in upper part mostly black hairy; bracts 2–3 mm, sparsely black hairy. Calyx 3–4 mm, densely covered with ascending predominantly black hairs up to 0.5 mm; teeth 1–2 mm. Petals pale pink, violet, or white; standard obovate, 8–10 × ca. 5 mm, apex rounded to slightly emarginate; wings 7–8 mm, limbs narrowly obovate, rounded at apex; keel ca. 5 mm. Legumes 4–5 mm, 2.5–3 mm high, 2-locular; valves transversely rugose, densely covered with white hairs, with a few black hairs mixed in. Seeds 2.

• Lakeshores; ca. 3100 m. Qinghai (Qinghai Hu).

138. *Astragalus luteiflorus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 113. 1996.

黄花黄耆 *huang hua huang qi*

?*Astragalus mahoschanicus* Handel-Mazzetti var. *subeicus* K. T. Fu.

Plants 10–20 cm tall. Stems branched at base, densely covered with ascending to spreading white hairs 0.5–1 mm and with a few black hairs. Leaves 2.5–4.5 cm; stipules 3–5 mm, lower ones distinctly and upper ones scarcely vaginate-connate behind stem; petiole 0.3–1 cm, together with rachis hairy like stem; leaflets in 7–9 pairs, narrowly elliptic, 3–15 × 1–3.5(–5) mm, both surfaces densely silvery hairy with ascending hairs up to 1 mm, apex obtuse to subacute. Racemes cylindric, 2.5–4 cm, densely many flowered; peduncle 5–10 cm, hairy like stem but toward raceme with increasingly black hairs; bracts whitish membranous, 2–3.5 mm, white and black hairy. Calyx 4–5 mm, rather densely covered with subappressed to ascending white and black or predominantly white hairs up to 0.8 mm; teeth 1.5–2 mm. Petals whitish or yellowish; standard obovate, ca. 8 × 5–5.5 mm, apex emarginate; wings 6.5–7 mm, limbs obliquely incised at tip; keel 5–5.5 mm. Legume globose, ca. 3 mm in diam.; valves white tomentose.

• About 3400 m. Qinghai (Nan Shan).

139. *Astragalus mahoschanicus* Handel-Mazzetti, Oesterr. Bot. Z. 82: 247. 1933.

马衔山黄耆 *ma xian shan huang qi*

Plants up to 15–40 cm tall. Stems several, up to 20 cm, branched, loosely covered with subappressed white hairs 0.1–0.3 mm and with some black hairs. Leaves 5–8 cm; stipules 3–5 mm, free from each other, sparsely black and white hairy; petiole 1–2 cm, like rachis sparsely covered with subappressed to ascending black and white hairs up to 0.3 mm; leaflets in 5–7(–9) pairs, narrowly elliptic, 7–20 × 1.5–4(–6) mm, abaxially loosely hairy, adaxially glabrous, apex obtuse to shortly acuminate. Racemes 2–4.5 cm, densely 10- to many flowered; peduncle 5–10 cm, loosely covered with subappressed white and toward raceme increasingly black hairs; bracts whitish membranous, 1–3 mm, sparsely black or black and white hairy. Calyx 3–4 mm, loosely to rather densely covered with subappressed

predominantly black hairs up to 0.8 mm; teeth 1.5–2 mm. Petals yellow, fading reddish; standard elliptic to rhombic-elliptic, 7–8 × ca. 3.5 mm, apex slightly incised; wings 5–6 mm, limbs asymmetrically incised; keel 4–5 mm. Legume sessile, nearly globose, ca. 3 mm in diam., rounded ventrally and dorsally, nearly beakless, 2-locular; valves rather thick, covered rather densely with ascending white hairs intermixed with black hairs. Seeds 2.

• 1800–4500 m. Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang.

Astragalus mahoschanicus var. *mengdaensis* Y. H. Wu (Acta Bot. Yunnan. 20: 40. 1998) and *A. mahoschanicus* var. *multipilosus* Y. H. Wu (loc. cit.: 39) do not agree with *A. mahoschanicus* or with the species *A. longiracemosus* and *A. luteiflorus*, all occurring in Qinghai Province. Without having seen the types, it is not possible to get a clear opinion about their taxonomic status.

140. *Astragalus malcolmii* Hemsley & H. Pearson, J. Linn. Soc., Bot. 35: 172. 1902.

短茎黄耆 duan jing huang qi

Plants small, 3–4 cm tall, acaulescent to subacaulescent, covered with ± spreading white and black hairs 0.1–0.5 mm. Stems, if present, up to 0.5 cm, loosely hairy. Leaves 1–2 cm, sessile; stipules (2–)3 mm, very shortly adnate to petiole, often shortly connate before petiole, behind stem distinctly vaginate-connate, lower ones glabrous, upper ones sparsely to loosely black hairy; rachis hairy like stem; leaflets in 4–7 pairs, elliptic, 2–6 × 1.5–2.5 mm, mostly folded, abaxially loosely to densely spreading white hairy, often with some black hairs mixed in, some leaflets adaxially glabrous but most sparsely to loosely spreading hairy, apex obtuse. Racemes globose, 1–1.5 cm in diam., densely ca. 20-flowered; peduncle subterminal, 1–2.5 cm, loosely to rather densely covered with predominantly black hairs 0.2–0.5 mm; bracts whitish membranous, 2–3 mm, sparsely black hairy. Calyx campanulate, 3.5–4 mm, densely covered with ascending to spreading, tangled, predominantly black hairs 0.4–0.6 mm; teeth unequal, 1.5–2 mm. Petals mauve; standard suborbicular, 7–8 × 5–5.5 mm, emarginate; wings 5–5.5 mm, limbs obtriangular, widest below widely retuse tip; keel ca. 4.5 mm. Ovary with a stipe ca. 0.5 mm, ellipsoid, glabrous, 2-ovuled. Legumes unknown.

• Qinghai, Xizang, Yunnan.

141. *Astragalus melanostachys* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 21. 1868.

黑穗黄耆 hei sui huang qi

Astragalus bracteosus Klotzsch (1862), not Boissier & Noë (1856).

Plants (5–)10–30 cm tall. Stems several to numerous, glabrous or more rarely sparsely covered with appressed white hairs 0.2–0.3 mm. Leaves (2–)3–7 cm; stipules 2–6(–8) mm, shortly to ± high vaginate-connate behind stem, sparsely black and white ciliate or toward apex also with appressed hairs; petiole ± as long as rachis or shorter, like rachis sparsely covered with ascending black and white or only white hairs 0.3–0.8 mm; leaflets in 5–7(–9) pairs, triangular-obovate to more rarely

orbicular-cordate or narrowly obovate, 3–10(–14) × (1–)1.5–6(–8) mm, abaxially sparsely to loosely appressed hairy, especially at midvein and margins, sometimes nearly glabrous, adaxially glabrous, apex retuse to distinctly emarginate or more rarely rounded, mostly minutely mucronulate. Racemes 1–3 cm, densely many flowered; peduncle 6–16(–20) cm, loosely covered with appressed white and black hairs, toward raceme increasingly with black hairs up to 1.2 mm, more rarely only sparsely hairy or nearly only with white hairs; bracts 3–5(–8) mm, black hairy. Bracteoles sometimes present, 1–1.5 mm. Calyx 4–6 mm, rather densely covered with spreading, curly, predominantly black hairs up to 1 mm, more rarely only with white hairs; teeth 2–3 mm. Petals pink-red to red, fading violet; standard rhombic-elliptic, (5–)6–7(–8.5) × 2.5–3.2 mm, apex emarginate; wings (4.5–)5.5–6.5(–7) mm; keel (4–)4.5–5.5(–7) mm. Legumes ovoid, 4–6 mm, 2–3 mm high and 1.5–2 mm wide, keeled ventrally, ± deeply grooved dorsally, distinctly beaked, 1-locular; valves covered rather densely with ascending black hairs, rarely hairs white. Seeds 2.

Alpine meadows, riversides; 3100–5000 m. Xinjiang [Afghanistan, India, Kashmir, Pakistan, Tajikistan, Uzbekistan].

142. *Astragalus mieheorum* Podlech & L. R. Xu, Novon 14: 219. 2004.

青东黄耆 qing dong huang qi

Astragalus densiflorus Karelin & Kirilov var. *konlonicus* H. Ohba, S. Akiyama & S. K. Wu.

Plants 7–12 cm tall. Stems 1–2 cm, densely covered with ascending to spreading white or black and white hairs 0.5–0.8 mm. Leaves 2–4(–5.5) cm; stipules 3–6 mm, lower ones shortly vaginate-connate behind stem, sparsely predominantly black hairy; petiole 0.5–1 cm, with rachis hairy like stem; leaflets in (3 or)4–6 pairs, narrowly elliptic, 5–14 × 1.5–4.5 mm, abaxially rather densely covered with tangled, ascending, white hairs up to 1 mm, adaxially glabrous, apex obtuse to acute. Racemes 1.5–3 cm, densely many flowered; peduncle 2–4 cm, densely covered with ascending to spreading, tangled, white or black and white or only black hairs up to 1 mm; bracts linear-acute, 4–6 mm, black hairy. Calyx 5–6 mm, ± densely covered with ascending to nearly spreading, tangled, black hairs up to 1 mm; teeth (1.5–)2–3.5 mm. Petals violet, in dry state often pale yellowish brown; standard widely ovate, 8–9.5 × 5–6.5 mm, apex retuse to slightly emarginate; wings 6.5–7(–8) mm, limbs truncate to incised at tip; keel 5.5–6 mm. Legume globose, ca. 4 mm in diam., rounded at apex without beak but with persistent glabrous style, 2-locular; valves densely covered with ascending to spreading, partly straight, partly curly, white and black hairs up to 1 mm.

• High alpine steppes; 4000–4900 m. Qinghai, Xinjiang.

143. *Astragalus nanshanicus* Podlech & L. R. Xu, Novon 14: 219. 2004.

南山黄耆 nan shan huang qi

Plants tall, up to 30 cm or more, basal parts unknown. Stem up to 30 cm, loosely to rather densely covered with spreading white hairs and sometimes below nodes with a few

black hairs 0.15–0.3 mm. Leaves 2–4.5 cm; stipules 2.5–3 mm, free, loosely to rather densely covered with ascending to nearly spreading white hairs, at base also black hairy; petiole 0.3–1 cm, together with rachis white hairy like stem; leaflets in 4–6 pairs, narrowly elliptic, 4–8 × 1–3 mm, mostly folded, abaxially rather densely covered with subappressed to ascending hairs up to 0.3 mm, adaxially glabrous, apex rounded to slightly emarginate. Racemes at anthesis short, densely many flowered, distinctly elongating in fruit; peduncle 1–6 cm, white hairy like stem; bracts 2–2.5 mm, sparsely black hairy. Calyx ca. 3 mm, rather densely covered with subappressed, black and white hairs up to 0.5 mm; teeth 1–1.5 mm. Petals violet; standard widely elliptic, ca. 7 × 4.5 mm, apex emarginate; wings ca. 5.5 mm, limbs obovate, rounded at apex; keel ca. 4 mm. Ovary sessile, nearly globose, glabrous. Legumes unknown.

- About 3600 m. Qinghai (Qinghai Nanshan).

144. *Astragalus pishanxianensis* Podlech, Feddes Repert. 116: 57. 2005.

皮山黄耆 pi shan huang qi

Plants 20–25 cm tall. Caudex with ± elongated, slender, branched stolons. Stems 15–20 cm, loosely to rather densely covered with appressed to ascending white hairs 0.3–0.6 mm, below nodes often predominantly black hairy, mostly glabrous at base. Leaves 4–5 cm, uppermost subsessile, others with a petiole 0.6–2 cm; stipules greenish, ovate, 4–5 mm, free from petiole and from each other, all black ciliate; petiole and rachis loosely to rather densely covered with appressed to subappressed, tangled, white hairs up to 0.5 mm, with black hairs mixed in; leaflets in 4 or 5 pairs, narrowly elliptic to elliptic, 5–13 × 1–4.5 mm, abaxially loosely to rather densely covered with appressed white hairs 0.3–0.5 mm, adaxially glabrous, apex rounded to subacute. Racemes capitate to ovoid, 2–3 cm, densely many flowered, slightly elongating with age; peduncle 3–7 cm, rather densely white hairy like rachis, toward raceme increasingly with black hairs; bracts whitish membranous, linear, ca. 5 mm, black hairy. Calyx 4.5–5 mm, rather densely covered with subappressed to ascending black hairs 0.3–0.5 mm; teeth 1.5–2 mm. Petals whitish to yellow; standard obovate, ca. 8 × 5 mm, apex slightly emarginate; wings ca. 7 mm, limbs obovate; keel ca. 6 mm. Ovary very shortly stipitate, ovoid, glabrous. Legumes unknown.

- About 3300 m. Xinjiang.

145. *Astragalus porphyrocalyx* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 67. 1980.

紫萼黄耆 zi e huang qi

Plants up to 25 cm tall. Stems 12–15 cm, branched at base, sparsely to loosely covered with appressed white and some black hairs 0.1–0.3 mm. Leaves 2–4 cm; stipules 2–3 mm, lower ones shortly vaginate-connate behind stem, loosely mostly black hairy; petiole 0.5–1 cm, like rachis loosely to rather densely appressed white or white and black hairy; leaflets in 4–7 pairs, narrowly elliptic, 4–12 × 0.8–3 mm, abaxially loosely to rather densely covered with appressed hairs 0.1–0.3 mm, adaxially glabrous. Racemes globose to ovoid, rather densely many flowered; peduncle 1–8 cm, loosely covered with mainly white hairs in basal part and mainly black hairs in upper

part; bracts 1.5–2.5 mm, black hairy. Calyx 3–3.5 mm, ± densely covered with appressed black hairs sitting on very minute whitish tubercles; teeth 1–1.5 mm. Petals lilac; standard widely ovate, ca. 7 × 3.5 mm, apex emarginate; wings ca. 6 mm, limbs obovate, emarginate; keel ca. 4.5 mm. Legume sessile, widely ellipsoid, 4–5 mm, 3–3.5 mm thick, widely rounded to truncate at apex without beak, 2-locular; valves strongly cross-wrinkled, with subappressed to somewhat spreading white and black hairs. Seeds 2.

- 3800–4200 m. Qinghai, Sichuan, Xizang.

146. *Astragalus pseudojagnobicus* Podlech & L. R. Xu, Novon 14: 220. 2004.

喀什黄耆 ka shi huang qi

Plants up to 25 cm tall, with appressed to subappressed hairs 0.1–0.3 mm. Stems several, sparsely to loosely white hairy, below nodes also black hairy. Leaves 4–7 cm; stipules white and black hairy, lower ones high connate behind stem; petiole 1–2.5 cm, like rachis loosely hairy; leaflets in 4–6 pairs, elliptic, 5–12 × 3–6 mm, abaxially loosely to rather densely appressed white hairy, adaxially glabrous, apex rounded to distinctly retuse. Racemes globose-ovoid, soon elongating up to 4 cm, many flowered; peduncle 6–10 cm, loosely covered in lower part with only white and in upper part also increasingly with black hairs; bracts 1.5–2 mm, black hairy. Calyx 3–4 mm, loosely to rather densely covered with black and a few white hairs; teeth 1.2–1.5 mm. Petals (when dry) whitish to slightly pale violet tinged, keel mostly violet at tip; standard obovate, ca. 10 × 5 mm, apex slightly emarginate; wings ca. 7 mm, limbs obovate, rounded at apex; keel ca. 5 mm. Ovary ovoid. Legumes unknown.

- W Xinjiang.

147. *Astragalus pseudomahoschanicus* Podlech, Feddes Repert. 120: 48. 2009.

类马衔山黄耆 lei ma xian shan huang qi

Plants 25–30 cm tall, in basal parts loosely covered with appressed white hairs, in upper parts sparsely with white and black hairs 0.3–0.5 mm. Leaves 7–9 cm; stipules 7–10 mm, free from petiole and from each other, sparsely white and black hairy; petiole 1–2 cm, rachis white and black hairy; leaflets in 5–7 pairs, elliptic, 15–25 × 6–13 mm, abaxially loosely appressed white hairy, adaxially glabrous. Racemes ovoid to shortly cylindrical, 3–4 cm, densely many flowered; peduncles 9–11 cm, hairy like rachis; bracts 5–6 mm, black hairy. Calyx ca. 5 mm, loosely to rather densely with predominantly black hairs; teeth 2–2.5 mm. Petals yellowish when dry; standard elliptic, ca. 10 × 5–6 mm, apex emarginate; wings ca. 8 mm, limbs narrowly obtriangular, widest at retuse tip; keel ca. 6 mm. Legumes sessile, globose, ca. 4 mm in diam., beakless, densely covered with spreading white and black hairs ca. 1 mm.

- Sichuan, Xinjiang.

148. *Astragalus pseudoversicolor* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 71. 1980.

类变色黄耆 lei bian se huang qi

Astragalus golubojensis Podlech & L. R. Xu.

Plants 20–40 cm tall. Stems branched at base, up to 30 cm, loosely to rather densely covered with appressed to spreading white hairs 0.2–0.3 mm. Leaves 3–8 cm, sessile; stipules 3.5–4 mm, free, sparsely white hairy; rachis sparsely to loosely hairy like stem; leaflets in 4–7 pairs, narrowly elliptic, 6–20 × 1–3 mm, abaxially loosely to rather densely covered with subappressed to ascending hairs up to 0.3 mm, adaxially glabrous, apex obtuse. Racemes 1–4 cm, densely many flowered, distinctly elongating with age; peduncle 6–10 cm, loosely to densely covered with appressed to spreading white or toward raceme also with black hairs; bracts whitish membranous, 1.5–2 mm, sparsely predominantly black hairy. Calyx 3.5–4 mm, loosely to rather densely appressed white and black hairy; teeth 1.5–2 mm. Petals purple, blue, or nearly white; standard obovate, 7–8 × 4–4.5 mm, apex slightly emarginate; wings 5–6 mm, limbs slightly bilobed; keel 4–5 mm. Ovary subsessile, glabrous. Legumes unknown.

- About 3000 m. Qinghai, Sichuan, Xizang.

149. *Astragalus rytidocarpus* Ledebour, Fl. Altaic. 3: 315. 1831.

橙果黄耆 cheng guo huang qi

Plants 8–18(–30) cm tall, covered with hairs 0.1–0.3 mm. Stems mostly several, base mostly densely and middle and upper part loosely hairy; hairs subappressed to ascending, white, at nodes also black. Leaves 4–6 cm; stipules 2–3 mm, shortly to distinctly connate behind stem and partly around petiole, with white and sometimes also with black hairs; petiole 0.8–2.5 cm, like rachis loosely white hairy; leaflets in 4 or 5 pairs, linear, 8–20 × 1.5–2.5 mm, abaxially somewhat densely and adaxially loosely covered with appressed white hairs, apex obtuse to very narrowly retuse. Racemes 1–2 cm, densely many flowered; peduncle 3–7 cm, loosely white and black hairy; bracts whitish, 1–1.5 mm, white and predominantly black hairy. Calyx 2.5–3 mm, loosely to rather densely covered with sometimes partly very short (less than 0.05 mm) appressed black hairs; teeth 0.8–1 mm. Petals pale violet; standard widely elliptic to suborbicular, 6–6.5 × 4–4.5 mm, apex retuse to emarginate; wings 4.5–5 mm, limbs bilobed; keel 4–4.5 mm. Legumes sessile, erect or obliquely spreading, obliquely ovoid to nearly globose, 4–5 mm, 3–4(–4.5) mm high and wide, slightly keeled ventrally, deeply grooved dorsally, retuse at apex, with a ± straight beak 1.5–2 mm, 2-locular; valves strongly cross-wrinkled, loosely covered with short, subappressed, black and white hairs. Seed 1 in each locule.

Gansu [Mongolia, Russia (Siberia)].

150. *Astragalus sagastaigolensis* N. Ulziykhutag ex Podlech & L. R. Xu, Novon 14: 220. 2004.

萨格斯台黄耆 sa ge si tai huang qi

Plants ca. 15 cm tall, with hairs 0.3–0.6 mm. Stems many, rather densely appressed to subappressed white hairy, with some black hairs mixed in, especially at nodes. Leaves 3–6 cm, sessile; stipules 4–6 mm, free, sparsely to loosely covered with subappressed predominantly black hairs; rachis hairy like stem;

leaflets in 6–9 pairs, narrowly elliptic, 8–15 × 2–5 mm, abaxially rather densely appressed hairy, adaxially glabrous, apex obtuse. Racemes 2–3 cm, densely many flowered; peduncle 2.5–5 cm, hairy like stem, toward raceme with increasingly black hairs; bracts 4–5 mm, with subappressed to ascending predominantly black hairs. Calyx 4–4.5 mm, loosely to rather densely covered with subappressed to ascending black hairs; teeth ca. 2 mm. Petals whitish when dry; standard elliptic, 8.5–9.5 × ca. 4 mm, rounded at apex; wings ca. 7 mm, limbs obtriangular, distinctly dilated to unequally, widely emarginate tip; keel ca. 5 mm. Legumes globose, ca. 3 mm in diam., rounded ventrally, deeply grooved dorsally, rounded at apex, beakless, 2-locular; valves rather densely covered with subappressed to slightly ascending white and black hairs up to 0.8 mm. Seeds 2.

- Xinjiang (Junggar Pendi).

151. *Astragalus thomsonii* Podlech, Sendtnera 6: 140. 1999.

汤母森黄耆 tang mu sen huang qi

Plants up to 35 cm tall, covered with hairs 0.2–0.5 mm. Stems mostly several, erect, loosely covered with subappressed to ascending white hairs. Leaves 2.5–6 cm, upper ones often sessile; stipules 3–4 mm, lower ones high connate behind stem, upper ones only shortly connate or free, glabrous; petiole of lower leaves 1–3 cm, like rachis sparsely subappressed white hairy; leaflets in 5 or 6 pairs, narrowly elliptic, 6–16 × 2–4 mm, abaxially when young densely and with age loosely appressed white hairy, adaxially glabrous, apex narrowly rounded to subacute. Racemes ovoid, densely many flowered; peduncle 5–10 cm, sparsely to loosely covered with appressed white hairs, toward raceme hairs increasingly ascending and black; bracts 2–3 mm, white and black hairy. Calyx 3–3.5 mm, densely appressed white and black hairy; teeth 1–1.5 mm. Standard widely elliptic, 6–8 × 4–5 mm, apex emarginate; wings 5–6 mm; keel 4–4.5 mm. Legumes 3.5–4 mm, ca. 2 mm high and 4–5 mm wide, obtriangular to nearly globose as seen from dorsal side, cuneate at base, widely truncate at apex with persistent style, widely flattened ventrally, narrowly and deeply grooved dorsally, 2-locular; valves with conspicuous transverse ridges at dorsal side, covered with subappressed white and predominantly black hairs. Seeds 2.

3600–5300 m. Xizang [India, Kashmir, Nepal].

152. *Astragalus tulinovii* O. Fedtschenko, Fl. Pamir. 27. 1903.

土力黄耆 tu li huang qi

Plants 8–20 cm tall. Stems glabrous or in upper parts sometimes sparsely to loosely covered with ± appressed white and black hairs 0.1–0.3 mm. Leaves 2–4 cm; stipules 3–6 mm, glabrous or with sparse black and white hairs at margins and apex, lower ones ± high connate; petiole 0.5–1.2 cm, like rachis sparsely subappressed white and black hairy; leaflets in 3–5 pairs, narrowly elliptic, 5–8 × 1–3 mm, glabrous or abaxially sparsely hairy, apex obtuse to subacute. Racemes 1.5–2.5 cm, densely many flowered; peduncle 5–8 cm, loosely white hairy, toward raceme increasingly black hairy; bracts 4–5 mm, sparsely black hairy. Calyx ca. 5 mm, ± densely black villous; teeth ca. 2.5 mm. Petals whitish; standard widely obovate to suborbicular, 7–8 × 4–5 mm, apex retuse; wings 6–7 mm; keel

4.5–5 mm. Legume ovoid-globose, 3–4 mm, ca. 3 mm high and wide, rounded at apex without beak but sometimes with persistent style, 2-locular; valves smooth, covered with spreading white and black hairs. Seeds 2.

3300–5500 m. Xinjiang [Kashmir, N Pakistan, Tajikistan].

153. *Astragalus valerii* N. Ulziykhutag, *Novosti Sist. Vyssh. Rast.* 30: 111. 1996.

瓦来黄耆 *wa lai huang qi*

Plants 5–10 cm tall, with appressed to spreading hairs 0.3–0.6 mm. Stems loosely to densely covered with white hairs, below nodes also with black hairs. Leaves 1.5–3 cm; stipules 4–7 mm, loosely black hairy or white and black hairy, adnate to

petiole for 0.5–2 mm, lower ones connate behind stem to middle; petiole 0.5–1 cm, like rachis loosely to rather densely hairy; leaflets in 5–8 pairs, narrowly elliptic, 4–13 × 1.5–4.5 mm, abaxially with appressed to ascending hairs, adaxially glabrous, apex obtuse to subacute. Racemes 1–2.5 cm, densely many flowered; peduncle longer than leaves, densely spreading white hairy, below raceme also black hairy; bracts 4–6 mm, white and black hairy. Calyx 5–6 mm, loosely covered with appressed to ascending predominantly black hairs; teeth 2–3 mm. Petals yellowish, honey-colored; standard widely elliptic to obovate, 6.5–9 × 3.5–5 mm, apex retuse to emarginate; wings 5–6.5 mm, rounded at apex; keel 4–6.5 mm. Ovary sessile, ovoid, glabrous. Legumes unknown.

• 3600–3800 m. Qinghai, Xinjiang.

22. *Astragalus* sect. *Hemiphragmium* (W. D. J. Koch) Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 21. 1868.

囊果组 *nang guo zu*

Phaca sect. *Hemiphragmium* W. D. J. Koch, *Syn. Fl. Germ. Helv.* 180. 1836.

Plants perennial, with ± well-developed stems, with basifixed hairs. Stipules free from petiole or shortly adnate, ± high connate behind stem. Racemes borne on short or mostly rather long peduncle, at anthesis dense, becoming loose. Bracteoles absent. Calyx campanulate. Petals lilac-violet or whitish, with violet-tipped keel, rarely yellowish white; wings deeply incised to bilobed at apex. Ovary with a stipe (1–)2–4 mm. Legumes with a rather long stipe rarely shorter than calyx, at least (2–)3–4 mm, pendulous, 1-locular or 2-locular; valves mostly membranous, glabrous.

Twenty-one species: China, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; Europe; two species in China.

- 1a. Plants 5–17 cm tall, with exception of calyx subglabrous, with hairs 0.02–0.2 mm; leaflets 2–8 mm; petals lilac to violet; legumes bladderlike inflated, 15–25 mm, 8–10 mm high, shortly acuminate 154. *A. beketowii*
 1b. Plants 20–50 cm tall, more densely hairy with hairs 0.2–1 mm; leaflets 8–22 mm; petals whitish with violet-tipped keel; legumes narrowly oblong, 12–18 mm, 4–5 mm high, with a hooked beak ca. 2 mm 155. *A. vaginatus*

154. *Astragalus beketowii* (Krasnov) B. Fedtschenko, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 24: 202. 1905 [*“beketowi”*].

斑果黄耆 *ban guo huang qi*

Oxytropis beketowii Krasnov, *Bot. Zap.* 2: 15. 1887–1888; *Astragalus polychromus* Freyn.

Plants 5–17 cm tall, with very short appressed or ascending hairs 0.05–0.2 mm. Stems several, 1–7(–10) cm, prostrate, glabrous. Leaves 1.5–5 cm; stipules 4–5 mm, connate behind stem to more than 1/2 of length, ciliate with white or black and white hairs; petiole much shorter than to rarely nearly as long as rachis, like rachis nearly glabrous; leaflets in 4–7 pairs, ± glaucous, narrowly elliptic to ovate, 2–8 × 0.5–3 mm, abaxially subglabrous or sparsely hairy on both surfaces, adaxially glabrous, apex subacute or rarely obtuse. Racemes short, densely 5–16-flowered; peduncle 2–7 cm, subglabrous, toward raceme increasingly with white and black hairs; bracts 2–4 mm, subglabrous. Calyx 6–8 mm, loosely covered with appressed to spreading predominantly black hairs; teeth slightly unequal, 1.5–2 mm. Petals lilac to violet, with a dark spot at keel tip; standard obovate, 14–16 × ca. 8 mm, apex incised; wings 12–14 mm, deeply incised and bilobed; keel 9–11 mm. Legumes with a slender stipe ca. 3 mm, pendulous, bladderlike inflated, obliquely ovoid, 15–25 mm, 8–10 mm high, 1-locular; valves glabrous, red spotted.

Alpine slopes; 2500–4300 m. Xinjiang [Kyrgyzstan, Mongolia, Tajikistan].

155. *Astragalus vaginatus* Pallas, *Sp. Astragal.* 46. 1800.

鞘叶黄耆 *qiao ye huang qi*

Plants 20–50 cm tall, covered with flexuous-curly, subappressed to ascending or even spreading hairs 0.2–1 mm. Stems solitary or several, erect, loosely to rather densely covered with white hairs up to 0.4 mm, at nodes also with black hairs. Leaves 4–10 cm; stipules 4–6 mm, loosely covered with white or mixed white and black hairs, distinctly connate behind stem; petiole 0.3–1.5 cm, like rachis rather densely covered with ± spreading hairs; leaflets in 6–9 pairs, narrowly elliptic, 8–22 × 1–6 mm, abaxially rather densely subappressed hairy, adaxially glabrous, or both surfaces with nearly spreading hairs up to 0.8(–1) mm, apex acute. Racemes loosely to rather densely many flowered, 3–6 cm, elongating in fruit up to 13 cm; peduncle 6–23 cm, loosely subappressed hairy; bracts 2–4 mm, white and black hairy. Calyx 5–6 mm, covered with subappressed to ± spreading predominantly white or mixed white and black hairs up to 0.5 mm; teeth 1.5–2 mm. Petals whitish, tip of keel violet; standard obovate, 11–14 × 6–8 mm, apex deeply incised; wings 9–11 mm, limbs deeply bilobed; keel 7–9 mm. Legumes pendulous, with a stipe 6–9 mm, narrowly oblong, 12–18 mm, 4–5 mm high and 2.5–3 mm wide, long acuminate at base, shortly acuminate at apex into a hooked beak ca. 2 mm, strongly keeled ventrally, rounded dorsally, 2-locular; valves glabrous.

Steppic mountain slopes. NW Xinjiang [Kazakhstan, Russia (Siberia)].

23. Astragalus sect. **Poliothrix** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 48. 1868.

多枝组 duo zhi zu

Astragalus sect. *Polycladi* Y. C. Ho.

Plants ± caespitose, with several to numerous, well-developed, often procumbent to ascending, mostly slender stems, rarely acaulescent or nearly so, especially in strongly trampled plants; hairs basifixed. Leaves subsessile or with a short petiole; stipules free from petiole or nearly so, all or those of lower leaves only often high connate behind stem. Racemes mostly several in upper leaf axils, ± dense; bracts mostly whitish membranous. Flowers with short pedicel. Standard longer than wings, mostly emarginate at apex, often without distinct claw; wings longer than keel, limbs obtuse or rounded at apex. Legumes sessile, subsessile, or with a distinct stipe, distinctly to semicircular curved, rarely slightly curved, 1-locular or more rarely incompletely 2-locular; valves thin. Seeds few, mostly 2 or 4.

Thirty-three species: Afghanistan, Bhutan, China, India, Kashmir, Mongolia, Nepal, N Pakistan; 28 species (24 endemic) in China.

- 1a. Stems, rachises, and peduncles covered at least partly with ascending to spreading hairs.
- 2a. Plants covered with subbasifixed to extremely asymmetrically bifurcate hairs, with a very short obtuse appendix at base; peduncles 1–2 cm; calyx teeth 0.3–0.5 mm; ovary and legumes hairy 167. *A. minutidentatus*
- 2b. Plants with basifixed hairs; peduncles and calyx teeth distinctly longer.
- 3a. Calyx ca. 3 mm; standard ca. 7 mm; ovary and legumes sessile, rather densely white hairy 163. *A. hysophilus*
- 3b. Calyx 4–5 mm; standard at least 8 mm but often distinctly longer (up to 11 mm); ovary with a stipe 1–3 mm, sessile only in *A. mekongensis*.
- 4a. Stipules 2–3 mm; peduncles, bracts, and calyx only with white hairs; keel 8.5–10 mm, as long as wings 165. *A. maowensis*
- 4b. Stipules distinctly longer; peduncles, bracts, and calyx at least partly black hairy; keel up to 7 mm, shorter than wings.
- 5a. Stipules 4–5 mm, lower ones high vaginate-connate, upper ones free from each other; calyx covered with appressed to ascending black hairs 0.1–0.3 mm, teeth 1–1.5 mm; wing limbs obovate, distinctly widened toward apex; ovary glabrous 161. *A. golmunensis*
- 5b. Stipules 6–12 mm, all distinctly vaginate-connate; calyx covered with black and white hairs up to 0.8–1 mm, teeth 2–3 mm; wing limbs narrowly oblong, not widened toward tip; ovary hairy.
- 6a. Leaflets of main stem leaves in 7 or 8 pairs, adaxially loosely hairy; bracts predominantly white hairy; petals violet; ovary shortly stipitate, white hairy 171. *A. oreocharis*
- 6b. Leaflets of main stem leaves in 10–13 pairs, adaxially glabrous or sparsely hairy; bracts black hairy; petals white; ovary and legumes sessile, white and black hairy 166. *A. mekongensis*
- 1b. Stems, rachises, and peduncles with appressed to subappressed hairs or glabrous.
- 7a. Leaflets in 11–15 pairs, adaxially glabrous; bracts 1.5–2 mm, predominantly black hairy 164. *A. jiazaensis*
- 7b. Leaflets in at most 12 pairs, at least most leaves with distinctly fewer pairs of leaflets, if in some leaves up to 15 pairs, then at least mostly hairy adaxially and bracts white or predominantly white hairy.
- 8a. Leaflets 1–4(–5) mm.
- 9a. Standard 9–10 mm or longer.
- 10a. Plants 2–6 cm tall; stipules 1–2 mm; peduncles ca. 1 cm; racemes 3–6-flowered; petals in life pale yellow; ovary subsessile 179. *A. yangii*
- 10b. Plants 10–20 cm tall; stipules 3–5 mm; peduncles up to 15 cm; racemes 10–15-flowered; petals violet; ovary with a stipe 1–2 mm 170. *A. nanjiangianus*
- 9b. Standard at most 8 mm but mostly distinctly shorter.
- 11a. Stems, rachises, peduncles, and legumes glabrous 157. *A. baxoiensis*
- 11b. Stems, rachises, peduncles, and legumes hairy.
- 12a. Leaflets hairy adaxially 169. *A. montivagus*
- 12b. Leaflets glabrous adaxially.
- 13a. Leaflets narrowly elliptic, 1–5 × 0.3–1 mm; petals white with violet-tipped keel; legumes incompletely 2-locular 180. *A. yunningensis*
- 13b. Leaflets elliptic, 1–4 × 0.6–2 mm; petals blue to purple; legumes 1-locular ... 159. *A. cobresiophilus*
- 8b. At least most leaflets distinctly longer.
- 14a. Plants in vegetative parts completely glabrous 158. *A. blandulus*
- 14b. Plants hairy.
- 15a. Stems, rachises, and peduncles sparsely covered with white and black hairs up to 0.3(–0.4) mm and often also with very short bladderlike-globose hairs 0.05–0.1 mm, sometimes subglabrous 175. *A. sikkimensis*

- 15b. Stems, rachises, and peduncles without bladderlike-globose hairs, these elongated, not flattened also if short; peduncles distinctly longer.
- 16a. Calyx 2.5–3 mm, teeth up to 1 mm 182. *A. zacharensis*
- 16b. Calyx at least 3 mm but often longer, at least lower teeth distinctly longer.
- 17a. Leaflets adaxially sparsely to loosely hairy (only in *A. austrotibetanus* more often some leaflets glabrous adaxially).
- 18a. Bracts white ciliate; standard 10–11 mm 177. *A. sungpanensis*
- 18b. Bracts white and black hairy; standard 7–9 mm.
- 19a. Stems and rachises with appressed to ascending hairs 0.5–0.8 mm; stipules 6–9 mm; leaflets up to 14 mm, acute to subobtusate; bracts 3–4 mm, predominantly white hairy; standard limb suborbicular; ovary and legumes sessile 156. *A. austrotibetanus*
- 19b. Stems and rachises with appressed hairs 0.2–0.4 mm; stipules up to 5 mm; leaflets up to 10 mm, rounded to emarginate; bracts 2–3 mm, white and black hairy; standard limb narrower, elliptic to obovate; ovary and legumes with a stipe 1–2 mm.
- 20a. Leaves sessile to subsessile; standard 6–7 mm; legumes incompletely 2-locular 172. *A. polycladus*
- 20b. Leaves, at least lower ones, with a petiole 1–2 cm; standard 7–9(–10) mm; legumes 1-locular 176. *A. strictus*
- 17b. Leaflets adaxially glabrous or sometimes with a few scattered hairs only.
- 21a. Standard 6–7 mm; ovary and legumes sessile to subsessile.
- 22a. Stipules 2–3 mm; leaves 3–4 cm; leaflets in 4–6 pairs; ovary glabrous 181. *A. yutianensis*
- 22b. Stipules 4–9 mm; leaves 5–12 cm; leaflets in 8–12 pairs; ovary white hairy.
- 23a. Stipules 6–9 mm, all high connate behind stem, sparsely to loosely hairy; petals mauve; standard 6–8 × ca. 5 mm, widely elliptic to transversely elliptic 178. *A. tibeticola*
- 23b. Stipules 4–6 mm, upper ones free from each other, glabrous or only sparsely ciliate; petals white, violet tipped; standard 5–7 × 4–4.5 mm, widely obovate 160. *A. euchlorus*
- 21b. Standard 9 mm or longer; ovary and legumes with a stipe 1.5–3.5 mm.
- 24a. Calyx 3–4 mm.
- 25a. Stems 8–20(–30) cm; stipules glabrous or sparsely ciliate; leaflets 4–8(–15) × 1.5–4(–8) mm; legumes with a stipe ca. 3 mm, 7–8 mm, ca. 3 mm high, rather densely black hairy 162. *A. havianus*
- 25b. Stems 4–6 cm; stipules sparsely to loosely white and black hairy; leaflets 4–7 × 1.5–3 mm; legumes sessile, 4–5 mm, ca. 1.8 mm high, glabrous 173. *A. praeteritus*
- 24b. Calyx at least 4.5 mm but mostly longer.
- 26a. Peduncles 0.5–1.2 cm, glabrous or nearly so 183. *A. zayuensis*
- 26b. Peduncles at least 3 cm but mostly distinctly longer, distinctly hairy.
- 27a. Stems and peduncles black hairy; stipules 3–7 mm, glabrous or with a few black or white hairs; bracts white and black ciliate; calyx densely covered with black hairs 0.3–0.5 mm 174. *A. pullus*
- 27b. Stems and peduncles predominantly white hairy; stipules 5–10 mm, loosely to rather densely white hairy; bracts loosely predominantly black hairy; calyx loosely covered with black hairs 0.2–0.4 mm and with white hairs 0.5–0.7 mm 168. *A. monbeigii*

156. *Astragalus austrotibetanus* Podlech & L. R. Xu, Sendtnera 7: 195. 2001.

藏南黄耆 zang nan huang qi

Plants up to 30 cm, vegetative parts covered with subappressed to ascending, often flexuous, white hairs 0.5–1.5 mm. Stems ± erect, loosely to rather densely hairy. Leaves 4–8 cm, subsessile; stipules 6–9 mm, lower ones behind stem distinctly

connate, loosely hairy; rachis hairy like stem; leaflets in 12–15 pairs, narrowly elliptic to elliptic, 5–14 × 1.5–7 mm, abaxially loosely to rather densely hairy, adaxially glabrous or subglabrous to sparsely hairy, apex acute to obtuse. Racemes 2–5 cm, rather loosely many flowered; peduncle 2–7 cm, hairy like stem but mostly also with black hairs toward raceme; bracts 3–4 mm, predominantly white but also black hairy. Calyx 4–5 mm, rather densely covered with subappressed to ascending white hairs 0.5–1 mm and with mostly somewhat shorter black hairs; teeth 1.5–3 mm. Petals blue-violet; standard widely elliptic to suborbicular, 7–8(–9) × 5–6(–7) mm; wings 5.5–7(–8) mm; keel 5–6(–7) mm. Legumes subsessile, obliquely ellipsoid, curved, 6–7 mm, 2–2.5 mm high and wide, keeled ventrally, flattened to shallowly grooved dorsally, acute, often with hooked persistent style, 1-locular; valves rather densely covered with ascending white or white and black hairs up to 0.8 mm.

- 3400–5100 m. Qinghai, Xizang.

The Chinese record of *Astragalus leucocephalus* Graham ex Bentham (FRPS 42(1): 220. 1993) is referable to *A. austrotibetanus*.

157. *Astragalus baxoiensis* Podlech & L. R. Xu, Novon 17: 241. 2007.

八宿黄耆 ba su huang qi

Plants 6–12 cm tall, densely caespitose, furnished with appressed hairs. Stems up to 6 cm, slender, glabrous. Leaves 1.5–4.5 cm; stipules often reflexed, 2–3 mm, nearly free from petiole, distinctly connate behind stem, sparsely hairy to sometimes glabrous; petiole 0.5–1 cm, like rachis glabrous or with scattered hairs up to 0.3 mm; leaflets in 5–8(or 9) pairs, elliptic, 2–3 × 1–1.5 mm, abaxially especially at midvein sparsely covered with appressed hairs up to 0.3 mm, adaxially glabrous, apex subobtuse. Racemes short, rather densely 4–8-flowered; peduncle 2–3.5 cm, glabrous; bracts whitish membranous, ovate to narrowly triangular, 1–2 mm, sparsely white and black hairy. Calyx campanulate, ca. 3 mm, loosely covered with appressed white and black hairs 0.1–0.3 mm; teeth 1–1.5 mm. Petals pale purple; standard widely elliptic to orbicular, ca. 8 × 4.5 mm, apex emarginate; wings ca. 7 mm; keel ca. 6 mm. Legumes with a stipe ca. 1 mm, ellipsoid, ca. 5 mm, ca. 2 mm high and ca. 2.5 mm wide, keeled ventrally, grooved dorsally, acute with hooked persistent style, 1-locular; valves glabrous.

- About 4200 m. Sichuan, Xizang.

158. *Astragalus blandulus* Podlech & L. R. Xu, Feddes Rept. 117: 225. 2006.

温和黄耆 wen he huang qi

Plants ca. 25 cm tall, vegetative parts glabrous. Stems several, ca. 20 cm, near base ca. 3 mm thick. Leaves 3.5–5 cm, subsessile; stipules green, 4–5 mm, adnate to petiole for 1–2 mm, those of lower leaves shortly connate behind stem, those of upper leaves free from each other; leaflets in 9–11 pairs, narrowly elliptic to elliptic, 4–12 × 2–5 mm, apex rounded to acute. Racemes densely many flowered; peduncle 1.5–6 cm, glabrous or sparsely covered with black hairs up to 0.1 mm; bracts whitish, linear-acute, 2–3 mm, very sparsely minutely black hairy. Calyx campanulate, 4.5–5 mm, sparsely covered

with appressed black hairs up to 0.1 mm; teeth 2–2.5 mm. Standard ca. 8 × 6.5 mm, apex emarginate; wings ca. 7 mm; keel ca. 5.5 mm. Legumes sessile, obliquely ellipsoid, 4–5 mm, ca. 2.5 mm high and wide, 1-locular; valves glabrous or at ventral suture with a few white and black hairs.

- Xizang (Gyangzê).

159. *Astragalus cobresiophilus* Podlech & L. R. Xu, Sendtnera 7: 196. 2001.

雅鲁黄耆 ya lu huang qi

Plants up to 12 cm tall, with appressed to subappressed hairs. Stems prostrate to ascending, up to 5 cm, loosely furnished with somewhat flattened white hairs 0.1–0.2 mm, partly glabrescent. Leaves 1–3.5 cm; stipules 2–3.5 mm, all distinctly connate behind stem, sparsely hairy to sometimes glabrous; petiole short, with rachis sparsely to loosely hairy like stem; leaflets in 5–8 pairs, elliptic, 1–4 × 0.6–2 mm, abaxially sparsely to loosely covered with appressed hairs up to 0.3 mm, adaxially glabrous, apex rounded to emarginate. Racemes 3–10-flowered; peduncle 1.5–5 cm, sparsely to loosely hairy like stem but hairs increasingly black toward raceme; bracts 1–1.5 mm, white and black hairy. Calyx (2.5–)3–4 mm, loosely covered with appressed black hairs 0.1–0.3 mm and more rarely also with some white hairs; teeth unequal, 0.3–1.5 mm. Petals blue to purple; standard widely elliptic to orbicular, 6–7 × ca. 5 mm; wings ca. 5.5 mm; keel ca. 5 mm. Legumes subsessile or with a stipe ca. 1 mm, pendulous, narrowly ellipsoid, curved, ca. 6 mm, ca. 2 mm high and wide, acute with hooked persistent style, 1-locular; valves loosely covered with appressed black hairs 0.1–0.2 mm, soon glabrescent.

- 3300–5100 m. Qinghai, Xinjiang, Xizang.

160. *Astragalus euchlorus* K. T. Fu, Bull. Bot. Res., Harbin 2(4): 67. 1982.

深绿黄耆 shen lü huang qi

Plants 30–40 cm tall, sparsely hairy. Stems glabrous or very sparsely covered with subappressed to ascending predominantly black hairs 0.1–0.25 mm. Leaves (3–)5–10 cm, subsessile or with short petiole; stipules 4–6 mm, behind stem connate in lower 1/2, glabrous or sparsely ciliate; rachis glabrous or hairy like stem but mostly with predominantly white hairs; leaflets in 8–12 pairs, narrowly elliptic, 5–13 × 2–6 mm, abaxially sparsely and adaxially very sparsely covered with subappressed hairs 0.5–0.8 mm, apex rounded to widely emarginate. Racemes 2–4 cm, many flowered; peduncle 8–11(–19) cm, sparsely black hairy like stem; bracts 2–3.5 mm, sparsely black hairy. Calyx 4–4.5 mm, densely covered with subappressed black hairs 0.3–0.5 mm; teeth 2–2.5 mm. Petals white, violet tipped; standard widely obovate, 5–7 × 4–4.5 mm; wings 5–6 mm; keel 4.5–5.5 mm. Ovary subsessile, densely appressed predominantly white hairy. Legumes unknown.

- About 3400 m. Sichuan.

161. *Astragalus golmunensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 61. 1980.

格尔木黄耆 ge er mu huang qi

Astragalus golmunensis var. *paucipilus* Y. H. Wu.

Plants 25–40 cm tall, covered with mostly spreading hairs 0.1–0.3 mm. Stems ascending to erect, sparsely to loosely white hairy, below nodes also black hairy. Leaves 3.5–6 cm; stipules 4–5 mm, lower ones distinctly to high connate behind stem, upper ones amplexicaul but free from each other, all mostly white ciliate; petiole short, like rachis loosely predominantly white hairy; leaflets of lower leaves in 4–6 pairs, mostly flat, elliptic, 4–8 × 2–4.5 mm, apex rounded to slightly emarginate, those of upper leaves in 6–9 pairs, narrowly elliptic, 8–12 × 3–4 mm, mostly folded, apex obtuse, all abaxially loosely to rather densely and adaxially loosely covered with appressed to subappressed white hairs. Racemes ovoid to oblong, many flowered; peduncle 8–10 cm, loosely to rather densely covered in basal part with predominantly white and in upper part with predominantly black hairs; bracts 3–3.5 mm, sparsely black hairy. Calyx ca. 4 mm, loosely to rather densely covered with subappressed to ascending black hairs; teeth unequal, 1–1.5 mm. Petals violet; standard ovate, 8–9 × ca. 5 mm; wings ca. 7 mm; keel ca. 5 mm. Ovary with a stipe ca. 1 mm, glabrous. Legumes unknown.

• 4100–4500 m. Qinghai.

162. *Astragalus havianus* E. Peter, Acta Horti Gothob. 12: 37. 1938.

华山黄耆 hua shan huang qi

Astragalus havianus var. *pallidiflorus* Y. C. Ho; *A. tataricus* Franchet var. *major* H. T. Tsai & T. T. Yu.

Plants up to 30 cm tall, sparsely hairy or subglabrous, rarely ± densely hairy, with appressed white and in inflorescence also black hairs 0.15–0.35 mm. Stems subglabrous to sparsely hairy. Leaves 3–7.5 cm; stipules green, 3–4 mm, ± high vaginate-connate behind stem, glabrous or sparsely ciliate; petiole short, like rachis sparsely to loosely hairy; leaflets in (5–)7–9 pairs, elliptic, 4–8(–15) × 1.5–4(–8) mm, flat, abaxially sparsely hairy, adaxially glabrous, rarely hairy on both surfaces, apex subacute. Racemes at anthesis densely 8–12-flowered, at fruiting time distinctly elongated; peduncle 4–6 cm, sparsely to loosely white hairy; bracts 1–1.5 mm, sparsely ciliate. Calyx 3–4 mm, sparsely to loosely white and black hairy; teeth unequal, 0.5–1.2 mm. Petals blue or pale purple; standard obovate, ca. 10 × 5–6 mm; wings ca. 9 mm; keel ca. 8 mm. Legumes with a stipe distinctly longer than calyx tube, obliquely ellipsoid, 7–8 mm, ca. 3 mm high, attenuate at both ends, dorsally shallowly grooved, with a short beak, nearly 1-locular; valves at first rather densely hairy, when ripe only with scattered black hairs.

• Loessic soil; 800–2000 m. Gansu, Qinghai, Shaanxi, Sichuan.

163. *Astragalus hysophilus* Podlech & L. R. Xu, Feddes Rept. 117: 226. 2006.

高地黄耆 gao di huang qi

Plants ca. 20 cm tall, loosely caespitose. Stems several, 10–17 cm, branched at base, sparsely to rather densely covered with appressed to subappressed or partly slightly ascending to spreading white hairs 0.2–0.4 mm, in basal part glabrescent. Leaves 4–7 cm; stipules 2.5–4 mm, free from petiole, behind

stem distinctly vaginate-connate, sparsely to loosely appressed to subappressed white hairy; petiole 0.5–1.5 cm, with rachis hairy like stem; leaflets in 8 or 9 pairs, narrowly elliptic, 5–10 × 2–4 mm, abaxially sparsely to rather densely covered with subappressed tangled white hairs 0.5–0.8 mm, adaxially glabrous, apex acute to subobtusate. Racemes ovoid, rather loosely 10–12-flowered; peduncle 5–6 cm, hairy like stem but in upper part with very few black hairs mixed in; bracts 1–2 mm, white or predominantly white hairy. Calyx ca. 3 mm, loosely to rather densely covered with subappressed tangled white hairs 0.3–0.5 mm and with shorter appressed black hairs; teeth 1–1.5 mm. Petals whitish when dry; standard widely obovate-orbicular, ca. 7 × 6 mm, apex emarginate; wings ca. 6 mm; keel ca. 5 mm. Legumes sessile, obliquely ellipsoid, curved, 5–6 mm, ca. 2 mm high and ca. 1.5 mm wide, with a beak ca. 0.5 mm, incompletely 2-locular; valves rather densely covered with slightly ascending white hairs 0.2–0.3 mm, with some black hairs mixed in.

• E Xizang (Mainling).

164. *Astragalus jiazaensis* Podlech & L. R. Xu, Novon 17: 242. 2007.

加查黄耆 jia cha huang qi

Plants up to 25 cm tall. Stems several, ± erect, sparsely to loosely covered with subappressed to slightly ascending white hairs 0.2–0.6 mm, with some shorter black hairs mixed in. Leaves 6–10 cm, upper ones subsessile, lower ones with a petiole 1.5–2.5 cm; stipules 5–6 mm, lower ones shortly connate behind stem, upper ones free from each other, all sparsely to loosely covered with subappressed, at margins with ± spreading, white hairs 0.4–1 mm; rachis sparsely hairy like stem; leaflets in 11–15 pairs, narrowly elliptic to elliptic, 8–15 × 1–4 mm, abaxially loosely covered with subappressed hairs 0.4–0.6 mm, adaxially glabrous, apex acute to acuminate. Racemes 2.5–4 cm, rather densely many flowered; peduncle 4–7 cm, sparsely hairy like stem; bracts 1.5–2(–3) mm, predominantly black hairy. Calyx 3–4 mm, loosely covered with subappressed black and white hairs 0.2–0.5 mm; teeth unequal, upper 0.5–0.8 mm, 3 lower 1.5–1.8 mm. Petals pale violet, keel with deep-purple tip; standard widely obovate, ca. 7 × 3–3.5 mm, apex deeply emarginate; wings ca. 5.5 mm; keel ca. 4.5 mm. Legumes sessile, narrowly ellipsoid, curved, 6–7 mm, ca. 2.5 mm high and wide, very shortly acuminate, 1-locular; valves loosely covered with appressed black hairs 0.2–0.3 mm, glabrescent with age.

• E Xizang (Gyaca).

165. *Astragalus maowensis* Podlech & L. R. Xu, Sendtnera 7: 200. 2001.

茂文黄耆 mao wen huang qi

Astragalus aridicola P. C. Li (1989), not Sosnowsky (1948, “*aridicolus*”).

Plants 5–12 cm tall (grazed, probably distinctly taller), furnished with hairs mostly 0.2–0.4 mm. Stem loosely to densely hairy. Leaves (4–)8–12 cm; stipules 2–3 mm, connate behind stem to middle, densely hairy; petiole short, like rachis sparsely

to loosely covered with spreading white hairs, at base also with some black or predominantly with black hairs; leaflets in 8–11 pairs, in lateral branches in fewer pairs, narrowly elliptic, 10–16 × 3.5–7 mm, abaxially loosely to rather densely covered with appressed hairs 0.5–0.8 mm, adaxially glabrous or sparsely hairy like abaxial surface, apex subacute to obtuse. Racemes ovoid, many flowered; peduncle 3–7 cm, loosely spreading white hairy; bracts 2–3 mm, white hairy. Calyx ca. 5 mm, sparsely to loosely subappressed white hairy; teeth 2–3 mm. Petals white-green or white; standard elliptic, 9–11 × ca. 5 mm; wings 8–10 mm; keel 8.5–10 mm. Legumes (unripe) pendulous, with a stipe ca. 3 mm, white hairy.

- Sichuan (Maowen).

166. *Astragalus mekongensis* Podlech, Feddes Repert. 120: 54. 2009.

湄公黄耆 mei gong huang qi

Plants ca. 20 cm tall. Stems 12–16 cm, densely covered with appressed to ascending or even spreading white hairs 0.2–0.3 mm. Leaves 5–10 cm; stipules 6–10 mm, all distinctly connate behind stem, densely hairy; petiole up to 2 cm, hairy like stem; leaflets of main stem leaves in 10–13 pairs, 8–15 × 2.5–6 mm, abaxially rather densely hairy, adaxially glabrous or sparsely hairy. Racemes rather densely 10–20-flowered; peduncle 5–7 cm, covered with ascending to spreading white hairs, below raceme also with black hairs; bracts ca. 4 mm, black hairy. Calyx 4.5–5 mm, rather densely covered with subappressed black hairs 0.3–0.8 mm; teeth subulate, longer ones 2.5–3 mm. Petals white, tip of keel sometimes purple; standard 9–10 × 4.5–5 mm, without distinct claw, apex emarginate; wings ca. 8 mm; keel 6–6.5 mm. Legumes (unripe) sessile, slightly curved, 5–7 mm, ca. 2 mm high, densely white and black hairy.

- 3300–3400 m. E Xizang.

167. *Astragalus minutidentatus* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 108. 1981.

小齿黄耆 xiao chi huang qi

Plants furnished with ± flattened hairs, mostly with an acute appendix at base and therefore subbasifixed. Stems prostrate to ascending, up to 12 cm, densely to rather densely hairy; hairs subappressed to ascending, in upper part to spreading, white, at nodes also black. Leaves 2.5–4 cm, subsessile; stipules 2–3 mm, lower ones distinctly connate behind stem, hairy; rachis subappressed white hairy; leaflets in 6–10 pairs, elliptic, 3–7 × 1.5–3.5 mm, abaxially somewhat densely covered with subappressed, ± straight, white hairs, adaxially loosely covered with subappressed flexuous hairs, apex rounded to emarginate. Racemes densely 6–8-flowered; peduncle 1–2 cm, with ascending to spreading white and black hairs; bracts 1.5–2 mm, white and black hairy. Calyx ca. 4 mm, subappressed black hairy; teeth 0.2–0.5 mm. Petals lilac; standard obovate, ca. 9 × 3.5 mm; wings ca. 9 mm; keel ca. 8 mm. Ovary subsessile, white hairy, without a visible septum. Legumes with a stipe ca. 2 mm, ± erect, obliquely ellipsoid, 5–7 mm, ca. 3 mm high and wide, with a beak ca. 1 mm, 1-locular; valves loosely to rather densely covered with subappressed to slightly ascending black hairs 0.1–0.3 mm, sometimes also with white hairs when young.

2100–4900 m. Xizang [Bhutan, India, Nepal].

168. *Astragalus monbeigii* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 243. 1915.

异长齿黄耆 yi chang chi huang qi

Astragalus pullus N. D. Simpson var. *pubifolius* C. C. Ni & P. C. Li.

Plants up to 30 cm tall. Stems sparsely to loosely or in upper part to rather densely hairy; hairs appressed, white, at nodes also black, 0.1–0.3 mm. Leaves 7–12 cm; stipules 5–10 mm, behind stem distinctly connate, sometimes up to 3/4 of length, appressed white hairy; petiole 1.5–4.5 cm, with rachis sparsely to loosely hairy like stem; leaflets in 7–10 pairs, elliptic, 8–16 × 3–7 mm, abaxially sparsely to loosely covered with subappressed to ascending or even partly spreading white hairs 0.6–1 mm, adaxially glabrous or sparsely hairy like abaxial surface, apex rounded to acute or very shortly mucronulate. Racemes ovoid, up to 20-flowered; peduncle 5–11 cm, sparsely white, below raceme increasingly black hairy; bracts 3–4 mm, predominantly black hairy. Calyx 5–7 mm, loosely covered with appressed black hairs 0.2–0.4 mm and sometimes with some white hairs 0.5–0.7 mm; teeth unequal 2.5–4.5 mm. Petals violet; standard widely ovate to rhombic-orbicular, 10.5–12 × 7–8 mm; wings 8–11 mm; keel 7–9 mm. Legumes ± spreading, with a stipe ca. 2 mm, 5–6 mm, 2–2.5 mm high and wide, with a minute beak, incompletely 2-locular; valves loosely ± appressed white and black hairy.

- 3200–4800 m. Qinghai, Sichuan, Xizang, Yunnan.

169. *Astragalus montivagus* Podlech & L. R. Xu, Feddes Repert. 117: 227. 2006.

如多黄耆 ru duo huang qi

Plants 7–20 cm tall, caespitose. Stems numerous, 3–16 cm, loosely covered with subappressed white hairs 0.2–0.4 mm. Leaves 1.5–5.5 cm; stipules 3–4 mm, behind stem connate to middle or higher up, subglabrous or sparsely hairy; petiole 0.5–2 cm, with rachis loosely to rather densely hairy like stem; leaflets in 6–9 pairs, narrowly elliptic to obovate, 2–5 × 0.8–2 mm, abaxially loosely to rather densely and adaxially loosely covered with subappressed white hairs 0.3–0.6 mm, apex obtuse. Racemes rather densely 8–15-flowered; peduncle 3–8 cm, sparsely white hairy like stem, with some black hairs mixed in; bracts ca. 1 mm, white ciliate. Calyx ca. 3 mm, rather densely covered with subappressed white hairs 0.3–0.6 mm, with shorter black hairs mixed in, especially toward teeth; teeth unequal, 0.7–1 mm. Petals light purple in life; standard rhombic-elliptic, 6–7 × 4–4.5 mm, apex emarginate; wings 6–6.5 mm; keel ca. 6 mm. Legumes with a stipe ca. 1 mm, narrowly oblong, distinctly curved, 4–5 mm, ca. 1.5 mm high and wide, acute, 1-locular; valves loosely covered with appressed white hairs ca. 0.3 mm, sometimes with a few black hairs mixed in.

- Xizang.

170. *Astragalus nanjiangianus* K. T. Fu, Bull. Bot. Res., Harbin 2(4): 69. 1982.

南疆黄耆 nan jiang huang qi

Plants 10–20 cm tall. Stems sparsely covered with appressed white hairs 0.2–0.3 mm. Leaves 2.5–3.5 cm; stipules 3–5 mm, behind stem connate to middle, sparsely to loosely appressed black or black and white hairy; petiole short, with rachis hairy like stem; leaflets in 6–8 pairs, elliptic, 3–4 × 1.5–2 mm, abaxially more densely appressed white hairy, adaxially glabrous or sparsely appressed white hairy, apex obtuse to slightly retuse. Racemes short, 10–15-flowered; peduncle 3.5–15 cm, sparsely to loosely hairy like stem but toward raceme hairs increasingly black; bracts 1.5–3 mm, sparsely black hairy. Calyx 4–5 mm, loosely covered with appressed black hairs 0.05–0.3 mm, sometimes also with some white hairs; teeth 1–2 mm. Petals violet; standard obovate to elliptic, 9–10 × ca. 5 mm; wings 8–9 mm; keel ca. 7 mm. Ovary with a stipe 1–2 mm, slightly white hairy. Legumes unknown.

- 2500–3200 m. Xinjiang.

171. *Astragalus oreocharis* Podlech & L. R. Xu, Feddes Rept. 117: 228. 2006.

山黄耆 shan huang qi

Plants ca. 30 cm tall. Stems few, erect, 15–20 cm, rather densely furnished with white, appressed to subappressed and partly ascending, sometimes curved, tangled hairs 0.5–1 mm, with some spreading hairs mixed in, in upper part also with some black hairs. Leaves 7–10 cm; stipules 8–12 mm, shortly adnate to petiole, behind stem distinctly connate, densely to rather densely hairy like stem; petiole 1–3 cm, with rachis hairy like stem; leaflets in 7 or 8 pairs, elliptic, 10–20 × 3–7 mm, abaxially somewhat densely and adaxially loosely covered with subappressed to slightly ascending, partly curved, tangled hairs 0.8–1 mm, apex obtuse to slightly retuse. Racemes 4–5 cm, loosely many flowered; peduncle 6–10 cm, hairy like stem; bracts 4–5 mm, predominantly white hairy. Calyx ca. 5 mm, densely covered with subappressed black hairs 0.2–0.5 mm and with white hairs up to 1 mm; teeth 2–2.5 mm. Petals violet, partly even when dry; standard elliptic, ca. 9 × 5.5 mm, apex emarginate; wings ca. 8 mm; keel ca. 7 mm. Ovary with a stipe ca. 1 mm, white hairy. Legumes unknown.

- Xizang.

172. *Astragalus polycladus* Bureau & Franchet, J. Bot. (Morot) 5: 23. 1891.

多枝黄耆 duo zhi huang qi

Astragalus decumbens Komarov; *A. nigrescens* Franchet (1890), not Pallas (1800), nor Nuttall (1847), nor (Hooker) A. Gray (1862); *A. polycladus* var. *glabricarpus* Y. H. Wu; *A. polycladus* var. *nigrescens* E. Peter.

Plants 10–50 cm tall; hairs ± subappressed, in vegetative parts nearly only white, in inflorescence also black. Stems sparsely to loosely covered with hairs 0.2–0.4 mm. Leaves 4–6 cm, sessile; stipules 3–4 mm, behind stem distinctly connate, sometimes up to 3/4 of length, upper ones sometimes nearly free, all hairy or subglabrous; rachis loosely hairy; leaflets in 5–11 pairs, narrowly elliptic, 4–9(–14) × 2–4(–5) mm, abaxially loosely to densely and adaxially sparsely to loosely covered with hairs 0.5–1 mm, apex rounded to emarginate. Ra-

cemes ovoid to shortly cylindric, rather densely many flowered; peduncle 3–8 cm, loosely or in upper part more densely covered with white or black hairs 0.2–0.3 mm; bracts 2–3 mm, white and black hairy. Calyx 3–4 mm, loosely covered with black hairs 0.1–0.3 mm and mostly with some white hairs 0.5–0.7 mm; teeth 0.8–2.5 mm. Petals pale violet, with darker keel; standard elliptic, 6–7 × 3–4; wings 5–6 mm; keel 5–5.5 mm. Legumes spreading to slightly pendulous, with a stipe ca. 2 mm, 5–10 mm, 1.8–3 mm high and wide, with a minute beak, incompletely 2-locular; valves rather densely covered with subappressed to ascending white or white and black hairs 0.3–0.4 mm.

- Meadows, roadsides, light scrub; 2000–4500 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan.

173. *Astragalus praeteritus* Podlech & L. R. Xu, Feddes Rept. 117: 228. 2006.

贡觉黄耆 gong jue huang qi

Plants ca. 10 cm tall, loosely caespitose. Stems several, 4–6 cm, branched at base, sparsely to loosely covered with appressed to subappressed white hairs 0.1–0.4 mm, at nodes also with black hairs, partly glabrescent. Leaves 2–3 cm, subsessile or with a petiole up to 0.8 cm; stipules 3–4 mm, adnate to petiole for ca. 1 mm, behind stem high distinctly vaginate-connate, sparsely to loosely subappressed white and black hairy; rachis sparsely to loosely covered with subappressed white hairs up to 0.3 mm; leaflets in 7–10 pairs, elliptic, 4–7 × 1.5–3 mm, abaxially at midrib and margins loosely furnished with subappressed white hairs 0.5–0.8 mm, otherwise glabrous or with scattered hairs only, adaxially glabrous, apex rounded. Racemes ovoid, rather densely ca. 10-flowered; peduncle 1.5–3 cm, hairy like stem but in upper part with some black hairs mixed in; bracts ca. 2 mm, white hairy. Calyx ca. 4 mm, sparsely covered with appressed black hairs 0.1–0.3 mm, with some white hairs mixed in; teeth 1.5–2 mm. Petals whitish yellow when dry; standard elliptic, ca. 11 × 5.5 mm, apex slightly emarginate; wings ca. 8 mm; keel ca. 6.5 mm. Legumes sessile, obliquely oblong, slightly curved, 4–5 mm, ca. 1.8 mm high and wide, with a beak ca. 0.5 mm, 1-locular; valves glabrous.

- E Xizang (Gonjo).

174. *Astragalus pullus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 125. 1913.

黑毛黄耆 hei mao huang qi

Plants up to 30 cm tall, ± subappressed hairy. Stems very sparsely covered with black hairs 0.2–0.5 mm. Leaves 5–10 cm; stipules 3–7 mm, behind stem distinctly connate to 1/2 of length, upper ones sometimes nearly free, glabrous to subglabrous; petiole 1.5–2.2 cm, like rachis sparsely white or white and black hairy; leaflets in 7–11 pairs, narrowly elliptic, 5–12 × 2–5 mm, abaxially sparsely white hairy, adaxially glabrous or very sparsely hairy, apex rounded to slightly retuse. Racemes ovoid, rather densely 13–15-flowered; peduncle 7–14 cm, loosely hairy like stem; bracts 3–4 mm, white and black ciliate. Calyx 5–6 mm, densely black hairy; teeth 2.5–3 mm. Petals blue; standard elliptic, 10–11 × 5–5.5 mm; wings 8.5–9 mm; keel 8–8.5 mm. Ovary with a stipe ca. 2 mm, narrowly

ellipsoid, sparsely white hairy to glabrous. Legumes with a stipe 3–4 mm, slightly curved, 8–9 mm, ca. 2.5 mm high and ca. 2 mm wide, shortly acuminate, incompletely 2-locular; valves loosely covered with subappressed black hairs 0.1–0.3 mm.

• Meadows, roadsides, light scrub; 2600–3700 m. Sichuan, Xizang, Yunnan.

175. *Astragalus sikkimensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 23. 1868.

锡金黄耆 xi jin huang qi

Astragalus inconspicuus Baker; *A. tenuicaulis* Bunge.

Plants up to 60 cm tall, sparsely covered with wide, distinctly flattened or sometimes bladderlike hairs. Stems ascending to erect, with ± long internodes, sparsely to loosely covered with appressed, partly bladderlike-globose, white or also black hairs 0.05–0.3 mm or nearly glabrous, in uppermost part of stem densely to more densely hairy, sometimes branched. Leaves 3–7 cm, subsessile or with short petiole; stipules 1.5–4 mm, ± distinctly and sometimes high connate behind stem, subglabrous; rachis hairy like stem; leaflets in 5–11 pairs, elliptic to obovate, 3–8 × 1–4 mm, sparsely to loosely covered with appressed white hairs 0.2–0.5 mm abaxially, glabrous adaxially, apex emarginate or more rarely rounded; leaves of lateral branches smaller in all parts. Racemes ovoid, loosely to densely 3- to many flowered, strongly elongated in fruit; peduncle 1–4 cm, loosely to rather densely hairy like stem but mostly with predominantly black hairs; bracts 1.5–3 mm, white or black hairy. Calyx 4.5–6 mm, loosely to rather densely covered with appressed black hairs 0.2–0.3 mm; teeth 0.7–2 mm. Petals pale pinkish to purple; standard elliptic, 8–12 × 4–5 mm; wings 8–10 mm; keel 8–10 mm. Legumes with a stipe 1–2 mm, 5–10 mm, 3–4 mm high and wide, with a straight or bent beak 1–1.5 mm, 1-locular; valves densely covered with appressed to ascending black hairs up to 0.2 mm, sometimes also with minute bladderlike-globose hairs.

Riversides, hillsides among herbs; 2700–4600 m. Xizang [Bhutan, India, Nepal].

176. *Astragalus strictus* Graham ex Benth in Royle, Ill. Bot. Himal. Mts. 198. 1835.

笔直黄耆 bi zhi huang qi

Astragalus ladakensis Balakrishnan.

Plants 8–30 cm tall, appressed hairy. Stems sparsely to loosely covered with white and a few or sometimes also more black hairs 0.3–0.6 mm. Leaves 4–7 cm; stipules 3.5–6.5 mm, at least lower ones ± distinctly and sometimes high connate behind stem, loosely to rather densely covered with mostly white hairs up to 1 mm; petiole 1–2 cm, with rachis hairy like stem; leaflets in 8–12 pairs, narrowly elliptic to elliptic, (3–)4–10 × 1–4.5 mm, abaxially somewhat densely hairy, adaxially sparsely to loosely hairy, apex narrowly rounded to slightly emarginate. Racemes ovoid, densely up to 20-flowered; peduncle 5–8 cm, sparsely to loosely hairy like stem; bracts 2–3 mm, white and black hairy. Calyx 3.5–4 mm, rather densely covered with appressed white hairs up to 1 mm and with mostly shorter black hairs, sometimes with predominantly black hairs; teeth 1–2

mm. Petals pale pinkish to purple; standard elliptic, 7–9 × 4–5.5(–6) mm; wings 6–8 mm; keel 5.5–7 mm. Legumes with a stipe ca. 2 mm, 6–8 mm, ca. 3 mm high and ca. 2 mm wide, with a beak 0.5–1 mm, 1-locular; valves loosely covered with subappressed white and black hairs 0.3–0.7 mm.

Alpine steppic grasslands, stony slopes; 3000–5600 m. Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Kashmir, Nepal].

177. *Astragalus sungpanensis* E. Peter, Acta Horti Gothob. 12: 34. 1938.

松潘黄耆 song pan huang qi

Astragalus polycladus Bureau & Franchet var. *magniflorus* Y. H. Wu; *A. sungpanensis* f. *albiflorus* Y. H. Wu.

Plants up to 28 cm tall; hairs appressed to subappressed, in vegetative parts only white, in inflorescence also black. Stems loosely covered with hairs up to 0.3 mm. Leaves 4–8 cm, subsessile; stipules 3–4 mm, behind stem distinctly vaginate-connate, often reflexed, white ciliate; rachis loosely hairy; leaflets in 8–14 pairs, elliptic, 4–8 × 2–4 mm, abaxially somewhat densely and adaxially sparsely to loosely covered with hairs up to 1 mm, apex rounded to retuse. Racemes ovoid, many flowered; peduncle 4–7 cm, loosely white, toward raceme also black hairy; bracts ca. 2 mm, white ciliate. Calyx 4–5 mm, covered with a few appressed white hairs up to 0.5 mm and loosely to rather densely covered with much shorter, subappressed to slightly ascending, black hairs; teeth 1.5–2.5 mm. Petals violet; standard obovate, 10–11 × 5–5.5 mm; wings 9–10 mm; keel 7.5–8 mm. Ovary with a slender stipe 1–1.5 mm, densely white hairy. Legumes with a stipe 1–2 mm, oblong, distinctly curved, 7–8 mm, 2–3 mm high and wide, with a very short beak, 1-locular; valves rather densely covered with appressed black hairs 0.4–0.5 mm with some white hairs mixed in.

• 3000–4600 m. Gansu, Qinghai, Sichuan.

178. *Astragalus tibeticola* Podlech & L. R. Xu, Novon 14: 224. 2004.

藏黄耆 zang huang qi

Plants 15–25 cm tall. Stems branched at base, sparsely to loosely covered with appressed to subappressed white hairs 0.4–0.7 mm, at nodes also with black hairs. Leaves 6–12 cm; stipules 6–9 mm, high vaginate-connate behind stem, sparsely to loosely appressed, mostly white hairy; petiole 1–3 cm, like rachis loosely white hairy; leaflets in 9–11 pairs, narrowly elliptic, 7–17 × 3–6 mm, abaxially sparsely furnished with appressed white hairs 0.5–1 mm, adaxially glabrous, apex rounded to slightly emarginate. Racemes ovoid, rather loosely 7–15-flowered; peduncle 5–6 cm, hairy like stem but in upper part with predominantly black hairs; bracts 2.5–3 mm, predominantly black hairy. Calyx 4–5 mm, rather densely covered with appressed black hairs 0.2–0.3 mm and with fewer, slightly longer white hairs; teeth 1.5–2 mm. Petals mauve with whitish center, keel purplish mauve; standard widely elliptic to transversely elliptic, 6–8 × ca. 5 mm; wings ca. 6 mm; keel ca. 5 mm. Legumes sessile, obliquely ellipsoid, 4–7 mm, 2–2.5 mm high and 2.5–3 mm wide, with a beak ca. 0.5 mm, incompletely 2-locular; valves loosely covered with subappressed white or black hairs 0.2–0.4 mm.

- Xizang.

179. *Astragalus yangii* C. Chen & Z. G. Qian, *Acta Bot. Yunnan.* 19: 237. 1997.

竟生黄耆 jing sheng huang qi

Plants 2–6 cm tall. Stems ascending to erect, appressed hairy or nearly glabrous. Leaves 1.5–3 cm, subsessile; stipules 1–2 mm; leaflets in 4–7 pairs, elliptic to obovate, 2–3 × ca. 1.5 mm, abaxially densely and adaxially sparsely appressed hairy, rounded to retuse. Racemes 3–6-flowered; peduncle ca. 1 cm; bracts sparsely hairy. Calyx 3–4 mm, with appressed black hairs; teeth 1.5–2 mm. Petals pale yellowish; standard elliptic, ca. 10 × 5 mm; wings ca. 9 mm; keel ca. 8 mm. Ovary subsessile, linear, glabrous. Legumes unknown.

- About 4200 m. NW Yunnan (Zhongdian).

180. *Astragalus yunningensis* H. T. Tsai & T. T. Yu, *Bull. Fan Mem. Inst. Biol.* 9: 267. 1940.

永宁黄耆 yong ning huang qi

Plants 2–20 cm tall, caespitose. Stems numerous, 2–16 cm, very sparsely covered with appressed white hairs 0.1–0.4 mm or nearly glabrous. Leaves 1–5.5 cm; stipules 2.5–4 mm, connate behind stem to middle, subglabrous or sparsely white appressed hairy; petiole very short or up to 2 cm, with rachis very sparsely to loosely hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, 1–5 × 0.3–1(–2) mm, abaxially loosely to rather densely covered with appressed white hairs, adaxially glabrous or sparsely to rather loosely hairy, apex subacute to retuse or emarginate. Racemes 5–11-flowered; peduncle 1.5–3.5 cm, slender, appressed white hairy; bracts 0.5–1.5 mm. Calyx 2–3 mm, loosely covered with appressed white and predominantly black or only black hairs 0.1–0.3 mm; teeth up to 1 mm. Petals white, keel with violet tip; standard rhombic-suborbicular, 6–7 × 4–4.5 mm, apex emarginate; wings ca. 5.5 mm, limbs narrowed toward apex, subacute; keel ca. 5 mm. Legumes with a stipe ca. 1 mm, narrowly obliquely ellipsoid, slightly curved, 5–6 mm, 1.8–2 mm high and wide, incompletely 2-locular; valves rather densely covered with appressed white or white and black hairs 0.1–0.3 mm.

- Sichuan, Xinjiang, Xizang, Yunnan.

181. *Astragalus yutianensis* Podlech & L. R. Xu, *Feddes Repert.* 117: 229. 2006.

于田黄耆 yu tian huang qi

Plants ca. 25 cm tall. Stems several to many, up to 20 cm, branched at base, sparsely to somewhat loosely covered with appressed to subappressed white hairs 0.02–0.2 mm, with a few black hairs mixed in, at nodes also with black hairs. Leaves 3–4 cm; stipules 2–3 mm, shortly adnate to petiole, those of lower leaves behind stem vaginate-connate, those of upper leaves free from each other, sparsely hairy or subglabrous; petiole 0.5–1 cm, hairy like stem; leaflets in 4–6 pairs, narrowly elliptic to elliptic, 4–8 × 1.5–3 mm, abaxially sparsely to loosely hairy like stem, adaxially glabrous, apex obtuse. Racemes ovoid,

rather densely 7–15-flowered; peduncle 7–12 cm, hairy like stem but in upper part hairs increasingly black; bracts 2–3 mm, sparsely predominantly black hairy. Calyx 3–4 mm, loosely covered with appressed black hairs ca. 0.1 mm; teeth 1–1.5 mm. Petals probably violet, whitish when dry; standard widely elliptic, ca. 7 × 5 mm, apex emarginate; wings ca. 6 mm, limbs obovate-spatulate, widest near widely rounded tip; keel ca. 5 mm. Ovary subsessile, glabrous. Legumes unknown.

- Xinjiang (Kunlun Shan).

182. *Astragalus zacharensis* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 23. 1868.

小果黄耆 xiao guo huang qi

Astragalus hulunensis P. Y. Fu & Y. A. Chen; *A. tataricus* Franchet; *Phaca brachycarpa* Turczaninow.

Plants up to 50 cm tall; hairs appressed to subappressed, in vegetative parts nearly only white, in inflorescence also black. Stems sparsely to loosely covered with white hairs 0.1–0.3 mm. Leaves 2–5 cm; stipules 1.5–2.5 mm, behind stem distinctly vaginate-connate, sometimes to middle, loosely hairy or white ciliate; petiole short, with rachis sparsely to loosely hairy like stem; leaflets in 6–11 pairs, narrowly elliptic, 2–6 × 1–2.5 mm, abaxially loosely covered with hairs 0.5–1 mm, adaxially glabrous or hairy only at margins, apex obtuse to retuse. Racemes ovoid, rather densely 5–12-flowered, later elongating; peduncle 1.5–6 cm, loosely hairy like stem; bracts ca. 1 mm, white ciliate. Calyx 2.5–3 mm, loosely black and white hairy; teeth 0.3–1 mm. Petals white to pale violet; standard elliptic to orbicular, 6.5–8 × (3–)4–5 mm; wings 6–7 mm; keel 6–7.5 mm. Legumes nodding, with a stipe 1–2 mm, 5–7 mm, ca. 2 mm high and wide, very shortly acuminate, 1-locular; valves rather densely covered with appressed white hairs up to 0.3 mm.

1000–3400 m. Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang [Mongolia].

We have seen no material of *Astragalus hulunensis*. According to the description, it most probably belongs to *A. zacharensis*, although it was described as a member of *A. sect. Komaroviella*.

183. *Astragalus zayuensis* C. C. Ni & P. C. Li, *Acta Phytotax. Sin.* 18: 369. 1980.

察隅黄耆 cha yu huang qi

Plants sparsely hairy. Stems strongly branched, nearly glabrous or hairy when young. Leaves 3–4 cm, subsessile; stipules ca. 3 mm, sparsely hairy, behind stem connate to middle; rachis hairy or nearly glabrous; leaflets in 4–6 pairs, narrowly elliptic, 4–7 × 2–3 mm, sparsely hairy abaxially, glabrous adaxially, apex emarginate. Racemes 4- or 5-flowered; peduncle 0.5–1.2 cm, subglabrous. Calyx ca. 5 mm, sparsely covered with white and black hairs or subglabrous; teeth ca. 1.7 mm. Petals purple-red; standard elliptic, ca. 9 × 5 mm; wings ca. 8 mm; keel ca. 7.5 mm. Legumes with a stipe ca. 3.5 mm, oblong, ca. 10 mm, 3–4 mm high, with a short beak, 1-locular; valves sparsely white hairy.

- About 1700 m. SE Xizang (Zayü).

24. Astragalus sect. **Chrysopteri** Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 56. 1980 [*“Chrysopterus”*].

金翼组 jin yi zu

Plants herbaceous, with long developed stems. Stem and rachis subglabrous to glabrous. Stipules free from petiole and from each other. Inflorescences several in axil of upper stem. Pedicels 1–2 mm. Bracteoles absent. Petals yellow; wings shorter than standard, limbs with a long, linear-acute auricle 2–4.5 mm, mostly as long as or longer than claw; keel longer than wings. Stigma glabrous. Legumes keeled ventrally and dorsally, 1-locular, with thin walls.

- Two species: China.

- 1a. Leaflets glabrous adaxially, sparsely covered abaxially with hairs 0.1–0.3 mm; calyx glabrous or with a few hairs at upper margins and teeth; petals all of nearly equal length, 8–13 mm; legumes glabrous 185. *A. chrysopterus*
 1b. Leaflets adaxially very sparsely and abaxially more densely covered with hairs 0.6–1 mm; calyx white and black hairy; standard and keel 14–15 mm, wings ca. 10 mm; legumes black or white and black hairy 184. *A. brevialetus*

184. Astragalus brevialetus H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 257. 1940.

金翼黄耆 jin yi huang qi

短翼黄耆 duan yi huang qi

Astragalus chrysopterus var. *wutaicus* Handel-Mazzetti;
A. coronilloides Ulbrich.

Plants up to 60 cm tall, rather sparsely hairy. Stems several, ascending to erect, sparsely covered with appressed white hairs 0.2–0.3 mm. Leaves 5–9 cm, subsessile; stipules 3–5(–9) mm, spreading, glabrous or with a few hairs at margins; leaflets in 5–9 pairs, narrowly ovate to narrowly elliptic, 7–15 × 4–5 mm, abaxially somewhat densely and adaxially very sparsely covered with appressed white hairs 0.6–1 mm, apex rounded to slightly retuse. Racemes 1.5–2.5 cm, rather densely 6–12-flowered, later somewhat elongating and loose; peduncle 5–9 cm, white and black hairy; bracts 1–2 mm. Calyx 4–5 mm, black and white hairy; teeth ca. 2 mm. Petals pale yellow; standard ovate, 14–15 × ca. 7 mm, apex widely emarginate; wings ca. 10 mm, limbs ca. 6 × 2 mm, auricle linear, 2–3 mm, acute; keel 14–15 mm. Legumes obliquely ellipsoid, curved, 10–12 mm, 2.5–3 mm high, long attenuate at base; valves sparsely covered with black or mixed black and white hairs.

Plants up to 60(–100) cm tall; hairs appressed to subappressed, white, in inflorescence also black, 0.1–0.3 mm. Stem slender, sometimes branched in lower part or throughout length, glabrous or subglabrous. Leaves (2–)4–7 cm, subsessile; stipules soon falling, 3–5(–9) mm, mostly reflexed, glabrous; rachis very sparsely mostly white hairy to subglabrous; leaflets in 5–11 pairs (in leaves of lateral branches in 3 or 4 pairs only), remote, narrowly elliptic, (4–)7–14 × (2–)3–5 mm, abaxially sparsely hairy, adaxially glabrous, apex obtuse or slightly retuse to very shortly acuminate. Racemes 6–10 cm, remotely 6–20-flowered; peduncle (0.8–)2–6 cm, subglabrous; bracts 1.5–5 mm, mostly falling, subglabrous. Calyx 4–6 mm, glabrous or rarely rather densely covered with subappressed black hairs; teeth 1–3 mm. Standard widely obovate, 9–13 × 5–7 mm, apex widely emarginate; wings 8–12 mm, limbs 6–8 × 1.5–2.5 mm, auricle linear, 2–4 mm, as long as slightly curved claw, acute; keel 10–13 mm. Legumes obliquely ellipsoid, 8–10 mm, ca. 4 mm high and wide, long attenuate at base; valves glabrous.

- About 2600 m. Sichuan (Muli).

- 1600–3700 m. Gansu, Hebei, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

185. Astragalus chrysopterus Bunge, Mélanges Biol. Bull. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 10: 51. 1877.

25. Astragalus sect. **Ebracteolati** N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 253. 1915.

无小苞组 wu xiao bao zu

Plants herbaceous, with developed stem; hairs basifixed. Stipules free from petiole and from each other. Inflorescence solitary on 1 stem. Pedicels 2–3.5 mm. Petals yellow; standard with a very short claw; wings as long as or shorter than standard, limbs rounded at apex, with a long, linear-acute auricle mostly as long as claw; keel often longer than wings. Legumes with a slender stipe 5–8 mm, 1-locular, with thin walls.

- Two species: China.

- 1a. Leaflets in 1 or 2 pairs, 8–20 × 7–13 mm; calyx rather densely covered with blackish brown hairs; legumes 15–18 mm, densely black hairy 187. *A. smithianus*
 1b. Leaflets in 5–10 pairs, 5–14 × 3–5 mm; calyx sparsely covered with white and blackish hairs; legumes 18–28 mm, covered with blackish hairs 0.3–0.6 mm and with white hairs up to 1 mm 186. *A. craibianus*

186. Astragalus craibianus N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 240. 1915.

Plants 10–18 cm tall, sparsely covered with subappressed to ascending, white to mostly dark brownish or blackish hairs 0.5–1 mm. Stems ascending to erect, 3–12 cm, glabrous. Leaves 4–8 cm; stipules 8–15 mm, glabrous or very sparsely ciliate; petiole 1–2 cm, like rachis mostly glabrous; leaflets in 5–10 pairs, narrowly elliptic, 5–14 × 3–5 mm, abaxially sparsely

川西黄耆 chuan xi huang qi

Astragalus craibianus var. *baimashanensis* C. Chen & Z. G. Qian; *A. saccatocarpus* K. T. Fu.

hairy or subglabrous, adaxially glabrous, apex obtuse to subacute, shortly acuminate-mucronulate. Racemes 2–3 cm, rather densely 4–9-flowered; peduncle solitary on 1 stem, 3–7 cm, sparsely hairy; bracts 5–10 mm, sparsely ciliate. Calyx 6–7 mm, sparsely to rather loosely covered with white and predominantly brownish to blackish hairs; teeth 3–4 mm. Petals bronzy yellow; standard widely obovate to suborbicular, 14–16 × 8–10 mm, strongly recurved above claw, apex rounded to scarcely emarginate; wings 15–16 mm, limbs ca. 10 × 4 mm, auricle narrow, 3–3.5 mm, apex acute; keel 15–16 mm. Style with minute hairlets below stigma. Legumes inflated obovoid, 18–28 mm, ca. 5 mm high and 9–10 mm wide, rounded ventrally and dorsally, with a minute beak; valves rather densely covered with subappressed to slightly ascending blackish hairs 0.3–0.6 mm and with longer white hairs up to 1 mm.

- 3300–4800 m. Sichuan, Yunnan.

26. *Astragalus* sect. *Pseudotapinodes* Podlech & L. R. Xu, *Sendtnera* 7: 199. 2001.

假短茎组 *jia duan jing zu*

Similar to *Astragalus* sect. *Poliothrix* but plants acaulescent to subacaulescent, at most up to 10 cm tall. Stipules adnate to or distinctly connate before petiole. Legumes incompletely 2-locular, so far as known (not 1-locular).

Seven species: Bhutan, China, India, Nepal; six species (four endemic) in China.

- 1a. Standard 6–7 mm.
- 2a. Leaflets 2–4 × 1–2 mm, adaxially hairy toward margins; peduncle only with white hairs; legumes loosely predominantly white hairy 192. *A. orbicularifolius*
- 2b. Leaflets 4–8 × 2–3.5 mm, glabrous adaxially; peduncle toward raceme with black hairs; legumes densely black hairy 191. *A. longiscapus*
- 1b. Standard 9–12 mm.
- 3a. Stipules adnate to petiole for 1–2 mm and connate to each other before petiole further up; leaflets in 8–11 pairs, 4–9 mm; ovary and legumes black hairy 193. *A. rigidulus*
- 3b. Stipules not as above; leaflets in at most 8 pairs, up to 5 mm; ovary white hairy or glabrous.
- 4a. Plants ca. 10 cm tall, with stems up to 4 cm; leaves 3–5 cm; peduncles glabrous; ovary glabrous 190. *A. dingjiensis*
- 4b. Plants 1.5–5 cm tall, acaulescent or nearly so; leaves 1–2 cm; peduncles hairy; ovary glabrous or hairy.
- 5a. Stem, if present, glabrous; leaflets 3–5 × 1–1.5 mm, glabrous or with a few hairs only; peduncle inconspicuous, up to 3 mm, densely black hairy; calyx 3–4 mm, covered with flexuous black hairs up to 0.3 mm; ovary glabrous 189. *A. dickorei*
- 5b. Stem, if present, loosely hairy; leaflets 1–3 × 0.5–1.5 mm, adaxially sparsely to loosely hairy, abaxially densely to rather densely hairy; peduncle 3–15 mm, white and black hairy; calyx covered with black hairs 0.1–0.3 mm and with white hairs 0.6–1 mm; ovary white hairy 188. *A. conaensis*

188. *Astragalus conaensis* Podlech & L. R. Xu, *Sendtnera* 7: 198. 2001.

错那黄耆 *cuo na huang qi*

Plants acaulescent to subacaulescent, 2–5 cm tall; hairs subappressed, in vegetative parts white, in inflorescence also black, 0.4–0.5 mm. Stems or basal leaf-rosettes numerous, stems if present up to 0.5 cm, loosely hairy. Leaves 1–2 cm; stipules 3–4 mm, distinctly connate before petiole, behind stem connate to middle, rather densely hairy; petiole short, like rachis rather densely hairy; leaflets in 3–7 pairs, elliptic, 1–3 × 0.5–1.5 mm, abaxially densely to rather densely hairy, adaxially sparsely to loosely hairy, apex obtuse. Racemes 2–5-flowered; peduncle 0.3–0.5 cm, white and black hairy; bracts 1.5–2.5 mm, predominantly black hairy. Calyx 4–5 mm, densely to ra-

187. *Astragalus smithianus* E. Peter, *Acta Horti Gothob.* 12: 52. 1938.

无毛叶黄耆 *wu mao ye huang qi*

Plants 8–12 cm tall, subacaulescent, nearly glabrous, only in inflorescence with predominantly dark brown hairs. Stem 1.5–3 cm. Leaves 4–8 cm; stipules 7–12 × 1.5–4 mm; petiole 2.5–4 cm; leaflets in 1 or 2 pairs, ovate to widely elliptic, 8–20 × 7–13 mm, apex slightly emarginate. Racemes 0.5–1 cm, 1–4-flowered; peduncle solitary on 1 stem, 4.5–7.5 cm, sparsely to loosely black and white hairy in upper part; bracts 3–5 mm, with blackish brown hairs. Calyx 5–6 mm, rather densely appressed dark brown hairy; teeth ca. 3 mm. Standard suborbicular, 12–13 × 8–9 mm, apex emarginate; wings 15–16 mm, limbs 12–13 × 3–3.5 mm, auricle narrow, 4–4.5 mm; keel 14–15 mm. Legumes (immature) obovoid, 15–18 mm, densely black hairy.

- 4800–5000 m. Qinghai, Sichuan.

ther densely covered with appressed black hairs 0.1–0.3 mm and with subappressed white hairs 0.6–1 mm; teeth 2–2.5 mm. Petals deeply violet; standard widely elliptic to suborbicular, ca. 9 × 6 mm; wings ca. 8 mm; keel ca. 8 mm. Ovary with a slender stipe ca. 1 mm, narrowly ellipsoid, white hairy. Legumes unknown.

- 4600–5200 m. Xizang.

189. *Astragalus dickorei* Podlech & L. R. Xu, *Sendtnera* 7: 199. 2001.

地科黄耆 *di ke huang qi*

Plants acaulescent, 1.5–2 cm tall, subglabrous in vegetative parts. Leaves 1–1.5 cm, subsessile, glabrous or leaflets with a few white hairs up to 0.4 mm; stipules 3–4 mm, adnate to

petiole for 1.5–2 mm, vaginate-connate behind stem for 1–2 mm, toward apex and at margins with white and black hairs up to 0.3 mm; leaflets in 3 or 4 pairs, narrowly elliptic, 3–5 × 1–1.5 mm, apex obtuse. Racemes short, densely 4- or 5-flowered; peduncle inconspicuous, up to 3 mm, densely covered with subappressed to slightly ascending black hairs ca. 0.3 mm; bracts 3–4 mm, rather densely hairy like peduncle. Calyx 3–4 mm, rather densely covered with flexuous black hairs up to 0.3 mm; teeth 1.5–2 mm. Petals blue-violet; standard elliptic, ca. 10 × 6 mm; wings ca. 9 mm; keel ca. 5 mm. Ovary sessile, glabrous. Legumes unknown.

- About 4800 m. W Sichuan.

190. *Astragalus dingjiensis* C. C. Ni & P. C. Li, *Acta Phytotax. Sin.* 17(2): 109. 1979.

定结黄耆 ding jie huang qi

Plants ca. 10 cm tall, subcaulescent, densely caespitose; hairs subappressed, often ± flexuous, tangled, 0.3–0.8 mm, only white in vegetative parts with exception of stipules. Stems up to 4 cm, prostrate to ascending-erect, loosely covered with mostly straight hairs. Leaves 3–5 cm; stipules 3–4(–5) mm, adnate to petiole for ca. 1 mm, high connate behind stem, often only with 2 short triangular tips, loosely to rather densely hairy; petiole 1–2 cm, like rachis loosely hairy; leaflets in 5–8 pairs, oblong, ca. 4 mm, abaxially appressed white hairy, adaxially glabrous. Racemes 4–6-flowered; peduncle 1.5–2 cm, glabrous. Petals reddish; standard 10–12 mm, with short claw 1–2 mm; wings 8.5–9 mm; keel 6–7 mm. Ovary sessile, glabrous. Legumes unknown.

- 2900–5000 m. Qinghai, Xizang.

191. *Astragalus longiscapus* C. C. Ni & P. C. Li, *Acta Phytotax. Sin.* 17(2): 108. 1979.

长梗黄耆 chang geng huang qi

Plants acaulescent or nearly so, 4–9 cm tall. Stems, if present, up to 1 cm but mostly absent. Leaves 3.5–9 cm; stipules 4–5 mm, adnate to petiole for 1.5–2 mm, vaginate-connate behind stem for 1–2 mm, toward apex at margins with white and black hairs up to 0.4 mm; petiole 2.5–6 cm, like rachis loosely to rather densely covered with subappressed to ascending white and also some black hairs; leaflets in 3–5 pairs, narrowly elliptic, 4–8 × 2–3.5 mm, often folded, abaxially loosely to densely white hairy like rachis, adaxially glabrous, apex obtuse. Racemes ca. 1 cm, densely 4–10-flowered; peduncle 1.5–4 cm, hairy like rachis but toward raceme often with more black hairs; bracts ca. 2 mm, sparsely to loosely white and black hairy. Calyx 3–4 mm, rather densely covered with subappressed to ascending black and sometimes also a few white hairs 0.3–0.4 mm; teeth 1.5–2 mm. Petals purple; standard widely obovate, ca. 7 × 4.5 mm, without distinct claw; wings ca. 6 mm; keel ca.

5 mm. Legumes (immature) sessile, ca. 6 mm, ca. 2 mm high and ca. 3 mm wide, densely covered with appressed black hairs.

- 4000–4700 m. Xizang [Nepal].

192. *Astragalus orbicularifolius* P. C. Li & C. C. Ni, *Acta Phytotax. Sin.* 17(2): 112. 1979.

圆叶黄耆 yuan ye huang qi

Plants ca. 10 cm tall, subcaulescent, densely caespitose, vegetative parts covered with appressed to subappressed white hairs 0.2–0.3 mm. Stems up to 1 cm, glabrous. Leaves 2–5 cm; stipules 5–7 mm, adnate to petiole for 2–4 mm, behind stem connate to middle, glabrous or toward apex sparsely hairy; petiole 0.5–2 cm, like rachis loosely hairy; leaflets in 4–6 pairs, elliptic, 2–4 × 1–2 mm, abaxially loosely to rather densely hairy, adaxially hairy only along margins, apex rounded to slightly retuse. Racemes 4–7-flowered; peduncle 1–3 cm, loosely white hairy; bracts ca. 3 mm, black and white hairy. Calyx ca. 3.5 mm, predominantly subappressed black hairy, but also with some longer grayish or white hairs; teeth 1–1.5 mm. Petals red-purple; standard widely elliptic to suborbicular, 6–7 × ca. 4 mm, without distinct claw; wings ca. 5 mm; keel ca. 4.5 mm. Legumes sessile, obliquely ovoid to obliquely ellipsoid, 5–6 mm, 3–3.5 mm high and wide, apex shortly acuminate, incompletely 2-locular; valves transversely rugulose, loosely covered with appressed white hairs 0.1–0.2 mm, sometimes also with a few black hairs.

- 5000–5500 m. Xizang.

193. *Astragalus rigidulus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 23. 1868.

坚硬黄耆 jian ying huang qi

Plants 4–8 cm tall, subcaulescent to shortly caulescent, with appressed to subappressed hairs 0.1–0.3 mm. Stems up to 3 cm, glabrous or nearly so. Leaves 3–7 cm; stipules 3–5 mm, adnate to petiole for 1–2 mm, sometimes distinctly connate before petiole, shortly connate behind stem, glabrous or ciliate; petiole 1–2 cm, like rachis glabrous or with scattered hairs only; leaflets in 8–11 pairs, narrowly elliptic, 4–9 × 1–3.5 mm, abaxially sparsely to loosely covered with subappressed to slightly ascending white hairs, adaxially glabrous, apex obtuse to subacute. Racemes rather densely 4–7-flowered; peduncle 0.3–0.7 cm, rather densely subappressed white or black hairy; bracts 3–4 mm, sparsely to loosely black hairy or subglabrous. Calyx 4–6 mm, densely appressed black hairy; teeth 2–3 mm. Petals purple-red; standard elliptic, 9–11 × 4.5–5 mm, apex emarginate; wings 7–9 mm; keel ca. 6 mm. Legumes sessile, ellipsoid, inflated, ca. 20 mm, ca. 8 mm high and wide, scarcely keeled ventrally by prominent nerve, acuminate at apex, incompletely 2-locular; valves sparsely appressed black hairy, glabrous or nearly so when fully ripe.

- Alpine slopes; 4000–4500 m. Xizang [Bhutan, India (Sikkim)].

27. *Astragalus* sect. *Irinaea* Borissova in Komarov, *Fl. URSS* 12: 880. 1946.

极矮组 ji ai zu

Plants perennial, covered with hairs partly basifixed, partly with a very short subbasal acute appendix and therefore extremely asymmetrically medifixed. Stipules minute, very shortly to shortly adnate to petiole, otherwise free. Racemes pedunculate, loose to rather dense. Flowers with short pedicels. Calyx campanulate. Standard widely and deeply incised; limbs of wings rounded at apex.

Stigma glabrous or with minute hairlets. Legumes (unknown in Chinese species) linear, curved, keeled ventrally, grooved dorsally, 1-locular or 2-locular; valves thin.

Seven species: Afghanistan, China, India, Pakistan, Tajikistan; one species (endemic) in China.

194. *Astragalus nanellus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 25. 1936.

极矮黄耆 ji ai huang qi

Plants 3–12 cm tall, subcaulescent, caespitose, covered with appressed to subappressed white hairs 0.2–0.3 mm, partly basifixed but mostly with a very short subacute basal appendix and therefore extremely asymmetrically bifurcate. Stems very short or rarely up to 10 cm and then ascending. Leaves 1.5–6 cm; stipules 2–3 mm, glabrous, nearly free from petiole; petiole 0.5–2 cm, rather densely hairy; leaflets in 3–5 pairs, elliptic to

widely obovate, 2–4 × 2–3 mm, both surfaces rather densely spotted with minute blackish dots, abaxially loosely to rather densely hairy, adaxially loosely hairy, often only in basal 1/2, rounded at apex. Racemes short, 3–9-flowered; peduncle 0.5–2 cm, loosely to rather densely hairy; bracts 0.5–1 mm, white hairy. Calyx ca. 3 mm, loosely covered with short appressed white hairs; teeth 1–1.6 mm. Petals violet (according to collector); standard suborbicular, ca. 6 × 5 mm, with a very short claw; wings ca. 5 mm; keel ca. 4 mm. Ovary ellipsoid, glabrous. Legumes unknown.

• About 3200 m. W Sichuan.

28. *Astragalus* sect. *Lotidium* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 5. 1868.

伞序组 san xu zu

Astragalus sect. *Longistipitati* Y. C. Ho; *A.* sect. *Umbellati* N. D. Simpson.

Plants biennial or perennial, rarely annual, with prostrate to erect or long creeping stems, with short basifixed hairs. Stipules free or shortly adnate to petiole, connate behind stem or not. Flowers pedicellate, umbellate, subumbellate, or in a loose raceme. Petals purplish or rarely white, yellow, or pink; wing limbs mostly obtuse at apex; keel as long as or distinctly longer than wings. Ovary and legumes mostly stipitate; legumes linear, erect, 2-locular or rarely 1-locular.

Thirteen species: China, Japan; 13 species (12 endemic) in China.

- 1a. Whole plant covered with spreading hairs 0.3–0.5(–0.8) mm 205. *A. wushanicus*
 1b. Plant covered with appressed to sometimes slightly ascending hairs (only *A. zhouquinus* with spreading hairy stem).
 2a. Stipules all or at least those of lower leaves behind stem distinctly, often high vaginate-connate.
 3a. Keel as long as or longer than standard and distinctly longer than wings; ovary and legumes glabrous or rarely sparsely hairy.
 4a. Leaflets hairy adaxially; standard 10–13 mm, wings 9–10 mm, and keel 12–13 mm; ovary and legumes glabrous 195. *A. davidii*
 4b. Leaflets glabrous adaxially; standard 8–10 mm, wings 6–9 mm, and keel 8–10 mm; ovary and legumes glabrous or hairy 202. *A. sutchuenensis*
 3b. Keel distinctly shorter than standard but as long as wings; ovary and legumes hairy.
 5a. Leaflets in 3–5 pairs; peduncles 4–7 cm; bracts linear-acute, 2–3.5 mm; standard ca. 11 × 7–9 mm, suborbicular 201. *A. souliei*
 5b. Leaflets in 5–9 pairs; peduncles 1–3 cm; bracts subulate, 0.5–1 mm; standard 11–12 × 5–6 mm, obovate.
 6a. Stipules 3–5 mm; leaflets in 8 or 9 pairs, sparsely hairy adaxially, both surfaces very densely spotted with minute dark purplish dots; calyx teeth unequal, short ones ca. 1 mm, longer ones 2–2.2 mm 206. *A. yangtzeanus*
 6b. Stipules ca. 2 mm; leaflets in 5–8 pairs, glabrous adaxially, without purplish dots; calyx teeth unequal, short ones 0.6–0.8 mm, longer ones ca. 1.2 mm 196. *A. fangensis*
 2b. Stipules all free from one another (in *A. tungensis* stipules in short lateral branches connate).
 7a. Leaflets in 9–12 pairs; bracts 2–3 mm 203. *A. tungensis*
 7b. Leaflets in at most 9 pairs, but mostly distinctly fewer; bracts up to 1.5 mm.
 8a. Stems covered with short spreading hairs; leaflets 2–3 × 1.5–2.5 mm; standard 6.5–7 mm 207. *A. zhouquinus*
 8b. Stems appressed hairy or subglabrous to glabrous; leaflets distinctly larger; standard at least 8 mm but mostly distinctly longer.
 9a. Plants 9–10 cm tall, with an erect stem 2–3 cm, with minute globose hairs in lower part and with appressed hairs 0.2–0.4 mm in upper part; stipules clasping stem but free from each other 197. *A. nankotaizanensis*
 9b. Plants prostrate, with partly creeping stems 15–50 cm, sparsely hairy to subglabrous or glabrous, never with globose hairs; stipules not clasping stem.

- 10a. Stems, rachises, and peduncles covered with very short hairs 0.05–0.1 mm; leaflets abaxially with hairs 0.5–0.7 mm, both surfaces densely spotted with minute dark purple dots; petals all of equal length, ca. 8.5 mm 204. *A. wolungensis*
- 10b. Stems, rachises, and peduncles covered with longer hairs 0.1–0.8 mm; leaflets without purple dots; standard and keel of equal length but distinctly longer than wings, if all of nearly same length, then standard ca. 11 mm.
- 11a. Leaflets very narrowly elliptic, 4–9 × 0.5–1.5 mm; standard ca. 7 × 9 mm, limb wider than long, transversely elliptic; style below stigma with a long line of minute hairlets; stems not prostrate, not rooting at nodes 199. *A. sciadophorus*
- 11b. Leaflets elliptic, less than 2 × as long as wide, glabrous adaxially; standard with limb always distinctly longer than wide; style below stigma glabrous; stems prostrate, often rooting at nodes.
- 12a. Leaflets with a hairy petiolule 0.5–1 mm, glabrous abaxially or with scattered hairs only; peduncle glabrous; legumes glabrous, with a beak 9–10 mm; stems not rooting at nodes 198. *A. nokoensis*
- 12b. Leaflets without a hairy petiolule, sparsely hairy abaxially; peduncle sparsely hairy; legumes mostly hairy, at least when young, with a shorter beak; stems rooting at nodes 200. *A. sinicus*

195. *Astragalus davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 214; Pl. David. 2: 32. 1885 [“*davidii*”].

宝兴黄耆 *bao xing huang qi*

Astragalus davidii var. *acutidentatus* P. C. Li; *A. gonggamontis* P. C. Li.

Plants perennial, 15–30 cm tall, with mostly appressed white hairs 0.1–0.5 mm. Stems branched, ascending to erect or sometimes prostrate, sparsely hairy, soon glabrescent. Leaves 2–6 cm, subsessile; stipules 3–4 mm, ovate, behind stem connate to middle or even higher, sparsely hairy; rachis sparsely covered with very short, partly minute and subglobose hairs; leaflets in 5–8 pairs, narrowly elliptic, 3–10 × 1.5–4 mm, both surfaces sparsely to loosely covered with subappressed to ascending hairs up to 0.5 mm, sometimes adaxially glabrous with age, apex obtuse to retuse. Racemes loosely 3–7-flowered, in fruit elongating and with remote fruits; peduncle 2–4.5 cm, hairy like stem; bracts 1–1.5 mm, ciliate. Calyx 3.5–4 mm, loosely subappressed hairy; teeth (0.5–)1.5–2 mm. Petals pale pink; standard widely ovate, 10–13 × 5–6.5 mm, apex emarginate; wings 9–10 mm; keel 12–13 mm. Legumes erect, with a stipe 5–7 mm, straight or slightly curved, 20–35 mm, 2–3 mm high and wide, sharply keeled ventrally, widely grooved dorsally, with a slender beak up to 3 mm; valves glabrous or rarely sparsely hairy.

• Sichuan.

196. *Astragalus fangensis* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 242. 1915.

房县黄耆 *fang xian huang qi*

Plants caespitose, with appressed white hairs 0.2–0.3 mm. Stems several, prostrate to ascending, up to 25 cm, sparsely to loosely hairy. Leaves 3–7 cm; stipules 1–2(–3) mm, high connate behind stem, subglabrous or sparsely hairy; petiole 0.5–2 cm, like rachis sparsely hairy; leaflets in 5–8 pairs, elliptic, 4–9(–10) × 3–5(–8) mm, abaxially sparsely hairy, adaxially glabrous, apex retuse to emarginate. Racemes short, rather loosely 2–4-flowered; peduncle mostly solitary on 1 stem, 1(–1.5) cm,

loosely hairy; bracts 0.5–1 mm, sparsely hairy. Calyx 4–5 mm, subglabrous to sparsely hairy; teeth unequal, 0.6–1.2 mm. Petals pale yellow to purplish; standard elliptic, (10–)12 × ca. 5 mm, apex retuse; wings ca. 10 mm, limbs narrowly triangular, widest at base, apex subacute; keel ca. 10 mm. Ovary with a stipe ca. 1.5 mm, narrowly linear, very shortly appressed hairy. Legumes unknown.

• About 1300 m. Hubei.

197. *Astragalus nankotaizanensis* Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 152. 1931.

南口台黄耆 *nan kou tai huang qi*

Plants perennial, 9–10 cm tall, with only white hairs. Caudex with long subterranean, branched stolons. Stems several, 2–3 cm, ascending, in lower part furnished with minute globose hairs, in upper part loosely to rather densely covered with appressed white hairs 0.2–0.4 mm. Leaves 4–7 cm; stipules 3–5 mm, clasping stem but not connate, ciliate; petiole 1.5–2.5 cm, like rachis appressed hairy; leaflets in 6–8 pairs, elliptic, 7–12 × 3–6 mm, abaxially loosely covered with appressed hairs 0.4–0.7 mm, adaxially glabrous or sparsely hairy, apex rounded. Racemes subumbellate, 2–5-flowered; peduncle 4–6 cm, appressed hairy; bracts 1–1.5 mm, hairy. Calyx ca. 5 mm, loosely covered with appressed hairs 0.4–0.7 mm; teeth 1.5–2 mm. Petals bright yellow; standard elliptic, 12–12.5 × ca. 6 mm, apex emarginate; wings 11–13 mm; keel ca. 15 mm. Legumes (unripe) with a stipe ca. 2 mm, slightly upcurved, ca. 13 mm, ca. 1.5 mm high, with a slender beak 3–4 mm; valves rather densely covered with subappressed hairs 0.4–0.5 mm.

• About 3700 m. Taiwan (Nanhu Dashan).

198. *Astragalus nokoensis* Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 151. 1931.

台湾黄耆 *tai wan huang qi*

Plants annual. Stems prostrate, pale brownish, 40–50 cm, glabrous. Leaves 3.5–12 cm; stipules papery, 1–2 mm; leaflets in 5 or 6 pairs, with hairy petiolules 0.5–1 mm, obovate, 6–3 × 4–7 mm, glabrous or abaxially with scattered hairs, apex

rounded to retuse or emarginate. Racemes umbellate to subumbellate; peduncle 8–19 cm, glabrous; bracts very short, hairy. Calyx campanulate, tube ca. 5 × 3 mm. Standard obovate, ca. 11 × 6 mm; wings ca. 10 mm; keel ca. 10 mm. Ovary oblong, glabrous. Legumes ca. 15 × 3 mm, with a beak 9–10 mm, glabrous.

- 2700–3000 m. Taiwan.

199. *Astragalus sciadophorus* Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 2, 5: 236; *Pl. David*. 1: 84. 1883.

辽西黄耆 *liao xi huang qi*

Plants ca. 15 cm tall. Stem ca. 8 cm, slender, branched, loosely covered with subappressed to ascending white hairs 0.6–0.8 mm. Leaves 1.5–3 cm; stipules 2.5–3 mm, free, sparsely to loosely hairy; petiole 0.5–1 cm, with rachis hairy like stem; leaflets in 3–5 pairs, narrowly elliptic, 4–9 × 0.5–1.5 mm, both surfaces loosely covered with subappressed to ascending hairs 0.6–0.8(–1) mm, apex acute. Racemes densely 4–6-flowered; peduncle 7–8 cm, slender, sparsely to loosely white hairy, toward raceme also with black hairs; bracts whitish, ca. 2 mm, with predominantly black hairs. Calyx ca. 3.5 mm, loosely covered with subappressed predominantly blackish hairs 0.3–0.5 mm; teeth 1–1.5 mm. Petal color unknown; standard transversely elliptic, ca. 7 × 9 mm, apex very widely and shallowly emarginate; wings ca. 6.5 mm; keel ca. 7.5 mm. Style hairy in lower part, below stigma with a long line of minute hairlets. Legumes (very unripe) subsessile, narrowly ellipsoid, at least 6 mm, densely covered with subappressed to slightly ascending white hairs 0.6–0.8 mm.

- Hebei.

200. *Astragalus sinicus* Linnaeus, *Mant. Pl.* 1: 103. 1767.

紫云英 *zi yun ying*

Astragalus lotoides Pallas; *A. sinicus* var. *macrocalyx* Ulbrich.

Plants annual or short-lived perennial, sparsely covered with appressed white hairs 0.1–0.6 mm. Stems intricately branched, ascending to nearly erect or prostrate to creeping, with long internodes, up to 30 cm, sparsely hairy to subglabrous, rooting at nodes. Leaves 2.5–10 cm; stipules 2–3 mm, free, ciliate; petiole much shorter than to as long as rest of leaf, like rachis sparsely hairy; leaflets in 3–5 pairs, obovate to obcordate, 5–17 × 3–13 mm, abaxially sparsely appressed hairy, adaxially glabrous or with a few scattered hairs, apex widely rounded to distinctly emarginate. Racemes umbellate, 4–10-flowered; peduncle erect, 2.5–25 cm, sparsely hairy; bracts 0.3–1 mm, ciliate. Calyx 3–5 mm, loosely to rather densely or more rarely scarcely covered with appressed, wide and flattened, white hairs 0.1–0.3 mm; teeth 1–2(–3) mm. Petals white, pink, light red, or purple, rarely creamy yellow or yellow; standard ovate, 9–14 × 5–8 mm, apex incised; wings 7–11 mm; keel 9–14 mm. Legumes with a stipe 2–3 mm, 12–20 mm, 2.5–3.5 mm high and wide, with a slender beak up to 5 mm; valves thin, blackish, loosely hairy.

Wet places, riversides, as a weed in rice fields, widespread in E

Asia; 100–3000 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan].

201. *Astragalus souliei* N. D. Simpson, *Notes Roy. Bot. Gard. Edinburgh* 8: 246. 1915.

蜀西黄耆 *shu xi huang qi*

Plants perennial, 10–25 cm tall, sparsely covered with appressed white hairs 0.2–1 mm. Stems several, erect to ascending, very sparsely hairy to glabrescent. Leaves 3–7 cm; stipules 1–3 mm, very shortly adnate to petiole, high connate behind stem, subglabrous to loosely hairy; petiole 1–2.5 cm, like rachis sparsely hairy; leaflets in 3–5(or 6) pairs, widely elliptic, 4–6 × 2.5–4.5 mm, abaxially sparsely to rather loosely hairy, more glaucous and densely spotted with blackish dots, adaxially obscurely brownish green and sparsely hairy to subglabrous, apex rounded to slightly retuse. Racemes short, rather loosely 3–6-flowered; peduncle 4–7 cm, very scarcely or higher up rather loosely hairy; bracts 2–3.5 mm, hairy. Calyx 5–6.5 mm, sparsely to loosely hairy; teeth 2–3 mm. Petals ?yellow; standard widely obovate to suborbicular, 11–13 × 7–9 mm, apex incised to nearly bilobed; wings ca. 10 mm; keel ca. 10 mm. Stigma with minute hairlets. Legumes with a stipe 1–2 mm, erect, straight, 25–30 mm, appressed hairy.

- 2000–2900 m. Sichuan.

202. *Astragalus sutchuenensis* Franchet, *Pl. Delavay*. 160. 1889.

四川黄耆 *si chuan huang qi*

Astragalus wexianensis Y. C. Ho.

Plants perennial, with subappressed white hairs 0.5–0.8 mm. Stems several, prostrate, up to 40 cm, very scarcely hairy to glabrescent. Leaves 2–5 cm, nearly sessile; stipules free, ca. 4 mm, sparsely hairy; rachis sparsely hairy; leaflets in 4–7 pairs, elliptic to obovate, rounded to distinctly emarginate, 3–9 × 2–5 mm, adaxially glabrous and abaxially sparsely hairy or both surfaces to loosely hairy. Racemes at first densely, later rather loosely, 4–9-flowered; peduncle 3–5 cm, very sparsely to rather loosely hairy; bracts ca. 1 mm, ciliate, soon falling. Calyx 3.5–5 mm, sparsely hairy to nearly glabrous; teeth unequal, 1.5–3 mm. Petals white, yellowish, or pink; standard widely elliptic, 8–10(–13) × 5–6 mm, apex deeply emarginate; wings 6–9(–10.5) mm; keel 8–10(–13) mm. Stigma with minute hairs. Legumes with a stipe 2–7 mm, erect, narrowly linear, straight to slightly curved, 15–25 mm, ca. 4 mm high and wide, with a beak 1–2 mm, 2-locular; valves blackish, glabrous to loosely appressed hairy when young.

- 400–3300 m. Gansu, Sichuan.

203. *Astragalus tungensis* N. D. Simpson, *Notes Roy. Bot. Gard. Edinburgh* 8: 246. 1915.

洞川黄耆 *dong chuan huang qi*

Plants ca. 30 cm tall, white hairy. Stem sparsely covered with subappressed hairs 0.1–0.3 mm, in axils of middle leaves with lateral branches up to 5 cm. Leaves of main stem 4–5 cm,

subsessile; stipules of main stem free, sparsely hairy, those of lateral branches shorter, high connate behind stem; rachis loosely to rather densely hairy; leaflets in 9–12 pairs, narrowly elliptic, 6–8 × 2–3 mm, abaxially loosely and adaxially scarcely covered with rigid subappressed hairs 0.4–0.5 mm, apex deeply emarginate. Racemes loosely 8–12-flowered; peduncle 3–6 cm, hairy like stem; bracts 2–3 mm, white hairy. Calyx 4–5 mm, loosely to rather densely hairy; teeth 1.5–2 mm. Standard ca. 13 × 6 mm, apex widely incised; wings ca. 10.5 mm; keel ca. 13 mm. Legumes (unripe) with a stipe ca. 4 mm, narrowly linear, glabrous.

- About 2000 m. Sichuan.

204. *Astragalus wolungensis* P. C. Li, Acta Bot. Yunnan. 11: 295. 1989.

卧龙黄耆 wo long huang qi

Plants up to 25 cm tall, with appressed white hairs 0.05–0.7 mm. Stems several, prostrate to ascending, sparsely covered with hairs up to 0.1 mm to glabrous. Leaves 2.5–5 cm, subsessile; stipules 3–4 mm, free, sparsely ciliate; rachis hairy like stem; leaflets in 7 or 8 pairs, narrowly elliptic, 4–9 × 1.5–3 mm, both surfaces densely spotted with dark purplish minute dots, abaxially loosely and adaxially sparsely covered with hairs 0.5–0.7 mm, or adaxially glabrous, apex acute. Racemes loosely 3- or 4-flowered; peduncle 2–3.5 cm, sparsely hairy like stem; bracts ca. 1 mm, hairy. Calyx 3–4 mm, very sparsely covered with very short hairs; teeth 0.5–1 mm. Petals yellowish; standard obovate, ca. 8.5 × 4.5 mm, apex emarginate; wings ca. 8.5 mm; keel ca. 8.5 mm. Legumes (immature) with a stipe ca. 5 mm, ca. 10 mm; valves thin, brown, glabrous.

- Sichuan.

205. *Astragalus wushanicus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 248. 1915.

巫山黄耆 wu shan huang qi

Plants perennial, covered with spreading white hairs 0.3–0.8 mm. Stems up to 30 cm, prostrate to ascending, branched, loosely hairy. Leaves 7–14 cm, those of lateral branches distinctly shorter; stipules 3–5 mm, nearly free from petiole, mostly distinctly connate behind stem, sparsely hairy or glabrous; petiole 0.5–4.5 cm, like rachis loosely to rather densely hairy; leaflets in 5–8 pairs, elliptic to obovate, 6–12 × 3–6 mm, abaxially and at margins sparsely to loosely hairy, adaxially glabrous, apex retuse to emarginate. Racemes loosely 3–5-flowered; peduncle 1–3 cm, rather densely hairy; bracts ca. 1 mm, hairy. Calyx 3–3.5 mm, loosely hairy; teeth ca. 1 mm. Petals pink; stan-

dard obovate, 9–11.5 × ca. 5 mm, apex emarginate; wings 8–10 mm; keel 8–10 mm. Legumes with a stipe ca. 3 mm, erect, 10–15 mm, 2–3 mm high and 3–4 mm wide, with a beak ca. 1 mm, 1-locular; valves loosely covered with subappressed to slightly ascending white hairs 0.2–0.3 mm.

- Sichuan.

206. *Astragalus yangtzeanus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 249. 1915.

扬子黄耆 yang zi huang qi

Plants perennial, covered with subappressed to slightly ascending white hairs 0.3–0.6 mm. Stems up to 20 cm, prostrate to ascending, branched in lower parts, sparsely hairy to subglabrous. Leaves 3–5 cm, subsessile, those of lateral branches distinctly shorter; stipules 3–5 mm, mostly reflexed, adnate to petiole for up to 1 mm, mostly distinctly connate behind stem, ciliate, otherwise sparsely hairy or glabrous; rachis sparsely hairy; leaflets in 8 or 9 pairs, narrowly elliptic, 4–8 × 1.5–3 mm, both surfaces very densely spotted with minute, dark purplish dots, abaxially somewhat densely hairy, adaxially sparsely hairy, apex obtuse. Racemes loosely 2–8-flowered; peduncle 2–3 cm, loosely hairy; bracts ca. 1 mm, hairy. Calyx 5–6 mm, loosely hairy; teeth very unequal, shorter ones ca. 1 mm, longer ones 2–2.2 mm. Petals white; standard obovate, 11–12 × ca. 5 mm, apex deeply incised; wings 10–10.5 mm; keel ca. 10 mm. Legumes (very immature) with a stipe ca. 3 mm, densely white hairy.

- 100–300 m. Sichuan.

207. *Astragalus zhouquinus* K. T. Fu, Acta Bot. Boreal.-Occid. Sin. 11: 342. 1991.

舟曲黄耆 zhou qu huang qi

Plants perennial, caespitose. Stems several, prostrate to ascending, 10–18 cm, covered with short, spreading, white hairs. Leaves 1.5–3 cm, subsessile; stipules ca. 2 mm, free, white hairy; rachis covered with appressed white hairs; leaflets in 5–9 pairs, elliptic, 2–3 × 1.5–2.5 mm, abaxially somewhat densely hairy, adaxially sparsely hairy, apex rounded to slightly emarginate. Racemes subumbellate, 4–8-flowered; peduncle ca. 1.5 cm, sparsely appressed hairy, after anthesis elongating; bracts ca. 1 mm, hairy. Calyx ca. 3 mm, sparsely appressed white hairy; teeth ca. 1.2 mm. Petals purple; standard widely obovate, up to 7 × 5 mm, apex emarginate; wings ca. 6.5 mm; keel ca. 7 mm. Legumes with a stipe ca. 2 mm, 11–12 mm, ca. 2 mm high; valves covered with appressed white hairs.

- Gansu.

29. *Astragalus* sect. *Lithoon* (Nevski) Gontscharow in Komarov, Fl. URSS 12: 98. 1946.

棉果组 mian guo zu

Lithoon Nevski, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 4: 255. 1937.

Plants perennial, herbaceous, with long, hollow, stout stems; hairs basifixed, white or yellowish. Stipules green, free from petiole, connate behind stem. Flowers large, in sessile, few-flowered racemes. Calyx tubular to slightly ventricose. Petals glabrous, yellow, second pair of filaments at base of free part spreading ciliate. Legumes sessile, ovoid-globose, 2-locular; walls very thick, hard leathery, consisting of 2 different layers of parenchyma and a very thin inner fiber-layer, with a narrow hollow, few seeded.

One species: Afghanistan, China, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran).

208. *Astragalus sieversianus* Pallas, Sp. Astragal. 15. 1800.

棉果黄耆 mian guo huang qi

Lithoon sieversianum (Pallas) Nevski.

Plants strong, 60–150 cm tall. Stem up to 20 mm thick, very densely covered with \pm spreading hairs up to 4 mm. Leaves 15–25 cm; stipules up to 35 mm, nearly amplexicaul at base, ciliate; petiole 1–3 cm, like rachis densely spreading hairy; leaflets in 8–12 pairs, narrowly ovate to elliptic, 35–50 \times 14–23 mm, abaxially densely covered with \pm appressed hairs

0.5–2.5 mm, adaxially glabrous, apex rounded. Racemes 3–9-flowered; bracts 10–18 mm, densely ciliate. Calyx 20–22 mm, densely \pm spreading hairy; teeth 8–10 mm. Standard widely ovate, 34–39 \times 17–21 mm, apex deeply emarginate; wings 28–34 mm; keel 27–31 mm. Legumes 15–20 mm, ca. 15 mm in diam., rounded ventrally and dorsally, with a beak ca. 3 mm, nearly completely hidden in dense indumentum of tangled, mostly spreading hairs up to 5 mm.

700–2500 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

30. *Astragalus* sect. *Alopecias* (Steven) Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 58. 1868.

苦豆子组 ku dou zi zu

Alopecias Steven, Bull. Soc. Imp. Naturalistes Moscou 29(2): 143. 1856.

Plants perennial, herbaceous, with well-developed stem and white, rarely reddish, basifixed hairs. Stipules greenish, shortly adnate to petiole. Racemes with a short stout peduncle, densely many flowered, globose to cylindrical; bracts filiform to linear. Bracteoles absent (in Chinese species). Flowers sessile or with short pedicel. Calyx campanulate to tubular, mostly slightly to rarely distinctly inflated ellipsoid, with subulate teeth. Petals glabrous or more rarely hairy; wing limbs obtuse at apex. Legumes mostly included into calyx, sessile, mostly short, 2-locular.

Forty-nine species: Afghanistan, China, Mongolia, Russia (Siberia); C and SW Asia, Europe; four species (one endemic) in China.

- 1a. Standard hairy 211. *A. burqinensis*
 1b. All petals glabrous.
 2a. Racemes cylindrical, 9–13 cm; bracts 6–9 mm; calyx 20–25 mm 209. *A. alopecias*
 2b. Racemes ovoid, up to 6 cm, if sometimes up to 9.5 cm, then calyx 12–19 mm; bracts 10–20 mm.
 3a. Leaflets in 17–27 pairs, ovate to elliptic, mostly 20–30 \times 10–15 mm; calyx 12–19 mm, with teeth 5–7 mm 210. *A. alopecurus*
 3b. Leaflets in 12–17 pairs, widely ovate to widely elliptic, 8–25 \times 5–20 mm; calyx 15–23 mm, with teeth 8–11 mm 212. *A. vulpinus*

209. *Astragalus alopecias* Pallas, Sp. Astragal. 12. 1800.

长果黄耆 chang guo huang qi

Plants 40–90 cm tall. Stem up to 7 mm thick, very densely covered with soft spreading hairs. Leaves 10–23 cm; stipules 6–12 mm, hairy; petiole 2–3 cm, like rachis rather densely spreading hairy; leaflets in 20–25 pairs, ovate to elliptic, 10–16 \times 7–10 mm, abaxially densely subappressed hairy, adaxially glabrous or sparsely hairy, apex rounded to subacute. Racemes sessile, cylindrical, 9–13 cm; bracts 6–9 mm, hairy. Flowers sessile. Calyx tubular-campanulate, 20–25 mm, spreading hairy; teeth 9–12 mm. Petals yellow, glabrous; standard ovate, 15–21 \times ca. 8 mm, apex obtuse; wings 14–20 mm; keel 13–19 mm. Legumes ovoid, 6–7 mm, 3–4 mm high, densely hairy.

NW Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

210. *Astragalus alopecurus* Pallas, Sp. Astragal. 11. 1800.

狐尾黄耆 hu wei huang qi

Astragalus maximus Willdenow.

Plants 50–90 cm tall. Stem up to 10 mm thick, with ascending hairs. Leaves 20–30 cm; stipules 10–18 mm, hairy; petiole 1–3 cm, like rachis rather densely covered with ascending hairs; leaflets in 17–27 pairs, ovate to elliptic, mostly 20–30 \times 10–15 mm, abaxially sparsely hairy, adaxially gla-

brous, apex obtuse. Racemes sessile or with a peduncle up to 1 cm, ovoid to cylindrical, 5–9.5 cm; bracts 10–20 mm, hairy. Calyx 12–19 mm, slightly inflated, spreading hairy; teeth 5–7 mm. Petals yellow, glabrous; standard elliptic, ca. 20 \times 5–7 mm, rounded at apex; wings 18–20 mm; keel ca. 18 mm. Legumes ovoid, ca. 7 mm, ca. 4 mm high, densely hairy.

NW Xinjiang [Kazakhstan, Russia (Siberia); SW Asia (Caucasus, Turkey), Europe].

211. *Astragalus burqinensis* Podlech & L. R. Xu, Novon 14: 216. 2004.

布尔津黄耆 bu er jin huang qi

Plants at least 30–40 cm tall. Stem erect, glabrous or just below stipules and at base of stipules sparsely hairy. Leaves 20–30 cm, glabrous; stipules ca. 15 mm, narrowly triangular, shortly adnate to petiole; petiole 2.5–7 cm; leaflets in 13–15 pairs, widely ovate, 12–30 \times 10–22 mm, apex rounded to slightly emarginate. Racemes (in fruit) cylindrical, 7–9 cm; peduncle very short, up to 1 cm, densely covered with spreading hairs 1–2 mm; bracts 12–18 mm, ciliate with spreading hairs 1.5–2.5 mm. Calyx 12–19 mm, densely covered with ascending to spreading hairs 2–5 mm; teeth 5–7 mm. Petals yellow; standard elliptic, 27–28 \times ca. 9 mm, hairy, apex emarginate; wings unknown; keel ca. 27 mm. Legumes oblong, 12–14 mm, 7–9 mm high and 4–7 mm wide, with a beak ca. 2 mm; valves netlike wrinkled, loosely covered with subappressed soft hairs up to 3 mm.

- About 600 m. Xinjiang (Burqin).

212. *Astragalus vulpinus* Willdenow, Sp. Pl. 3: 1259. 1802.

序尾黄耆 xu wei huang qi

Astragalus lagocephalus Fischer & C. A. Meyer.

Plants 30–40 cm tall. Stem 4–6 mm thick, glabrous or sparsely spreading hairy. Leaves 10–25 cm; stipules 10–20 mm, ciliate; petiole 2–3 cm, like rachis loosely ± spreading hairy; leaflets in 12–17 pairs, widely ovate to elliptic, 8–25 × 5–20

mm, abaxially sparsely or rarely to densely appressed hairy, adaxially glabrous, apex rounded to retuse. Racemes subsessile or with a peduncle up to 2 cm, ovoid, 4–6 × 3–5 cm; bracts 10–20 mm, hairy. Calyx 15–23 mm, slightly inflated, spreading hairy; teeth 8–11 mm. Petals yellow, glabrous; standard elliptic, 20–28 × 9–11 mm, apex emarginate; wings 18–26 mm; keel 17–25 mm. Legumes ovoid, ca. 10 mm, ca. 6 mm high; valves slightly wrinkled, sparsely hairy.

W Xinjiang [Kazakhstan, Russia (Siberia); Europe].

31. *Astragalus* sect. *Myobroma* (Steven) Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 33. 1868.

短缩茎组 duan suo jing zu

Myobroma Steven, Bull. Soc. Imp. Naturalistes Moscou 29(2): 150. 1856.

Plants perennial, acaulescent or with distinct stems, sometimes subshrubby, with basifixed hairs. Leaves imparipinnate, sometimes with hardened rachises; stipules mostly adnate to petiole. Racemes sessile or with a well-developed peduncle, 1- to many flowered. Calyx mostly tubular, more rarely campanulate. Petals mostly yellow, often fading red or from beginning red or purplish, of very different shapes and sizes, glabrous or hairy. Style sometimes with hairy stigma or hairy below stigma (but not in Chinese species). Legumes very variable, 1-locular to 2-locular.

About 275 species: from Europe and N Africa to Siberia, China, and India; 18 species (three endemic) in China.

31a. *Astragalus* “Caprini group”

短缩茎群 duan suo jing qun

Plants acaulescent to caulescent. Leaflets always in pairs, in upper part glabrous or hairy but never cottonlike. Calyx tubular or campanulate. Petals glabrous or rarely hairy; wings and especially keel mostly distinctly shorter than standard, wing limbs rounded at apex, auricles of wings mostly short, rarely up to 3 mm; limbs of keel straight or ± triangular, never with minute teeth at upper edge. Legumes of very different sizes.

About 195 species: from Europe and N Africa to Siberia, China, and India; 14 species (three endemic) in China.

1a. Standard and wings hairy.

2a. Leaflets on both surfaces densely covered with appressed hairs; calyx 13–21 mm; standard 23–28 mm 219. *A. nicolaii*

2b. Leaflets glabrous adaxially; calyx 9–15 mm; standard 14–19 mm.

3a. Stipules green; leaves 7–10 cm, sessile or with very short petiole; legumes with a stipe 1–3 mm 220. *A. orbiculatus*

3b. Stipules whitish membranous; leaves 15–30 cm; petiole 4–7 cm; legumes sessile 217. *A. lasiopetalus*

1b. All petals glabrous.

4a. Plants completely glabrous.

5a. Plants acaulescent; leaflets in 7 or 8 pairs, suborbicular; peduncle 15–18 cm; racemes as long as peduncle, remotely up to 20-flowered 216. *A. fukangensis*

5b. Plants caulescent, rarely acaulescent; leaflets in 10–15 pairs, ovate; peduncle much shorter; racemes 5–9-flowered.

6a. Plants glabrous or sometimes in part to loosely hairy, acaulescent or with a stem sometimes up to 7 cm; stipules 10–20 mm, narrowly ovate, not distinctly nerved; peduncle 0.5–2 cm 223. *A. psilosepalus*

6b. Plants always completely glabrous, with a stem up to 20 cm; stipules 20–30 mm, narrowly triangular, very long acuminate, distinctly longitudinally nerved; peduncle 8–9 cm 218. *A. luculentus*

4b. Plants at least in part hairy.

7a. Stipules distinctly longitudinally nerved; inflorescence often with some black hairs; petiole and rachis often at least partly hardening toward end of vegetation period and persistent.

8a. Plants densely or sparsely covered with hairs 1–2(–2.5) mm; leaflets mostly hairy on both surfaces 224. *A. rhizanthus*

8b. Plants sparsely covered with hairs 0.3–0.7(–1) mm; leaflets glabrous adaxially.

9a. Standard 19–23 mm; auricles of wing limbs ca. 1 mm; ovary and legumes subsessile, hairy 221. *A. pindrensis*

9b. Standard 24–27 mm; auricles of wing limbs 2–2.5 mm; ovary and legumes with a stipe 2–4 mm, glabrous 226. *A. webbiana*

7b. Stipules without distinct longitudinal nerves; plants never with black hairs.

10a. Leaflets adaxially glabrous or hairy; keel limbs slightly obliquely elliptic, stretched straight forward 225. *A. schanginianus*

- 10b. Leaflets adaxially glabrous.
- 11a. Keel limbs large, at least as long as wing limbs, only connate in proximal 1/3.
- 12a. Keel always longer than wings, limbs much larger (longer and wider) than wing limbs; petiole and rachis slender 215. *A. flexus*
- 12b. Keel ca. as long as wings, limbs as long as wing limbs; petiole and rachis stout, at base 2–3 mm thick; leaflets with whitish cartilaginous margins, with long hairs sitting on small tubercles 213. *A. austrodshungaricus*
- 11b. Keel limbs always shorter than wing limbs, connate nearly to top.
- 13a. Stipules 10–20 mm, free from petiole; leaves 12–35 cm; leaflets 8–30 × 5–22 mm, glabrous or abaxially sparsely hairy; calyx glabrous or with a few hairs at teeth only 223. *A. psilosepalus*
- 13b. Stipules distinctly shorter, if upper ones up to 15 mm, then adnate to petiole for 3–5 mm; leaves up to 16 cm; leaflets up to 10(–14) × ca. 6 mm, abaxially sparsely to rather densely hairy; calyx at least in upper part distinctly hairy.
- 14a. Stipules adnate to petiole for 3–5 mm; leaflets densely crowded to touching; calyx 13–15(–17) mm, teeth 5–6 mm; legumes sessile, with a beak 3–5 mm, covered with hairs up to 3 mm 214. *A. charguschanus*
- 14b. Stipules adnate to petiole up to 1 mm; leaflets not densely crowded; calyx 11–12 mm, teeth 2.5–4 mm; legumes with a stipe ca. 3 mm, with a beak ca. 2 mm, covered with hairs 1–2 mm 222. *A. przhewalskianus*

213. *Astragalus austrodshungaricus* Goloskokov, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Kazakhsk. S.S.R. 2: 15. 1964.

南准噶尔黄耆 nan zhun ga er huang qi

Plants 20–30 cm tall, acaulescent or subacaulescent, with thin, long, white hairs. Stem, if present, up to 3 cm, glabrous. Leaves 15–20(–25) cm; stipules 15–20 mm, adnate to petiole for 3–5 mm, ciliate; petiole 4–8 cm, like rachis sparsely to rather densely covered with spreading hairs 1.5–3 mm; leaflets in (6–)8–10 pairs, remote, widely elliptic to nearly orbicular, 12–25(–27) × 8–20(–22) mm, abaxially sparsely to loosely nearly spreading hairy, at margins mostly narrowly whitish cartilaginous, often minutely denticulate by base of hairs, adaxially glabrous, apex rounded to slightly emarginate. Racemes 2–10 cm, loosely 4–6(–8)-flowered; peduncle 6–12 cm, spreading hairy; bracts 8–12 mm, hairy. Calyx 15–18 mm, sparsely and in upper part more densely covered with long spreading hairs; teeth 3–4(–5) mm. Petals yellow; standard oblong to obovate, 30–34 × 10–12 mm, apex emarginate; wings 26–32 mm, auricle 1.5–2 mm; keel 26–32 mm. Legumes with a stipe 7–12(–15) mm, 25–45 mm, 12–15 mm high and 15–20 mm wide, widely rounded ventrally, widely flattened dorsally, with a beak 2–3 mm, incompletely 2-locular; valves thinly leathery, glabrous or sparsely covered with long spreading hairs.

Xinjiang [Kazakhstan].

214. *Astragalus charguschanus* Freyn, Bull. Herb. Boissier, sér. 2, 4: 764. 1905.

卡尔古斯黄耆 ka er gu si huang qi

Astragalus pamiricus (B. Fedtschenko) B. Fedtschenko; *A. staintonianus* Ali; *A. tianschanicus* Bunge var. *pamiricus* B. Fedtschenko.

Plants 5–15 cm tall, acaulescent, caespitose, with white hairs 1–2(–2.5) mm. Leaves 5–9(–10) cm; stipules adnate to petiole for 3–5 mm, lower ones 8–10 mm, glabrous, upper ones up to 15 mm, ciliate; petiole 2.5–5 cm, in basal part glabrous or sparsely spreading hairy, in upper part ± densely spreading

hairy like rachis; leaflets in 12–21 pairs, densely crowded to touching at margins, ovate, 4–6(–9) × 2–4(–6) mm, abaxially loosely to rather densely ± spreading hairy, adaxially glabrous, margins long rigidly comblike ciliate. Racemes crowded, with a glabrous peduncle 0.3–0.5(–0.7) cm, 3–5-flowered; bracts 4–7(–10) mm, ciliate. Calyx (11–)13–15(–17) mm, in basal part glabrous or scarcely hairy, toward teeth more densely spreading hairy; teeth 5–6 mm. Petals glabrous, creamy yellow; standard obovate, (18–)19–22 × 8–10 mm, apex emarginate; wings (17–)18–21 mm, auricle ca. 1 mm; keel 15–17 mm. Legumes sessile, (10–)14–18 mm, 4–5 mm high and wide, with a beak 3–5 mm, incompletely 2-locular; valves thin but tough, covered with spreading hairs up to 3 mm.

Xinjiang [Afghanistan, Pakistan, Tajikistan].

215. *Astragalus flexus* Fischer, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 307. 1844.

弯花黄耆 wan hua huang qi

Astragalus pentapetaloides Bunge.

Plants 18–30 cm tall, acaulescent, sparsely covered with white hairs 0.5–1.5 mm, at rachis up to 2 mm. Leaves 12–30 cm; stipules 8–17(–20) mm, adnate to petiole for 2–4 mm, glabrous or hairy at margin and apex; petiole 4–7 cm, like rachis glabrous or sparsely spreading hairy; leaflets in 7–13 pairs, remote, widely obovate to suborbicular, 8–18 × 7–17 mm, abaxially sparsely to densely appressed hairy or subglabrous, adaxially glabrous, apex rounded to slightly retuse. Racemes loosely (10–)15–25-flowered; peduncle 5–12 cm, glabrous or sparsely spreading hairy; bracts 5–9 mm, sparsely ciliate. Calyx curved, 13–17(–20) mm, glabrous or in upper part and at teeth sparsely and shortly hairy; teeth 1.5–3 mm. Petals yellow; standard elliptic to obovate, (25–)30–35 × 9–11 mm, apex emarginate; wings 20–26 mm; keel longer than wings, (21–)24–29 mm, limbs ± straight or slightly curved. Legumes with a stipe 6–8 mm, ovoid, 16–25 mm, 8–9 mm high and 10–12 mm wide, widely rounded ventrally and dorsally, with a straight beak 2–3 mm, incompletely 2-locular; valves glabrous or sparsely hairy.

Sandy steppes. Xinjiang [Kazakhstan, Turkmenistan, Uzbekistan; SW Asia (Iran), Europe].

216. *Astragalus fukangensis* Podlech & L. R. Xu, *Novon* 17: 230. 2007.

阜康黄耆 fu kang huang qi

Plants ca. 40 cm tall, acaulescent, completely glabrous. Leaves ca. 35 cm; stipules ca. 10 mm, adnate to petiole for ca. 2 mm; petiole 8–10 cm, like rachis 1.5–2.5 mm thick, rigid, slightly hardened; leaflets in 7 or 8 pairs, remote, widely elliptic to suborbicular, 15–25 × 12–22 mm, apex rounded to retuse. Racemes as long as peduncle, remotely up to 20-flowered; peduncle 15–18 cm, up to 2.5 mm thick; bracts 8–10 mm. Flowers unknown. Legumes with a stipe 3–4 mm, ellipsoid, 17–18 mm, 9–12 mm high and 9–10 mm wide, slightly keeled ventrally, widely rounded dorsally, with a triangular beak ca. 2 mm, incompletely 2-locular; valves thinly leathery, straw-colored.

• Xinjiang (Fukang).

217. *Astragalus lasiopetalus* Bunge, *Delect. Sem. Horti Bot. Dorpat.* 1839: 7. 1839.

毛瓣黄耆 mao ban huang qi

Astragalus lasianthus C. A. Meyer; *A. ulacholensis* B. Fedtschenko.

Plants 20–40 cm tall, subacaulescent to caulescent, ± densely covered with soft white hairs 0.5–3 mm. Stems (1–)3–15 cm, densely spreading hairy. Leaves 15–30 cm; stipules 10–15 mm, adnate to petiole for ca. 1 mm, loosely hairy, toward margins densely hairy; petiole 4–7 cm, like rachis densely covered with spreading hairs 2–3 mm; leaflets in 9–12(–15) pairs, ovate to elliptic, 10–25(–32) × 7–16(–20) mm, abaxially sparsely covered with ascending hairs, adaxially glabrous or nearly so, apex rounded and mostly with a minute cusp. Racemes densely (2–)6–10-flowered; peduncle 0.5–4 cm, spreading hairy; bracts 8–14(–20) mm, hairy. Calyx campanulate, 12–15(–18) mm, villous; teeth 9–10 mm. Petals yellow, standard and wings hairy; standard oblong-pandurate, 14–18 mm, distinctly constricted in middle, apex slightly emarginate; wings 11–16 mm; keel 9–11 mm, limbs ± straight. Legumes sessile, 12–18 mm, 6–8 mm high and 3–4 mm wide, with a beak 1–2 mm, mostly completely 2-locular; valves thin, long villous.

Riversides, meadows, dry slopes, often in saline soils; 1800–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Uzbekistan].

218. *Astragalus luculentus* Podlech & L. R. Xu, *Novon* 17: 230. 2007.

光滑黄耆 guang hua huang qi

Plants ca. 35 cm tall, completely glabrous. Stems stout, 3–4 mm in diam., ca. 20 cm. Leaves 25–30 cm; stipules 20–30 mm (much smaller in branches sprouting after grazing), narrowly triangular, very long acuminate, distinctly longitudinally nerved, free from petiole; petiole 8–11 cm; leaflets in 11–15 pairs, ovate, 20–35 × 8–18 mm (much smaller in branches sprouting after grazing), apex subacute to rounded, often minutely mucronulate. Racemes distributed along whole stem, with a peduncle 8–9 cm, loosely 5–9-flowered; bracts 10–15

mm. Calyx 12–13 mm; teeth unequal, 2–4 mm. Petals yellow; standard ca. 25 mm; keel ca. 15 mm; other petal data missing. Legumes subsessile, oblong, straight, 18–25 mm, 5–8 mm high and ca. 9 mm wide, rounded with prominent, thickened nerve ventrally, deeply and widely grooved dorsally, with a narrowly triangular beak 1–2 mm, incompletely 2-locular; valves leathery.

• Xinjiang.

219. *Astragalus nicolaii* Borissova in Komarov, *Fl. URSS* 12: 119. 1946 [*“nicolaii”*].

木垒黄耆 mu lei huang qi

Astragalus songoricus Gontscharow, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R.* 7: 152. 1938, not *A. songoricus* Pallas (1800), nor *A. songaricus* K. Koch (1853).

Plants 15–28(–40) cm tall, acaulescent, white hairy. Leaves 15–36 cm; stipules whitish, distinctly longitudinally nerved, (6–)10–20 mm, adnate to petiole for 3–5 mm, lower ones ciliate, upper ones densely hairy; petiole 4–10 cm, like rachis densely covered with spreading very unequal hairs 0.5–2.5 mm; leaflets in 15–29 pairs, ± elliptic, 8–24 × 5–12 mm, both surfaces densely appressed hairy, apex obtuse to subacute. Racemes loosely 2–7-flowered; peduncle 1–7 cm, spreading hairy; bracts 8–20 mm, hairy. Calyx 13–21 mm, ± densely long spreading hairy; teeth unequal, 4–9 mm. Petals yellow, hairy; standard elliptic to obovate, 23–28 mm, apex emarginate; wings 19–23 mm; keel 15–18 mm. Legumes sessile, 15–17 mm, 6–10 mm high and 5–7 mm wide, with a curved beak ca. 2 mm, 2-locular; valves leathery, loosely spreading hairy.

Stony slopes. Xinjiang [Kazakhstan].

220. *Astragalus orbiculatus* Ledebour, *Fl. Altaic.* 3: 311. 1831.

圆形黄耆 yuan xing huang qi

Plants 20–60 cm tall, white hairy. Stems solitary or several, densely covered with spreading short hairs, with longer hairs up to 2.5 mm. Leaves 7–10 cm, sessile or with very short petiole; stipules green, 6–15 mm, very shortly adnate to petiole, densely spreading hairy; rachis loosely to densely covered with long spreading hairs; leaflets in 9–14 pairs, elliptic, 6–15 × 4–9 mm, abaxially densely and adaxially sparsely to densely covered with subappressed hairs, more rarely both surfaces sparsely hairy or adaxially glabrous, apex rounded or more rarely slightly emarginate. Racemes 2–3 cm, loosely 3–7-flowered; peduncles several, along nearly entire length of stem, 2–4 cm, spreading hairy; bracts 8–12 mm, hairy. Calyx 9–14 mm, with long spreading hairs; teeth 4–7 mm. Petals yellowish white, standard and wings hairy; standard narrowly oblong-pandurate, 14–19 × 3–5 mm, in or below middle slightly constricted, apex emarginate; wings 13–16 mm; keel 8–11 mm. Legumes with a stipe 1–3 mm, 14–17 mm, 5–7 mm high and 5–6 mm wide, with a very short beak, 2-locular; valves thin, hairy.

Fallow lands, wastelands, pastures; 400–2900 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

221. *Astragalus pindreensis* (Bentham ex Baker) Ali, *Kew Bull.* 13: 312. 1958.

明铁盖黄耆 ming tie gai huang qi

Astragalus candolleanus Royle ex Benth. var. *pindreensis* Benth. ex Baker, Fl. Brit. India 2: 133. 1876; *A. rhizanthus* Royle ex Benth. var. *pindreensis* (Benth. ex Baker) Podlech.

Plants acaulescent or subacaulescent; hairs white, in inflorescence also black, 0.5–1(–1.2) mm. Leaves 5–16 cm; stipules with longitudinal nerves, 6–10 mm, adnate to petiole for 2–4 mm, ciliate at margins or sometimes sparsely hairy; petiole 1.5–6 cm, like rachis sparsely to loosely subappressed to sometimes nearly spreading hairy, mostly hardening and persistent, sometimes somewhat pungent with age; leaflets in 7–15 pairs, narrowly elliptic, 4–12 × 1–4 mm, abaxially sparsely hairy, adaxially glabrous or more rarely sparsely hairy. Racemes subsessile, 1–4-flowered; bracts 5–8 mm. Calyx 12–15 mm, shortly appressed black or black and white or rarely only white hairy; teeth 3–5 mm. Petals yellow; standard narrowly obovate to obovate, 19–23 × 6–8 mm, apex emarginate; wings 17–22 mm; keel 15–18 mm. Legumes subsessile, 10–19 mm, 4–7 mm high and wide, with a straight to slightly curved beak up to 4 mm, incompletely to nearly fully 2-locular; valves subappressed hairy.

Subalpine to alpine meadows and stony slopes; 2600–4300 m. Xinjiang (Kunlun Shan), Xizang [Afghanistan, India, Kashmir, Pakistan].

222. *Astragalus przhewalskianus* Podlech & N. Ulziykhutag, Mitt. Bot. Staatssamml. München 25: 366. 1988.

波氏黄耆 *bo shi huang qi*

Plants 4–20 cm tall, acaulescent, with white or reddish when mature hairs up to 3 mm. Leaves 3–20 cm; stipules 5–7 mm, shortly adnate to petiole, glabrous, or upper ones ciliate; petiole 1–5 cm, like rachis sparsely to loosely spreading hairy; leaflets in 10–18 pairs, narrowly ovate to elliptic, 2–10 × 1–3.5 mm, mostly folded, abaxially sparsely to rather densely covered with ascending hairs, adaxially glabrous. Racemes subsessile, 1- or 2-flowered; bracts 6–8 mm, ciliate. Calyx 11–12 mm, basal part nearly glabrous, upper part sparsely to loosely spreading hairy; teeth 2.5–4 mm. Petals yellow, fading purplish; standard obovate, ca. 20 × 7 mm, apex emarginate; wings ca. 19 mm; keel ca. 17 mm. Legumes with a stipe ca. 3 mm, 8–12 mm, 5–7 mm high and 5–6 mm wide, with a beak ca. 2 mm, incompletely 2-locular; valves thin but tough, loosely covered with very thin ± spreading hairs 1–2 mm.

W Xinjiang [Kazakhstan].

223. *Astragalus psilosepalus* Podlech & L. R. Xu, Novon 17: 231. 2007.

光萼黄耆 *guang e huang qi*

Plants 20–35 cm tall, acaulescent or shortly caulescent, glabrous except for ovary or sparsely white hairy. Stem, if present, up to 7 cm. Leaves 12–35 cm; stipules 10–20 mm, free from petiole, glabrous; petiole 4–8 cm, at base up to 2 mm thick, like rachis glabrous or loosely covered with spreading hairs 1–2 mm; leaflets in 10–15 pairs, ovate, 8–30 × 5–22 mm, glabrous or at margins and abaxially at midvein sparsely covered with spreading hairs ca. 1 mm, apex rounded to very shortly acuminate. Racemes very loosely 5–7-flowered; peduncle 0.5–2 cm; bracts 5–12 mm, glabrous or loosely hairy. Calyx 11–13 mm, glabrous or with a few spreading hairs at teeth; teeth unequal,

3–5 mm. Petals yellow or greenish yellow; standard oblong to elliptic, 24–25 × 8–9 mm, apex emarginate; wings 20–22 mm; keel 17–18 mm. Ovary with a stipe 1–1.5 mm, hairy. Legumes ellipsoid, ca. 20 mm, ca. 10 mm high.

• Xinjiang.

The Chinese record of *Astragalus sewertzowii* Bunge from Xinjiang (FRPS 42(1): 210. 1993) is possibly based on a misidentification of *A. psilosepalus*. *Astragalus sewertzowii* is not known to occur in China.

224. *Astragalus rhizanthus* Royle ex Benth. in Royle, Ill. Bot. Himal. Mts. 200. 1835.

畸形黄耆 *ji xing huang qi*

Plants herbaceous or subshrubby, acaulescent to distinctly caulescent, white hairy, inflorescence sometimes also with black hairs. Stems, if present, up to 25 cm, spreading hairy. Leaves 5–12(–17) cm; stipules distinctly longitudinally nerved, adnate to petiole for 3–5 mm, lower ones 5–7 mm, glabrous or ciliate, upper ones 10–15 mm, mostly densely long hairy; petiole 1–3 cm, like rachis loosely to rather densely covered with ascending hairs 1–2(–2.5) mm, sometimes toward end of vegetation period hardening and persistent to next year; leaflets in 6–20(–28) pairs, elliptic to widely elliptic, 4–8(–14) × 2–5(–6) mm, mostly on both surfaces densely subappressed hairy, more rarely adaxially sparsely hairy to glabrous, very rarely hairy only at midvein abaxially, apex subacute to slightly retuse. Racemes subsessile (mostly in acaulescent plants) or with a hairy to subglabrous peduncle 0.5–5 cm, loosely 3–5-flowered; bracts 8–10 mm, hairy. Calyx 12–14(–16) mm, loosely to densely spreading white or white and black hairy; teeth 5–8 mm. Petals yellow; standard obovate, 18–23 × 8–12 mm, apex emarginate; wings 17–21 mm; keel 14–15 mm. Legumes subsessile, oblong, 10–17(–20) mm, 4–7 mm high and wide, with a straight or curved beak 3–10 mm, 2-locular; valves leathery, loosely to densely covered with spreading hairs.

Subalpine to alpine meadows and stony slopes; 1800–5000 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Nepal, Pakistan].

- 1a. Leaflets in (12–)15–20(–28) pairs, mostly densely hairy; inflorescence mostly only white hairy; legumes with a beak 3–5 mm 224a. subsp. *rhizanthus*
- 1b. Leaflets in 6–13 pairs, sparsely hairy to glabrous; inflorescence predominantly black hairy; legumes with a beak up to 10 mm 224b. subsp. *candolleanus*

224a. *Astragalus rhizanthus* subsp. *rhizanthus*

畸形黄耆(原亚种) *ji xing huang qi* (*yuan ya zhong*)

Astragalus anomalus Bunge; *A. badrinathensis* M. P. Sharma; *A. malacophyllus* Bunge.

Plants mostly acaulescent but sometimes with ± long stems. Leaflets in (12–)15–20(–28) pairs, mostly densely hairy. Inflorescence mostly only white hairy. Legumes 5–7 mm high and wide, at both ends shortly narrowed, rounded or slightly grooved dorsally, with a beak 3–5 mm.

Subalpine to alpine meadows and stony slopes; 1800–5000 m. Xinjiang [Afghanistan, India, Kashmir, Pakistan].

224b. *Astragalus rhizanthus* subsp. *candolleanus* (Royle ex Benth) Podlech, Mitt. Bot. Staatssamml. München 25: 184. 1988.

短梗畸形黄耆 *duan geng ji xing huang qi*

Astragalus candolleanus Royle ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

Plants mostly with developed stems. Leaflets in 6–13 pairs, mostly relatively glabrous. Inflorescence mostly black hairy. Legumes at both ends long narrowed, 10–15(–20) mm, 4–5 mm high and ca. 4 mm wide, deeply grooved dorsally, with a beak up to 10 mm.

Subalpine to alpine meadows and stony slopes; 2100–4000 m. Xizang [India, Kashmir, Nepal, Pakistan].

The two subspecies are not easy to distinguish in flowering state, especially because of the high polymorphism of *Astragalus rhizanthus* subsp. *rhizanthus*. The legumes are necessary for exact determination.

225. *Astragalus schanginianus* Pallas, Sp. Astragal. 77. 1802.

卡通黄耆 *ka tong huang qi*

Astragalus schanginianus subsp. *neoschanginianus* Goloskokov.

Plants 20–40 cm tall, acaulescent or shortly caulescent, covered with white hairs 0.5–2 mm, at rachis and legumes up to 4 mm. Stems 1–5 cm, glabrous or spreading hairy. Leaves 10–40 cm; stipules whitish, 8–16 mm, adnate to petiole for 3–5 mm, glabrous or sparsely hairy, more rarely to densely hairy; petiole 4–10 cm, like rachis subglabrous or sparsely, more rarely densely covered with spreading unequal hairs 0.5–3(–4) mm; leaflets in 15–23 pairs, narrowly elliptic to narrowly ovate, 12–25 × 6–12 mm, abaxially sparsely to loosely, rarely to densely, appressed hairy, adaxially glabrous or to loosely appressed hairy, apex rounded to subacute. Racemes loosely 5–12-flowered; peduncle 1.5–6 cm, sparsely to loosely spreading hairy; bracts 10–15 mm, hairy. Calyx 10–19 mm, glabrous or

loosely spreading hairy; teeth 4–7 mm. Petals yellow; standard obovate, 23–26 × 8–10 mm, apex slightly emarginate; wings 20–23 mm; keel (16–)17–18 mm, limbs slightly obliquely elliptic, straightly stretched forward. Legumes with a stipe 1–3 mm, 15–27 mm, 6–8 mm high and 5–6 mm wide, with a slender beak 2–5 mm, 2-locular; valves glabrous or loosely to densely covered with spreading hairs.

Under bushes, in open dry plains. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia)].

226. *Astragalus webbianus* Graham ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

藏西黄耆 *zang xi huang qi*

Astragalus minutifoliolatus Wendelbo.

Plants subshrubby, acaulescent to shortly caulescent, with white hairs 0.3–0.7(–1) mm, inflorescence also with black hairs. Stems, if present, up to 5 cm. Leaves 8–22 cm; stipules distinctly longitudinally nerved, 10–15 mm, adnate to petiole for 3–5 mm, lower ones ciliate and often hairy at base, upper hairy, often connate around petiole for 1–3 mm; petiole 3–6 cm, like rachis sparsely to loosely covered with ascending hairs up to 1 mm, toward end of vegetation period hardening and often spiny, persistent to next year or even longer; leaflets in 17–23 pairs, elliptic to obovate, 2–9 × 1–4.5 mm, abaxially and at margins sparsely ± appressed hairy, adaxially glabrous, apex rounded to slightly retuse. Racemes 2–5-flowered; peduncles several, 0.5–1.5 cm, appressed hairy; bracts 8–10 mm, with white and also black hairs. Bracteoles often present, up to 2 mm. Calyx 15–17 mm, sparsely to rather densely covered with ascending white and blackish to black hairs; teeth 4–8 mm. Petals yellow; standard obovate, 24–27 × 9–11 mm, apex emarginate; wings 22–23 mm; keel 19–21 mm. Legumes with a stipe 3–4 mm, 20–25 mm, 5–6 mm high and 8–10 mm wide, narrowly grooved ventrally and dorsally, with a straight beak 3–4 mm, 2-locular; valves glabrous.

Moraines, among debris in alpine zone; 3600–5000 m. Xizang [Afghanistan, India, Kashmir, Pakistan].

31b. *Astragalus* “*Purpurascens* group”

布河黄耆群 *bu he huang qi qun*

Plants acaulescent or nearly so, with white hairs. Calyx tubular. Petals always glabrous, mostly fading red or purple, mostly of nearly equal length; auricles of wings mostly large, 2–4 mm; limbs of keel with widely curved lower edge and mostly sigmoid upper edge, tip therefore often slightly beaklike, upper edge for whole length or in upper part furnished with minute teeth. Legumes mostly with leathery vaulted valves.

Seventy-nine species: Afghanistan, China, Mongolia, Pakistan, Russia; C and SW Asia, E Europe; four species in China.

- 1a. Plants 6–12 cm tall; racemes subsessile, 2-flowered; bracts 4–6 mm; legumes with a stipe 1–2 mm, 10–15 mm 230. *A. taldicensis*
- 1b. Plants distinctly taller; racemes with a distinct peduncle, mostly with more flowers; bracts distinctly longer; legumes with a much longer stipe, 15–28 mm.
 - 2a. Leaflets in 18–30 pairs, narrowly elliptic, 5–12 × 2–4 mm; racemes 2- or 3-flowered 228. *A. buchtormensis*
 - 2b. Leaflets in 9–17 pairs, ovate to obovate, 8–15 × 4–11 mm; racemes 6–15-flowered.
 - 3a. Peduncle 4–8 cm, glabrous or sparsely hairy; bracteoles absent 227. *A. altaicola*
 - 3b. Peduncle 6–14 cm, densely hairy; bracteoles present, linear, 2–3 mm 229. *A. neochorgosicus*

227. *Astragalus altaicola* Podlech, Sendtnera 1: 270. 1993.

阿尔泰黄耆 a er tai huang qi

Astragalus altaicus Bunge (1868), not Pallas (1800).

Plants 15–35 cm tall, acaulescent, sparsely hairy to subglabrous. Leaves 11–25 cm; stipules 10–15 mm, ciliate, adnate to petiole for 4–5 mm; petiole 3–5 cm, like rachis glabrous or more rarely sparsely to loosely covered with long hairs; leaflets in 9–14 pairs, remote, ovate to obovate, 8–15 × 6–11 mm, mostly glabrous or ciliate, apex rounded to slightly retuse. Racemes 6–8 cm, loosely 6–15-flowered; peduncle 4–8 cm, glabrous or sparsely hairy; bracts 6–11 mm, ciliate. Calyx 12–15 mm, glabrous, rarely sparsely to rather densely covered all over with spreading hairs 1.5–3 mm; teeth 3–4 mm. Petals yellow; standard obovate, 23–25 × 9–10 mm; wings 17–19 mm; keel 16–19 mm. Legumes with a stipe 4–5 mm, 17–28 mm, 9–10 mm high and 10–12 mm wide, with a beak 1–2 mm, 2-locular; valves glabrous.

Sand, steppic meadows, *Pinus* forests. Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

228. *Astragalus buchtormensis* Pallas, Sp. Astragal. 76. 1802.

布河黄耆 bu he huang qi

Plants 10–22 cm tall, acaulescent, covered with ± spreading hairs up to 3 mm. Leaves 10–20 cm; stipules 10–15 mm, sparsely to densely hairy, adnate to petiole for 2–4 mm; petiole 2–6 cm, like rachis loosely to densely hairy; leaflets in 18–30 pairs, narrowly elliptic, 5–12 × 2–4 mm, often folded, abaxially loosely to rather densely hairy, adaxially glabrous, apex rounded to slightly retuse. Racemes 2- or 3-flowered; peduncle 1–5 cm, loosely hairy; bracts 7–13 mm, ciliate. Calyx 10–14 mm, loosely to densely hairy especially in upper part, rarely in basal part glabrous; teeth 4–5 mm. Petals yellow; standard elliptic to obovate, 20–24 × 8–10(–12) mm, apex emarginate; wings 19–22 mm; keel 16–20 mm. Legumes with a stipe 2–5 mm, (10–)15–20 mm, 6–8 mm high and wide, with a straight beak 3–5 mm, incompletely 2-locular; valves thin leathery, loosely covered with long spreading hairs, more rarely glabrous.

Steppic meadows in the forest-free zone. Xinjiang [Kazakhstan, Russia; SW Asia (Caucasus), Europe].

32. *Astragalus* sect. *Gontschariella* Kamelin, Bot. Zhurn. (Moscow & Leningrad) 59: 1754. 1974.

刚查诺夫组 gang cha nuo fu zu

Plants acaulescent to subacaulescent, with only basifixed white hairs. Leaflets verticillate in several approximate to remote whorls. Calyx tubular. Petals glabrous; standard mostly pandurate, more rarely obovate. Legumes small, with thin walls.

Nineteen species: mountains of Afghanistan, W China, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; two species in China.

1a. Rachis with hairs 1–2 mm; leaflets 4–8 verticillate; calyx in basal part subglabrous or at least distinctly less

hairy than in upper part; legumes 8–15 mm 231. *A. alatavicus*

1b. Rachis with hairs 0.3–1 mm; leaflets 4–6 verticillate; calyx densely hairy throughout; legumes 12–18 mm 232. *A. pamirensis*

231. *Astragalus alatavicus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 344. 1842.

阿拉套黄耆 a la tao huang qi

229. *Astragalus neochorgosicus* Podlech, Mitt. Bot. Staats-samml. München 25: 624. 1988.

新霍尔果斯黄耆 xin huo er guo si huang qi

Plants 18–25 cm tall, acaulescent or nearly so, covered with mostly spreading hairs up to 2 mm. Leaves 15–25 cm; stipules 8–12 mm, adnate to petiole for 3–5 mm, ciliate or sparsely hairy; petiole 3–7 cm, like rachis loosely to rather densely hairy; leaflets in 15–17 pairs, ovate to obovate, 8–15 × 4–8 mm, abaxially loosely to densely covered with short appressed to ascending hairs, adaxially glabrous, apex rounded and sometimes with a minute cusp. Racemes 6–13 cm, very loosely 6–10-flowered; peduncle 6–14 cm, densely hairy; bracts 7–13 mm, hairy. Bracteoles present, linear, 2–3 mm. Calyx 12–16 mm, sparsely to loosely hairy; teeth 2–5 mm. Petals yellow; standard obovate, 26–27 × 8–10 mm, in lower part slightly constricted; wings 23–24 mm; keel 21–22 mm. Legumes with a stipe 7–9 mm, 18–20 mm, 7–8 mm high and 10–11 mm wide, widely flattened ventrally and dorsally, with a beak 1–2 mm, 2-locular; valves loosely hairy or glabrous when completely ripe.

W Xinjiang [Kyrgyzstan].

230. *Astragalus taldicensis* Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 344. 1896.

假黄耆 jia huang qi

Astragalus mendax Freyn; *A. pamiro-altaicus* Lipsky.

Plants 6–12 cm tall, acaulescent, furnished with mostly spreading hairs 0.3–1.5(–2) mm. Leaves 4–12 cm; stipules 5–12 mm, adnate to petiole for 3–5 mm, ciliate; petiole 0.5–2 cm, like rachis rather densely hairy; leaflets in 10–18 pairs, narrowly elliptic, 4–8 × 2–3 mm, abaxially rather densely or sometimes sparsely covered with ascending hairs, adaxially glabrous, apex rounded or slightly retuse. Racemes subsessile, 2-flowered; bracts 4–6 mm, hairy. Calyx 12–14 mm, sparsely hairy; teeth 3–4 mm, ciliate. Petals yellow, fading red; standard obovate, 22–25 × 9–12 mm, apex emarginate; wings 20–22 mm; keel 16–18 mm. Legumes with a stipe 1–2 mm, 10–15 mm, 6–8 mm high and wide, with a beak 3–4 mm, incompletely 2-locular; valves hairy.

From the *Juniperus* zone up to the alpine zone; 2000–4800 m. Xinjiang [Kyrgyzstan, Tajikistan].

in 10–18 approximate whorls, narrowly elliptic to narrowly obovate, 3–8(–15) × 1.5–2.5(–3) mm, mostly folded, abaxially rather densely covered with appressed to ascending hairs, adaxially glabrous, apex rounded. Racemes 3–5-flowered; peduncle 0.2–0.6(–2.5) cm, spreading hairy; bracts 4–8 mm, hairy. Calyx 10–15 mm, very sparsely to loosely, more rarely rather densely, spreading hairy, at base often completely glabrous; teeth 2–3 mm. Petals yellow, fading reddish; standard oblong-pandurate, 20–26 × 7–10 mm, in lower 1/3 distinctly constricted, apex deeply incised; wings 19–24 mm; keel 16–22 mm. Legumes with a stipe 2–3 mm, 8–15 mm, 4–5 mm high and 3–4 mm wide, with a beak ca. 2 mm, incompletely 2-locular; valves rather densely covered with ascending hairs.

Stony ground in subalpine to alpine zones; 1700–3400 m. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

232. *Astragalus pamirensis* Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 344. 1896.

帕米尔黄耆 pa mi er huang qi

Astragalus alatavicus Karelin & Kirilov var. *pamirensis*

33. *Astragalus* sect. *Erionotus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 32. 1868.

毛被组 mao bei zu

Plants acaulescent to caulescent, with basifixed white hairs. Leaflets always in pairs, adaxially with long, flexuous, cottonlike hairs (when mature sometimes falling as a whole and then leaflets adaxially nearly glabrous). Calyx campanulate to tubular. Petals hairy (in Chinese species) or glabrous. Legumes mostly small.

Twenty-five species: Afghanistan, NW China, N Pakistan; C Asia, SW Asia (Iran); two species in China.

1a. Keel 12–18 mm, limbs obliquely elliptic to triangular, 4–6 mm; calyx tube ca. 10 mm; style below stigma

with minute nipplelike hairs 233. *A. floccosifolius*

1b. Keel 14–22 mm, limbs narrowly elliptic, 8–10 mm; calyx tube 10–16 mm; style below stigma glabrous 234. *A. lanuginosus*

233. *Astragalus floccosifolius* Sumnevicz, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1937(9–10): 2. 1937.

丛毛叶黄耆 cong mao ye huang qi

Plants 15–35(–50) cm tall, caulescent or more rarely subacaulescent. Stems (1–)3–15(–30) cm, loosely to rather densely covered with spreading hairs up to 1 mm. Leaves 10–25(–30) cm; stipules 6–11 mm, adnate to petiole for 2–4 mm, ciliate and mostly loosely to rather densely subappressed hairy; petiole 3–7 cm, like rachis loosely to rather densely covered with ascending or more rarely spreading hairs 0.2–1 mm; leaflets in 18–30(–40) pairs, narrowly elliptic, 6–20 × 2–6 mm, abaxially loosely to rather densely appressed hairy, adaxially densely cottonlike hairy, often glabrescent with age, apex rounded to shortly acuminate. Racemes sessile or with a peduncle 1–3(–5) cm and hairy like stem, loosely (1–)3–10(–12)-flowered; bracts 3–6 mm, hairy. Calyx 14–17 mm, densely covered with ascending hairs; tube ca. 10 mm; teeth 4–8 mm. Petals yellow, appressed hairy; standard obovate-pandurate, 18–24 × 8–11 mm, in lower part slightly constricted, apex emarginate; wings 16–22 mm; keel 12–18 mm, limbs obliquely elliptic to triangular, 4–6 mm. Style below stigma with minute nipplelike hairs.

(Franchet) B. Fedtschenko; *A. myriophyllus* Bunge (1880), not (Pallas) Pallas (1802).

Plants 13–20 cm tall, caespitose, acaulescent or subacaulescent, densely covered with mostly spreading hairs 0.3–0.5(–1) mm. Leaves 5–20 cm; stipules with longitudinal nerves, 7–12 mm, adnate to petiole for 3–5 mm, at margin and sometimes toward apex loosely to densely hairy; petiole 2.5–5 cm, like rachis densely spreading hairy; leaflets 4–6 verticillate in 8–14(–20) approximate whorls, narrowly elliptic to narrowly obovate, 5–10 × 2–4 mm, mostly folded, abaxially densely villous with appressed to spreading hairs, adaxially glabrous or nearly so, apex rounded to subacute. Racemes 3–4 cm, 5–15-flowered; peduncle 1–5 cm, densely spreading hairy; bracts 3–5(–8) mm, densely ciliate. Calyx 13–15 mm, densely spreading hairy; teeth 2–4 mm. Petals yellow, fading red; standard obovate-pandurate, 20–21 × 8–9 mm, in lower 1/3 slightly constricted, apex deeply incised; wings 19–20 mm; keel 17–18 mm. Legumes with a stipe 2–3 mm, 12–18 mm, 4–5 mm high and wide, with a beak 2–3 mm, incompletely 2-locular; valves densely villous.

Sandy and stony ground in subalpine to alpine zones; 2800–4200 m. Xinjiang [Kyrgyzstan, Tajikistan].

Legumes with a stipe 1–4 mm, 11–17 mm, 4–6 mm high and wide, with a straight beak 1–2.5 mm, incompletely 2-locular; valves densely covered with nearly spreading hairs up to 2 mm.

Loessic soil, ephemeral steppes, under bushes; 800–2300(–3100) m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

234. *Astragalus lanuginosus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 409. 1841.

棉毛黄耆 mian mao huang qi

Astragalus anrachaicus Goloskokov; *A. xinjiangnensis* Y. C. Ho.

Plants 15–30 cm tall, caulescent, covered with mostly spreading hairs up to 3 mm. Stems ascending to erect, densely hairy. Leaves 10–15 cm; stipules 7–15 mm, densely hairy, adnate to petiole for 2–3 mm; petiole and rachis loosely to rather densely hairy; leaflets in 20–26 pairs, ovate to obovate, 5–12 × 4–8 mm, abaxially rather densely subappressed hairy, adaxially loosely cottonlike hairy, often glabrescent with age, apex obtuse to retuse. Racemes 2–6-flowered; peduncles several, often along whole stem, 0.5–2 cm; bracts 5–10 mm, hairy. Calyx 15–

23(–27) mm, hairy; tube 10–16 mm; teeth subulate, 5–8 mm. Petals pale yellow, hairy; standard obovate-pandurate, 20–29 mm, slightly constricted in lower part, apex slightly emarginate; wings 18–26 mm; keel 14–22 mm, limbs narrowly elliptic, 8–10 mm. Legumes pendulous, with a stipe 2–7 mm, 14–20 mm,

5–6 mm high and 4–5 mm wide, with a beak 2–4 mm, 2-locular; valves densely appressed to spreading hairy.

Artemisia steppes, semideserts, riverbanks, as a weed in crops, from plains to the mountain zone. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

34. *Astragalus* sect. *Aegacantha* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 42. 1868.

刺叶柄组 ci ye bing zu

Shrubs spiny, much-branched, often cushionlike with basifixed hairs. Leaves paripinnate with spiny rachis; stipules adnate to petiole, often amplexicaul; leaflets mostly strongly becoming smaller toward tip of leaves. Racemes shortly pedunculate, with few pedicellate flowers. Bracteoles sometimes present. Calyx tubular, ruptured by fruit. Standard emarginate. Legumes incompletely to completely 2-locular with leathery valves.

Fifty-six species: mostly in Afghanistan, also in W China, N India, Kashmir, Nepal, Pakistan, C Asia, and SW Asia (Iran); three species in China.

1a. Petals hairy 235. *A. lasiosemius*
1b. Petals glabrous.

2a. Leaflets in 4–6 pairs, mostly hairy on both surfaces; stems of current year up to 40 cm 236. *A. multiceps*

2b. Leaflets in 8–14 pairs, glabrous adaxially; stems of current year 1–2(–10) cm 237. *A. oplites*

235. *Astragalus lasiosemius* Boissier, Diagn. Pl. Orient., ser. 1, 9: 96. 1849.

毛果黄耆 mao guo huang qi

Astragalus genistoides Boissier; *A. latistylus* Freyn; *A. latistylus* subsp. *aridus* Freyn; *A. psilopterus* Bunge.

Plants to 30 cm tall, strongly branched, with appressed to spreading only white hairs 0.2–1.5 mm, at calyx up to 3 mm. Stems of current year 2–8(–15) cm, hairy, glabrescent with age. Leaves 3–5 cm; stipules 3–8 mm, semiamplexicaul, adnate to petiole for 1–2 mm, hairy; petiole 1–2.5 cm; rachis rigid, spiny, obliquely erect, hairy, glabrescent with age, free tip 2–3 × as long as uppermost leaflets; leaflets in 5–8 pairs, elliptic to obovate, lower ones 3–6(–9) × 1.5–3 mm, mostly folded, hairy, apex rounded to retuse. Racemes 1–3-flowered; peduncle 0.1–2.5 cm; bracts 2–4 mm. Calyx 12–15 mm, hairy; teeth 2–5 mm. Petals yellow, hairy; standard obovate, 15–26 × 8–11 mm; wings 14–25 mm; keel 13–22 mm. Legumes 11–18 mm, 5–7 mm high, with a beak 1.5–3 mm, incompletely to nearly completely 2-locular; valves leathery, densely hairy.

Steppic stony plains, *Pinus* and *Cedrus* forests, montane to alpine zones; 2400–4300 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

236. *Astragalus multiceps* Wallich ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

二尖齿黄耆 er jian chi huang qi

Astragalus bicuspis Fischer.

Plants to 60 cm tall, mostly branched at base, with ± spreading hairs 0.4–2 mm, vegetative parts only white hairy. Stems of current year up to 40 cm, villous. Leaves 2.5–4.5 cm, spreading; stipules 4.5–9 mm, semiamplexicaul, adnate to petiole for 1.5–2 mm, ciliate, otherwise glabrous or hairy; petiole 0.5–1 cm; rachis thin, hairy, free spiny tip ± as long as uppermost leaflets; leaflets in 4–6 pairs, obovate, lower ones 5–11 × 3–4 mm, hairy on both surfaces or more rarely glabrous adaxi-

ally, apex rounded to retuse. Racemes subsessile or with a peduncle rarely up to 1.4 cm, 1–3-flowered; bracts 3–5 mm, ciliate. Bracteoles sometimes present. Calyx 9–15 mm, rather densely white hairy, sometimes also with shorter black hairs; teeth 2.5–5 mm. Petals yellow, glabrous; standard obovate, 15–26 × 7–10 mm; wings 14–23 mm; keel 13–19 mm. Legumes subsessile, 10–15 mm, 3–5 mm high, compressed laterally, with a beak 2–5 mm, incompletely 2-locular; valves leathery, densely hairy.

1300–3300 m. Xizang [India, Kashmir].

237. *Astragalus oplites* Benth in R. Parker, Bull. Misc. Inform. Kew 1921: 270. 1921.

刺叶柄黄耆 ci ye bing huang qi

Astragalus cicerifolius Royle ex Bunge (1868), not Royle ex Fischer (1853); *A. zanskarensis* Benth in R. Parker ex Bunge subsp. *oplites* (Benth in R. Parker) I. Deml.

Plants mostly branched at base; hairs appressed to ± spreading, in vegetative parts only white, in inflorescence partly blackish, up to 1.5 mm, at calyx and legume up to 2–3 mm. Stems more than 20 cm, parts of current year 1–2(–10) cm, hairy. Leaves 5–7 cm, erect; stipules 7–15 mm, semiamplexicaul, adnate to petiole for 2–4 mm, glabrous or hairy; petiole 1–2.5 cm; rachis glabrous, free tip ± as long as uppermost leaflets; leaflets in 8–14 pairs, obovate, lower ones 4–11 × ca. 2.5 mm, abaxially rather densely hairy, adaxially glabrous, apex rounded to retuse. Racemes 3–5-flowered; peduncle 1–2 cm, hairy; bracts 3–8, mostly ca. 5 mm, ciliate, rarely hairy. Bracteoles sometimes present, 0.5–1.5 mm. Calyx 10–15 mm, always with black and white hairs; teeth 2.5–5 mm. Petals yellow, glabrous; standard elliptic to obovate, 17–25 × 6–8(–10) mm; wings 15–23 mm; keel 14–21 mm. Legumes subsessile, 10–15 mm, ca. 4 mm high, with a straight beak 2.5–5 mm, incompletely 2-locular; valves leathery, spreading hairy.

Xinjiang, Xizang [India, Kashmir].

35. Astragalus sect. **Eremophysa** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 62. 1868.

沙孚组 sha fu zu

Plants perennial, with well-developed stems, covered with soft, white, basifixed hairs. Leaves imparipinnate with mostly remote, ± orbicular leaflets; stipules shortly adnate to petiole or free. Racemes sessile or with a distinct peduncle, at anthesis rather densely many flowered, later distinctly elongated. Bracteoles mostly present. Flowers subsessile. Calyx at anthesis tubular to slightly swollen, later strongly bladderlike inflated and distinctly netlike nerved. Petals yellow, included in calyx. Fruit included in calyx, distinctly stalked, ellipsoid to ovoid, ± fully 2-locular, with few seeds.

Thirteen species: steppes of European Russia and Caucasus to Kazakhstan, from N Africa (Egypt) through SW Asia to Pakistan and NW China; two species in China.

1a. Stem with spreading hairs; ovary and legumes densely hairy 238. *A. lehmannianus*

1b. Stem with subappressed hairs; ovary and legumes glabrous 239. *A. sphaerophysa*

238. Astragalus lehmannianus Bunge, Arbeiten Naturf. Vereins Riga 1: 252. 1847.

菟萁黄耆 jian jia huang qi

Plants 35–65 cm tall, with tangled spreading hairs. Stem 25–50 cm, hairy, glabrescent with age. Leaves 15–27 cm; stipules 8–9 mm, adnate to petiole, hairy; petiole short, like rachis hairy; leaflets in 7–10 pairs, (10–)15–25(–30) mm long and wide, abaxially hairy, adaxially glabrous. Racemes sessile or with a hairy peduncle up to 2 cm, (7–)9–14 cm, many flowered; bracts 5–6 mm, hairy. Bracteoles 3–4 mm. Calyx at anthesis 11–15 mm, tubular to slightly inflated, densely velvety-villous; teeth 4–5 mm; fruiting calyx ovoid to inflated globose, 17–22 mm, finely netlike nerved, velvety. Petals yellow; standard ovate to orbicular, 16–20 mm, apex slightly emarginate; wings as long as standard; keel 15–19 mm. Legumes with a stipe 2–3 mm, included in calyx, 7–9 mm, with a beak 1–2 mm; valves thin, velvety.

Sandy soil, dunes. Xinjiang [Kazakhstan, Turkmenistan, Uzbekistan; SW Asia (Caucasus), Europe].

239. Astragalus sphaerophysa Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 338. 1842.

球孚黄耆 qiu fu huang qi

Plants 27–50 cm tall. Stem 23–37 cm, lower part glabrescent or glabrous, upper part sparsely to loosely covered with subappressed hairs 0.5–1 mm. Leaves 10–15 cm; stipules 8–12 mm, high adnate to petiole, at margins with hairs up to 2 mm; petiole 2–3 cm, like rachis sparsely to loosely spreading hairy; leaflets in 4–7 pairs, remote, (14–)20–30 mm, abaxially rather densely subappressed hairy, adaxially glabrous. Racemes sessile, 3–5 cm, densely many flowered, at fruiting time elongated up to 8 cm; bracts 8–10 mm, villous at margins. Bracteoles 5–7 mm. Calyx at anthesis 12–14 mm, tubular to slightly inflated, hairy only in upper part and at teeth; teeth 4–5 mm; fruiting calyx ovoid to inflated globose, 17–22 mm, finely netlike nerved, nearly glabrous with exception of upper margins and teeth. Petals yellow; standard ± orbicular, 15–20 mm, apex slightly emarginate; wings as long as standard; keel 14–18 mm. Legumes with a slender stipe 3–4 mm, included in calyx, 5–9 mm, ca. 3.5 mm high and wide, with a beak 1–2 mm; valves thin, glabrous.

Sandy soil, dunes. NW Xinjiang [Kazakhstan].

36. Astragalus sect. **Uliginosi** A. Gray, Proc. Amer. Acad. Arts 6: 196. 1864.

湿地组 shi di zu

Astragalus sect. *Euodmus* Bunge.

Plants perennial, herbaceous, with medifixed to asymmetrically bifurcate hairs. Stems long, erect. Stipules free from petiole, vaginate-connate behind stem. Racemes many flowered, with a long peduncle. Bracteoles sometimes present. Calyx shortly tubular. Petals glabrous. Legumes sessile, keeled or rounded ventrally, grooved dorsally, 1-locular to 2-locular; valves thinly leathery.

Seven species: Afghanistan, China, India, Japan, Kashmir, Korea, Mongolia, Pakistan, Russia; C and SW Asia; three species (one endemic) in China.

1a. Bracteoles present; ovary and legumes densely hairy; legumes nodding 240. *A. peduncularis*

1b. Bracteoles absent; legumes obliquely erect to erect.

2a. Stem 30–70 cm; leaflets narrowly elliptic, 20–40 × 5–15 mm, glabrous adaxially; calyx teeth 1.5–3 mm; ovary and legumes glabrous 242. *A. uliginosus*

2b. Stem 5–10 cm; leaflets elliptic, 10–25 × 5–12 mm, sparsely hairy adaxially; calyx teeth 4–5 mm; ovary and legumes black hairy 241. *A. qitaiensis*

240. Astragalus peduncularis Royle ex Benth in Royle, III. Bot. Himal. Mts. 199. 1835.

青藏黄耆 qing zang huang qi

Astragalus corydalinus Bunge.

Plants 25–70 cm tall, covered with mostly ± medifixed hairs. Stems several, 20–60 cm, often with very short lateral branches, densely hairy; hairs appressed, often flexuous, white, at nodes also black, 0.3–0.5 mm, a few ascending up to 1 mm. Leaves 5–10 cm, subsessile; stipules 6–8 mm, high vaginate-

connate behind stem, loosely to rather densely appressed hairy; rachis rather densely white hairy; leaflets in 7–13 pairs, narrowly elliptic, 7–19(–25) × 1.5–7 mm, abaxially loosely to densely appressed hairy, adaxially glabrous or subglabrous, apex rounded or obtuse, mostly very shortly mucronulate. Racemes up to 10 cm, rather densely many flowered; peduncle 6–23 cm, hairy like stem; bracts 3–5 mm, black and white hairy. Bracteoles 1–2 mm. Calyx 8–10 mm, loosely covered with appressed to ascending, mostly asymmetrically bifurcate to subbasifixed, black or mixed white and black hairs; teeth unequal, 1–2 mm. Petals greenish white, standard often ± purple tinged; standard obovate, 14–17 × 6–8 mm, apex emarginate; wings 12–13 mm; keel 11–12 mm. Legumes sessile, nodding, 11–20 mm, 4–5 mm high and 5–6 mm wide, with a beak 1–2 mm, 1-locular to incompletely 2-locular; valves densely black and white hairy, glabrous with age.

Steppes, open scrub and woodlands; 1100–3700 m. Qinghai, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

241. *Astragalus qitaiensis* Podlech & L. R. Xu, *Novon* 17: 253. 2007.

奇台黄耆 qi tai huang qi

Plants ca. 30 cm tall, covered with ± medifixed, appressed hairs. Stems of current year 5–10 cm, sparsely to loosely covered with white hairs 0.3–0.5 mm, at nodes sometimes with black hairs mixed in. Leaves 10–12 cm; stipules 7–15 mm, high vaginate-connate behind stem, loosely to rather densely covered with symmetrically or asymmetrically bifurcate white hairs 0.2–0.5 mm; petiole 3–4 cm, with rachis sparsely to loosely white hairy like stem; leaflets in 9 or 10 pairs, elliptic, 10–25 × 5–12 mm, both surfaces sparsely covered with white hairs 0.3–0.5 mm, apex rounded to slightly retuse. Racemes ca. 4 cm, densely many flowered; peduncle 8–10 cm, subglabrous; bracts 4–5 mm, sparsely black ciliate. Calyx 9–10 mm, loosely covered with medifixed, appressed, black hairs 0.2–0.4 mm and

with symmetrically or asymmetrically bifurcate white hairs 0.5–0.7 mm; teeth 4–5 mm. Petals probably pale greenish yellow; standard elliptic, 15–16 × ca. 5 mm, emarginate; wings ca. 14 mm; keel ca. 13 mm. Legumes sessile, obliquely erect, ca. 10 mm, ca. 3 mm high and wide, with a beak 1–2 mm, incompletely 2-locular; valves thinly leathery, densely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly ascending, ± flexuous, black hairs 0.2–1 mm, partly glabrescent with age.

• Xinjiang.

242. *Astragalus uliginosus* Linnaeus, *Sp. Pl.* 2: 757. 1753.

湿地黄耆 shi di huang qi

Astragalus nertschinskensis Freyn.

Plants (25–)45–90 cm tall. Stems usually several, erect, 30–70 cm, rather sparsely hairy; hairs medifixed, appressed, white, at nodes also black, 0.3–0.4 mm. Leaves 10–20 cm; stipules 6–10 mm, connate behind stem, rather densely white hairy; petiole 1.5–4 cm, with rachis sparsely to loosely hairy like stem; leaflets in 10–13 pairs, narrowly elliptic, 20–40 × 5–15 mm, abaxially loosely appressed white hairy, adaxially glabrous, apex obtuse or minutely mucronulate. Racemes 3–6 cm, many flowered; peduncle 3–10 cm, loosely to rather densely covered with symmetrically to mostly asymmetrically bifurcate hairs up to 0.8 mm; bracts 5–6 mm, sparsely black ciliate. Calyx 8–9 mm, loosely covered with medifixed, short, appressed, mostly black hairs; teeth 1.5–3 mm. Petals pale greenish yellow, keel violet tipped; standard elliptic, 14–18 × 5–6 mm, apex emarginate; wings 10–14 mm; keel 9–12 mm. Legumes sessile, obliquely erect, 9–13 mm, 3.5–4 mm high and 4–5 mm wide, 2-locular; valves thinly leathery, glabrous.

Mesophytic meadows, riversides, margins of coniferous forests. Heilongjiang, Jilin, Liaoning, Nei Mongol [Kazakhstan, N Korea, Mongolia, Russia (Far East, Siberia)].

37. *Astragalus* sect. *Brachycephali* N. D. Simpson, *Notes Roy. Bot. Gard. Edinburgh* 8: 262. 1915 [*“Brachycephalae”*].

短序组 duan xu zu

Plants perennial, herbaceous, with well-developed stem; hairs bifurcate, often with mostly spreading basifixed hairs mixed in. Stipules free from petiole, connate behind stem. Racemes umbellate to globose, with a well-developed peduncle. Bracteoles present. Calyx campanulate-tubular. Standard slightly longer than wings and keel, without distinct claw. Legumes sessile or stipitate, incompletely to completely 2-locular, with thin, glabrous walls.

One species: Bhutan, China, S Korea.

243. *Astragalus bhotanensis* Baker in J. D. Hooker, *Fl. Brit. India* 2: 126. 1876.

地八角 di ba jiao

Astragalus bhotanensis var. *montigenus* Handel-Mazzetti; *A. brachycephalus* Franchet; *A. brachycephalus* var. *minor* Pampanini; *A. hamulosus* H. Léveillé.

Plants 20–90 cm tall, with symmetrically or asymmetrically bifurcate appressed hairs 0.3–0.8 mm, often with mostly ± spreading, longer, basifixed hairs mixed in. Stems mostly several, prostrate or ascending to erect, hollow, 2–6 mm thick, gla-

brous or sparsely to rather densely covered with medifixed hairs. Leaves 4–20 cm; stipules shortly connate behind stem or up to 1/4 of length, sparsely white and black hairy; petiole 0.5–3.5 cm, like rachis sparsely to rather densely covered with medifixed hairs up to 2 mm and sometimes sparsely with spreading basifixed hairs; leaflets in 10–17 pairs, narrowly elliptic, 5–23 × 3–13 mm, abaxially loosely to rather densely covered with appressed, medifixed hairs, adaxially glabrous or rarely with very few long basifixed hairs, rounded at apex. Racemes dense, ± umbellate-globose, 8–20-flowered; peduncle 4–15 cm, sparsely to loosely covered with appressed, medifixed hairs and sometimes also longer, ± spreading, basifixed, white

hairs; bracts 4–8 mm, glabrous or ciliate. Bracteoles 2–3 mm. Calyx 5–8 mm, sparsely to loosely covered with predominantly black, very short, sometimes also longer hairs up to 0.5 mm; teeth 2–3.5 mm. Petals dark purple to blue-purple or more rarely yellow or standard and keel purplish and wings white;

standard obovate, 10–14 × 4–6.5 mm; wings 9–12 mm; keel 8–10 mm. Legumes sessile, linear, 15–30 mm, 2.5–4 mm high and wide, with a short straight beak, incompletely 2-locular.

600–2800 m. Gansu, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, S Korea].

38. *Astragalus* sect. *Craccina* (Steven) Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 97. 1868.

旱生组 han sheng zu

Craccina Steven, Bull. Soc. Imp. Naturalistes Moscou 29(2): 144. 1856.

Perennials with well-developed or rarely short stems, rarely subshrubby, with bifurcate white and black hairs. Stipules nearly free from petiole, at least those of lower leaves vaginate-connate behind stem. Racemes loose, more rarely dense, borne on well-developed peduncle. Calyx campanulate or shortly tubular-campanulate. Flowers mostly small. Petals purplish or violet, rarely white; standard often without distinct claw; wings as long as or mostly longer than keel, with obtuse to incised tip. Legumes sessile or shortly stipitate, narrowly oblong to narrowly ellipsoid, grooved dorsally, incompletely to completely 2-locular, more rarely 1-locular.

Twenty-one species: China, Mongolia, Russia (Siberia); C Asia, SW Asia (Iran), Europe; seven species (three endemic) in China.

- 1a. Leaflets linear or very narrowly oblong, more than 4 × as long as wide.
- 2a. Plants small, 7–20 cm tall; leaflets in mostly 3–5 pairs; wing limbs distinctly obliquely emarginate; legumes 2-locular 247. *A. miniatum*
- 2b. Plants large, 20–80 cm tall; leaflets in 6–11 pairs; wing limbs obtuse.
- 3a. Stem and rachis with hairs 0.1–0.25 mm; bracts ca. 1 mm; calyx 2–2.5 mm, with predominantly white hairs; legumes incompletely to nearly completely 2-locular 244. *A. consanguineus*
- 3b. Stem and rachis with hairs 0.3–0.8 mm; bracts 1.5–3 mm; calyx 3(–4) mm, with predominantly black hairs; legumes nearly 1-locular 249. *A. sulcatus*
- 1b. Leaflets wider, less than 2–3 × as long as wide.
- 4a. Leaflets in 1 pair or in uppermost leaves only 1 terminal 246. *A. hotianensis*
- 4b. Leaflets in at least 3 pairs, but mostly in more.
- 5a. All stipules vaginate-connate to middle; wing limbs subobtuse; calyx teeth 2–2.5 mm; legumes sessile or subsessile, 1-locular 248. *A. miyalomontis*
- 5b. All or only lower stipules shortly connate; wing limbs incised; calyx teeth up to 1.5 mm; legumes sessile or stipitate, incompletely or completely 2-locular.
- 6a. Calyx teeth 0.1–0.8 mm; legumes with a stipe 3–5 mm, incompletely 2-locular, covered with medifixed black or white and black hairs 245. *A. discolor*
- 6b. Calyx teeth 1–1.5 mm; legumes sessile, completely 2-locular, covered with symmetrically or asymmetrically or even subbasifixed white hairs 250. *A. variabilis*

244. *Astragalus consanguineus* Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 22. 1841.

亚黄耆 ya huang qi

Plants (20–)30–50 cm tall; hairs medifixed, appressed, 0.1–0.25 mm. Stems mostly several, erect, (15–)30–50 cm, weakly branched in lower part, sparsely to more rarely loosely white hairy or sometimes with scattered hairs only. Leaves 4–6 cm; stipules 2–3 mm, covered with scattered appressed hairs, lower ones shortly vaginate-connate, upper ones free from each other; petiole 0.5–1 cm, with rachis hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, 6–12 × 2–3 mm, abaxially sparsely appressed hairy, adaxially glabrous, apex subobtuse to sometimes slightly retuse. Racemes 1.5–3 cm, loosely few to many flowered, elongating in fruit; peduncle 1.5–7 cm, very sparsely white and black hairy or subglabrous; bracts ca. 1 mm, white and black ciliate. Calyx 2–2.5 mm, sparsely white hairy, sometimes with a few black hairs mixed in; teeth 0.5–0.8 mm. Petals pale violet; standard elliptic to obovate, 6–8 mm, apex emarginate; wings 5.5–6.5 mm; keel 4.5–5 mm. Legumes sessile, slightly curved, 7–10 mm, 1.5–2 mm high, with a beak 0.5–1

mm, incompletely to nearly fully 2-locular; valves thin, loosely white hairy.

Xinjiang [Kazakhstan, Russia (Siberia)].

245. *Astragalus discolor* Bunge, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 33. 1877.

灰叶黄耆 hui ye huang qi

Astragalus biondianus Ulbrich; *A. ulachanensis* Franchet.

Plants 30–40 cm tall; hairs medifixed, appressed, in vegetative parts only white. Stems several, ascending or erect, 15–25 cm, sparsely to densely covered with hairs 0.2–0.3 mm. Leaves 3–5 cm, subsessile; stipules 1–2 mm, lower ones shortly vaginate-connate, upper ones only semiamplexicaul, all sparsely hairy; rachis densely hairy like stem; leaflets in 6–11 pairs, narrowly elliptic, 2–7(–10) × 1–2.5(–4) mm, abaxially sparsely to rather densely and adaxially sparsely to loosely covered with appressed hairs 0.4–0.5 mm, or adaxially glabrous, apex obtuse to rounded or slightly emarginate. Racemes loosely 10–22-flowered; peduncle 4–6 cm, erect, loosely white hairy; bracts

0.6–1 mm, mostly white hairy. Calyx 4–5 mm, rather densely covered with appressed white hairs 0.2–0.4 mm and with mostly distinctly shorter black hairs; teeth 0.1–0.8 mm. Petals white or pale blue; standard rhombic-elliptic to elliptic, 10–15 × 4.5–6 mm, apex emarginate; wings 10–14 mm, limbs obliquely incised; keel 8–11 mm. Legumes (unripe) with a stipe 3–5 mm, 12–15 mm, 2–2.5 mm high and wide, with a short beak, loosely to densely covered with very short, appressed, white or black or black and white hairs (in one plant).

• Semideserts, steppes; 1000–1500 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi.

246. *Astragalus hotianensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 68. 1983 [*“hotanensis”*].

和田黄耆 he tian huang qi

Plants 30–50 cm tall. Stems several, ascending to erect, 3–5 mm thick, near base furnished with globose, white villous buds. Leaves 1–3 cm, upper sessile, lower with a distinct petiole; stipules 1–3 mm, white hairy; leaflets 3 or in upper leaves sometimes only 1, narrowly elliptic, 10–20 × 3–5 mm, both surfaces loosely covered with medifixed, appressed hairs, apex acute. Racemes loosely 6–8-flowered; peduncle 3–5 cm, appressed white hairy; bracts 1.5–2 mm. Calyx 4–6 mm, campanulate, densely appressed white hairy; teeth ca. 1 mm. Petals whitish pink, purplish when dry; standard obovate-pandurate, 8–12 × ca. 5 mm, apex emarginate, slightly constricted below middle; wings 7–11 mm; keel 7–10 mm. Legumes (unripe) sessile, linear, upcurved, 10–15 mm, with white appressed hairs.

• Xinjiang.

247. *Astragalus miniatus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 98. 1868.

细弱黄耆 xi ruo huang qi

Astragalus ervoides Turczaninow.

Plants 7–20 cm tall; hairs appressed, ± medifixed, in vegetative parts only white, in inflorescence black, 0.3–0.5 mm. Stems several, ascending to erect, slender, sparsely to loosely hairy. Leaves 3–7 cm; stipules 2–3 mm, connate behind stem to middle, sparsely hairy; petiole 1–2 cm, like rachis sparsely to loosely hairy; leaflets in 3–5(–7) pairs, linear, (4–)6–15 × 0.5–1 mm, often folded, abaxially sparsely to loosely hairy, adaxially glabrous, apex distinctly emarginate. Racemes loosely 4–12-flowered; peduncle 5–10 cm, sparsely white hairy; bracts 0.5–1 mm, ciliate with mostly subbasifixed black hairs. Calyx 3–4 mm, loosely covered with predominantly black hairs; teeth 0.5–1 mm. Petals pinkish red; standard rhombic-elliptic to widely rhombic-elliptic, ca. 9 × 5–6.5 mm, apex deeply incised; wings ca. 9 mm, limbs obliquely and deeply incised; keel ca. 6 mm. Legumes sessile, obliquely erect to spreading, 8–12 mm, ca. 2 mm high and wide, with a subulate beak 0.6–1 mm, 2-locular; valves loosely to rather densely covered with subappressed to ascending white hairs.

Steppes, stony slopes, saline soil; 1200–2800 m. Heilongjiang, Nei Mongol, Xinjiang [Mongolia, Russia (Siberia)].

248. *Astragalus miyalomontis* P. C. Li, Acta Bot. Yunnan. 11: 288. 1989.

米亚罗黄耆 mi ya luo huang qi

Plants 10–20 cm tall; hairs appressed, symmetrically to slightly asymmetrically bifurcate, white. Main stem prostrate, branched, side stems ascending to erect, branched, up to 15 cm, loosely to rather densely covered with hairs 0.3–0.5 mm. Leaves 1.5–3 cm; stipules ca. 3 mm, free from petiole but shortly connate to each other in front of petiole, behind stem vaginate-connate to middle, rather densely hairy; petiole 0.5–1 cm, with rachis densely to rather densely hairy like stem; leaflets in (4–)6 or 7 pairs, elliptic to obovate, 2.5–5 × 1.5–3 mm, apex emarginate, both surfaces loosely covered with hairs 0.4–0.7 mm. Racemes short, rather densely 4–7-flowered; peduncle 1–2.5 cm, loosely hairy like stem; bracts ca. 1 mm, partly covered with basifixed hairs. Calyx 4–5 mm, rather densely hairy; teeth 2–2.5 mm. Petals reddish; standard elliptic, ca. 11 × 5 mm, apex emarginate; wings ca. 10 mm; keel ca. 8 mm. Legumes shortly stipitate, erect, linear, in upper part distinctly upcurved, 10–12 mm, ca. 2 mm high and ca. 1.5 mm wide, with a beak ca. 1 mm, 1-locular; valves thin, loosely covered with appressed to subappressed hairs ca. 3 mm.

• Bushes, meadows in forests; ca. 2500 m. Sichuan (Lixian).

249. *Astragalus sulcatus* Linnaeus, Sp. Pl. 2: 756. 1753.

纹茎黄耆 wen jing huang qi

Astragalus leptostachys Pallas.

Plants 20–80 cm tall, sparsely hairy; hairs mostly strongly asymmetrically bifurcate to subbasifixed, appressed, 0.3–0.8 mm. Stems mostly several, erect, with numerous non-flowering branches in leaf axils, sparsely to loosely hairy, sometimes glabrous. Leaves 4–8 cm, sessile; stipules 3–4 mm, those on lateral branches shorter, lower ones shortly to distinctly connate behind stem, upper ones free, sparsely hairy or glabrous; rachis hairy like stem; leaflets in leaves of main stem in 8–11 pairs, linear to narrowly oblong, 10–25 × 1–4(–7) mm, those at lateral branches mostly shorter and narrower, glabrous or abaxially sometimes with scattered appressed white hairs. Racemes 3–6 cm, remotely 6–20-flowered; peduncle 2.5–4 cm, sparsely covered with white and black hairs 0.2–0.3 mm; bracts 1.5–3 mm, sparsely black ciliate. Calyx 3(–4) mm, sparsely covered with black and sometimes also with some white hairs up to 0.3 mm; teeth linear, 0.8–1.2 mm. Petals pale violet; standard elliptic to rhombic-ovate, 6.5–8 × 4–4.5 mm, apex deeply incised; wings 5–7 mm; keel 4.5–5 mm. Legumes sessile, obliquely ascending, straight, 9–11 mm, 2–3 mm high and 1.5–2 mm wide, subtriquetrous in cross section, subacute, nearly 1-locular to slightly incompletely 2-locular; valves thin, sparsely covered with appressed white or predominantly black hairs up to 0.5 mm.

Gravelly steppes, moist meadows, saline soil. Gansu, Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)]; Europe].

250. *Astragalus variabilis* Bunge, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 33. 1877.

变异黄耆 bian yi huang qi

Astragalus dulanensis Y. H. Wu; *A. loczyi* Kanitz.

Plants 10–20 cm tall; hairs appressed to subappressed, ± medifixed, white, or in inflorescence also a few black, 0.3–0.5 mm. Stems several to many, branched at base, 6–15 cm, rather densely hairy. Leaves 2–4 cm; stipules ca. 2 mm, connate behind stem, sparsely hairy; petiole 1–1.5 cm; leaflets in 3(or 4) pairs, elliptic, 7–13 × 1.5–8 mm, abaxially rather densely hairy, adaxially subglabrous to sparsely hairy, sometimes densely hairy on both surfaces, apex rounded to widely retuse or emarginate. Racemes loosely to rather densely 5–20-flowered; peduncle 2–4 cm, rather densely hairy; bracts 0.5–1 mm, hairy. Calyx 3–5 mm, loosely to rather densely covered with white and some-

times also with a few black hairs; teeth subulate, 1–1.5 mm. Petals pale purplish to purple; standard elliptic, 9–11 × 4–5 mm, apex slightly emarginate to deeply incised; wings 8–8.5 mm, limbs distinctly incised; keel 6–7 mm. Legumes sessile, obliquely erect, slightly curved, slightly to distinctly torulose, 11–16 mm, 3–3.5 mm high and 1.5–2 mm wide, shortly acuminate, 2-locular; valves rather densely covered with appressed, symmetrically or asymmetrically bifurcate to partly subbasifixed, white hairs 0.3–0.5 mm, partly glabrescent with age.

Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia].

39. *Astragalus* sect. *Onobrychides* A. Gray, Proc. Amer. Acad. Arts 6: 197. 1864.

驴豆组 lü dou zu

Astragalus sect. *Onobrychium* Bunge.

Plants with well-developed stem, covered with appressed to spreading, medifixed to slightly or strongly, even extremely, asymmetrically bifurcate or partly subbasifixed hairs. Stipules small, membranous, free from petiole, distinctly vaginate-connate behind stem. Peduncles straight, mostly shorter than stems. Bracteoles absent. Calyx tubular or campanulate, ruptured by legumes. Petals glabrous. Legumes 2-locular to more rarely incompletely 2-locular.

Eighty-nine species: mostly in SW Asia (Caucasus, Iran, and Turkey), spreading into Europe, other parts of SW Asia, C Asia, Pakistan, China, Mongolia, Russia, and Japan; two species in China.

- 1a. Leaflets in 4–7 pairs, 2–5 × 1–2 mm; standard 8–9 mm 251. *A. laspurensis*
 1b. Leaflets in 6–16 pairs, 5–25 × 2–7 mm; standard 12–16 mm 252. *A. laxmannii*

251. *Astragalus laspurensis* Ali, Phytol. (Horn) 11: 139. 1966.

西巴黄耆 xi ba huang qi

Plants 15–22 cm tall; hairs in vegetative parts ± medifixed, distinctly flattened, appressed, white, 0.3–0.5 mm. Stems several, branched at base, slender, loosely to rather densely hairy. Leaves 1.5–4 cm, subsessile or lower ones with a short petiole; stipules 2–3 mm, behind stem vaginate-connate to middle or even higher up, loosely to rather densely hairy; rachis slender, hairy like stem; leaflets in (3 or) 4–7 pairs, obovate, 2–5 × 1–2 mm, both surfaces rather densely hairy, apex obtuse to slightly retuse. Racemes capitate, densely 10–12-flowered; peduncle 3.5–7.5 cm, hairy like stem; bracts 2–3 mm, with strongly asymmetrically bifurcate to basifixed predominantly black hairs. Calyx 5–7 mm, loosely to rather densely covered with subbasifixed to basifixed, ± spreading, white or white and black hairs ca. 1 mm; teeth 2–2.5 mm. Petals pale purple to yellow when dry; standard elliptic, 8–9 × ca. 3.5 mm, without distinct claw, apex deeply incised; wings ca. 8 mm; keel 6.5–7 mm. Ovary sessile, covered with white hairs up to 1 mm. Legumes unknown.

3000–4600 m. Xinjiang [Pakistan].

252. *Astragalus laxmannii* Jacquin, Hort. Bot. Vindob. 3: 22. 1776 [*“laxmanni”*].

斜茎黄耆 xie jing huang qi

Astragalus adsurgens Pallas; *A. albus* Širjaev; *A. austrosibiricus* Schischkin; *A. fujisanensis* Miyabe & Tatewaki; *A.*

inopinatus Borissova; *A. longispicatus* Ulbrich; *A. oostachys* E. Peter.

Plants 10–60 cm tall; hairs appressed, ± medifixed, in vegetative parts mostly only white, 0.3–0.6 mm. Stems mostly several, sometimes branched, prostrate to ascending or erect, sparsely hairy to glabrescent. Leaves 3–15 cm; stipules 4–10 mm, behind stem vaginate-connate to middle, sparsely hairy; petiole very short or up to 2.5 cm, like rachis sparsely to loosely hairy; leaflets in 6–16 pairs, narrowly elliptic, 5–25 × 2–7 mm, both surfaces sparsely to loosely hairy or adaxially subglabrous to glabrous, apex subacute to obtuse. Racemes ellipsoid, many flowered; peduncle 3–14 cm, sparsely hairy with white or black hairs; bracts 2–4 mm, with few black and white hairs. Calyx 5–7(–8) mm, sparsely to loosely, more rarely rather densely, covered with black and white or only black hairs 0.2–0.3 mm; teeth 1–3.5 mm. Petals purple to bluish violet, mostly yellow when dry; standard elliptic to slightly rhombic-elliptic, 12–16 × 5–6 mm, emarginate; wings 10–13 mm; keel 8–10 mm. Legumes sessile, distinctly curved, 20–30 mm, ca. 2 mm high and wide, 2-locular; valves loosely to rather densely covered with flexuous subappressed white hairs or appressed white and shorter black hairs.

Dry stony gravelly sandy soil in mixed forests, wet meadows, riverbanks, fallows; below 3700 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Mongolia, Russia (Far East, Siberia)].

40. *Astragalus* sect. *Ornithopodium* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 100. 1868.

鸟爪组 niao zhua zu

Plants herbaceous or subshrubby, with developed stems, covered with ± medifixed to strongly asymmetrically bifurcate hairs.

Leaves imparipinnate, with 1–12 pairs of leaflets; stipules free from petiole or shortly adnate to it, vaginate-connate behind stem, more rarely upper ones or all free from each other. Inflorescences usually long, loosely to remotely flowered, rarely short, densely flowered, elongated in fruit. Petals free, pink, reddish, or more rarely violet, mostly violet when dry; wings shorter than standard and longer than keel, limbs rounded at apex or incised. Legumes linear, long, often slightly to more rarely distinctly constricted between seeds, 2-locular; valves leathery, appressed hairy or rarely glabrous.

Thirty-eight species: N Africa, C Asia to China and Mongolia, SW Asia (Caucasus, Iran, Turkey), Europe; 12 species (eight endemic) in China.

- 1a. Leaflets in 1–4 pairs.
- 2a. Leaflets elliptic, ca. 2 × as long as wide; calyx 7–8 mm; standard 13–15 mm 255. *A. hamiensis*
- 2b. Leaflets linear to narrowly elliptic, ca. 6 × as long as wide; calyx 11–14 mm; standard at least 19 mm.
- 3a. Plants herbaceous; leaflets in 1–3 pairs, 10–45 × 2–6 mm; calyx teeth 4–5 mm; petals white, standard 19–21 mm; ovary and legumes sessile, legumes 25–45 mm 258. *A. kifonsanicus*
- 3b. Plants subshrubby; leaflets in 3 or 4 pairs, 7–20 × 1–3 mm; calyx teeth 1–1.5 mm; petals pink to pale violet, standard 24–25 mm; ovary and legumes distinctly stipitate; legumes 12–15 mm 253. *A. chorgosicus*
- 1b. Leaflets in at least 4 pairs but mostly in distinctly more.
- 4a. Petals all or only wings and keel pale yellow.
- 5a. Plants herbaceous, only with white hairs; standard ca. 15 mm 263. *A. shadiensis*
- 5b. Plants subshrubby, at least in calyx also with black hairs; standard at least 20 mm but mostly distinctly longer.
- 6a. Stipules 5–9 mm; bracts 4–5 mm; calyx covered with appressed to ascending, symmetrically or asymmetrically bifurcate, flexuous hairs; standard 25–27 × 10–11 mm 262. *A. maiusculus*
- 6b. Stipules distinctly shorter; bracts 1.5–2 mm; calyx covered with appressed, medifixed hairs; standard 20–24 × 7–8 mm.
- 7a. Stems very densely hairy; stipules 3–5 mm, those of lower leaves high connate; calyx 8–10 mm; limbs of wings minutely incised, wings and keel yellow, standard purple; legumes covered with ± symmetrically to slightly asymmetrically bifurcate, appressed hairs 256. *A. huochengensis*
- 7b. Stems loosely hairy; stipules 2–3 mm, shortly connate; calyx 11–13 mm; limbs of wings distinctly and often deeply obliquely incised, all petals pale yellow; legumes covered with strongly asymmetrically bifurcate, ascending to spreading hairs 254. *A. dsharkenticus*
- 4b. Petals all white, pink, purple, or violet.
- 8a. Leaflets adaxially glabrous or with a few scattered hairs only; calyx up to 8 mm; standard up to 14 mm.
- 9a. Stipules 5–7 mm, all high connate behind stem; bracts 2–4 mm; calyx 5–6 mm, covered with black hairs up to 1 mm and with strongly asymmetrically bifurcate white hairs up to 1.2 mm; legumes 25–30 mm 260. *A. leansanicus*
- 9b. Stipules 6–10 mm, only those of lowest leaves very shortly connate, all others free; bracts 5–10 mm; calyx ca. 8 mm, covered with medifixed only white hairs up to 0.8 mm; legumes ca. 15 mm 264. *A. supralaevis*
- 8b. Leaflets distinctly hairy adaxially; calyx 9–12 mm; standard at least 16 mm but mostly longer.
- 10a. Calyx teeth 4–5 mm; standard ca. 16 mm; legumes 17–20 mm, with a very short beak 259. *A. lanzhouensis*
- 10b. Calyx teeth 1–3 mm; standard 20–22 mm; legumes at least 22 mm but mostly distinctly longer, with a distinct beak 2–6 mm.
- 11a. Leaflets in 4–6 pairs; legumes sparsely covered with medifixed to asymmetrically bifurcate, appressed white hairs 261. *A. limprichtii*
- 11b. Leaflets in 6–10 pairs; legumes villous with asymmetrically bifurcate, subappressed to ascending or spreading white hairs up to 1 mm and with fewer, more appressed and shorter black hairs 257. *A. karkarensis*

253. *Astragalus chorgosicus* Lipsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 26: 257. 1907.

霍尔果斯黄耆 *huo er guo si huang qi*

Plants subshrubby, 20–32 cm tall, vegetative parts with appressed, ± medifixed, only white hairs 0.5–0.8 mm. Stems several, branched, old parts lignified, stems of current year up to 8 cm, loosely hairy, sometimes glabrescent. Leaves 3–5 cm; stipules 2–3 mm, adnate to petiole for 1–1.5 mm, behind stem connate to middle, sparsely hairy or nearly glabrous; petiole 0.5–1 cm, like rachis loosely to rather densely hairy; leaflets in

3 or 4 pairs, narrowly elliptic to linear, 7–20 × 1–3 mm, both surfaces loosely hairy, apex obtuse to subacute. Racemes 4–8 cm, loosely 5–10-flowered; peduncle 5–18 cm, sparsely to loosely hairy; bracts 1.5–2 mm, sparsely black and white hairy. Calyx 11–12 mm, sparsely covered with subappressed white and black hairs 0.3–0.5 mm; teeth 1–1.5 mm. Petals pink or pale violet; standard narrowly obovate to oblong, 24–25 × 7–8 mm, apex emarginate, slightly constricted in middle; wings 21–23 mm; keel ca. 20 mm. Legumes with a stipe 3–5 mm, oblong, straight, 12–15 mm, 3–4 mm high and 2–3 mm wide, with a straight beak 1–1.5 mm, 2-locular; valves glabrous or with scattered hairs.

Mountain slopes, arid bushes; 600–1200 m. NW Xinjiang [Kazakhstan].

254. *Astragalus dsharkenticus* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 11. 1947.

托木尔黄耆 tu mu er huang qi

Astragalus dsharkenticus var. *gongliuensis* S. B. Ho.

Plants subshrubby, 12–20 cm tall, with appressed ± medifixed hairs 0.5–1 mm. Stems several, branched at base, old parts lignified, stems of current year 3–10 cm, loosely hairy, sometimes glabrescent. Leaves 4–8 cm; stipules 2–3 mm, shortly adnate to petiole, shortly connate behind stem, sparsely black and white hairy or nearly glabrous; petiole 1.2–2.5 cm, like rachis loosely hairy; leaflets in 4–9 pairs, narrowly elliptic, 5–20 × 3–4 mm, abaxially loosely hairy, adaxially sparsely hairy, apex rounded to subacute. Racemes short, densely 5–10-flowered; peduncle 5–15 cm, sparsely to loosely hairy; bracts 1.5–2 mm, sparsely black and white hairy. Calyx 11–13 mm, loosely covered with subappressed predominantly black hairs, sometimes on ventral side with predominantly white and on dorsal side with predominantly black hairs; teeth 2–2.5 mm. Petals pale yellow; standard obovate, 20–22 × 7–8 mm, apex deeply emarginate, slightly constricted below middle; wings 16–19 mm, limbs oblong, apex obliquely and deeply emarginate; keel 13–17 mm. Legumes with a stipe ca. 2 mm, erect to spreading, linear, slightly to distinctly upcurved to nearly semicircular, 25–30 mm, 3–3.5 mm high and wide, with a straight beak ca. 1 mm, 2-locular; valves densely covered with ascending to spreading, strongly asymmetrically bifurcate, white hairs up to 1.2 mm and with mostly distinctly shorter and more symmetrically bifurcate black hairs.

Steppes; ca. 1800 m. NW Xinjiang [Kazakhstan, Kyrgyzstan].

Astragalus dsharkenticus var. *gongliuensis* is said to differ from the typical variety mainly by its 6–13 (instead of 4–9) pairs of leaflets.

255. *Astragalus hamiensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 43. 1983.

哈密黄耆 ha mi huang qi

Astragalus banzragczii N. Ulziykhutag; *A. centraligobicus* Z. Y. Chu & Y. Z. Zhao.

Plants 12–40 cm tall, caespitose, with appressed ± medifixed white hairs. Stems several to numerous, ascending to erect, sparsely to loosely covered with hairs 0.3–0.5 mm, often strongly glabrescent with age. Leaves 3–5 cm; stipules nearly semiamplexicaul, 3–4 mm, shortly adnate to petiole, loosely hairy; petiole 0.5–2.5 cm, like rachis loosely hairy; leaflets in (2 or) 3 or 4 pairs, remote, ± elliptic, 10–20 × 4–10 mm, both surfaces loosely covered with hairs 0.8–1 mm, apex acute or acuminate. Racemes 4–15-flowered; peduncle 5–8 cm, hairy like stem; bracts 3–4 mm, sparsely to loosely hairy. Calyx 7–8 mm, loosely to rather densely hairy; teeth unequal, 1–2 mm. Petals whitish to pinkish; standard obovate, 13–15 × 6–7 mm, apex emarginate; wings 11–13 mm; keel 13–14 mm. Legumes sessile, erect, linear, straight to slightly curved, 25–40 mm, 2–3 mm high and wide, with a straight beak 1–2 mm, 2-locular;

valves slightly knobby by seeds, loosely covered with appressed hairs up to 1 mm.

Gansu, Nei Mongol, Xinjiang [Mongolia].

256. *Astragalus huochengensis* Podlech & L. R. Xu, Novon 17: 238. 2007.

金沟河黄耆 jin gou he huang qi

Plants up to 30 cm tall, covered with appressed ± medifixed hairs. Stems several, loosely to rather densely covered with white or black and white hairs 0.5–0.7 mm. Leaves 3–8 cm; stipules 3–5 mm, very shortly adnate to petiole, lower ones high connate behind stem, often up to 3/4 of length or higher up, upper ones shortly connate, sparsely to loosely hairy; petiole 1–3 cm, with rachis hairy like stem; leaflets in 7–10 pairs, narrowly elliptic, 5–10 × 1.5–2.5 mm, abaxially loosely to rather densely covered with hairs ca. 1 mm, adaxially glabrous, apex obtuse to minutely acuminate. Racemes rather densely 10–15-flowered, elongating in fruit; peduncle 7–11 cm, sparsely to loosely white or black and white hairy like stem; bracts ca. 2 mm, sparsely white and black hairy. Calyx ca. 10 mm, rather densely covered with ± medifixed, subappressed, white and black hairs 0.5–1 mm; teeth 1–3 mm. Petals of lower flowers purple, of upper flowers yellow; standard narrowly rhombic-obovate, 23–24 × ca. 7 mm, apex slightly emarginate; wings ca. 21 mm, limbs obliquely emarginate; keel ca. 19 mm. Legumes (unripe) sessile, erect, linear, slightly curved, at least 25 mm, ca. 2 mm high and wide, with a short, straight beak 1–2 mm, 2-locular; valves densely covered with symmetrically or asymmetrically bifurcate, appressed, white hairs 0.5–0.8 mm.

• Xinjiang.

257. *Astragalus karkarensis* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 17. 1947.

直荚黄耆 zhi jia huang qi

Plants herbaceous, with appressed to subappressed, ± medifixed, mostly white hairs 0.5–0.8 mm. Stems 5–15(–20) cm, very densely hairy. Leaves 2–6(–9) cm; stipules 2–3 mm, shortly adnate to petiole, distinctly to high connate behind stem, hairy; petiole 1–2 cm, like rachis densely covered with subappressed to partly ascending hairs; leaflets in 6–10 pairs, narrowly elliptic, 5–12(–16) × 1.5–3 mm, both surfaces densely to rather densely hairy, apex obtuse. Racemes ovoid, rather densely 5–14-flowered; peduncle 3–11 cm, densely hairy; bracts 2.5–3 mm, with extremely asymmetrically bifurcate to basifixed mainly black hairs. Calyx 9–11 mm, densely covered with flexuous, ascending, on ventral side predominantly white, on dorsal side predominantly black hairs; teeth 1–2 mm. Petals whitish violet; standard obovate, ca. 22 × 7 mm, apex emarginate; wings ca. 20 mm, limbs oblong-spatulate, apex obliquely incised; keel ca. 16 mm. Legumes subsessile, spreading, linear, straight or scarcely curved, 22–35 mm, ca. 3 mm high and wide, with a subulate, straight beak 4–6 mm, 2-locular; valves villous with asymmetrically bifurcate, subappressed to ascending or spreading, white hairs up to 1 mm and with fewer, more appressed, shorter, black hairs.

Steppes. Xinjiang [Kazakhstan, Kyrgyzstan].

258. *Astragalus kifonsanicus* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 64. 1905.

鸡峰山黄耆 ji feng shan huang qi

Plants herbaceous, 15–40 cm tall, vegetative parts covered with appressed, ± medifixed, white hairs 0.8–1.2 mm. Stems branched at base, densely hairy. Leaves 3–6 cm, sessile or subsessile; stipules 4–6 mm, free from petiole but connate in front of petiole up to 1 mm, slightly to high vaginate-connate behind stem, sometimes up to top, rather densely appressed hairy; rachis densely to rather densely hairy; leaflets in 1–3 pairs, narrowly elliptic, 10–45 × 2–6 mm, abaxially mostly densely hairy, adaxially loosely hairy, apex acute to acuminate. Racemes 2.5–6 cm, rather densely 6–20-flowered; peduncle 5–13 cm, loosely to rather densely white hairy; bracts 2–5 mm, with partly strongly asymmetrically bifurcate and at margins basifixed hairs. Calyx 11–14 mm, rather densely white or black and white hairy; teeth 4–5 mm. Petals whitish; standard narrowly elliptic to narrowly obovate, 19–21 × 5–6 mm, apex deeply incised; wings 17–18 mm; keel 14–16 mm. Legumes subsessile, spreading, linear, straight or slightly curved, 25–45 mm, 2.5–3 mm high and 2–2.5 mm wide, with a subulate, straight beak ca. 3 mm, 2-locular; valves slightly netlike wrinkled, loosely covered with appressed white hairs ca. 1 mm.

• Bushes, forest margins; 400–2000 m. Gansu, Henan, Shaanxi, Shanxi.

259. *Astragalus lanzhouensis* Podlech & L. R. Xu, Sendtnera 7: 185. 2001.

兰州黄耆 lan zhou huang qi

Astragalus stenoceras C. A. Meyer var. *longidentatus* S. B. Ho.

Plants 10–25 cm tall, with ± medifixed, appressed to subappressed hairs. Stems branched near base, densely to rather densely covered with appressed mostly white hairs 0.6–1 mm. Leaves 2–5 cm; stipules 3–4 mm, free from petiole, high connate behind stem, white hairy; petiole 0.5–1 cm, like rachis loosely to rather densely white hairy; leaflets in 8–12 pairs, narrowly elliptic, 7–15 × 1–3 mm, both surfaces loosely hairy, apex acute. Racemes at fruiting time 2–4 cm, loosely 4–8-fruited; peduncle 2.5–8.5 cm, loosely hairy; bracts 3–4 mm, sparsely white and black hairy. Calyx 11–12 mm, loosely hairy; hairs subappressed, white and black, mostly predominantly white, ca. 1 mm; teeth 4–5 mm. Standard narrowly elliptic-oblong, ca. 16 × 6.5 mm, apex emarginate; wings ca. 14 mm; keel ca. 11 mm. Legumes subsessile, obliquely erect or spreading, shortly stipitate, linear, slightly curved, terete, 17–20 mm, 2–2.4 mm thick, with a straight beak ca. 1 mm, nearly fully 2-locular; valves thin but tough, loosely to rather densely covered with appressed to subappressed, somewhat flexuous, white hairs 0.6–0.8 mm.

• Loessic steppes; 1200–2600 m. C Gansu.

260. *Astragalus leansanicus* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 62. 1905.

莲山黄耆 lian shan huang qi

Plants up to 40 cm tall, covered with appressed, mostly ± medifixed, in vegetative parts only white hairs up to 1 mm. Stems several to numerous, very sparsely to loosely hairy. Leaves 3–6 cm; stipules 5–7 mm, very shortly adnate to petiole, high vaginate-connate behind stem, glabrous or ciliate; petiole 0.5–1 cm, like rachis loosely hairy; leaflets in 5–8 pairs, ± narrowly elliptic, 5–10(–15) × 1.5–4(–6) mm, abaxially sparsely to loosely hairy, adaxially glabrous or with few hairs, apex obtuse to emarginate. Racemes rather densely 6–15-flowered; peduncle 6–10 cm, sparsely white hairy; bracts 2–4 mm, sparsely ciliate with subbasifixed to basifixed white and black hairs. Calyx 5–6 mm, sparsely to loosely covered with strongly asymmetrically to nearly symmetrically bifurcate black hairs 0.3–1 mm and with mostly fewer and slightly longer, strongly asymmetrically bifurcate white hairs up to 1.2 mm; teeth 1–2 mm. Petals purple; standard obovate, ca. 14 × 5–6 mm, apex emarginate; wings 12–13 mm; keel ca. 10 mm. Legumes sessile, erect, linear, straight or very slightly curved, 25–30 mm, ca. 2 mm high and wide, with a straight beak 1–2 mm, 2-locular; valves sparsely covered with appressed white hairs 0.5–1.2 mm.

• 1000–2200 m. Gansu, Shaanxi, Shanxi.

261. *Astragalus limprichtii* Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 422. 1922.

长管萼黄耆 chang guan e huang qi

Plants up to 40 cm tall, with appressed, medifixed, mostly white hairs 0.3–0.8 mm. Stems prostrate to ascending or erect, slender, branched, densely hairy. Leaves 3–8 cm, subsessile or with a petiole up to 1.5 cm; stipules 4–5 mm, free from petiole, high vaginate-connate behind stem, sparsely to loosely hairy; rachis densely hairy; leaflets in 4–6 pairs, narrowly elliptic, 8–12 × 2–4 mm, abaxially more densely hairy, adaxially sparsely to loosely hairy. Racemes loosely 8–10-flowered; peduncle 3.5–6 cm, densely hairy; bracts 1–2 mm, sparsely white and black hairy. Calyx 10–12 mm, sparsely white and black hairy; teeth 2–3 mm. Petals pale violet; standard obovate, ca. 20 × 5–6 mm, apex emarginate; wings ca. 18 mm; keel ca. 15 mm. Legumes subsessile, erect, linear, slightly curved, 30–40 mm, ca. 3 mm high and ca. 2.5 mm wide, with a beak 2–4 mm, 2-locular; valves sparsely covered with medifixed to asymmetrically bifurcate, appressed, white hairs 0.6–1 mm.

• 300–1100 m. Henan, Shaanxi, Shanxi, Xinjiang.

262. *Astragalus maiusculus* Podlech & L. R. Xu, Novon 17: 239. 2007.

买依尔黄耆 mai yi er huang qi

Plants ca. 20 cm tall. Stems several, branched, old parts lignified, stems of current year 1–5 cm, very densely hairy; hairs ± medifixed, appressed to subappressed, white, near nodes also black, 0.8–1 mm. Leaves 5–15 cm; stipules 5–9 mm, very shortly adnate to petiole, shortly but distinctly vaginate-connate behind stem, densely hairy; petiole 3–9 cm, like rachis sparsely to loosely covered with subappressed to ascending, symmetrically to strongly asymmetrically bifurcate hairs 0.8–1.5 mm; leaflets in 5–8 pairs, remote, elliptic, 5–10 × 2–6 mm, both surfaces loosely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly ascending hairs 1.2–2 mm,

apex rounded. Racemes short, densely 3–5-flowered; peduncle 2–4 cm, loosely to rather densely white and black hairy like rachis; bracts 4–5 mm, white and black or predominantly black hairy. Calyx 13–14 mm, slightly inflated, rather densely covered with symmetrically or asymmetrically bifurcate, subappressed to ascending, flexuous, on dorsal side and at teeth predominantly black, on ventral side often predominantly white hairs 0.8–1 mm; teeth 2–3 mm. Petals pale yellow; standard obovate, 25–27 × 10–11 mm, deeply and widely emarginate; wings 23–24 mm, limbs narrowly oblong, obliquely and sometimes deeply emarginate; keel ca. 20 mm. Ovary subsessile, linear, white hairy. Legumes unknown.

- N Xinjiang (Toli).

263. *Astragalus shadiensis* L. R. Xu, Zhao Y. Chang & Podlech, *Acta Bot. Boreal.-Occid. Sin.* 27: 170. 2007.

沙地黄耆 sha di huang qi

Astragalus sadiensis Podlech, L. R. Xu & Zhao Y. Chang.

Plants 20–25 cm tall, only white hairy. Stems few, densely covered with medifixed, appressed hairs 0.5–0.8 mm. Leaves 4–5 cm; stipules ca. 3 mm, only those of lowest leaves shortly connate behind stem, others free from each other, all rather densely appressed hairy; petiole 1–1.5 cm, with rachis densely hairy like stem, at insertion of leaflets and leaflet petiole with ± spreading, strongly to extremely asymmetrically bifurcate hairs ca. 0.8 mm; leaflets in 4 pairs, narrowly elliptic, 7–12 × 1.5–3 mm, both surfaces loosely to rather densely covered with medifixed, appressed hairs 0.6–1 mm, apex acute to shortly acuminate. Racemes loosely 2–10-flowered; peduncle 3–5 cm, hairy like stem; bracts 2–3 mm, loosely hairy. Calyx ca. 10 mm, loosely to rather densely covered with subappressed, ± medifixed, white hairs 0.5–0.8 mm, at margins of teeth also with strongly asymmetrically bifurcate hairs; teeth unequal, 2–3 mm.

Petals yellow; standard ca. 15 × 5 mm, apex emarginate; wings ca. 12 mm; keel ca. 12 mm. Legumes (unripe) ca. 25 mm, ca. 2 mm high, shortly acuminate; valves loosely covered with medifixed, appressed hairs 0.5–0.8 mm.

- Xinjiang.

The holotype of *Astragalus sadiensis* Podlech et al., conserved at PE, belongs to the same gathering as that of *A. shadiensis* L. R. Xu et al., conserved at LZD. The name *Astragalus shadiensis* has priority (published mid-January 2007) over *A. sadiensis* (published 20 June 2007).

264. *Astragalus supralaevis* Podlech & L. R. Xu, *Novon* 17: 240. 2007.

德钦黄耆 de qin huang qi

Plants at least 35 cm tall (basal parts missing), covered with appressed, mostly ± medifixed, white hairs 0.3–0.5 mm. Stems loosely to rather densely hairy. Leaves 10–16 cm; stipules 6–10 mm, very shortly adnate to petiole, only those of lowest leaves shortly connate behind stem, all others free from each other, loosely to rather densely hairy; petiole 2–2.5 cm, hairy like stem; leaflets in 9–12 pairs, narrowly elliptic, 12–22 × 4–9 mm, abaxially sparsely to loosely hairy, adaxially glabrous, apex obtuse to rounded. Racemes loosely many flowered, elongating in fruit up to 8 cm; peduncle 10–11 cm, hairy like stem; bracts 5–10 mm, loosely to rather densely hairy. Calyx ca. 8 mm, densely to rather densely hairy; teeth unequal, 2–3 mm. Petals pink; standard obovate to elliptic, ca. 13 × 5 mm, apex emarginate; wings ca. 12 mm; keel ca. 10 mm. Legumes (unripe) sessile, linear, slightly curved, ca. 15 mm, ca. 3 mm high, with a short, straight beak ca. 2 mm; valves loosely hairy, soon glabrescent.

- About 3300 m. NW Yunnan (Baima Shan).

41. *Astragalus* sect. *Xiphidium* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 123. 1868.

疏花组 shu hua zu

Plants shrubby, subshrubby, or herbaceous, perennial, with well-developed stems, covered with bifurcate or more rarely to subbasifixed hairs. Leaves imparipinnate; stipules free or adnate to petiole, otherwise free from each other. Racemes mostly loose, borne on a well-developed peduncle. Bracteoles absent. Flowers shortly pedicellate. Calyx tubular. Petals glabrous; wing limbs mostly rounded at apex to retuse or slightly emarginate. Legumes sessile, or more rarely stipitate, 2-locular; valves leathery.

About 165 species: Afghanistan, China, Kashmir, Mongolia, Pakistan, Russia (Siberia); N Africa (Egypt), C and SW Asia, Europe; 13 species (two endemic) in China.

- 1a. Plants subshrubby to shrubby, up to 120 cm.
 - 2a. Bracts 2.5–4 mm, white and black hairy; calyx covered with subbasifixed to basifixed, subappressed to ascending, white hairs 0.6–1.8 mm and with ± medifixed, appressed, black hairs 0.3–0.6 mm; standard with tongue-like narrowed tip 270. *A. gontscharovii*
 - 2b. Bracts 1–2 mm, black ciliate; calyx covered with strongly asymmetrically bifurcate, flexuous, ascending, white hairs up to 1 mm and with subappressed black hairs 0.1–0.3 mm; standard without tongue-like narrowed tip 267. *A. arbuscula*
- 1b. Plants herbaceous, if slightly subshrubby, then only up to 35 cm tall.
 - 3a. Leaflets in 2–4 pairs.
 - 4a. Calyx 11–13 mm; standard slightly constricted below middle.
 - 5a. Leaflets narrowly elliptic, 4–14 × 1–3 mm; petals purple or dirty yellowish violet; legumes ca. 20 mm, covered with symmetrically to strongly asymmetrically bifurcate white hairs 1–1.5 mm and with fewer shorter black hairs 266. *A. anfractuosus*

- 5b. Leaflets filiform, 8–20 × 0.3–0.5 mm; petals yellow; legumes 30–35 mm, covered with medifixed predominantly black hairs 0.3–0.5 mm 271. *A. laetabilis*
- 4b. Calyx 8–10 mm; standard not or distinctly constricted.
- 6a. Leaves 6–16 cm with a long petiole ± as long as rachis; calyx with white hairs only 276. *A. sogotensis*
- 6b. Leaves 1–5 cm, subsessile; calyx white and black hairy.
- 7a. Stipules ca. 2 mm; leaflets linear, 4–15(–20) × 1–1.5 mm; bracts 1–1.5 mm; calyx covered with medifixed, at dorsal side predominantly appressed black hairs 0.3–0.5 mm and at ventral side with subappressed to ascending, longer, predominantly white hairs; standard obovate 269. *A. compressus*
- 7b. Stipules 3–5 mm; leaflets narrowly oblong, 12–20 × 2–4 mm; bracts 2.5–4 mm; calyx covered with strongly asymmetrically bifurcate, appressed to ascending, white hairs 0.8–1 mm and with medifixed, appressed, black hairs 0.2–0.3 mm; standard rhombic-elliptic, distinctly constricted below middle 274. *A. polyceras*
- 3b. Leaflets at least in 4, but mostly in more and up to 9, pairs.
- 8a. Peduncles equaling or slightly longer than leaves.
- 9a. Calyx densely covered with subappressed to spreading, strongly asymmetrically bifurcate, white hairs 0.3–1.2 mm and with often much shorter black hairs 265. *A. amabilis*
- 9b. Calyx covered with appressed, medifixed, predominantly black hairs.
- 10a. Calyx 11–15 mm; petals pink, often suffused with yellow or green; standard 24–27 mm ... 273. *A. macrotropis*
- 10b. Calyx 9–12 mm; petals white or violet; standard 20–22 mm 272. *A. macrolobus*
- 8b. Peduncles 1.5–3 × as long as leaves.
- 11a. Leaflets in 9–12 pairs; bracts 3–4 mm; calyx 10–12 mm; petals yellowish, standard ca. 25 mm; legumes 40–45 mm, black hairy 275. *A. pseudoamabilis*
- 11b. Leaflets in 5–9 pairs; bracts 1–2 mm; calyx up to 10 mm; petals purple to lilac, standard up to 22 mm; legumes 20–35 mm, white and black hairy.
- 12a. Stems and leaves sparsely hairy; calyx 6–7 mm 268. *A. ceratoides*
- 12b. Stems and leaves densely to very densely hairy; calyx 8–10 mm 277. *A. stenoceras*

265. *Astragalus amabilis* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 113. 1938.

喜黄耆 xi huang qi

Plants 8–15 cm tall, vegetative parts covered with medifixed, appressed, white hairs up to 1(–1.5) mm, stipules and rachis with black hairs mixed in. Stems up to 10 cm, densely hairy. Leaves 3–4 cm; stipules 2.5–4 mm, densely hairy; petiole 0.5–1 cm, densely hairy; leaflets in 5 or 6 pairs, elliptic, 7–9 × 3–4.5 mm, abaxially rather densely and adaxially loosely covered with tangled hairs up to 1.5 mm. Racemes densely 5–10-flowered; peduncle ca. 3 cm, hairy like rachis; bracts 2–4 mm, white and black hairy. Calyx 14–16 mm, densely covered with subappressed to ascending or even spreading, strongly asymmetrically bifurcate white hairs up to 1.3 mm and with often much shorter black hairs; teeth 3–4 mm. Petals purplish violet; standard obovate, 19–24 × 8–10 mm, apex emarginate; wings 18–23 mm; keel 17–20 mm. Legumes sessile, narrowly linear, erect to spreading, 25–40 mm, with a subulate beak 1.5–2 mm, densely covered with subappressed to ascending, asymmetrically bifurcate white hairs up to 1 mm.

Xinjiang [Kazakhstan].

266. *Astragalus anfractuosus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 125. 1868.

曲之黄耆 qu zhi huang qi

Plants 7–18 cm tall, vegetative parts covered with medifixed white hairs 0.3–1 mm, stipules and nodes also with some black hairs. Stems mostly several, slender, prostrate to ascending or rarely erect, loosely appressed hairy. Leaves 2–4.5 cm; stip-

ules 2–4 mm, nearly free from petiole, rather densely hairy; petiole 1–1.5 cm, like rachis slender, rather densely appressed hairy; leaflets in 2–4 pairs, remote, linear to narrowly elliptic, 4–10 × 1–2 mm, abaxially rather densely appressed hairy, adaxially loosely appressed hairy, apex obtuse to subacute. Racemes short, rather loosely (2–)4–7-flowered; peduncle 2–11 cm, slender, rather loosely hairy; bracts 1–2 mm, white or black and white hairy. Calyx 11–13 mm, densely or more rarely loosely covered with appressed white hairs 0.8–1 mm and with mostly shorter black hairs; teeth 1.5–2 mm. Petals purplish or dirty yellowish violet, rarely pale yellowish; standard rhombic-elliptic to obovate, 20–21 × 7.5–9 mm, slightly constricted below middle, apex truncate to slightly retuse; wings 18–20 mm; keel 15–17 mm. Legumes (unripe) sessile, linear, erect to horizontally spreading, ca. 20 mm, ca. 2 mm high, shortly attenuate; valves densely covered with appressed to subappressed, ± symmetrically to strongly asymmetrically bifurcate, often flexuous, partly distinctly flattened, white hairs 1–1.5 mm and with much fewer and shorter black hairs.

Gravelly areas; 2700–3700 m. Xinjiang, Xizang [Kashmir].

The Chinese record of *Astragalus gladiatus* Boissier (FRPS 42(1): 306. 1993) is referable to *A. anfractuosus*.

267. *Astragalus arbuscula* Pallas, Sp. Astragal. 19. 1800.

木黄耆 mu huang qi

Astragalus eremothamnus Karelin & Kirilov; *A. horizontalis* Karelin & Kirilov.

Plants subshrubs, 50–120 cm tall, covered with mostly medifixed, appressed, in vegetative parts nearly only white

hairs 0.6–1(–1.2) mm. Stems several, branched near base, older parts (10–)30–80 cm, ligneous, covered with longitudinally splitting bark; branches of current year 5–20(–30) cm, densely hairy. Leaves 3–5 cm, sessile; stipules 3–4 mm, shortly adnate to petiole, densely hairy; rachis 1–2 cm, rather densely hairy; leaflets in 2–4 pairs, linear, (8–)12–40 × (1–)1.5–3(–7) mm, abaxially somewhat densely and adaxially loosely hairy, apex acute. Racemes ovoid, 2–3(–4) cm, densely 8–22-flowered; peduncle 7–10 cm, densely hairy; bracts 1–2(–3) mm, mostly black ciliate. Calyx 7–10 mm, sparsely to densely covered with strongly asymmetrically bifurcate, flexuous, ascending, white hairs up to 1 mm and with distinctly shorter, subappressed, black hairs 0.1–0.3 mm; teeth 1.5–2 mm. Petals purple; standard rhombic, 15–19 × ca. 6 mm, apex retuse; wings 14–17 mm; keel 11–14 mm. Legumes sessile, spreading or rarely nodding, straight, 20–30 mm, (1.5–)2 mm thick, apex shortly acuminate; valves densely covered with symmetrically or asymmetrically bifurcate, appressed, black hairs 0.3–0.6 mm and with distinctly asymmetrically bifurcate, appressed to slightly ascending, white hairs 0.6–0.8 mm, rarely only with white hairs.

Steppes, semideserts. NW Xinjiang [Kazakhstan, Russia (Siberia)].

268. *Astragalus ceratoides* M. Bieberstein, Fl. Taur.–Caucas. 3: 492. 1819.

角黄耆 jiao huang qi

Astragalus ceratoides var. *montanus* Ledebour; *A. stenolobus* Bunge.

Plants 12–40 cm tall, vegetative parts with ± medifixed, appressed, mostly white hairs 0.5–0.8 mm. Stems mostly several to many, erect or ascending at base, loosely hairy. Leaves 3–6 cm; stipules 2–3 mm, nearly free from petiole, hairy; petiole 0.5–1.5 cm, like rachis slender, loosely hairy; leaflets in 5–7(–9) pairs, narrowly elliptic, 5–15 × 1–4 mm, abaxially loosely hairy, adaxially glabrous or sparsely hairy. Racemes subumbellate to capitate, 5–10-flowered; peduncle 9–20 cm, sparsely hairy; bracts 1.5–2 mm, black hairy, at margins with extremely asymmetrically bifurcate hairs. Calyx 6–7 mm, rather densely covered with predominantly black hairs 0.3–0.5 mm; teeth 1–1.5 mm. Petals purplish lilac; standard obovate, 18–22 × 7–10 mm, apex retuse; wings 16–17 mm; keel 15–16 mm. Legumes sessile, obliquely erect or starlike spreading, linear, 25–35 mm, 2–3 mm high and wide, acuminate; valves densely covered with ± appressed, asymmetrically bifurcate, white hairs up to 0.8 mm and with distinctly shorter black hairs.

Stony mountain slopes, steppes. NW Xinjiang [Kazakhstan, Russia (Siberia)].

269. *Astragalus compressus* Ledebour, Fl. Altaic. 3: 304. 1831.

扁序黄耆 bian xu huang qi

Plants 6–30 cm tall. Stems several, ligneous at base, prostrate to erect, branched, parts of current year 1–12 cm, very densely covered with medifixed, appressed, white hairs 0.6–0.8 mm. Leaves 1–5 cm, sessile or petiole up to 1 cm, with rachis hairy like stem; stipules ca. 2 mm, very shortly adnate to petiole, white hairy; leaflets in 3(or 4) pairs, linear, 4–15(–20)

× 1–1.5 mm, abaxially rather densely and adaxially loosely covered with medifixed, appressed hairs ca. 1 mm. Racemes 2.5–3 cm, 5–12-flowered; peduncle 4–6(–20) cm, hairy like stem; bracts 1–1.5 mm, black and white hairy. Calyx 8–10 mm, covered with medifixed hairs, at dorsal side with predominantly appressed black hairs 0.3–0.5 mm and at ventral side with subappressed to ascending, longer, predominantly white hairs, sometimes all over with white hairs; teeth 0.5–1.5 mm. Petals lilac-purple; standard obovate, 18–22 × 7–9 mm, apex emarginate; wings 17–20 mm; keel 15–17 mm. Legumes 12–28 mm, 2–3 mm high and ca. 1.5 mm wide, shortly acuminate; valves densely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly or partly distinctly ascending, white hairs 0.4–0.8 mm, with some black hairs mixed in.

Sandy and gravelly soil near rivers and lakes. Gansu, Xinjiang [Kazakhstan, Russia (Siberia)].

270. *Astragalus gontscharovii* Vassilczenko in Komarov, Fl. URSS 12: 887. 1946.

半灌黄耆 ban guan huang qi

Plants subshrubby, up to 100 cm tall, vegetative parts with appressed, medifixed, white hairs. Stems ligneous in lower part, branched, parts of current year up to 30 cm, densely covered with hairs 0.5–0.8 mm. Leaves 3–8 cm, sessile; stipules 3–4 mm, nearly free from petiole, hairy, at margins with short basifixed hairs; rachis rather densely hairy; leaflets in 3–5 pairs, 7–20(–25) × 1.5–4(–7) mm, abaxially loosely to rather densely and adaxially sparsely to loosely covered with hairs up to 1.3 mm. Racemes capitate, densely many flowered; peduncle 7–12 cm, erect, densely hairy; bracts 2.5–4 mm, with black and white hairs. Calyx 10–15 mm, sparsely to densely covered with subbasifixed to basifixed, subappressed to ascending, white hairs 0.6–1.8 mm and with ± medifixed, appressed, black hairs 0.3–0.6 mm; teeth 2–5 mm. Petals pale violet to white; standard elliptic, 16–18 × ca. 7 mm, slightly constricted in lower 1/3, in upper 1/3 tongue-like narrowed, emarginate; wings 14–16 mm; keel 10–11 mm. Legumes sessile, obliquely ascending, 20–30 mm, 2.5–3 mm in diam., with a breakable beak 3–5 mm; valves covered with appressed black and scattered white hairs.

Mountain meadows. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

271. *Astragalus laetabilis* Podlech & L. R. Xu, Novon 17: 234. 2007.

丝叶黄耆 si ye huang qi

Plants subshrubby, ca. 30 cm tall, covered with medifixed, appressed hairs. Stems shortly ligneous in lower part, parts of current year up to 18 cm, loosely furnished with hairs 0.4–0.5 mm. Leaves 2–4.5 cm; stipules 1.5–3 mm, hairy like stem; petiole 0.8–2 cm, very slender, with rachis loosely to rather densely hairy like stem; leaflets in 2–4 pairs, filiform, (4–)8–20 × 0.3–0.5 mm, both surfaces loosely covered with hairs 0.5–1 mm. Racemes 2.5–4 cm, 3–7-flowered; peduncle 6–11 cm, hairy like stem; bracts 1.5–2 mm. Calyx 11–12 mm, rather densely covered with white and black hairs 0.5–1 mm; teeth 2–3 mm. Petals yellow; standard obovate, ca. 20 × 7–8 mm, in middle constricted, apex emarginate; wings ca. 18 mm; keel ca.

15 mm. Legumes (not fully ripe) linear, straight, 30–35 mm, ca. 2 mm high and wide, shortly acuminate; valves densely covered with \pm medifixed, appressed, predominantly black hairs 0.3–0.5 mm.

• Xizang.

272. *Astragalus macrolobus* M. Bieberstein, Fl. Taur.-Caucas. 3: 493. 1819.

长荚黄耆 chang jia huang qi

Astragalus macroceras C. A. Meyer ex Bongard.

Plants 10–20(–50) cm tall. Stems of current year 1.5–8(–20) cm, mostly ascending at base, very densely covered with appressed white hairs. Leaves 3–7 cm; stipules 3–5 mm, free or shortly adnate to petiole, hairy; petiole 1–2 cm; leaflets in 5–7 pairs, 5–12 \times 1.5–4 mm. Racemes 4–5 cm, rather loosely 7–15-flowered; peduncle 3–8 cm, appressed white hairy; bracts ca. 2 mm, black or white and black hairy. Calyx 9–12 mm, appressed, predominantly black hairy; teeth ca. 2 mm. Petals white or violet; standard obovate, 20–22 mm, apex retuse; wings 15–17 mm; keel 13–14 mm. Legumes sessile, obliquely erect, slightly curved, 20–30 mm, 2–2.5 mm high and wide, with a subulate beak ca. 1 mm; valves appressed white hairy, with some black hairs mixed in.

Stony mountain steppes. Xinjiang [Mongolia, Russia (Siberia)].

The Chinese records of *Astragalus ortholobiformis* Sumnevitz from Gansu and Xinjiang (FRPS 42(1): 310. 1993) are possibly based on misidentifications of some forms of *A. macrolobus* (a difficult group). No Chinese material of *A. ortholobiformis* has been seen; it is a rare species of W Kazakhstan.

273. *Astragalus macrotropis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 127. 1868.

长龙骨黄耆 chang long gu huang qi

Astragalus stenoceras C. A. Meyer var. *macranthus* Bunge.

Plants 15–22 cm tall, with \pm medifixed, appressed hairs 0.4–1.5 mm. Stems mostly several, erect, loosely to rather densely covered with mostly white hairs. Leaves 3–7 cm; stipules 2.5–3.5 mm, shortly adnate to petiole, hairy; petiole 1–2.5 cm, with slender rachis hairy like stem; leaflets in 4–7(–9) pairs, 5–12 \times 1.5–4 mm, abaxially loosely and adaxially sparsely covered with white hairs 0.8–1.5 mm. Racemes short to subumbellate, 3–5-flowered; peduncle 4–9 cm, loosely hairy like stem; bracts 2–2.5 mm, sparsely mainly black hairy, at margins with subbasifixed hairs. Calyx 11–15 mm, loosely to rather densely covered with predominantly black hairs 0.3–0.5(–0.8) mm; teeth 1.5–2.5 mm. Petals pink; standard obovate, 24–27 \times 8–10 mm, apex emarginate, slightly constricted below middle; wings 20–23 mm; keel 18–21 mm. Legumes sessile, obliquely erect or starlike spreading, 25–40 mm, ca. 2 mm high and wide, with a straight beak 1–2 mm; valves densely covered with short, at ventral side predominantly black, at dorsal side predominantly white hairs.

Stony mountain steppes, wastelands; ca. 1000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

274. *Astragalus polyceras* Karelín & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 332. 1842.

多角黄耆 duo jiao huang qi

Plants subshrubby, 30–40 cm tall, vegetative parts covered with medifixed, appressed hairs. Stems in older parts ligneous, 5–12 cm, branched, parts of current year 10–25(–30) cm, very densely covered with white hairs 0.7–0.9 mm. Leaves 3–5 cm; stipules (2–)3–5 mm, densely white hairy; petiole 0.3–0.7 cm, with rachis densely hairy like stem; leaflets in 2 or 3 pairs, 12–20(–30) \times (1–)2–4 mm, abaxially densely and adaxially loosely to rather densely or more rarely sparsely covered with hairs 1–1.5 mm. Racemes 6–11(–14) cm, loosely to remotely (4–)9–15-flowered; peduncle 4–8 cm, densely white hairy like stem; bracts 2–4 mm, white and black hairy. Calyx 8–11 mm, densely covered with strongly asymmetrically bifurcate, subappressed to ascending, \pm flexuous, white hairs 0.8–1 mm and with \pm medifixed, flexuous, appressed, black hairs 0.2–0.3 mm; teeth 2–2.5 mm. Petals purple; standard rhombic-elliptic to rhombic-obovate, 16–21 \times ca. 8 mm, apex emarginate, mostly distinctly constricted below middle; wings 15–19 mm; keel 14–15 mm. Legumes sessile, straight or slightly curved, 23–31 mm, 1.5–2 mm high and 2–3 mm wide, with a straight beak 1–2 mm; valves densely covered with symmetrically to predominantly strongly asymmetrically bifurcate, appressed to predominantly ascending, white hairs up to 1 mm and sometimes with shorter, appressed, black hairs.

Xinjiang [Kazakhstan].

275. *Astragalus pseudoamabilis* Podlech & L. R. Xu, Feddes Repert. 120: 50. 2009.

类喜黄耆 lei xi huang qi

Plants ca. 30 cm tall, covered with appressed, medifixed hairs. Stems 10–20 cm, loosely to rather densely covered with white hairs 0.3–0.5 mm and some black hairs mixed in. Leaves 8–10 cm; stipules 3–4 mm, white and black hairy; petiole 1.5–3 cm, with rachis hairy like stem; leaflets in 9–12 pairs, 10–13 \times 3–5 mm, abaxially sparsely to loosely and adaxially very sparsely hairy. Racemes densely 10–15-flowered; peduncle 13–18 cm, sparsely to loosely hairy like stem; bracts 3–4 mm, black hairy. Calyx 10–12 mm, loosely black hairy; teeth ca. 2 mm. Petals yellowish; standard narrowly elliptic, ca. 25 \times 7 mm, apex emarginate; wings 18–21 mm; keel ca. 16 mm. Legumes (unripe) sessile, erect to spreading, narrowly linear, 40–45 mm, 1.5–2 mm high, with a subulate beak 1.5–2 mm, densely covered with appressed, symmetrically or asymmetrically bifurcate, black hairs up to 0.6 mm.

• 1200–1900 m. NW Xinjiang.

276. *Astragalus sogotensis* Lipsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 26: 178. 1907.

索戈特黄耆 suo ge te huang qi

Plants herbaceous to subshrubby, 25–30 cm tall, covered with \pm medifixed, appressed, only white hairs 0.8–1.2 mm. Stems branched, 4–10 cm, very densely hairy. Leaves 6–16 cm; stipules 1.5–2 mm, shortly adnate to petiole, densely hairy; petiole 2–12 cm, like rachis densely hairy; leaflets in 2 or 3

pairs, 12–30 × 1–2 mm, both surfaces rather densely hairy. Racemes (7–)12–18 cm, remotely 8–10-flowered; peduncle 8–15 cm, rather densely hairy; bracts 2–3 mm, hairy, at margins with strongly asymmetrically bifurcate to basifixed hairs. Calyx 8–10 mm, densely hairy; teeth ca. 2 mm. Petals pale purplish; standard elliptic, 10–20 × ca. 7 mm, apex emarginate; wings 15–17 mm; keel 12–13 mm. Legumes sessile, erect, straight or slightly curved, 21–23 mm, ca. 2 mm high and wide, with a subulate beak 2–2.5 mm; valves with scattered short, appressed hairs.

Gravelly steppes. NW Xinjiang [Kazakhstan].

277. *Astragalus stenoceras* C. A. Meyer in Bongard & C. A. Meyer, *Verz. Saisang-nor Pfl.* 23. 1841.

狭荚黄耆 xia jia huang qi

Plants 12–25 cm tall, subshrubby, vegetative parts covered with medifixed, appressed hairs. Stems mostly several, older parts ligneous, branched near base, parts of current year 3–12 cm, very densely covered with mostly white hairs 0.6–0.8 mm.

Leaves 2–5 cm; stipules 1–2 mm, shortly adnate to petiole, hairy; petiole 0.5–1.5 cm, with rachis slender, loosely to densely hairy like stem; leaflets in 5–7 pairs, narrowly elliptic, 4–11 × 0.5–2 mm, both surfaces loosely to densely covered with white hairs. Racemes capitate-umbellate, 4–8(–10)-flowered; peduncle 5–10 cm, loosely to densely hairy like stem; bracts 1–1.5 mm, white and black hairy. Calyx 8–10 mm, densely covered with ± asymmetrically bifurcate, subappressed, white hairs 0.5–0.8 mm (predominantly adaxially) and with more symmetrically bifurcate, shorter, black hairs (predominantly abaxially); teeth 0.5–1.5 mm. Petals lilac; standard obovate, 20–22 × ca. 8 mm, apex emarginate; wings 18–20 mm; keel 16–18 mm. Legumes shortly stipitate, erect to obliquely erect or spreading, straight, 20–35 mm, 1.5–2 mm high, ca. 1 mm wide, with a straight, slender beak 1–2 mm; valves rather densely covered with appressed to subappressed, asymmetrically bifurcate, white hairs ca. 1 mm and with more symmetrically bifurcate, shorter, black hairs.

Steppes and steppelike meadows in dry mountain regions. Xinjiang [Kazakhstan, Mongolia, Russia (Siberia), Tajikistan].

42. *Astragalus* sect. *Corethrums* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 98. 1868.*

帚状组 zhou zhuang zu

Plants perennial, acaulescent or subacaulescent, furnished with medifixed or partly asymmetrically bifurcate hairs. Leaves imparipinnate; stipules ± adnate to petiole, otherwise free. Racemes borne on a long peduncle, loosely flowered, rarely dense at beginning of anthesis and elongating with age. Bracteoles absent. Calyx campanulate to campanulate-tubular. Petals purple, rose, or violet; wing limbs often distinctly incised. Legumes narrowly ovoid to narrowly oblong, keeled ventrally, grooved dorsally, fully 2-locular or nearly so.

Twelve species: China, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; six species (three endemic) in China.

- 1a. Calyx 10–15 mm, with subbasifixed, spreading, white hairs 1–1.5 mm and with shorter black hairs 278. *A. angustissimus*
 1b. Calyx shorter, with appressed hairs.
 2a. Plants with sterile shoots; leaves of sterile shoots 1–2 cm, with 1 or 2 pairs of small leaflets 2–3 mm; leaves of flowering shoots 3–7 cm, leaflets in (2 or)3 or 4 pairs, linear, 10–15 × 1–1.5 mm; petals probably yellow 279. *A. chaidamuensis*
 2b. Plants without sterile shoots; leaves and leaflets all of equal size; petals pink, purple, or violet.
 3a. Calyx 8–11 mm, teeth 2–4 mm; legumes linear, ca. 2 mm in diam.; racemes rather dense, short, up to 4 cm.
 4a. Stipules 1.5–2.5 mm; leaflets in 3 or 4(or 5) pairs; standard below middle slightly constricted; wing limbs obtuse 280. *A. hesiensis*
 4b. Stipules 4–5 mm; leaflets in 2 or 3 pairs; standard not constricted; wing limbs distinctly emarginate 283. *A. yumenensis*
 3b. Calyx shorter, at most up to 8 mm, teeth 1–1.5 mm; legumes 2.5–3.5 mm high; racemes distinctly longer, remotely flowered.
 5a. Wings (12–)14–15 mm, limbs distinctly incised to obliquely bilobed; keel 10–11 mm; legumes 6–10 mm, rather densely white and black hairy 282. *A. scoparius*
 5b. Wings ca. 19 mm, limbs obtuse; keel ca. 16 mm; legumes 14–20 mm, glabrous or with scattered hairs only 281. *A. kessleri*

278. *Astragalus angustissimus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 135. 1868.*

狭叶黄耆 xia ye huang qi

Plants subshrubby, (10–)15–35(–45) cm tall, subacaulescent to shortly caulescent. Stems ligneous in lower parts, parts of current year 1–3(–5) cm, very densely covered with medifixed, appressed, white hairs 0.2–0.3 mm. Leaves (3–)5–12(–14) cm; stipules 5–12 mm, glabrous; petiole 2–3(–5) cm,

like rachis loosely to rather densely white hairy; leaflets 5–11(–14) pairs, narrowly linear, (13–)20–30 × 1–2(–3) mm, abaxially densely and adaxially sparsely to loosely covered with medifixed, appressed hairs 0.8–1 mm, apex acute. Racemes 3–4 cm, 12–20-flowered, elongating in fruit up to 6–14 cm; peduncle (5–)10–18 cm, hairy; bracts 4–10 mm, white and black hairy. Calyx 10–15 mm, tubular, densely covered with subbasifixed, ± spreading, white hairs 1–1.5 mm and especially at dorsal side with mostly shorter and more appressed black

hairs; teeth 2–4 mm. Petals yellow; standard narrowly elliptic, 22–25 × 6–7.5 mm, apex slightly retuse; wings 17–18 mm; keel 14–15 mm. Legumes sessile, erect, ellipsoid, 8–12 mm, 3–4 mm high and 4–5 mm wide, with a slightly curved beak 3–4 mm, incompletely 2-locular; valves densely covered with strongly asymmetrically bifurcate, appressed, white hairs 0.8–1 mm, in upper part with mostly shorter black hairs mixed in.

NW Xinjiang [Kazakhstan, Kyrgyzstan].

279. *Astragalus chaidamuensis* (S. B. Ho) Podlech & L. R. Xu, *Novon* 14: 222. 2004.

柴达木黄耆 *chai da mu huang qi*

Astragalus kronenburgii B. Fedtschenko var. *chaidamuensis* S. B. Ho, *Bull. Bot. Res.*, Harbin 3(1): 42. 1983.

Plants ca. 18 cm tall, nearly acaulescent, caespitose, vegetative parts covered with medifixed, appressed, white hairs 0.3–1 mm. Stems branched at base, parts of current year, if developed, up to 0.5 cm, densely hairy. Leaves of sterile shoots 1–2 cm; stipules ca. 2 mm, densely hairy; petiole 0.5–1 cm, with 1 or 2 pairs of small leaflets 2–3 mm. Leaves of flowering shoots 3–7 cm; petiole 1–2 cm, like rachis densely hairy; leaflets in (2 or) 3 or 4 pairs, linear, 10–15 × 1–1.5 mm, both surfaces ± densely hairy, apex acute. Racemes subumbellate, 3–7-flowered; peduncle 5–14 cm, loosely to rather densely white hairy; bracts 1–2 mm, sparsely furnished with mostly basifixed white and black hairs. Calyx ca. 10 mm, loosely to rather densely covered with medifixed, appressed, white hairs 0.5–1 mm and mostly slightly shorter black hairs; teeth 2.2–3 mm. Petals probably yellow; standard elliptic, 15–17 × 6–7 mm, apex emarginate; wings ca. 15 mm, limbs deeply incised; keel ca. 12 mm. Ovary with a stipe ca. 2 mm, linear, white hairy. Legumes unknown.

• 3000–3300 m. Gansu, Qinghai, ?Xinjiang.

The Chinese record of *Astragalus nematodes* Bunge ex Boissier from Xinjiang (FRPS 42(1): 264. 1993) is possibly based on a misidentification of *A. chaidamuensis*. *Astragalus nematodes* is not known to occur in China.

280. *Astragalus hesiensis* N. Ulziykhutag, *Novosti Sist. Vyssh. Rast.* 33: 142. 2001.

河西黄耆 *he xi huang qi*

Plants 20–40 cm tall, acaulescent to subacaulescent, rather densely caespitose. Stems several to numerous, branched at base, sometimes 2–6(–10) cm, densely white hairy. Leaves 4–12 cm; stipules 1.5–2.5 mm, white hairy; petiole 2–5 cm, like rachis densely appressed white hairy; leaflets in 3 or 4(or) 5 pairs, linear to narrowly elliptic, 10–20(–23) × 1–2(–3) mm, both surfaces appressed hairy. Racemes 2–3 cm, rather densely many flowered, elongating in fruit up to 12 cm; peduncle 6–20 cm, slender, appressed white hairy; bracts 1.5–2.5 mm, sparsely appressed black hairy. Calyx 8–11 mm, densely appressed white and sparsely black hairy; teeth 2–2.5 mm. Petals pink; standard 14–18 mm, limb narrowly obovate, in middle slightly constricted, apex retuse; wings 12–15 mm; keel 10–12 mm. Legumes stipitate, linear, 14–18 mm, ca. 2 mm high and wide, with a beak 1–2 mm; valves densely appressed white and black hairy.

• Gansu (Nan Shan).

281. *Astragalus kessleri* Trautvetter, *Bull. Soc. Imp. Naturalistes Moscou* 33(1): 496. 1860.

凯斯列黄耆 *kai si lie huang qi*

Plants 20–27 cm tall, nearly acaulescent, caespitose. Stems up to 1 cm, densely covered with remnants of old stipules and petioles, very densely appressed hairy. Leaves 4–6 cm; stipules 3–4 mm, ± densely covered with subappressed, medifixed, white hairs ca. 1 mm; petiole 2–3 cm, like rachis loosely hairy, hardening with age and partly persistent; leaflets in 5 or 6 pairs, narrowly linear-elliptic, 8–20 × 1–2 mm, both surfaces loosely to rather densely appressed hairy, apex subacute. Racemes 5–8(–15) cm, remotely flowered; peduncle 8–12 cm, sparsely hairy; bracts 1.5–2 mm, subglabrous. Calyx tubular, 7–8 mm, loosely covered with appressed, medifixed, black hairs 0.3–0.4 mm and with slightly longer white hairs; teeth ca. 1 mm. Standard narrowly obovate, ca. 20 mm, apex slightly retuse; wings ca. 19 mm; keel ca. 16 mm. Legumes with a stipe ca. 1 mm, pendulous, narrowly oblong, 14–20 mm, 2.5–3 mm high, apex shortly acuminate; valves glabrous or with scattered, appressed, white hairs.

Xinjiang [Kazakhstan].

282. *Astragalus scoparius* Schrenk in Fischer & C. A. Meyer, *Enum. Pl. Nov.* 1: 82. 1841.

帚黄耆 *zhou huang qi*

Astragalus scoparius f. *minutus* Lipsky.

Plants subacaulescent, 16–30(–40) cm tall, vegetative parts with ± medifixed, appressed, white hairs 0.5–1 mm. Stems several, up to 2.5 cm, very densely hairy. Leaves 6–10(–13) cm; stipules 3–4 mm, hairy; petiole 2–5 cm, like rachis densely hairy; leaflets in 3–6 pairs, narrowly elliptic, 5–15(–18) × 2–4(–7) mm, both surfaces loosely to rather densely hairy, apex acute to acuminate. Racemes 7–22 cm, remotely 10–20-flowered; peduncle 10–22 cm, rather densely white hairy; bracts 1–1.5 mm, subglabrous. Calyx 6–7 mm, loosely to rather densely white and black hairy; teeth unequal, 0.8–1.5 mm. Petals violet; standard obovate, 15–18 × 6–7 mm, apex emarginate; wings 14–15 mm, limbs incised to deeply unequally bilobed; keel 10–11 mm. Legumes sessile, erect, narrowly ellipsoid, 6–10 mm, 3–3.5 mm high and 2.8–3 mm wide, with a slender style 3–4 mm; valves rather densely covered with ± appressed, ± medifixed, white and black hairs, partly glabrescent with age.

Stony mountain slopes; 700–1500 m. Xinjiang [Kazakhstan].

The Chinese record of *Astragalus pseudoscoparius* Gontscharov (FRPS 42(1): 265. 1993) is referable to *A. scoparius*.

283. *Astragalus yumenensis* S. B. Ho in S. Y. Jin & Y. L. Chen, *Cat. Type Spec. Herb. China*, 419. 1994.

玉门黄耆 *yu men huang qi*

Plants 15–30 cm tall, shortly caulescent. Stems several, 2–10 cm, densely covered with medifixed, appressed, white hairs 0.6–1 mm. Leaves 5–12 cm; stipules 4–5 mm, hairy; petiole 2–5 cm, like rachis densely hairy; leaflets in 2 or 3 pairs, linear,

10–25 × 1–3 mm, both surfaces sparsely to rather densely appressed hairy. Racemes 3–4 cm, rather dense; peduncle 7–15 cm, hairy; bracts 2–3 mm, loosely predominantly black hairy. Calyx narrowly tubular, 8–12 mm, rather densely covered with appressed white and predominantly black hairs; teeth 2–4 mm. Petals purplish red; standard narrowly obovate, 17–20 × 6–7 mm, apex retuse; wings 14–18 mm, limbs distinctly emarginate; keel 10–15 mm. Legumes sessile, straight to slightly

curved, 10–15 mm, ca. 2 mm high and wide, shortly acuminate at apex, 2-locular; valves with appressed white and black or with predominantly black hairs.

- Arid slopes; 1900–2100 m. W Gansu.

This name was originally published by S. B. Ho (Bull. Bot. Res., Harbin 3(1): 65. 1983) but not validly so because two gatherings were indicated as types (*Vienna Code*, Art. 37.2).

43. *Astragalus* sect. *Ammodytes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 109. 1868.

喜沙组 xi sha zu

Plants perennial, dwarf, caespitose, psammophytic, with prostrate stems covered with bifurcate hairs. Stipules adnate to petiole and nearly fully vaginate-connate behind stem and around petiole. Racemes subsessile, 1- or 2-flowered. Calyx tubular. Legumes short, 2-locular, few seeded.

One species: China, Kazakhstan, Mongolia, Russia (Siberia), Uzbekistan.

284. *Astragalus ammodytes* Pallas, Reise Russ. Reich. 2: 742. 1773.

喜沙黄耆 xi sha huang qi

Plants 3–6 cm tall, forming prostrate, rather dense mats, white hairy. Stems 0.5–4(–6) cm, very densely tomentose with symmetrically to extremely asymmetrically bifurcate to sub-basifixed, partly curly or flexuous, tangled, ascending to spreading hairs up to 1 mm. Leaves 1.5–3(–4) cm; stipules 3–4 mm, adnate to petiole for ca. 1 mm, nearly fully connate into a sheath surrounding stem and base of petiole, triangular bidentate at apex, densely ± appressed hairy; petiole 1–2 cm, like rachis rather densely covered with subappressed to partly as-

ending hairs up to 0.5 mm; leaflets in 2–4 pairs, close together, subflabellate, narrowly obovate to obovate, 4–6 × 1.5–2 mm, densely appressed hairy, rounded at apex. Racemes sessile or with a hairy peduncle 2–3 mm, 1- or 2-flowered; bracts 2–2.5 mm, densely hairy. Flowers subsessile. Calyx tubular, 8–15 mm, densely subappressed hairy; teeth 1–2 mm. Petals pink, rarely white; standard ca. 1 × 6–7 mm, slightly constricted below middle, apex emarginate; wings 14–20 mm, limbs rounded to slightly obliquely emarginate, auricle very short; keel 11–18 mm. Legumes sessile, 4–5 mm, 2.5–3 mm high and 4–5 mm wide, densely white tomentose.

Sandy soil. Gansu, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia), Uzbekistan].

44. *Astragalus* sect. *Erioceras* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 109. 1868.

毛角组 mao jiao zu

Plants perennial, with short to rather long stems, rarely subcaulescent, covered with appressed to spreading bifurcate hairs. Leaves imparipinnate; stipules free or adnate to petiole. Racemes with a peduncle equaling or exceeding leaves (rarely very short), short, subumbellate. Bracteoles absent. Calyx tubular to campanulate-tubular. Petals violet, rarely yellow or purple; wing limbs obtuse to emarginate. Legumes sessile to subsessile, linear or narrowly oblong to narrowly ellipsoid, ± curved, rarely straight, grooved or rounded dorsally, 2-locular or nearly so, rarely incompletely 2-locular; valves leathery, covered with ascending to spreading hairs.

Forty-four species: Afghanistan, China, Mongolia, Pakistan; C Asia, SW Asia (Iran), E Europe; six species (four endemic) in China.

1a. Leaflets in 1–3 pairs.

2a. Stipules free from petiole, covered with extremely asymmetrically bifurcate hairs; leaflets 8–23 × 1.5–3.5 mm; bracts 2–4 mm, white and black hairy; calyx 7–10 mm, covered with extremely asymmetrically bifurcate to basifixed, appressed to ascending hairs; legumes 8–11 mm 286. *A. habaheensis*

2b. Stipules adnate to petiole for 0.5–1 mm, covered with slightly asymmetrically bifurcate hairs; leaflets 5–10 × 1.5–3 mm; bracts 1.5–2 mm, predominantly black hairy; calyx 9–11 mm, covered with symmetrically or asymmetrically bifurcate, ascending to spreading hairs; legumes 10–17 mm 285. *A. arcuatus*

1b. Leaflets in at least (3 or) 4 pairs but mostly in distinctly more.

3a. Stem, rachis, and peduncle covered with spreading hairs.

4a. Plants with a short stem 1–3 cm; stipules 3–9 mm; leaflets in 9–16 pairs; bracts 5–9 mm; calyx 12–15 mm; legumes 12–15 mm 289. *A. pilutschensis*

4b. Plants acaulescent; stipules 1–2 mm; leaflets in 3–7 pairs; bracts 3–4 mm; calyx 11–12 mm; legumes 30–40 mm 290. *A. yangchangii*

3b. Stem, rachis, and peduncle with ± appressed hairs.

5a. Bracts 5–7 mm; calyx 12–13 mm; petals yellow, standard narrowly oblong-ovate, ca. 20 × 4.5 mm 287. *A. kuldshensis*

- 5b. Bracts ca. 2 mm; calyx at most up to 10 mm; petals purple or violet, standard obovate, 18–22 × ca. 7 mm 288. *A. petraeus*

285. *Astragalus arcuatus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 407. 1841.

弯弓黄耆 wan gong huang qi

Plants 5–15 cm tall, subshrubby, loosely caespitose. Stems of current year 1–7(–10) cm, very densely covered with symmetrically to slightly asymmetrically bifurcate, subappressed to ascending or partly spreading, tangled, white hairs 0.8–1 mm. Leaves 1.5–2.5 cm; stipules 2–3 mm, rather densely covered with subappressed to ascending hairs, at margins also with basifixed hairs; petiole 0.5–1 cm, with slender rachis rather densely hairy like stem; leaflets in 2 or 3(or 4) pairs, 5–10 × 1.5–3 mm, abaxially somewhat densely and adaxially sparsely to loosely covered with ± medifixed, ascending to spreading hairs up to 1 mm. Racemes 2–3 cm, 2–5(–7)-flowered; peduncle 1–3 cm, densely covered with symmetrically or asymmetrically bifurcate, spreading hairs up to 0.5 mm; bracts 1.5–2 mm, sparsely white and predominantly black hairy. Calyx 9–11 mm, densely covered with symmetrically or asymmetrically bifurcate, ascending to partly spreading, white hairs 0.8–1 mm and especially at dorsal side with ± medifixed, appressed, distinctly shorter, black hairs; teeth 1–1.5 mm. Petals violet; standard obovate, 18–25 × 7–9 mm, apex emarginate; wings 17–22 mm; keel 16–19 mm. Legumes slightly curved, 10–17 mm, 3.5–4 mm high and 2–2.5 mm wide, apex shortly acuminate; valves densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 1.5–2 mm.

Xinjiang [Kazakhstan, Russia (European part)].

The Chinese record of *Astragalus subarcuatus* Popov (FRPS 42(1): 278. 1993) is referable to *A. arcuatus*.

286. *Astragalus habaheensis* Y. X. Liou, Fl. Desert. Reipubl. Popul. Sin. 2: 444. 1987.

哈巴河黄耆 ha ba he huang qi

Plants subshrubby, ca. 10 cm tall, caespitose. Stems of current year 4–8 cm, very densely tomentose, with ± medifixed, flexuous, white hairs 0.5–0.8 mm. Leaves 2–3 cm; stipules 2–4 mm, free from petiole, densely hairy; petiole 0.5–0.8 cm, with rachis ± hairy like stem; leaflets in 1–3(or 4) pairs, 8–23 × 1.5–3.5 mm, both surfaces densely or adaxially sometimes only sparsely hairy like stem, apex acute. Racemes rather densely 6–8-flowered; peduncle 1.5–4 cm, hairy like stem; bracts 2–4 mm, white and black hairy. Calyx 7–10 mm, tubular to slightly inflated, rather densely covered with strongly asymmetrically bifurcate to basifixed, subappressed to ascending, flexuous, white hairs 0.8–1 mm, with shorter black hairs mixed in, especially at teeth; teeth 1–2.5 mm. Petals purple-red, drying partly to yellowish; standard obovate, ca. 21 × 9 mm, apex emarginate; wings ca. 18 mm; keel ca. 17 mm. Legumes sessile, 8–11 mm, 3–4 mm high and 2.5–3 mm wide, with a beak ca. 1 mm; valves densely white to yellowish villous, with basifixed to subbasifixed spreading hairs 2–3 mm and with some short hairs 0.3–0.5 mm mixed in.

• Xinjiang.

287. *Astragalus kuldshensis* Bunge, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 374. 1880.

伊宁黄耆 yi ning huang qi

Plants 16–20 cm tall, only white hairy. Stems several, branched at base, ascending, very densely covered with ± medifixed hairs 0.6–0.8 mm. Leaves 5–12 cm; stipules 7–8 mm, adnate to petiole for ca. 3 mm, rather densely covered with strongly asymmetrically bifurcate hairs ca. 1 mm, hairs also basifixed at margins; petiole 1.5–4 cm, with rachis hairy like stem; leaflets in 7–10 pairs, 8–12 × 3–4 mm, both surfaces loosely covered with appressed, ± medifixed hairs 0.8–1.2 mm. Racemes ellipsoid, densely many flowered; peduncle sparsely hairy like stem; bracts 5–7 mm, with ± spreading, strongly asymmetrically bifurcate to basifixed hairs. Calyx 12–13 mm, slightly inflated, rather densely covered with strongly asymmetrically bifurcate to basifixed, ascending hairs 1.2–1.5(–2) mm; teeth 3–3.5 mm. Petals yellow; standard narrowly oblong-ovate, ca. 20 × 4.5 mm, apex retuse; wings ca. 17 mm, limbs laterally and unequally incised; keel ca. 15 mm. Legumes sessile, included in calyx; valves villous with ascending, strongly asymmetrically bifurcate to basifixed hairs 0.6–0.8 mm.

• NW Xinjiang.

288. *Astragalus petraeus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 333. 1842.

喜石黄耆 xi shi huang qi

Astragalus irkeschtami B. Fedtschenko; *A. xylorrhizus* Bunge.

Plants 5–30 cm tall, vegetative parts covered with ± medifixed, appressed hairs 0.6–1 mm. Stems several, 1.5–7 cm, densely covered with mostly white hairs. Leaves 4–8 cm; stipules 3–4 mm, adnate to petiole for 1–2 mm, often shortly connate behind stem, white and black or only white hairy; petiole 1–2 cm, like rachis densely white hairy; leaflets in 4–7 pairs, 6–15 × 3–8 mm, both surfaces densely covered with appressed hairs ca. 1 mm. Racemes short, rather densely 10–18-flowered; peduncle 8–11 cm, densely covered with appressed white hairs, toward raceme increasingly black hairy; bracts ca. 2 mm, white and predominantly black hairy, at margins mainly with subbasifixed to basifixed hairs. Calyx 8–10 mm, densely covered with tangled, spreading or ascending, extremely asymmetrically bifurcate to subbasifixed, white hairs up to 1 mm and especially on abaxial side with shorter, more symmetrically bifurcate, black hairs; teeth 2–3 mm. Petals violet; standard obovate, 18–22 × ca. 7 mm, constricted below middle, apex emarginate; wings 17–20 mm; keel 14–17 mm. Legumes sessile, pendulous, distinctly upcurved-falcate, 20–30 mm, 2–3 mm thick, apex shortly acuminate; valves densely covered with spreading or ascending, extremely asymmetrically bifurcate to subbasifixed, white hairs up to 1 mm and especially on adaxial side with shorter, more symmetrically bifurcate, black hairs.

Desertic mountain slopes; 2800–3200 m. Xinjiang [Kazakhstan, Kyrgyzstan].

289. *Astragalus pilutschensis* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 33: 137. 2001.

皮鲁斯黄耆 pi lu si huang qi

Plants 10–15 cm tall, subcaulescent, covered with bifurcate, spreading hairs. Stems (0.5–)1–2(–3) cm, ascending to erect, densely covered with short and long white hairs. Leaves 6–12 cm; stipules (2–)3–9 mm, adnate to petiole, densely white hairy; petiole 1.5–4 cm, like rachis covered with ascending to spreading white hairs; leaflets in 9–16 pairs, 8–16 × (3–)4–6 mm, abaxially densely and adaxially sparsely hairy. Racemes 2–4 cm, at first densely, later on rather loosely many flowered; peduncle 2–5(–8) cm, with white hairs, toward raceme predominantly black hairy; bracts 5–9 mm, white and black hairy. Calyx 12–16 mm, densely villous, with rigid white and black hairs, at nerves and teeth more black hairy and so slightly black striate; teeth 3–5.5 mm. Petals yellow; standard elliptic to narrowly obovate, 21–25 × 7–8 mm, apex slightly retuse; wings 20–23 mm; keel 19–22 mm. Ovary stipitate, oblong, white hairy; style glabrous. Legumes unknown.

• NW Xinjiang.

290. *Astragalus yangchangii* Podlech & L. R. Xu, Novon 17: 235. 2007.

托里黄耆 tuo li huang qi

Plants 8–12 cm tall, acaulescent. Leaves 4–9 cm; stipules 1–2 mm, free from petiole, densely covered with ± medifixed, appressed, tangled, white hairs ca. 1 mm, at margins also with basifixed hairs; petiole 2–4 cm, like rachis densely covered with partly flexuous, tangled, ascending to spreading, ± medifixed, white hairs 0.5–1 mm; leaflets in 3–7 pairs, 5–10 × 3–5 mm, abaxially densely and adaxially loosely to rather densely covered with symmetrically or asymmetrically bifurcate, flexuous, tangled, ascending to spreading, white hairs ca. 1 mm. Racemes (in fruit) rather densely 2–6-flowered; peduncle 3–8 cm, white hairy like rachis, just below raceme with some black hairs mixed in; bracts (2–)3–4 mm, with strongly asymmetrically bifurcate, predominantly black hairs. Calyx 11–12 mm, rather densely villous, with ± symmetrically to extremely asymmetrically bifurcate, flexuous, tangled, ascending to spreading, white hairs 0.5–1 mm and especially at dorsal (lower) side and teeth with shorter black hairs; teeth subulate, 2–3 mm. Petals unknown. Legumes sessile, linear, ± erect, straight or slightly curved, (20–)30–40 mm, 2.5–3.5 mm high and wide, with a beak 1–2 mm; valves densely covered with symmetrically or asymmetrically bifurcate, ± appressed, white hairs 0.5–0.6 mm and with extremely asymmetrically bifurcate, ascending to spreading hairs ca. 1 mm.

• Xinjiang.

45. *Astragalus* sect. *Helmia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 111. 1868.

乌拉尔组 wu la er zu

Plants often dwarf, acaulescent or nearly so, caespitose, covered with bifurcate hairs. Stipules free or adnate to petiole, vaginateconnate behind stem. Racemes shortly to long pedunculate, rarely subsessile, few or up to 20-flowered; bracts whitish hyaline. Flowers with a short pedicel or subsessile. Calyx campanulate to tubular. Petals yellow or purple. Legumes sessile to subsessile, compressed laterally or inflated, keeled ventrally, narrowly grooved to flattened dorsally, 1-locular to 2-locular; valves thinly leathery, densely covered with mostly spreading hairs.

Twenty-four species: China, India, Kashmir, Mongolia, Nepal, Pakistan; C Asia, E Europe to Siberia; 16 species (ten endemic) in China.

- 1a. Leaves simple, 10–50 × ca. 1 mm 298. *A. efoliolatus*
 1b. Leaflets in at least 1 pair but mostly in more.
 2a. Leaflets in 10–13 pairs, villous with spreading hairs; bracts 4–5 mm; petals yellow 304. *A. pendulotopetalus*
 2b. Leaflets in 1–6 pairs, covered with ± appressed hairs; bracts shorter; petals mostly purple to violet.
 3a. Standard up to 10(–11) mm.
 4a. Leaflets linear, 8–10 × as long as wide.
 5a. Plants 3–12 cm tall, at base with numerous non-flowering off-shoots; calyx campanulate, 4–6 mm; wing limbs retuse to slightly emarginate 303. *A. nematodioides*
 5b. Plants without non-flowering off-shoots; calyx tubular; wing limbs distinctly emarginate 306. *A. vladimirii-komarovii*
 4b. Leaflets narrowly elliptic, up to 5 × as long as wide.
 6a. Leaflets in 4 or 5 pairs, 6–10 × 1–2 mm; legumes 2-locular, subacute, without beak 296. *A. divnogorskajae*
 6b. Leaflets in 1–3 pairs, 1–6 × 0.5–1 mm; legumes 1-locular or incompletely 2-locular, with a beak 1–2 mm.
 7a. Stipules 1.5–2 mm, white and black hairy; standard ca. 10 mm; peduncles 4–9 cm; legumes ca. 1.5 mm high and ca. 1 mm wide, subappressed hairy, incompletely 2-locular 297. *A. dshangartensis*
 7b. Stipules 3–5 mm, white hairy; standard 6–8 mm; peduncles 1–2.5 cm; legumes inflated, with ± spreading hairs, nearly 1-locular 291. *A. arnoldii*
 3b. Standard distinctly longer.
 8a. Leaflets 10–30(–40) mm; stipules 4–12 mm, adnate to petiole for 3–4 mm.
 9a. Calyx 7–10 mm, widely campanulate, base slightly inflated ovoid, urn-shaped, only white hairy; standard 15–20 × 6–7 mm, obovate, below middle slightly constricted 294. *A. cupulicalycinus*

- 9b. Calyx at least 10 mm, tubular, at least with some black hairs; standard at least 20 mm but mostly distinctly longer, not constricted.
- 10a. Only stipules of lower leaves connate, those of upper leaves free from each other; leaflets with hairs all similar, 0.5–1 mm; standard 20–23 mm, ovate with rather long claw; legumes covered with extremely asymmetrically bifurcate, spreading, flexuous hairs ca. 1 mm, 1-locular 292. *A. burtschumensis*
- 10b. All stipules high connate behind stem; leaflets with hairs 0.5–0.8 mm and with distinctly thicker hairs 1–1.8 mm; standard 21–30 mm, obovate with short claw; legumes unknown 302. *A. eergisiensis*
- 8b. Leaflets up to 11(–15) × ca. 3 mm; stipules up to 5 mm, free from petiole or shortly adnate to it.
- 11a. Stipules 1–3 mm; standard up to 17 mm, elliptic or obovate, never constricted; legumes (ovary) appressed hairy.
- 12a. Stipules 1–2 mm, nearly free from petiole, behind stem shortly connate; leaflets in 2–5 pairs; bracts ca. 1 mm, white and black hairy; calyx covered with subappressed, flexuous, black hairs with some longer, spreading, white and black hairs; legumes (immature) linear, falcate, ca. 15 mm 305. *A. persimilis*
- 12b. Stipules 2–3 mm, adnate to petiole for ca. 1 mm, behind stem connate to top; leaflets in 1 pair; bracts 1.5–3 mm, predominantly white hairy; calyx densely covered with appressed white and black hairs; legumes unknown 300. *A. hoshanbaoensis*
- 11b. Stipules 2.5–5(–6) mm; standard 17–24(–26) mm, in middle slightly constricted or not; legumes villous, with spreading hairs.
- 13a. Stipules free from petiole; calyx 7–8 mm; standard narrowly elliptic-pandurate, ca. 6 mm wide, constricted in middle; wing limbs obliquely incised; legumes (6–)8–10 mm, nearly 1-locular 293. *A. chomutowii*
- 13b. Stipules shortly adnate to petiole; calyx at least 8 mm but mostly distinctly longer and up to 12 mm; standard 8–10 mm wide, if only ca. 6 mm wide (in *A. kasachstanicus*) then oblong, not constricted, and wing limbs obtuse; legumes 18–23 mm, 2-locular.
- 14a. Standard oblong, ca. 6 mm wide; wing limbs obtuse; legumes with tangled, flexuous, spreading hairs ca. 3 mm, sitting on small tubercles 301. *A. kasachstanicus*
- 14b. Standard obovate, 8–10 mm wide; wing limbs retuse or incised; hairs of legumes not sitting on small tubercles.
- 15a. Petals pale yellowish or white; standard obovate, not constricted; wing limbs slightly retuse; legumes with a stipe 1–2 mm 295. *A. depauperatus*
- 15b. Petals pale purplish; standard constricted in middle; wing limbs distinctly emarginate; legumes sessile 299. *A. heptapotamicus*

291. *Astragalus arnoldii* Hemsley & H. Pearson, J. Linn. Soc., Bot. 35: 172. 1902.

团垫黄耆 tuān diān huáng qī

Astragalus arnoldii f. *albiflorus* Y. H. Wu; *A. culcitiformis* P. C. Li & C. C. Ni; *A. li-nii* Gómez-Sosa; *A. monticola* P. C. Li & C. C. Ni (1979), not Philippi (1864); *A. roborovskiyi* N. Ulziykhutag.

Plants 3–5 cm tall, nearly acaulescent, forming compact mats; hairs appressed, mostly ± medifixed, in vegetative parts white, 0.5–1 mm. Leaves 1–2 cm; stipules 3–5 mm, adnate to petiole up to 1/2, shortly connate behind stem, loosely to densely white hairy; petiole 0.8–1.5 cm, like slender rachis rather densely hairy; leaflets in 1–3 pairs, 1–5 × 0.5–1 mm, often folded, both surfaces rather densely hairy. Racemes rather densely 4–8-flowered, somewhat elongated in fruit; peduncle 1–2.5 cm, slender, rather densely hairy; bracts 1.5–2 mm, with few black hairs. Calyx 3–4 mm, loosely to rather densely predominantly black hairy; teeth 0.5–1 mm. Petals purplish to violet; standard nearly orbicular, 6–8 × 4–5 mm, apex emarginate; wings 6–7.5 mm; keel 5.5–6.5 mm. Legumes sessile,

slightly curved, (6–)8–10 mm, strongly inflated, with a slender beak 1–1.5 mm, nearly 1-locular; valves villous with white hairs.

High alpine slopes; 4000–5500 m. Qinghai, Xinjiang, Xizang [India (Sikkim), Kashmir, Nepal].

292. *Astragalus burtschumensis* Sumnevicz, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1933 (1–2): 7. 1933.

布尔楚黄耆 bù er chū huáng qī

Plants 14–18 cm tall, shortly caulescent, densely caespitose, appressed white hairy. Stems several, up to 4 cm. Leaves 7–9 cm; stipules hairy, of lower leaves connate, those of upper leaves free from each other; leaflets in 1 pair, very rarely in 2 pairs, ovate to elliptic, 28–35 × 13–17 mm, covered with hairs 0.5–1 mm. Racemes pedunculate, 2–6-flowered, at fruiting time together with peduncle as long as leaves. Calyx tubular, ca. 11 mm, hairy; teeth 1–1.5 mm. Petals violet; standard ovate, 20–23 × ca. 11 mm, with a rather long claw, apex emarginate; wings ca. 19 mm, limbs narrowly oblong, apex emarginate; keel ca. 17 mm. Legumes sessile, nodding, narrowly oblong, 16–20

mm, 6–8 mm high; valves white hairy, hairs spreading, flexuous, ca. 1 mm.

• NW Xinjiang.

293. *Astragalus chomutowii* B. Fedtschenko, Bull. Herb. Boissier 7: 826. 1899 [*“chomutowi”*].

中天山黄耆 *zhong tian shan huang qi*

Plants 2–8 cm tall, nearly acaulescent, densely caespitose, often forming compact mats; hairs appressed, mostly ± medifixed, in vegetative parts only white, 0.5–1 mm. Leaves 0.5–4 cm; stipules 3–5 mm, free from petiole, high connate behind stem, often up to top, loosely to rather densely white hairy; petiole 0.2–2 cm, like rachis densely hairy; leaflets in 1–3 pairs, narrowly elliptic, 3–7(–15) × 1–2.5 mm, mostly folded, both surfaces densely hairy. Racemes short, rather densely 3–7(–15)-flowered; peduncle 1–4(–6) cm, densely covered with appressed white hairs; bracts 2.5–4 mm, with white and sometimes also black hairs. Calyx 7–8 mm, densely white and black hairy; teeth 2–2.5 mm. Petals violet; standard narrowly elliptic-pandurate, 20(–22) × ca. 6 mm, sometimes slightly constricted below middle, apex emarginate; wings 16–18(–20) mm, limbs narrowly oblong, apex obliquely incised; keel 13–14(–16) mm. Legumes sessile, oblong, slightly curved, (6–)8–10 mm, strongly inflated, with a slender beak 1–1.5 mm, nearly 1-locular; valves villous with white hairs.

Alpine slopes; 3700–3800 m. Qinghai, Xinjiang [Kyrgyzstan, Tajikistan].

294. *Astragalus cupulicalycinus* S. B. Ho & Y. C. Ho, Bull. Bot. Res., Harbin 3(1): 47. 1983.

杯萼黄耆 *bei e huang qi*

Plants 7–10 cm tall, subacaulescent, covered with appressed to subappressed, medifixed, white hairs 0.5–1 mm. Stems short, 1–2 cm, very densely hairy. Leaves 5–7 cm; stipules 4–9 mm, adnate to petiole for 3–4 mm, distinctly to high vaginate-connate behind stem, sparsely to loosely hairy; petiole 2–4 cm, like rachis densely hairy; leaflets in 1 or 2 pairs, 10–25 × 4–8 mm, both surfaces densely to rather densely or adaxially only loosely hairy. Racemes rather densely 5–8-flowered; peduncle 4–8 cm, hairy like stem; bracts ca. 2 mm, hairy. Calyx widely campanulate, 7–10 mm, rather densely hairy, base slightly inflated ovoid, urn-shaped; teeth ca. 2 mm. Petals reddish purple; standard obovate, 15–20 × 6–7 mm, below middle slightly constricted, apex emarginate; wings 13–15 mm; keel 11–13 mm. Legumes sessile, ca. 12 mm, ca. 3 mm high and ca. 5 mm wide, apex subacute; valves rather densely hairy.

• Xinjiang.

295. *Astragalus depauperatus* Ledebour, Fl. Altaic. 3: 314. 1831.

疆北黄耆 *jiang bei huang qi*

Astragalus eriobolus Bunge.

Plants (3–)6–15 cm tall, loosely caespitose, furnished with medifixed, appressed hairs. Stems of current year 0.5–4 cm, densely white hairy. Leaves 3–7(–10) cm; stipules 3–5 mm, shortly adnate to petiole, behind stem shortly connate, hairy;

petiole 1.5–4 cm, like slender rachis densely white hairy; leaflets in 2–4(–6) pairs, 5–11 × 1.5–3(–4) mm, both surfaces rather densely hairy. Racemes subumbellate, loosely 2–5-flowered; peduncle 3–6 cm, white hairy; bracts (1–)2–3.5 mm, white hairy. Calyx 9–12 mm, with appressed white and black hairs; teeth ca. 3 mm. Petals pale yellowish or white, keel violet tipped; standard obovate, 18–24(–26) × 8–9(–10) mm, apex retuse; wings 15–20(–23) mm; keel 13–18(–20) mm. Legumes with a stipe 1–2 mm, straight to slightly curved, 18–23 mm, 4–5 mm high and 2–2.5 mm wide, compressed laterally, 2-locular; valves densely hispid-lanate with spreading white hairs.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

296. *Astragalus divnogorskajae* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 33: 140. 2001.

疆西黄耆 *jiang xi huang qi*

Plants up to 5–7 cm tall, acaulescent to subacaulescent, forming loose mats. Stems numerous, very short, slender. Leaves 1–3 cm; stipules small, adnate to petiole, sometimes amplexicaul, white hairy; petiole 0.5–1 cm; leaflets in 4 or 5 pairs, narrowly elliptic, 6–10 × 1–2 mm, both surfaces densely appressed hairy. Racemes 1–2 cm, rather loosely 8–20-flowered, elongating in fruit up to 4 cm; peduncle ascending, 3–10 cm, covered with appressed white hairs, below raceme also with black hairs; bracts 1–1.5 mm, mostly black hairy. Calyx 4–5 mm, densely appressed white and black hairy; teeth ca. 2 mm. Petals pale bluish to yellowish with violet tips; standard 9–11 mm, limb orbicular, apex retuse; wings 8–9 mm; keel 7–8.5 mm. Legumes curved, 9–12 mm, 2.5–3 mm high, keeled ventrally; valves with long, ascending, white hairs.

• W Xinjiang.

297. *Astragalus dshangartensis* Sumnevicz, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1933(1–2): 5. 1933.

詹加尔特黄耆 *zhan jia er te huang qi*

Plants 5–10 cm tall, acaulescent, densely caespitose. Leaves 2–3 cm; stipules 1.5–2 mm, covered with ascending white and black hairs; petiole 1.5–2 cm, like rachis densely appressed white hairy; leaflets in 2 or 3 pairs, narrowly elliptic, 4–6 × 1(–1.5) mm, abaxially densely and adaxially only toward margins covered with appressed hairs, silvery-canescens. Racemes 1–2 cm, loosely 5–7-flowered; peduncle 4–9 cm, slender, white hairy, below raceme also with black hairs; bracts 1–1.5 mm, black or white and black hairy. Calyx ca. 4 mm, covered with white and predominantly black hairs; teeth ca. 1.5 mm. Petals pink-violet; standard nearly orbicular, ca. 10 × 6 mm, apex emarginate; wings ca. 8.5 mm; keel ca. 8 mm. Legumes sessile, narrowly oblong, 7–10 mm, ca. 1.5 mm high and ca. 1 mm wide, attenuate at both ends, laterally compressed, with a slender beak 1.5–2 mm, incompletely 2-locular; valves densely covered with subappressed white hairs.

Mountain slopes; 1900–3100 m. Xinjiang [Kyrgyzstan].

298. *Astragalus efoliolatus* Handel-Mazzetti, Oesterr. Bot. Z. 85: 215. 1936.

单叶黄耆 *dan ye huang qi*

Plants acaulescent, covered with mostly medifixed white hairs 1(–1.5) mm. Leaves sessile, simple; stipules 4–6 mm, nearly free from petiole, often high vaginate-connate behind stem, glabrous or sparsely hairy, at margins often with basifixed hairs; leaf blade linear, 10–50 × ca. 1 mm, flat or folded, both surfaces loosely to rather densely appressed hairy. Racemes sessile or with a short, hairy peduncle, loosely up to 8-flowered; bracts 1–2 mm, sparsely hairy, at margins with basifixed hairs. Calyx ca. 5 mm, loosely to rather densely appressed hairy; teeth ca. 2.5 mm. Petals red-purple or violet; standard oblong-pan-durate, ca. 8 × 3 mm, without distinct claw, distinctly constricted in middle, apex emarginate; wings ca. 7 mm; keel ca. 6 mm. Legumes (immature) sessile, linear-oblong, with a short beak, densely white hairy.

• Gansu, Nei Mongol, Ningxia, Shaanxi.

299. *Astragalus heptapotamicus* Sumnevicz, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1933 (5–6): 7. 1933.

七溪黄耆 *qi xi huang qi*

Astragalus poljakovii Popov; *A. wensuensis* S. B. Ho.

Plants 2–4 cm tall, acaulescent, densely caespitose, vegetative parts densely covered with appressed to subappressed, ± medifixed, white hairs 0.5–1 mm. Leaves 0.5–4 cm; stipules 2.5–4(–6) mm, shortly adnate to petiole, behind stem connate to middle or even higher up, rather densely hairy; petiole 0.3–1.5 cm, like rachis densely hairy; leaflets in (1 or)2–4 pairs, close together, 2–6 × 1–2 mm, flat or boot-shaped to folded, both surfaces densely hairy. Racemes (1 or)2–5-flowered; peduncle 0.3–3 cm, hairy like rachis; bracts 1.5–3 mm, hairy, margins with subbasifixed hairs. Calyx 9–10(–13) mm, densely covered with symmetrically or asymmetrically bifurcate, subappressed, white hairs 0.5–0.8 mm and often with much shorter black hairs especially at dorsal side; teeth 1.5–3.5 mm. Petals pale purplish; standard obovate, 17–22 × 9–10 mm, slightly constricted below middle, apex emarginate; wings 15–20 mm, limbs obliquely incised; keel 13–17 mm. Legumes subsessile, 18–22 mm, 3.5–5 mm high and ca. 2 mm wide, apex acuminate; valves densely villous with ascending to spreading white hairs 0.5–3 mm, glabrescent with age.

1700–2400 m. Xinjiang [Kazakhstan].

300. *Astragalus hoshanbaoensis* Podlech & L. R. Xu, Novon 17: 235. 2007.

善宝黄耆 *shan bao huang qi*

Plants 2–3 cm tall, acaulescent or nearly so, densely caespitose, forming compact mats; hairs appressed, white, in inflorescence also black. Stems, if present, up to 1 cm, very densely covered with medifixed hairs 0.5–0.6 mm. Leaves 0.5–1 cm; stipules 2–3 mm, adnate to petiole for ca. 1 mm, behind stem connate to top, lower ones glabrous or ciliate only at margins, uppermost ones loosely hairy like stem, at margins with asymmetrically bifurcate to subbasifixed hairs; petiole 0.3–0.6 cm, with rachis densely hairy like stem; leaflets in 1 pair, close together, narrowly obovate, 3–5 × 1–2 mm, flat or boot-shaped to folded, both surfaces densely covered with appressed, medifixed hairs 0.5–0.8 mm. Racemes 2–8-flowered; peduncle 0.3–

3 cm, densely white hairy like stem, below rachis with some black hairs mixed in; bracts 1.5–3 mm, white hairy, sometimes with black hairs mixed in, at margins with subbasifixed hairs. Calyx 6–7 mm, densely covered with medifixed, appressed, white and black hairs 0.3–0.8 mm; teeth ca. 1 mm. Petals pale purplish with darker keel; standard obovate, 13–14 mm, ca. 5 mm high, apex emarginate; wings 12–13 mm; keel ca. 11 mm. Ovary with a stipe ca. 1 mm, white hairy. Legumes unknown.

• NW Xinjiang.

301. *Astragalus kasachstanicus* Goloskokov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 111. 1957.

哈萨克黄耆 *ha sa ke huang qi*

Plants 5–10(–15) cm tall, acaulescent to subacaulescent, loosely to densely caespitose. Stems, if present, 0.5–3 cm, appressed white hairy, densely enveloped by stipules. Leaves 2–5 cm; stipules 2–4 mm, adnate to petiole, behind stem connate to middle, appressed white hairy; petiole (1–)2–3 cm, like slender rachis densely covered with medifixed, appressed, white hairs 0.5–0.8 mm; leaflets in 1–3 pairs, (5–)7–10(–15) × (2–)3–5(–8) mm, terminal leaflet larger than lateral ones, both surfaces densely or more rarely loosely to rather densely covered with medifixed, appressed, white hairs 1–1.2 mm. Racemes densely 2- or 3(or 4)-flowered; peduncle 3–5(–8) cm, rather densely white hairy like rachis; bracts 1–3 mm, appressed white and black hairy. Calyx (8–)10–12 mm, rather densely covered with ± medifixed, flexuous, appressed, white and predominantly black hairs 0.2–0.5 mm; teeth 1–2(–3) mm. Petals yellow; standard oblong, 17–22 × ca. 6 mm, apex scarcely emarginate; wings 16–20 mm; keel 15–18 mm. Legumes subsessile, straight, (15–)18–20(–22) mm, 4–5 mm high and ca. 3 mm wide, with a beak 1–2 mm, 2-locular; valves densely covered with soft, flexuous, tangled, spreading, white hairs ca. 3 mm, sitting on small tubercles; valves therefore warty.

Xinjiang [Kazakhstan, Mongolia].

302. *Astragalus eerqisiensis* Zhao Y. Chang, L. R. Xu & Podlech, Acta Bot. Boreal.-Occid. Sin. 27: 170. 2007.

额尔齐斯黄耆 *e er qi si huang qi*

Plants 5–10 cm tall, acaulescent to subacaulescent; hairs appressed to subappressed, medifixed, white, at calyx sometimes also black. Stems, if present, 1–2 cm, very densely covered with hairs 1–1.2 mm. Leaves 2.5–9 cm; stipules 6–12 mm, adnate to petiole for 3–4 mm, distinctly to high vaginate-connate behind stem, densely hairy, at margins partly with basifixed hairs; petiole 1–6 cm, with rachis densely hairy like stem; leaflets in 1 or 2 pairs, 10–30(–40) × 3–12(–15) mm, both surfaces densely to rather densely or adaxially only loosely covered with thin medifixed hairs 0.5–0.8 mm and with distinctly thicker hairs 1–1.8 mm. Racemes loosely 2–5-flowered; peduncle 1–3.5 cm, hairy like stem; bracts 2–5 mm, sparsely white hairy, sometimes with some black hairs mixed in. Calyx 10–13 mm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed, white hairs 0.5–0.8 mm and often with ± medifixed black hairs 0.15–0.4 mm mixed in; teeth

1.5–2 mm. Petals violet; standard obovate, 21–30 × 9–11 mm, apex emarginate; wings 20–24 mm; keel 16–20 mm. Ovary sessile, white hairy. Legumes unknown.

- Xinjiang.

303. *Astragalus nematodioides* H. Ohba, S. Akiyama & S. K. Wu, *J. Jap. Bot.* 70: 16. 1995.

类线叶黄耆 *lei xian ye huang qi*

Astragalus caudiculosus Komarov; *A. ui-eilakensis* F. Ghahremaninejad.

Plants 3–12 cm tall, acaulescent or nearly so, caespitose. Stems, if present, up to 2(–4) cm, prostrate to ascending, branched, with numerous, short, non-flowering off-shoots and few-flowering stems, densely covered with symmetrically or asymmetrically bifurcate, subappressed, white hairs 0.7–1 mm. Leaves 1–4 cm; stipules 1.5–3 mm, adnate to petiole for 0.5–1 mm, vaginate-connate behind stem to middle or higher up, rather densely hairy; petiole 0.5–2 cm, with very slender rachis hairy like stem; leaflets in 2–6 pairs, 3–10 × 0.5–1.5 mm, both surfaces densely hairy, with incurved margins or partly folded. Racemes 2–4 cm, loosely 4–12-flowered; peduncle 2.5–13 cm, slender, densely to rather densely white hairy like stem; bracts 1–1.5 mm, white and black hairy. Calyx campanulate, 4–6 mm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed, white and black hairs 0.5–0.9 mm; teeth 2–3 mm. Petals purple; standard orbicular, 7–10 × 5–8 mm, apex emarginate; wings 6–8 mm; keel 6–7.5 mm. Legumes curved, 10–15 mm; valves densely covered with subappressed to ascending, strongly asymmetrically bifurcate to subbasifixed, white hairs ca. 1 mm.

- 2400–3700 m. S Xinjiang (Kunlun Shan).

304. *Astragalus pendulatopetalus* S. B. Ho & Z. H. Wu, *Acta Bot. Boreal.-Occid. Sin.* 8: 133. 1988.

琴瓣黄耆 *qin ban huang qi*

Plants 2–5 cm tall, vegetative parts densely covered with ± medifixed, spreading, white hairs 0.4–0.5 mm. Stem, if present, very short. Leaves 3–4 cm, subsessile; stipules ca. 2.5 mm, adnate to petiole for ca. 1 mm, connate behind stem for 1.5–2 mm, hairy; rachis hairy; leaflets in 10–13 pairs, 4–5 × 1.5–2 mm, both surfaces, though abaxially more densely, spreading hairy. Racemes 3- or 4-flowered; peduncle ca. 3 cm, hairy; bracts 4–5 mm, hairy. Calyx inflated tubular, 10–12 mm, covered with ± spreading, symmetrically bifurcate hairs 0.6–1 mm and with appressed, symmetrically or asymmetrically bifurcate, white hairs 0.1–0.2 mm, with some gray hairs mixed in; teeth 2.5–3 mm. Petals yellow; standard obovate-pandurate,

20–22 × ca. 7 mm, in middle distinctly constricted, apex emarginate; wings 19–21 mm; keel ca. 17 mm. Ovary sessile, hairy. Legumes unknown.

- Steppes; 400–600 m. Xinjiang.

305. *Astragalus persimilis* Podlech & L. R. Xu, *Novon* 17: 236. 2007.

类中天山黄耆 *lei zhong tian shan huang qi*

Plants ca. 5 cm tall, acaulescent or nearly so, vegetative parts covered with appressed, ± medifixed, only white hairs. Stems, if present, up to 1 cm, very densely covered with hairs ca. 0.5 mm. Leaves 1.5–3 cm; stipules 1–2 mm, nearly free from petiole, behind stem shortly connate or to middle, loosely to rather densely hairy, at margins also with basifixed hairs; petiole 0.5–1.2 cm, with rachis hairy like stem; leaflets in 2–5 pairs, 2–6 × 1–1.5 mm, both surfaces very densely covered with hairs ca. 1 mm. Racemes short, rather densely 6–8-flowered; peduncle 2–3 cm, densely hairy like leaflets; bracts ca. 1 mm, white and black hairy. Calyx 7–8 mm, rather densely covered with ± medifixed, subappressed, flexuous, black hairs 0.5–1 mm, with some longer, ascending, white and black hairs mixed in; teeth ca. 1 mm. Petals violet; standard elliptic, ca. 17 × 6 mm, apex emarginate; wings ca. 14 mm; keel ca. 13 mm. Legumes (immature) sessile, linear, pendulous, distinctly falcate, ca. 15 mm, apex acuminate; valves densely covered with symmetrically to strongly asymmetrically bifurcate, appressed, white hairs 0.5–1 mm.

- Xinjiang.

306. *Astragalus vladimirii-komarovii* B. Fedtschenko, *Sborn. President Akad. Nauk V. L. Komarov*, 742. 1939 [*“vladimirii-komarovi”*].

卡乌洛夫黄耆 *ka wu luo fu huang qi*

Plants 10–20 cm tall, subacaulescent. Stems of current year 1–3 cm, densely covered with short white hairs. Leaves 3–5 cm; stipules connate behind stem; petiole long; leaflets in 3 or 4 pairs, linear, 7–9 × 0.5–1 mm, appressed white hairy. Racemes subumbellate-capitate, 5- or 6-flowered; peduncle longer than leaves, appressed white hairy; bracts minute. Flowers subsessile. Calyx tubular, appressed white and black hairy; teeth unequal, upper 2 narrowly triangular, ca. 1/3 of tube length, lower 3 subulate, longer. Petals purple-violet; standard ca. 10 mm, limb slightly emarginate; wings shorter than standard, limbs narrowly oblong, slightly dilated toward emarginate tip; keel slightly shorter than wings, limbs oblong-curved. Ovary narrowly oblong, hairy. Legumes unknown.

- About 2800 m. Xinjiang (Kashi Diqu).

46. *Astragalus* sect. *Ammotrophus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 111. 1868.

沙地组 *sha di zu*

Plants herbaceous or slightly subshrubby, with developed stems covered with minutely warty, medifixed hairs. Stipules whitish hyaline, small, free from petiole to shortly adnate to it, ± high connate behind stem. Inflorescence borne on a long peduncle, a short raceme or umbellate to subumbellate. Bracteoles absent. Calyx tubular, at length slightly inflated, ruptured by legume. Limbs of wings emarginate to bilobed at tip. Legumes subsessile, oblong, compressed laterally, rounded dorsally, 2-locular or nearly so, villos, few seeded.

Seven species: China, Mongolia, Russia (Siberia); C Asia; three species in China.

- 1a. Lower stipules connate behind stem, upper ones free; bracts 3–5 mm; calyx 12–16 mm, teeth 2–3 mm; standard 20–26 mm; wing limbs 19–22 mm, slightly emarginate at tip 308. *A. megalanthus*
 1b. All stipules distinctly connate behind stem; bracts 1.5–3 mm; calyx mostly 9–10 mm, teeth 1–2 mm; standard 18–21 mm; wing limbs 12–16 mm.
 2a. Leaflets elliptic to ovate, 2–5 × 0.8–3 mm, both surfaces rather densely hairy; calyx covered with medifixed, appressed, white and shorter black hairs; wing limbs deeply bilobed 309. *A. saratagi*
 2b. Leaflets widely obovate, 6–12 × 4–12 mm, adaxially glabrous or rarely to loosely hairy; calyx covered with subbasifixed, appressed to ascending, white hairs; wing limbs rounded 307. *A. albicans*

307. *Astragalus albicans* Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 21. 1841.

革果黄耆 *ge guo huang qi*

Plants 18–30(–40) cm tall, only furnished with white hairs. Stems several, 10–20(–32) cm, very densely covered with ± medifixed, appressed hairs 0.6–0.8 mm. Leaves 6–7(–11) cm; stipules 3–5 mm, shortly adnate to petiole, behind stem connate to middle or even higher up, sparsely hairy to subglabrous; petiole 1–2(–3) cm, with rachis loosely to densely hairy like stem; leaflets in 6–11(–14) pairs, widely obovate, (3–)6–12(–15) × 4–12 mm, abaxially sparsely to rather densely covered with medifixed, appressed hairs 0.6–0.8 mm, adaxially glabrous or with a few scattered hairs only, more rarely sparsely to loosely hairy. Racemes 2–2.5 cm, rather loosely 6–10-flowered; peduncle 1.5–6 cm, densely to rather densely hairy like stem; bracts 2–3 mm, white hairy. Calyx 9–10 mm, slightly inflated, rather densely covered with mostly subbasifixed, subappressed to ascending, often curly or flexuous, tangled hairs 0.5–0.8 mm; teeth 1–2 mm. Petals purple; standard elliptic, 18–21 × 7–8 mm, apex emarginate; wings 16–19 mm, limbs rounded; keel 14–16 mm. Legumes sessile, obliquely erect, 8–13 mm, 3.5–5 mm high and wide, with a curved beak 1–1.5 mm; valves densely villous with ascending to spreading, flexuous, tangled hairs 1–2.5 mm.

Xinjiang [Kazakhstan, Mongolia].

308. *Astragalus megalanthus* Candolle, Astragalogia, 165. 1802.

大花黄耆 *da hua huang qi*

Plants 10–18 cm tall, loosely caespitose, vegetative parts covered with ± medifixed, appressed to subappressed, white hairs. Stems several, parts of current year 2–6 cm, very densely covered with hairs ca. 1 mm. Leaves 4–15 cm; stipules 3–7 mm, adnate to petiole for 1–2 mm, lower ones ovate-triangular, distinctly connate behind stem, upper narrowly triangular, free from each other, sparsely to loosely hairy, at margins also with basifixed hairs; petiole 3.5–6 cm, with rachis loosely to rather densely hairy like stem; leaflets in 7–10 pairs, 5–15 × 2–5 mm, abaxially somewhat densely and adaxially loosely covered with mostly slightly asymmetrically bifurcate hairs 1.5–2 mm. Racemes 3–4 cm, rather densely 5–10-flowered; peduncle 1.5–7 cm, sparsely to loosely covered with subappressed white hairs; bracts 3–5 mm, with white or white and black hairs, at margins with basifixed hairs. Calyx 12–16 mm, at anthesis tubular, soon

slightly inflated ovoid but ruptured by legume, densely covered with tangled, subappressed to ascending, white hairs 1–2 mm and also, especially toward teeth, with mostly shorter black hairs; teeth 2–3 mm. Petals violet, drying yellow; standard obovate, 20–26 × ca. 7 mm, slightly to distinctly constricted in lower 1/3, apex emarginate; wings 19–22 mm, limbs obliquely emarginate; keel 16–19 mm. Legumes sessile, partly enclosed in ruptured calyx, 9–11 mm, ca. 5 mm high and ca. 3 mm wide, with a beak ca. 1 mm; valves densely covered with strongly asymmetrically bifurcate, spreading, white hairs 1–1.2 mm, glabrescent with age and minutely warty.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

309. *Astragalus saratagi* Bunge, Izv. Imp. Obsc. Ljubit. Estestv. Moskovsk. Univ. 26(2): 269. 1880.

阿赖山黄耆 *a lai shan huang qi*

Astragalus saratagi var. *minutiflorus* S. B. Ho.

Plants 15–35 cm tall, vegetative parts covered with mostly medifixed, appressed, white hairs 0.5–1 mm. Stems several, branched at base, loosely to rather densely hairy. Leaves 1.5–4.5 cm; stipules 1.5–3 mm, shortly or up to 2/3 connate behind stem, sparsely to loosely hairy, margins partly with strongly asymmetrically bifurcate hairs; petiole 0.3–1 cm, like slender rachis rather densely hairy; leaflets in 6–8(–10) pairs, elliptic to ovate, 2–5(–7) × 0.8–3(–4) mm, both surfaces rather densely hairy. Racemes short, ovoid to capitate, densely 5–15(–22)-flowered; peduncle 2.4–10 cm, loosely to rather densely white hairy; bracts 1.5–3 mm, with white and sometimes a few black hairs, margins with strongly asymmetrically bifurcate to basifixed hairs. Calyx at anthesis tubular, 9–10 mm, at length slightly inflated but ruptured by legume, loosely to rather densely covered with subappressed white and distinctly shorter black hairs, sometimes glabrescent; teeth 1–1.5 mm. Petals violet, keel with a dark violet tip; standard obovate, 18–20(–24) × 6–7 mm, slightly constricted below middle, apex narrowly retuse; wings 15–20 mm, limbs deeply bilobed; keel 12.5–16 mm. Legumes sessile, 7–11 mm, ca. 3 mm high and ca. 2 mm wide, with a curved beak 1.5–2 mm; valves densely covered with subappressed to slightly ascending, subbasifixed to basifixed, white hairs up to 1.5 mm and with fewer, much shorter, ± medifixed, black hairs.

Subalpine steppes; 2000–3000 m. Xinjiang [Kyrgyzstan, Tajikistan, Uzbekistan].

47. *Astragalus* sect. *Leucophysa* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 112. 1868.

白泡果组 *bai pao guo zu*

Plants perennial, herbaceous, with a developed stem; hairs bifurcate. Leaves imparipinnate; stipules free from petiole or very

shortly adnate to it, otherwise free. Racemes short, ± capitate, with a distinct peduncle. Bracteoles absent. Calyx campanulate to tubular. Petals glabrous; wing limbs rounded at apex. Legumes sessile, bladderlike inflated, completely or more rarely incompletely 2-locular; valves membranous.

Six species: China, Kazakhstan, Mongolia; one species in European Russia; five species (three endemic) in China.

- 1a. Leaflets in 2 or 3 pairs; petals yellowish; standard ca. 8 mm 311. *A. qingheensis*
 1b. Leaflets in at least 5 pairs; petals pink, purple, or violet; standard at least 16 mm.
 2a. Leaves 10–30 cm; petiole as long as rachis or longer; legumes with a beak 4–10(–14) mm.
 3a. Leaflets in 5–8 pairs, widely elliptic, 4–10 × 3–9 mm; legumes 10–15 mm, with a beak 5–6 mm 313. *A. toksunensis*
 3b. Leaflets in 6–14 pairs, elliptic, 10–24 × 6–11 mm; legumes 17–26 mm, with a beak
 4–10(–14) mm 314. *A. urunguensis*
 2b. Leaves up to 18 cm; petiole much shorter than rachis; legumes with a beak up to 3 mm.
 4a. Stems covered with strongly flexuous, ± spreading hairs up to 0.4 mm and sparsely with ± straight,
 spreading hairs up to 1.5 mm; legumes inflated ovoid, 12–17 mm, 11–14 mm high and 7–8 mm
 wide, densely and shortly velvety and loosely furnished with spreading hairs up to 1.5 mm 310. *A. candidissimus*
 4b. Stems covered with asymmetrically to strongly asymmetrically bifurcate, often flexuous,
 subappressed to ascending, white hairs ca. 1 mm; legumes globose, 13–15 mm, covered with
 asymmetrically to strongly asymmetrically bifurcate, tangled, subappressed to ascending,
 white hairs 1–1.5 mm 312. *A. steinbergianus*

310. *Astragalus candidissimus* Ledebour, Fl. Altaic. 3: 309. 1831.

亮白黄耆 liang bai huang qi

Plants 15–30 cm tall, densely white tomentose-villous. Stems solitary or several, 10–20 cm, ascending to erect, very densely covered with strongly flexuous, ± spreading hairs up to 0.4 mm and sparsely with ± straight, spreading hairs up to 1.5 mm. Leaves 2.5–13 cm; stipules 4–7 mm, densely covered with tangled, subappressed to ascending hairs 0.2–1.5 mm; petiole 0.8–2.5(–5) cm, with rachis hairy like stem; leaflets in 5–12 pairs, 3–15 × 2.5–8 mm, both surfaces densely hairy like stipules. Racemes short, densely 5–15-flowered; peduncle 1.5–7 cm, hairy like stem; bracts 8–9 mm, densely hairy. Calyx 9–10 mm, densely shortly tomentose and with a few spreading hairs up to 1 mm; teeth 2–4 mm. Petals pinkish violet; standard obovate, 16–17 × 7.5–8 mm, sometimes slightly constricted below middle, apex deeply incised; wings 14–15.5 mm; keel 13–14 mm. Legumes inflated ovoid, 12–17 mm, 11–14 mm high and 7–8 mm wide, deeply grooved ventrally and dorsally, with a straight beak ca. 3 mm; valves densely and shortly velvety and loosely furnished with spreading hairs up to 1.5 mm.

NW Xinjiang [Kazakhstan, Mongolia].

311. *Astragalus qingheensis* Y. X. Liou, Fl. Desert. Reipubl. Popul. Sin. 2: 444. 1987.

清河黄耆 qing he huang qi

Plants ca. 17 cm tall, subshrubby. Stems of current year erect, covered with appressed to ascending hairs. Leaves 2–2.5 cm; stipules 2–3 mm, with appressed to ascending hairs; petiole short; leaflets in 2 or 3 pairs, narrowly elliptic, 3–10 × 1.5–2.5 mm, both surfaces white hairy, apex acute. Racemes densely 6–12-flowered; peduncle 4–7 cm; bracts 2–3 mm, linear-acute. Calyx 4–6 mm, covered with ascending white and black hairs; teeth ca. 1 mm. Petals yellowish; standard oblong, ca. 8 × 2.5 mm, apex truncate; wings ca. 8 mm; keel shorter than wings. Legumes (unripe) ovoid, 5–6 mm; valves densely covered with white and black hairs.

• Xinjiang (Qinghe).

312. *Astragalus steinbergianus* Sumnevicz, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1934(2–3): 3. 1934.

蒙西黄耆 meng xi huang qi

Astragalus candidissimus Ledebour var. *pauciflorus* Krylov & Sergievskaya.

Plants 8–23 cm tall. Stems solitary or several, 2–10 cm, very densely covered with asymmetrically to strongly asymmetrically bifurcate, often flexuous, subappressed to ascending, white hairs ca. 1 mm. Leaves 5–18 cm; stipules 5–7 mm, rather densely hairy like stem; petiole 2–5 cm, with rachis densely hairy like stem; leaflets in 7–14 pairs, (5–)7–15 × 4–8 mm, both surfaces densely to rather densely covered with asymmetrically bifurcate white hairs 1–1.5 mm, abaxially with ± flexuous, tangled, subappressed hairs, adaxially with ± appressed, straight hairs. Racemes short, densely (3–)5–8-flowered; peduncle (2–)3–7 cm, densely hairy like stem; bracts 4–8 mm, with subbasifixed to basifixed white hairs. Calyx 11–12 mm, densely covered with symmetrically or asymmetrically bifurcate, flexuous, subappressed to slightly ascending, white hairs ca. 1 mm, with a few short black hairs mixed in; teeth unequal, 1.2–3.5 mm. Petals pinkish violet; standard obovate, 18–19 × ca. 7 mm, apex emarginate; wings 17–18 mm; keel 15–16 mm. Legumes globose, 13–15 in diam., slightly grooved ventrally, distinctly grooved dorsally, with a beak 1–2 mm; valves densely covered with asymmetrically to strongly asymmetrically bifurcate, tangled, subappressed to ascending, white hairs 1–1.5 mm.

Xinjiang [Kazakhstan].

313. *Astragalus toksunensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 50. 1983.

托克逊黄耆 tuo ke xun huang qi

Plants up to 35 cm tall, all parts covered with short, ascending, white hairs. Stems 3–8 cm, branched at base. Leaves 10–30 cm; stipules shortly adnate to petiole; petiole up to 2 × as

long as rachis; leaflets in 5–8 pairs, widely elliptic, 4–10 × 3–9 mm, both surfaces spreading hairy, apex obtuse. Racemes loosely 7–10-flowered; peduncle 1–2 cm; bracts longer than pedicels. Calyx 10–15 mm; teeth filiform, 3–4 mm. Petals purplish; standard obovate-pandurate, 20–22 × 7–8 mm, constricted in middle, apex emarginate; wings 18–20 mm; keel 16–18 mm. Legumes sessile, inflated ovoid, 10–15 mm, 6–10 mm high, grooved dorsally, with a narrowly triangular beak 5–6 mm; valves white lanate.

• Xinjiang (Toksun).

314. *Astragalus urunguensis* N. Ulziykhutag, Byull. Moskovsk. Obsch. Isp. Prir., Otd. Biol. 95: 75. 1990.

乌伦古黄耆 *wu lun gu huang qi*

Plants 25–40 cm tall. Stems 8–20 cm, ascending to erect,

shortly white lanate. Leaves 10–30 cm; stipules 7–14 mm, subappressed white hairy; petiole 2–9 cm, like rachis covered with subappressed short hairs; leaflets in 6–14 pairs, mostly elliptic, 10–24 × 6–11 mm, both surfaces gray hairy with subappressed, long, white hairs. Racemes 2–3 cm, densely 9–15-flowered; peduncle 1.5–7(–11) cm, densely covered with short white hairs; bracts 4–11 × 0.5–1.5 mm, white hairy. Calyx 11–15 mm, with subappressed white hairs; teeth 2–3.5 mm. Petals pink-violet; standard oblong-obovate to rarely suborbicular, 16–21 mm, apex retuse; wings 14–18 mm; keel 11–16 mm. Legumes inflated ovoid, 17–26 mm, 10–15 mm high, grooved ventrally and dorsally, with a beak 4–10(–14) mm, incompletely 2-locular; valves transversely nerved, covered with long spreading and short appressed white hairs.

• Xinjiang.

48. *Astragalus* sect. *Cystium* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 113. 1868.

泡荚组 *pao jia zu*

Plants subcaulescent, covered with bifurcate hairs. Stipules adnate to petiole and connate behind stem. Racemes with a long peduncle. Calyx tubular. Petals violet. Legumes bladderlike inflated, grooved ventrally and dorsally, 2-locular; valves membranous.

Six species: China, Pakistan, Russia; C Asia, SW Asia (Caucasus, Iran, Turkey), E Europe; one species in China.

315. *Astragalus masanderanus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 114. 1868.

乌恰黄耆 *wu qia huang qi*

Astragalus skorniakowii B. Fedtschenko; *A. skorniakowii* var. *wuqiaensis* S. B. Ho.

Plants 10–30 cm tall, acaulescent or nearly so, covered with ± appressed to subappressed, mostly ± symmetrically to slightly asymmetrically bifurcate hairs 0.5–0.8(–1.1) mm. Stems, if present, up to 2.5(–3.5) cm, densely white hairy. Leaves 5–20 cm; stipules 5–12 mm, connate behind stem to middle, loosely white hairy with some black hairs mixed in, soon glabrescent or partly glabrous; petiole 2–8 cm, like rachis sparsely to loosely white hairy; leaflets in mostly 10–20 pairs, 6–14 × 1.5–3 mm, abaxially loosely and adaxially sparsely to loosely white hairy. Racemes 2–4 cm, rather densely few to

many flowered, elongating in fruit up to 13 cm; peduncle 4–20 cm, sparsely to more rarely rather loosely white hairy, in upper part often also with black hairs or subglabrous; bracts 3–6 mm, sparsely black hairy. Calyx mostly 10(–13) mm, tubular to slightly inflated, loosely to densely black or black and white hairy; teeth 2–3 mm. Petals violet; standard obovate to rhombic-elliptic, 20–25 × 6–7 mm, apex widely emarginate to retuse; wings 17–22 mm, limbs narrowly obovate-obtriangular, widest near obliquely incised tip; keel 15–19 mm. Legumes sessile, ovoid to globose, bladderlike inflated, 16–30 mm, 10–15(–20) mm high and wide, grooved ventrally and dorsally, with a straight beak ca. 1 mm; valves glabrous or covered with scattered appressed white or black hairs.

Foothill and mountain semideserts and deserts; below 3200 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

49. *Astragalus* sect. *Paracystium* Gontscharow in Komarov, Fl. URSS 12: 881. 1946.

类泡荚组 *lei pao jia zu*

Plants similar to *Astragalus* sect. *Cystium*, acaulescent to shortly caulescent, covered with bifurcate hairs. Stipules ± adnate to petiole, otherwise free. Racemes with a short peduncle, loosely few flowered. Legumes bladderlike inflated, 2-locular; valves rigidly membranous to leathery.

Five species: China, Kazakhstan, Mongolia, Uzbekistan; SW Asia (Caucasus), E Europe; one species in China.

316. *Astragalus pallasii* Sprengel, Mant. Prim. Fl. Hal. 48. 1807.

毛叶黄耆 *mao ye huang qi*

Astragalus inderiensis Claus; *A. lasiophyllus* Ledebour.

Plants 5–10 cm tall, acaulescent to shortly caulescent, caespitose. Stems, if present, up to 5 cm, densely covered with ± medifixed, appressed to subappressed, white hairs up to 1

mm. Leaves 2.5–8 cm; stipules 3–5 mm, mostly ± appressed hairy; petiole 1–3 cm, like rachis rather densely covered with appressed to partly ascending, mostly ± medifixed hairs; leaflets in 4–7 pairs, 4–8 × 1–3 mm, adaxially glabrous or with scattered hairs along margins, abaxially densely to rather densely covered with subappressed to spreading hairs. Racemes 2–5-flowered; peduncle 2–6 cm, with appressed to ascending hairs; bracts ca. 1.5 mm, predominantly white hairy. Calyx 13–16 mm, rather densely covered with symmetrically or asymmetri-

cally bifurcate, ± subappressed, black (predominantly at dorsal side) and white (predominantly at ventral side) hairs up to 0.5 mm; teeth 2–2.5 mm. Petals pale lilac; standard narrowly obovate, 23–28 × ca. 8 mm, in middle slightly constricted, apex slightly emarginate; wings 22–27 mm; keel 19–25 mm. Legumes subsessile, inflated ovoid, 18–24 mm, 10–12 mm in

diam. with a curved beak ca. 2 mm; valves thin, sparsely covered with strongly asymmetrically bifurcate to subbasifixed, spreading, white hairs up to 2 mm.

Artemisia steppes, on saline, rarely sandy, soil. Xinjiang [Kazakhstan, Uzbekistan].

50. *Astragalus* sect. *Tanythrix* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 114. 1868.

毛冠组 mao guan zu

Astragalus sect. *Pseudoroesei* N. Ulziykhutag.

Plants perennial, with lignified stem bases, covered with ascending to spreading bifurcate hairs. Stems well developed, prostrate. Stipules adnate to petiole, otherwise free. Racemes borne on short peduncles, densely capitate. Bracteoles absent. Calyx campanulate-tubular, ruptured by legume. Petals glabrous or all hairy; standard at base hastately angularly passing into claw; wing limbs bilobed. Legumes small, incompletely 2-locular, many seeded.

Two species: NW China, Kazakhstan, Russia (Siberia); two species (one endemic) in China.

- 1a. Calyx 11–14 mm; petals hairy, rarely glabrous; standard 13–17 mm 318. *A. roseus*
 1b. Calyx 9–10 mm; petals glabrous; standard 10–11 mm 317. *A. pseudoroeseus*

317. *Astragalus pseudoroeseus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 33: 135. 2001.

毛冠黄耆 mao guan huang qi

类毛冠黄耆 lei mao guan huang qi

Plants 10–20 cm tall, white hairy. Stems 7–15 cm, prostrate to erect, densely to very densely covered with symmetrically or asymmetrically bifurcate, ascending to spreading hairs ca. 2 mm. Leaves (5–)7–13 cm; stipules 5–10 mm, adnate to petiole for ca. 1 mm, spreading hairy; petiole 1.5–4.5 cm, with rachis hairy like stem; leaflets in 9–13 pairs, 8–15 × 3–6 mm, both surfaces densely covered with ± medifixed, spreading hairs 2–3 mm. Racemes 2–2.5 cm, densely many flowered; peduncle distributed over whole length of stem, mostly 1–4 cm, hairy like stem; bracts 5–10 mm, spreading hairy. Calyx 11–14 mm, densely white villous; teeth filiform, 6–9 mm. Petals pink, all partly covered with short appressed hairs on upper or outer side, rarely glabrous; standard narrowly oblong, 13–17 × ca. 4 mm, apex emarginate; wings 11–15 mm; keel 9–11 mm. Legumes sessile, 7–9 mm, 4–5 mm high and ca. 3 mm wide, with a reflexed beak ca. 1 mm; valves densely covered with spreading white hairs.

Plants 5–10 cm tall. Stems 3–5 cm, prostrate, white or gray lanate with bifurcate hairs. Leaves 3–6 cm; stipules 4–5 mm, covered with ascending hairs; petiole 1–2.5 cm, like rachis densely white villous; leaflets in 9–13 pairs, 4–7 × 3–4 mm, both surfaces densely covered with ascending hairs. Racemes subsessile, capitate, ca. 1.5 cm, with densely villous peduncle 0.3–0.5(–1) cm; bracts 6–9 mm, spreading hairy. Calyx 9–10 mm, densely white villous; teeth 4–5 mm. Petals pink to pink-violet, glabrous; standard 10–11 mm, limb oblong, apex emarginate; wings 9–10.5 mm; keel 8–9.5 mm. Legumes with a stipe ca. 1 mm, narrowly oblong, 7–8 mm, ca. 3 mm high, with a short, oblique beak; valves densely white villous.

• Xinjiang.

On sand. Xinjiang [Kazakhstan, Russia (Siberia)].

318. *Astragalus roseus* Ledebour, Fl. Altaic. 3: 330. 1831.

51. *Astragalus* sect. *Trachycercis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 114. 1868.

糙叶组 cao ye zu

Astragalus sect. *Borodiniani* B. Fedtschenko; *A.* sect. *Deserti* S. B. Ho.

Plants acaulescent or nearly so, mostly caespitose, with bifurcate to basifixed, mostly only white hairs. Stipules shortly to high adnate to petiole, otherwise free. Racemes subsessile or more rarely with a short peduncle, 1–8(–10)-flowered. Wing limbs rounded to emarginate. Legumes sessile, short, included in calyx or exceeding and rupturing calyx, mostly 2-locular.

Seventy-seven species: Afghanistan, China, Mongolia, Russia; C Asia, SW Asia (Caucasus, Iran, Iraq, Turkey), Europe; 43 species (29 endemic) in China.

- 1a. At least some leaves with only 1 leaflet.
 2a. Calyx 5–7 mm; petals pink; standard 12–15 mm.
 3a. Basal leaves with 1 terminal leaflet, other leaves with 1 additional pair of leaflets; plants with ± medifixed, appressed hairs; racemes with a peduncle 2–5 cm 361. *A. visibilis*
 3b. All leaves with only 1 terminal leaflet; plants at stipules and calyx with strongly asymmetrically bifurcate to basifixed, ascending to spreading hairs 359. *A. vellestris*
 2b. Calyx 10–12 mm; petals yellow; standard 21–23 mm.

- 4a. Leaves partly with only 1 terminal leaflet, partly with an additional pair of leaflets, leaflets obovate, 6–15 × 3–6 mm; bracts ca. 8 mm; legumes subglobose, 4–5 mm 341. *A. muschketowii*
- 4b. Leaves always with only 1 terminal leaflet, widely elliptic, 8–16 × 8–12 mm; bracts 3–4 mm; legumes narrowly ellipsoid, 15–18 mm, ca. 6 mm high 340. *A. monophyllus*
- 1b. All leaves (ignore terminal ones) with at least 1 pair of leaflets.
- 5a. Leaflets in 1–3(or 4) pairs.
- 6a. Calyx 6–9 mm; bracts up to 7 mm.
- 7a. Standard 12–13 mm 322. *A. brevivexillatus*
- 7b. Standard ca. 16 mm or longer.
- 8a. Stipules 2–3 mm; leaflets only in 1 pair; calyx black hairy; petals pink; standard ca. 21 mm, keel ca. 15 mm 328. *A. gregorii*
- 8b. Stipules longer; leaflets at least partly in 2 or 3 pairs; calyx white hairy; petals whitish, yellow, or purplish.
- 9a. Stipules 2.5–4 mm; leaflets in 3 pairs; bracts 1–1.5 mm; standard ca. 16 mm, keel ca. 11 mm; calyx with medifixed, appressed hairs 358. *A. trijugus*
- 9b. Stipules longer; leaflets in 1–3 pairs; bracts distinctly longer; standard 19–20 mm, if standard only ca. 16 mm (*A. porphyreus*), then calyx with basifixed, spreading hairs.
- 10a. Racemes with a peduncle 2–3 cm, 5–7-flowered; bracts ciliate, otherwise glabrous 353. *A. secretus*
- 10b. Racemes sessile, 1–3-flowered; bracts hairy.
- 11a. Calyx with ± medifixed, appressed hairs; keel ca. 16 mm 360. *A. vescus*
- 11b. Calyx with basifixed, ± spreading hairs; keel 12–13 mm or ca. 18 mm.
- 12a. Leaflets in 3 or 4 pairs, adaxially sparsely and abaxially rather densely covered with hairs ca. 1 mm; bracts ca. 7 mm; standard ca. 22 mm, keel ca. 18 mm 319. *A. acceptus*
- 12b. Leaflets in 1 or 2 pairs, adaxially loosely to rather densely and abaxially more densely covered with hairs 0.3–0.5 mm; bracts ca. 3 mm; standard 16–17 mm, keel 12–13 mm 347. *A. porphyreus*
- 6b. Calyx at least (8–)9 mm, but mostly and at least partly longer; bracts (7–)8–12 mm.
- 13a. Standard 13–15 mm 348. *A. pseudoborodinii*
- 13b. Standard (16–)20–24 mm.
- 14a. Keel ca. 1/2 as long as standard.
- 15a. Stipules 5–7 mm, ciliate, otherwise glabrous; calyx tube glabrous at least in lower 1/2 326. *A. glabritubus*
- 15b. Stipules 7–12 mm, densely hairy; calyx hairy all over 345. *A. parvicarinatus*
- 14b. Keel distinctly more than 1/2 as long as standard.
- 16a. Petiole and rachis at least partly covered with spreading hairs.
- 17a. Petiole and rachis covered with medifixed hairs 0.4–0.6 mm; bracts ca. 3 mm 333. *A. jiuquanensis*
- 17b. Petiole and rachis covered with medifixed hairs ca. 1 mm and with basifixed hairs up to 2 mm; bracts 8–10 mm 346. *A. perbrevis*
- 16b. Petiole and rachis covered with appressed hairs.
- 18a. Some leaves with only 1 leaflet, others with an additional pair of leaflets; bracts ca. 8 mm, with hairs up to 0.8 mm; standard 22–23 mm 341. *A. muschketowii*
- 18b. Leaves with 1 or 2 pairs of leaflets; bracts 10–12 mm, with hairs up to 1.5 mm; standard ca. 20 mm 320. *A. borodinii*
- 5b. Leaflets in more pairs.
- 19a. Rachis with appressed to ascending hairs.
- 20a. Plants in parts furnished with black hairs 356. *A. testiculatus*
- 20b. Plants only with white hairs.
- 21a. Leaflets adaxially glabrous.
- 22a. Stipules 4–5 mm; leaflets 2–6 × 0.8–2.5 mm; bracts ca. 5 mm; calyx 6–7 mm, with teeth 1.5–2 mm, covered with subbasifixed to basifixed hairs; standard 15–18 mm 343. *A. occultus*
- 22b. Stipules 5–7(–10) mm; leaflets 5–13(–19) × 1–3(–5) mm; bracts 6–9 mm; calyx ca. 9 mm, with teeth 4–6 mm, covered with asymmetrically bifurcate hairs; standard 21–26 mm 324. *A. galactites*
- 21b. Leaflets on both surfaces sparsely to densely hairy.
- 23a. Standard 15–16 mm.
- 24a. Leaflets in 6–9 pairs; bracts 3–4 mm; calyx 8–9 mm, with teeth ca. 2 mm 330. *A. hebecarpus*
- 24b. Leaflets in 3–6 pairs; bracts 7–8 mm; calyx 10–12 mm, with teeth 4–6 mm 349. *A. pseudohypogaeus*
- 23b. Standard distinctly longer.
- 25a. Calyx 7–9 mm.
- 26a. Standard 20–30 × 6–7 mm, narrowly oblong-pandurate, slightly to distinctly constricted below middle 321. *A. brevifolius*
- 26b. Standard 18–21 × 8–9 mm, ovate to obovate, not constricted.

- 27a. Racemes sessile, 1–3-flowered; calyx covered with strongly asymmetrically bifurcate to basifixed, tangled, flexuous, \pm spreading hairs 336. *A. levidensis*
- 27b. Raceme with a peduncle 0.3–1.4(–4) cm, 3–5-flowered; calyx covered with \pm medifixed, appressed hairs 351. *A. scaberrimus*
- 25b. Calyx 10–15 mm.
- 28a. Plants caulescent with stem up to 15 cm; peduncle distinct, 0.5–3 cm; calyx after anthesis slightly inflated 327. *A. gracilidentatus*
- 28b. Plants acaulescent; racemes sessile; calyx always tubular.
- 29a. Hairs of rachis and leaflets 1.8–3 mm; calyx with subappressed to slightly ascending hairs up to 1.5 mm, teeth 4–6 mm; standard 16–19 mm, constricted below middle; legumes with a beak 5–8 mm 352. *A. scabrisetus*
- 29b. Hairs of rachis and leaflets up to 1 mm; calyx with other kind of hairs, teeth shorter, at most up to 4 mm; standard mostly longer, not constricted below middle; legumes minutely acuminate (unknown in *A. ningxiaensis*).
- 30a. Stipules 4–5 mm, with spreading, partly basifixed hairs; bracts 10–11 mm, with spreading hairs; calyx with spreading, partly basifixed hairs up to 1.2 mm; standard 23–27 mm 342. *A. ningxiaensis*
- 30b. Stipules 4–12 mm, with \pm appressed, asymmetrically bifurcate hairs; bracts 3–5 mm, with appressed to ascending hairs; calyx with ascending, asymmetrically bifurcate hairs 1.5–2.5 mm, teeth 2–3 mm; standard 18–22 mm 334. *A. junatovii*
- 19b. Rachis with at least partly spreading hairs.
- 31a. Standard and wings hairy 323. *A. filidens*
- 31b. All petals glabrous.
- 32a. Racemes with a distinct peduncle 1–3 cm, 6–10-flowered.
- 33a. Stipules 10–15 mm, adnate to petiole for 3–5 mm; calyx 10–12 mm; standard obovate, base gradually narrowed 325. *A. geerwusuensis*
- 33b. Stipules 5–6 mm, nearly free from petiole; calyx 15–16 mm; standard obovate-pandurate, below middle constricted, base angularly passing into claw 337. *A. lustricola*
- 32b. Racemes sessile or subsessile.
- 34a. Leaflets in (9 or) 10–17 pairs.
- 35a. Stipules 3–7 mm; leaflets 3–6 \times 1.5–3 mm; standard narrowly ovate; wing limbs slightly emarginate 335. *A. lang-ranii*
- 35b. Stipules 6–12 mm; leaflets larger; standard narrowly obovate, often slightly constricted in middle; wing limbs obtuse.
- 36a. Leaflets on both surfaces covered with spreading hairs; bracts ca. 12 mm; petals yellow 344. *A. ordosicus*
- 36b. Leaflets covered at least partly with subappressed to ascending hairs; bracts up to 10 mm; petals white or purple in life (often drying to yellowish brown).
- 37a. Leaflets adaxially with subappressed hairs; bracts 7–10 mm; calyx teeth 5–7 mm; petals purple in life; standard 18–21 mm, obovate, widely cuneate at base; legumes 8–9 mm, ca. 3 mm high, with a beak 3–5 mm 329. *A. grubovii*
- 37b. Leaflets on both surfaces with ascending hairs; bracts ca. 5 mm; calyx teeth 2.5–5 mm; petals whitish; standard 22–28 mm, slightly constricted below middle, with a short claw; legumes 10–14 mm, ca. 5 mm high, shortly acuminate 331. *A. hsinbaticus*
- 34b. Leaflets in 4–11 pairs.
- 38a. Leaflets in 4(or 5) pairs; calyx ca. 8 mm; standard ca. 17 mm 355. *A. tesquorum*
- 38b. Leaflets in mostly distinctly more pairs; calyx and standard distinctly longer.
- 39a. Leaflets covered with symmetrically to slightly asymmetrically bifurcate, appressed to slightly ascending hairs; bracts ca. 2 mm 338. *A. lychnobius*
- 39b. Leaflets covered with ascending to spreading hairs; bracts distinctly longer.
- 40a. Calyx 15–18 mm; standard 27–32 mm 332. *A. hypogaeus*
- 40b. Calyx at most up to 13 mm; standard up to 25 mm.
- 41a. Rachis partly appressed to subappressed hairy, with few to many spreading hairs mixed in; calyx covered with ascending to spreading, flexuous hairs up to 1 mm and with spreading, straight hairs up to 2 mm.
- 42a. Plants covered only with white hairs; stipules 10–15 mm; leaflets elliptic to widely elliptic, 3–4 \times 2–2.5 mm, rounded; flowers subsessile; standard elliptic 357. *A. transecticola*
- 42b. Bracts, pedicels, and calyx with black hairs mixed in; stipules 6–8 mm; leaflets narrowly elliptic, 5–10 \times 1.5–3 mm, acute; flowers with pedicel 2–3 mm; standard obovate, below middle slightly constricted 339. *A. macriculus*

- 41b. Rachis only with spreading hairs; calyx with strongly asymmetrically bifurcate to basifixed, ascending to spreading hairs 1–2 mm.
- 43a. Stipules 4–8 mm, sparsely to loosely covered with \pm medifixed, subappressed to ascending hairs 0.7–1 mm, at margins also with \pm basifixed hairs ca. 1.5 mm; leaflets elliptic to ovate, 3–5 \times 1.5–3.5 mm; bracts 3–5 mm, very sparsely to sparsely hairy 350. *A. pseudoscaberrimus*
- 43b. Stipules 10–15 mm, loosely covered with basifixed, spreading hairs 1–2 mm; leaflets widely obovate to orbicular, 4–6 \times 3.5–5.5 mm; bracts 5–7 mm, more densely hairy 354. *A. sinkiangensis*

319. *Astragalus acceptus* Podlech & L. R. Xu, Novon 17: 243. 2007.

德令哈黄耆 *de ling ha huang qi*

Plants 4–5 cm tall, acaulescent, densely caespitose, only white hairy. Leaves 2–6 cm; stipules 5–8 mm, adnate to petiole for ca. 3 mm, densely covered with \pm symmetrically or asymmetrically bifurcate, subappressed hairs 1–1.5 mm; petiole 1–3 cm, like rachis slender, densely covered with \pm medifixed, subappressed hairs 0.4–0.6 mm; leaflets in 3 or 4 pairs, 4–8 \times 1.8–3 mm, abaxially rather densely and adaxially sparsely covered with medifixed, appressed hairs ca. 1 mm. Racemes sessile, 1- or 2-flowered; bracts ca. 7 mm, sparsely covered with basifixed hairs 0.8–1 mm. Calyx 9–10 mm, densely covered with strongly asymmetrically bifurcate to basifixed, flexuous, tangled, white hairs 0.7–1 mm; teeth 2.5–3 mm. Petals yellowish when dry; standard oblong, ca. 22 \times 6–7 mm, slightly constricted below middle, apex emarginate; wings ca. 19 mm, limbs narrowly oblong, laterally incised; keel ca. 18 mm. Ovary sessile, white hairy. Legumes unknown.

• Qinghai.

320. *Astragalus borodini* Krasnov, Bot. Zap. 2: 15. 1887–1888 [*“borodini”*].

东天山黄耆 *dong tian shan huang qi*

Astragalus hypogaeus Ledebour var. *borodini* (Krasnov) Krasnov; *A. projecturus* Sumnevich.

Plants 3–10 cm tall, only white hairy. Leaves 2–5 cm; stipules 8–10 mm, adnate to petiole for 4–5 mm, sparsely covered with subappressed, subbasifixed to basifixed hairs and at margins with spreading, basifixed cilia ca. 1 mm; petiole 1–3 cm, like rachis covered with \pm medifixed, appressed hairs 0.8–1 mm; leaflets mostly in 2 pairs, obovate, 8–20 \times 3–8 mm, both surfaces rather densely hairy like petiole. Racemes sessile, 2- or 3-flowered; bracts 10–12 \times ca. 1.5 mm, densely hairy like stipules. Calyx 11–13 mm, densely covered with ascending to \pm spreading, tangled, subbasifixed to basifixed hairs up to 2 mm; teeth 2.5–4 mm. Petals yellow; standard narrowly obovate, ca. 20 \times 7 mm, apex slightly emarginate to rounded; wings ca. 15 mm, limbs rounded at apex; keel ca. 13 mm. Legumes 4–5 mm, 3–4.5 mm high, slightly compressed laterally, abruptly contracted into a beak ca. 1 mm, incompletely 2-locular to \pm 1-locular; valves densely covered with subappressed hairs.

Xinjiang [Kazakhstan, Kyrgyzstan].

321. *Astragalus brevifolius* Ledebour, Fl. Altaic. 3: 334. 1831.

短叶黄耆 *duan ye huang qi*

Plants 3–6 cm tall, covered with mostly medifixed, ap-

pressed, only white hairs 0.3–0.8 mm. Leaves 2–4 cm; stipules 3–6 mm, adnate to petiole for 1–2 mm, subglabrous to loosely hairy; petiole 0.5–2 cm, like rachis rather densely hairy; leaflets in (2 or)3 or 4 pairs, narrowly elliptic, 4–10 \times 1–3 mm, both surfaces sparsely to rather densely hairy. Racemes subsessile, 1- or 2-flowered; bracts 4–5 mm, at margins with subbasifixed hairs. Calyx 7–9 mm, rather densely hairy; teeth 1–2.5 mm. Petals yellow; standard narrowly elliptic to narrowly obovate, 20–30 \times 6–7 mm, slightly constricted below middle; wings 18–25 mm, limbs obtuse to slightly emarginate; keel 16–21 mm. Legumes oblong, slightly curved, 2-locular; valves covered with appressed hairs.

Nei Mongol, Xinjiang [Mongolia, Russia (Siberia)].

322. *Astragalus brevixillatus* Podlech & L. R. Xu, Novon 17: 243. 2007.

短旗瓣黄耆 *duan qi ban huang qi*

Plants 5–6 cm tall, acaulescent, caespitose, only with white hairs. Leaves 3–6 cm; stipules ca. 2 mm, shortly adnate to petiole, hairy like rachis; petiole 2–4 cm, like rachis densely covered with appressed, symmetrically or asymmetrically bifurcate hairs ca. 1 mm; leaflets in 2 pairs, narrowly elliptic to elliptic, 7–15 \times 3–5 mm, both surfaces densely covered with mostly \pm medifixed, appressed hairs 2–2.5 mm. Racemes sessile, 3- or 4-flowered; bracts 4–7 mm, with basifixed hairs up to 1 mm. Calyx ca. 8 mm, rather densely covered with subbasifixed to basifixed, ascending to spreading, tangled hairs ca. 1 mm; teeth filiform, 3–4 mm. Petals probably yellow; standard oblong, ca. 12 \times 4 mm, apex rounded; wings ca. 12 mm, limbs obtuse; keel ca. 9 mm. Legumes sessile, ca. 5 mm, ca. 2 mm high and wide, with a rigid beak 4–5 mm, incompletely 2-locular; valves densely covered with appressed to ascending, tangled, medifixed to basifixed hairs 0.5–1 mm.

• Xinjiang.

323. *Astragalus filidens* Podlech & L. R. Xu, Novon 17: 244. 2007.

丝齿黄耆 *si chi huang qi*

Plants 6–8 cm tall, acaulescent or subacaulescent, caespitose, densely covered with ascending to spreading, bifurcate, only white hairs. Stems, if present, up to 2 cm, densely covered with symmetrically or asymmetrically bifurcate, ascending to spreading, flexuous, tangled hairs 0.5–0.8 mm. Leaves 3–6 cm; stipules 3–5 mm, shortly adnate to petiole, hairy like stem; petiole 1–2.5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate, ascending to spreading, tangled hairs 0.5–0.8 mm and with strongly asymmetrically bifurcate, spreading hairs up to 2.5 mm; leaflets in 5–9 pairs, narrowly

elliptic to elliptic, 4–9 × 2–3 mm, partly folded, both surfaces densely covered with symmetrically or asymmetrically bifurcate, ascending to partly spreading, tangled hairs 1.5–2.5 mm. Racemes subsessile, 4- or 5-flowered; bracts 7–8 mm, with mostly strongly asymmetrically bifurcate hairs 0.8–1.5 mm. Calyx 10–12 mm, densely covered with mostly strongly asymmetrically bifurcate, ascending to spreading, tangled hairs 1.5–2.5 mm; teeth filiform, 5–6 mm. Petals probably whitish or yellow, standard abaxially and wings on outer side loosely covered with ± asymmetrically bifurcate, flexuous, appressed hairs; standard oblong-pandurate, ca. 15 × 4–4.5 mm, below middle distinctly constricted, toward base widened and obtusely angularly passing into short, cuneate claw, apex emarginate; wings ca. 14 mm, limbs distinctly incised; keel ca. 10 mm. Ovary sessile, densely white hairy. Legumes unknown.

- NW Xinjiang.

324. *Astragalus galactites* Pallas, Sp. Astragal. 85. 1802.

乳白花黄耆 ru bai hua huang qi

Astragalus otosemius Kitagawa; *A. zhaolingicus* K. T. Fu.

Plants 3–12 cm tall, often forming compact mats, only white hairy. Leaves 3–12 cm; stipules 5–7(–10) mm, adnate to petiole for 2–3 mm, loosely to rather densely covered with strongly asymmetrically bifurcate, subappressed hairs, sometimes glabrescent, margins with basifixed, ± spreading hairs up to 1.5 mm; petiole 1–5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate, appressed hairs 0.6–0.8 mm; leaflets in 4–8 pairs, narrowly elliptic, 5–13(–19) × 1–3(–5) mm, abaxially loosely to rather densely hairy like rachis, adaxially glabrous or rarely with scattered hairs toward margins. Racemes many, forming dense, capitate synflorescences around base of leaves, (1 or)2–4-flowered; peduncle up to 0.5 cm, densely hairy; bracts 6–9 mm, with subbasifixed to basifixed hairs up to 1.5 mm. Calyx (6–)8–10 mm, densely covered with subappressed to ascending, asymmetrically bifurcate hairs up to 1.5 mm; teeth (2.5–)4–6 mm. Petals whitish, tip of standard and keel often violet; standard oblong-pandurate, (18–)21–26 × 6–7 mm, slightly to distinctly constricted in lower 1/3, apex retuse to emarginate; wings (14–)18–22 mm; keel (14–)18–20 mm. Legumes white hairy.

Steppes. Gansu, Nei Mongol, Shaanxi [Mongolia, Russia (Siberia)].

325. *Astragalus geerwusuensis* H. C. Fu, Fl. Intramongol., ed. 2, 3: 671. 1989.

格尔乌苏黄耆 ge er wu su huang qi

Plants 10–15 cm tall, with bifurcate spreading hairs. Leaves 5–10 cm; stipules 10–15 mm, adnate to petiole for 3–5 mm, loosely hairy; petiole 2–5 cm; leaflets in 4–9 pairs, elliptic, 8–14 × 3–8 mm, both surfaces spreading hairy. Racemes 7–10-flowered; peduncle 1–2 cm, hairy; bracts ca. 12 mm. Calyx 10–12 mm, densely hairy; teeth 5–6 mm. Petals yellow; standard elliptic-obovate, 15–20 × 6–7 mm, apex slightly emarginate; wings 17–20 mm; keel 15–18 mm. Legumes oblong-ovoid, with a long beak; valves densely white hairy.

- Steppes. Nei Mongol.

326. *Astragalus glabritubus* Podlech & L. R. Xu, Novon 17: 244. 2007.

秃萼筒黄耆 tu e tong huang qi

Plants 3–4 cm tall, acaulescent, very densely compactly caespitose, only white hairy. Leaves 1–2.5 cm; stipules 5–7 mm, adnate to petiole up to middle, at margins with spreading, basifixed cilia ca. 0.8 mm, otherwise glabrous; petiole 0.6–1.8 cm, like rachis slender, densely covered with medifixed, appressed hairs 0.4–0.6 mm; leaflets in 1(or)2 pairs, narrowly obovate, 4–9 × 1.5–2.2 mm, mostly folded, both surfaces loosely to rather densely covered with medifixed, appressed hairs 0.5–0.8 mm. Racemes sessile, 2- or 3-flowered; bracts 8–12 mm, margins comblike ciliate with basifixed hairs. Calyx 8–10 mm, tube glabrous; teeth ca. 4 mm, at margins comblike ciliate with basifixed hairs up to 0.8 mm. Petals white; standard narrowly obovate, ca. 20 × 5 mm, apex emarginate; wings ca. 15 mm; keel ca. 9 mm. Ovary shortly stipitate, subglobose, appressed white hairy. Legumes unknown.

- Steppes. NW Xinjiang.

327. *Astragalus gracilidentatus* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 51. 1983.

线齿黄耆 xian chi huang qi

Plants up to 30 cm tall, caulescent, loosely caespitose, white subappressed hairy. Stems numerous, up to 15 cm, densely covered with medifixed hairs 1–1.2 mm. Leaves 7–12 cm; stipules of lower leaves 4–5 mm, those of upper leaves 7–9 mm, free, loosely covered with hairs 0.8–1.2 mm; petiole 3–5 cm, like rachis covered with symmetrically or asymmetrically bifurcate hairs 0.8–1.5 mm; leaflets in 5–8 pairs, 3–8 × 2–4 mm, abaxially somewhat densely and adaxially loosely covered with ± medifixed hairs. Racemes 3–8-flowered; peduncle 0.5–3 cm, rather densely hairy; bracts 5–7 mm, hairy. Calyx 10–12 mm, ± densely hairy like rachis; teeth 4–6 mm. Petals purplish, yellowish when dry; standard oblong-pandurate, (13–)15–20 × 5–5.5 mm, slightly constricted in lower 1/3, apex emarginate; wings (8–)11–15 mm; keel (6–)9–12 mm. Legumes sessile, ovoid, 5–6 mm.

- Xinjiang.

328. *Astragalus gregorii* B. Fedtschenko & Basilevskaja in Grumm-Grzhimailo, Zap. Mongolij i Urjango Kraj 3(2): 815. 1930.

格热高尔黄耆 ge re gao er huang qi

Plants 4–7 cm tall, with ± medifixed, in vegetative parts white hairs. Leaves 1.5–3 cm; stipules 2–3 mm, shortly adnate to petiole, sparsely appressed hairy; petiole 0.5–1 cm, rather densely covered with appressed hairs 0.6–0.8 mm; leaflets in 1 pair, narrowly elliptic, 3–5 × ca. 1.5 mm, both surfaces densely to rather densely appressed hairy. Racemes with a peduncle 1–2 cm, 2–4-flowered. Calyx ca. 7 mm, rather densely covered with appressed black hairs 0.2–0.5(–0.8) mm and with a few white hairs 0.8–1.2 mm; teeth 1.5–2 mm. Petals pink; standard elliptic, ca. 21 × 10 mm, apex widely emarginate; wings ca. 19 mm; keel ca. 15 mm. Ovary substipitate, linear, white hairy. Legumes unknown.

Steppes. Xinjiang [Mongolia].

329. *Astragalus grubovii* Sanchir, Bot. Zhurn. (Moscow & Leningrad) 59: 367. 1974.

荒漠黄耆 huang mo huang qi

Astragalus alaschanensis H. C. Fu; *A. dengkouensis* H. C. Fu; *A. scabrisetus* Bongard var. *multijugus* Handel-Mazzetti.

Plants 10–15 cm tall, densely covered with ascending to ± spreading, ± symmetrically or asymmetrically bifurcate, only white hairs 0.5–1(–1.2) mm. Stems, if present, very short, densely villous. Leaves 9–17 cm; stipules 6–10 mm, adnate to petiole for 2–2.5 mm, densely hairy; petiole 3–7 cm, with rachis hairy like stem; leaflets in (6–)10–13 pairs, elliptic to obovate, 4–15 × 2.5–7 mm, abaxially densely to rather densely and adaxially loosely covered with subappressed to ascending or even spreading hairs. Racemes subsessile, few to 10-flowered; bracts 7–10 mm, hairy. Calyx 11–14 mm, densely villous; teeth 5–7 mm. Petals purplish, drying yellowish brown; standard obovate, 18–21 × ca. 7 mm, apex slightly emarginate; wings 16–18 mm; keel 14–16 mm. Legumes 8–10 mm, ca. 3 mm high and ca. 2 mm wide, with a subulate, straight or slightly curved beak 3–5 mm, incompletely 2-locular; valves densely covered with tangled, ascending, partly strongly asymmetrically bifurcate, flexuous hairs up to 1.2 mm.

Gansu, Nei Mongol, Ningxia [Mongolia].

330. *Astragalus hebecarpus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 53. 1983.

茸毛果黄耆 rong mao guo huang qi

Plants 10–15 cm tall, covered with subappressed, symmetrically or asymmetrically bifurcate, only white hairs 1–2 mm. Stems 1–2 cm, densely hairy. Leaves 7–15 cm; stipules 5–7 mm, adnate to petiole for ca. 2 mm, hairy; petiole 3–6 cm, like rachis loosely to rather densely hairy; leaflets in 6–9 pairs, narrowly elliptic, 5–20 × 1.5–5 mm, both surfaces loosely to rather densely hairy. Racemes 4- or 5-flowered; peduncle 1–1.5 cm, hairy; bracts 3–4 mm, with mostly basifixed hairs. Calyx 8–9 mm, rather densely hairy; teeth ca. 2 mm. Petals pale yellow; standard narrowly elliptic, ca. 15 × 4 mm, apex emarginate; wings ca. 13 mm; keel ca. 12 mm. Legumes ca. 15 mm, 6–7 mm high and ca. 2 mm wide, with a subulate beak ca. 1 mm, incompletely 2-locular; valves rather densely covered with subappressed to ascending, flexuous-tangled, extremely asymmetrically bifurcate hairs up to 2.5 mm.

• Xinjiang.

331. *Astragalus hsinbaticus* P. Y. Fu & Y. A. Chen, Fl. Pl. Herb. Chin. Bor.-Orient. 5: 175. 1976.

新巴黄耆 xin ba huang qi

Plants 4–15 cm tall, covered with mostly ascending to spreading, bifurcate, only white hairs. Leaves 8–18 cm; stipules 7–10 mm, adnate to petiole for ca. 2 mm, sparsely to loosely furnished with strongly asymmetrically bifurcate, subappressed hairs up to 2 mm, at margins with basifixed hairs; petiole 3–5 cm, like rachis loosely to rather densely covered with flexuous, asymmetrically to symmetrically bifurcate hairs 1–2(–2.5) mm;

leaflets in 10–12 pairs, elliptic to obovate, 7–15 × 3–8 mm, both surfaces loosely to rather densely covered with ascending, ± medifixed hairs. Bracts ca. 5 mm, sparsely hairy. Flowers crowded at base of leaves. Calyx 11–15 mm, densely covered with flexuous, ± medifixed hairs 1–1.5 mm; teeth 2.5–5 mm. Petals whitish; standard narrowly obovate, 22–28 × ca. 6 mm, slightly constricted below middle, apex slightly retuse; wings 21–23 mm; keel 15–16 mm. Legumes 10–14 mm, ca. 5 mm high, slightly compressed laterally, shortly acuminate, 2-locular; valves densely villous, with spreading, asymmetrically bifurcate hairs ca. 2 mm.

Heilongjiang, Nei Mongol [Mongolia].

332. *Astragalus hypogaeus* Ledebour, Icon. Pl. 1: t. 95. 1829.

留土黄耆 liu tu huang qi

Plants 6–10 cm tall, acaulescent, caespitose, mostly spreading white hairy. Leaves 4–12(–14) cm; stipules 10–12 mm, adnate to petiole for 2–3 mm, densely covered with subbasifixed or at margins basifixed, subappressed hairs ca. 1.5 mm; petiole 0.8–3 cm, like rachis densely to rather densely covered with ± symmetrically to slightly asymmetrically bifurcate, flexuous, tangled, spreading hairs ca. 1 mm and with much fewer, straight, extremely asymmetrically bifurcate hairs ca. 1.5 mm; leaflets in 4–6(–8) pairs, obovate, 5–15 × 4.5–9 mm, abaxially rather densely covered with ascending to spreading hairs, adaxially loosely covered with subappressed to slightly ascending hairs; hairs 0.6–1.2 mm. Racemes subsessile, 2–5-flowered; bracts ca. 12 mm, linear-acute, loosely covered with subbasifixed to basifixed, nearly spreading hairs up to 2 mm. Calyx 15–18 mm, densely villous with symmetrically to strongly asymmetrically bifurcate, appressed to spreading hairs 1.5–2 mm; teeth 5–7 mm. Petals pale yellowish; standard oblong to narrowly obovate, (25–)27–32(–38) × 7–9 mm, slightly constricted below middle, base slightly to distinctly triangular-hastate, apex emarginate; wings 20–25(–29) mm, limbs unequally emarginate to bilobed; keel 18–22 mm. Legumes sessile, nearly inflated globose, 5–6 mm, with a beak 1–1.5 mm, 2-locular; valves densely covered with short hairs.

Xinjiang (Altay) [Kazakhstan, Kyrgyzstan, Russia (Siberia)].

333. *Astragalus jiuquanensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 56. 1983.

酒泉黄耆 jiu quan huang qi

Plants 5–10 cm tall, acaulescent, densely covered with only white hairs. Leaves 1.5–6 cm; stipules 7–10 mm, densely covered with basifixed to asymmetrically bifurcate hairs up to 1.5 mm; petiole 0.8–3 cm, like rachis densely covered with ± medifixed, subappressed to partly ± spreading hairs 0.4–0.6 mm; leaflets in 2 or 3 pairs, elliptic to obovate, 5–9 × 2–5 mm, abaxially densely to rather densely and adaxially loosely covered with appressed, medifixed hairs up to 1 mm. Racemes sessile, few flowered; bracts ca. 3 mm, ciliate with basifixed hairs. Calyx 9–11 mm, densely covered with tangled, ± spreading, basifixed hairs up to 1.5 mm; teeth 3–5 mm. Petals whitish yellow; standard obovate, 22–24 × 6–9 mm, apex emarginate; wings 21–22 mm, limbs obliquely bilobed; keel 16–19 mm. Legumes 5–6 mm, ca. 3 mm high and ca. 4 mm wide, with

a beak 1–1.5 mm, 1-locular; valves densely covered with ascending to spreading hairs ca. 0.5 mm.

• Gansu.

334. *Astragalus junatovii* Sanchir, Bot. Zhurn. (Moscow & Leningrad) 59: 368. 1974.

尤那托夫黄耆 you na tuo fu huang qi

Plants 2–15 cm tall, acaulescent or nearly so, densely covered with subappressed to ascending, mostly asymmetrically bifurcate, white hairs up to 2 mm. Stems absent or rarely up to 3 cm, subglabrous to loosely hairy. Leaves 3–10(–15) cm; stipules 4–12 mm, loosely to densely hairy, at margins with basifixed hairs; petiole ± as long as rachis, densely covered with ascending hairs up to 1 mm; leaflets in 4–7 pairs, narrowly elliptic, 2–16 × 0.8–4 mm, both surfaces densely covered with appressed hairs. Racemes subsessile, loosely 2–4-flowered; bracts 3–5 mm, hairy. Calyx 10–15 mm, densely covered with tangled, ascending hairs 1.5–2.5 mm; teeth 2–3 mm. Petals white, standard with a violet blotch in center, keel violet tipped; standard obovate, 18–22 × ca. 7 mm, scarcely constricted in middle, apex emarginate; wings 16–21 mm, limbs obliquely emarginate; keel 13–19 mm. Legumes 3–7 mm, 3–5 mm high, with a minute beak; valves white lanate.

Steppes. Gansu, Nei Mongol, Ningxia [Mongolia].

335. *Astragalus lang-ranii* Podlech, Novon 14: 225. 2004.

盐生黄耆 yan sheng huang qi

Astragalus salsugineus Karelin & Kirilov var. *multijugus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 52. 1983, not *A. multijugus* Candolle (1825).

Plants ca. 10 cm tall, shortly caulescent, densely covered with symmetrically or asymmetrically bifurcate, spreading, white hairs up to 2 mm. Stems up to 5 cm, densely tomentose. Leaves 8–12 cm; lower stipules 3–4 mm, upper 5–7 mm, all densely hairy; petiole 3–4 cm, like rachis hairy; leaflets in 11–13 pairs, elliptic, 3–6 × 1.5–3 mm, both surfaces covered with tangled, ± spreading hairs. Racemes loosely 4–6-flowered; peduncle 1–1.5 cm, hairy like stem; bracts 4–6 mm, loosely white hairy, partly with basifixed hairs. Calyx 12–13 mm, densely covered with short to long spreading, tangled hairs; teeth 2.5–4 mm. Petals pale purple; standard narrowly ovate, 20–22 × ca. 7 mm, ± rounded at apex; wings ca. 19 mm; keel ca. 15 mm. Legumes ovoid-oblong, ca. 12 mm, with a short beak, incompletely 2-locular.

• Steppes. Ningxia.

336. *Astragalus levidensis* Podlech & L. R. Xu, Novon 17: 245. 2007.

光萼齿黄耆 guang e chi huang qi

Plants 5–8 cm tall, acaulescent or nearly so, caespitose, mostly appressed hairy. Leaves (1.5–)2–5 cm; stipules 5–8 mm, adnate to petiole for 3–4 mm, densely covered with symmetrically to strongly asymmetrically bifurcate, at margins also basifixed white hairs 0.5–1.5 mm; petiole (0.5–)1–2.5 cm, like rachis slender, densely to rather densely covered with ± medifixed white hairs 0.4–0.5 mm; leaflets in 4–6 pairs, elliptic, 3–7

× 1–3 mm, both surfaces loosely or abaxially more densely covered with medifixed hairs 0.5–0.7 mm. Racemes sessile, 1–3-flowered; bracts 4–5 mm, white hairy. Calyx 7–9 mm, densely covered with strongly asymmetrically bifurcate, flexuous, tangled, ± spreading, white hairs 1–1.2 mm; teeth subulate, ca. 2 mm. Petals yellow when dry; standard obovate, 20–21 × ca. 7 mm, apex emarginate; wings 17–18 mm, limbs narrowly oblong, slightly dilated toward distinctly and obliquely incised tip; keel ca. 15 mm. Ovary sessile, narrowly oblong, white hairy. Legumes unknown.

• Qinghai.

337. *Astragalus lustricola* Podlech & L. R. Xu, Novon 17: 245. 2007.

荒野黄耆 huang ye huang qi

Plants 5–8 cm tall, acaulescent or nearly so, covered with ascending to spreading, bifurcate hairs. Stems, if present, very short, very densely tomentose. Leaves 7–9 cm; stipules 5–6 mm, free from petiole, sparsely to loosely furnished with medifixed to basifixed, subappressed to spreading hairs 0.8–1 mm; petiole 1.5–3 cm, like rachis densely covered with ± medifixed, partly flexuous, tangled, ascending to spreading, white hairs 0.5–0.8 mm and with much fewer, strongly to extremely asymmetrically bifurcate, straight, spreading hairs 1–1.5 mm; leaflets in 7–11 pairs, elliptic to obovate, 7–10 × 2–7 mm, both surfaces rather densely covered with ascending, straight or flexuous, ± medifixed hairs 1–1.5 mm. Racemes 6–10-flowered, with a peduncle hairy like rachis; bracts 5–6 mm, furnished with ± spreading white hairs up to 1.5 mm, with short black hairs mixed in, at margins with basifixed hairs. Calyx 15–16 mm, densely covered with flexuous, ± medifixed, subappressed to ascending, white hairs 0.8–1 mm and with strongly asymmetrically bifurcate, spreading, white hairs up to 2 mm, with some short, medifixed, black hairs mixed in; teeth 4–5 mm. Petals yellowish; standard obovate, ca. 20 × 8 mm, distinctly constricted in middle, apex emarginate; wings ca. 20 mm; keel ca. 17 mm. Legumes (unripe) ca. 15 mm, ca. 3 mm high, with a beak 3–4 mm; valves densely covered with subappressed, flexuous, ± medifixed, white hairs ca. 0.5 mm and with strongly asymmetrically bifurcate, straight, spreading hairs 1.5–2 mm.

• Xinjiang.

338. *Astragalus lychnobius* Podlech & L. R. Xu, Novon 17: 246. 2007.

喜光黄耆 xi guang huang qi

Plants 6–8 cm tall, acaulescent or nearly so, loosely caespitose, covered with bifurcate hairs. Stems, if present, up to 1 cm, very densely covered with strongly asymmetrically bifurcate, ascending to partly spreading, ± flexuous, tangled, white hairs 1–1.5 mm. Leaves 3–7 cm; stipules 4–5 mm, adnate to petiole for 1–2 mm, rather densely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly ascending, white hairs ca. 0.5 mm, at margins with basifixed hairs; petiole 1.5–3 cm, like rachis densely covered with ± medifixed, subappressed to ascending hairs 0.5–1 mm and with a few strongly asymmetrically bifurcate, spreading hairs ca. 1 mm; leaflets in 8–10 pairs, narrowly elliptic to elliptic, 3–8 × 1.5–4 mm, both

surfaces densely to rather densely (when young) or loosely (when mature) covered with \pm symmetrically to slightly asymmetrically bifurcate, appressed to partly slightly ascending hairs 0.8–1.2 mm. Racemes subsessile, 1–4-flowered; bracts ca. 2 mm, densely white hairy, with some black hairs mixed in. Calyx 11–12 mm, densely covered with strongly asymmetrically bifurcate or subbasifixed, tangled, flexuous, white hairs 0.5–1 mm and with more medifixed black hairs, especially toward teeth, sometimes with 5 blackish longitudinal stripes; teeth 1–1.5 mm. Petal color probably whitish or yellow, yellowish when dry; standard obovate, ca. 25×9 mm, apex widely and deeply emarginate; wings ca. 21 mm, limbs narrowly obovate, widely obliquely emarginate; keel ca. 20 mm. Ovary sessile, narrowly oblong, very densely villous, with \pm spreading white hairs. Legumes unknown.

- Steppes. NW Xinjiang.

339. *Astragalus macriculus* Podlech & L. R. Xu, Novon 17: 247. 2007.

裕民黄耆 *yu min huang qi*

Plants 6–8 cm tall, caespitose, nearly acaulescent, covered with ascending to spreading, bifurcate hairs. Stems 1–1.5 cm, very densely covered with strongly asymmetrically bifurcate, ascending to partly spreading, \pm flexuous, tangled, white hairs 1–1.5 mm. Leaves 4–5 cm; stipules 6–8 mm, adnate to petiole for 1–2 mm, loosely hairy like stem, at margins with basifixed hairs; petiole 1.5–2 cm, like rachis densely covered with \pm medifixed, subappressed to ascending hairs 0.5–1 mm and with few, strongly asymmetrically bifurcate, spreading hairs 1.5–2 mm; leaflets in (4–)6–8 pairs, narrowly elliptic, $5–10 \times 1.5–3$ mm, often folded, both surfaces densely to rather densely covered with \pm medifixed, ascending hairs and with basifixed, ascending to spreading hairs 0.8–1 mm. Racemes subsessile, loosely 4- or 5-flowered; bracts 6–10 mm, with subbasifixed white hairs 1–1.5 mm and shorter black hairs. Calyx 11–12 mm, densely covered with symmetrically to strongly asymmetrically bifurcate, ascending, flexuous, tangled, white and black hairs up to 1 mm and with \pm straight, strongly asymmetrically bifurcate to basifixed, \pm spreading hairs up to 2 mm; teeth 2.5–3 mm. Petal color probably whitish or yellow; standard obovate, ca. 21×8 mm, apex emarginate, slightly constricted below middle; wings ca. 18 mm; keel 15–16 mm. Ovary sessile, densely white hairy. Legumes unknown.

- Steppes. NW Xinjiang.

340. *Astragalus monophyllus* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 473. 1880.

长毛莢黄耆 *chang mao jia huang qi*

Astragalus macrotrichus E. Peter.

Plants 2–3 cm tall, acaulescent, with exception of fruit covered with subappressed, only white hairs 2–3(–4) mm. Leaves 1.5–3 cm, 1-foliolate; stipules 6–8 mm, densely covered with asymmetrically bifurcate hairs, at margins with basifixed hairs; petiole 0.3–1.5 cm, densely covered with \pm medifixed hairs 1–2 mm; leaflets widely elliptic to rhombic-elliptic, $8–16 \times 8–12$ mm, both surfaces loosely covered with subappressed, medifixed hairs. Racemes 1- or 2-flowered; peduncle up to 1

cm, densely hairy; bracts 3–4 mm, ciliate with basifixed hairs. Calyx 10–12 mm, loosely to rather densely hairy; teeth 5–6 mm. Petals yellow; standard narrowly elliptic, ca. 21×5 mm, apex emarginate; wings ca. 16 mm; keel ca. 14 mm. Legumes 15–18 mm, ca. 6 mm high and ca. 4 mm wide, apex acuminate; valves very densely villous, with tangled, flexuous, ascending to spreading, asymmetrically to extremely asymmetrically bifurcate hairs 2–3 mm.

Gansu, Nei Mongol, Qinghai, Shanxi, Xinjiang [Mongolia, Russia (Siberia)].

341. *Astragalus muschketowii* B. Fedtschenko, Bull. Herb. Boissier 7: 825. 1899.

木斯克黄耆 *mu si ke huang qi*

Plants 3–10 cm tall, acaulescent to nearly so, covered with only white hairs. Leaves 2–5 cm; stipules 5–8 mm, densely covered with subappressed, subbasifixed to basifixed hairs, at margins ciliate; petiole 1–3 cm, like rachis covered with \pm medifixed, appressed to subappressed hairs 0.3–0.5 mm; leaflets mostly 1 or 3, obovate, $6–15 \times 3–6$ mm, both surfaces rather densely hairy like petiole. Racemes sessile, 2- or 3-flowered; bracts ca. 8 mm, densely covered with subbasifixed to basifixed, subappressed hairs up to 0.8 mm. Calyx 10–11 mm, densely villous with ascending to \pm spreading, tangled, subbasifixed to basifixed hairs up to 2 mm; teeth 2–3 mm. Petals in dry state yellow; standard obovate, $22–23 \times$ ca. 7 mm, apex slightly emarginate; wings 19–20 mm; keel ca. 16 mm. Legumes 4–5 mm, 3–4.5 mm high, slightly compressed laterally, abruptly contracted into a beak ca. 1 mm, incompletely 2-locular to nearly 1-locular; valves densely covered with subappressed hairs.

W Xinjiang (Pamir Shan) [Tajikistan].

342. *Astragalus ningxiaensis* Podlech & L. R. Xu, Novon 17: 247. 2007.

宁夏黄耆 *ning xia huang qi*

Plants 5–7 cm tall, acaulescent, densely caespitose, white hairy. Leaves 3–6 cm; stipules 4–5 mm, adnate to petiole for 1–2 mm, densely covered with strongly asymmetrically bifurcate to basifixed hairs 0.3–1 mm; petiole 1.5–3 cm, like rachis densely covered with \pm medifixed, appressed hairs 0.6–0.7 mm; leaflets in 4–6 pairs, narrowly elliptic to elliptic, $3–7 \times 1–2$ mm, abaxially rather densely covered with \pm medifixed, appressed hairs 0.8–1 mm, adaxially sparsely to rarely loosely hairy, sometimes only toward margins. Racemes sessile, 3- or 4-flowered; bracts 10–11 mm, covered with \pm spreading, basifixed hairs 0.5–0.8 mm. Calyx 10–12 mm, densely covered with subbasifixed to basifixed, tangled, \pm spreading hairs up to 1.2 mm; teeth 3.5–4 mm. Petals purple in life, yellowish when dry; standard narrowly obovate, 23–27 mm, apex emarginate; wings 21–25 mm, obliquely incised; keel 18–20 mm. Ovary sessile, narrowly oblong, white hairy. Legumes unknown.

- Ningxia.

343. *Astragalus occultus* Podlech & L. R. Xu, Novon 17: 248. 2007.

克郎河黄耆 *ke lang he huang qi*

Plants (including leaves) 5–7 cm tall, acaulescent or nearly so, densely caespitose, covered with only white hairs. Stems, if present, up to 0.5 cm, very densely covered with \pm medifixed, appressed hairs 0.5–0.7 mm. Leaves 5–7 cm; stipules 4–5 mm, adnate to petiole for ca. 2 mm, loosely to rather densely covered with symmetrically or asymmetrically bifurcate, appressed hairs, at margins with basifixed hairs; petiole 2.5–3 cm, like rachis densely to very densely hairy like stem; leaflets in 7–10 pairs, remote, narrowly elliptic, 2–6 \times 0.8–2.5 mm, abaxially densely to rather densely hairy like rachis, adaxially glabrous or rarely with scattered hairs toward margins. Racemes sessile, 1- or 2-flowered; bracts ca. 5 mm, densely covered with strongly asymmetrically bifurcate to basifixed hairs 0.8–1 mm. Calyx 6–7 mm, densely covered with ascending, subbasifixed to basifixed hairs 1–1.5 mm; teeth 1.5–2 mm. Petals probably yellowish or whitish; standard elliptic, 15–18 \times 5–6 mm, apex emarginate; wings 15–17 mm; keel 14–15 mm. Ovary sessile, narrowly ellipsoid, white hairy. Legumes unknown.

• Gansu, Xinjiang.

344. *Astragalus ordosicus* H. C. Fu, Fl. Intramongol., ed. 2, 3: 671. 1989.

鄂尔多斯黄耆 *e er duo si huang qi*

Plants 10–20 cm tall, subacaulescent. Stems very short. Leaves 10–22 cm; stipules 8–12 mm, white hairy; petiole 4–6 cm; leaflets in 9–17 pairs, obovate to elliptic, 6–12 \times 3–6 mm, both surfaces covered with spreading hairs. Racemes many, sessile, 1- or 2-flowered; bracts ca. 12 mm, loosely white hairy. Calyx ca. 12 mm, densely covered with spreading hairs; teeth ca. 4 mm. Petals yellow; standard oblong-obovate, 20–22 \times ca. 5 mm, slightly constricted in middle, without distinct claw, apex emarginate; wings ca. 20 mm; keel ca. 18 mm. Legumes sessile, ovoid, 10–15 mm, with a short, slightly curved beak; valves densely covered with spreading white hairs.

• Steppes. Nei Mongol.

345. *Astragalus parvicarinatus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 55. 1983.

短龙骨黄耆 *duan long gu huang qi*

Plants 5–10 cm tall, acaulescent or nearly so, caespitose, only white hairy. Stems, if present, up to 1 cm, densely covered with subappressed hairs. Leaves 2–4(–8) cm; stipules 7–12 mm, adnate to petiole up to middle, densely villous with spreading hairs up to 1 mm; petiole 1.5–2(–4) cm, like rachis covered with medifixed, appressed hairs 0.3–0.5 mm; leaflets in (1 or) 2 or 3 pairs, obovate, 4–7 \times 1.5–3 mm, abaxially densely and adaxially loosely covered with medifixed, appressed hairs up to 1 mm. Racemes sessile, few flowered; bracts 6–7 mm, ciliate with \pm spreading, basifixed hairs. Calyx tubular, 8–9 mm, densely covered with \pm spreading, tangled, basifixed hairs up to 1 mm; teeth 3–4 mm. Petals white or yellowish; standard narrowly elliptic, 17–20 \times ca. 4 mm, apex emarginate; wings 16–17 mm; keel 9–10 mm. Legumes widely ellipsoid (as seen from adaxial side), ca. 5 mm, ca. 2 mm high and ca. 4 mm wide, with a filiform beak ca. 2 mm; valves rather densely covered with subappressed, medifixed hairs.

• Steppes. Nei Mongol, Ningxia.

346. *Astragalus perbrevis* Podlech & L. R. Xu, Novon 17: 248. 2007.

紫色黄耆 *zi se huang qi*

Plants 2–3 cm tall, acaulescent, very densely caespitose, only white hairy. Leaves 1.5–3 cm; stipules 8–10 mm, adnate to petiole for 1–3 mm, densely covered with basifixed, subappressed to slightly ascending hairs up to 2.5 mm; petiole 0.6–1 cm, like rachis densely covered with \pm medifixed, flexuous, subappressed to ascending hairs ca. 1 mm and with basifixed, straight, spreading hairs up to 2 mm; leaflets in 1–3 pairs, narrowly elliptic, 5–10 \times 2–3.5 mm, both surfaces densely covered with medifixed, ascending hairs ca. 1.5 mm. Racemes sessile, few flowered; bracts 8–10 mm, rather densely covered with basifixed hairs ca. 1 mm. Calyx ca. 12 mm, densely covered with symmetrically or asymmetrically bifurcate, flexuous, subappressed to ascending hairs ca. 1 mm and with basifixed, straight, ascending to nearly spreading hairs 2–3 mm; teeth ca. 3 mm. Petals whitish yellow when dry; standard obovate, ca. 25 \times 9 mm, apex deeply emarginate; wings ca. 22 mm, limbs narrowly obovate, deeply emarginate to obliquely bilobed; keel ca. 21 mm. Ovary sessile, densely white hairy. Legumes unknown.

• Steppes. NW Xinjiang.

347. *Astragalus porphyreus* Podlech & L. R. Xu, Novon 17: 249. 2007.

博乐黄耆 *bo le huang qi*

Plants 2–4 cm tall, acaulescent, densely caespitose, only white hairy. Leaves 0.8–1.5 cm; stipules 5–6 mm, adnate to petiole for ca. 3 mm, loosely to rather densely covered with basifixed, subappressed hairs up to 1 mm; petiole 0.3–0.7 cm, like rachis very densely covered with medifixed, appressed hairs 0.4–0.6 mm; leaflets in 1 or 2 pairs, obovate, 3–6 \times 1.2–3 mm, mostly boot-shaped or folded, especially toward apex, abaxially somewhat densely and adaxially loosely to rather densely covered with appressed, medifixed hairs 0.3–0.5 mm. Racemes sessile, 1- or 2-flowered; bracts ca. 3 mm, with basifixed hairs 0.5–1 mm. Calyx 8–9 mm, densely to rather densely covered with subbasifixed to basifixed, spreading, tangled hairs 0.5–1 mm; teeth 2–2.5 mm. Petals purplish in life, whitish yellowish when dry; standard oblong, 16–17 \times 4.5–5.5 mm, below middle constricted, base angular-auriculate, somewhat abruptly contracted into short claw, apex emarginate; wings 14–15 mm; keel 12–13 mm. Ovary sessile, white hairy. Legumes unknown.

• W Xinjiang.

348. *Astragalus pseudoborodini* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 54. 1983.

西域黄耆 *xi yu huang qi*

Astragalus bairdianus N. Ulziykhutag.

Plants 3–7 cm tall, acaulescent or nearly so, hairy. Leaves 1.5–4 cm; stipules 3–4 mm, loosely to rather densely covered with predominantly basifixed, spreading, white hairs up to 1 mm; petiole 1–3 cm, like rachis densely covered with ap-

pressed, medifixed hairs 0.5–0.8 mm; leaflets in 1 or 2 pairs, narrowly elliptic to narrowly obovate, 4–8 × 1.5–3 mm, both surfaces densely covered with appressed, medifixed hairs 0.5–0.8 mm. Racemes sessile, 2- or 3-flowered; bracts ca. 10 mm, hairy like stipules. Calyx 9–11 mm, densely covered with spreading, predominantly basifixed, white hairs up to 1 mm, often sitting on small tubercles; teeth 3–5 mm. Petals pale yellow; standard narrowly oblong, 13–15 × ca. 5 mm, rounded at apex; wings 12–13 mm; keel ca. 11 mm. Ovary narrowly ellipsoid, white hairy. Legumes unknown.

- Nei Mongol, Xinjiang.

349. *Astragalus pseudohypogaeus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 58. 1983.

类留土黄耆 lei liu tu huang qi

Plants 6–10 cm tall, subcaulescent, only white hairy. Stems ca. 1 cm, densely covered with subappressed, extremely asymmetrically bifurcate to subbasifixed hairs 1–1.8 mm. Leaves 5–10 cm; stipules loosely to rather densely hairy like stem; petiole as long as rachis, like rachis densely covered with subappressed to partly slightly spreading, nearly symmetrically to strongly asymmetrically bifurcate hairs 1–1.8 mm; leaflets in 3–6 pairs, obovate, 8–13 × 4–8 mm, abaxially rather densely and adaxially loosely covered with ± medifixed, subappressed hairs 1.2–2.5 mm. Bracts 7–8 mm, with strongly asymmetrically bifurcate hairs. Flowers crowded around base of leaves. Calyx 10–12 mm, densely covered with subappressed to ascending, strongly asymmetrically bifurcate hairs up to 2 mm; teeth 4–6 mm. Petals whitish reddish; standard oblong, 15–16 × 4–5 mm, apex retuse; wings 12–14 mm; keel 9–10 mm. Legumes (immature) 10–15 mm, with a slightly curved beak 4–7 mm; valves spreading hairy.

- Xinjiang.

350. *Astragalus pseudoscaberrimus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 57. 1983.

拟糙叶黄耆 ni cao ye huang qi

Plants 3–10 cm tall, acaulescent or nearly so, caespitose, sometimes forming low, dense cushions, only white hairy. Stems, if present, up to 1 cm, very densely covered with spreading, symmetrically or asymmetrically bifurcate, tangled hairs 0.5–1 mm. Leaves 3–6 cm; stipules 4–8 mm, adnate to petiole for ca. 1 mm, sparsely to loosely covered with ± medifixed, subappressed to ascending hairs 0.7–1 mm, at margins also with ± basifixed hairs ca. 1.5 mm; petiole 1.5–3 cm, with rachis densely to very densely hairy like stem; leaflets in 3–10 pairs, elliptic to ovate, 3–5 × 1.5–3.5 mm, both surfaces densely or adaxially loosely covered with ± medifixed, ascending to partly spreading, tangled hairs 0.8–1.5 mm. Racemes subsessile, 1–6-flowered; bracts 3–5 mm, sparsely to very sparsely hairy, margins with basifixed hairs. Calyx 12–13 mm, densely to very densely covered with ascending to partly spreading, strongly to extremely asymmetrically bifurcate, tangled hairs 1–2 mm; teeth 1.5–3 mm. Petals whitish yellow; standard obovate, 20–24 × 6–6.5 mm, below middle slightly constricted, apex emarginate; wings slightly shorter than standard; keel 16–17 mm. Legumes sessile, 7–10 mm, 3–4 mm

high and wide, acuminate at apex, 2-locular; valves densely covered with strongly asymmetrically bifurcate to basifixed, spreading, tangled hairs 1–1.5 mm.

- Gansu, Nei Mongol, Xinjiang.

351. *Astragalus scaberrimus* Bunge, Enum. Pl. China Bor. 17. 1833.

糙叶黄耆 cao ye huang qi

Astragalus giraldianus Ulbrich; *A. harmsii* Ulbrich.

Plants 8–15 cm tall, acaulescent to more rarely shortly caulescent, covered with appressed to subappressed, ± medifixed, only white hairs up to 1 mm. Stems, if present, up to 5 cm, densely hairy. Leaves 3–10(–14) cm; stipules 4–7 mm, densely hairy; petiole 1.5–3(–5) cm, like rachis rather densely hairy; leaflets in 3–6(–8) pairs, narrowly elliptic to elliptic, 4–12(–15) × 2–5(–7) mm, both surfaces sparsely to rather densely hairy. Racemes loosely 3–5-flowered; peduncle 0.3–1.5(–3.5) cm, appressed white hairy; bracts 2–3 mm, hairy. Calyx 7–9 mm, densely covered with appressed hairs; teeth 2–2.5(–4) mm. Petals yellow, standard and keel often suffused with violet; standard ovate, 20–21 × 8–9 mm, apex retuse to emarginate; wings 16–17 mm; keel 12–13 mm. Legumes somewhat curved, acuminate, 10–13 mm, 3.5–4 mm high and ca. 3 mm wide; valves densely covered with appressed white hairs 0.3–0.8 mm, sometimes partly glabrescent with age.

Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Mongolia, Russia (Siberia)].

352. *Astragalus scabrisetus* Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 26. 1841.

粗毛黄耆 cu mao huang qi

Plants 5–15 cm tall, acaulescent or nearly so, only white hairy. Stems, if present, very short, rarely up to 4 cm, densely hairy. Leaves 3–12 cm; stipules 5–6 mm, densely covered with strongly asymmetrically bifurcate, subappressed hairs, at margins with basifixed, ± spreading cilia up to 1.5 mm; petiole 1–5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate, appressed to subappressed hairs 1.8–3 mm; leaflets in 3–6(–8) pairs, elliptic, 5–13 × 2.5–5(–8) mm, adaxially loosely to rather densely and abaxially somewhat more densely hairy like rachis. Racemes many, subsessile, 2–4-flowered, forming dense, capitate synflorescences around base of leaves; bracts 6–12 mm, with subbasifixed to basifixed hairs up to 1.5 mm. Calyx 10–12 mm, densely covered with subappressed to ascending, asymmetrically bifurcate hairs up to 1.5 mm; teeth 4–6 mm. Petals whitish, tip of standard and keel often violet; standard obovate, 16–19 × 5–6 mm, constricted below middle, apex emarginate; wings 14–17 mm; keel 12–14 mm. Legumes 6–8 mm, ca. 3 mm high and ca. 5 mm wide, acuminate into straight or slightly curved beak 6–8 mm; valves rather densely covered with asymmetrically bifurcate, subappressed to ascending hairs up to 1.5 mm, sometimes partly glabrescent with age.

Xinjiang [Kazakhstan, Mongolia, Uzbekistan].

353. *Astragalus secretus* Podlech & L. R. Xu, *Novon* 17: 250. 2007.

粘线黄耆 nian xian huang qi

Plants 3.5–6 cm tall, acaulescent, caespitose, only white hairy. Leaves 2.5–3 cm; stipules ca. 4 mm, adnate to petiole for ca. 2 mm, densely covered with \pm medifixed, appressed hairs up to 1 mm, at margins with basifixed hairs; petiole 0.8–2 cm, like rachis densely to very densely covered with medifixed, appressed hairs 0.5–0.7 mm; leaflets in 1–3 pairs, obovate, 5–10 \times 1.5–4 mm, both surfaces very densely covered with appressed, medifixed hairs 0.8–1.2 mm. Racemes 5–7-flowered, with a peduncle 2–3 cm and hairy like rachis; bracts 2–4 mm, at margins with subbasifixed to basifixed hairs, otherwise glabrous. Calyx 7–8 mm, densely covered with symmetrically to strongly asymmetrically bifurcate, appressed hairs 0.8–1 mm; teeth 1–2 mm. Petals yellow; standard obovate, ca. 17 \times 8 mm, apex retuse; wings ca. 16 mm; keel ca. 13 mm. Ovary sessile, white hairy. Legumes unknown.

• Steppes. NW Xinjiang.

354. *Astragalus sinkiangensis* Podlech & L. R. Xu, *Novon* 17: 250. 2007.

赛里木黄耆 sai li mu huang qi

Plants ca. 8 cm tall, acaulescent, caespitose. Leaves 5–8 cm; stipules 10–15 mm, adnate to petiole for ca. 1 mm, loosely covered with basifixed, spreading, white hairs 1–2 mm; petiole 1.5–2 cm, like rachis rather densely covered with symmetrically or asymmetrically bifurcate, \pm spreading, tangled hairs 0.5–1 mm and with some basifixed longer hairs up to 2 mm; leaflets in 7–9 pairs, widely obovate to suborbicular, 4–6 \times 3.5–5.5 mm, abaxially rather densely and adaxially sparsely to loosely covered with symmetrically or asymmetrically, partly flexuous, ascending to spreading, white hairs 0.5–0.8 mm, with a few basifixed, straight, longer hairs mixed in. Racemes sessile, 1- or 2-flowered; bracts 5–7 mm, hairy like stipules. Calyx 10–12 mm, densely covered with extremely asymmetrically bifurcate to basifixed, spreading hairs 1–2 mm; teeth ca. 4 mm. Petals white; standard oblong-pandurate, ca. 25 \times 8 mm, in lower 1/3 slightly constricted, base widened, hastate-auriculate, apex emarginate; wings 22–23 mm, limbs slightly retuse; keel ca. 21 mm. Ovary sessile, ellipsoid, densely white hairy. Legumes unknown.

• Steppes. N Xinjiang.

355. *Astragalus tesquorum* Podlech & L. R. Xu, *Novon* 17: 251. 2007.

干草原黄耆 gan cao yuan huang qi

Plants 3–5 cm tall, acaulescent, densely caespitose, covered with ascending to spreading, bifurcate, white hairs. Leaves 2–5 cm; stipules 4–8 mm, adnate to petiole for ca. 1 mm, rather densely covered with basifixed, ascending hairs 0.5–0.8 mm; petiole 1–2.5 cm, like rachis rather densely covered with symmetrically to strongly asymmetrically, ascending to spreading, \pm flexuous, tangled hairs 1–1.8 mm; leaflets in 4(or 5) pairs, elliptic to obovate, 3–7 \times 1.5–4 mm, often folded, both surfaces rather densely covered with \pm medifixed, ascending to partly \pm

spreading hairs 1.5–2.5 mm. Racemes subsessile, ca. 3-flowered; bracts 7–8 mm, hairy like stipules. Calyx ca. 8 mm, rather densely covered with symmetrically to strongly asymmetrically bifurcate or partly basifixed, ascending to spreading hairs up to 1.2 mm; teeth ca. 2 mm. Petals in life purplish, yellowish when dry; standard obovate, ca. 17 \times 7 mm, distinctly constricted below middle, apex emarginate; wings ca. 17 mm; keel ca. 15 mm. Ovary sessile, densely white hairy. Legumes unknown.

• W Xinjiang.

356. *Astragalus testiculatus* Pallas, *Sp. Astragal.* 82. 1802.

卵果黄耆 luan guo huang qi

Plants 5–12 cm tall, acaulescent or nearly so, loosely to densely caespitose. Stems, if rarely present, up to 2–3(–6) cm, ascending, very densely covered with symmetrically to mostly strongly asymmetrically bifurcate, tangled, mostly spreading hairs of different lengths from 1–2 mm. Leaves (2–)5–12 cm; stipules 6–12 mm, adnate to petiole for ca. 2 mm, densely to very densely hairy like stem; petiole 2–4 cm, with rachis densely hairy like stem; leaflets in 7–13 pairs, narrowly elliptic, 2–13 \times 1–4 mm, both surfaces very densely covered with \pm symmetrically or asymmetrically bifurcate, subappressed to slightly ascending hairs 1–1.5 mm. Racemes several, crowded at base of leaves, subsessile or with a peduncle up to 2–6 cm, 2–4-flowered; bracts 7–10 mm, covered with asymmetrically bifurcate, subappressed to partly \pm spreading, white hairs, apex sometimes with short black hairs. Calyx 10–12 mm, rather densely covered with strongly asymmetrically bifurcate, tangled, ascending to partly spreading, white hairs 1.5–2 mm and, especially in upper part and at teeth, with mostly shorter black hairs, rarely without black hairs; teeth 2–3 mm. Petals whitish or pinkish or pale violet; standard oblong-pandurate, 18–25(–28) \times 7–8(–10) mm, scarcely to distinctly constricted below middle, apex retuse; wings 18–21(–25) mm; keel 14–19(–21) mm. Legumes sessile, 9–18 mm, 6–9 mm high and wide, acute, incompletely 2-locular; valves densely villous, with strongly asymmetrically bifurcate, ascending to spreading, tangled, white hairs ca. 2 mm.

Xinjiang [Kazakhstan, Russia (Siberia), Tajikistan, Turkmenistan; SW Asia (Caucasus, Iran), E Europe (Russia, Ukraine)].

357. *Astragalus transecticola* Podlech & L. R. Xu, *Novon* 17: 251. 2007.

路边黄耆 lu bian huang qi

Plants 3–5 cm tall, acaulescent, caespitose, densely covered with ascending to spreading, bifurcate, only white hairs. Leaves 2–4.5 cm; stipules 10–15 mm, adnate to petiole for ca. 3 mm, with spreading, basifixed hairs 1–2 mm; petiole 0.6–1.5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate or basifixed, subappressed to spreading, tangled hairs 0.8–1.5 mm; leaflets in 6 or 7 pairs, elliptic to widely elliptic, 3–4 \times 2–2.5 mm, both surfaces densely covered with asymmetrically to strongly asymmetrically bifurcate, ascending to partly spreading, tangled hairs 0.8–1 mm or adaxially loosely covered with subappressed hairs. Racemes subsessile, ca. 2-flowered; bracts 10–12 mm, with basifixed hairs ca. 1 mm. Calyx 12–13 mm, densely covered with symmetrically or

asymmetrically bifurcate, flexuous, tangled hairs 0.5–1 mm and with basifixed, \pm spreading, straight hairs up to 2 mm; teeth 3–4 mm. Petal color probably whitish or yellow; standard elliptic, ca. 21×8 mm, apex emarginate; wings 19–20 mm, limbs distinctly obliquely emarginate; keel ca. 17 mm. Ovary sessile, densely white hairy. Legumes unknown.

- W Xinjiang.

358. *Astragalus trijugus* Podlech & L. R. Xu, Novon 17: 252. 2007.

三棱黄耆 san leng huang qi

Plants 6–7 cm tall, shortly caulescent, caespitose, with \pm medifixed, appressed, white hairs. Stems many, procumbent to ascending, 1.5–3 cm, very densely covered with hairs 0.8–1 mm. Leaves 2–5 cm; stipules 2.5–4 mm, adnate to petiole for 1–1.5 mm, densely hairy like stem; petiole 1–3 cm, with rachis densely hairy like stem; leaflets in 3 pairs, elliptic, $3-8 \times 1.5-4$ mm, both surfaces loosely to densely covered with hairs 0.6–0.8 mm. Racemes 2–4-flowered; peduncle 1–3 cm, loosely to densely hairy like stem; bracts 1–1.5 mm, hairy, at margins also with basifixed hairs. Calyx 8–9 mm, densely hairy like stem; teeth ca. 2 mm. Petals yellow when dry; standard obovate, ca. 16×8 mm, apex widely emarginate; wings ca. 14 mm, limbs obliquely incised; keel ca. 11 mm. Ovary sessile, narrowly oblong, sparsely white hairy. Legumes unknown.

- Hebei.

359. *Astragalus vellestris* Kamelin, Novosti Sist. Vyssh. Rast. 15: 173. 1979.

线沟黄耆 xian gou huang qi

Plants 2–4 cm tall, acaulescent, covered with white hairs. Leaves 1–2.5 cm, with only 1 leaflet; stipules ca. 4 mm, densely covered with appressed to ascending, strongly asymmetrically bifurcate to basifixed hairs up to 1 mm; petiole 0.5–1 cm, densely covered with symmetrically or asymmetrically bifurcate, appressed to subappressed hairs 0.3–0.8 mm; leaflets narrowly elliptic, $6-18 \times 2-6$ mm, both surfaces densely covered with appressed, mostly \pm medifixed hairs 0.6–1.1 mm, apex acute. Racemes sessile. Calyx ca. 7 mm, loosely to rather densely covered with subbasifixed to basifixed, \pm spreading hairs 1–1.5 mm; teeth 2–2.5 mm. Petals pink; standard oblong to obovate-pandurate, $12-15 \times$ ca. 5 mm, slightly constricted near base, apex rounded; wings ca. 12 mm; keel 7–8 mm.

Ovary with a stipe ca. 1 mm, ellipsoid, white hairy. Legumes unknown.

- Xinjiang [Mongolia].

360. *Astragalus vescus* Podlech & L. R. Xu, Novon 17: 252. 2007.

辛辣黄耆 xin la huang qi

Plants 2–3 cm tall, acaulescent, caespitose, only white hairy. Leaves 1.5–2 cm; stipules 4–5 mm, adnate to petiole for 1–1.5 mm, loosely to rather densely covered with symmetrically or asymmetrically bifurcate, appressed hairs up to 1 mm, at margins with basifixed hairs; petiole 0.5–1.2 cm, like rachis densely to rather densely covered with medifixed, appressed hairs 0.3–0.5 mm; leaflets in 2 or 3 pairs, obovate, $2-5 \times 0.5-2.2$ mm, abaxially somewhat densely and adaxially loosely covered with appressed, medifixed hairs up to 1 mm. Racemes sessile, 1- or 2-flowered; bracts ca. 3 mm, hairy, margins with basifixed hairs. Calyx 8–9 mm, densely to rather densely covered with \pm medifixed, appressed hairs 0.5–0.6 mm; teeth 2–2.5 mm. Petals white, suffused with red; standard obovate, ca. 19×8 mm, apex rounded; wings ca. 18 mm; keel ca. 16 mm. Ovary sessile, white hairy. Legumes unknown.

- Xinjiang.

361. *Astragalus visibilis* Podlech & L. R. Xu, Novon 17: 253. 2007.

明媚黄耆 ming mei huang qi

Plants 4–7 cm tall, acaulescent, with \pm medifixed, appressed, white hairs 0.8–1 mm. Leaves 2–5 cm; stipules 3–4 mm, adnate to petiole for 1–2 mm, densely hairy, at margins also with basifixed hairs; petiole 1–2.5 cm, very densely hairy; leaflets in basal leaves solitary, in other leaves 3, close together, elliptic to obovate or partly narrowly obovate, $10-18 \times 3-8$ mm, both surfaces very densely hairy. Racemes densely 8–10-flowered; peduncle 2–5 cm, very densely hairy; bracts ovate, 1.5–2 mm, loosely hairy, margins with basifixed hairs. Calyx 5–7 mm, densely white hairy; teeth subulate, 2–3 mm. Petals pink; standard ca. 14×8 mm, slightly constricted in lower 1/3, without distinct claw, apex slightly emarginate; wings ca. 12 mm; keel ca. 10 mm. Ovary sessile, densely white hairy. Legumes unknown.

- Xinjiang.

52. *Astragalus* sect. *Podochreati* W. D. J. Koch, Syn. Fl. Germ. Helv. 186. 1836.

灰白毛组 hui bai mao zu

Plants perennial, acaulescent, covered with bifurcate, mostly appressed hairs. Stipules adnate to petiole, otherwise free from each other. Racemes mostly borne on a long peduncle. Bracteoles mostly present (absent in Chinese species). Calyx tubular. Legumes mostly 2-locular, with leathery walls.

About 140 species: mostly in SW Asia (Caucasus, Iran, and Turkey), spreading into Europe, N Africa, other parts of SW Asia, C Asia, Afghanistan, Pakistan, and China; one species in China.

362. *Astragalus platyphyllus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 345. 1842.

宽叶黄耆 kuan ye huang qi

Plants 10–35 cm tall, with appressed, in vegetative parts only white, \pm medifixed hairs 0.5–0.8 mm. Leaves 5–25 cm; stipules 10–13 mm, densely covered with appressed hairs; petiole 2–11 cm, like rachis loosely to rather densely hairy; leaflets

in 4–8 pairs, elliptic, 6–25 × 4–15 mm, sparsely to loosely hairy. Racemes ovoid to cylindrical, rather densely many flowered; peduncle 6–30 cm, loosely to rather densely hairy, hairs white, toward raceme increasingly black; bracts 3–7 mm, sparsely hairy and ciliate. Bracteoles absent. Calyx 7–10 mm, loosely white and predominantly black hairy; teeth 2–4 mm. Petals violet; standard narrowly oblong-elliptic, 20–25 × 6–8

mm, apex retuse or obtuse; wings 16–20 mm, limbs retuse to emarginate; keel 13–17 mm. Legumes sessile, erect, 10–13 mm, 4–4.5 mm high and ca. 4 mm wide, with a slender beak 2–3 mm; valves loosely white hairy, glabrescent to nearly glabrous with age.

Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

53. *Astragalus* sect. *Cytisodes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 127. 1868.

金雀组 jin que zu

Plants shrubby, acaulescent or caulescent, with bifurcate hairs. Stipules mostly ± connate behind stem or rarely free (in Chinese species). Bracteoles absent. Calyx tubular. Legumes sessile, mostly large, ± gradually narrowed into a prominent, rigid, long beak, 2-locular.

Fourteen species: C Asia to China, SW Asia (Iran); two species (one endemic) in China.

- 1a. Stems with appressed hairs 1–1.5 mm; leaflets with appressed to slightly ascending hairs; calyx rather densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 1.5–2 mm and with few, more symmetrically bifurcate, subappressed, flexuous hairs 0.5–1 mm, with black hairs mixed in; legumes 15–25 mm, with subbasifixed, spreading hairs 1–2 mm, soon glabrescent 364. *A. yanerwoensis*
- 1b. Stems with appressed to ascending and partly spreading hairs up to 2 mm; leaflets with at least partly spreading hairs; calyx densely covered on ventral side with shaggy, ± spreading, mostly asymmetrically to strongly asymmetrically bifurcate, predominantly white hairs up to 2 mm, on dorsal side with predominantly appressed to ascending, shorter black hairs 0.5–1 mm; legumes 20–50 mm, with ± subbasifixed spreading hairs up to 3 mm and with some medifixed, very short appressed hairs 363. *A. ornithorrhynchus*

363. *Astragalus ornithorrhynchus* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 19, 102. 1947.

雀喙黄耆 que hui huang qi

Plants 10–18 cm tall, subacaulescent. Stems up to 2 cm, very densely covered with subappressed to ascending or sometimes nearly spreading, ± medifixed, white hairs up to 2 mm. Leaves 5–10 cm; stipules 5–7 mm, nearly free from petiole and from each other, rather densely hairy; petiole 2–3 cm, like rachis loosely to rather densely covered with nearly spreading, symmetrically to strongly asymmetrically bifurcate hairs up to 1.5 mm; leaflets in 5–7 pairs, 5–12 × 2–3.5 mm, both surfaces loosely to rather densely covered with ascending to spreading white hairs up to 2.5 mm. Racemes short, 2–12-flowered; peduncle 4–11 cm, loosely to rather densely white hairy; bracts 3–8 mm, predominantly black hairy. Calyx tubular, 13–17 mm, densely covered on ventral side with ± spreading, mostly asymmetrically bifurcate, predominantly white hairs up to 2 mm, on dorsal side with ± appressed, shorter, black hairs 0.5–1 mm; teeth 2–3 mm. Petals purple; standard ovate, ca. 25 × 10 mm, with a short claw, apex emarginate; wings 22–23 mm, limbs bilobate; keel 20–21 mm. Legumes sessile, linear, terete, slightly curved, 20–50 mm, 2.5–3 mm in diam., with a straight beak 5–10 mm; valves rather densely covered with strongly asymmetrically bifurcate, spreading, white hairs up to 2 mm and with some very short, ± appressed, ± medifixed, white hairs.

Gravelly slopes, gravelly flood lands. Qinghai, Xinjiang [Kazakhstan].

364. *Astragalus yanerwoensis* Podlech & L. R. Xu, Novon 17: 234. 2007.

长喙黄耆 chang hui huang qi

Astragalus pavlovianus Gamajunova var. *longirostris* S. B. Ho.

Plants 12–25 cm tall, caulescent, shrubby. Stems in older parts ligneous, parts of current year 5–10 cm, very densely hairy; hairs medifixed, appressed, white, at nodes also black, 1–1.5 mm. Leaves 2.5–5 cm; stipules 3–7 mm, shortly adnate to petiole, densely covered with white and sometimes also black hairs; petiole 1–2 cm, like rachis densely to rather densely covered with medifixed, appressed, white hairs 0.8–1 mm and with more spreading, asymmetrically bifurcate hairs 1.5–2 mm; leaflets in 4–6 pairs, 7–15 × 3–5 mm, both surfaces sparsely to rather densely covered with appressed to slightly ascending, medifixed hairs 1–2 mm. Racemes loosely to rather densely 10–12-flowered; peduncle 1.5–4 cm, loosely to densely hairy, hairs symmetrically or asymmetrically bifurcate, ± flexuous, appressed to slightly ascending or more rarely also spreading, white, toward raceme sometimes also black, 0.5–1.5 mm; bracts 4–6 mm, with ± spreading, partly basifixed, white and black hairs. Calyx ca. 15 mm, rather densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 1.5–2 mm and with few, more symmetrically bifurcate, subappressed, flexuous hairs 0.5–1 mm, with black hairs mixed in; teeth 2–3 mm. Petals pale violet or yellow; standard obovate, ca. 24 mm, slightly constricted in middle, with a rather long claw, apex emarginate; wings ca. 22 mm; keel ca. 20 mm. Legumes sessile, 15–25 mm (without beak), slightly curved, attenuate into a rigid beak 6–10 mm; valves densely covered with subbasifixed, ± spreading, white hairs 1–2 mm, sometimes completely glabrous.

• Xinjiang.

54. Astragalus sect. **Ammodendron** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 128. 1868.

沙生组 sha sheng zu

Plants shrubby or subshrubby, with well-developed stems very densely covered with short, appressed, medifixed hairs. Stipules membranous, shortly adnate to petiole, high vaginate-connate behind stem, often up to top; leaflets in 1–3 pairs, rarely in more. Petals mostly lilac to violet, small. Legumes sessile, ± ovoid, ± keeled ventrally, mostly rounded to flat dorsally, 2-locular or rarely incompletely 2-locular; valves densely covered with long, soft, ± spreading, basifixed hairs and often also with short, appressed, ± medifixed hairs.

Seventy-three species: Afghanistan, China, Pakistan; N Africa (Egypt), C and SW Asia, E Europe; five species (one endemic) in China.

- 1a. Leaflets in 1 or 2 pairs.
 2a. Plants shrubby with hardening and persistent, subspiny rachises; calyx 6–7(–8) mm; standard 13–15 mm 365. *A. brachypus*
 2b. Plants subshrubby; rachises not hardening and subspiny; calyx 4–5 mm; standard 8–9 mm 368. *A. iliensis*
- 1b. Leaflets in 2 or 3(or 4) pairs.
 3a. Petiole stout, ca. 1.5 mm thick; leaflets in 3 pairs; standard with a claw longer than limb; legumes 10–12 mm, with subbasifixed, spreading hairs 2–3 mm, mostly sitting on small tubercles, without very short hairs 369. *A. macrostephanus*
 3b. Petiole slender; leaflets in 2 or 3 pairs, basal leaves with only 1 pair; standard with a claw not longer than limb; legumes 5–8 mm, with both spreading hairs up to 1.5 mm and very short appressed hairs.
 4a. Leaflets in 2 or 3(or 4) pairs, 4–15(–20) mm; raceme 4–10 cm, bracts ca. 2 mm; calyx 6–7 mm; standard at base gradually narrowed 366. *A. cognatus*
 4b. Leaflets in 2 or 3 pairs, 15–30 mm; raceme 3–4 cm, bracts ca. 1 mm; calyx 5–5.5 mm; standard limb abruptly contracted into a rather long claw 367. *A. gebleri*

365. Astragalus brachypus Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 79. 1841.

盐木黄耆 yan mu huang qi

Astragalus halodendron Bunge.

Plants 60–90 cm tall, shrubby. Stems of current year 10–40 cm, very densely covered with medifixed, appressed hairs 0.7–1 mm. Leaves (1.5–)2–4 cm; stipules 2–5 mm, rather densely covered with asymmetrically bifurcate, appressed hairs, glabrescent to glabrous with age; petiole 0.2–0.5 cm, with short rachis hairy like stem, hardening, subspiny, persistent; leaflets in 1 pair, those of lower leaves sometimes in 2 pairs, 15–35(–50) × (1.5–)2–3(–4) mm, in brachyblast leaves often only 10–15 mm, both surfaces densely to rather densely covered with ± medifixed, appressed hairs 0.5–1(–1.5) mm. Racemes 3–8(–13) cm, loosely 6- to many flowered; peduncle 2–4 cm; bracts 1–2 mm. Calyx 6–7(–8) mm, densely covered with symmetrically or asymmetrically bifurcate, white hairs 0.6–0.8 mm; teeth 0.5–1.2 mm. Petals purple; standard rhombic-elliptic, 13–15 × ca. 6 mm, apex slightly emarginate; wings (10–)11–12 mm; keel (9–)10–11 mm. Legumes 5–7(–8) mm, 3(–4) mm high and 2–2.5 mm wide, with a beak ca. 1 mm, 2-locular; valves densely covered with soft, basifixed, ascending, white hairs ca. 2 mm and with very short, subappressed hairs.

Xinjiang [Kazakhstan].

366. Astragalus cognatus Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 81. 1841.

沙丘黄耆 sha qiu huang qi

Astragalus cognatus var. *brachybotrys* Trautvetter.

Plants 35–50 cm tall, subshrubby, all parts mostly very densely covered with appressed, often somewhat flexuous, only

white hairs. Stems of current year very densely covered with ± medifixed hairs 0.8–1 mm. Leaves 4–10 cm; stipules 3–4 mm, appressed hairy; petiole 2–4 cm, hairy like stem; leaflets in 2 or 3(or 4) pairs, 4–15(–20) × 2–5(–8) mm, both surfaces densely covered with ± medifixed, appressed hairs ca. 1 mm. Racemes 4–10 cm, remotely 4–8-flowered; peduncle 3–6 cm, densely appressed hairy; bracts ca. 2 mm, hairy. Calyx 6–7 mm, densely covered with medifixed, flexuous, appressed hairs ca. 0.5 mm; teeth 0.5–1 mm. Petals pale violet; standard elliptic to obovate, 13–15 × 5–6 mm, apex slightly emarginate; wings 11–13 mm; keel 10–12 mm. Legumes 6–8 mm, 4–5 mm high and 3.5–4 mm wide, with a beak 1–2 mm, incompletely 2-locular; valves densely covered with tangled, ascending to spreading, ± flexuous, basifixed, white hairs 1–1.5 mm and with subappressed, ± medifixed, very short hairs.

Xinjiang [Kazakhstan].

367. Astragalus gebleri Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 24. 1841.

准噶尔黄耆 zhun ga er huang qi

Plants 30–40 cm tall, subshrubby, covered with appressed, ± medifixed, white hairs 0.8–1.2 mm. Stems of current year 7–15 cm, very densely hairy. Leaves 3.5–10 cm; stipules 2–4 mm, densely hairy; petiole 1.5–3 cm, like rachis very densely hairy; leaflets in 2 or 3 pairs (in lowermost leaves in 1 pair), 15–30 × 2–6 mm, both surfaces rather densely to very densely hairy. Racemes 3–4 cm, remotely 4–6-flowered; peduncle 1–5 cm, densely hairy; bracts ca. 1 mm, hairy. Calyx 5–5.5 mm, densely appressed white hairy; teeth 0.5–1 mm. Petals pale purplish; standard widely rhombic-elliptic, 13–14 × 5.5–6 mm, somewhat abruptly narrowed into long claw, apex deeply emarginate; wings 12–13 mm; keel 8–10 mm. Legumes 5–8 mm, 3.5–5 mm high and 2.5–3.5 mm wide, with a beak 2–3 mm; valves

rather densely covered with strongly asymmetrically bifurcate to subbasifixed spreading hairs up to 1.5 mm and with very short subappressed hairs.

Xinjiang [Kazakhstan].

368. *Astragalus iliensis* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 20. 1866.

伊犁黄耆 yi li huang qi

Plants 30–60(–80) cm tall, subshrubby, densely covered with appressed, ± medifixed, only white hairs 0.5–1 mm. Stems of current year up to 20 cm. Leaves 3–5 cm; stipules 2–3(–4) mm, lower ones connate behind stem, upper ones mostly free, sparsely to loosely hairy, at margins with strongly asymmetrically bifurcate to basifixed hairs; petiole 0.5–1 cm, like rachis densely to rather densely hairy; leaflets in 1 or 2 pairs, 20–35 × 2.5–4 mm, both surfaces rather densely hairy. Racemes 5–12 cm, remotely many flowered; peduncle 2–5 cm, densely hairy; bracts 1–2 mm, hairy. Calyx 4–5 mm, densely covered with partly flexuous, tangled, subappressed hairs; teeth ca. 1 mm. Petals purple; standard ovate, 8–9 × ca. 3.5 mm, apex slightly emarginate; wings 7–8 mm; keel 6–7 mm. Legumes 4–5 mm, ca. 2 mm high, slightly compressed laterally, with a beak ca. 1 mm; valves densely villous with spreading, soft, white hairs.

Xinjiang [Kazakhstan].

55. *Astragalus* sect. *Bulimoides* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 130. 1868.

球刺组 qiu ci zu

Plants subspherical spiny shrublets, strongly branched, furnished with medifixed, appressed, white hairs. Petioles and rachises hardened, persistent, spiny. Racemes 1- or 2-flowered, subsessile. Bracteoles absent. Legumes sessile, drooping, incompletely 2-locular, few seeded.

One species: China, Kazakhstan.

370. *Astragalus unijugus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 130. 1868.

对叶黄耆 dui ye huang qi

Astragalus oligophyllus Schrenk (1844), not Boissier (1843).

Plants (12–)15–23(–32) cm tall, covered with hairs 0.5–0.8 mm. Stems densely hairy. Leaves (3–)4–8 cm; stipules 1.5–4 mm, adnate to petiole for 1–2 mm, loosely to rather densely hairy; petiole 2–4 cm, like rachis sparsely to loosely hairy;

369. *Astragalus macrostephanus* (S. B. Ho) Podlech & L. R. Xu, Novon 14: 217. 2004.

霍城黄耆 huo cheng huang qi

Astragalus iliensis Bunge var. *macrostephanus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 68. 1983.

Plants ca. 35 cm tall, covered with medifixed, appressed, white hairs. Stems of current year up to 30 cm, very densely covered with hairs 0.3–0.6 mm. Leaves 8–12 cm; stipules 2–4 mm, lower ones distinctly connate behind stem, upper ones mostly free, sparsely to loosely hairy, at margins with strongly asymmetrically bifurcate to basifixed hairs; petiole 0.5–1 cm, like rachis stout, at base up to 1.5 mm thick, hairy like stem; leaflets in 3 pairs, 12–25 × 3–5 mm, abaxially loosely to rather densely with somewhat shorter hairs, adaxially loosely covered with hairs 0.6–0.8 mm. Racemes 5–12 cm, very remotely 10–12-flowered; peduncle 6–10 cm, hairy like stem; bracts 1–1.5 mm, sparsely hairy. Calyx 5–6 mm, rather densely covered with hairs 0.3–0.4 mm; teeth ca. 1 mm. Standard widely elliptic, ca. 13 × 5 mm, below middle somewhat abruptly contracted into claw longer than limb, apex emarginate; wings ca. 12 mm; keel ca. 10 mm. Legumes 10–12 mm, 4–5 mm high and wide, with a curved beak ca. 1 mm; valves densely villous with subbasifixed, ± spreading, tangled, soft hairs 2–3 mm, mostly sitting on depressed tubercles.

• Xinjiang.

leaflets in 1(or 2) pairs and an early falling terminal leaflet, narrowly linear, 10–20 × 1–1.5 mm, sparsely to loosely or rather densely hairy on both surfaces, apex acute. Racemes loosely 1- or 2(–4)-flowered; bracts 1.5–2 mm, hairy. Calyx 6–7 mm, loosely to rather densely hairy; teeth 1–1.5 mm, often recurved. Petals pink; standard elliptic to obovate, 10–12 × ca. 4 mm, apex slightly emarginate; wings 9–10 mm; keel 8–9 mm. Legumes oblong, 6–9 mm, ca. 3 mm high and ca. 2 mm wide, with a beak 0.5–1 mm; valves finally completely glabrous.

Xinjiang [Kazakhstan].

56. *Astragalus* sect. *Chaetodon* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 136. 1868.

须毛组 xu mao zu

Plants perennial, herbaceous, subcaulescent or nearly so, sometimes with well-developed stem covered with ± spreading, bifurcate hairs. Stipules mostly adnate to petiole, otherwise free. Inflorescences subsessile or with a stout peduncle up to 5 cm or rarely up to 20 cm. Bracteoles absent. Calyx tubular at anthesis, at length scarcely to strongly bladderlike inflated, villous with long spreading hairs, ruptured by legume or not. Legumes sessile or subsessile, often included in calyx, villous with spreading hairs, few seeded.

Seventeen species: C Asia to China, Pakistan, and Kashmir; two species in China.

1a. Plants subcaulescent; stems 0.5–2 cm; peduncles 0.6–2.2 cm, bracts 7–12 mm; legumes 8–12 mm 371. *A. breviscapus*
1b. Plants caulescent; stems 2–12 cm; peduncles 2–5(–8) cm, bracts 4–8 mm; legumes 11–16 mm 372. *A. saccocalyx*

371. *Astragalus breviscapus* B. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 24: 234. 1905.

短梗黄耆 duan geng huang qi

Astragalus oophorus Freyn (1905), not S. Watson (1871).

Plants 6–13 cm tall, subcaulescent to shortly caulescent, vegetative parts covered with white hairs. Stems several, 0.5–2(–5) cm; very densely covered with unequally bifurcate, tangled, ascending hairs 0.8–1 mm. Leaves 2–11 cm; stipules nearly free from petiole, loosely hairy; petiole 0.8–4.5 cm, like rachis loosely to densely covered with unequally bifurcate, ascending to spreading hairs 1–2 mm; leaflets in 3–6 pairs, 5–18 × 2–13 mm, abaxially loosely to densely and adaxially loosely hairy like rachis. Racemes 3.5–6(–8) × 3.5(–4) cm, densely many flowered; peduncle 0.6–2.2 cm, densely hairy like rachis; bracts 7–12 mm, with strongly asymmetrically bifurcate to basifixed, spreading, white or black and white hairs. Calyx at anthesis or later in fruit inflated ovoid, 17–22 mm, rather densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 2–3 mm, sometimes with shorter black hairs mixed in; teeth 5–8(–9) mm. Petals pinkish violet, drying yellow; standard obovate-pandurate, (17–)20–24(–27) × ca. 7 mm, slightly constricted below middle; wings (14–)20–23(–27) mm; keel nearly as long as wings. Legumes sessile, 8–12 mm, 3.5–4 mm high, compressed laterally, with a reflexed beak 2.5–3 mm, nearly 2-locular; valves with spreading white hairs ca. 3 mm.

Xinjiang (W Kunlun Shan) [Kashmir, Kyrgyzstan, Tajikistan].

372. *Astragalus saccocalyx* Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 83. 1841.

袋萼黄耆 dai e huang qi

Astragalus suidunensis Bunge.

Plants 5–17 cm tall, vegetative parts covered with ± medifixed, appressed to ascending, white hairs. Stems 2–12 cm, densely covered with appressed hairs 0.5–0.8 mm. Leaves (3–)4–8 cm; stipules (2–)3–5 mm, adnate to petiole for 1–2 mm, white hairy; petiole 1–2 cm, like rachis slender, rather densely covered with subappressed to ascending hairs 0.8–1 mm; leaflets in (4 or)5–9 pairs, elliptic or narrowly elliptic, (5–)7–13 × 3–6 mm, abaxially densely and adaxially sparsely covered with subappressed to partly ascending hairs 1.2–1.5 mm. Racemes 2.5–5 cm, loosely few flowered; peduncle 2–5(–8) cm, rather densely hairy like rachis, below raceme also with black hairs; bracts 4–8 mm, with ascending white and black, at margins basifixed hairs up to 2 mm. Calyx at beginning of anthesis tubular, slightly inflated, soon bladderlike ovoid, 15–20 mm, at fruiting time not ruptured by legume, rather densely covered with ascending, asymmetrically bifurcate to subbasifixed, white hairs 1–2 mm and sparsely, toward teeth more densely, with black hairs; teeth 3–7 mm. Petals pinkish violet; standard oblong-obovate, 20–27 × ca. 8 mm, slightly constricted below middle, apex emarginate; wings 20–24 mm; keel 19–23 mm. Legumes sessile, 11–16 mm, 2.5–3.5 mm high, slightly compressed laterally, with a straight beak 1–3 mm, 2-locular; valves sparsely covered with spreading hairs.

Xinjiang [Kazakhstan].

57. *Astragalus* sect. *Cysticalyx* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 135. 1868.

囊萼组 nang e zu

Plants subshrubby, with well-developed stems; hairs bifurcate. Stipules adnate to petiole, otherwise free, rarely lower ones vaginate-connate only at base. Inflorescences capitate to subumbellate, with a rather long peduncle. Bracteoles absent. Calyx tubular at beginning of anthesis, soon bladderlike inflated, enclosing legume. Petals yellow. Legumes sessile, 2-locular or rarely nearly 1-locular, covered with spreading hairs.

Seventeen species: China, Mongolia; C Asia; eight species (one endemic) in China.

- 1a. Stem with only black hairs 379. *A. tyttocarpus*
 1b. Stem with white or white and black hairs.
 2a. Calyx covered with subappressed hairs; standard 15–16 mm 378. *A. scleropodius*
 2b. Calyx covered with ascending or mainly spreading hairs.
 3a. Leaflets adaxially glabrous, abaxially with scattered hairs only; peduncles with few scattered hairs;
 calyx teeth 4–5 mm 373. *A. cysticalyx*
 3b. At least some leaflets hairy adaxially, all sparsely to rather densely hairy abaxially; peduncles mostly
 distinctly hairy; calyx teeth 2–3 mm.
 4a. Fruiting calyx 12–13 mm, covered with symmetrically to strongly asymmetrically bifurcate,
 ascending, predominantly black hairs; standard 16–18 mm; legumes covered with spreading
 predominantly black hairs ca. 1 mm, without distinctly shorter hairs 377. *A. majevskianus*
 4b. Fruiting calyx 14 mm or longer, covered with strongly asymmetrically to basifixed,
 predominantly longer white hairs and with distinctly shorter black hairs; standard mostly
 distinctly longer; legumes covered with predominantly white or golden yellowish hairs
 and with or without shorter black hairs.
 5a. Leaflets elliptic, 10–20 × 4–11 mm; longer white calyx hairs ascending; standard narrowly
 oblong, 17–25 × ca. 6 mm, constricted in middle 374. *A. dendroides*
 5b. Leaflets distinctly relatively narrower; longer white calyx hairs at least partly spreading;
 standard obovate, if narrowly oblong, then not constricted.

- 6a. Leaflets in 3 or 4 pairs, narrowly elliptic, 10–35 × 4–10 mm; peduncles 3–5 cm, sparsely white hairy to subglabrous; standard obovate, 20–26 × 8–10 mm; legumes villous with long, golden yellowish hairs, on ventral side with shorter black hairs mixed in 380. *A. xanthotrichos*
- 6b. Leaflets in 4–7 pairs, mostly linear; peduncles 9–15 cm, ± densely hairy; standard shorter; legumes (ovary) with white hairs.
- 7a. Leaflets narrowly linear, 10–20 × 1–1.5 mm; standard narrowly oblong, ca. 19 × 4 mm; wing limbs obtuse 375. *A. gongliuensis*
- 7b. Leaflets linear to very narrowly elliptic, 13–22 × 2–4 mm; standard obovate, constricted below middle, ca. 20 × 6 mm; wing limbs obliquely emarginate 376. *A. leuocladus*

373. *Astragalus cysticalyx* Ledebour, Fl. Ross. 1: 643. 1843.

囊萼黄耆 nang e huang qi

Astragalus physocalyx Karelin & Kirilov (1841), not Fischer (1837).

Plants subshrubby, up to 60 cm tall, vegetative parts sparsely covered with ± medifixed, appressed, white hairs 0.5–1 mm. Stems branched, old parts ligneous; stems of current year 7–17 cm, sparsely hairy. Leaves 6–9 cm, subsessile; stipules 5–9 mm, adnate to petiole for 1–2 mm, sparsely covered with appressed, mostly white hairs; rachis sparsely appressed hairy; leaflets in 4 or 5 pairs, 13–35 × 4–8 mm, covered with scattered hairs abaxially, glabrous adaxially. Racemes ovoid, (3.5–)4–6 × ca. 3.5 cm, densely many flowered; peduncle 8–15(–22) cm, with scattered appressed hairs; bracts 5–9 mm, with spreading black hairs. Calyx at anthesis tubular, ca. 12 mm, later enlarged, spherical-ovoid, 13–14 mm, villous, rather densely covered with ± spreading, basifixed, white hairs 1–1.5 mm and toward teeth increasingly covered with distinctly shorter, ± appressed, subbasifixed to strongly asymmetrically bifurcate, black hairs; teeth 4–5 mm. Petals dingy yellow; standard narrowly obovate, 18–20 × 5–6 mm, apex slightly emarginate; wings 19–20 mm; keel 14–17 mm. Legumes included in persistent calyx, sessile, oblong, ca. 10 mm, densely villous with ± spreading white hairs.

Xinjiang [Kazakhstan].

374. *Astragalus dendroides* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 339. 1842.

树黄耆 shu huang qi

Plants subshrubby, up to 100 cm tall, covered with mostly appressed and ± medifixed hairs 0.5–1(–1.2) mm. Stems in parts of current year densely to rather densely covered with appressed white hairs, at nodes sometimes also with some black hairs. Leaves 3–9 cm; stipules 5–8(–10) mm, adnate to petiole for 2–3 mm, loosely to rather densely white and black hairy; petiole 0.4–1.2 cm, like rachis loosely white hairy; leaflets in 4 or 5(or 6) pairs, (5–)10–20 × (3–)4–11 mm, abaxially loosely to rather densely hairy, adaxially glabrous or sparsely hairy, rarely loosely appressed hairy. Racemes shortly cylindrical, 3–7 cm, densely many flowered; peduncle 3–14 cm, loosely covered with white hairs, toward raceme increasingly black hairy; bracts 4–7(–8) mm, with mostly subbasifixed to basifixed black and sometimes a few white hairs. Calyx 10–13 mm, during anthesis becoming inflated ovoid, at least up to 15 mm and up to 7 mm in diam., loosely to rather densely covered with subbasifixed to basifixed, nearly straight, ascending, white hairs up to 1.8 mm and with much shorter, symmetrically or asymmetrically bifur-

cate, flexuous, subappressed, black hairs; teeth 2–2.5 mm. Petals greenish yellow; standard oblong, 17–25 × ca. 6 mm, slightly constricted in lower part, apex slightly emarginate; wings 16–18 mm; keel 13–15 mm. Legumes sessile, included in calyx, 9–11 mm, ca. 4 mm high and ca. 2.5 mm wide, with a beak up to 2 mm, 2-locular; valves densely covered with ascending to spreading, basifixed, white hairs up to 2 mm and sitting on indistinct tubercles and with some strongly asymmetrically bifurcate, spreading, partly very short, black hairs.

Steppes. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

375. *Astragalus gongliuensis* Podlech & L. R. Xu, Novon 17: 233. 2007.

巩留黄耆 gong liu huang qi

Plants subshrubby, 25–45 cm tall. Stems branched, older parts ligneous, 3–4 cm, parts of current year up to 20 cm, very densely covered with medifixed, appressed, white hairs ca. 1 mm, toward nodes with scattered black hairs mixed in. Leaves 4–8 cm, subsessile; stipules 4–6 mm, adnate to petiole for 1–2 mm, densely appressed hairy like stem; rachis densely white hairy like stem; leaflets in 5–7 pairs, 10–20 × 1–1.5 mm, abaxially densely and adaxially sparsely to loosely covered with medifixed hairs 1–1.5 mm. Racemes 3–4 × ca. 3 cm, densely ca. 12-flowered; peduncle 10–13 cm, densely hairy like stem, toward raceme with some black hairs mixed in; bracts 3–4 mm, covered with subbasifixed to basifixed, spreading, white hairs 1–1.5 mm, with shorter black hairs mixed in. Calyx at anthesis tubular, soon inflated ovoid, ca. 14 mm, loosely covered with strongly to extremely asymmetrically bifurcate, ascending to spreading, white hairs 1–2 mm and with more symmetrically bifurcate, subappressed, black hairs 0.5–1 mm. Petals yellow; standard narrowly oblong, ca. 19 × 4 mm, apex emarginate; wings ca. 17 mm; keel ca. 16 mm. Ovary sessile, densely covered with subbasifixed, ascending, white hairs at least 1.5 mm. Legumes unknown.

• Xinjiang.

376. *Astragalus leuocladus* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 27. 1866.

白枝黄耆 bai zhi huang qi

Plants 30–45 cm tall, densely covered with mostly ± medifixed hairs. Stems branched at base, those of current year 9–16 cm, densely covered with white hairs 0.5–0.8 mm, at nodes also with black hairs. Leaves 4–6 cm, subsessile; stipules 4–7 mm, adnate to petiole for up to 1 mm, covered with white and predominantly black hairs; rachis loosely to rather densely hairy

like stem; leaflets in 4–6 pairs, 13–22 × 2–4 mm, abaxially loosely and adaxially sparsely covered with appressed white hairs 1–1.5 mm. Racemes short, densely 8–12-flowered; peduncle 9–15 cm, rather densely hairy like stem; bracts 4–5 mm, covered with mostly strongly asymmetrically bifurcate to basifixed, spreading, black and white hairs ca. 1 mm. Calyx at anthesis ca. 12 mm, tubular, rather densely covered with mostly strongly asymmetrically bifurcate, ± spreading, white hairs up to 1.5 mm and with shorter, mostly more symmetrically medifixed, black hairs; teeth 2–2.5 mm; calyx soon becoming inflated, at fruiting time ovoid, ca. 15 × 6–7 mm, loosely hairy. Petals yellow; standard obovate, ca. 20 × 6 mm, slightly constricted in middle, apex emarginate; wings 17–18 mm, limbs obliquely emarginate; keel 15–16 mm. Legumes included in calyx, ca. 10 mm, ca. 3 mm high (immature), with a slender beak ca. 2 mm, 2-locular; valves densely covered with mostly basifixed, spreading, white hairs ca. 2 mm and with much shorter black hairs up to 0.5 mm.

Steppes. Xinjiang [Kazakhstan].

377. *Astragalus majevskianus* Krylov, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1932(3): 1. 1932.

富蕴黄耆 fu yun huang qi

Plants 25–50(–100) cm tall, densely covered with mostly ± medifixed hairs. Stems branched, old parts long, ligneous; parts of current year 9–16 cm, densely covered with white and black hairs 0.4–0.8 mm. Leaves 3–7 cm; stipules 4–7 mm, adnate to petiole for ca. 1.2 mm, covered with white and predominantly black hairs; petiole 0.5–1 cm, like rachis sparsely to loosely white and black hairy; leaflets in 5 or 6(–8) pairs, 7–25 × 1–4(–10) mm, both surfaces or more rarely only abaxially sparsely covered with white and sometimes a few black hairs up to 1.2 mm. Racemes 4–5 cm, densely many flowered, at fruiting time elongating up to 10 cm; peduncle 4–7 cm, sparsely to loosely white and black hairy; bracts 3–4 mm, covered with mostly strongly asymmetrically bifurcate to basifixed, spreading, black and sometimes a few white hairs. Calyx at anthesis 10–11 mm, tubular, rather densely covered with ± symmetrically to strongly asymmetrically bifurcate, ascending, black and sometimes a few white hairs up to 1 mm; teeth 2.5–3 mm; calyx soon becoming inflated, at fruiting time ovoid, 12–13(–14) mm, ca. 5 mm in diam., loosely hairy. Petals pale yellow; standard obovate, 16–18 × ca. 7 mm, slightly constricted in middle, apex emarginate; wings 15–17 mm; keel 14–16 mm. Legume included in calyx, 8–9 mm, ca. 2.5 mm high (immature), compressed laterally, with a beak ca. 1 mm, 2-locular; valves densely covered with mostly basifixed, spreading, white and predominantly black hairs ca. 1 mm.

Forest margins; ca. 1600 m. Xinjiang [Kazakhstan, Mongolia].

378. *Astragalus scleropodius* Ledebour, Fl. Altaic. 3: 326. 1831.

硬柄黄耆 ying bing huang qi

Plants subshrubby, 30–50 cm tall. Stems of current year 5–25 cm, slender, sparsely to rather densely covered with medifixed, appressed, white hairs 0.3–0.5 mm, at nodes with black

hairs mixed in. Leaves 2.5–6 cm; stipules 4–8 mm, adnate to petiole for ca. 2 mm, loosely appressed white and black hairy; petiole 0.5–1.5(–2) cm, with rachis sparsely to loosely hairy like stem; leaflets in 5–10 pairs, 10–28 × (3–)4–7 mm, abaxially covered with medifixed, appressed hairs 0.7–1 mm, adaxially glabrous or nearly so. Racemes 3–8 cm, 1-sided, 8- to many flowered; peduncle up to 6(–8) cm, sparsely hairy; bracts 4–7 mm, sparsely covered with basifixed, black or mixed white and black hairs. Calyx already during anthesis inflated ovoid, ca. 13 mm, loosely covered with subappressed, mostly subbasifixed, white hairs 0.7–1 mm and with shorter, bifurcate, black hairs; teeth 2.5–4 mm. Petals yellow; standard obovate, 15–16 mm, apex emarginate; wings 14–15 mm. Legumes with a beak 1–1.5 mm, 2-locular; valves covered with spreading black and very sparsely with white hairs.

Xinjiang [Kazakhstan].

379. *Astragalus tyttocarpus* Gontscharov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 148. 1946.

细果黄耆 xi guo huang qi

Astragalus woldemarii Juzepczuk; ?*A. woldemarii* var. *atrotrichocladus* S. B. Ho.

Plants subshrubby, 25–45 cm tall. Stems branched, parts of current year (3–)5–15(–20) cm, densely appressed white hairy, with scattered or toward nodes more numerous black hairs mixed in. Leaves 4–7 cm, subsessile; stipules 4–6 mm, adnate to petiole, lower ones connate at base, covered with appressed black and mostly with fewer white hairs; rachis appressed hairy; leaflets in 5–8 pairs, (10–)12–35 × 2–4 mm, abaxially sparsely covered with appressed hairs, adaxially covered with scattered hairs. Racemes (4–)6–10 cm, densely few to many flowered; peduncle up to 12 cm, appressed white hairy, toward raceme with black hairs mixed in; bracts (2–)4–5 mm, black hairy. Calyx in fruit narrowly ovoid, 8–11 mm, sparsely covered with ascending white hairs and subappressed, short, black hairs; teeth 2–2.5 mm. Petals dirty yellow; standard elliptic-pandurate, 17–20 mm, slightly constricted below middle, apex scarcely emarginate; wings 15–16 mm. Legumes ca. 5 mm, ca. 2.5 mm high, with a beak 1–1.5 mm, 2-locular; valves covered with subappressed white and black hairs.

Xinjiang [Kazakhstan, Kyrgyzstan].

In China, *Astragalus woldemarii* var. *atrotrichocladus* S. B. Ho (Bull. Bot. Res., Harbin 3(4): 56. 1983) is said to differ from the typical plant by its higher growth, 50–100 cm tall, young stems with black hairs only, and leaves white hairy on both surfaces. Because we have not seen the type, we cannot determine if it is a separate species. Therefore, we have not made a formal transfer of this variety to *A. tyttocarpus*.

380. *Astragalus xanthotrichos* Ledebour, Fl. Altaic. 3: 324. 1831.

黄毛黄耆 huang mao huang qi

Plants subshrubby, 20–50(–90) cm tall, vegetative parts covered with medifixed, appressed, mostly white hairs 0.8–1 mm. Stems of current year 6–13 cm, often branched at base, densely hairy. Leaves 3–7 cm; stipules 5–8 mm, adnate to petiole for ca. 2 mm, densely hairy, sometimes soon glabrescent;

petiole 0.7–1.2 cm, like rachis loosely to rather densely hairy; leaflets in 3 or 4 pairs, 10–35 × 4–10(–12) mm, abaxially sparsely to loosely covered with appressed hairs 0.8–1.5 mm, adaxially sparsely hairy or nearly glabrous. Racemes subspherical, 3–5 cm in diam., 4–8-flowered; peduncle 3–5 cm, sparsely white hairy to partly subglabrous; bracts 4–7 mm, white and black hairy. Calyx at anthesis ca. 12 mm, tubular, rather densely covered with basifixed to subbasifixed, spreading, white hairs 1–1.5 mm and with strongly asymmetrically bifurcate, shorter,

mostly subappressed to ascending, black hairs; teeth subulate, 2.5–3 mm; calyx at fruiting time ovoid, 15–18 mm. Petals yellow; standard obovate, 20–26 × 8–10 mm, apex widely retuse; wings 18–23 mm; keel 18–22 mm. Legumes 12–14 mm, ca. 3.5 mm high, with a beak 1–1.5 mm, 2-locular; valves villous with spreading white and golden hairs, at apex and sometimes also on ventral side with shorter black hairs mixed in.

Xinjiang [Kazakhstan].

58. *Astragalus* sect. *Hypsophili* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 136. 1868 [*"Hypsophilus"*].

雪地组 xue di zu

Plants perennial, herbaceous, caulescent, covered with symmetrically or asymmetrically bifurcate hairs. Stipules free from petiole, high vaginate-connate behind stem. Racemes borne on long peduncles, spherical, few flowered. Bracteoles absent. Calyx at beginning of anthesis tubular, soon elongating and becoming inflated, bladderlike ovoid in fruit, not ruptured by legume. Legumes shortly stipitate, small, keeled ventrally, grooved dorsally, compressed laterally, incompletely 2-locular.

Four species: China, one also in C Asia and from Afghanistan to India; four species (three endemic) in China.

- 1a. Leaflets on both surfaces densely hairy 383. *A. nivalis*
 1b. Leaflets adaxially glabrous, abaxially sparsely to loosely hairy.
 2a. Calyx 12–14 mm in flower, 14–16 mm in fruit; standard 23–27 mm 381. *A. burchan-buddaicus*
 2b. Calyx 8–11 mm in flower, 10–12 mm in fruit; standard 18–21 mm.
 3a. Plants 25–35 cm tall; peduncles 5–18 cm, sparsely to very sparsely hairy; calyx with black hairs 0.4–1.2 mm and with white hairs up to 1.5 mm; ovary with a stipe 1.5–2 mm 384. *A. yechengensis*
 3b. Plants 12–20 cm tall; peduncles 1–3 cm, rather densely hairy; calyx with black hairs 0.3–0.5 mm and with slightly longer white hairs; ovary subsessile 382. *A. kukunoricus*

381. *Astragalus burchan-buddaicus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 104. 1996.

布尔卡黄耆 bu er ka huang qi

Plants 20–40 cm tall, loosely caespitose, vegetative parts covered with ± medifixed, appressed hairs 0.4–0.8 mm. Stems many, branched at base, 6–35 cm, loosely white hairy, below nodes mostly also with black hairs. Leaves 4–6 cm; stipules 5–10 mm, sparsely to loosely covered with white or black and white hairs; petiole 1–1.5 cm, like rachis loosely to rather densely white hairy; leaflets in 6–8 pairs, 5–10 × 2–4 mm, abaxially loosely white hairy, adaxially glabrous. Racemes spherical, 1.5–3 cm, densely 5–8-flowered; peduncle 4–7 cm, hairy; bracts 5–8 mm, mostly black hairy. Calyx at anthesis tubular, 12–14 mm, soon inflated, spherical to ovoid, 14–16 mm, loosely to rather densely covered with appressed to ascending, symmetrically to strongly asymmetrically bifurcate, black hairs 0.2–0.5 mm and with ascending to partly ± spreading, white hairs up to 1 mm; teeth 1–1.5(–2) mm. Petals pale pink; standard narrowly obovate, 23–27 × 5–8 mm, constricted below middle, apex widely emarginate; wings 20–24 mm, limbs obtriangular, widest at obliquely bilobed tip; keel 16–20 mm. Legumes with a stipe 1–2 mm, included in calyx, 7–9 mm, 3–3.5 mm high, compressed laterally, with a strongly bent style 0.6–2 mm, incompletely 2-locular; valves densely covered with ascending to spreading, subbasifixed to basifixed, white hairs up to 1.5 mm and often also with much shorter black hairs.

• Qinghai.

382. *Astragalus kukunoricus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 107. 1996.

青海黄耆 qing hai huang qi

Astragalus nivalis Karelin & Kirilov var. *aureocalycatus* S. B. Ho.

Plants 12–20 cm tall, caespitose. Stems several, branched at base, densely to very densely covered with somewhat flattened, medifixed, appressed, white hairs 0.3–0.6 mm. Leaves 1–6 cm; stipules 4–6 mm, loosely white hairy, partly glabrescent; petiole 0.3–2 cm, together with rachis hairy like stem; leaflets in 5–8 pairs, 2–8 × 1–3 mm, abaxially sparsely to loosely appressed white hairy, adaxially glabrous or subglabrous. Racemes 1–2.5 cm, few flowered; peduncle 1–3 cm, rather densely hairy; bracts 3–4(–5) mm, white and black hairy, at margins with basifixed hairs. Calyx at anthesis tubular, 8–11 mm, soon inflated and ovoid to globose, 10–12 mm, loosely to rather densely covered with appressed, ± medifixed, black hairs 0.3–0.5 mm and with ascending, strongly asymmetrically bifurcate to basifixed, slightly longer, tangled, white hairs; teeth 0.5–1.5 mm. Petals pale lilac or white with violet-tipped keel; standard narrowly obovate, 18–21 × ca. 7 mm, apex retuse; wings 16–19 mm; keel 13–16(–17) mm. Legumes with a stipe 0.7–1 mm, 9–10 mm, 3–3.5 mm high, nearly without or with an inconspicuous, reflexed beak.

• Gansu, Qinghai, Xinjiang.

383. *Astragalus nivalis* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 341. 1842.

雪地黄耆 xue di huang qi

Astragalus nathaliae Meffert; *A. orthanthoides* Borissova; *A. orthanthus* Freyn.

Plants 8–25 cm tall, loosely caespitose, covered with mostly medifixed hairs. Stems 4–15 cm, loosely covered with appressed white hairs 0.3–0.5 mm. Leaves 2–4 cm; stipules 2–4 mm, sparsely to loosely covered with appressed white or black or white and black hairs; petiole 0.5–1 cm, like rachis slender, rather densely white hairy; leaflets in 4–8 pairs, (1–)2–8 × 1–4 mm, both surfaces densely covered with appressed hairs. Racemes densely 5–10-flowered; peduncle 2–5(–8) cm, hairy; bracts 2–5 mm, mostly black hairy. Calyx at anthesis tubular, 8–13 mm, soon bladderlike inflated, spherical to ovoid, 10–15(–17) mm, rather densely covered with appressed to ascending, symmetrically to strongly asymmetrically bifurcate, black hairs 0.1–1 mm and with ± spreading, rarely subappressed, subbasifixed to basifixed, mostly longer, white hairs in different relations; teeth 1–2 mm. Petals violet or pink; standard obovate, 17–21 × 7–9 mm, constricted below middle, apex emarginate; wings 17–20 mm, limbs obtriangular, widest at obliquely bilobed tip; keel 14–17 mm. Legumes with a stipe 0.5–1.5 mm, included in calyx, 5–9 mm, 3–3.5 mm high, compressed laterally, with a strongly bent slender style 0.6–2 mm, incompletely 2-locular; valves densely covered with spreading, subbasifixed to basifixed, white hairs up to 1.5 mm and often also with much shorter black hairs.

Gansu, Qinghai, Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Tajikistan].

384. *Astragalus yechengensis* Podlech & L. R. Xu, Novon 17: 236. 2007.

叶城黄耆 ye cheng huang qi

Plants 25–35 cm tall. Stems several, densely covered with medifixed, appressed, white hairs 0.3–0.6 mm, with some black hairs mixed in, especially toward nodes. Leaves 3–7 cm; stipules 3–4 mm, free from petiole, high connate behind stem, loosely white and black hairy, partly glabrescent with age; petiole 0.4–1.5 cm, with rachis hairy like stem; leaflets in 5–8 pairs, 4–7 × 1.5–3 mm, abaxially sparsely to loosely covered with appressed white hairs 0.4–0.8 mm, adaxially glabrous. Racemes ca. 3 cm, densely 8–10-flowered; peduncle 5–18 cm, sparsely to very sparsely hairy like stem; bracts 3–4 mm, with strongly asymmetrically bifurcate to basifixed white and black hairs. Calyx at anthesis narrowly ellipsoid, ca. 11 mm, loosely covered with subappressed, symmetrically to strongly asymmetrically bifurcate, flexuous, black hairs 0.4–1.2 mm and with fewer, strongly asymmetrically bifurcate to basifixed, white hairs 1–1.5 mm; teeth ca. 1 mm. Petals probably white with violet-tipped keel or pale violet; standard narrowly obovate, 19–20 × ca. 7 mm, apex retuse; wings 16–17 mm; keel 14–15 mm. Ovary with a stipe 1.5–2 mm, white and black hairy. Legumes unknown.

• Xinjiang (Kashi Diqu).

59. *Astragalus* sect. *Laguropsis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 137. 1868.

兔尾组 tu wei zu

Plants perennial, acaulescent or nearly so, with bifurcate hairs. Stipules shortly or high adnate to petiole, otherwise free or more rarely distinctly vaginate-connate. Inflorescences with a well-developed peduncle, densely mostly many flowered. Bracteoles absent. Calyx tubular at beginning of anthesis, at length bladderlike inflated. Legumes mostly included in calyx, sessile to subsessile, rarely distinctly stipitate, 2-locular or 1-locular.

Forty-three species: Afghanistan, China, Mongolia, Russia (Siberia); C Asia, SW Asia (Caucasus, Iran, Turkey), E Europe; 17 species (eight endemic) in China.

- 1a. Petals purple or violet (in *A. dilutus* sometimes yellow with purple keel), sometimes drying yellowish brown, but mostly purple.
- 2a. Calyx 7–8 mm; bracts 2–2.5 mm; standard ca. 15 mm; stipules high connate behind stem 387. *A. chamaephyton*
- 2b. Calyx and standard longer, bracts mostly longer; stipules free from each other.
- 3a. Calyx teeth ca. 0.5 mm; plants only white hairy 390. *A. grum-grshimailoi*
- 3b. Calyx teeth longer; plants at least at calyx teeth but mostly elsewhere with black hairs, if only with white hairs (*A. sabuletorum*), then calyx teeth 3–4 mm.
- 4a. Standard 20–24 × ca. 7 mm, rhombic-elliptic, without distinct claw; leaflets in 4–9 pairs 399. *A. tekesensis*
- 4b. Standard at most up to 20 mm, with a ± distinct claw; leaflets in mostly fewer pairs.
- 5a. Most leaflets more than 10 mm and up to 15–25 mm; wings 2–4 mm shorter than standard.
- 6a. Leaflets in 3–5 pairs, in basal leaves often only in 1 or 2 pairs; bracts 5–10 mm; calyx covered with spreading hairs; legumes sessile 392. *A. laguroides*
- 6b. Leaflets in 5–9 pairs; bracts 3–5 mm; calyx covered with appressed hairs; legumes with a stipe 1–1.5 mm 396. *A. sabuletorum*
- 5b. Leaflets up to 10 mm; wings as long as standard or ca. 1 mm shorter.
- 7a. Leaflets in 2–4 pairs; bracts white and black hairy; calyx covered with spreading hairs 394. *A. obtusifoliolus*
- 7b. Leaflets in at least 4 pairs, but mostly in more; bracts white hairy; calyx appressed hairy.
- 8a. Calyx at anthesis 9–10 mm, with teeth 1–1.5 mm; standard limb elliptic; petals pale purple or yellow with purple keel 388. *A. dilutus*
- 8b. Calyx at anthesis 13–14 mm, with teeth 2.5–3.5 mm; standard limb obovate-pandurate; petals purplish 395. *A. ochrius*

- 1b. Petals all yellow.
- 9a. Stipules 4–7 mm, adnate to petiole for ca. 2 mm, sometimes connate in front of petiole higher up, always connate behind stem up to 3/4 of length 397. *A. sphaerocystis*
- 9b. Stipules never connate behind stem or around petiole.
- 10a. Leaves 1–2 cm; leaflets in 1 or 2 pairs 400. *A. wenquanensis*
- 10b. Leaves longer; leaflets in more pairs.
- 11a. Standard ca. 14 mm 393. *A. novissimus*
- 11b. Standard at least 17 mm but mostly longer.
- 12a. Calyx covered with appressed hairs.
- 13a. Stipules 4–10 mm, adnate to petiole for 2–4 mm; calyx teeth 3–7 mm; legumes sessile, 7–8 mm, covered with asymmetrically bifurcate, ascending to spreading hairs 398. *A. taiyuanensis*
- 13b. Stipules 3–5 mm, very shortly adnate to petiole; calyx teeth up to 3 mm; legumes stipitate, longer, covered with medifixed, appressed hairs.
- 14a. Wing limbs deeply bilobed; ovary and legumes with a stipe 3–3.5 mm, grooved dorsally, incompletely 2-locular 401. *A. zaissanensis*
- 14b. Wing limbs slightly emarginate; ovary and legumes with a stipe 1–1.5 mm, narrowly rounded dorsally, 2-locular 391. *A. kurtschumensis*
- 12b. Calyx covered with spreading hairs.
- 15a. Leaflets in 2–5 pairs; stipules 10–17 mm; bracts 6–9 mm 386. *A. baotouensis*
- 15b. Leaflets in at least 4 pairs but in most leaves in distinctly more; stipules up to 8 mm; bracts at most up to 5 mm.
- 16a. Stipules 6–8 mm, high adnate to petiole, covered with strongly asymmetrically bifurcate hairs; leaflets 5–10 × 1.5–4 mm, very densely silvery hairy; peduncles longer than leaves 385. *A. arkalycensis*
- 16b. Stipules very shortly adnate to petiole, covered with medifixed hairs; leaflets mostly longer and distinctly wider, 6–25 × 4–13 mm, densely but not silvery hairy; peduncles shorter than leaves 389. *A. ellipsoideus*

385. *Astragalus arkalycensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 139. 1868.

边塞黄耆 *bian sai huang qi*

Astragalus ellipsoideus Ledebour var. *abbreviatus* Ledebour.

Plants 5–15 cm tall, acaulescent, densely matlike caespitose. Leaves 5–10 cm; stipules 6–8 mm, high adnate to petiole, densely white hairy; petiole 2.5–5 cm, slender, densely appressed white hairy; leaflets in (5–)7–11(–14) pairs, 5–10 × 1.5–4 mm, both surfaces silvery hairy with dense appressed hairs. Racemes spherical to shortly ellipsoid, 3–4 cm, densely many flowered; peduncle 6–15 cm, stout, densely covered with medifixed, appressed, white hairs; bracts 4–5 mm, white or white and black hairy. Calyx at anthesis tubular, ca. 10 mm, later on inflated ovoid and 13–15 mm, rather densely covered with spreading white hairs, at teeth with black hairs mixed in; teeth 2.5–3 mm. Petals yellow; standard narrowly obovate, 18–22 × 5–6 mm, apex emarginate; wings 17–20 mm; keel 16–19 mm. Legumes 9–10 mm, 3–4 mm high, shortly acuminate, 2-locular; valves densely covered with short spreading hairs.

Gansu, Nei Mongol, Ningxia, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

386. *Astragalus baotouensis* H. C. Fu, Fl. Intramongol., ed. 2, 3: 670. 1989.

包头黄耆 *bao tou huang qi*

Plants 15–30 cm tall, subacaulescent, caespitose. Leaves 10–30 cm; stipules 10–17 mm, densely appressed hairy; petiole

5–15 cm; leaflets in 2–5 pairs, 10–30(–35) × 3–12 mm, both surfaces appressed hairy. Racemes ovoid to oblong, 3–7 × 3–3.5 cm, densely many flowered; peduncle as long as or shorter than leaves, covered with white or also black hairs; bracts 6–9 mm, white ciliate. Calyx tubular at anthesis, soon inflated ovoid, 12–15 mm, densely villous with spreading white hairs; teeth 5–6 mm, white and black hairy. Petals yellow; standard 20–22 mm, limb obovate, slightly emarginate; wings ca. 20 mm; keel ca. 18 mm. Ovary sessile, narrowly ellipsoid, densely white hairy. Legumes unknown.

• Nei Mongol.

387. *Astragalus chamaephyton* Podlech & L. R. Xu, Novon 17: 238. 2007.

低矮黄耆 *di ai huang qi*

Plants ca. 7 cm tall, acaulescent, vegetative parts covered with medifixed, appressed, white hairs 0.5–0.8 mm. Leaves 1.5–2.5 cm; stipules ca. 3 mm, adnate to petiole for ca. 1 mm, high connate behind stem, loosely to rather densely subappressed hairy; petiole 0.5–1 cm, like rachis very densely hairy; leaflets in 2 or 3 pairs, 4–7 × 1.5–2.5 mm, both surfaces densely hairy. Racemes globose to ovoid, 2–3 cm, densely 12–15-flowered; peduncle ca. 4 cm, rather densely hairy like rachis, toward raceme with increasingly black hairs; bracts 2–2.5 mm, with strongly asymmetrically bifurcate to basifixed white and black hairs. Calyx soon becoming inflated ovoid, 7–8 mm, loosely covered with strongly asymmetrically bifurcate to basifixed, tangled, spreading, white and black hairs; teeth ca. 1 mm. Petals violet; standard narrowly oblong, ca. 15 × 5 mm, mostly slightly

constricted in lower 1/3, apex rounded; wings ca. 14 mm, limbs obliquely emarginate; keel ca. 13 mm. Ovary sessile, glabrous. Legumes unknown.

• Xinjiang.

388. *Astragalus dilutus* Bunge, Delect. Sem. Horti Bot. Dorpat. 1840: 7. 1840.

浅黄耆 qian huang qi

Plants 3–10 cm tall, acaulescent, caespitose, with mostly \pm symmetrically medifixed, appressed to subappressed hairs 0.8–1.5 mm. Leaves 2–7 cm; stipules 3–4 mm, adnate to petiole for ca. 1 mm, densely covered with subappressed white hairs; petiole 1–2.5 cm, like rachis densely hairy; leaflets in 4–6 pairs, 4–8(–12) \times 2–4(–5) mm, very densely covered on both surfaces with subappressed hairs. Racemes subspherical to ovoid, densely 8–15-flowered; peduncle 1–7(–10) cm, densely white hairy, toward raceme with black hairs mixed in; bracts 3–5 mm, covered with partly strongly asymmetrically bifurcate white hairs especially at margins. Calyx at anthesis tubular, 9–10 mm, loosely covered with appressed black and white hairs; teeth 1–1.5 mm; fruiting calyx slightly elongated, up to 12 mm, inflated ellipsoid; teeth up to 2 mm. Petals pale purplish to yellowish with purple keel; standard elliptic, 17–20 \times 5–6 mm, distinctly emarginate; wings 16–19 mm; keel 13–15 mm. Legumes included in calyx, subsessile, 8–10 mm, 3–3.5 mm high and 1.5–2 mm wide, with a beak ca. 1 mm, 2-locular; valves rather densely covered with strongly asymmetrically bifurcate, spreading, white hairs up to 2 mm.

Xinjiang [Mongolia, Russia (Siberia)].

389. *Astragalus ellipsoideus* Ledebour, Fl. Altaic. 3: 319. 1831.

胀萼黄耆 zhang e huang qi

Astragalus ellipsoideus var. *kuldshensis* Basilevskaja; *A. transiliensis* Gontscharov.

Plants 13–27 cm tall, acaulescent to subacaulescent, caespitose, vegetative parts covered with \pm medifixed, appressed, white hairs 0.8–1 mm. Leaves 7–20 cm; stipules 5–8 mm, very shortly adnate to petiole, densely hairy; petiole 2–7 cm, like rachis stout, densely hairy; leaflets in 4–8 pairs, 6–25 \times 4–13 mm, both surfaces densely hairy. Racemes ovoid, (4–)5–6 cm, 3–3.5 cm in diam., very densely many flowered; peduncle stout, 12–19 cm, covered with appressed white hairs; bracts 2–5 mm, with mostly basifixed, white or black hairs. Calyx at anthesis tubular, ca. 10 mm; teeth 2–2.5 mm; fruiting calyx inflated ovoid, 12–18 mm, rather densely covered with basifixed, tangled, spreading, white hairs 1–2 mm and often, especially at teeth, with black hairs mixed in; teeth (2–)4–6 mm. Petals yellowish; standard obovate, 20–24 \times 7–10 mm, apex widely emarginate; wings 19–23 mm, limbs narrowly oblong to obtriangular-spatulate, obliquely emarginate; keel 17–19 mm. Legumes enclosed in calyx, with a stipe ca. 1 mm, 12–15 mm, ca. 4 mm high, 2-locular; valves densely covered with spreading white hairs 1.5–2 mm.

Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Kazakhstan, Mongolia].

390. *Astragalus grum-grshimailoi* Palibin, Bull. Herb. Boissier, sér. 2, 8: 158. 1908.

胶黄耆 jiao huang qi

Plants subacaulescent, caespitose, white sericeous. Stems 1–1.5 cm. Leaves 4–5 cm; stipules 1–1.5 mm, shortly adnate to petiole, hairy; petiole 1.5–2 cm; leaflets in (6–)8 or 9 pairs, narrowly elliptic, 5–6(–7) \times 2–2.5 mm, both surfaces covered with appressed, medifixed hairs. Racemes ovoid, 3–4 cm, 4–9-flowered; peduncle 3–3.5 cm, appressed hairy; bracts 1–1.5 mm. Calyx at beginning of anthesis tubular, 9–13 mm, ca. 4 mm in diam., soon enlarging and inflated, ellipsoid to ovoid, covered with short, medifixed, appressed hairs; teeth ca. 0.5 mm. Petals pale yellowish brown when dry; standard 20–21 mm; wings 18–19 mm; keel 15–16 mm. Legumes unknown.

• Xinjiang.

391. *Astragalus kurtshumensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 139. 1868.

库尔楚黄耆 ku er chu huang qi

Plants 12–15 cm tall, acaulescent or nearly so, caespitose, vegetative parts densely covered with medifixed, appressed, white hairs 0.8–1 mm. Stems, if present, up to 2 cm, densely hairy. Leaves 5–15 cm; stipules 3–5 mm, densely hairy; petiole 3–7 cm, like rachis loosely to rather densely hairy; leaflets in 4–12 pairs, 6–14 \times 3–6 mm, both surfaces densely hairy. Racemes spherical, densely 8–12-flowered; peduncle 8–12 cm, densely to rather densely white hairy; bracts 2–3(–5) mm, with appressed white or black and white hairs, at margins with basifixed hairs. Calyx at anthesis tubular, 9–12 mm, soon inflated ovoid and 13–14 mm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed, black and white hairs in different proportions up to 0.8 mm; teeth 1.5–3 mm. Petals pale yellow; standard narrowly obovate, 18–24 \times ca. 7 mm, apex slightly emarginate; wings 16–20 mm; keel 13–18 mm. Legumes with a stipe 1–1.5 mm, enclosed in calyx, 11–13 \times ca. 1.5 mm, compressed laterally, 2-locular; valves covered with appressed, medifixed, white hairs.

Nei Mongol, Ningxia, Xinjiang [Kazakhstan, Mongolia].

392. *Astragalus laguroides* Pallas, Reise Russ. Reich. 3: 750. 1776.

兔尾黄耆 tu wei huang qi

Astragalus gobi-altaicus N. Ulziykhutag; *A. lagurus* Pallas; *A. lupulinus* Pallas var. *laguroides* (Pallas) Basilevskaja.

Plants 5–16(–20) cm tall, acaulescent or nearly so, vegetative parts covered with medifixed, appressed, white hairs 0.8–1.1 mm. Stems, if present, up to 1.5 cm, densely hairy. Leaves 3–14 cm; stipules 6–7(–10) mm, adnate to petiole for 2(–3) mm, hairy; petiole 1.5–5 cm, like rachis densely to rather densely hairy; leaflets in 3–5(–8) pairs, in basal leaves often only in 1 or 2 pairs, 8–25 \times 3–8 mm, both surfaces rather densely hairy, apex acute. Racemes ovoid, 2–6 cm, densely many flowered; peduncle 2–11 cm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed to subappressed, white hairs 0.4–1 mm, toward raceme sometimes also

with some black hairs mixed in; bracts 5–10 mm, covered with asymmetrically bifurcate, at margins with basifixed, white hairs. Calyx at anthesis tubular, soon becoming inflated ovoid, 11–14 mm, loosely to rather densely covered with asymmetrically bifurcate to basifixed, tangled, spreading, white hairs 1–2 mm, with some black hairs mixed in; teeth 3–6 mm. Petals violet; standard narrowly obovate, 17–20 × 6–7 mm, mostly slightly constricted in middle, apex emarginate; wings 14–17 mm; keel 13–15 mm. Legumes included in calyx, sessile, oblong, 7–8 mm, with a hooked beak ca. 1 mm, 1-locular; valves covered with spreading white hairs.

Xinjiang [Mongolia, Russia (Siberia)].

393. *Astragalus novissimus* Podlech & L. R. Xu, *Novon* 14: 223. 2004.

小花兔尾黄耆 xiao hua tu wei huang qi

Astragalus laguroides Pallas var. *micranthus* S. B. Ho.

Plants 8–12 cm tall, acaulescent, with only white hairs. Leaves 3–6 cm; stipules 3–4 mm, nearly free from petiole, appressed hairy, margin with basifixed hairs; petiole 1–3 cm, like rachis loosely to rather densely covered with medifixed, appressed hairs 0.5–1 mm; leaflets in 2–4 pairs, in basal leaves often only in 1 or 2 pairs, 7–12 × 3–5 mm, both surfaces densely to rather densely covered with medifixed, appressed hairs 1.5–2(–3) mm, apex acute. Racemes ovoid, 3–5 cm, densely many flowered; peduncle 3.5–6 cm, loosely to rather densely covered with medifixed, appressed hairs 0.5–1 mm; bracts ca. 2 mm, covered with mostly basifixed hairs. Calyx 11–12 mm, tubular at beginning of anthesis, soon inflated ovoid, rather densely covered with subbasifixed to basifixed, spreading, straight, white hairs 2–3 mm; teeth 3–4 mm. Standard elliptic, ca. 14 × 5 mm, slightly constricted below middle, apex slightly emarginate; wings ca. 13 mm; keel ca. 12 mm. Ovary sessile, hairy. Legumes unknown.

• Nei Mongol.

394. *Astragalus obtusifoliolus* (S. B. Ho) Podlech & L. R. Xu, *Sendtnera* 7: 200. 2001.

钝叶黄耆 dun ye huang qi

Astragalus nobilis Bunge & B. Fedtschenko var. *obtusifoliolus* S. B. Ho, *Bull. Bot. Res.*, Harbin 3(4): 58. 1983.

Plants 7–8 cm tall, acaulescent, vegetative parts covered with ± medifixed, appressed, white hairs. Leaves 2–6 cm; stipules ca. 5 mm, adnate to petiole for 2–3.5 mm, densely covered with hairs up to 1 mm, at margins also with basifixed hairs; petiole 1–3 cm, like rachis densely covered with hairs 0.5–1 mm; leaflets in 2–4 pairs, 4–9 × 2–5 mm, both surfaces densely hairy like rachis, apex rounded to very shortly acuminate. Racemes shortly ovoid, densely many flowered; peduncle 4–5 cm, densely to rather densely white hairy like rachis, in upper part with a few black hairs mixed in; bracts 4–5 mm, with white and black hairs, at margins with basifixed hairs. Calyx soon inflated ovoid, 9–11 mm, 7–9 mm in diam., loosely covered with ± spreading, basifixed to subbasifixed, white hairs 1–1.5 mm and with fewer and slightly shorter, ± medifixed, subappressed, black hairs, whole surface finely rugulose-warty; teeth 1–2 mm.

Petals purple-red (according to diagnosis); standard ovate, ca. 20 × 7 mm, somewhat abruptly constricted in lower 1/3, apex emarginate; wings ca. 18 mm, limbs narrowly oblong, obliquely emarginate; keel 13–15 mm. Legumes subsessile, oblong, 6–7 mm, 3–3.5 mm high and ca. 2 mm wide, with a slender, hooked beak ca. 2 mm with persistent style, 2-locular; valves densely covered with subappressed to partly ascending, subbasifixed, white hairs 0.5–0.8 mm.

• Xinjiang.

395. *Astragalus ochrias* Bunge, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 24: 33. 1877.

中宁黄耆 zhong ning huang qi

Astragalus transiliensis Gontscharow var. *microphyllus* S. B. Ho.

Plants 10–20 cm tall, acaulescent. Leaves 2.5–7 cm; stipules ca. 3 mm, free from each other; petiole 1.5–2.5 cm, like rachis densely covered with medifixed, appressed, white hairs 0.4–0.6 mm; leaflets in 6 or 7 pairs, 3–6 × 1–2.5 mm, both surfaces densely covered with appressed hairs ca. 0.8 mm, apex subacute. Racemes subglobose to ovoid, dense; peduncle 4–8 cm, densely covered with medifixed, appressed, white hairs 0.4–0.5 mm; bracts 2–3 mm, white hairy, at margins also with basifixed hairs. Calyx 12–13 mm, at beginning of anthesis tubular, slightly inflated, later on inflated cylindrical, densely covered with symmetrically or asymmetrically bifurcate, subappressed, flexuous, white hairs 0.8–1 mm, at teeth with some black hairs mixed in; teeth 2.5–4 mm. Petals ?purplish. Standard obovate-oblong-pandurate, ca. 19 × 7 mm, distinctly constricted below middle, apex emarginate; wings ca. 19 mm, limbs narrowly obovate, obliquely emarginate; keel ca. 18 mm. Ovary sessile, narrowly ellipsoid, densely covered with subappressed to ascending white hairs up to 1 mm.

Nei Mongol, Ningxia, Qinghai [Mongolia].

396. *Astragalus sabuletorum* Ledebour, *Fl. Altaic*. 3: 321. 1831.

粗沙黄耆 cu sha huang qi

Plants 7–20 cm tall, nearly acaulescent. Stems of current year at most up to 2 cm, very densely covered with appressed, medifixed, white hairs 0.8–1 mm. Leaves (4–)7–12(–17) cm; stipules ca. 5 mm, adnate to petiole for 2–3 mm, densely covered with appressed to subappressed white hairs; petiole (1.5–)3–7 cm, with rachis densely hairy like stem; leaflets in 5–9 pairs, 7–16(–22) × 3–7(–9) mm, densely covered on both surfaces with appressed, silky, white hairs. Racemes 3–4 cm, densely 6–12-flowered; peduncles 5–16 cm, mostly shorter than leaves, loosely to rather densely white hairy like stem; bracts 3–5(–7) mm, sparsely white hairy, especially at margins with basifixed hairs. Calyx initially tubular, becoming inflated cylindrical-ovoid, 8–11(–12) mm, densely covered with appressed to subappressed, asymmetrically to strongly asymmetrically bifurcate to even partly subbasifixed, white hairs ca. 1 mm; teeth (2–)3–4 mm. Petals pink; standard obovate, 18–20 mm, slightly constricted below middle, apex emarginate; wings 15–16 mm; keel 13–14 mm. Legumes shortly stipitate, 9–11 mm, ca. 3 mm wide,

with a straight, subulate beak 1–2 mm, 2-locular; valves densely appressed white hairy.

Xinjiang [Kazakhstan].

397. *Astragalus sphaerocystis* Bunge, Beitr. Fl. Russl. 97. 1852.

球囊黄耆 qiu nang huang qi

Astragalus baisensis Sumnevicz.

Plants 6–18 cm tall, acaulescent, loosely caespitose, vegetative parts with mostly \pm medifixed, appressed to subappressed hairs 0.8–1 mm. Leaves 2.5–10 cm; stipules 4–7 mm, adnate to petiole for ca. 2 mm, sometimes before petiole higher up shortly connate, connate behind stem up to 3/4 of length, densely covered with subappressed white hairs, at margins with basifixed or subbasifixed hairs; petiole 0.7–3.5 cm, like rachis densely hairy; leaflets in 3–6 pairs, 5–12 \times 2–5(–7) mm, both surfaces very densely hairy. Racemes subspherical to ovoid, densely many flowered, 2.5–4(–8) cm; peduncle 4–12 cm, loosely to rather densely covered with subappressed white hairs, toward raceme also with black hairs; bracts 3–5 mm, covered with strongly asymmetrically bifurcate and especially at margins basifixed white and black hairs. Calyx at anthesis tubular, 10–11 mm, rather densely covered with subappressed, strongly asymmetrically bifurcate, white hairs up to 1.5 mm and with distinctly shorter, \pm medifixed, black hairs; teeth 1.5–2(–2.5) mm; fruiting calyx slightly elongated, bladderlike inflated ovoid, loosely hairy. Petals pale yellowish to whitish; standard oblong-elliptic, 17–18 \times 5–6 mm, slightly constricted in lower 1/3, apex emarginate; wings 16–17 mm, limbs narrowly oblong, obliquely emarginate; keel 13–14 mm. Legumes included in calyx, sessile, 5–10 mm, ca. 3 mm high, compressed laterally, with a short beak, nearly fully 2-locular; valves rather densely hairy, hairs subappressed to ascending, tangled, white, sometimes also some black, up to 1.5 mm.

Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia].

398. *Astragalus taiyuanensis* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 60. 1983.

太原黄耆 tai yuan huang qi

Plants 15–20 cm tall, acaulescent to subacaulescent, caespitose, covered with mostly \pm medifixed, appressed, white hairs. Leaves 6–11 cm; stipules 4–10 mm, adnate to petiole for 2–4 mm, densely hairy; petiole 2–3.5 cm, like rachis densely covered with hairs 0.8–1 mm; leaflets in 5–7 pairs, 5–12 \times 1.5–5 mm, both surfaces rather densely covered with hairs 0.8–1 mm. Racemes globose to ovoid, 3–4 cm, rather densely 5–9-flowered; peduncle 5–12 cm, loosely to densely hairy; bracts 2–3 mm, loosely hairy. Calyx inflated ellipsoid, 12–13 mm, loosely covered with appressed hairs 0.4–1 mm; teeth 3–7 mm. Petals yellowish; standard narrowly oblong-elliptic, 20–22 \times ca. 6 mm, apex emarginate; wings 19–20 mm, limbs narrowly oblong, obliquely emarginate; keel 18–19 mm. Legumes included in calyx, sessile, 7–8 mm, ca. 3 mm high and ca. 2 mm wide, with beak ca. 1 mm, incompletely 2-locular; valves densely covered with asymmetrically bifurcate, tangled, ascending to spreading, white hairs 1–1.5 mm.

• Shaanxi, Shanxi.

399. *Astragalus tekesensis* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 53. 1983.

特克斯黄耆 te ke si huang qi

Plants 10–30 cm tall, subacaulescent. Stems 2–6 cm, with appressed hairs. Leaves 7–17 cm; stipules 3–5 mm, ?free, covered with ascending white hairs; petiole 3–7 cm; leaflets in 4–9 pairs, 10–20 \times 3–7 mm, both surfaces with appressed white hairs. Racemes 4–8 cm, rather densely many flowered; peduncle 4.5–9 cm, loosely covered with appressed white hairs; bracts greenish, 7–10 mm, at margins white and black hairy. Calyx 8–13 mm, at anthesis tubular, soon inflated ovoid, covered with spreading white and black hairs; teeth 3–5 mm, with predominantly black hairs. Petals purple; standard rhombic-elliptic, 20–24 \times ca. 7 mm, without distinct claw, apex emarginate; wings 18–22 mm, limbs narrowly oblong, obliquely emarginate; keel 16–20 mm. Ovary with a stipe ca. 1.5 mm, densely covered with \pm spreading white hairs. Legumes unknown.

• Xinjiang.

400. *Astragalus wenquanensis* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 58. 1983.

温泉黄耆 wen quan huang qi

Plants small, 2–5 cm tall, acaulescent or nearly so. Leaves 1–2 cm; stipules adnate to petiole, white ciliate; petiole longer than rachis, like rachis appressed white hairy; leaflets in 1 or 2 pairs, elliptic or obovate, 4–8 \times 2–4 mm, both surfaces covered with \pm medifixed, appressed hairs. Racemes capitate, densely 5–7-flowered; peduncle 1–2.5 cm, with appressed white hairs, toward racemes also sometimes with black hairs; bracts white villous at margins, longer than pedicels. Calyx from beginning inflated ovoid, 7–13 mm, red suffused, with white and black hairs; teeth 1–2 mm. Petals whitish; standard obovate, 16–18 \times 7–8 mm, in middle slightly constricted, apex emarginate; wings 15–17 mm; keel 14–15 mm. Ovary nearly glabrous. Legumes unknown.

• Xinjiang.

401. *Astragalus zaissanensis* Sumnevicz, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1934(2–3): 4. 1934.

斋桑黄耆 zhai sang huang qi

Plants 6–15 cm tall, nearly acaulescent; hairs appressed, \pm medifixed, in vegetative parts mostly white, 0.5–0.8 mm. Stems, if present, 0.5–2 cm, densely hairy. Leaves 5–11 cm; stipules 3–4 mm, shortly adnate to petiole, densely hairy; petiole 2–5 cm, like rachis densely hairy; leaflets in 3–7 pairs, 4–12 \times 1.5–4 mm, both surfaces very densely hairy. Racemes rather densely 5–11-flowered; peduncle 3–8 cm, densely white hairy; bracts 3–4 mm, sparsely hairy or only ciliate with mostly basifixed white hairs. Calyx at anthesis ca. 7 mm, tubular, loosely to rather densely white hairy; teeth narrowly triangular, ca. 1 mm; fruiting calyx inflated ovoid, 14–15 mm, 6–7 mm in diam., loosely covered with white and some black hairs. Petals sulfur-

yellow; standard elliptic, 20–22 × 5–9 mm, constricted in lower part, apex emarginate; wings 18–20 mm, limbs narrowly oblong, bilobed; keel 15–16 mm. Ovary with a stipe up to 3.5 mm. Legume enclosed in calyx, 8–10 mm, 3–4 mm high, in-

completely 2-locular; valves densely covered with appressed white hairs.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

140. OXYTROPIS Candolle, *Astragalogia*, ed. 4^o, 66; ed. f^o, 53. 1802, nom. cons.

棘豆属 *ji dou shu*

Zhu Xiangyun (朱相云); Stanley L. Welsh, Hiroyoshi Ohashi

Spiesia Necker ex Kuntze.

Perennial herbs or cushionlike shrublets, caulescent or acaulescent, with glandular trichomes, glands, or scalelike or slender basifixed trichomes. Stipules conspicuous, membranous, papery, leathery, scarious, herbaceous, or leaflike, usually persistent, free or adnate to petiole, distinct or connate. Leaves usually imparipinnate, rarely appearing paripinnate by apical leaflet reduced to a spine (*Oxytropis aciphylla*, *O. hystrix*, and *O. tragacanthoides*), rarely 1-foliolate (*O. monophylla* and *O. neimongolica*); leaflets alternate, opposite, subopposite, verticillate, or subverticillate; leaflet blades various in shape, base ± oblique. Inflorescences racemes, spicate or capitate, dense or lax, with 1 to many flowers; bracts usually triangular or lanceolate-triangular. Bracteoles absent or sometimes narrowly triangular. Calyx campanulate, tubular-campanulate, or tubular, with 5 subequal lobes. Corolla various in color, petals clawed; standard various in shape, apex rounded, emarginate, or 2-lobed; wings variously shaped, apex rounded or emarginate; keel variously shaped, apex beaked with vascular bundles reaching beak apex. Stamens diadelphous with 9 connate filaments and 1 ± distinct filament. Ovary sessile or stipitate, glabrous or pubescent. Legume sessile or stipitate, membranous or leathery, enveloped by calyx or exerted from calyx, usually 1-locular or ± 2-locular, septum absent, narrow, or wide.

About 310 species: Africa, Asia, Europe, North America; 133 species (74 endemic) in three subgenera and 20 sections (five endemic) in China.

The genus *Oxytropis* resembles *Astragalus* but is distinguished from the latter in having several species with glandular trichomes, several species with verticillate leaflets (although these are present in *A. alatavicus* and *A. pamirensis*; see pp. 402–403), leaflets basally oblique, and vascular bundles reaching the apex of the corolla keel beak.

The following taxa were reported in FRPS (42(2): 1–145. 1998) but are not treated here. The authors have not seen any Chinese material of these taxa, and in most cases their reported occurrence in China is based on misidentifications in literature covering plants occurring outside of China (except for *Oxytropis falcata* var. *maquensis* which is based on a type from S Gansu): *O. altaica* (Pallas) Persoon, *O. ambigua* (Pallas) Candolle, *O. ampullata* (Pallas) Persoon, *O. biloba* Saposhnikow, *O. bogdoshanica* Jurtzev, *O. caespitosula* Gontscharow, *O. cana* Bunge, *O. chantengriensis* Vassilczenko, *O. chionophylla* Schrenk, *O. chorgossica* Vassilczenko, *O. confusa* Bunge, *O. cuspidata* Bunge, *O. falcata* Bunge var. *maquensis* C. W. Chang, *O. fetisowii* Bunge, *O. floribunda* (Pallas) Candolle, *O. gorbunovii* Borissova, *O. ketmenica* Saposhnikow, *O. kyzitalensis* Vassilczenko, *O. lamuginosa* Komarov, *O. longibracteata* Karelin & Kirilov, *O. macrobotrys* Bunge, *O. martjanovii* Krylov, *O. microsphaera* Bunge, *O. pellita* Bunge, *O. platonychchia* Bunge, *O. rhynchophysa* Schrenk, *O. sarkandensis* Vassilczenko, *O. saurica* Saposhnikow, *O. schrenkii* Trautvetter, *O. semenowii* Bunge, *O. sulphurea* (Fischer) Ledebour, *O. thomsonii* Benthham ex Bunge.

The following taxa are based on Chinese types but are not treated here because additional study is needed to determine if any of these should be recognized or whether they belong to existing taxa: *Oxytropis barkultagi* Grubov & Vassilczenko, *O. burchan-buddae* Grubov & Vassilczenko, *O. candolleorum* Vassilczenko, *O. dehra-duni* Vassilczenko, *O. dschagastaica* Grubov & Vassilczenko, *O. dumbedanica* Grubov & Vassilczenko, *O. kumbelica* Grubov & Vassilczenko, *O. larionovii* Grubov & Vassilczenko, *O. lutchensis* Franchet.

There are additional taxa reported as occurring in China in various publications, but most if not all of these reports are based on misidentifications of Chinese plants in treatments that cover areas outside of China.

Artificial keys

- 1a. Shrubs; leaf rachises persistent or modified as a thorn Key 1 (p. 454)
- 1b. Herbs; leaf rachises sometimes persistent but never modified as a thorn.
 - 2a. Corolla standard and keel pubescent on outer surface Key 2 (p. 454)
 - 2b. Corolla standard and keel glabrous on outer surface.
 - 3a. Plants caulescent, with 1–4 apparent internodes.
 - 4a. Corolla yellow, yellowish, or white Key 3 (p. 454)
 - 4b. Corolla some shade of purple, blue, pink, or less commonly white Key 4 (p. 454)
 - 3b. Plants acaulescent, with no apparent internodes.
 - 5a. Plants glandular, especially on inflorescence and floral parts; leaflets (at least some) verticillate or not verticillate Key 5 (p. 455)
 - 5b. Plants non-glandular or with appressed or yellowish glandular trichomes.
 - 6a. Leaves with leaflets scattered or opposite, none verticillate.
 - 7a. Corolla yellow or white Key 9 (p. 457)
 - 7b. Corolla some shade of purple, blue, or pink Key 10 (p. 457)

- 6b. Leaves with at least some leaflets verticillate.
 8a. Corolla yellow, yellowish white, or white Key 6 (p. 456)
 8b. Corolla purple, violet, bluish purple, or rarely white.
 9a. Plants with appressed glandular trichomes Key 7 (p. 456)
 9b. Plants non-glandular or glandular but in some part glands not appressed Key 8 (p. 456)

Key 1

- 1a. Leaves lacking terminal leaflet, rachis apex spinescent; legume nut-form in shape, thickly leathery 131. *O. aciphylla*
 1b. Leaves with a terminal leaflet, rachis ultimately persistent as a thorn; legume vesicular, membranous.
 2a. Leaves 7–11(–13)-foliolate; racemes 2–5-flowered; calyx 1–1.4 cm, lobes 2–4 mm 132. *O. tragacanthoides*
 2b. Leaves 19–31-foliolate; racemes 1- or 2-flowered; calyx 0.9–1.1 cm, lobes 1.2–2 mm 133. *O. hystrix*

Key 2

- 1a. Corolla white; leaflet blades narrowly elliptic; calyx lobes 3–4 mm 119. *O. lhasaensis*
 1b. Corolla purple, bluish purple, violet, blue, or rarely white; leaflet blades oblong, elliptic, or ovate-lanceolate;
 calyx lobes 4.5–9 mm.
 2a. Plants 10–35 cm tall; calyx lobes 4.5–5 × ca. 1.2 mm 120. *O. sericopetala*
 2b. Plants 7–9 cm tall; calyx lobes 7–9 × ca. 3 mm 121. *O. parasericopetala*

Key 3

- 1a. Corolla white, keel beak (0.5–)2.5–3 mm; bracts 5–10 mm 28. *O. nutans*
 1b. Corolla yellow, pale yellowish, or rarely red, keel beak 0.2–1 mm; bracts 1.5–7(–8) mm.
 2a. Corolla standard 6–7 mm; calyx ca. 4 mm; bracts ca. 1.5 mm 40. *O. sinkiangensis*
 2b. Corolla standard 8–17 mm; calyx 5.8–11.4 mm; bracts 2–8 mm.
 3a. Bracts ca. 2 mm; corolla standard 0.8–0.9 cm, keel ca. 6.7 mm; legume stipe ca. 7 mm 44. *O. gueldenstaedtioides*
 3b. Bracts 4–8 mm; corolla standard 0.9–1.7 cm, keel 7–14 mm; legume stipe 0–2 mm.
 4a. Calyx 7–10 mm, lobes 3.5–4.5 mm.
 5a. Leaves 11–15-foliolate; peduncle 10–35 cm; legume body 2–3 × 0.5–0.6 cm 42. *O. meinshausenii*
 5b. Leaves 15–29-foliolate; peduncle 3–12 cm; legume body 1.5–2 × 1–1.5 cm 43. *O. pilosa*
 4b. Calyx 5.8–11.5 mm, lobes 2–8 mm.
 6a. Leaflet blades 2.5–3 cm; calyx 5.8–7.2(–8.5) mm 41. *O. ochrocephala*
 6b. Leaflet blades 0.5–2(–3) cm; calyx 6.5–11.5 mm.
 7a. Legume body (1–)1.5–2.5 cm; bracts ca. 4 mm 45. *O. ochroleuca*
 7b. Legume body 0.8–1.2 cm; bracts 6–7 mm 46. *O. kansuensis*

Key 4

- 1a. Plants with impressed yellow glands; leaflets at least moderately spaced; racemes 2–6-flowered; beak of
 corolla keel 0.4–0.7 mm 26. *O. tudanensis*
 1b. Plants non-glandular; leaflets variously arranged; racemes variously flowered; beak of corolla keel various.
 2a. Plants (3–)4–10(–12) cm tall.
 3a. Leaves (0.5–)1–3 cm, 9–15-foliolate; leaflet blades (1–)2–5 mm 30. *O. tianschanica*
 3b. Leaves 2–8 cm, 15–25(–29)-foliolate; leaflet blades 3–10(–12) mm.
 4a. Racemes many flowered; corolla standard 5–9(–14) mm.
 5a. Leaves 5–20 cm; leaflet blades 5–25 × 2–9 mm; peduncle 7–25 cm or more 32. *O. deflexa*
 5b. Leaves 2–5(–8) cm; leaflet blades 3–10(–12) × 1.5–5 mm; peduncle 1.4–6(–8) cm.
 6a. Calyx 4–5 mm; corolla standard 5–9 mm, keel beak ca. 0.3 mm 34. *O. hirsutiuscula*
 6b. Calyx 5–7 mm; corolla standard 9–14 mm, keel beak 1.5–2 mm 49. *O. dichroantha*
 4b. Racemes (4–)6–8(or 9)-flowered; corolla standard (9–)11–13(–15) mm.
 7a. Plants 8–12 cm tall; leaves (17 or)19- or 21-foliolate; peduncle 7–11 cm; calyx ca. 4 mm 38. *O. chinglingensis*
 7b. Plants 3–7 cm tall; leaves 9–19-foliolate; peduncle 2–9 cm; calyx 5–9 mm.
 8a. Leaves 11–19-foliolate; leaflet blades 7–15 mm; racemes 7–9-flowered; corolla standard
 1.2–1.3(–1.5) cm 48. *O. hirsuta*
 8b. Leaves 9- or 11-foliolate; leaflet blades 2.5–6 mm; racemes 2–5-flowered; corolla standard
 0.9–1.1 cm 56. *O. latialata*
 2b. Plants (3–)10–80(–100) cm tall.
 9a. Leaves 21-foliolate or more on at least some leaves (only to 23-foliolate in *O. maqinensis* and *O.*
xinglongshanica).
 10a. Corolla standard 1–1.2 cm; corolla keel beak 0.2–0.5 mm; legume stipe 1.5–2 mm, body
 1.2–1.6 cm 47. *O. qinghaiensis*

- 10b. Corolla standard (0.5–)0.7–1.5 cm; corolla keel beak, legume stipe, and legume body not simultaneously within same range as above.
- 11a. Calyx 7.5–11(–11.2) mm; corolla standard 1.5–1.6 cm 52. *O. maqinensis*
- 11b. Calyx (2.2–)4–8(–10) mm; corolla standard (0.5–)0.7–1.5 cm.
- 12a. Racemes 3–10(–15)-flowered.
- 13a. Calyx lobes 1.5–2 mm; corolla standard (5–)7–8(–10) mm 50. *O. glabra*
- 13b. Calyx lobes 2.5–4.7 mm; corolla standard (10–)11–14 mm 58. *O. melanocalyx*
- 12b. Racemes many flowered.
- 14a. Corolla wings (5–)6–7 mm, keel beak 0.2–0.5 mm 50. *O. glabra*
- 14b. Corolla wings 8–14 mm, keel beak 0.5–2.5 mm.
- 15a. Leaves 5–6 cm; peduncle ca. 6 cm 55. *O. densiflora*
- 15b. Leaves (3–)5–20 cm; peduncle mainly over 6 cm.
- 16a. Corolla standard 0.8–1.2 cm, keel 0.7–0.9 cm; calyx (3–)5–7(–8) mm.
- 17a. Corolla standard 8–9 mm, keel 8–9 mm 32. *O. deflexa*
- 17b. Corolla standard 8–12 mm, keel 7–8 mm 57. *O. lapponica*
- 16b. Corolla standard 1–1.5 cm, keel (0.9–)1–1.3 cm; calyx (7–)8(–10) mm.
- 18a. Leaflet blades 14–20 mm; beak of corolla keel 1.5–1.7 mm 54. *O. xinglongshanica*
- 18b. Leaflet blades 3–14 mm; beak of corolla keel 1–1.5 mm.
- 19a. Stipules 10–12 mm 29. *O. penduliflora*
- 19b. Stipules 6–8 mm 53. *O. giraldii*
- 9b. Leaves 9–21-foliolate (rarely 25-foliolate in *O. podoloba* and *O. zekogensis*).
- 20a. Plants 3–4 cm tall; leaves 9- or 11-foliolate 56. *O. latialata*
- 20b. Plants (3–)5–80(–100) cm tall; leaves (7–)11–21(–29)-foliolate.
- 21a. Plants 3–13 cm tall; racemes 6–9-flowered.
- 22a. Leaves 1.5–4 cm; leaflet blades 4–7 mm; corolla standard 0.9–1 cm, keel beak short; legume body 1–1.2 cm 31. *O. gerzeensis*
- 22b. Leaves 5–9 cm; leaflet blades 7–15 mm; corolla standard 1.2–1.3 cm, keel beak 2.5–3 mm; legume body 1.5–2 cm 48. *O. hirsuta*
- 21b. Plants (5–)10–80(–100) cm tall; racemes 3–9-flowered or more.
- 23a. Racemes 3–12-flowered.
- 24a. Racemes 3–5-flowered, dense or compact 39. *O. sitaipaiensis*
- 24b. Racemes 3–12-flowered, rather lax.
- 25a. Corolla keel 1–1.4 cm; stipules ca. 3 mm; bracts ca. 1.5 mm 36. *O. taochensis*
- 25b. Corolla keel ca. 0.8 cm; stipules 5–7 mm; bracts 3–6 mm 37. *O. zekogensis*
- 23b. Racemes 8- to many flowered.
- 26a. Leaflet blades 1.4–2 cm; corolla standard 1.1–1.5 cm, wings 1.1–1.4 cm 54. *O. xinglongshanica*
- 26b. Leaflet blades (0.4–)0.5–1.4 cm (but to 2.5 cm in *O. glabra*); corolla standard (0.5–)0.6–1 cm, wings 0.5–1 cm.
- 27a. Calyx 6–8 mm, lobes 3–4 mm 59. *O. subpodoloba*
- 27b. Calyx (2.2–)4–5 mm, lobes 1.2–2.5 mm.
- 28a. Leaves 2–4 cm; peduncle 1.5–3 cm; corolla wings ca. 5.5 mm 35. *O. ganningensis*
- 28b. Leaves (3–)5–15 cm; peduncle (2–)4.5–20 cm; corolla wings (5–)6–10 mm.
- 29a. Calyx lobes 2.4–2.5 mm; corolla wings ca. 10 mm; leaflet blades oblong 51. *O. podoloba*
- 29b. Calyx lobes 1.2–2 mm; corolla wings (5–)6–8 mm; leaflet blades linear, lanceolate, ovate-lanceolate, narrowly ovate, or elliptic.
- 30a. Leaflet blades ca. 1 mm wide; racemes (1–)4–7 cm; beak of corolla keel ca. 1.5 mm 33. *O. yekenensis*
- 30b. Leaflet blades (1–)3–7 mm wide; racemes 4–7 cm; beak of corolla keel 0.2–0.5 mm 50. *O. glabra*

Key 5

- 1a. Leaflets not verticillate.
- 2a. Stipules ca. 4 mm; racemes 1–3-flowered; calyx with scalelike glands; legume body 1–1.7 cm 25. *O. squamulosa*
- 2b. Stipules ca. 10 mm; racemes 5–10-flowered; calyx and/or other herbage usually with dense but not scalelike glands; legume body 2.2–5 cm 27. *O. falcata*
- 1b. Leaflets, at least some, verticillate (except in some *O. pseudomyriophylla*).
- 3a. Corolla pale or dirty yellow, standard apex shortly acuminate; stipules hard 5. *O. muricata*
- 3b. Corolla various purplish, bluish, or violet colors (rarely yellow or white in *O. microphylla*), standard apex rounded; stipules herbaceous or membranous.
- 4a. Racemes (6–)8–20-flowered; legume without glands.
- 5a. Stipules (10–)12–15 mm; calyx 10–13 mm, lobes 2–4 mm; corolla standard 1.9–2.5 cm; legume subglobose, bladderlike inflated, membranous 6. *O. trichophylla*

- 5b. Stipules 3.2–4.3 mm; calyx ca. 7.5 mm, lobes ca. 1 mm; corolla standard ca. 1.7 cm; legume lanceolate-ovoid, not bladderlike inflated, leathery 7. *O. pseudomyriophylla*
- 4b. Racemes 3–6-flowered; legume glandular.
- 6a. Plants (4–)5–15 cm tall; stipules conspicuously white pilose and long persistent; leaflets in (10–)13–27 whorls; leaflet blades 2–3 mm; corolla standard 1.9–2 cm; legume falcately cylindrical 8. *O. microphylla*
- 6b. Plants 22–35 cm tall; stipules not markedly white pilose or long persistent; leaflets in 3–5 whorls; leaflet blades 5–15 mm; corolla standard ca. 2.2 cm; legume cylindrical 9. *O. pseudoglandulosa*

Key 6

- 1a. Plants to 25 cm tall; leaflets 4–24 mm; beak of corolla keel 1.2–1.8 mm; legume sessile 15. *O. ochrantha*
- 1b. Plants to 40 cm tall; beak of corolla keel 1–1.5 mm; legume substipitate or shortly stipitate.
- 2a. Leaves 10–19 cm; leaflets 1–3 cm, mostly opposite but some verticillate; bracts longer than calyx; corolla yellow, keel beak ca. 1 mm 16. *O. ochrolongibracteata*
- 2b. Leaves 5–8 cm; leaflets 0.4–0.7 cm, mostly verticillate; bracts shorter than calyx; corolla white, keel beak 1–1.5 mm 17. *O. gamdoensis*

Key 7

- 1a. Beak of corolla keel (1.5–)1.8–3.8 mm; leaflets in 12–16(–50) whorls; bracts 8–15 mm 12. *O. myriophylla*
- 1b. Beak of corolla keel 1.5–2.5 mm; leaflets in (2 or)3–12 whorls and some or most leaflets merely opposite; bracts 3–10 mm.
- 2a. Calyx 0.9–1 cm; herbage non-glandular; legume stipitate 13. *O. trichophora*
- 2b. Calyx (1–)1.2–1.7 cm; herbage with appressed yellowish or glandular trichomes; legume sessile 14. *O. bicolor*

Key 8

- 1a. Plants with appressed or yellowish glandular trichomes.
- 2a. Beak of corolla keel (1.5–)1.8–3.8 mm; leaflets in 12–16(–50) whorls; bracts 8–15 mm 12. *O. myriophylla*
- 2b. Beak of corolla keel 1.5–2.5 mm; leaflets in (2 or)3–12 whorls and some or most leaflets merely opposite; bracts 3–10 mm.
- 3a. Calyx 0.9–1 cm; herbage non-glandular; legume stipitate 13. *O. trichophora*
- 3b. Calyx (1–)1.2–1.7 cm; herbage with appressed yellowish or glandular trichomes; legume sessile 14. *O. bicolor*
- 1b. Plants non-glandular.
- 4a. Plants caulescent or shortly caulescent (acaulescent in some *O. racemosa*).
- 5a. Plants shortly caulescent, stems neither diffuse nor many branched; racemes 7–10-flowered; leaves 5–14 cm, with 6–13 whorls of 4–6 leaflets 21. *O. racemosa*
- 5b. Plants definitely caulescent, stems diffuse and often many branched; racemes 1–3-flowered; leaves 3–5 cm, with 2–5 whorls of 3 or 4 leaflets 23. *O. ramosissima*
- 4b. Plants strictly acaulescent.
- 6a. Plants (1.5–)2–6 cm tall; leaves (0.5–)1–5 cm; racemes 1–3-flowered.
- 7a. Leaves (0.5–)1–3 cm, with 6–12 whorls of 4–6 leaflets; corolla standard 1.4–2.2 cm, keel beak 0.5–1.1 mm; plants turf- or cushion-forming 22. *O. chionobia*
- 7b. Leaves 3–5 cm, with 2–4 whorls of 3 or 4 leaflets; corolla standard 2.1–3.2 cm, keel beak ca. 2 mm; plants caespitose 24. *O. langshanica*
- 6b. Plants (3–)5–20(–40) cm tall; leaves (2.5–)3–20(–30) cm; racemes 5–15-flowered or more (few flowered in *O. shanxiensis*).
- 8a. Leaves of 3 kinds, i.e., with a solitary leaflet, with 7–15 opposite leaflets, and with 3 or 4 whorls of 3 or 4 leaflets each; corolla standard 1.5–1.6 cm 10. *O. shanxiensis*
- 8b. Leaves with leaflets in (1–)3–18 whorls or some leaves with leaflets in whorls and others opposite or alternate (if with 3 kinds as above, then plants not from Shandong or Shanxi); corolla standard 1.4–2.5(–3) cm.
- 9a. Leaflets in (7–)12–18 whorls; corolla standard (1.4–)1.5–2.5(–3) cm.
- 10a. Corolla standard 2.5–3 cm; legume body 2–2.5 cm 18. *O. przewalskii*
- 10b. Corolla standard 2–2.5 cm; legume body 1–1.6 cm.
- 11a. Plants 5–8 cm tall; leaves 5–7 cm; calyx lobes ca. 2 mm 11. *O. lanata*
- 11b. Plants 11–40 cm tall; leaves (5–)10–30 cm; calyx lobes 3.5–4.5 mm 12. *O. myriophylla*
- 9b. Leaflets in (1–)3–10 whorls (or not verticillate for some leaves); corolla standard 1.4–1.8(–2.3) cm.
- 12a. Calyx (1–)1.2–1.7 cm, lobes (2–)3.5–7 mm; corolla standard 1.4–2.3 cm 14. *O. bicolor*
- 12b. Calyx 0.6–1 cm, lobes 1–3.5 mm; corolla standard 1.4–1.8 mm.
- 13a. Leaves 3–6 cm; leaflets in 4 or 5 whorls; peduncle 3–5 cm; calyx 8–10 mm 19. *O. pumila*
- 13b. Leaves 7–20(–25) cm; leaflets in (1–)3–9 whorls; peduncle 6–11(–19) cm; calyx 6–8.3(–10) mm 20. *O. oxyphylla*

Key 9

- 1a. Leaves 1-foliolate.
- 2a. Petiole 2–5 cm; corolla light yellow, yellow, yellowish green, red, whitish green, or white; ovary pubescent 129. *O. neimonggolica*
- 2b. Petiole 0.5–1 cm; corolla purple; ovary glabrous 130. *O. monophylla*
- 1b. Leaves 3-foliolate or more.
- 3a. Leaves 3-foliolate 64. *O. diversifolia*
- 3b. Leaves 5-foliolate or more.
- 4a. Racemes 2- or 3-flowered; corolla white; leaflet blades not more than 4 mm 82. *O. biflora*
- 4b. Racemes (2 or)3- to many flowered; corolla variously colored (sometimes white in *O. argentata* but not a Xizang species); leaflet blades at least some greater than 4 mm (only 2–3 mm in *O. holanshanensis* but not a Xizang species).
- 5a. Corolla standard ca. 0.7 cm; calyx 2.5–3 mm 95. *O. holanshanensis*
- 5b. Corolla standard 1.2–2.6 cm; calyx 6–14 mm.
- 6a. Racemes much longer than leaves; calyx 6–7 mm 93. *O. ladyginii*
- 6b. Racemes shorter to slightly longer than leaves; calyx 8–14 mm.
- 7a. Racemes dense and many flowered; corolla standard ca. 1.3 cm, keel beak 0.5–1 mm 65. *O. maduoensis*
- 7b. Racemes dense and 2–8-flowered, or if many flowered then lax; corolla standard 1.7–2.6 cm, keel beak 1–2.5 mm.
- 8a. Plants 2–3 cm tall; leaves 1.5–4 cm, 13–19-foliolate; legume ca. 1.2 cm 104. *O. stracheyana*
- 8b. Plants 5–20 cm tall; leaves 3–15 cm, 7–25(–31)-foliolate; legume 1.7–2.5 cm.
- 9a. Calyx 1.2–1.3 cm; corolla standard 1.7–2 cm, apex emarginate 68. *O. ciliata*
- 9b. Calyx 0.8–1(–1.2) cm; corolla standard 2–2.6 cm, apex rounded.
- 10a. Leaves (9–)19–25(–31)-foliolate; racemes subcompact, 3–5-flowered; beak of corolla keel 2–2.5 mm 77. *O. pseudohirsuta*
- 10b. Leaves 7–11-foliolate; racemes lax, many flowered; beak of corolla keel 1–1.5 mm 122. *O. argentata*

Key 10

- 1a. Petals pubescent on outer surfaces.
- 2a. Plants 10–35 cm tall; leaves 7–20 cm; leaflet blades 0.6–2.5 cm; calyx lobes 4.5–5 mm; corolla standard 0.9–1.2 cm 120. *O. sericopetala*
- 2b. Plants 7–9 cm tall; leaves 3–5 cm; leaflet blades 0.8–1.2 cm; calyx lobes 7–9 mm; corolla standard 1.8–2 cm 121. *O. parasericeopetala*
- 1b. Petals glabrous on outer surfaces.
- 3a. Corolla standard auriculate above claw, standard tapering into 2 auricles at base 62. *O. auriculata*
- 3b. Corolla standard tapering (sometimes abruptly) to claw or widened in basal half, not auriculate.
- 4a. Corolla standard oblong, widened in basal half 61. *O. sichuanica*
- 4b. Corolla standard variously shaped, not widened in basal half.
- 5a. Corolla standard contracted at middle, tapering at base, lamina obovate 60. *O. guinanensis*
- 5b. Corolla standard not contracted at middle, base various, lamina various.
- 6a. Plants with rigid spreading trichomes 63. *O. hirta*
- 6b. Plants variously glabrous, subglabrous, or otherwise pubescent, but not with rigid spreading trichomes (though sometimes with spreading trichomes).
- 7a. Plants (including leaves and racemes) at tallest point mostly exceeding 10 cm in height Key 10a
- 7b. Plants (including leaves and racemes) not or seldom exceeding 10 cm in height Key 10b (p. 458)

Key 10a

- 1a. Corolla standard 0.5–1(–1.1) cm.
- 2a. Beak of corolla keel 0.5 mm or shorter; calyx 4–7 mm.
- 3a. Stipules triangular; leaves 19–29-foliolate; inflorescences 5–14-flowered; peduncle (2.5–)11–19(–30) cm; calyx 5–6 113. *O. qilianshanica*
- 3b. Stipules linear-lanceolate or ovate; leaves 9–19(or 21)-foliolate; inflorescences 6–10-flowered; peduncle 2–3 cm or 4–15 cm; calyx 5–9 mm.
- 4a. Stipules linear-lanceolate; racemes lax; peduncle 2–3 cm; calyx lobes as long as tube 92. *O. avisoides*
- 4b. Stipules ovate; racemes compact; peduncle 4–15 cm; calyx lobes shorter than tube 126. *O. proboscidea*
- 2b. Beak of corolla keel 1–2.5 mm; calyx 2.5–6(–8) mm.
- 5a. Racemes compactly globose; beak of corolla keel ca. 2.5 mm 89. *O. globiflora*
- 5b. Racemes not compactly globose; beak of corolla keel 1–2 mm.
- 6a. Legume body 5–6 mm 100. *O. imbricata*

- 6b. Legume body (5–)8–15 mm.
- 7a. Peduncle 2–4 × as long as subtending leaves; leaflets more than 29 at least for some leaves.
- 8a. Peduncle ca. 2 × as long as subtending leaves; corolla standard 5.5–7 mm, apex emarginate; legume body 5–10 mm 94. *O. filiformis*
- 8b. Peduncle 3–4 × as long as subtending leaves; corolla standard 6–11 mm, apex rounded; legume body 10–15 mm 124. *O. lehmannii*
- 7b. Peduncle shorter than to somewhat surpassing subtending leaves; leaflets 25 or fewer for all leaves.
- 9a. Calyx 3–3.5 mm, lobes ca. 1 mm 97. *O. tashkurensis*
- 9b. Calyx (3.5–)4–6 mm, lobes (1–)1.2–3 mm.
- 10a. Racemes 7–13-flowered; calyx lobes ca. 1.2 mm; beak of corolla keel ca. 1.5 mm; legume stipe 2–2.5 mm 102. *O. fragiliphylla*
- 10b. Racemes 15–20-flowered or many flowered; calyx lobes 2.5–3 mm; beak of corolla keel ca. 2 mm; legume stipe (0.7–)1–2 mm.
- 11a. Stipules 4–5 mm; calyx 5–6 mm, lobes 2.5–3 mm; legume 11–13 × 4.5–5.5 mm 67. *O. lanceatifoliola*
- 11b. Stipules 5–10 mm; calyx (3.5–)4–5 mm, lobes 1–2 mm; legume 8–9 × ca. 3 mm 90. *O. pagobia*
- 1b. Corolla standard (0.7–)1–2.2(–3) cm.
- 12a. Calyx (9–)10–15 mm; corolla standard (1.5–)1.7–3 cm.
- 13a. Leaflets more than 31 on at least some leaves; beak of corolla keel ca. 1 mm.
- 14a. Plants 20–40 cm tall; bracts 7–9 mm; calyx lobes 1–2.2 mm; corolla standard apex slightly emarginate, keel 1.8–2 cm 115. *O. songarica*
- 14b. Plants (6–)10–21 cm tall; bracts 12–15 mm; calyx lobes 3–5 mm; corolla standard apex 2-lobed, keel 1.5–1.7 cm 87. *O. alpina*
- 13b. Leaflets never more than 29 per leaf; beak of corolla keel (1–)1.5–3 mm.
- 15a. Racemes 3–13-flowered; beak of corolla keel 1–1.5 mm.
- 16a. Bracts 4–5 mm; corolla standard 1.8–2 cm; legume 0.7–0.8 mm 1. *O. sacciformis*
- 16b. Bracts 8–18 mm; corolla standard 2.1–2.7 cm; legume ca. 1.5 cm 110. *O. latibracteata*
- 15b. Racemes many flowered; beak of corolla keel 2–3 mm.
- 17a. Plants 10–18 cm tall; leaves 13- or 15-foliolate; leaflet blades 0.8–1 cm; corolla standard ca. 1.5 cm, wings 1.2–1.3 cm 88. *O. pseudofrigida*
- 17b. Plants 20–40 cm tall; leaves 15–29-foliolate; leaflet blades 1–2.5 cm; corolla standard 2.3–3 cm, wings ca. 2 cm 112. *O. grandiflora*
- 12b. Calyx 3–10(–10.5) mm; corolla standard 0.7–1.7(–2) cm.
- 18a. Racemes 2–8(–10)-flowered.
- 19a. Corolla standard 1.5–2 cm with an emarginate apex, wings 1.6–1.8 cm, keel ca. 1.3 cm; legume sessile 74. *O. anertii*
- 19b. Corolla standard 1.2–1.3 cm with a 2-lobed apex, wings 1–1.2 cm, keel 1–1.1 cm; legume with a 2–4 mm stipe 81. *O. yunnanensis*
- 18b. Racemes many flowered (5–12-flowered in *O. barkolensis*).
- 20a. Leaves 1.5–5 cm, 11–15-foliolate 4. *O. trichocalycina*
- 20b. Leaves (3–)5–30 cm, 13–35(–41)-foliolate.
- 21a. Calyx 6.3–10 mm.
- 22a. Stipules 1.8–2.5 cm; corolla standard 1.4–2 cm, apex emarginate 111. *O. barkolensis*
- 22b. Stipules 1–1.7 cm; corolla standard 0.9–1.7 cm, apex rounded.
- 23a. Stipules ca. 1 cm; leaflet apices acuminate; corolla standard with a broadly oblong lamina, wings apically emarginate, keel beak 3–4 mm 114. *O. pseudocoerulea*
- 23b. Stipules 1.4–1.7 cm; leaflet apices acute to subtruncate; corolla standard with a suborbicular to broadly ovate lamina, wings apically rounded, keel beak 0.8–1.5 mm 116. *O. mollis*
- 21b. Calyx 3–7 mm.
- 24a. Beak of corolla keel 2.2–3 mm 101. *O. caerulea*
- 24b. Beak of corolla keel 0.5–2 mm.
- 25a. Leaflet blades 1.9–2.8 cm; peduncle 17–40 cm; corolla standard ca. 1.6 cm, keel 1.5–1.6 cm 86. *O. qitaiensis*
- 25b. Leaflet blades 0.3–2 cm; peduncle 10–25 cm; corolla standard 0.7–1 cm, keel 0.8–0.9 cm.
- 26a. Plants to 30 cm tall; racemes lax; peduncle with sparse appressed white trichomes; calyx 3.6–5 mm; corolla standard 7–10 mm; legume stipitate 96. *O. merkensis*
- 26b. Plants only to 12 cm tall; racemes dense; peduncle with spreading white long trichomes; calyx 6–7 mm; corolla standard ca. 10 mm; legume sessile 118. *O. qingnanensis*

Key 10b

- 1a. Corolla standard (1.3–)1.7–2.6 cm; calyx 8–16 mm.
- 2a. Plants 10–15 cm tall; legume body 0.6–0.8 cm.
- 3a. Racemes dense; bracts triangular, 4–5 mm; calyx ca. 1 cm 1. *O. sacciformis*

- 3b. Racemes lax; bracts linear, ca. 6 mm; calyx 1.1–1.3 cm 2. *O. sziwangensis*
- 2b. Plants 1–10 cm tall; legume body 1–3 cm.
- 4a. Leaves (2–)5–10 cm (1–2 cm in *O. leptophylla* var. *turbinata*).
- 5a. Leaflets 13–21; corolla wings ca. 1.5 cm; legume body oblong 76. *O. moellendorffii*
- 5b. Leaflets 5–13; corolla wings 1.8–2 cm; legume body ovoid.
- 6a. Leaves 5–9-foliolate; corolla standard 2–3 cm with a subelliptic lamina, keel ca. 1.8 cm; legume ca. 0.8 cm wide 71. *O. inschanica*
- 6b. Leaves 9–13-foliolate; corolla standard 1.8–2.3 cm with a suborbicular lamina, keel 1.5–1.7 cm; legume 1.2–1.5 cm wide 72. *O. leptophylla*
- 4b. Leaves 2–6 cm.
- 7a. Leaves 21–27-foliolate; corolla standard apically 2-lobed and reflexed 73. *O. wutaiensis*
- 7b. Leaves 5–21-foliolate; corolla standard apically emarginate (sometimes 2-lobed in *O. rupifraga*) and not reflexed.
- 8a. Leaves 15–21-foliolate; leaflet blades 1–2 mm wide; calyx 0.8–1.2 cm; corolla standard 1.5–2 cm, wings 1–1.6 cm, keel beak ca. 1 mm 127. *O. rupifraga*
- 8b. Leaves 5–15-foliolate; leaflet blades (1.5–)2–4 mm wide; calyx (1–)1.2–1.6 cm; corolla standard (1.8–)2–2.6 cm, wings 1.7–2.5 cm, keel beak 1.5–3 mm.
- 9a. Racemes only 2- or 3-flowered; bracts 3–6 mm; leaves 7–11-foliolate 69. *O. poncinsii*
- 9b. Racemes 1–7-flowered; bracts 6–14 mm; leaves 7–15-foliolate.
- 10a. Plants 1–3 cm tall; leaves 5–11-foliolate; bracts 0.6–1 cm; corolla keel 1.5–1.7 cm, beak 2–3 mm 70. *O. eriocarpa*
- 10b. Plants (1–)3–8 cm tall; leaves 9–15-foliolate; bracts 1–1.4 cm; corolla keel 1.7–1.8 cm, beak 1.5–2 mm 75. *O. assiensis*
- 1b. Corolla standard 0.5–1.3(–1.4) cm; calyx 3–9(–15) mm.
- 11a. Racemes many flowered (few to ca. 10 in *O. immersa*).
- 12a. Calyx 9–15 mm; corolla standard 1–1.4 cm, keel beak 2.5–3 mm 4. *O. trichocalycina*
- 12b. Calyx 3–8 mm; corolla standard 0.6–1.3 cm, keel beak (0.3–)1–2 mm.
- 13a. Leaves 5–9(–15)-foliolate 3. *O. bella*
- 13b. Leaves 13–21(–25)-foliolate.
- 14a. Beak of corolla keel 0.3–0.5 mm.
- 15a. Leaves 15–21-foliolate; corolla standard apically emarginate, keel beak ca. 0.3 mm 66. *O. linearibracteata*
- 15b. Leaves at least some 21–25-foliolate; corolla standard apically subrounded, keel beak ca. 0.5 mm 109. *O. valerii*
- 14b. Beak of corolla keel (0.7–)1–2 mm.
- 16a. Racemes rather globose; corolla standard 7–8.5 mm, wings 7–8 mm 90. *O. pagobia*
- 16b. Racemes ± elongate; corolla standard 9–11 mm, wings 9.5–12 mm.
- 17a. Stipules ca. 1 cm; corolla wings 10–12 mm, keel beak ca. 2 mm 105. *O. longialata*
- 17b. Stipules 5–6 mm; corolla wings ca. 9.5 mm, keel beak ca. 1 mm 128. *O. immersa*
- 11b. Racemes (1 or)2–10-flowered.
- 18a. Calyx 3–3.4 mm, lobes 1/2 or more as long as tube.
- 19a. Leaves ca. 5 cm; calyx lobes ca. 3 mm; corolla purple, standard 6.5–7.5 mm 84. *O. yanchiensis*
- 19b. Leaves 1–2 cm; calyx lobes ca. 1.6 mm; corolla red, standard 7–8 mm 103. *O. tukemansuensis*
- 18b. Calyx (3–)4–9 mm, lobes 1/4–1/2 as long as tube.
- 20a. Leaves 21–25-foliolate; legume linear in profile 123. *O. malloryana*
- 20b. Leaves variously 9–25(–29)-foliolate; legume various but seldom if ever linear in profile.
- 21a. Racemes (2–)5–10-flowered; beak of corolla keel ca. 0.5 mm (ca. 1.5 mm in *O. reniformis*).
- 22a. Leaves 9- or 11-foliolate.
- 23a. Peduncle ca. 2 × as long as leaves; calyx 0.8–1 cm; leaves 1.5–2.5 cm; leaflet blades 3–4 mm 91. *O. baxoiensis*
- 23b. Peduncle as long as leaves; calyx 1.1–1.3 cm; leaves 3–4 cm; leaflet blades 4–7 mm 117. *O. reniformis*
- 22b. Leaves (9 or)11–19(or 21)-foliolate.
- 24a. Corolla standard 5–8 mm; leaves 1–3 cm; legume body 0.9–1.2 cm 107. *O. densa*
- 24b. Corolla standard 8–13 mm; leaves 2–7 cm; legume body 1.3–2.5 cm 108. *O. humifusa*
- 21b. Racemes 2–5(–8)-flowered; beak of corolla keel 0.3–1(–1.5) mm.
- 25a. Corolla standard 0.9–1.5(–2.1) cm, keel beak 1–1.6 mm.
- 26a. Leaves 0.5–1.5 cm; peduncle ca. 2 × as long as leaves 106. *O. vermicularis*
- 26b. Leaves (0.8–)2–8 cm; peduncle subequal to leaves or only slightly surpassing them.
- 27a. Peduncle 4–10 cm; legume body 4–7 mm wide 128. *O. immersa*
- 27b. Peduncle 0.5–5(–6.5) cm; legume body 3–4 mm wide.
- 28a. Racemes lax; calyx 4–6 mm, lobes ca. 1.5 mm; legume with a 2–3 mm stipe, body ca. 1 cm 99. *O. krylovii*

- 28b. Racemes compact; calyx 6–9(–13) mm, lobes 1.5–4 mm; legume sessile or substipitate, body 1–2 cm.
 29a. Calyx lobes 1.5–1.7 mm; corolla standard 0.9–1.3 cm, apex emarginate 78. *O. platysema*
 29b. Calyx lobes (1.8–)3–4 mm; corolla standard 1–1.5(–2.1) cm, apex 2-lobed 83. *O. pauciflora*
- 25b. Corolla standard 0.5–1 cm, keel beak 0.3–1 mm.
 30a. Peduncle longer than leaves; calyx 4(–4.8) mm; legume body ca. 13 × 5 mm 98. *O. saposhnikovii*
 30b. Peduncle shorter than, subequal to, or only slightly surpassing leaves; calyx 3–6 mm; legume body 5–12 × 2–3 mm (unknown in *O. cinerascens*).
 31a. Corolla standard 5–7(–8) mm, keel beak 0.3–0.4 mm.
 32a. Leaves 2–7 cm; peduncle subequal to or slightly longer than leaves; legume 10–12 mm, shortly stipitate 79. *O. pusilla*
 32b. Leaves 1–2 cm; peduncle shorter than leaves, less than 1 cm; legume 5–6 mm, stipe as long as calyx tube 80. *O. brevipedunculata*
 31b. Corolla standard 6–10 mm, keel beak 0.5–1 mm.
 33a. Plants 7–10 cm tall; leaves 2.5–6 cm; peduncle ± equaling leaves; bracts ca. 3 mm 85. *O. cinerascens*
 33b. Plants 3–5 cm tall; leaves 0.5–3 cm; peduncle somewhat surpassing leaves; bracts 1–1.5 mm 125. *O. savellanica*

Key to subgenera

- 1a. Shrublets, usually pulvinate; leaf rachises and petioles persistent 3. *O.* subg. *Traganthoxytropis* (p. 499)
 1b. Herbs, perennial; leaf rachises not persistent but petioles sometimes persistent.
 2a. Legume enveloped by calyx, indehiscent 1. *O.* subg. *Ptiloxytropis*
 2b. Legume exerted from calyx, dehiscent when mature 2. *O.* subg. *Oxytropis* (p. 461)

1. *Oxytropis* subg. *Ptiloxytropis* Bunge in Boissier, Fl. Orient. 2: 502. 1872.

柔毛棘豆亚属 rou mao ji dou ya shu

Herbs, acaulescent, markedly pubescent. Leaves imparipinnate, 5–15-foliolate; rachis not persistent as a spine. Racemes dense or lax, 3- to many flowered. Flowers 0.7–2 cm. Calyx long lobed; lobes 0.5–2 × as long as tube. Corolla bluish violet, purple, rose, reddish purple, or white. Legume 6–9 mm, included within calyx tube but sometimes splitting tube, indehiscent.

Five species in two sections: China, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; four species (two endemic) in two sections (one endemic) in China.

- 1a. Calyx inflated at anthesis, lobes shorter than tube 1. *O.* sect. *Mongolia*
 1b. Calyx not inflated at anthesis, lobes as long as or longer than tube 2. *O.* sect. *Ptiloxytropis* (p. 461)

1. *Oxytropis* sect. *Mongolia* H. C. Fu, Acta Phytotax. Sin. 20: 311. 1982.

长梗组 chang geng zu

Herbs, 10–15 cm tall, acaulescent. Leaves imparipinnate; leaflets not verticillate. Racemes 3–10-flowered; peduncle typically longer than leaves. Calyx inflated at late anthesis; lobes shorter than tube. Corolla standard 1.8–2 cm.

- Two species: China.

- 1a. Racemes dense; bracts triangular, 4–5 mm; calyx ca. 1 cm 1. *O. sacciformis*
 1b. Racemes lax; bracts linear, ca. 6 mm; calyx 1.1–1.3 cm 2. *O. siziwangensis*

1. *Oxytropis sacciformis* H. C. Fu, Acta Phytotax. Sin. 20: 311. 1982.

囊萼棘豆 nang e ji dou

Herbs, 10–15 cm tall, acaulescent, from a multiheaded caudex. Stipules narrowly triangular, ca. 1.5 cm × 2 mm, scarious, with long stout trichomes, basally connate. Leaves 1.5–8 cm, 7–17-foliolate; leaflet blades lanceolate, lanceolate-ovate, ovate, or elliptic, 3–20 × 1–2 mm, with appressed dense stout trichomes. Racemes dense, 3–10-flowered; peduncle 6–12 cm; bracts triangular, 4–5 × ca. 2 mm, with long stout trichomes. Calyx cylindric, becoming somewhat inflated, ca. 10 × 3 mm, with dense long stout trichomes; lobes subulate, 3–5 × ca. 0.5

mm, to 1/2 as long as tube. Corolla bluish violet; standard 1.8–2 cm, lamina spatulate, apex rounded to slightly emarginate; wings 1.5–1.7 cm, lamina obovate; keel ca. 1.4 cm, beak ca. 1.5 mm. Legume sessile, ovoid, 7–8 × ca. 4 mm, enveloped by calyx after anthesis, with dense whitish stout trichomes. Fl. Sep, fr. Sep.

- Sand dunes on slopes. Nei Mongol (Ulanqab Meng).

2. *Oxytropis siziwangensis* Y. Z. Zhao & Zong Y. Zhu, Acta Sci. Nat. Univ. Neimenggu 26: 721. 1995.

四子王棘豆 si zi wang ji dou

Herbs, to ca. 10 cm tall, acaulescent, from a shortly

branched multiheaded caudex. Stipules membranous, white hirsute, basally adnate to petiole. Leaves 1.5–8 cm, 7–11-foliolate; leaflet blades linear-lanceolate, 8–15 × 1–4 mm, abaxially densely appressed white pilose, adaxially glabrous or laxly appressed white pilose, base attenuate to narrowly cuneate. Racemes lax, 3–10-flowered; peduncle 5–9 cm, densely hirsute with spreading white stout trichomes; bracts linear, ca. 6 × 2 mm, glabrous or adaxially with appressed to spreading white

stout trichomes. Calyx cylindric or finally somewhat inflated, 11–13 × ca. 3 mm, externally hirsute; lobes subulate, 3–4 × ca. 0.5 mm. Corolla bluish violet; standard ca. 2 cm, lamina obovate, apex slightly emarginate; wings ca. 1.7 cm; keel ca. 1.5 cm, beak ca. 1.5 mm. Legume sessile, ovoid, ca. 6 × 4 mm, densely appressed whitish pilose, septum narrow. Fl. Jul, fr. unknown.

- Sandy areas. Nei Mongol (Ulanqab Meng).

2. *Oxytropis* sect. *Ptiloxytropis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 46. 1874.

柔毛棘豆组 rou mao ji dou zu

Herbs, 3–12 cm tall, acaulescent. Calyx not inflated at anthesis; lobes as long as or ± longer than tube. Corolla standard 0.7–1.4 cm.

Three species: China, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; two species in China.

- 1a. Calyx (4.5–)6–8 mm, lobes ± as long as tube; corolla standard (0.6–)0.7–0.9 cm, keel beak (0.3–)1 mm 3. *O. bella*
 1b. Calyx 9–15 mm, lobes ca. 2 × as long as tube; corolla standard 1–1.4 cm, keel beak 2.5–3 mm 4. *O. trichocalycina*

3. *Oxytropis bella* B. Fedtschenko ex O. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 303. 1903.

美丽棘豆 mei li ji dou

Oxytropis trichosphaera Freyn.

Herbs, 3–7(–9.5) cm tall, acaulescent, arising from a multi-headed caudex, caespitose, densely gray pubescent. Stipules with a lanceolate-triangular and ca. 3 × 2 mm free part, scarios, pubescent, adnate to petioles only at base. Leaves (1–)1.5–6 cm, 5–9(–15)-foliolate; petioles and rachis with spreading trichomes; leaflet blades linear to lanceolate-oblong, (3–)5–10 × 1–3 mm, both surfaces densely white pilose. Racemes 1–3 cm, compact, many flowered; peduncle 2.5–7.5 cm, as long as or longer than leaves, with white fine trichomes; bracts triangular, 3–5 × 1–2 mm, with appressed trichomes. Calyx broadly cylindric, not inflated, (4.5–)6–8 × 2–4 mm, with spreading dense white trichomes; lobes subulate, (2–)3–4 × ca. 0.5 mm, subequal to tube. Corolla purple, rose-red, or violet; standard (6–)7–9 mm, lamina orbicular, apex rounded to emarginate; wings lamina obovate, 6.5–8 mm; keel subequal to wings, beak (0.3–)1 mm. Legume shortly stipitate; body ovoid, (4–)6–8 × 2–3(–5) mm, sometimes enveloped by calyx or sometimes splitting calyx, with dense whitish long trichomes. Fl. Jun–Jul, fr. Jun–Jul.

Sandy areas, alpine gravelly areas; 3800–4300 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

4. *Oxytropis trichocalycina* Bunge ex Boissier, Fl. Orient. 2: 502. 1872.

毛齿棘豆 mao chi ji dou

Herbs, 3–12 cm tall, acaulescent, from a short multiheaded caudex. Stipules subulate to linear-lanceolate with a subulate linear free part, lanate with white soft trichomes, adnate to petioles nearly to middle, not connate. Leaves 1.5–5 cm, 11–15-foliolate; petiole and rachis with spreading dense cottonlike trichomes; leaflet blades linear-lanceolate, 3–11 mm, both surfaces densely sericeous-lanate. Racemes compact, many flowered; peduncle longer than leaves, densely and softly shortly lanate-pubescent mixed with sparse long trichomes; bracts linear-subulate, 5–10 mm, with soft lanate pubescence. Calyx campanulate, not inflated, 0.9–1.5 cm, densely lanate with spreading soft trichomes; lobes subulate, ca. 2 × as long as tube, densely plumose. Corolla purple; standard 1–1.4 cm, lamina oblong-ovate, apex rounded to retuse; wings slightly shorter than standard; keel subequal to wings, beak long subulate, 2.5–3 mm. Legume sessile, oblong-ovoid, 7–9 × 2.5–3 mm, inflated, thinly leathery, included in calyx, 1-locular, 2-seeded, with appressed white short trichomes, beak ca. 2 mm. Fl. May–Jun, fr. May–Jun.

S-facing slopes, in gravelly areas. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

2. *Oxytropis* subg. *Oxytropis*

棘豆亚属 ji dou ya shu

Herbs, caulescent or acaulescent, either with both glands and trichomes or only trichomes. Stipules free or adnate to petioles. Leaves imparipinnate; leaflets alternate, opposite, or whorled (verticillate). Corolla varying in color, large to medium-sized. Legume exerted from calyx, dehiscent when mature, adaxial septum and sometimes abaxial septum developed.

About 250 species in ca. 20 sections: circumboreal; 126 species (72 endemic) in 16 sections (four endemic) in China.

- 1a. Leaves 1-foliolate 18. *O.* sect. *Neimonggolicae* (p. 498)
 1b. Leaves 3- to many foliolate.

- 2a. Leaflets verticillate or both verticillate and opposite.
- 3a. Plants with glands; leaflets verticillate 3. *O.* sect. *Polyadena* (p. 462)
- 3b. Plants without glands; leaflets verticillate and opposite 4. *O.* sect. *Baicalia* (p. 464)
- 2b. Leaflets opposite on rachis, or sometimes alternate or subopposite, not verticillate.
- 4a. Plants with glands.
- 5a. Plants with conspicuous persistent stramineous petioles clothing caudex apices 5. *O.* sect. *Leucopodia* (p. 468)
- 5b. Plants lacking persistent petioles at caudex apices 6. *O.* sect. *Falcicarpae* (p. 469)
- 4b. Plants without glands.
- 6a. Plants caulescent, with conspicuous internodes.
- 7a. Corolla standard lamina usually orbicular, not contracted in middle, not widened at basal half, and without auricles 7. *O.* sect. *Mesogaea* (p. 469)
- 7b. Corolla standard lamina spatulate, oblong, or ovate-triangular.
- 8a. Corolla standard lamina spatulate, base tapering, middle contracted hence becoming 3-lobed 8. *O.* sect. *Dolichanthos* (p. 479)
- 8b. Corolla standard lamina oblong or ovate-triangular, base widened or tapering into 2 auricles.
- 9a. Corolla standard lamina oblong, widened in basal half, base widened and without auricles, apex emarginate 9. *O.* sect. *Sichuanicae* (p. 479)
- 9b. Corolla standard lamina ovate-triangular, base auriculate, apex obliquely cuneate 10. *O.* sect. *Auriculatae* (p. 480)
- 6b. Plants acaulescent, without conspicuous internodes or only exceptionally caulescent.
- 10a. Plants hirsute with spreading coarse long straight rigid trichomes; leaves 10–15 cm, with leaflets 1–5 cm 11. *O.* sect. *Brachytropis* (p. 480)
- 10b. Plants glabrous, with spreading trichomes, or densely pubescent but not hirsute; leaves never 10–15 cm with leaflets to 5 cm.
- 11a. Corolla standard and keel pubescent on outer surface 16. *O.* sect. *Sericopetalae* (p. 495)
- 11b. Corolla standard and keel not pubescent on any surface.
- 12a. Plants glabrous or with spreading trichomes; leaflet blades whitish green.
- 13a. Legume membranous; peduncle \pm as long as leaves 12. *O.* sect. *Xerobia* (p. 480)
- 13b. Legume scariosus; peduncle much longer than leaves 13. *O.* sect. *Eumorpha* (p. 486)
- 12b. Plants densely pubescent; leaflet blades yellowish gray or whitish gray.
- 14a. Plants covered with whitish gray trichomes; leaflet blades whitish gray 17. *O.* sect. *Orobia* (p. 496)
- 14b. Plants with yellowish gray or yellowish brown trichomes; leaflet blades yellowish gray or yellowish brown.
- 15a. Peduncle 1.5–9 cm 14. *O.* sect. *Janthina* (p. 491)
- 15b. Peduncle 2–38 cm 15. *O.* sect. *Oxytropis* (p. 493)

3. *Oxytropis* sect. *Polyadena* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 152. 1874.

多腺棘豆组 duo xian ji dou zu

Herbs, acaulescent, glandular. Leaves imparipinnate; leaflets verticillate. Racemes 3- to many flowered; peduncle 2–25 cm, shorter to longer than leaves. Corolla bluish purple, purple, or yellow. Ovary sessile or shortly stipitate, with 15–35 ovules. Legume usually inflated, 1- or \pm 2-locular.

Seven species: China, Himalayas, Mongolia, Russia; five species (two endemic) in China.

- 1a. Corolla pale or dirty yellow, standard apex shortly acuminate; stipules hard 5. *O.* *muricata*
- 1b. Corolla various purplish, bluish, or violet colors (rarely yellow or white in *O. microphylla*), standard apex rounded; stipules herbaceous or membranous.
- 2a. Racemes (6–)8–20-flowered; legume without glands.
- 3a. Stipules (10–)12–15 mm; calyx 10–13 mm, lobes 2–4 mm; corolla standard 1.9–2.5 cm; legume subglobose, bladderlike inflated, membranous 6. *O. trichophysa*
- 3b. Stipules 3.2–4.3 mm; calyx ca. 7.5 mm, lobes ca. 1 mm; corolla standard ca. 1.7 cm; legume lanceolate-ovoid, not bladderlike inflated, leathery 7. *O. pseudomyriophylla*
- 2b. Racemes 3–6-flowered; legume glandular.
- 4a. Plants (4–)5–15 cm tall; stipules conspicuously white pilose and long persistent; leaflets in (10–)13–27 whorls; leaflet blades 2–3 mm; corolla standard 1.9–2 cm; legume falcately cylindrical 8. *O. microphylla*
- 4b. Plants 22–35 cm tall; stipules not markedly white pilose or long persistent; leaflets in 3–5 whorls; leaflet blades 5–15 mm; corolla standard ca. 2.2 cm; legume cylindrical 9. *O. pseudoglandulosa*

5. *Oxytropis muricata* (Pallas) Candolle, *Astragalologia*, 86. 1802.

糙荚棘豆 cao jia ji dou

Phaca muricata Pallas, *Reise Russ. Reich.* 3: 746. 1776; *Astragalus muricata* (Pallas) Pallas.

Herbs, 5–12 cm tall, acaulescent, from a multiheaded caudex. Stipules with a lanceolate-subulate free part, densely yellowish villous with appressed long trichomes, glandular, adnate to petioles nearly to middle. Leaves 5–12(–20) cm; rachis with sparse trichomes and yellow glands; leaflets verticillate, in 15–18(–25) whorls, ca. 4 blades per whorl or rarely 2 and opposite; leaflet blades linear, lanceolate, or oblong, 4–6 × 1–2 mm, both surfaces with yellow glands, adaxially with appressed white trichomes, base rounded, apex acute. Racemes elongate, lax, several to many flowered; peduncle as long as or shorter than leaves, with appressed long trichomes and glands; bracts broadly lanceolate, ca. 10 × 3 mm, with appressed dense yellow glands, apex acute. Calyx cylindrical, 0.9–1.1 cm, with brown trichomes and pale yellow glands; lobes triangular, 2–3 × ca. 0.5 mm. Corolla pale to dirty yellow; standard 2.2–2.5 × ca. 0.7 cm, lamina elliptic-lanceolate, apex shortly acuminate; wings 1.7–2 × ca. 0.3 cm, lamina obovate, apex rounded; keel as long as wings, beak ca. 1 mm. Legume tapering cylindrical, 2–2.5 × 0.4–0.6 cm, leathery, ± 2-locular, glabrous and glandular, beak ca. 3 mm. Fl. Jun, fr. Jul. $2n = 32$.

Hillsides. Ningxia [N Mongolia, Russia (Siberia)].

6. *Oxytropis trichophysa* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 22(1): 158. 1874.

毛泡棘豆 mao pao ji dou

Herbs, 12–20 cm tall, acaulescent, from a multiheaded caudex, tuft-forming, clothed with many persistent stipules and leaves. Stipules with a lanceolate free part, (10–)12–15 × 3–5 mm, membranous, glandular and glabrous or strigose, adnate to petiole base, connate-sheathing, margin densely white ciliate with stout trichomes, apex acuminate. Leaves (4–)5–12.5(–18) cm; petiole 1–4.5 cm; petiole and rachis firm, sparingly and finely spreading villous and tubercular-glandular; leaflets verticillate, in 12–28 whorls, 4–6 blades per whorl; leaflet blades oblong-ovate to ovate, 2–5(–7) × 0.8–1.5 mm, slightly thickened, glabrous or with sparse short trichomes. Racemes subcapitate to elongate, (6–)8–20-flowered; peduncle 7–13 cm, shorter than to ± equaling leaves, with spreading trichomes and glands; bracts ovate-lanceolate to lanceolate-oblong, (5–)6–8 × 1–2 mm, herbaceous, with spreading white and black trichomes and glands, apex acute. Calyx cylindrical, 10–13 × ca. 3 mm, slightly inflated, with appressed black and white trichomes and glands; lobes lanceolate, 2–4 × ca. 0.5 mm. Corolla violet to purple; standard 1.9–2.5 cm, lamina suborbicular to obliquely spatulate, apex rounded; wings 1.8–2.1 cm, lamina obliquely triangular-spatulate, apex emarginate; keel 1.7–2 cm, beak 2–3.3 mm. Legume sessile; body bladderlike inflated, 1.6–2 cm, membranous, whitish and blackish villous and glandular, beak 2–3 mm. Fl. Jun–Aug, fr. Jun–Aug.

Gravelly slopes and valleys. Gansu, Xinjiang [Mongolia, Russia (W Siberia)].

7. *Oxytropis pseudomyriophylla* S. H. Cheng ex X. Y. Zhu, H. Ohashi & Y. B. Deng, *J. Jap. Bot.* 74: 127. 1999.

拟多叶棘豆 ni duo ye ji dou

Herbs, 10–25(–30) cm tall, acaulescent, from a simple to copiously branched multiheaded caudex. Stipules narrowly triangular, 3.2–4.3 × 1.7–2.6 mm, herbaceous to membranous, with rigid trichomes, highly adnate to petiole, veins conspicuous. Leaves 12–15 cm, with yellowish brown trichomes; leaflets verticillate or opposite, in 15–27 whorls or pairs, 2–4 blades per node; leaflet blades narrowly oblong, lanceolate, or elliptic, 6–9 × 2–2.5 mm, both surfaces with dense glandular trichomes. Racemes elongate, lax, (5–)8–20-flowered; peduncle 7–25 cm, much surpassing leaves; bracts ovate, ca. 6.5 × 2.5 mm, with yellowish brown trichomes and glands. Calyx cylindrical, ca. 7.5 × 3 mm, with yellowish brown trichomes; lobes subulate, ca. 1 × 0.2 mm. Corolla purple; standard ca. 1.7 × 0.4 cm, lamina narrowly obovate, apex rounded; wings ca. 1.6 cm, lamina obovate, apex rounded; keel ca. 1.2 cm, beak 1.5–2 mm. Legume sessile; body lanceolate-ovoid, leathery, with glandular trichomes. Fl. May–Sep, fr. May–Sep.

• Hillsides, roadsides along fields; 1400–2600 m. Gansu, Ningxia, Shanxi.

8. *Oxytropis microphylla* (Pallas) Candolle, *Astragalologia*, 83. 1802.

小叶棘豆 xiao ye ji dou

Phaca microphylla Pallas, *Reise Russ. Reich.* 3: 744. 1776; *Astragalus microphyllus* (Pallas) Pallas (1802), not Linnaeus (1753); *Oxytropis chiliophylla* Royle ex Benth; *O. grenardii* Franchet; *O. ingrata* Freyn; *O. polyadenia* Freyn; *O. tibetica* Bunge.

Herbs, (4–)5–15 cm tall, acaulescent, from a multiheaded caudex. Branches conspicuously white villous-pilose, with persistent stipules at base. Stipules narrowly triangular, ca. 5 × 1.5 mm, membranous, densely yellowish villous or with spreading to ascending whitish trichomes and with glands, basally connate. Leaves (2–)4–6(–7) cm; leaflets verticillate, in (10–)13–27 whorls; leaflet blades lanceolate-ovate to narrowly elliptic, 2–3 × 0.5–1 mm. Racemes compact to rather lax, becoming 2–5 cm, 3–6-flowered; peduncle 2–5(–7) cm, shorter to longer than leaves, densely villous and with glands; bracts triangular, 7–8 × 2–3 mm, villous and with glands. Calyx cylindrical, 9–10 × ca. 3 mm, whitish and blackish villous and with glands; lobes subulate, 2–2.7 × ca. 0.5 mm. Corolla purple, pink, bluish purple, light bluish violet, violet, yellow, or white; standard 1.9–2 cm, lamina elliptic, apex rounded; wings 1.5–1.7 cm, lamina obovate, apex retuse; keel 1.3–1.5 cm, beak 1–1.6(–2) mm. Legume sessile or subsessile; body falcate-oblong in profile, (1.2–)1.7–3 × 0.5–0.7 cm, erect-ascending, abaxially deeply sulcate, whitish and blackish villous or glabrous and tubercular-glandular. Fl. May–Sep, fr. Jul–Sep. $2n = 16, 16 + 2B$.

Hillsides, valley slopes, gravelly river terraces, hillsides in *Stipa* grasslands, ice terraces, high-elevation grasslands, *Carex-Arenaria* communities in stony open limestone areas, sandy areas, *Caragana* scrub;

2700–5200 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

9. *Oxytropis pseudoglandulosa* Gontscharow ex Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 18. 1955.

拟腺棘豆 ni xian ji dou

Herbs, 22–35 cm tall, acaulescent, from a multiheaded caudex. Branches clothed with marcescent stipules. Stipules lanceolate to narrowly lanceolate, 0.8–1.4 cm, thinly membranous, densely pilose, basally adnate to petiole, shortly connate,

apex subulate-acuminate to obtuse. Leaves 3–20 cm; petiole 1–5 cm; leaflets verticillate, in 3–5 whorls; leaflet blades linear to linear-oblong, 0.5–1.5 cm, abaxially tubercular-glandular. Racemes rather lax, 3–6-flowered; peduncle 6–13 cm, subequal to leaves, with spreading trichomes. Calyx cylindric, 1.1–1.5 cm, with appressed black and white trichomes and with glandular trichomes; lobes 3–4 mm. Corolla purple; standard ca. 2.2 cm, lamina elliptic, apex rounded; wings 1.6–1.8 cm; keel ca. 1.6 cm, beak ca. 1.5 mm. Legume cylindric. Fl. Jun–Aug, fr. Jun–Aug.

- Sandy areas along Qinghai Hu; 3000–3100 m. Qinghai.

4. *Oxytropis* sect. *Baicalia* Steller ex Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 135. 1874.

轮叶棘豆组 lun ye ji dou zu

Oxytropis sect. *Arenicola* C. W. Chang.

Herbs, acaulescent or caulescent, non-glandular (except for glands between leaflets and sometimes on bracts; but glands indicated for *Oxytropis myriophylla*, *O. lanata*, and *O. bicolor*). Leaves with leaflets verticillate or verticillate and opposite. Racemes 1- to many flowered; peduncle 3–20 cm. Legume (unknown in *O. shanxiensis*) sessile or shortly stipitate; body ovoid-oblong, ovoid, or globose, 1–2.5 cm, usually inflated, 1- or ± 2-locular, with 15–35 seeds.

About 40 species: Afghanistan, China, Himalayas, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Turkmenistan, Uzbekistan; North America; 15 species (eight endemic) in China.

1a. Corolla yellow, yellowish white, or white.

2a. Plants to 25 cm tall; leaflets 4–24 mm; beak of corolla keel 1.2–1.8 mm; legume sessile 15. *O. ochrantha*

2b. Plants to 40 cm tall; beak of corolla keel 1–1.5 mm; legume substipitate or shortly stipitate.

3a. Leaves 10–19 cm; leaflets 1–3 cm, mostly opposite but some verticillate; bracts longer than calyx; corolla yellow, keel beak ca. 1 mm 16. *O. ochrolongibracteata*

3b. Leaves 5–8 cm; leaflets 0.4–0.7 cm, mostly verticillate; bracts shorter than calyx; corolla white, keel beak 1–1.5 mm 17. *O. qamdoensis*

1b. Corolla various purplish, bluish, reddish, or violet colors and usually 2-colored (rarely white in *O. oxyphylla*).

4a. Plants with appressed or yellowish glandular trichomes.

5a. Beak of corolla keel (1.5–)1.8–3.8 mm; leaflets in 12–16(–50) whorls; bracts 8–15 mm 12. *O. myriophylla*

5b. Beak of corolla keel 1.5–2.5 mm; leaflets in (2 or)3–12 whorls and some or most leaflets merely opposite; bracts 3–10 mm.

6a. Calyx 0.9–1 cm; herbage non-glandular; legume stipitate 13. *O. trichophora*

6b. Calyx (1–)1.2–1.7 cm; herbage with appressed yellowish or glandular trichomes; legume sessile 14. *O. bicolor*

4b. Plants non-glandular.

7a. Plants caulescent or shortly caulescent (acaulescent in some *O. racemosa*).

8a. Plants shortly caulescent, stems neither diffuse nor much branched; racemes 7–10-flowered; leaves 5–14 cm, with 6–13 whorls of 4–6 leaflets 21. *O. racemosa*

8b. Plants definitely caulescent, stems diffuse and often much branched; racemes 1–3-flowered; leaves 3–5 cm, with 2–5 whorls of 3 or 4 leaflets 23. *O. ramosissima*

7b. Plants strictly acaulescent.

9a. Plants (1.5–)2–6 cm tall; leaves (0.5–)1–5 cm; racemes 1–3-flowered.

10a. Leaves (0.5–)1–3 cm, with 6–12 whorls of 4–6 leaflets; corolla standard 1.4–2.2 cm, keel beak 0.5–1.1 mm; plants turf- or cushion-forming 22. *O. chionobia*

10b. Leaves 3–5 cm, with 2–4 whorls of 3 or 4 leaflets; corolla standard 2.1–3.2 cm, keel beak ca. 2 mm; plants caespitose 24. *O. langshanica*

9b. Plants (3–)5–20(–40) cm tall; leaves (2.5–)3–20(–30) cm; racemes 5–15-flowered or more (few flowered in *O. shanxiensis*).

11a. Leaves of 3 kinds, i.e., with a solitary leaflet, with 7–15 opposite leaflets, and with 3 or 4 whorls of 3 or 4 leaflets each; corolla standard 1.5–1.6 cm 10. *O. shanxiensis*

11b. Leaves with leaflets in (1–)3–18 whorls or some leaves with leaflets in whorls and others opposite or alternate (if with 3 kinds as above, then plants not from Shandong or Shanxi); corolla standard 1.4–2.5(–3) cm.

- 12a. Leaflets in (7-)12-18 whorls; corolla standard (1.4-)1.5-2.5(-3) cm.
 13a. Corolla standard 2.5-3 cm; legume body 2-2.5 cm 18. *O. przewalskii*
 13b. Corolla standard 2-2.5 cm; legume body 1-1.6 cm.
 14a. Plants 5-8 cm tall; leaves 5-7 cm; calyx lobes ca. 2 mm 11. *O. lanata*
 14b. Plants 11-40 cm tall; leaves (5-)10-30 cm; calyx lobes 3.5-4.5 mm 12. *O. myriophylla*
 12b. Leaflets in (1-)3-10 whorls (or not verticillate for some leaves); corolla standard
 1.4-1.8(-2.3) cm.
 15a. Calyx (1-)1.2-1.7 cm, lobes (2-)3.5-7 mm; corolla standard 1.4-2.3 cm 14. *O. bicolor*
 15b. Calyx 0.6-1 cm, lobes 1-3.5 mm; corolla standard 1.4-1.8 cm.
 16a. Leaves 3-6 cm; leaflets in 4 or 5 whorls; peduncle 3-5 cm; calyx 8-10 mm 19. *O. pumila*
 16b. Leaves 7-20(-25) cm; leaflets in (1-)3-9 whorls; peduncle
 6-11(-19) cm; calyx 6-8.3(-10) mm 20. *O. oxyphylla*

10. *Oxytropis shanxiensis* X. Y. Zhu, *Nordic J. Bot.* 23: 279. 2005.

山西棘豆 *shan xi ji dou*

Herbs, 7-15 cm tall, acaulescent, from a short few-headed caudex. Stipules narrowly triangular, 7-11 × 1-2 mm, herbaceous, with white trichomes, adnate to petiole base, apical ca. 2/3 free. Leaves 5-13 cm, of 3 types: first type with leaves 1-foliolate eophylls (early produced leaves), petiole 1.3-2.6 cm, leaf blade narrowly ovate to ovate, 1.5-1.7 × ca. 0.5 cm, apex acute; second type with leaves 7-15-foliolate, to 13 cm, leaflets opposite, leaflet blade apices acuminate to acute; third type with leaves verticillate, leaflets in 3 or 4 whorls, 3 or 4 blades per whorl, leaflet blades narrowly ovate to lanceolate-elliptic, 6-10 × 0.5-1 mm. Racemes few flowered; peduncle 3-16 cm, curved when young, soft, shorter than leaves at anthesis but almost as long as leaves in fruit; bracts narrowly ovate, 2.5-4.5 × 0.5-1 mm, with white trichomes. Calyx campanulate, 7-9 mm, with white trichomes; tube 4-4.5 mm; lobes subulate, 3-4 × ca. 0.2 mm. Corolla purple; standard 1.5-1.6 × 0.5-0.6 cm, lamina broadly ovate, apex emarginate; wings ca. 1.2 cm, lamina obovate, apex rounded; keel 1.1-1.3 cm, beak ca. 1 mm. Ovary pubescent. Legume unknown. Fl. Jun-Aug.

- Grasslands on hillsides. Shandong, Shanxi.

11. *Oxytropis lanata* (Pallas) Candolle, *Astragalogia*, 89. 1802.

绵毛棘豆 *mian mao ji dou*

Phaca lanata Pallas, *Reise Russ. Reich.* 3: 746. 1776.

Herbs, 5-8 cm tall, acaulescent, from a much-branched multiheaded caudex, tuft- or mat-forming, clothed with marcescent stipules, sericeous. Stipules membranous, adnate to petiole. Leaves 5-7 cm; leaflets verticillate, in 12-18 whorls, 4-8 blades per whorl, arranged on opposite sides of rachis; leaflet blades oblong to linear, 3-12 × 1-2.5 mm, softly lanate-pubescent, apex obtuse. Racemes compact, a broad ovoid head, many flowered; peduncle shorter to slightly longer than leaves, densely spreading lanate. Calyx cylindrical, 11-12 × 3-3.5 mm; lobes triangular-lanceolate, ca. 2 mm. Corolla reddish pink to purple; standard 2-2.5 cm, lamina ovate-orbicular and 1-1.2 cm wide, apex rounded to barely emarginate; wings 1.8-2 cm, lamina longer than claw; keel 1.5-1.6 cm, beak ca. 2 mm. Legume ovoid-oblong, 12-14 × ca. 6 mm, slightly inflated, thinly leathery, ± 2-locular, softly lanate. Fl. Jun-Jul, fr. unknown. $2n = 16$.

Sandy areas; ca. 1200 m. Nei Mongol [Russia (Siberia)].

12. *Oxytropis myriophylla* (Pallas) Candolle, *Astragalogia*, 87. 1802.

多叶棘豆 *duo ye ji dou*

Phaca myriophylla Pallas, *Reise Russ. Reich.* 3: 745. 1776; *Astragalus myriophyllus* (Pallas) Pallas; *Oxytropis davidii* Franchet; *O. myriophylloides* Hurusawa.

Herbs, 11-40 cm tall, acaulescent, from a multiheaded caudex, tufted, with appressed white and yellow trichomes or with some long spreading trichomes. Stipules ovate-lanceolate, membranous, with appressed dense yellow elongate trichomes, connate to middle, apex subulate-acuminate. Leaves (5-)10-30 cm; leaflets verticillate, in 12-16(-50) whorls, 4-8 blades per whorl, arranged on opposite sides of rachis; leaflet blades linear, oblong, or lanceolate, 3-15 × 1-3 mm, both surfaces with dense long trichomes, base rounded, apex acuminate. Racemes compact, many flowered; peduncle 8-17 cm, shorter than to ca. 1.5 × as long as leaves, covered with spreading long thin trichomes; bracts lanceolate, 0.8-1.5 cm, with long trichomes. Flowers ascending. Calyx tubular, 1.1-1.4(-1.6) cm, with long trichomes; lobes lanceolate, 3.5-4.5 mm, both surfaces with trichomes. Corolla pale purple drying bluish; standard lamina oblong and 1.8-2.5 cm, apex rounded to emarginate; wings 1.5-2 cm, apex acute; keel 1.2-2 cm, beak (1.5-)1.8-3.8 mm. Legume erect-ascending, substipitate; body ovoid-oblong, 10-16 × 3-5 mm, leathery, ± 2-locular, with dense long trichomes, beak 5-7 mm. Fl. May-Jun, fr. Jul-Aug. $2n = 16$.

Hillsides, grasslands, rocky mountain slopes, prairies, sandy areas, *Betula* forest margins; 200-2600 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shanxi [Mongolia, Russia].

13. *Oxytropis trichophora* Franchet, *J. Bot. (Morot)* 4: 303. 1809.

毛序棘豆 *mao xu ji dou*

Oxytropis shensiana Ulbrich.

Herbs, 10-20 cm tall, acaulescent, from a multiheaded caudex. Branches with white long stout trichomes and yellowish or glandular trichomes. Stipules with a lanceolate free part, membranous, basally adnate to petiole, apex acute. Leaves 2.5-6(-8) cm; leaflets verticillate, in (2-)7-12 whorls, 3 or 4 blades per whorl and some also arranged on opposite sides of rachis; leaflet blades ovate to narrowly lanceolate, 2-8 × 1-2 mm. Racemes capitate or lax, few to many flowered; peduncle (6-)10-20 cm, thick, erect, slightly to greatly longer than leaves; bracts

ovate, 4–5 mm, with long trichomes, apex acute. Calyx cylindrical, 9–10 mm, with white long trichomes; lobes lanceolate-linear, 2.5–5 mm. Corolla basally almost white and apically blue; standard 1.5–2 × 0.7–0.9 cm, lamina broadly ovate, apex rounded to emarginate; wings 1.5–1.7 cm; keel ca. 1.4 cm, beak 1.5–2.5 mm. Legume stipitate; body ovoid-oblong, leathery, with white long trichomes. Fl. May, fr. Aug.

• Hillsides, roadsides, grasslands; 800–2000 m. Gansu, Hebei, Henan, Shaanxi, Shanxi.

14. *Oxytropis bicolor* Bunge, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 2: 91. 1835.

地角儿苗 *di jiao er miao*

Oxytropis angustifolia Ulbrich; *O. bicolor* f. *luteola* (C. W. Chang) X. Y. Zhu & H. Ohashi; *O. bicolor* var. *luteola* C. W. Chang.

Herbs, 5–20 cm tall, acaulescent, from a simple or multi-headed caudex, with appressed yellowish or glandular trichomes. Stipules narrowly triangular, ca. 1.8 × 0.3 cm, membranous, villous, basally connate. Leaves 3–20 cm; rachis with glands; leaflets at least some verticillate, in 3–10 whorls per leaf or with blades arranged on opposite sides of rachis; leaflet blades linear, ovate, or triangular, 3–25 × 1–5 mm. Racemes dense to lax, (7–)10–25-flowered; peduncle 4–20 cm, mostly shorter than leaves, rather densely whitish villous; bracts triangular, 3–10 × 1–3 mm, whitish villous. Calyx cylindrical, (10–)12–17 × 2–4 mm, with whitish and blackish trichomes; lobes subulate to triangular, (2–)3.5–7 × ca. 0.5 mm. Corolla bluish purple, purple, dark purple, reddish purple, pink, red, blue, purplish yellow, or pale yellow; standard 1.4–2.3 cm, lamina elliptic, apex emarginate; wings (1.2–)1.4–1.6(–2) cm, lamina obliquely obovate, apex emarginate to rounded; keel 1–1.4(–1.6) cm, beak (1.5–)2–2.5 mm. Legume sessile, ovoid-oblong, 1.7–2.4 × 0.4–0.5 cm, inflated, leathery, villous, septum ca. 1.5 mm wide. Fl. Apr–Jul, fr. Jun–Aug.

Hillsides, weedy slopes, scrub, field margins, grasslands, grassland margins, dry places, riverbanks, *Salix* scrub, roadsides, sandy places, floodplains, loess areas, S-facing slopes at base of hills, gravelly slopes and sandy sites in alpine areas; 400–2700 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Mongolia].

15. *Oxytropis ochrantha* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 188. 1832.

黄毛棘豆 *huang mao ji dou*

Oxytropis chrysotricha Franchet; *O. daqingshanica* Y. Z. Zhao & Zong Y. Zhu; *O. ochrantha* var. *albopilosa* P. C. Li; *O. ochrantha* f. *diversicolor* H. C. Fu & Ma; *O. ochrantha* subsp. *diversicolor* (H. C. Fu & Ma) P. C. Li; *O. ochrantha* var. *diversicolor* (H. C. Fu & Ma) G. Z. Qian; *O. turczaninowii* Jurtzev.

Herbs, usually 10–25 cm tall, acaulescent, from a multi-headed caudex, with appressed yellow long trichomes. Stipules broadly ovate, herbaceous, with dense yellow long trichomes, basally adnate to petiole, apex acute. Leaves 8–20 cm; leaflets (at least some typically) verticillate, in 1–9 whorls but apically 1 to several leaflets reduced to 2 opposite blades; leaflet blades

ovate, oblong-ovate, lanceolate, or linear, 0.6–2.5 × 0.3–1 cm, abaxially with long trichomes when mature, adaxially glabrous, apex acuminate to acute. Racemes elongate, compact to rather lax, many flowered; peduncle 8–11(–16.5) cm; bracts lanceolate, almost as long as calyx, with yellow long trichomes. Calyx cylindrical, 0.8–1.2(–1.3) cm, with yellow long trichomes; lobes lanceolate-linear, (3.5–)5.5–7 mm, slightly shorter or as long as tube. Corolla white or yellowish white; standard 1.4–2.1 cm, lamina obovate-oblong, apex rounded; wings 1.7–1.8 cm, lamina spatulate-elliptic, apex rounded; keel 1.5–1.8 cm, beak 1.2–3 mm. Legume sessile, ca. 1.8 × 0.8 cm, inflated, membranous. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Meadows, weedy and grassy hillsides, dry valleys, sandy areas; 500–4800 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Mongolia].

16. *Oxytropis ochrolongibracteata* X. Y. Zhu & H. Ohashi, Cathaya 11–12: 75. 2000.

长苞黄花棘豆 *chang bao huang hua ji dou*

Oxytropis ochrocephala Bunge var. *longibracteata* P. C. Li, Fl. Xizang. 2: 859. 1985, not *O. longibracteata* Karelin & Kirilov (1841).

Herbs, 35–40 cm tall or more, acaulescent, from a multi-headed caudex. Stems with 3–5 or more apparent internodes, thick, erect. Stipules ovate, herbaceous, with appressed dense long trichomes, free from petiole, connate at base, distinct parts triangular. Leaves 10–19 cm; node between petiole and leaflets with pale brown glands and appressed dense long trichomes; leaflets 17–25, mainly opposite but some verticillate, 2–4 blades per whorl; leaflet blades lanceolate, ovate-lanceolate, or lanceolate-oblong, 1–3 cm, both surfaces with short trichomes. Racemes many flowered; peduncle 10–25 cm, erect, with dense curved trichomes; bracts linear-lanceolate, longer than calyx. Calyx cylindrical, 1.2–1.3 cm, membranous, with long trichomes; lobes subulate, ca. 6 mm. Corolla yellow; standard 1.1–1.7 cm, lamina obovate, apex emarginate; wings oblong, 1.3–1.5 cm; keel as long as wings, beak ca. 1 mm. Legume shortly stipitate; body oblong, 1.2–1.5 cm, inflated, membranous, 1-locular, with appressed black trichomes, beak curved. Fl. Jun–Aug, fr. Jul–Sep.

• Hillsides, roadsides, dry valleys, shrubby hillsides, streamsides, alpine meadows and scrub; 1700–4300 m. Gansu, Xizang.

17. *Oxytropis qamdoensis* X. Y. Zhu, Y. F. Du & H. Ohashi, Novon 12: 430. 2002.

昌都棘豆 *chang du ji dou*

Herbs, 7–40 cm tall or more, acaulescent, from a 1-headed or rarely multiheaded caudex. Stipules narrowly triangular, 3.5–8.8 × 2–3 mm, herbaceous, with white trichomes, basally adnate to petiole. Leaves 5–8 cm, with white trichomes; leaflets mostly verticillate, in 9 or 11 whorls, 4(–6) blades per whorl or blades opposite apically on rachis; leaflet blades ovate to oblong-ovate, 4–7 × 1.5–5 mm, both surfaces with white trichomes but when young with dense grayish white trichomes, apex acuminate to acute. Racemes elongate, rather lax, many flowered; peduncle 5–13.5 cm, shorter than leaves at anthesis, longer than leaves in fruit; bracts ovate, 4.5–7.5 × 2–3 mm,

with white trichomes. Calyx subcylindric, 1.1–1.2 cm, with white trichomes; tube ca. 6 mm; lobes lanceolate, 4–6 × ca. 0.1 mm. Corolla white; standard 1.6–1.9 × 0.6–0.7 cm, lamina broadly obovate and narrowed to base, apex 2-lobed; wings ca. 1.5 cm, lamina obovate, apex emarginate; keel 1.2–1.7 cm, beak 1–1.5 mm. Legume substipitate; body ovoid, ca. 1.6 × 0.7 cm, membranous, with white trichomes, beak ca. 6.5 mm. Fl. Jul–Aug, fr. Jul–Aug.

- Among shrubs on dry and stony slopes; 3200–3300 m. Xizang.

18. *Oxytropis przewalskii* Komarov, Repert. Spec. Nov. Regni Veg. 13: 227. 1914.

哈密棘豆 ha mi ji dou

Herbs, usually 10–20 cm tall, acaulescent, from a multi-headed caudex. Stipules herbaceous. Leaves 4–10 cm, with white short cottonlike trichomes; leaflets verticillate, almost sessile, in 7–18 whorls, 3–6 blades per whorl; leaflet blades broadly elliptic, elliptic, or orbicular, apex acute. Racemes 8–10-flowered or more; peduncle 6–16 cm, slender, ca. 2 × as long as leaves, with sparse white trichomes; bracts ovate-lanceolate, shorter than calyx. Calyx cylindric, 1–1.5 cm, with white and black short cottonlike trichomes; lobes triangular, ca. 2.5 mm, ca. 1/5 as long as tube. Corolla purplish blue; standard 2.5–3 cm; keel beak incurved. Legume sessile, globose, 2–2.5 cm, inflated, membranous, with appressed short cottonlike trichomes, abaxial suture with septum, adaxial suture deeply grooved, beak short. Fl. Jul, fr. unknown.

- Sunny slopes. Xinjiang.

19. *Oxytropis pumila* Fischer ex Candolle, Prodr. 2: 279. 1825.

普米腊棘豆 pu mi la ji dou

Herbs, 3–6 cm tall, acaulescent, from a simple or branching caudex. Stipules with a broadly triangular short free part, scarious to herbaceous, long ciliate at margin, adnate to petiole, connate for most of length. Leaves 3–6 cm, densely covered with spreading long thin trichomes; leaflets verticillate, in 4 or 5 whorls, 4 blades per whorl; leaflet blades elliptic, 1–1.5 cm. Racemes subglobose, compact, 7–12-flowered; peduncle 3–5 cm, subequal to or longer than leaves; bracts linear, nearly half as long as calyx. Calyx broadly cylindric, 8–10 mm, covered with spreading white and black long trichomes; lobes 1–2.5 mm, much shorter than tube. Corolla violet; standard 1.5–1.8 cm, lamina broadly suborbicular-ovate, apex emarginate; wings 1.3–1.4 cm, apex emarginate; keel slightly shorter than wings, beak 1.5–2 mm. Legume sessile, ovoid-globose, 1.2–1.3 cm, bladderlike, membranous, 1-locular, covered with spreading long soft trichomes, beak curved. Fl. Jul, fr. unknown.

- Xinjiang.

20. *Oxytropis oxyphylla* (Pallas) Candolle, Astragalogia, 84. 1802.

尖叶棘豆 jian ye ji dou

Phaca oxyphylla Pallas, Reise Russ. Reich. 3: 743. 1776; *Oxytropis andaensis* P. H. Huang & L. H. Zhuo; *O. arenaria* Jurtzev; *O. chankaensis* Jurtzev; *O. hailarensis* Kitagawa; *O. hailarensis* f. *chankaensis* (Jurtzev) Kitagawa; *O. hailarensis*

var. *chankaensis* (Jurtzev) Kitagawa; *O. hailarensis* f. *leiocarpa* (H. C. Fu) P. Y. Fu & Y. A. Chen; *O. hailarensis* f. *psilocarpa* (Kitagawa) Kitagawa; *O. hulunbailensis* H. C. Fu & S. H. Cheng; *O. hulunbailensis* var. *leiocarpa* H. C. Fu; *O. lanata* (Pallas) Candolle var. *psilocarpa* Kitagawa; *O. oxyphylla* var. *leiocarpa* (H. C. Fu) Y. Z. Zhao; *O. oxyphylla* var. *psilocarpa* (Kitagawa) G. Z. Qian; *O. selengensis* Bunge; *O. selengensis* var. *longiscapa* Hurusawa; *O. verticillaris* Ledebour (1842), not Candolle (1802).

Herbs, 7–20(–25) cm tall, acaulescent, arising from a subterranean long-branched multiheaded caudex, appressed sericeous. Stipules broadly ovate to triangular-ovate, 5–9 mm, herbaceous, densely appressed white or yellow sericeous. Leaves 2.5–14 cm; leaflets at least some verticillate or sometimes subverticillate, in (1–)3–9 whorls, 3 or 4 blades per whorl; leaflet blades linear-lanceolate, oblong-lanceolate, or linear, 1–2 cm × 1–3 mm, both surfaces sericeous. Racemes capitate, 5–15-flowered; peduncle 6–11(–19) cm, equal to or longer than leaves; bracts lanceolate to narrowly lanceolate, 2.5–6 mm, membranous, sericeous with appressed white long trichomes, apex acute. Calyx cylindric, 6–8.3(–10) mm, with intermixed black and white long trichomes, base oblique; lobes linear-lanceolate, 1.8–3.5 mm. Corolla purple, pale purple, or rarely white; standard 1.4–1.8 cm, lamina elliptic-ovate, apex rounded; wings 1.2–1.6 cm, lamina obliquely obovate, apex obliquely truncate to rounded; keel 1–1.4 cm, beak 1.5–2.5 mm. Legume sessile, ovoid, 1–2 × 0.7–1.2 cm, inflated, spreading-ascending, membranous, with white or sometimes black trichomes. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Sandy open hillsides, semistabilized sand dunes, gravelly areas, grasslands; 500–2700 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi [Korea].

21. *Oxytropis racemosa* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 187. 1832.

砂珍棘豆 sha zhen ji dou

Oxytropis acutirostrata Ulbrich; *O. gracillima* Bunge; *O. gracillima* f. *albiflora* (P. Y. Fu & Y. A. Chen) H. C. Fu; *O. koreana* Nakai; *O. psammocharis* Hance; *O. psammocharis* f. *albiflora* P. Y. Fu & Y. A. Chen; *O. psammocharis* subsp. *mongolica* H. C. Fu; *O. racemosa* f. *albiflora* (P. Y. Fu & Y. A. Chen) C. W. Chang.

Herbs, 5–30 cm tall, acaulescent or shortly caulescent with 1 or 2 apparent internodes, from a multiheaded caudex. Stipules ovate, herbaceous, pubescent. Leaves 5–14 cm; petiole and rachis with appressed long trichomes; leaflets verticillate, in 6–13 whorls, 4–6 blades per whorl; leaflet blades oblong, linear, or lanceolate, 5–10 × 1–2 mm, both surfaces with appressed white long trichomes, base cuneate, margin incurved, apex acute. Racemes to 4 cm, lax, 7–10-flowered; peduncle 6.5–7.5(–10) cm, with slightly curved trichomes; bracts lanceolate, shorter than calyx. Calyx broadly cylindric, 4–7 mm; lobes linear, 1–3 mm, with short trichomes. Corolla purple to pale purple; standard 7–12 mm, apex rounded to emarginate; wings 7.5–11 mm, lamina ovate-oblong, apex rounded; keel 7.2–9.5 mm, beak (0.6–)1–2 mm. Legume sessile, ovoid, 7–10 mm and ± as wide, inflated, membranous, with appressed short trichomes, septum ca. 0.5

mm wide, adaxial suture concave, beak hooked. Fl. May–Jul, fr. Jun–Oct.

Sandy places on hillsides, dry valleys, grasslands, damp places, sandy or gravelly floodplains and riverbanks, semistabilized sand dunes; 200–2300 m. Gansu, Hebei, Henan, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [Korea, Mongolia].

"*Oxytropis tunliaoensis*" (P. F. Fu & C. Y. Li, Fl. Pl. Herb. Chin. Bor.-Orient. 2: 188. 1959) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

22. *Oxytropis chionobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 148. 1874.

雪地棘豆 xue di ji dou

Oxytropis oligantha Bunge.

Herbs, (1.5–)2–6 cm tall, acaulescent, from a multiheaded caudex, tuft- or cushion-forming, with dense silvery white trichomes. Caudex branches with persistent petioles. Stipules broadly ovate with a triangular free part, herbaceous, with appressed white trichomes, adnate to petiole, apex acute. Leaves (0.5–)1–3 cm; petiole and rachis with appressed, spreading, or ascending white trichomes; leaflets verticillate, in 6–12 whorls, 4–6 blades per whorl; leaflet blades narrowly ovate to lanceolate, 1–3.5 × 0.5–1.5 mm. Racemes 1- or 2(or 3)-flowered; peduncle obsolete or to as long as leaves, spreading silvery white villous and apically mixed with blackish trichomes; bracts lanceolate, 4–7 × 1–3 mm, whitish and blackish villous. Calyx cylindrical, 10–15 × 2–4 mm, with whitish cottonlike trichomes and sometimes mixed with black trichomes; lobes linear-lanceolate, 4–5 × ca. 0.5 mm, apex obtuse. Corolla bluish purple; standard 1.4–2.2 cm, lamina ovate, apex emarginate; wings 1.4–1.7 cm, lamina apically truncate; keel (1.2–)1.4–1.6 cm, beak 0.5–1 mm. Legume sessile, ellipsoid, ovoid, or oblong-ovoid, 1.3–2 × 0.5–0.7 cm, slightly inflated, leathery to thinly leathery, ± 2-locular, appressed to spreading white and black villous, beak ca. 2 mm. Fl. Jun–Jul, fr. Jul–Aug.

Base and top of hills, grasslands, gravelly alpine slopes; 2500–4600 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

23. *Oxytropis ramosissima* Komarov, Repert. Spec. Nov. Regni Veg. 13: 227. 1914.

多枝棘豆 duo zhi ji dou

5. *Oxytropis* sect. *Leucopodia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 130. 1874.

鳞萼棘豆组 lin e ji dou zu

Herbs, acaulescent. Petioles ± woody and persistent but not spiny. Herbage (especially bracts, peduncles, and calyces) with stalked or scalelike glands. Peduncle obsolete or to 2 cm. Legume substipitate; body ovoid.

One species: China, Mongolia, Russia.

25. *Oxytropis squammulosa* Candolle, Astragalogia, 79. 1802.

鳞萼棘豆 lin e ji dou

Oxytropis leucopodia Ledebour; *O. squammulosa* var. *purpurea* G. Z. Qian.

Herbs, (2.5–)3–7 cm tall, acaulescent, from a simple or

Herbs, 10–20 cm tall or taller, caulescent, with appressed white trichomes. Stems prostrate, with several to many evident internodes, many branched. Stipules linear-lanceolate to lanceolate, 3–6 mm, herbaceous, with spreading white long trichomes, free from petiole, basally connate, apex acute. Leaves 3–5 cm; leaflets verticillate or rarely opposite, in 2–5 whorls, 3 or 4 blades per whorl; leaflet blades linear to narrowly oblong, 5–10 × 1–3 mm, both surfaces with dense white trichomes, base cuneate, margin involute, apex acute. Racemes 1–3-flowered; peduncle 5–8 mm, with appressed white trichomes; bracts linear-lanceolate, 2–3 mm, with white trichomes, apex acute. Calyx broadly cylindrical, ca. 5 × 2 mm, with appressed white trichomes; lobes lanceolate-subulate, shorter than tube. Corolla bluish purple; standard 1.1–1.3(–1.5) cm, lamina obovate, apex emarginate; wings 1.1–1.2(–1.3) cm, apex rounded to emarginate; keel 9–10(–11.2) mm, beak 1–1.2 mm. Legume sessile, ellipsoid, ovoid, or oblong-ovoid, 0.8–1.6 × 0.6–1.2 cm, leathery to thinly so, densely pubescent, beak 0.8–1 mm. Fl. May–Aug, fr. Aug–Sep.

• Active and partially stabilized sand dunes and sandy slopes; 900–1400 m. Gansu, Nei Mongol, Shaanxi.

24. *Oxytropis langshanica* H. C. Fu, Fl. Intramongol., ed. 2, 3: 672. 1989.

狼山棘豆 lang shan ji dou

Herbs, acaulescent, 3–5 cm tall, from a multiheaded caudex, clothed with marcescent stipules and leaf bases, appressed gray villous. Stipules triangular, herbaceous, appressed villous with long trichomes, adnate to petiole, basally connate. Leaves 3–5 cm; rachis densely long hirsute; leaflets verticillate or sometimes subverticillate, in 2–5 whorls, 3 or 4 blades per whorl or merely opposite; leaflet blades linear to linear-lanceolate, 4–8 × 1–1.5 mm, both surfaces appressed pilose with long trichomes, base rounded, margin usually involute, apex acute. Racemes 1–3-flowered; peduncle obsolete or to 3 cm, shorter than leaves, densely whitish villous; bracts ovate, ca. 4 mm, densely whitish villous, apex obtuse. Calyx cylindrical, 10–15 × 2–4 mm, white hirsute; lobes lanceolate, 3–5 × ca. 0.5 mm. Corolla purple; standard 2.1–3.2 cm, lamina rhombic, apex emarginate; wings 1.8–2 cm, lamina obliquely oblong, apex obtuse; keel ca. 1.6 cm, beak ca. 2 mm. Legume sessile, ovoid, ellipsoid, or oblong-ovoid, 1.6–2.3 × 0.8–1 cm, leathery to thinly leathery, densely hirtellous. Fl. and fr. May–Jun.

• Sandy deserts. Nei Mongol.

multiheaded caudex, clothed with stiff stramineous marcescent petioles with expanded or thickened bases. Stipules narrowly triangular, ca. 4 × 2 mm, membranous, basally connate, margin ciliate. Leaves (1.5–)3–7 cm, 7–19-foliolate; petiole expanded and clasping at base; leaflet blades lanceolate-linear, 5–15 × 1–2 mm, tightly involute, glabrous except for 1 or a few terminal

or lateral trichomes. Racemes 1–3-flowered; peduncle obsolete or to 2 cm; bracts triangular, 5–7 × ca. 3 mm, membranous, glandular, margin ciliate. Calyx cylindric, (10.6–)11–14 × ca. 4 mm, glabrous or with scalelike trichomes or raised conspicuous glands; tube 8–10 mm, glabrous or with yellowish glands; lobes subulate, 2–2.3 mm. Corolla yellow, white, blue, or purple; standard 2.5–2.7 cm, lamina spatulate, apex rounded; wings 2–2.2 cm, lamina obliquely obovate, apex rounded; keel spotted, 2–2.1 cm, beak 1–2 mm. Legume substipitate; body ovoid, 1–

1.7 × 0.7–0.8 cm, inflated, thickly leathery, prominently beaked. Fl. Apr–Jul, fr. Jul–Sep. $2n = 16$.

Hillsides, gravelly and sandy areas, in both damp and dry riparian sites; 1300–3300 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Xinjiang [Mongolia, Russia].

In *Oxytropis squammulosa*, there is a great variation in corolla color, and the presence of squamellae on the calyx and fruit is variable within a population or even on an individual plant.

6. *Oxytropis* sect. *Falcicarpae* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 9: 41. 1989 [*“Falcicarpa”*].

镰荚棘豆组 lian jia ji dou zu

Herbs, caulescent or acaulescent, glandular viscid. Leaves imparipinnate; leaflets not or rarely verticillate. Racemes 2–10-flowered; peduncle 1.5–10 cm or longer, shorter than to equaling leaves. Corolla standard usually orbicular, not contracted in middle, not widened at basal half, and without auricles.

- Two species: China.

1a. Plants caulescent, internodes apparent; stipules herbaceous; corolla wings emarginate at apex 26. *O. tudanensis*
1b. Plants acaulescent, without visible internodes; stipules membranous; corolla wings rounded at apex 27. *O. falcata*

26. *Oxytropis tudanensis* X. Y. Zhu, H. Ohashi & Si Feng Li, J. Jap. Bot. 74: 130. 1999.

土丹棘豆 tu dan ji dou

Herbs, to ca. 5 cm tall, caulescent, from a partially subterranean many-branched caudex. Stem with 1 or more apparent internodes, densely glandular or with yellowish brown trichomes. Stipules broadly ovate, 4–5 × 2–3 mm, herbaceous, pubescent, basally connate. Leaves 2–4 cm, 13–17-foliolate; petiole and rachis with yellowish brown trichomes; leaflet blades elliptic to ovate, 3.6–4.7 × 2.1–3.1 mm, both surfaces with glandular or yellowish brown trichomes. Racemes capitate, 2–5-flowered; peduncle 2–4 cm, shorter than leaves, sometimes with glands; bracts linear to narrowly elliptic, 4–5 × 0.4–0.5 mm, yellowish brown pubescent. Calyx cylindric, ca. 5 × 1.4 mm; lobes subulate, ca. 2.5 × 0.3 mm, subequal. Corolla bluish violet; standard ca. 8.6 × 8 mm, lamina broadly ovate, apex ± emarginate; wings ca. 7 mm, lamina narrowly obovate, apex emarginate; keel ca. 6 mm, beak ca. 0.4 mm. Legume unknown. Fl. Jul–Aug.

- Hillsides; 2800–4900 m. Gansu, Xizang.

27. *Oxytropis falcata* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 156. 1874.

镰荚棘豆 lian jia ji dou

Oxytropis hedinii Ulbrich; *O. holdererii* Ulbrich; *O.*

popovii Vassilczenko.

Herbs, 3–35 cm tall, acaulescent, from a multiheaded caudex, tuft-forming, clothed with marcescent petioles and stipules. Stipules narrowly triangular, ca. 10 × 3 mm, membranous, whitish or yellowish villous and sometimes with obscure glands, often with adherent sand grains, basally connate. Leaves 5–20 cm; leaflets opposite or alternate, some nearly or actually verticillate, either 11–19, 25–31, or 27–47 blades; leaflet blades lanceolate, oblong, or ovate, 5–15 × 1–4 mm, ± involute, with whitish long trichomes. Racemes rather lax, 5–10-flowered; peduncle (1.5–)3.5–10(–15) cm, subequal to or shorter than leaves; bracts triangular, 8–14 × 3–4(–6) mm, herbaceous, with trichomes and raised yellowish glands. Calyx cylindric, 10–18 × 3–4 mm, with whitish and blackish trichomes and dense glands or glands lacking; lobes subulate, 2.5–5 × ca. 0.5 mm. Corolla purple, pink, purplish white, blue, purplish blue, violet, red, or white; standard 2.4–2.6 cm, lamina ovate; wings 2–2.4 cm, lamina obovate, apex rounded; keel 1.9–2 cm, beak 1.1–2.5 mm. Legume reddish when young, erect-ascending, stipitate; stipe to 1.8 mm; body falcate-oblong, 2.2–5 cm × 4–8 mm, slightly inflated, leathery, villous and with or without glands. Fl. May–Aug, fr. Jul–Sep.

- Sunny slopes, river floodplains, riverside meadows, hillsides, grasslands, alpine meadows, sandy and stony areas, valley bottoms, desert grasslands, flooded places, *Picea* forests; 2700–5200 m. Gansu, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang.

7. *Oxytropis* sect. *Mesogaea* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 38. 1874.

长茎棘豆组 chang jing ji dou zu

Herbs, caulescent (but acaulescent in some *Oxytropis maqinensis*), with (1 or)2–6 conspicuous internodes, non-glandular (except *O. tudanensis*). Leaves with leaflets not verticillate. Racemes 6- to many flowered; peduncle 1.5–25 cm or longer, shorter to longer than leaves. Corolla standard broadly ovate, not contracted in middle, not widened at basal half, and without auricles. Legume shortly stipitate or stipitate; body cylindrical, narrowly ellipsoid, ovoid, or obovoid.

Thirty-two species: Afghanistan, Bhutan, China, India, Iran, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; 32 species (18 endemic) in China.

- 1a. Corolla yellow, pale yellowish, white, or rarely red.
- 2a. Corolla white, keel beak (0.5–)2.5–3 mm; bracts 5–10 mm 28. *O. mutans*
- 2b. Corolla yellow, pale yellowish, or rarely red, keel beak 0.2–1 mm; bracts 1.5–7(–8) mm.
- 3a. Corolla standard 6–7 mm; calyx ca. 4 mm; bracts ca. 1.5 mm 40. *O. sinkiangensis*
- 3b. Corolla standard 8–17 mm; calyx 5.8–11.4 mm; bracts 2–8 mm.
- 4a. Bracts ca. 2 mm; corolla standard 0.8–0.9 cm, keel ca. 6.7 mm; legume stipe ca. 7 mm 44. *O. gueldenstaedtioides*
- 4b. Bracts 4–8 mm; corolla standard 0.9–1.7 cm, keel 7–14 mm; legume stipe to 2 mm.
- 5a. Calyx 7–10 mm, lobes 3.5–4.5 mm.
- 6a. Leaves 11–15-foliolate; peduncle 10–35 cm; legume body 2–3 × 0.5–0.6 cm 42. *O. meinshausenii*
- 6b. Leaves 15–29-foliolate; peduncle 3–12 cm; legume body 1.5–2 × 1–1.5 cm 43. *O. pilosa*
- 5b. Calyx 5.8–11.5 mm, lobes 2–8 mm.
- 7a. Leaflet blades 2.5–3 cm; calyx 5.8–7.2(–8.5) mm 41. *O. ochrocephala*
- 7b. Leaflet blades 0.5–2(–3) cm; calyx 6.5–11.5 mm.
- 8a. Legume body (1–)1.5–2.5 cm; bracts ca. 4 mm 45. *O. ochroleuca*
- 8b. Legume body 0.8–1.2 cm; bracts 6–7 mm 46. *O. kansuensis*
- 1b. Corolla blue, purple, bluish purple, pale purple, or violet.
- 9a. Plants with impressed yellow glands; leaflets at least moderately spaced; racemes 2–6-flowered; beak of corolla keel 0.4–0.7 mm 26. *O. tudanensis* (*O. sect. Falcicarpae*)
- 9b. Plants non-glandular; leaflets variously arranged; racemes variously flowered; beak of corolla keel various.
- 10a. Plants (3–)4–10(–12) cm tall.
- 11a. Leaves (0.5–)1–3 cm, 9–15-foliolate; leaflet blades (1–)2–5 mm 30. *O. tianshanica*
- 11b. Leaves 2–8 cm, 15–25(–29)-foliolate; leaflet blades 3–10(–12) mm.
- 12a. Racemes many flowered; corolla standard 5–9(–14) mm.
- 13a. Leaves 5–20 cm; leaflet blades 5–25 × 2–9 mm; peduncle 7–25 cm or more 32. *O. deflexa*
- 13b. Leaves 2–5(–8) cm; leaflet blades 3–10(–12) × 1.5–5 mm; peduncle 1.4–6(–8) cm.
- 14a. Calyx 4–5 mm; corolla standard 5–9 mm, keel beak ca. 0.3 mm 34. *O. hirsutiuscula*
- 14b. Calyx 5–7 mm; corolla standard 9–14 mm, keel beak 1.5–2 mm 49. *O. dichroantha*
- 12b. Racemes (4–)6–8(or 9)-flowered; corolla standard (9–)11–13(–15) mm.
- 15a. Plants 8–12 cm tall; leaves (17 or)19- or 21-foliolate; peduncle 7–11 cm; calyx ca. 4 mm 38. *O. chinglingensis*
- 15b. Plants 3–7 cm tall; leaves 9–19-foliolate; peduncle 2–9 cm; calyx 5–9 mm.
- 16a. Leaves 11–19-foliolate; leaflet blades 7–15 mm; racemes 7–9-flowered; corolla standard 1.2–1.3(–1.5) cm 48. *O. hirsuta*
- 16b. Leaves 9- or 11-foliolate; leaflet blades 2.5–6 mm; racemes 2–5-flowered; corolla standard 0.9–1.1 cm 56. *O. latialata*
- 10b. Plants (3–)10–80(–100) cm tall.
- 17a. Leaves 21-foliolate or more on at least some leaves (only to 23-foliolate in *O. maqinensis* and *O. xinglongshanica*).
- 18a. Corolla standard 1–1.2 cm, keel beak 0.2–0.5 mm; legume stipe 1.5–2 mm, body 1.2–1.6 cm 47. *O. qinghaiensis*
- 18b. Corolla standard (0.5–)0.7–1.6 cm; keel beak, legume stipe, and legume body not simultaneously within same range as above.
- 19a. Calyx 7.5–11(–11.2) mm; corolla standard 1.5–1.6 cm 52. *O. maqinensis*
- 19b. Calyx (2.2–)4–8(–10) mm; corolla standard (0.5–)0.7–1.5 cm.
- 20a. Racemes 3–10(–15)-flowered.
- 21a. Calyx lobes 1.5–2 mm; corolla standard (0.5–)0.7–0.8(–1) cm; legume 3–5 mm in diam. 50. *O. glabra*
- 21b. Calyx lobes 2.5–4.7 mm; corolla standard (1–)1.1–1.4 cm; legume 7–12 mm in diam. 58. *O. melanocalyx*
- 20b. Racemes many flowered.
- 22a. Corolla wings (5–)6–7 mm, keel beak 0.2–0.5 mm 50. *O. glabra*
- 22b. Corolla wings 8–14 mm, keel beak 0.5–2.5 mm.
- 23a. Leaves 5–6 cm; peduncle ca. 6 cm 55. *O. densiflora*
- 23b. Leaves (3–)5–20 cm; peduncle mainly over 6 cm.
- 24a. Corolla standard 0.8–1.2 cm, keel 0.7–0.9 cm; calyx (3–)5–7(–8) mm.
- 25a. Corolla standard 0.8–0.9 cm, keel 8–9 mm; leaflets pilose or adaxially glabrous 32. *O. deflexa*
- 25b. Corolla standard 0.8–1.2 cm, keel 7–8 mm; leaflets with trichomes 57. *O. lapponica*
- 24b. Corolla standard 1–1.5 cm, keel (0.9–)1–1.3 cm; calyx (7–)8(–10) mm.
- 26a. Leaflet blades 14–20 mm; beak of corolla keel 1.5–1.7 mm 54. *O. xinglongshanica*
- 26b. Leaflet blades 3–14 mm; beak of corolla keel 1–1.5 mm.
- 27a. Stipules 10–12 mm; legume 10–15 × 3–4 mm 29. *O. penduliflora*
- 27b. Stipules 6–8 mm; legume (17–)20–25 × (7–)8–10 mm 53. *O. giraldii*

- 17b. Leaves 9–21-foliolate (rarely 25-foliolate in *O. podoloba* and *O. zekogensis*).
- 28a. Plants 3–4 cm tall; leaves 9- or 11-foliolate 56. *O. latialata*
- 28b. Plants (3–)5–80(–100) cm tall; leaves (7–)11–21(–29)-foliolate.
- 29a. Plants 3–13 cm tall; racemes 6–9-flowered.
- 30a. Leaves 1.5–4 cm; leaflet blades 4–7 mm; corolla standard 0.9–1 cm, keel beak short; legume body 1–1.2 cm 31. *O. gerzeensis*
- 30b. Leaves 5–9 cm; leaflet blades 7–15 mm; corolla standard 1.2–1.3 cm, keel beak 2.5–3 mm; legume body 1.5–2 cm 48. *O. hirsuta*
- 29b. Plants (5–)10–80(–100) cm tall; racemes 3–9-flowered or more.
- 31a. Racemes 3–12-flowered.
- 32a. Racemes 3–5-flowered, dense or compact 39. *O. sitaipaiensis*
- 32b. Racemes 3–12-flowered, rather lax.
- 33a. Corolla keel 1–1.4 cm; stipules ca. 3 mm; bracts ca. 1.5 mm 36. *O. taochensis*
- 33b. Corolla keel ca. 0.8 cm; stipules 5–7 mm; bracts 3–6 mm 37. *O. zekogensis*
- 31b. Racemes 8- to many flowered.
- 34a. Leaflet blades 1.4–2 cm; corolla standard 1.1–1.5 cm, wings 1.1–1.4 cm 54. *O. xinglongshanica*
- 34b. Leaflet blades (0.4–)0.5–1.4 cm (but to 2.5 cm in *O. glabra*); corolla standard (0.5–)0.6–1 cm, wings 0.5–1 cm.
- 35a. Calyx 6–8 mm, lobes 3–4 mm 59. *O. subpodoloba*
- 35b. Calyx (2.2–)4–5 mm, lobes 1.2–2.5 mm.
- 36a. Leaves 2–4 cm; peduncle 1.5–3 cm; corolla wings ca. 5.5 mm 35. *O. ganningensis*
- 36b. Leaves (3–)5–15 cm; peduncle (2–)4.5–20 cm; corolla wings (5–)6–10 mm.
- 37a. Calyx lobes 2.4–2.5 mm; corolla wings ca. 10 mm; leaflet blades oblong 51. *O. podoloba*
- 37b. Calyx lobes 1.2–2 mm; corolla wings (5–)6–8 mm; leaflet blades linear, lanceolate, ovate-lanceolate, narrowly ovate, or elliptic.
- 38a. Leaflet blades ca. 1 mm wide; racemes (1–)4–7 cm; beak of corolla keel ca. 1.5 mm ... 33. *O. yekenensis*
- 38b. Leaflet blades (1–)3–7 mm wide; racemes 4–7 cm; beak of corolla keel 0.2–0.5 mm 50. *O. glabra*

28. *Oxytropis nutans* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 61. 1866.

垂花棘豆 chui hua ji dou

Oxytropis qiemoensis H. Ohba, S. Akiyama & S. K. Wu.

Herbs, 14–50 cm tall, caulescent, with 1 or more apparent internodes, arising from much-branched caudex, sericeous with long trichomes. Stipules with a linear-lanceolate to triangular free part, with dense white trichomes, basally adnate to petiole, basal ca. 1/3 to most of length connate. Leaves 7–10 cm, 19–41-foliolate; petioles 3–4 cm, shorter than rachis, with spreading dense white trichomes and glands between petiole and rachis; leaflet blades ovate, lanceolate-ovate, oblong-lanceolate, or broadly ovate, 5–18 × 2–8 mm, both surfaces with spreading to ascending dense trichomes or sparsely yellow sericeous, base rounded, apex acute. Racemes at first compact but later elongating, 6–12 cm, many flowered; peduncle as long as or slightly longer than leaves, thick, with spreading dense white trichomes and apically mixed with pale yellow and black trichomes; bracts linear to linear-lanceolate, 5–10 mm, with trichomes. Flowers spreading-descending. Calyx campanulate, 7–10 mm, with mixed black and white trichomes; lobes linear, 2.5–3(–4) mm. Corolla yellow, bluish purple, or white; standard 1.5–2 cm, lamina ovate, apex emarginate; wings oblong, 1.4–1.6 cm, apex 2-lobed; keel 1.2–1.3 cm, beak (0.5–)2.5–3 mm. Legume stipitate; stipe ca. 2 mm; body oblong-ovoid to narrowly cylindrical, 1.4–1.8 × 0.4–0.5 cm, pendulous, thickly membranous, 1(or 2)-locular, densely black sericeous, apex acute. Fl. May–Jul, fr. Jun–Jul.

Valleys, forest margins, gravelly subalpine areas; 2500–4100 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

29. *Oxytropis penduliflora* Gontscharov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 186. 1940.

藍垂花棘豆 lan chui hua ji dou

Herbs, 14–33 cm tall, caulescent, with 1 or 2 or sometimes more apparent internodes, arising from a branched superficial or subterranean caudex. Stipules 1–1.2 cm, green, with long trichomes, margin ciliate. Leaves 5–16 cm, 21–31-foliolate; leaflet blades lanceolate to ovate-lanceolate, 3–14 × 2.5–5 mm, with appressed long trichomes, base rounded to acute, margin ciliate, apex acute. Racemes rather lax, 20–30-flowered; peduncle (6–)10–15(–17) cm, thick, much longer than leaves, with spreading trichomes and apically with dark brown and white trichomes; bracts linear-lanceolate, 3–7 mm, herbaceous, with long trichomes, margin ciliate, apex acute. Flowers spreading to declined. Calyx broadly cylindrical, 8–10 mm, with reddish yellow or white long trichomes and black trichomes; lobes linear to subulate, ca. 4 mm. Corolla blue; standard 1.3–1.5 cm, lamina orbicular-ovate, apex emarginate; wings ca. 1.2 cm, lamina oblong, apex rounded to emarginate; keel ca. 1.1 cm, beak ca. 1 mm. Legume shortly stipitate; body cylindrical, 10–15 × 3–4 mm, pendulous, membranous, with spreading black, white, or reddish black short trichomes. Fl. Jun–Jul, fr. Jul–Aug.

Dry hillsides, gravelly areas, alpine meadows; 2000–4100 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

30. *Oxytropis tianschanica* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 43. 1869.

天山棘豆 tian shan ji dou

Oxytropis brachycarpa Vassilczenko; *O. pulvinata* Saposchnikow.

Herbs, 4–5 cm tall, caulescent, from a multiheaded caudex, mat-forming, grayish white pubescent. Stems prostrate and diffuse, ± mat-forming, with 1–4 or more apparent internodes, with appressed dense white trichomes. Stipules ovate-lanceolate, 3–5 mm, herbaceous, densely white pilose, adnate to petiole for most of length, basally connate. Leaves (0.5–)1–3 cm, 9–15-foliolate; petiole and rachis with spreading white trichomes; leaflets densely arranged; leaflet blades broadly elliptic to lanceolate, (1–)2–5 × 1–3 mm, both surfaces with dense white trichomes, margin ciliate. Racemes compact, 5–10-flowered; peduncle 1.5–3.5 cm, as long as or longer than leaves, with white trichomes; bracts lanceolate, 3–5 mm, longer than pedicels, with white trichomes. Calyx cylindric, (5.5–)6–10 mm, densely villous with spreading long trichomes and black short trichomes; lobes subulate, as long as or sometimes slightly longer than tube. Corolla purple; standard 0.8–1.2 cm, lamina orbicular, apex ± emarginate; wings oblong, 8–9 mm; keel 6–7 mm, beak (0.5–)1–1.5 mm. Legume stipitate; stipe 1–2 mm; body broadly ellipsoid-oblong, 10–15 × 3–5 mm, thickly membranous, 2-locular, with white and black trichomes intermixed, septum ca. 0.3 mm wide, adaxial suture deeply grooved. Fl. Jun–Aug, fr. Jul–Aug. $2n = 16$.

Floodplain grasslands, saline grassy areas, sandy areas by rivers, rocky alpine areas; 3000–4400 m. Xinjiang, Xizang [Kyrgyzstan, Tajikistan].

31. *Oxytropis gerzeensis* P. C. Li, Fl. Xizang, 2: 859. 1985.

改则棘豆 *gai ze ji dou*

Herbs, 8–13 cm tall, caulescent, with 2 or more apparent internodes, horizontal or prostrate, with spreading sparse trichomes. Stipules herbaceous, with spreading trichomes, free from petiole, basal half connate. Leaves 1.5–4 cm, 12–17(–21)-foliolate; leaflet blades oblong, ovate-oblong, or lanceolate, 4–7 × 2.5–3 mm, both surfaces densely sericeous with long trichomes. Racemes dense, 6–8-flowered; peduncle 2.5–4 cm, slender, slightly shorter than to as long as leaves, basally with appressed white and black long trichomes, apically with dense black ones; bracts narrowly lanceolate, shorter than calyx. Calyx 5.5–6 mm, with dense black short trichomes; lobes shorter than tube. Corolla purple; standard 8.5–10 mm, lamina broadly ovate, apex emarginate; wings 8–9 mm, lamina oblong, apex with 2 unequal lobes; keel shorter than wings, beak short. Legume (immature) shortly stipitate; body ovoid to ellipsoid, 10–12 × 5–6 mm, tapering to a beak. Fl. and fr. Sep.

• Meadows; 3400–5200 m. Qinghai, Xinjiang, Xizang.

32. *Oxytropis deflexa* (Pallas) Candolle, Astragalogia, 96. 1802.

急弯棘豆 *ji wan ji dou*

Astragalus deflexus Pallas, Acta Acad. Sci. Imp. Petrop. 2: 268. 1779; *A. parviflorus* Lamarck; *A. retroflexus* Pallas.

Herbs, 2–12 cm tall, caulescent or less commonly acaulescent, with (0 or)1–7 apparent internodes, from a few- or several-headed caudex, subprostrate, with spreading or retrorse trichomes. Stipules lanceolate, herbaceous, with long trichomes, basally adnate to petiole, apex acute. Leaves 5–20 cm, (15–)21–31(–41)-foliolate; leaflet blades ovate-oblong, ovate, lanceo-

late-oblong, or lanceolate, 5–25 × 2–8 mm, both surfaces pilose or adaxially glabrous, base rounded, apex acute. Racemes at first dense, becoming lax, 13–30-flowered; peduncle 7–25 cm or sometimes longer, villous-pilose; bracts linear, almost as long as calyx, membranous. Flowers declined. Calyx campanulate, (3–)6–7(–8) mm, with white and black trichomes intermixed; lobes lanceolate, as long as or shorter than tube. Corolla pale bluish purple; standard 8–9 × ca. 5 mm, lamina obovate, apex rounded to emarginate; wings as long as standard, longer than keel, apex rounded; keel 8–9 mm, beak ca. 1 mm. Legume stipitate; stipe 2–4 mm; body oblong-ovoid, 10–20 × 4–5 mm, pendulous, membranous, 1-locular, with spreading long trichomes, apex with a beak. Fl. and fr. Jun–Jul. $2n = 16$.

Gravelly slopes, valleys, among shrubs; 1600–3700 m. Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [Mongolia, Russia; North America].

33. *Oxytropis yekenensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 68. 1999.

野克棘豆 *ye ke ji dou*

Herbs, 15–25 cm tall, caulescent, with 1–3(or 4) apparent internodes, clump-forming from a well-developed multiheaded caudex, ± whitish pubescent. Stipules subulate, 3–3.5 × ca. 0.8 mm, with appressed trichomes, distinct or sometimes basally connate. Leaves 7–9 cm, laxly 15–19-foliolate; leaflet blades linear to narrowly ovate, 8–13 × ca. 1 mm, margin involute, apex acute. Racemes lax, (1–)4–7 cm, many flowered; peduncle 7–19 cm or more, typically much longer than leaves; bracts linear-triangular, ca. 1.5 × 0.2 mm, with whitish trichomes. Calyx campanulate, 4–4.5 × ca. 2 mm, with whitish trichomes; lobes subulate, 1.2–2 × ca. 0.2 mm. Corolla purple; standard 8–9 mm, lamina broadly ovate and 6–6.5 × 5–5.5 mm, basally tapering into claw, apex rounded; wings ca. 8 mm, lamina oblong, apex rounded; keel ca. 8 mm, beak ca. 1.5 mm. Legume covered with trichomes when immature. Fl. May, fr. May.

• Hilly slopes; ca. 1400 m. Xinjiang.

34. *Oxytropis hirsutiuscula* Freyn, Bull. Herb. Boissier, sér. 2, 5: 1021. 1905.

短硬毛棘豆 *duan ying mao ji dou*

Oxytropis glabra Candolle var. *pamirica* B. Fedtschenko.

Herbs, 3–10 cm tall, caulescent, arising from a deeply subterranean multiheaded caudex. Stems very slender, with 3 or more apparent internodes, many branched, with whitish trichomes. Stipules with a broadly lanceolate distinct part, 4–6 mm, with sparse trichomes, adnate to petiole, basal half connate. Leaves 2–8 cm, 15–21-foliolate; leaflet blades ovate-oblong, oblong, elliptic, or lanceolate, 3–10 × 1.5–3 mm, both surfaces with appressed white stiff trichomes. Racemes compact to rather lax, many flowered; peduncle 1.5–4.5 cm, shorter than leaves; bracts lanceolate, 2–3 mm, membranous, with sparse black trichomes, margin ciliate, apex acute. Calyx campanulate, 4–5 mm, with black and white trichomes intermixed; lobes subulate, ca. 1/2 as long as tube. Corolla purple; standard 5–9 mm, lamina orbicular, apex emarginate; wings almost as long as standard; keel slightly shorter than wings, beak ca. 0.3 mm. Legume stipitate; stipe to ca. 2.5 mm; body broadly cylindrical,

8–15 × 3–5 mm, pendulous, membranous, with appressed black short trichomes, abaxial suture round, adaxial suture deeply grooved, beak 1–2 mm. Fl. Jun–Aug, fr. Aug–Sep.

Meadows in alpine areas and along riversides; 3800–4300 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Russia (W Siberia), Tajikistan, Turkmenistan, Uzbekistan].

35. *Oxytropis ganningensis* C. W. Chang, Acta Phytotax. Sin. 23: 229. 1985.

陇东棘豆 long dong ji dou

Herbs, 35–50 cm tall or more, caulescent, from a simple or branched caudex. Stems thin, decumbent or sprawling, with 4 or more apparent internodes, with many branches, subglabrous or with spreading sparse white trichomes. Stipules subulate to triangular, with a 2–5 mm distinct part, with subspreading sparse white trichomes, apex acuminate. Leaves 2–4 cm, 7–17-foliolate; petiole ca. 2 mm; petiole and rachis with spreading sparse to dense white trichomes; leaflet blades linear-oblong to linear, 5–14 × 1–2 mm, both surfaces with subspreading white trichomes, base cuneate to subrounded, margin slightly incurved, apex acute. Racemes spiciform, 1.5–3.5 cm, many flowered; peduncle 1.5–3 cm, densely appressed pubescent; bracts subulate, 2–3 mm, densely appressed pubescent. Flowers 6–9 mm. Pedicel ca. 1 mm. Calyx often purplish, tubular-campanulate, ca. 5 mm, sparsely appressed pubescent; lobes subulate, 1–2 mm. Corolla blue; standard 6–9 mm, apex rounded; wings ca. 5.5 mm, lamina obliquely oblong, apex obtuse; keel ca. 5.5 × 1.5 mm, beak ca. 0.5 mm. Legume sessile or with a stipe to 1 mm; body ellipsoid, 10–12 × 3–4 mm, slightly inflated, subleathery, with subspreading white trichomes, septum ca. 0.5 mm wide, apex acute, beak 2.5–3 mm and recurved. Fl. Aug–Sep, fr. Sep–Oct.

• Valleys, grasslands on hillsides; 1100–1200 m. Gansu, Ningxia.

36. *Oxytropis taochensis* Komarov, Repert. Spec. Nov. Regni Veg. 13: 232. 1914.

洮河棘豆 tao he ji dou

Herbs, (5–)10–30 cm tall, caulescent, from a much-branched subterranean rhizomatous caudex, clump-forming. Stems thin, diffuse, with 2–6 apparent internodes, with short pubescence. Stipules ovate-lanceolate, ca. 3 mm, with short trichomes, basally connate, apex acute. Leaves (3–)5–8(–10) cm, (9–)13–17-foliolate; leaflet blades elliptic, ovate, broadly ovate, suborbicular, or lanceolate-ovate, 5–10 × 2–4 mm, both surfaces with appressed stout trichomes, base rounded, apex acute to rounded. Racemes compact but becoming elongate and lax in fruit, 3–10-flowered or more; peduncle 3.5–11.5 cm, longer than leaves, with short pubescence; bracts lanceolate, ca. 1.5 mm, almost as long as pedicels, membranous. Calyx campanulate, (5.2–)6–7.5(–10) mm, with black and white trichomes intermixed; lobes subulate, 2–3.5(–4.5) mm. Corolla purple and bluish purple; standard 10–14.2 × 6–8 mm, lamina obovate to ovate, apex rounded to emarginate; wings 10–13.5 × ca. 3 mm, lamina narrowly elliptic, apex 2-lobed; keel 1–1.4 cm, beak (0.5–)2.5–3.5 mm. Legume stipitate; stipe as long as calyx; body cylindrical, 2–3 × ca. 0.5 cm, erect or slightly incurved, inflated, 1-locular, with appressed short pubescence. Fl. Jun–Jul, fr. Jul–Sep.

• Meadows, roadsides, hilltops, sandy sites in valleys; 2000–3400 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan.

37. *Oxytropis zekogensis* Y. H. Wu, Acta Phytotax. Sin. 35: 350. 1997.

泽库棘豆 ze ku ji dou

Herbs, 20–40 cm tall, caulescent, from a superficial caudex. Stems purplish, prostrate to erect-ascending, with sparsely spreading white pubescence. Stipules with an ovate-lanceolate to lanceolate free part, 5–7 mm, with sparse trichomes, basal ca. 1/3 connate. Leaves 3–8 cm, 13–21(–25)-foliolate; petiole of basal leaves 0.2–2 cm but apical leaves sessile; rachis with spreading long trichomes; leaflet blades ovate to lanceolate, 3–10 × 2–6 mm, both surfaces with appressed white trichomes, base rounded, apex acute. Racemes dense and remaining subcapitate or shortly elongating in fruit, 5–12-flowered; peduncle 7–15 cm, erect, sparsely white pubescent but below inflorescence densely pubescent; bracts ovate-lanceolate, 3–6 mm, with sparse trichomes. Calyx campanulate, ca. 6 × 3 mm, with blackish brown and white trichomes; lobes subulate, ca. 2 mm. Corolla violet to purple; standard 1–1.1 cm, lamina ovate, apex emarginate; wings ca. 9 mm, apex obliquely emarginate; keel ca. 8 mm, beak ca. 1 mm. Legume with a short pedicel; body elliptical to cylindrical, 10–14 × 5–6 mm, inflated, with spreading white and brown short trichomes. Fl. and fr. Sep.

• Riversides and alpine meadows; 2700–3400 m. Qinghai.

38. *Oxytropis chinglingensis* C. W. Chang, Fl. Tsinling. 1(3): 446. 1981.

秦岭棘豆 qin ling ji dou

Oxytropis humilis C. W. Chang.

Herbs, 8–12 cm tall, caulescent, arising from a multi-headed caudex, tuft-forming. Stems slender, prostrate or sometimes ascending, with 1 or more apparent internodes. Stipules lanceolate, 5–8 mm, abaxially pubescent, margin ciliate, apex acuminate. Leaves ca. 8 cm, (17 or)19- or 21-foliolate; petiole and rachis slender, sparsely pubescent; leaflet blades ovate to ovate-lanceolate, 5–10 × 3–4.5 mm, midvein with trichomes, base cuneate to rounded, apex acute to rounded. Racemes compact, (4–)6–8-flowered; peduncle 7–11 cm, sparsely pubescent; bracts lanceolate, 3–5 mm, herbaceous, abaxially pubescent. Calyx campanulate, ca. 4 × 3 mm; lobes lanceolate, ca. 2 mm, densely black strigose. Corolla color unknown; standard ca. 1.2 × 0.8 cm, lamina broadly ovate, apex emarginate; wings ca. 11 × 3 mm, lamina oblong, apex emarginate; keel ca. 1.1 cm, beak ca. 0.5 mm. Legume shortly stipitate; body oblong-cylindrical, 9–13 × 4–5 mm, inflated, papery, with black trichomes, 1-locular, 8–12-seeded, adaxial suture slightly convex, apex acute, beak curved. Fl. May–Jul, fr. Jul–Aug.

• Sunny grasslands, meadows on sunny slopes; 1800–3900 m. Shaanxi, Xizang.

39. *Oxytropis sitaipaiensis* T. P. Wang ex C. W. Chang, Fl. Tsinling. 1(3): 446. 1981.

西太白棘豆 xi tai bai ji dou

Herbs, 10–13 cm tall, caulescent, arising from a multi-

headed buried caudex. Stems slender, caespitose, spreading, ascending, or erect, with 2 or more apparent internodes. Stipules narrowly triangular, 3–5 mm, membranous, with sparse trichomes, basally connate, margin ciliate, apex acute. Leaves 5–10 cm, 13–21-foliolate; petiole and rachis thin, sparsely pubescent; leaflet blades ovate, ovate-lanceolate, or elliptic, 8–10 × 2–4 mm, both surfaces with subappressed white trichomes, base rounded, apex acute. Racemes rather lax, 3–5-flowered; peduncle 5–6 cm, as long as or shorter than leaves, with sparse trichomes; bracts subulate, ca. 2 mm, membranous, sparsely pilose. Calyx campanulate, ca. 4 × 3 mm; lobes linear, 2–3 mm. Corolla purplish; standard ca. 11 × 3 mm, lamina elliptic; wings ca. 1 cm, lamina oblong, apex rounded; keel ca. 9.5 mm, beak ca. 1.5 mm. Legume stipitate; stipe ca. 7 mm; body oblong-ellipsoid, ca. 2.3 × 0.4 cm, inflated and slightly flattened, 1-locular, with dense white short trichomes, base narrowly cuneate, apex acute, beak ca. 3 mm. Fl. May–Jun, fr. Jun–Aug.

- Gravelly valley bottoms, hillsides; 1800–2000 m. Shaanxi.

1a. Leaves almost sessile 39a. var. *sitaipaiensis*
1b. Leaves with a 1–3 mm petiole 39b. var. *brevidentata*

39a. *Oxytropis sitaipaiensis* var. *sitaipaiensis*

西太白棘豆(原变种) xi tai bai ji dou (yuan bian zhong)

Leaves almost sessile. Fl. May–Jun, fr. Jul–Aug.

- Gravelly valley bottoms; ca. 1800 m. Shaanxi.

39b. *Oxytropis sitaipaiensis* var. *brevidentata* (C. W. Chang) X. Y. Zhu & H. Ohashi, *Cathaya* 11–12: 112. 2000.

短萼齿棘豆 duan e chi ji dou

Oxytropis melanocalyx Bunge var. *brevidentata* C. W. Chang, *Fl. Tsinling* 1(3): 445. 1981.

Leaves with a 1–3 mm petiole. Fl. Jun, fr. Jun.

- Hillsides; ca. 2000 m. Shaanxi (Yangxian).

40. *Oxytropis sinkiangensis* S. H. Cheng ex C. W. Chang, *Acta Bot. Boreal.-Occid. Sin.* 8: 13. 1988.

新疆棘豆 xin jiang ji dou

Herbs, 10–60 cm tall, caulescent, evidently clump-forming from a superficial caudex. Stems erect or spreading-ascending, with spreading white short trichomes. Stipules triangular-lanceolate, 8–11 mm, herbaceous, with appressed trichomes, distinct, apex acuminate. Leaves 5–10 cm, 7–19-foliolate; petiole and rachis adaxially sulcate, with spreading white trichomes; leaflet blades oblong, broadly lanceolate, or oblong-ovate, 1.5–3 × 0.6–1 cm, with appressed white long trichomes, base rounded, apex acute. Racemes elongate and further elongating in fruit, many flowered; peduncle 7–20 cm, as long as or longer than leaves, basally with dense trichomes; bracts subulate, ca. 1.5 mm, membranous, with white long trichomes. Calyx campanulate, ca. 4 mm, with spreading dense white long trichomes sometimes mixed with appressed black short trichomes; lobes linear, ca. 1 mm. Corolla yellow; standard 6–7 mm, lamina orbicular and 4–5 mm wide, apex emarginate; wings ca. 5.5 mm, lamina oblong, apex emarginate; keel ca. 4 mm, beak ca. 0.3 mm. Legume stipitate; stipe ca. 4 mm; body oblong, pendulous,

inflated, thickly membranous, vesicular, 1-locular, without a septum, with semispreading white trichomes, beak ca. 2 mm. Fl. Jul–Aug, fr. Aug–Sep.

- Wastelands; 500–1000 m. Gansu, Xinjiang.

41. *Oxytropis ochrocephala* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 22(1): 57. 1874.

黄花棘豆 huang hua ji dou

Herbs, 10–56 cm tall, caulescent, arising from a multi-headed caudex, tuft-forming. Stems erect or sprawling, with 2–5 or more apparent internodes, yellowish pilose. Stipules ovate with a triangular distinct part, herbaceous to papery, with dense to sparse long trichomes, free from petiole, basally connate. Leaves 3–19 cm, (11 or) 13–27(–39)-foliolate; rachis with pale brown glands and yellow long trichomes; leaflet blades ovate-lanceolate, 2.5–3 × 0.2–1 cm, both surfaces strigose with sparse short or long trichomes. Racemes compact, 8–14-flowered or more; peduncle (3.5–)10–25 cm, as long as to much longer than leaves, erect, with incurved long trichomes or strigose; bracts linear-lanceolate, ca. 4 mm, with dense trichomes. Calyx cylindrical, 5.8–7.2(–8.5) mm, vesicular, membranous, with dense trichomes; lobes linear-lanceolate, 2.2–5.1 mm. Corolla yellow; standard 1–1.7 cm, lamina broadly obovate, margin entire, apex emarginate; wings 1–1.2 cm; keel 0.8–1.2 cm, beak 0.3–0.6(–1) mm. Legume shortly stipitate to subsessile; body oblong, 1.2–1.5 cm, inflated, leathery, 1-locular, with dense short trichomes, beak incurved at apex. Fl. Jun–Aug, fr. Jul–Sep.

- Grasslands, weedy slopes and alpine meadows; 1800–4500 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang.

42. *Oxytropis meinshausenii* Schrenk, *Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg* 10: 254. 1842 [“*meinshauseni*”].

萨拉套棘豆 sa la tao ji dou

Herbs, 20–45 cm tall, caulescent, from a simple or several-branched caudex. Stems erect or ascending, with 2–4 or more apparent internodes, with spreading long trichomes. Stipules narrowly triangular, ca. 1.1 cm, herbaceous to membranous, with spreading white trichomes. Leaves 7–15 cm, 11–15-foliolate; petiole and rachis with spreading long trichomes; leaflet blades oblong-lanceolate to broadly lanceolate, 1–3 × 0.3–0.8 cm, both surfaces with spreading sparse long trichomes, base rounded, apex acute. Racemes compact to lax, several to many flowered; peduncle 10–35 cm, thick, longer than leaves, with spreading dark brown trichomes; bracts lanceolate, 5–8 mm, membranous, with white and black long trichomes, apex acuminate. Calyx campanulate, 8–10 mm, with black and white short trichomes; lobes linear, 4–5 mm. Corolla yellow; standard 1.3–1.5 × 0.8–1.2 cm, lamina orbicular, apex 2-lobed; wings shorter than standard; keel as long as wings, beak 0.5–1 mm. Legume stipitate; stipe 1.5–2 mm; body oblong-ovoid, 2–3 × 0.5–0.6 cm, erect, leathery, 2-locular, with spreading black and white trichomes. Fl. Jun–Aug, fr. Jun–Aug.

- Hillsides, alpine grasslands, between stones in valleys, roadsides, *Picea* forest margins; 1600–3600 m. Gansu, Sichuan, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

43. *Oxytropis pilosa* (Linnaeus) Candolle, *Astragalologia*, 91. 1802.

疏毛棘豆 shu mao ji dou

Astragalus pilosus Linnaeus, Sp. Pl. 2: 756. 1753.

Herbs, 20–50 cm tall, caulescent, arising from a superficial multiheaded caudex. Stems thick, erect, with many branches, with 4–8 or more apparent internodes, with spreading dense long trichomes. Stipules oblong-ovate to lanceolate, (0.6–)1–1.3 cm, herbaceous, with long trichomes, adnate to base of petiole, apex acute. Leaves 5–12 cm, 15–29-foliolate; petiole and rachis sulcate, with spreading trichomes; leaflet blades elliptic to lanceolate, 1–2.3 × 0.3–1 cm, both surfaces pubescent, base rounded, apex acute. Racemes dense but slightly elongating in fruit, many flowered, basally with dense trichomes; peduncle in uppermost axils, 3–12 cm, thick, longer than leaves, with appressed long trichomes; bracts linear-lanceolate, ca. 7 mm, herbaceous, with long trichomes, apex acute. Calyx broadly cylindrical, 7–9 mm, with trichomes; lobes subulate to linear, 3.5–4.5 mm. Corolla pale yellow; standard 0.9–1.4 cm, lamina broadly ovate, apex emarginate; wings 8–11 mm; keel 7–10.2 mm, beak 0.5–1 mm. Legume lanceolate-ovoid to cylindrical, 1.5–2 × 1–1.5 cm, ascending, leathery, 2-locular, with spreading dense white trichomes, septum developed, adaxial suture grooved, apex acute. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Valleys, SW-facing hilly areas, meadows, and shrublands; 1400–4300 m. Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

44. *Oxytropis gueldenstaedtioides* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 65. 1905.

米口袋状棘豆 mi kou dai zhuang ji dou

Herbs, ca. 15 cm tall, caulescent, with trichomes or glabrous. Stems with 2–4 apparent internodes, many branched. Stipules lanceolate, rarely connate at base. Leaves 6–8 cm, sessile, 27–39-foliolate; leaflet blades ovate-elliptic, 5–10 × 2–4 mm, abaxially with appressed lax trichomes, adaxially glabrous, base rounded, apex acute. Racemes few flowered; peduncle 6–8 cm; bracts linear, ca. 2 mm. Calyx broadly cylindrical, 8–10 × 2–3 mm, with lax white trichomes; lobes subulate, 4–7 mm. Corolla yellow; standard 8–9 mm, lamina obovate, apex emarginate; wings shorter than standard, apex obliquely emarginate; keel ca. 6.7 mm, slightly shorter than wings, claw ca. 3.3 mm, beak ca. 1 mm. Legume stipitate; stipe ca. 7 mm; body ovoid, 2–2.5 × 0.5–0.6 cm, inflated, membranous, 1-locular, glabrous or subglabrous, beak ca. 5 mm. Fl. Jun–Jul, fr. Jun–Jul.

• Grasslands on hillsides. Gansu, Shaanxi.

45. *Oxytropis ochroleuca* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 6. 1866.

淡黄棘豆 dan huang ji dou

Herbs, 5–30 cm tall, caulescent, tuft-forming, from a multiheaded caudex. Stems green, erect, with 2–4 apparent internodes, with sparse trichomes. Stipules connate as a sheath. Leaves 5–15(–19) cm, 21–33-foliolate; petiole and rachis with spreading trichomes; leaflet blades oblong-lanceolate to broadly elliptic, 8–20(–30) × 2–5(–8) mm, both surfaces green and with

sparse trichomes. Racemes ovoid-globose, dense, many flowered; peduncle 1/2–2/3 as long as leaves, with sparse white incurved trichomes and apically mixed with black short trichomes; bracts linear, ca. 4 mm, longer than calyx tube, membranous, with black trichomes. Calyx broadly cylindrical, 7–8 mm, with sparse black trichomes; lobes lanceolate-linear, 3–4 mm. Corolla pale yellow; standard 1.2–1.6 cm, lamina orbicular-ovate, apex 2-lobed; wings 1.1–1.2 cm; keel ca. 1 cm, apically spotted, beak very short. Legume stipitate; stipe 1–1.5 mm; body cylindrical-ovoid, (1–)1.5–2.5 × 0.4–0.6 cm, pendulous, with dense black and white trichomes, adaxial suture deeply grooved, beak apex hooked. Fl. Jun–Aug, fr. Jul–Sep.

Valleys, gravelly areas; 1600–1700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

46. *Oxytropis kansuensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 38. 1874.

甘肃棘豆 gan su ji dou

Oxytropis leucocephala Ulbrich; *O. longipedunculata* C. W. Chang; *O. thionantha* Ulbrich.

Herbs, (12–)15–40(–60) cm tall, caulescent, from a multiheaded caudex. Stems apparently sprawling, with (3 or)4 or 5 conspicuous internodes. Stipules narrowly triangular, ca. 5 × 2 mm, herbaceous, villous with whitish and blackish trichomes, basally connate. Leaves (2.5–)4–14(–20) cm, erect, 17–31(–35)-foliolate; leaflet blades lanceolate, elliptic, or ovate, 5–15(–18) × 2–6(–7) mm, glabrescent or sparsely spreading white villous. Racemes 3–15-flowered; peduncle 7–21(–30) cm, erect, ± as long as leaves, glabrescent or sparsely spreading white villous; bracts triangular, 6–7 × ca. 3 mm, membranous, contrasting with petal color, with whitish and blackish trichomes. Calyx campanulate, 6.5–11.5 × 2–4 mm, with whitish and blackish trichomes; lobes subulate, 2–8 × ca. 0.5 mm, shorter than to as long as tube. Corolla yellow, pale yellow, or rarely red; standard 1–1.7 cm, lamina ovate, apex emarginate; wings 0.8–1.5 cm, lamina obovate; keel 0.8–1.3 cm, beak 0.2–1 mm. Legume stipitate; stipe 1–1.5 mm; body oblong-ovoid, 8–12 × 3–10.5 mm, inflated, papery. Fl. Jun–Aug, fr. Jul–Sep.

Subalpine or alpine meadows, hillsides, weedy areas, dry forest margins, *Picea* forests, riverside grasslands, damp areas; 2200–3000 m. Gansu, Qinghai, Sichuan, Xizang [Nepal].

47. *Oxytropis qinghaiensis* Y. H. Wu, Novon 6: 187. 1996.

青海棘豆 qing hai ji dou

Oxytropis qinghaiensis Y. H. Wu (1997).

Herbs, 15–40 cm tall, caulescent, tufted, much branched from a superficial caudex. Stems prostrate or sprawling, with (0 or)1–4 or more apparent internodes, densely white hispid. Stipules triangular-lanceolate, white hispid, basal half connate. Leaves (1.8–)5–12 cm; leaflets 13–29, opposite or subopposite, subsessile; leaflet blades ovate, ovate-lanceolate, or lanceolate, 3–12 × 2–7 mm, both surfaces densely white long pilose or pilosulose, base rounded, apex acuminate to obtuse. Racemes initially capitate, elongating to 1.5–2.5 cm in fruit, 5–13-flowered; peduncle (3–)6–16 cm, surpassing leaves, with spreading to ascending trichomes, crinkly below, straight above; bracts

lanceolate, 4–7 mm, hispid. Calyx campanulate, (5–)6–8 mm, black and white hispid; lobes 1.8–2.7 mm, shorter than to as long as tube. Corolla purple to bluish purple, turning bluish with age; standard 1–1.1 cm, lamina obovate, apex slightly emarginate; wings 0.9–1.1 cm, apex rounded; keel 8–9.5 mm, beak 0.2–0.5 mm. Legume stipitate; stipe 1.5–2 mm; body oblong, 12–16 × 4.5–7 mm, densely white and black hispid, apex hooked. Fl. Jul–Aug, fr. Aug–Sep.

• Floodplains, sunny slopes, roadsides, pebble terraces, sandy areas; 3400–4700 m. Qinghai.

Y. H. Wu named *Oxytropis qinghaiensis* twice (Novon 6: 187. 1996; Acta Bot. Boreal.-Occid. Sin. 17: 109. 1997), each time with a different type, so the two names are homonyms but also taxonomic synonyms. An apparent third homonym (Y. H. Wu, Acta Bot. Yunnan. 19: 36. 1997) is actually *O. qingnanensis*; see the comments under that species (p. 495).

48. *Oxytropis hirsuta* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 55. 1874.

长硬毛棘豆 chang ying mao ji dou

Herbs, 3–7 cm tall, caulescent, tuft-forming, from a multi-headed caudex, with spreading white long thin trichomes. Stems ascending or sometimes erect, with 2–4 or more apparent internodes. Stipules linear-lanceolate, herbaceous, not connate. Leaves 5–9 cm, 11–19-foliolate; petiole and rachis with spreading long crisp trichomes; leaflet blades lanceolate, 7–15 × 2–2.5 mm, both surfaces with long trichomes but with spreading trichomes on adaxial surface. Racemes elongate spicate, lax, 7–9-flowered; peduncle 3–9 cm, slightly shorter than to rarely as long as leaves, with spreading trichomes; bracts linear-subulate, slightly shorter to longer than calyx tube. Calyx campanulate, 7–9 mm, like bracts covered with spreading white long trichomes; lobes filiform, as long as or slightly shorter than tube. Corolla violet-purple; standard 1.2–1.3(–1.5) × 0.9–1 cm, lamina elliptic, apex rounded; wings as long as standard, apex slightly emarginate; keel shorter than wings, beak long subulate and 2.5–3 mm. Legume with a ca. 1.5 mm pedicel; body narrowly cylindrical, 1.5–2 × 0.3–0.4 cm including beak, ± 2-locular, covered with spreading white long trichomes, septum ca. 1 mm wide at adaxial suture, apex acuminate, beak ca. 3 mm. Fl. and fr. Aug.

Grasslands on hillsides, steppes on stony and dry slopes, gravelly areas, deserts; 500–1400 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (W Siberia), Tajikistan, Turkmenistan, Uzbekistan].

49. *Oxytropis dichroantha* Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 78. 1841.

色花棘豆 se hua ji dou

Oxytropis algida Bunge.

Herbs, 4–10 cm tall, acaulescent, arising from a shortly branched caudex. Stipules ovate-lanceolate, 6–7 mm, adnate to petiole at base, connate nearly to middle. Leaves 3–6(–8) cm, 17–25(–29)-foliolate; petiole and rachis spreading villous with short trichomes; leaflet blades oblong-elliptic to oblong-ovate, 3–8(–12) × 2–5 mm, both surfaces sericeous. Racemes capitate to ovoid, dense, many flowered; peduncle as long as leaves, with appressed to spreading trichomes; bracts linear-lanceolate,

as long as to slightly shorter than calyx tube, with white trichomes, sometimes with rufous trichomes intermixed. Calyx campanulate, 5–7 mm, semispreading villous with short black and longer white trichomes; lobes linear-subulate, as long as or longer than tube. Corolla pinkish violet; standard 0.9–1.4 cm, lamina broadly ovate to orbicular, apex slightly emarginate; wings as long or nearly as long as standard, lamina oblong; keel shorter than standard and wings, beak 1.5–2 mm. Legume subsessile; body oblong-ellipsoid, 7–12 × ca. 4 mm, inflated, thinly leathery, ± 2-locular, spreading villous with white long trichomes, beak 1–1.5 mm. Fl. and fr. Jul–Aug.

Stony slopes and valleys in high mountain regions; 2200–3200 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

50. *Oxytropis glabra* Candolle, Astragalologia, 95. 1802.

小花棘豆 xiao hua ji dou

Astragalus glaber (Candolle) Lamarck (1811), not Candolle (1802), nor Michaux (1803); *Oxytropis diffusa* Ledebour; *O. drakeana* Franchet; *O. glabra* var. *drakeana* (Franchet) C. W. Chang; *O. glabra* var. *tenuis* Palibin; *O. glareosa* Vassilczenko; *O. salina* Vassilczenko; *O. tenuis* Palibin.

Herbs, (8–)20–80(–100) cm tall, caulescent, tuft-forming. Stems erect (or sprawling), with 2–4 or more apparent internodes from a multiheaded caudex, with many branches, with appressed trichomes. Stipules ovate to lanceolate-ovate, herbaceous, basally connate, distinct part (2–)5–10 mm. Leaves (3–)5–15 cm, 11–29-foliolate; leaflet blades lanceolate, ovate-lanceolate, or elliptic, (4–)5–25 × (1–)3–7 mm, abaxially sparsely pubescent, adaxially glabrous or strigose, base rounded to broadly truncate, apex acute to retuse. Racemes 4–7 cm, lax, few to many flowered; peduncle (2–)5–20 cm, slightly shorter to longer than leaves; bracts narrowly lanceolate, 1–2 mm, membranous, with sparse trichomes, apex acute. Flowers spreading to declined. Calyx campanulate, (2.2–)4–5 mm, appressed white pubescent; lobes lanceolate, triangular, or subulate, 1.5–2 mm. Corolla purple to bluish purple; standard (5–)7–8(–10) mm, lamina orbicular, apex slightly emarginate; wings (5–)6–7 mm, apex rounded; keel (4.2–)5–6 mm, beak 0.2–0.5 mm. Legume stipitate; stipe 1–2.5 mm; body sub-cylindrical, 1–2 × 0.3–0.5 cm, pendulous, slightly inflated, membranous, 1-locular, with appressed white or white and black trichomes, glabrescent, beak 1–1.5 mm. Fl. Jun–Sep, fr. Jul–Sep. $2n = 16$.

Hillsides, roadsides, sandy areas, scrub, damp places, floodplains, fields, sandy flats, semistabilized sand dunes, steppes, desert meadows; 400–4400 m. Gansu, Hebei, Henan, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia].

"*Oxytropis puberula*" (Borissova, Trudy Tadzhikistansk. Bazy 2: 169. 1936) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

51. *Oxytropis podoloba* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 327. 1842.

长柄棘豆 chang bing ji dou

Oxytropis brachybotrys Bunge.

Herbs, (7–)15–35 cm tall, caulescent, arising from a multi-headed caudex, tuft-forming. Stems green to grayish green, erect or ascending, with 3–5 or more apparent internodes, with appressed to spreading trichomes. Stipules lanceolate, 4–7 mm, herbaceous, basally connate. Leaves 3–7 cm, (11 or)13–21(–25)-foliolate; leaflet blades oblong, 5–10(–12) × (1.5–)2–4 mm, both surfaces with appressed trichomes. Racemes initially compact but elongating after anthesis, 8–12-flowered; peduncle 4.5–13 cm, much longer than leaves, apically with incurved trichomes; bracts linear, with white and black trichomes. Calyx campanulate, 4.5–5 mm, with black and white trichomes; lobes lanceolate, 2.4–2.5 mm, as long as tube. Corolla purple; standard 8–10 mm, apex rounded; wings ca. 1 cm, almost as long as standard; keel 7–8 mm, beak 1.4–2 mm. Legume stipitate; stipe ca. 5 mm; body lanceolate-oblong, 1.5–2 × 0.3–0.4 cm, pendulous, thinly leathery, with long trichomes, adaxial suture deeply grooved. Fl. May–Jun, fr. Jun–Jul.

Sandy and gravelly floodplains; ca. 3900 m. Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

52. *Oxytropis maqinensis* Y. H. Wu, Acta Bot. Yunnan. 19: 34. 1997.

玛沁棘豆 ma qin ji dou

Oxytropis maqinensis var. *deformisifloris* Y. H. Wu.

Herbs, 20–40 cm tall, caulescent, from slender rhizomatous multiheaded caudex. Stems erect with 2–4 apparent internodes, sparsely short pubescent. Stipules with an ovate-lanceolate to lanceolate distinct part, 0.9–1.2 cm, with dense white long trichomes, basal half connate. Leaves 5–10(–12) × (1.5–)2–4 mm, 15–23-foliolate; petiole and rachis with sparse trichomes; petiole 0.5–4 cm; leaflet blades ovate-lanceolate to oblong, 6–17 × 2–5 mm, both surfaces with appressed white trichomes, base rounded, apex acute. Racemes dense, many flowered; peduncle 10–16 cm; bracts lanceolate to ovate-lanceolate, 6–11 mm, with dense long trichomes. Calyx broadly cylindrical, 7.5–11(–11.2) × ca. 3 mm, with dense long trichomes; lobes linear, (3–)5–6 mm. Corolla pale purple; standard 1.5–1.6 cm, lamina ovate, ca. 8 mm wide, apex emarginate; wings 1.2–1.4 cm, lamina obliquely obovate and ca. 4 mm wide, apex retuse to slightly emarginate; keel 1–1.2 cm, beak ca. 1 mm. Legume sessile, cylindrical, 1.5–2 × ca. 0.4 cm, with spreading dense white and black short trichomes, adaxial suture deeply grooved, apex acute. Fl. Jul–Aug, fr. Aug–Sep.

• Gravelly areas, sunny slopes, meadows in alpine areas; 3300–4500 m. Qinghai.

53. *Oxytropis giraldii* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 66. 1905.

华西棘豆 hua xi ji dou

Oxytropis ningxiaensis C. W. Chang.

Herbs, 20–45 cm tall, caulescent, arising from a multi-headed caudex, subglabrous with sparse trichomes or with appressed dense yellow trichomes. Stems erect or ascending, with 2–4 or more apparent internodes. Stipules ovate-triangular, 6–8 × ca. 3 mm, with sparse trichomes, distinct. Leaves 5–10 cm, (11–)21–31-foliolate; petiole and rachis with spreading yellow

trichomes or glabrous; leaflet blades ovate-lanceolate, elliptic, or oblong, 5–14 × (2–)3–5 mm, both surfaces with yellow long trichomes, base rounded, apex acute to obtuse. Racemes rather lax in both flower and fruit, many flowered; peduncle (3–)5–14 cm; bracts narrowly lanceolate, 3–7 mm, with sparse yellow trichomes. Calyx campanulate, 7–8 mm, with spreading black trichomes; lobes lanceolate, (2–)3–4 mm. Corolla blue to purple; standard 1–1.5 cm, lamina ovate and 8–10 mm wide, apex emarginate; wings 1–1.2(–1.4) cm, lamina elliptic, apex emarginate; keel 0.9–1.2 cm, beak 1–1.5 mm. Legume stipitate; stipe ca. 5 mm; body brown, oblong, ellipsoid, or subglobose, (1.7–)2–2.5 × (0.7–)0.8–1 cm, inflated, membranous to subleathery, 1-locular, with spreading sparse trichomes, septum 0.5(–0.8) mm wide, adaxial suture deeply grooved, beak very short to 3 mm. Fl. and fr. May–Aug.

• Wastelands, forested valleys, grasslands on hillsides; 2100–3600 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan.

54. *Oxytropis xinglongshanica* C. W. Chang, Taxon 53: 806. 2004.

兴隆山棘豆 xing long shan ji dou

Herbs, 20–50 cm tall, caulescent, sparsely appressed pubescent. Stems erect, with 2–4 or more apparent internodes. Stipules ovate-lanceolate with a triangular distinct part, ca. 8 mm, herbaceous, with dense white long trichomes, connate to middle, apex acute. Leaves 6–20 cm, 19–23-foliolate; petiole and rachis adaxially sulcate, with appressed sparse trichomes; leaflet blades ovate, oblong, or lanceolate, 1.4–2 × 0.5–0.9 cm, both surfaces with appressed sparse short trichomes, base rounded to broadly cuneate, apex acute. Racemes lax, many flowered; peduncle 7–18 cm, erect, with incurved white trichomes; bracts linear to narrowly ovate, 3–5 mm, herbaceous, with white short trichomes, apex acuminate. Calyx tubular-campanulate, ca. 8 × 3 mm, with appressed black and white short trichomes; lobes linear, (2.2–)3–5 mm. Corolla purple to bluish purple; standard 1.1–1.5 cm, lamina narrowly or broadly ovate and ca. 6 or 10 mm wide, apex emarginate; wings 1.1–1.4 cm, lamina ca. 3.3 or 4.5 mm wide, apex emarginate; keel 1–1.3 cm, beak 1.5–1.7 mm. Legume pale yellow brown, stipitate; stipe 2.5–3(–6) mm; body oblong, ca. 2.2 × 0.4 cm, inflated, subleathery, 1-locular, adaxially deeply grooved, with appressed black and white trichomes, septum ca. 0.5 mm wide, beak ca. 2 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Hillsides, valleys; 1800–2600 m. Gansu.

One of us (Welsh) considers that there is no fundamental difference between this species and *Oxytropis giraldii*.

- 1a. Corolla standard with lamina narrowly ovate, 1.1–1.4 × ca. 0.6 cm; wings ca. 1.1 cm, lamina ca. 3.3 mm wide 54a. var. *xinglongshanica*
- 1b. Corolla standard with lamina broadly ovate, ca. 1.5 × 1 cm; wings ca. 1.4 cm, lamina ca. 4.5 mm wide 54b. var. *obesusicorollata*

54a. *Oxytropis xinglongshanica* var. *xinglongshanica*

兴隆山棘豆(原变种) xing long shan ji dou (yuan bian zhong)

Corolla standard with lamina narrowly ovate, 1.1–1.4 × ca. 0.6 cm; wings ca. 1.1 cm, lamina ca. 3.3 mm wide. Fl. Jun–Jul, fr. Jul–Aug.

- Hillsides; 1800–2600 m. Gansu.

54b. *Oxytropis xinglongshanica* var. *obesucorollata* Y. H. Wu in X. Y. Zhu et al., *Legumes China*, 636. 2007.

肥冠棘豆 *fei guan ji dou*

Corolla standard with lamina broadly ovate, ca. 1.5 × 1 cm; wings ca. 1.4 cm, lamina ca. 4.5 mm wide. Fl. Jun, fr. unknown.

- Valleys; ca. 2300 m. Gansu.

55. *Oxytropis densiflora* P. C. Li, *Acta Phytotax. Sin.* 18: 372. 1980.

密叶棘豆 *mi ye ji dou*

Herbs, 10–17 cm tall, caulescent, arising from a multi-headed caudex. Stems erect to spreading, with 2–4 or more apparent internodes, with many branches, with spreading dense white and black trichomes. Stipules lanceolate, 6–10 mm, thinly membranous, with sparse to dense white long trichomes, free from petiole, basally connate. Leaves (4–)5–6 cm, densely 21–33-foliolate; petiole and rachis with spreading long trichomes; leaflet blades oblong, narrowly oblong, oblong-lanceolate, or ovate-lanceolate, (6–)7–10 × 3–5 mm, abaxially with dense trichomes, adaxially with spreading sparse to dense white long trichomes. Racemes oblong, many flowered; peduncle ca. 6 cm, almost as long as leaves, with spreading dense white or mixed black and white trichomes. Calyx campanulate, 5–7 mm, with black and white long trichomes; lobes linear, slightly shorter than to ca. 1/2 as long as tube. Corolla bluish purple to purple; standard 1–1.2 cm, lamina orbicular to broadly ovate-rhombic, apex emarginate; wings narrowly oblong, 9–10 mm, slightly concave, apex rounded; keel shorter than wings, beak 0.5–0.7 mm. Legume stipitate; stipe equaling calyx tube; body oblong-cylindric or broadly oblong, ca. 1 cm or 1.5–1.7 cm, ca. 3 mm wide, pendulous, adaxial suture grooved, with dense white and black short trichomes, septum narrow. Fl. and fr. Aug.

- Slopes, grasslands; 3200–4000 m. Gansu, Xizang.

This species was misspelled as "*Oxytropis densifolia*" in FRPS (42(2): 102. 1998).

- 1a. Legume body oblong-cylindric,
1.5–1.7 cm 55a. var. *densiflora*
1b. Legume body broadly oblong,
ca. 1 cm 55b. var. *multiramosa*

55a. *Oxytropis densiflora* var. *densiflora*

密叶棘豆(原变种) *mi ye ji dou (yuan bian zhong)*

Legume body oblong-cylindric, 1.5–1.7 cm. Fl. and fr. Aug.

- Slopes, grasslands; 3200–4000 m. Gansu, Xizang.

55b. *Oxytropis densiflora* var. *multiramosa* (P. C. Li) X. Y. Zhu & H. Ohashi, *Cathaya* 11–12: 91. 2000.

多枝密叶棘豆 *duo zhi mi ye ji dou*

Oxytropis multiramosa P. C. Li, *Acta Phytotax. Sin.* 18: 372. 1980.

Legume body broadly oblong, ca. 1 cm.

- Xizang (Qamdo).

56. *Oxytropis latialata* P. C. Li, *Acta Phytotax. Sin.* 18: 370. 1980.

宽翼棘豆 *kuan yi ji dou*

Herbs, 3–4 cm tall, acaulescent, from a multiheaded caudex, subterranean caudex branches sometimes with 1 or 2 apparent internodes below tuft of leaves. Stipules with a triangular distinct part ca. 2 mm, 8–10 mm, submembranous, with appressed white long trichomes when young, adnate to petiole, basal half connate, margin ciliate when mature. Leaves ca. 2 cm, 9- or 11-foliolate; petiole and rachis with appressed to spreading long trichomes; leaflet blades oblong, 2.5–6 × 1.5–2 mm, both surfaces with appressed white long trichomes or abaxially glabrescent, abaxially with trichomes on margin. Racemes compact, 2–5-flowered; peduncle 2–4.5 cm, longer than leaves, subglabrous, with spreading sparse trichomes below raceme; bracts lanceolate, shorter than calyx tube. Calyx campanulate, 5–7 mm, with dense black and white long trichomes; lobes lanceolate, as long as tube. Corolla purple; standard 0.9–1.1 cm, lamina suborbicular, apex emarginate; wings 7–9 mm, lamina obcordate, apex 2-lobed; keel slightly shorter than wings, beak ca. 0.3 mm. Ovary stipitate. Legume unknown. Fl. Jun.

- Mountain slopes; ca. 5100 m. Xizang (Baingoin).

57. *Oxytropis lapponica* (Wahlenberg) Gay, *Flora* 10(2): 30. 1827.

拉普兰棘豆 *la pu lan ji dou*

Phaca lapponica Wahlenberg, *Veg. Clim. Helv.* Sept. 131. 1813; *Oxytropis amoena* Karelin & Kirilov; *O. carinthiaca* Fischer-Ooster; *O. thomasi* Gaudin.

Herbs, 8–30 cm tall, caulescent, from a simple or branched caudex, tufted. Stems with 2 or more internodes apparent, pubescent with appressed pale yellow and black trichomes. Stipules ovate-lanceolate with an ovate-lanceolate distinct part, 4–10 mm, herbaceous, with sparse trichomes, basal half connate, apex acute. Leaves 3–16 cm, 17–37-foliolate; petiole and rachis with appressed white trichomes; leaflet blades lanceolate to elliptic-lanceolate, 10–17 × 1–5 mm, both surfaces with appressed trichomes, base rounded to obtuse, apex acute. Racemes many flowered; peduncle 2–22 cm, as long as or longer than leaves, basally with appressed black and white trichomes, apically with appressed black trichomes; bracts lanceolate-linear to linear, 2–6 mm, with appressed white and black trichomes. Calyx campanulate, 5–7 mm, densely black and white pubescent; lobes lanceolate-subulate, 1.5–3 mm. Corolla pale purple; standard 0.8–1.2 cm, lamina orbicular, apex emarginate; wings 7–10 mm, apex obliquely truncate and broadly emarginate; keel 7–8 mm, beak short and indistinct or to 2.5 mm. Legume stipitate; stipe 2–3 mm; body cylindric, ovoid, or narrowly cylindric, 8–14 × 4–5 mm, pendulous, inflated, thickly membranous, 1-locular, with appressed dense black trichomes, adaxial suture widely grooved, beak short. Fl. Jun–Aug, fr. Jul–Sep. $2n = 16$.

Meadows in alpine areas, gravelly areas, riverbanks; 3300–4600 m. Shaanxi, Xinjiang, Xizang [India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe].

58. *Oxytropis melanocalyx* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 22(1): 8. 1874.

黑萼棘豆 *hei e ji dou*

Herbs, usually 5–15(–17) cm tall, caulescent from a simple to much-branched at least slightly subterranean sometimes rhizomatous caudex. Stems with (0 or) 1–4 apparent internodes, basally with persistent stipules. Stipules ovate-triangular, herbaceous, free from petiole, basally connate, apex acute. Leaves mainly (1.8–) 4.5–16 cm, 9–25-foliolate; rachis thin, with sparse yellow long trichomes; leaflet blades ovate, ovate-lanceolate, or lanceolate, 5–11 × 2–4 mm, both surfaces with sparse yellow, white, and black long trichomes, base rounded, apex acute. Racemes compact, 3–10(–15)-flowered; peduncle 5.5–14 cm, slightly shorter to longer than leaves, thin, basally with white trichomes, apically with white and black trichomes intermixed; bracts longer than pedicels, membranous. Calyx campanulate, 4–9.2 × 2–3.5 mm, with black short trichomes intermixed with yellow and white trichomes; lobes lanceolate-linear, 2.5–4.7 mm, slightly shorter than tube. Corolla blue; standard (1–) 1.1–1.4 cm, lamina broadly ovate, apex rounded to 2-lobed; wings (7.3–) 8–11.6 mm, apex rounded to emarginate; keel 6.9–9.5(–11) mm, beak 0.2–1.1 mm. Legume sessile or with a stipe; body broadly oblong, 1.5–2 × 0.7–1.2 cm, pendulous, inflated,

papery, 1-locular, with long trichomes. Fl. Jul–Aug, fr. Aug–Sep.

• Hillsides, among scrub, grasslands, gravelly areas, alpine meadows among dwarf *Salix* on steep slopes, heavily grazed pasture/meadows in alpine areas, *Larix* forests; 2200–5100 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan.

59. *Oxytropis subpodoloba* P. C. Li, *Fl. Xizang*, 2: 864. 1985.

短序棘豆 *duan xu ji dou*

Herbs, 15–30 cm tall, caulescent, clump-forming from a multiheaded caudex. Stems erect or prostrate, with 2–4 or more elongate internodes, with lax branches, with spreading white trichomes. Stipules leathery, with sparse white long trichomes, basal half connate. Leaves 6–10 cm, 13–21-foliolate; petiole and rachis with sparse trichomes; leaflet blades oblong, 5–10 × 2–4 mm, both surfaces densely appressed sericeous with long trichomes. Racemes dense to lax, many flowered; peduncle ca. 20 cm, with spreading sparse white long trichomes. Calyx 6–8 mm, with dense white long and black short trichomes; lobes 3–4 mm, slightly shorter than tube. Corolla purple; standard 8–10 mm, lamina narrowly orbicular to suborbicular, apex emarginate; wings as long as standard, apex rounded emarginate; keel slightly shorter than wings, beak ca. 0.5 mm. Legume shortly stipitate; body oblong, ca. 14.5 × 5.3 mm, 2-locular, with an adaxial suture, with dense black and white short trichomes, septum narrow. Fl. and fr. Aug.

• Gravelly riparian sites, S-facing slopes; 3500–4200 m. Xizang.

8. *Oxytropis* sect. *Dolichanthos* Gontscharow in Komarov, *Fl. URSS* 13: 541. 1948.

长华棘豆组 *chang hua ji dou zu*

Herbs, acaulescent. Leaves imparipinnate; leaflets not verticillate. Racemes 3- or 4-flowered; peduncle 6–8 cm, shorter than leaves. Lamina of corolla standard oblong, widened in basal half, apex emarginate. Legume unknown for Chinese species.

Two species: C Asia, China; one species (endemic) in China.

60. *Oxytropis guinanensis* Y. H. Wu, *Acta Phytotax. Sin.* 35: 348. 1997.

贵南棘豆 *gui nan ji dou*

Herbs, 8–11 cm tall, acaulescent, from a multiheaded caudex clothed with marcescent stipules and petioles. Stipules narrowly triangular, ca. 10 × 3 mm, membranous, adnate to petiole, connate to above middle. Leaves 3–10 cm, 9–15-foliolate; petioles 2–5 cm, densely white pilose; leaflet blades narrowly elliptic, 5–16 × 1–3.5 mm, both surfaces densely appressed pilose, base rounded to cuneate, apex acute to obtuse. Racemes

compact, 3- or 4-flowered; peduncle 6–8 cm, with dense whitish trichomes; bracts oblong to broadly lanceolate, 5–7 × ca. 1.5 mm, with whitish and blackish trichomes. Calyx subcylindric, 12–14 × 4–5 mm, with spreading dense white and black trichomes; lobes subulate, 3–4 × ca. 0.5 mm, ca. 1/3 as long as tube. Corolla purple; standard 2.2–2.4 × 0.5–0.7 cm, lamina obovate, basally tapering and constricted above middle hence becoming 3-lobed, apex truncate and slightly retuse; wings 2–2.2 cm, lamina ca. 7 mm wide, apex rounded; keel 1.6–1.8 cm, beak 3–3.5 mm. Legume unknown. Fl. Jul.

• Deserts; ca. 3200 m. Qinghai (Guinan).

9. *Oxytropis* sect. *Sichuanicae* C. W. Chang, *Acta Bot. Boreal.-Occid. Sin.* 8: 11. 1988 [*“Sichuanica”*].

四川棘豆组 *si chuan ji dou zu*

Leaves imparipinnate; leaflets not verticillate. Racemes 7–9-flowered or more; peduncle longer than leaves. Lamina of corolla standard oblong, widened in basal half, apex emarginate. Legume evidently stipitate; body narrowly ellipsoid.

• One species: China.

61. *Oxytropis sichuanica* C. W. Chang, *Acta Bot. Boreal.-Occid. Sin.* 8: 11. 1988.

四川棘豆 *si chuan ji dou*

Herbs, 10–17 cm tall, caulescent, from a subterranean multiheaded caudex, with 1 or 2 apparent internodes. Stipules narrowly triangular, ca. 5 × 3 mm, thickly herbaceous, with sparse glands, basally connate. Leaves 3–8 cm, 7–21-foliolate;

petiole 3–4.5 cm; rachis with brownish glands at insertion of leaflets, pilose; leaflet blades ovate, 5–12 × 2–5 mm. Racemes compact and not expanding in fruit, 7–9-flowered or more; peduncle 10–14 cm, densely crisp pubescent below inflorescence; bracts lanceolate, ca. 9 × 3 mm, membranous, blackish villous. Calyx subcylindric, 8–10 × ca. 4 mm, with spreading blackish and lax yellowish trichomes intermixed; lobes subulate, 4–5 × ca. 0.5 mm, as long as tube. Corolla reddish green, bluish vio-

let, blue, yellow, or purple (when dry); standard 1.7–1.9 cm, lamina ovate, ca. 11 × 5 mm, and abruptly dilated below middle, apex emarginate; wings ca. 1.8 × 0.4 cm, apex retuse; keel ca. 1.5 cm, beak ca. 1.5 mm. Legume evidently stipitate; body narrowly ellipsoid, ca. 15 × 4.5 mm, with appressed dense blackish trichomes. Fl. Jun–Aug, fr. Aug.

- Forest margins, grasslands on ridges; 3900–4200 m. Sichuan.

10. *Oxytropis* sect. *Auriculatae* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 7: 197. 1987 [“*Auricula*”].

耳瓣棘豆组 er ban ji dou zu

Leaves imparipinnate; leaflets not verticillate. Racemes 6- or 7-flowered; peduncle subequal to or shorter than leaves. Corolla standard auriculate, tapering into auricles at base, apex rounded. Legume unknown.

- One species: China.

62. *Oxytropis auriculata* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 7: 197. 1987.

耳瓣棘豆 er ban ji dou

Herbs, ca. 17 cm tall, caulescent, procumbent, with 2–4 or more apparent internodes, sparsely white pubescent. Stipules narrowly triangular, ca. 5 × 2 mm, herbaceous, with whitish trichomes, not adnate to petiole, connate to middle. Leaves 5–8 cm, 19–23-foliolate; leaflet blades elliptic to ovate, 6–8 × 3–4 mm, both surfaces appressed pubescent, base rounded, apex acute. Racemes compact to rather lax, 6- or 7-flowered; pedun-

cle 4–7.5 cm, appressed pilose but below raceme crisp pubescent; bracts subulate, ca. 4 × 1 mm, membranous, pubescent. Calyx campanulate, 8–10 mm, with whitish and blackish trichomes; lobes subulate, ca. 4 × 0.5 mm, almost as long as tube. Corolla purple; standard ca. 1.2 cm, lamina ovate-triangular, ca. 7 × 5 mm, and base with 2 ca. 1.5 mm auricles, apex obliquely cuneate; wings ca. 1.1 cm, apex obliquely cuneate; keel ca. 1 cm, beak ca. 0.5 mm. Ovary long stipitate. Legume unknown. Fl. Jun–Jul.

- Grasslands. Sichuan.

11. *Oxytropis* sect. *Brachytripsis* N. Ulziykhutag, Bot. Zhurn. (Moscow & Leningrad) 64: 1235. 1979.

硬毛棘豆组 ying mao ji dou zu

Plants acaulescent, with spreading rigid trichomes. Leaves imparipinnate; leaflets not verticillate; leaflet blades largest of any Chinese species. Racemes spiciform, elongate, thick, many flowered; peduncle as long as or longer than leaves. Legume sessile, ovoid.

Two species: China, Mongolia, Russia; one species in China.

63. *Oxytropis hirta* Bunge, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 2: 91. 1835.

硬毛棘豆 ying mao ji dou

Oxytropis hirta var. *flavida* G. Z. Qian; *O. hirta* var. *wutuensis* C. W. Chang; *O. komarovii* Vassilczenko.

Herbs, 10–50 cm tall or more, acaulescent, from a simple or multiheaded caudex, hirsute with spreading coarse long straight rigid trichomes. Stipules narrowly triangular, 2–3 cm × 3–5 mm, membranous, with whitish rigid trichomes, basally connate. Leaves 10–15 cm or more, 9–21-foliolate; leaflet blades elliptic, lanceolate, or ovate, 1–5 × 0.5–2 cm (largest in *Oxytropis* species for China), base rounded to obtuse, apex acute to rounded. Racemes elongate, 6–14 cm, many flowered; peduncle 10–40 cm, coarse, as long as to longer than leaves;

bracts triangular, 10–13 × 3–4 mm, with rigid trichomes, margin ciliate. Calyx subcylindric, 8–10 × ca. 3.5 mm, usually with spreading dense trichomes, sometimes glabrous but lobes with trichomes; lobes subulate, 4–5 × ca. 0.5 mm, subequal to tube. Corolla bluish purple, purple, blue, red, light yellow, yellowish green, reddish violet, pink, yellow, red, or white; standard 1.5–2 cm, lamina oblong-ovate, apex rounded; wings 1.4–1.8 cm, lamina obliquely obovate, apically entire or emarginate; keel 1.5–1.6 cm, beak 1–2 mm. Legume sessile, ovoid, 12–14 × 4–5 mm, with dense trichomes. Fl. May–Sep, fr. Jul–Sep. $2n = 16, 32$.

Hilltops and hillsides, roadsides, grasslands, sandy tracts, among shrubs, dry slopes, beneath sparse forests; 1000–4100 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Mongolia, Russia].

12. *Oxytropis* sect. *Xerobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 119. 1874.

矮生棘豆组 ai sheng ji dou zu

Herbs, acaulescent, exceptionally caulescent, caespitose. Leaves imparipinnate; leaflets not verticillate. Racemes 1–8-flowered or more; peduncle 1–9 cm, shorter to slightly longer than leaves. Legume sessile or with a stipe to 5 mm; body ovoid or cylindric, 5–27 mm, membranous.

About 27 species: China, Mongolia, Russia; 22 species (12 endemic) in China.

- 1a. Leaves 3-foliolate; leaflet blades of mature leaves 1.7–4.5 cm 64. *O. diversifolia*
- 1b. Leaves 5–35-foliolate; leaflet blades 0.2–1(–1.4) cm.
- 2a. Racemes many flowered (usually 10 or more).
- 3a. Corolla yellow, standard ca. 13 mm 65. *O. maduoensis*
- 3b. Corolla purple, standard 6–8 mm.
- 4a. Plants acaulescent or essentially so; peduncle shorter than leaves; stipules 7–9 mm; beak of corolla keel ca. 0.3 mm 66. *O. linearibracteata*
- 4b. Plants caulescent, with 2 or more internodes apparent; peduncle equaling or shorter than leaves; stipules 4–5 mm; beak of corolla keel ca. 2 mm 67. *O. lanceatifoliola*
- 2b. Racemes (1 or)2–8(–10)-flowered.
- 5a. Corolla standard 0.5–0.9 cm; calyx 3.4–7 mm; racemes 2–5-flowered.
- 6a. Corolla white; racemes 2- or 3-flowered; calyx 6–7 mm; herbage green or greenish, not gray 82. *O. biflora*
- 6b. Corolla purple; racemes 2–5-flowered; calyx 3.4–6 mm; herbage with gray trichomes.
- 7a. Plants 1–2 cm tall; peduncle less than 1 cm, shorter than leaves 80. *O. brevipedunculata*
- 7b. Plants 2–10 cm tall; peduncle 2–7 cm, subequal to leaves or slightly surpassing them.
- 8a. Leaves 7–13-foliolate; leaflet blades lanceolate to linear-lanceolate, 4.5–10 × 0.5–2 mm; lamina of corolla standard oblong 79. *O. pusilla*
- 8b. Leaves 11–21-foliolate; leaflet blades ovate or oblong, 3–5 × 1–2 mm; lamina of corolla standard transversely broadly ovate or ovate.
- 9a. Calyx ca. 3.4 mm; corolla wings ca. 6.2 mm, keel ca. 5 mm; plants of Xinjiang 84. *O. yanchiensis*
- 9b. Calyx 5–6 mm; corolla wings ca. 8 mm, keel ca. 7 mm; plants of Xizang 85. *O. cinerascens*
- 5b. Corolla standard 0.9–2.6 cm; calyx (5–)6–15 mm; racemes (1 or)2–10-flowered.
- 10a. Corolla yellow or pale yellow.
- 11a. Racemes rather lax; calyx 1.2–1.3 cm; corolla pale yellow, standard rounded at apex, wings truncate to rounded apically; leaflets glabrous 68. *O. ciliata*
- 11b. Racemes subcompact; calyx 0.8–1 cm; corolla yellow, standard emarginate at apex, wings rounded apically; leaflets with trichomes 77. *O. pseudohirsuta*
- 10b. Corolla purple, blue, purplish blue, or light purple.
- 12a. Corolla standard 0.9–1.3 cm, wings 1–1.2 cm.
- 13a. Plants 2–8 cm tall; bracts 5–6 mm; calyx lobes 1.5–1.7 mm; apex of corolla standard emarginate; legume body 1–1.5 cm 78. *O. platysema*
- 13b. Plants 7–15 cm tall; bracts 2–4 mm; calyx lobes 2–4 mm; apex of corolla standard 2-lobed; legume body 1.4–3.7 cm 81. *O. yunnanensis*
- 12b. Corolla standard (1–)1.5–2.6(–3) cm, wings (1.2–)1.3–2.1(–2.5).
- 14a. Corolla standard 1–1.5(–2.1) cm; keel beak (1–)1.5–1.6 mm; legume 3–4 mm wide ... 83. *O. pauciflora*
- 14b. Corolla standard (1.5–)1.7–2.6(–3) cm; keel beak 1–3 mm; legume 6–16 mm wide (unknown for *O. wutaiensis*).
- 15a. Beak of corolla keel 1.5–3 mm; calyx (1–)1.2–1.6 cm.
- 16a. Bracts 10–14 mm 75. *O. assiensis*
- 16b. Bracts 3–10 mm.
- 17a. Stipules membranous; leaflet blades broadly elliptic-oblong, oblong, or oblong-linear, 3–7 × 1.5–3 mm, plane; bracts 3–6 mm 69. *O. poncinsii*
- 17b. Stipules scarious; leaflet blades ovate to lanceolate, 5–10 × 2–4 mm, folded; bracts 6–10 mm 70. *O. eriocarpa*
- 15b. Beak of corolla keel 1–1.5(–1.8) mm; calyx 0.8–1.2(–1.3) cm (to 1.5 cm for *O. inschanica*).
- 18a. Leaflet blades apparently linear (involute).
- 19a. Leaves 5–9-foliolate; corolla standard 2–3 cm, lamina subelliptic 71. *O. inschanica*
- 19b. Leaves 9–13-foliolate; corolla standard 1.8–2.3 cm, lamina suborbicular 72. *O. leptophylla*
- 18b. Leaflet blades ovate, oblong-lanceolate, lanceolate, or narrowly lanceolate, plane or only marginally involute.
- 20a. Leaves 13–21-foliolate; leaflet blades lanceolate to narrowly lanceolate; racemes (2 or)3–5-flowered 76. *O. moellendorffii*
- 20b. Leaves 17–35-foliolate; leaflet blades ovate or oblong-lanceolate; racemes 2–8-flowered.
- 21a. Corolla wings rounded at apex; racemes compact, 2–4-flowered; stipules ca. 3 mm 73. *O. wutaiensis*
- 21b. Corolla wings 2-lobed at apex; racemes rather lax, 2–8-flowered; stipules 5–13 mm 74. *O. anertii*

64. *Oxytropis diversifolia* E. Peter, Acta Horti Gothob. 12: 78. 1938.

二型叶棘豆 er xing ye ji dou

Herbs, 3–5 cm tall, acaulescent, from a simple or branching caudex, subglabrous. Branches with a thatch of marcescent leaf bases. Stipules ovate, ca. 4 mm, membranous, persistent, with white trichomes, adnate to petiole, apex acute. Leaves 3–5 cm, 3-foliolate. Eophylls (early leaves): petiole ca. 7 mm; leaflet blades lanceolate-obovate to elliptic, 5–10 × 2–3 mm, abaxially with dense white trichomes, adaxially with dense trichomes, base cuneate, apex acute. Mature leaves: petiole 1.5–4 cm, appressed sericeous; leaflet blades narrowly linear, 1.7–4.5 cm × 2–4 mm. Racemes 1- or 2-flowered; peduncle 2–8 mm, much shorter than leaves, with dense trichomes; bracts linear, ca. 3 mm, membranous, densely sericeous-pubescent. Calyx tubular, 0.9–1.2 cm, with appressed dense white trichomes; lobes lanceolate, 2–3 mm. Corolla pale yellow; standard 1.8–2.2 cm, lamina obovate, apex rounded; wings ca. 1.8 cm, apex rounded; keel ca. 1.6 cm, beak ca. 1 mm. Legume sessile, ovoid, 1–1.5 × ca. 1 cm, inflated, membranous, ± 2-locular, with dense white long trichomes, septum ca. 3 mm wide, adaxial suture grooved, apex beaked. Fl. Apr–May, fr. May–Jun. $2n = 16$.

Dry *Stipa* grasslands, stones in valleys, hillsides; 1000–2200 m. Nei Mongol [Mongolia].

65. *Oxytropis maduensis* Y. H. Wu, Acta Bot. Yunnan. 19: 33. 1997.

玛多棘豆 ma duo ji dou

Herbs, 3–8 cm tall, acaulescent, tufted. Stipules ovate-lanceolate, 6–9 mm, with appressed white long trichomes, basal half connate. Leaves 1.5–6 cm, 15–25-foliolate; petiole and rachis with spreading trichomes; petiole purplish brown, 0.5–2.5 cm; leaflet blades ovate to oblong, 2–7 × 1–3 mm, densely appressed white or yellow pubescent, base rounded, apex acute. Racemes dense, many flowered; peduncle 1–6 cm, pilose; bracts ovate-lanceolate, 5–8 mm, membranous, sparsely pubescent. Calyx tubular-campanulate, 8–10 × 3–4 mm, somewhat inflated, with black short and white long trichomes; lobes subulate, ca. 3 mm. Corolla yellow; standard ca. 1.3 cm, lamina ovate, apex emarginate; wings ca. 1.1 cm, apex obliquely obtuse to rarely emarginate; keel 9–10 mm, beak 0.5–1 mm. Legume unknown. Fl. May–Jul.

• Meadows on hillsides in alpine areas; 4300–4600 m. Qinghai (Madoi).

66. *Oxytropis linearibracteata* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

线苞棘豆 xian bao ji dou

Herbs, 6–11 cm tall, acaulescent, from a much-branched multiheaded caudex. Stipules with a linear-lanceolate free part, 7–9 mm, herbaceous, densely pale yellow sericeous with long trichomes, shortly adnate to petiole. Leaves 5–10 cm, 15–21-foliolate; petiole and rachis with spreading dense pale yellow long trichomes; leaflet blades oblong to ovate-lanceolate, 7–10 × 3–4 mm, both surfaces densely pale yellow sericeous with

long trichomes. Racemes dense to lax, many flowered; peduncle as long as to slightly longer than leaves, with spreading dense trichomes; bracts linear, as long as calyx. Calyx campanulate, 5–7 mm, with appressed dense white and black trichomes; lobes linear-subulate, as long as tube. Corolla purple; standard 6–8 mm, lamina broadly ovate, apex emarginate; wings slightly shorter than standard, apex emarginate; keel slightly shorter than wings, beak ca. 0.3 mm. Ovary shortly stipitate. Legume unknown. Fl. Jun.

• Dry slopes and alluvial fans; ca. 4200 m. Xizang (Sogxian).

67. *Oxytropis lanceatifoliola* H. Ohba, S. Akiyama & S. K. Wu, Bull. Natl. Sci. Mus., Tokyo, B 26(2): 53. 2000.

披针叶棘豆 pi zhen ye ji dou

Herbs, to 15 cm tall, caulescent, from a many-branched evidently subterranean multiheaded caudex, with 2 or more apparent internodes, with spreading dense trichomes. Stipules with a triangular free part, 4–5 mm, with dense white soft trichomes, basal 1/2–2/3 connate, amplexicaul, apical part adnate to petiole, apex acuminate. Leaves 7–10 cm; leaflets 15–19, opposite, sessile; leaflet blades very narrowly lanceolate to linear, 12–14 × 2–4 mm, both surfaces with appressed usually soft trichomes, base rounded, apex acute. Racemes subcompact, 15–20-flowered; peduncle 7.5–12 cm, subequal to leaves, with white and black trichomes; bracts linear to subulate, with dense green trichomes. Calyx campanulate, 5–6 mm, with dense white trichomes; lobes linear to subulate, 2.5–3 mm, nearly as long as tube. Corolla purple; standard spatulate, ca. 8 mm, apex slightly retuse; wings ca. 7.2 mm, lamina narrowly oblong, apex rounded; keel ca. 6.7 mm, beak ca. 2 mm. Legume shortly stipitate; stipe ca. 1 mm; body ovoid, 11–13 × 4.5–5.5 mm, thin, vesicular, 1-locular, with dense trichomes, abaxial and adaxial sutures not grooved, base attenuate, beak ca. 2 mm. Fl. unknown, fr. Aug.

• Dry alluvial slopes; ca. 4100 m. Xinjiang (Ruoqiang).

68. *Oxytropis ciliata* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 186. 1832.

缘毛棘豆 yuan mao ji dou

Herbs, 5–20 cm tall, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules. Stipules broadly ovate, membranous, with dense white or yellow long trichomes on surface and margin, basally adnate to petiole. Leaves 5–15 cm, 9–17-foliolate; rachis slightly flattened; leaflet blades linear-oblong, oblong, linear-lanceolate, or oblanceolate, 5–10 × 2–6 mm, both surfaces glabrous, base cuneate, margin long ciliate, apex acute to obtuse. Racemes rather lax, 2–8-flowered; peduncle shorter than to as long as leaves, incurved to erect. Calyx cylindrical, 1.2–1.3 cm, with sparse trichomes; lobes lanceolate-attenuate, 2.5–3 mm, ca. 1/3 as long as tube. Corolla pale yellow; standard 2–2.6 cm, lamina elliptic, apex rounded; wings 2–2.8 cm, as long as standard, apex truncate to obtuse; keel ca. 2 cm, shorter than wings, beak 1.5–2 mm. Legume sessile, dark brown to yellowish brown, ovoid, 2–2.5 × 1.2–1.5 cm, inflated, membranous, glabrous, apex beaked. Fl. May–Jun, fr. Jun–Jul.

Roadsides, hilly sunny slopes, valleys, scrub in *Betula* forests; 1800–1900 m. Hebei, Nei Mongol, Ningxia [Mongolia].

69. *Oxytropis poncinsii* Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 343. 1896.

帕米尔棘豆 pa mi er ji dou

Oxytropis introflexa Freyn.

Herbs, 2–5 cm tall, acaulescent, arising from a multi-headed caudex, cushionlike or matlike, densely sericeous with long trichomes. Stipules with a narrowly ovate free part, 0.8–1.5 cm, membranous, adnate to petiole for most of length, margin ciliate. Leaves 2–5 cm, 7–11-foliolate; petiole and rachis with appressed trichomes; leaflet blades broadly elliptic-oblong, oblong, or oblong-linear, 3–7 × 1.5–3 mm, both surfaces with dense white trichomes. Racemes compact, 1–4-flowered; peduncle 2–5 cm, as long as leaves, with appressed trichomes; bracts lanceolate, 3–6 mm, with trichomes. Calyx cylindrical, 1.3–1.5 cm, spreading white and black lanate; lobes lanceolate, shorter than tube. Corolla purple; standard 2–2.5 cm, lamina orbicular, apex emarginate; wings 1.8–2.1 cm; keel slightly shorter than wings, beak 1.5–2 mm. Legume sessile, subspherical-ovoid, 2–2.5 × 1–1.5 cm, vesicularly inflated, membranous, villous with spreading short trichomes, septum narrow. Fl. Jun–Jul, fr. Aug.

Alpine deserts; 2400–4400 m. Gansu, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

70. *Oxytropis eriocarpa* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 122. 1874.

绵果棘豆 mian guo ji dou

Oxytropis komei Saposhnikow.

Herbs, 1–3 cm tall, acaulescent, arising from a prostrate or diffuse many-branched caudex, with persistent stipules and petioles. Stipules with a triangular-lanceolate distinct part, ca. 1 cm, scarious, with appressed sparse trichomes, adnate to petiole, basal half connate. Leaves 2–5 cm, 5–11-foliolate; petiole and rachis with appressed trichomes; leaflet blades ovate to lanceolate, 5–10 × 2–4 mm, conduplicate, both surfaces with appressed trichomes. Racemes compact, 2–4-flowered; peduncle shorter than leaves, with spreading trichomes; bracts lanceolate, 6–10 mm, with cottonlike trichomes. Calyx cylindrical, 1.2–1.5 cm, with spreading white and appressed black trichomes; lobes linear-lanceolate, 4–5 mm. Corolla purple to bluish purple; standard ca. 2.5 cm, lamina ovate, apex emarginate; wings 1.7–2.5 cm, apex slightly emarginate; keel 1.5–1.7 cm, beak 2–3 mm. Legume sessile, ovoid, 1.5–2.2 × ca. 1 cm, thickly leathery, 2-locular, white pannose, septum narrow, adaxial suture grooved, beak 1.5–5 mm. Fl. Jul, fr. Aug. $2n = 16 + 0-3B$.

Hillsides, gravelly alpine areas; ca. 2600 m. Xinjiang [Mongolia, Russia].

71. *Oxytropis inschanica* H. C. Fu & S. H. Cheng, Fl. Intramongol. 3: 289. 1978.

阴山棘豆 yin shan ji dou

Herbs, (3.5–)5–8 cm tall, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules. Stipules lanceolate, with dense long trichomes, basally adnate to

petiole. Leaves (2–)5–8 cm, 5–9-foliolate; leaflet blades linear, (0.6–)1–1.3(–1.4) cm × 0.5–1.5 mm, both surfaces glabrous, base cuneate, margin ciliate, apex attenuate. Racemes 2–5-flowered; peduncle shorter than to as long as leaves, with long trichomes; bracts ovate-elliptic, ca. 10 × 5–7 mm, both surfaces glabrous, margin ciliate, apex acute. Calyx cylindrical, 1–1.5 cm, with dense white and black long trichomes; lobes linear-lanceolate, 2.5–4 mm. Corolla purple to bluish purple; standard 2–3 cm, lamina subelliptic, apex rounded or subtruncate; wings 1.8–2 cm, lamina obliquely obovate, apex rounded; keel ca. 1.8 cm, subequal to wings, beak 1–1.8 mm. Legume sessile, ovoid, 1–1.5 × ca. 0.8 cm, inflated, membranous, with spreading dense long trichomes. Fl. May–Jul, fr. Jul–Aug.

• Dry slopes, gravelly areas in valleys; 1800–2100 m. Nei Mongol.

72. *Oxytropis leptophylla* (Pallas) Candolle, Astragalologia, 77. 1802.

山泡泡 shan pao pao

Herbs, 6–8 cm tall, acaulescent, from a branching superficial caudex, almost glabrous. Stipules triangular, membranous, with dense long trichomes, adnate to petiole, apex retuse. Leaves 1–2 cm or 7–10 cm, 9–13-foliolate; leaflet blades linear, 0.4–1 cm or 1.3–3.5 cm, 1–2 mm wide, adaxially glabrous, base rounded, margin involute, apex acute. Racemes compact to rather lax, 2–5-flowered; peduncle slightly shorter than to as long as leaves, thin, with spreading sparse trichomes; bracts lanceolate to ovate-oblong, with dense long trichomes. Calyx tubular, 8–11 mm, membranous, with dense white long trichomes; lobes subulate, ca. 1/3 as long as tube. Corolla purple; standard 1.8–2.3 cm, lamina suborbicular, apex rounded to emarginate; wings 1.9–2 cm, apex rounded; keel 1.5–1.7 cm, beak ca. 1.5 mm. Legume sessile, ovoid, 1.4–1.8 × 1.2–1.5 cm, inflated, membranous, 1-locular, with white and black short trichomes, septum narrow, adaxially deeply grooved, beak 7–10 mm. Fl. May–Jun, fr. Jun–Jul.

Hillsides, gravelly areas, sand dunes, grasslands; 800–1900 m. Hebei, Jilin, Nei Mongol, Shanxi [Mongolia, Russia].

- 1a. Caudex not abbreviated and densely clothed with a marcescent thatch of leaf bases; leaves 7–10 cm; leaflet blades 1.3–3.5 cm 72a. var. *leptophylla*
- 1b. Caudex abbreviated, densely clothed with a marcescent thatch of leaves; leaves 1–2 cm; leaflet blades 0.4–1 cm 72b. var. *turbinata*

72a. *Oxytropis leptophylla* var. *leptophylla*

山泡泡(原变种) shan pao pao (yuan bian zhong)

Astragalus leptophyllus Pallas, Reise Russ. Reich. 3: 749. 1776; *Oxytropis zhangbeiensis* G. Z. Qian & L. F. Liu.

Caudex not abbreviated and densely clothed with a marcescent thatch of leaf bases. Leaves 7–10 cm; leaflet blades 1.3–3.5 cm. Fl. May–Jun, fr. Jun–Jul. $2n = 16$.

Hillsides, sand dunes, grasslands; 800–1900 m. Hebei, Jilin, Nei Mongol, Shanxi [Mongolia, Russia].

72b. *Oxytropis leptophylla* var. *turbinata* H. C. Fu, Acta Phytotax. Sin. 20: 315. 1982.

陀螺棘豆 tuo luo ji dou

Caudex abbreviated, densely clothed with a marcescent thatch of leaves. Leaves 1–2 cm; leaflet blades 0.4–1 cm. Fl. Jun, fr. unknown.

• Hillsides and gravelly areas. Nei Mongol (Ulanqab Meng, Darhan Muminggan Lianheqi).

73. *Oxytropis wutaiensis* Tatewaki & Hurusawa, J. Jap. Bot. 26: 81. 1951.

五台山棘豆 wu tai shan ji dou

Oxytropis wutaiensis var. *glabrata* Tatewaki & Hurusawa.

Herbs, 4–10 cm tall, acaulescent, from a multiheaded caudex. Stipules with a broadly triangular distinct part, ca. 3 mm, papery, sparsely villous-pilose with white long trichomes, glabrescent, adnate to petiole, connate into a sheath, margin membranous. Leaves 4–5 cm, 21–27-foliolate; petiole and rachis slender, with appressed white long trichomes; leaflet blades oblong-lanceolate, 3–6 × ca. 2 mm, both surfaces with white long trichomes when young and dense short trichomes when old, apex acuminate. Racemes compact, 2–4-flowered; peduncle 3–6 cm, with spreading white short trichomes; bracts lanceolate to ovate-lanceolate, ca. 2/3 as long as calyx tube, ca. 3 mm wide, with black and white long trichomes intermixed, apex acuminate. Calyx subcylindric, ca. 1.3 cm, with pubescence like bracts; lobes lanceolate, ca. 3 mm, apex acute. Corolla purple; standard ca. 1.7 cm, lamina ca. 6 mm wide, apex deeply 2-lobed and reflexed; wings ca. 1.4 cm, lamina ca. 3 mm wide, apex rounded; keel ca. 1.3 cm, beak ca. 1 mm. Ovary reportedly 2-locular. Legume unknown. Fl. May.

• Grasslands. Shanxi (Wutai Shan).

74. *Oxytropis anertii* Nakai in Nakai et al., Rep. Exped. Manchoukuo Sect. IV, Pt. 2, Contr. Cogn. Fl. Manshuricae, 125. 1935.

长白棘豆 chang bai ji dou

Oxytropis anertii f. *albiflora* (Z. J. Zong & X. R. He) X. Y. Zhu & H. Ohashi; *O. anertii* var. *albiflora* Z. J. Zong & X. R. He.

Herbs, 6–8(–10) cm tall, acaulescent, from a well-developed multiheaded caudex, tufted. Branches with a thatch of marcescent leaves, with long trichomes when young. Stipules narrowly triangular, 5–13 × 2–5 mm, connate for more than basal half. Leaves 3.5–8 cm or 16–27 cm, 17–35-foliolate; leaflet blades ovate, 5–10 × 1–3 mm, subglabrous. Racemes rather lax, 2–8-flowered; peduncle 3–6 cm, as long as to slightly longer than leaves, with short trichomes; bracts triangular, 2–3 × ca. 2 mm, pubescent. Calyx campanulate, 8–10.5 × 2–3 mm, with whitish trichomes; lobes subulate, 2–3 × 0.5–1 mm. Corolla blue, bluish purple, or light purple; standard 1.5–2 cm, lamina obovate, apex emarginate; wings 1.6–1.8 cm, lamina obovate, apex 2-lobed; keel ca. 1.3 cm, beak ca. 1 mm. Legume sessile, ovoid to oblong, 1.3–2.4 × 0.6–1 cm, inflated, glabrous or pubescent. Fl. Jun–Aug, fr. Aug–Sep.

Gravelly alpine grasslands, forest margins, damp places, frozen soils in alpine areas; 1800–3000 m. Jilin [Korea].

75. *Oxytropis assiensis* Vassilczenko, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 246. 1960.

阿西棘豆 a xi ji dou

Herbs, (1–)3–8 cm tall, acaulescent, from a multiheaded caudex, cushion- or mat-forming, white. Stipules with an ovate-triangular distinct part, membranous, basal half adnate to petiole, basally connate, margin ciliate. Leaves 2–5 cm, 9–15-foliolate; petiole and rachis with appressed trichomes; petiole persistent; leaflet blades ovate to lanceolate, 5–8 × 2–3 mm, both surfaces with appressed trichomes. Racemes compact, 1- or 2- or 5–7-flowered or more; peduncle shorter than to as long as leaves, thick, with semispreading trichomes intermixed with black trichomes; bracts oblong-ovate, 1–1.4 cm, with white and black trichomes. Calyx usually purple, cylindric, (1–)1.2–1.6 cm, inflated after anthesis, with spreading black and white cottonlike trichomes; lobes linear, 3–4 mm. Corolla purple; standard (1.8–)2.2–2.6 cm, lamina oblong-spatulate, apex emarginate; wings (1.8–)1.9–2.1 cm, apex slightly emarginate; keel 1.7–1.8 cm, beak 1.5–2 mm. Legume sessile, ovoid, 2–2.7 × 1–1.5 cm, membranous, appressed white lanate, septum 2–3 mm wide, adaxial suture grooved, beak 5–7 mm. Fl. Jun–Aug, fr. Jul–Sep.

Dry slopes, grasslands, gravelly alpine areas; 2200–5300 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

76. *Oxytropis moellendorffii* Bunge ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 469. 1880.

窄膜棘豆 zhai mo ji dou

Oxytropis limprichtii Ulbrich; *O. moellendorffii* var. *sylinchanensis* (Franchet) G. Z. Qian; *O. schensiensis* Komarov; *O. sylinchanensis* Franchet.

Herbs, 6–10 cm tall, acaulescent, arising from a shortly branched multiheaded caudex, green. Stipules lanceolate, membranous, with long trichomes, adnate to petiole, basally connate. Leaves 5–10 cm, 13–21-foliolate; leaflet blades lanceolate to narrowly lanceolate, 5–11 × 1–3 mm, sparsely pubescent but glabrescent, base rounded, margin incurved, apex acute to acuminate. Racemes compact, (2 or)3–5-flowered; peduncle 3–8 cm, subequal to or slightly longer than leaves, erect, with spreading white trichomes apically intermixed with black trichomes; bracts lanceolate, ca. 8 mm, with long trichomes, base rounded, apex acuminate. Calyx tubular, 0.9–1.2 cm, with spreading white long trichomes and appressed black trichomes; lobes subulate, ca. 4 mm. Corolla purple; standard 1.7–2.6 cm, lamina broadly ovate, apex emarginate; wings ca. 1.5 cm, lamina oblong, apex 2-lobed; keel ca. 1.3 cm, beak ca. 1 mm. Legume sessile, oblong, ca. 2 × 0.6 cm, membranous, with dense black stout and white long trichomes. Fl. Jun–Jul, fr. Jul–Aug.

• Roadsides on hillsides, gravelly hilltops; 2400–3400 m. Hebei, Shanxi.

77. *Oxytropis pseudohirsuta* Q. Wang & Chang Y. Yang, Acta Phytotax. Sin. 39: 151. 2001.

假长毛棘豆 jia chang mao ji dou

Herbs, 5–12 cm tall, acaulescent, from a multiheaded caudex, with persistent thatch of petioles and stipules. Stipules with a triangular free part, 8–10 mm, membranous, with appressed dense white trichomes, adnate to petiole, basally connate. Leaves 3–8 cm, 7–11-foliolate; petiole and rachis with spreading white trichomes; petiole 1–4 cm; leaflet blades narrowly elliptic to lanceolate, 3–12 × 1–3 mm, both surfaces with appressed long stout trichomes. Racemes subcompact, 3–5-flowered; peduncle 6–11 cm, as long as or slightly shorter than leaves, thin, with spreading white trichomes; bracts lanceolate to linear, 3–4 mm, herbaceous. Calyx cylindric, 8–10 × 3–3.5 mm, with spreading white trichomes; lobes lanceolate-subulate, as long as or slightly shorter than tube. Corolla yellow; standard 1.7–2 × 0.9–1 cm, lamina oblong, apex emarginate; wings 1.6–1.8 × 0.5–0.6 cm, lamina oblique, apex rounded; keel ca. 1.7 × 0.6 cm, beak 2–2.5 mm. Legume sessile, ovoid to oblong, 2–2.5 × 0.6–1 cm, inflated, thickly membranous, beak ca. 5 mm. Fl. May–Jul, fr. Jun–Aug.

- Grasslands on slopes; 700–1700 m. Xinjiang.

78. *Oxytropis platysema* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 254. 1842.

宽瓣棘豆 kuan ban ji dou

Herbs, 2–8 cm tall, acaulescent, from a superficial or subterranean branched caudex, almost glabrous. Stipules membranous, glabrous or only ciliate, free or slightly adnate to petiole, basally connate. Leaves 2–6 cm, (11 or) 13–19 (or 21)-foliolate; leaflet blades ovate-lanceolate, ovate-oblong, or ovate, 3–10(–12) × 1.5–4 mm, both surfaces glabrous or sometimes with dense short trichomes, margin sometimes ciliate when young. Racemes compact, 3–7-flowered; peduncle 2–6.5 cm, as long as to longer than leaves, with white trichomes basally intermixed with black trichomes; bracts oblong, 5–6 mm, with black stout trichomes. Calyx campanulate, 6–9 mm, with dense black and white long trichomes; lobes linear-lanceolate, 1.5–1.7 mm, as long as tube, with black cottonlike trichomes. Corolla purple; standard 0.9–1.3 cm, lamina broadly ovate, apex emarginate; wings 1–1.2 cm, slightly shorter than standard, lamina obliquely obovate-oblong, apex retuse; keel 9–10 mm, slightly longer than wings, beak 1–1.2 mm. Legume sessile or shortly stipitate; body cylindric, 10–15 × 3–4 mm, membranous, with appressed black trichomes, abaxial suture round, adaxial suture deeply grooved, beak incurved. Fl. Jun–Jul, fr. Aug.

Kobresia meadows, damp alpine grasslands, gravelly riparian areas; 2300–5200 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

79. *Oxytropis pusilla* Bunge, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 7, 22(1): 27. 1874.

细小棘豆 xi xiao ji dou

Herbs, 2–10 cm tall, acaulescent, from a multiheaded caudex. Stipules subovate with a lanceolate free part, ca. 6 mm, herbaceous, sparsely white and black strigose, basal half adnate to petiole, distinct, apex acute. Leaves 2–7 cm, laxly 7–13-foliolate; petiole and rachis slender, with white and black short trichomes; leaflet blades lanceolate to linear-lanceolate, 4.5–10 × 0.5–2 mm, subglabrous or abaxially with appressed long trichomes, margin ciliate, apex acute. Racemes 2–5-flowered; pe-

duncle 2.5–5.5 cm, subequal to or slightly longer than leaves, erect, basally glabrous, apically sparsely black strigose; bracts lanceolate, as long as calyx tube, with black bristles. Calyx campanulate, 4–6 mm, with appressed black and white long trichomes; lobes linear, 1.5–1.7 mm, shorter than tube. Corolla purple; standard 5–8 mm, lamina oblong, apex emarginate; wings 6–7.2 mm, slightly shorter than standard, apex retuse; keel 5–6.7 mm, shorter than wings, beak 0.3–0.4 mm. Legume shortly stipitate to subsessile; body oblong-cylindric, 10–12 × ca. 3 mm, with appressed black short trichomes. Fl. Jun–Jul, fr. Jul–Aug.

- Hillsides, grasslands on damp areas along riverbanks and on floodplains; 3700–5000 m. Xinjiang, Xizang.

80. *Oxytropis brevipedunculata* P. C. Li, Acta Phytotax. Sin. 18: 370. 1980.

短梗棘豆 duan geng ji dou

Herbs, 1–2 cm tall, acaulescent, from a few-headed caudex. Stipules herbaceous, adnate to petiole, distinct, margin ciliate. Leaves 1–2 cm, 11–19-foliolate; petiole and rachis with appressed white trichomes; leaflet blades oblong, 3–4 × 1.5–2 mm, abaxially with dense trichomes, adaxially glabrous medially, margin appressed white villous. Racemes compact, 2–5-flowered; peduncle less than 1 cm, shorter than leaves, densely villous. Calyx campanulate, ca. 5 mm, with dense black and white long trichomes; lobes subulate, longer than tube. Corolla purple; standard ca. 7 mm, lamina suborbicular, apex emarginate; wings slightly shorter than standard, apex rounded; keel slightly shorter than wings, beak ca. 0.3 mm. Legume with a stipe as long as calyx tube; body oblong, 5–6 × ca. 2 mm, erect, with appressed dense black and white trichomes. Fl. and fr. Jul–Aug.

- Meadows in alpine areas, along rivers; 5200–5400 m. Xizang.

81. *Oxytropis yunnanensis* Franchet, Pl. Delavay. 163. 1890.

云南棘豆 yun nan ji dou

Oxytropis konlonica H. Ohba.

Herbs, 7–15 cm tall, acaulescent or shortly caulescent, from a multiheaded caudex, with (0 or) 1–5 apparent internodes (as in sect. *Mesogaea*). Stipules oblong, papery, with sparse white and black long trichomes, free from or shortly adnate to petiole, basal 1/3–2/3 connate. Leaves (1–) 2–9 cm, 9–25-foliolate; petiole and rachis with sparse trichomes, petiole persistent; leaflet blades lanceolate, 5–7 × 1.5–3 mm, both surfaces with sparse white short trichomes, base rounded to shortly attenuate, apex acuminate, acute, or obtuse. Racemes 3–10-flowered; peduncle 1–9 cm, subequal to or longer than leaves, with sparse to dense short trichomes; bracts 2–4 mm, membranous, with white and black trichomes intermixed. Calyx subcylindric to campanulate, 5–9 × ca. 3 mm, with black and white long trichomes; lobes subulate, 2–4 mm, slightly shorter than tube. Corolla purple or purplish red; standard 1.2–1.3 cm, lamina broadly ovate to broadly obovate, apex 2-lobed; wings 1–1.2 cm, slightly shorter than standard, apex 2-lobed; keel 1–1.1 cm, shorter than wings, beak 1–1.2 mm. Legume stipitate to subsessile; stipe 2–4 mm; body ellipsoid, cylindric, or ovoid, 1.4–3.7 × 0.8–1 cm,

membranous to papery, with appressed dense black trichomes. Fl. and fr. Jul–Sep. $2n = 24^*$.

• Meadows, limestone scree, open stony pastures, S-facing slopes on hills, grassy slopes, rocky slopes in *Kobresia* meadows, alpine shrub steppes, frozen steppes; 1800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

82. *Oxytropis biflora* P. C. Li, Acta Phytotax. Sin. 18: 370. 1980.

二花棘豆 er hua ji dou

Herbs, 2.5–3 cm tall, acaulescent, from a multiheaded caudex, loosely caespitose. Stipules with a triangular-ovate distinct part, herbaceous, with sparse white and black trichomes, very shortly adnate to petiole, basally connate. Leaves 1.5–5 cm, 7–13-foliolate; petiole and rachis with sparse long trichomes; leaflet blades oblong, 2.5–4 × ca. 1.5 mm, both surfaces with spreading dense long trichomes, base rounded, apex acute. Racemes 2- or 3-flowered; peduncle 2–6 cm, subequal to or longer than leaves, with dense long trichomes; bracts narrowly lanceolate. Calyx subcylindric, 6–7 mm, with black and white long trichomes; lobes as long as tube. Corolla white; standard 7–9 mm, lamina broadly ovate, apex emarginate; wings slightly shorter than standard, apex emarginate; keel slightly shorter than wings, beak ca. 0.5 mm. Legume stipitate; stipe ca. 4 mm; body oblong-cylindric when young, densely white villous. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine meadows, along rivers; ca. 5000 m. Xizang.

83. *Oxytropis pauciflora* Bunge, Arbeiten Naturf. Vereins Riga 1: 227. 1847.

少花棘豆 shao hua ji dou

Oxytropis alpicola Bunge (1874), not Turczaninow (1842); *O. friabilis* H. Ohba, S. Akiyama & S. K. Wu; *O. tschujae* Bunge.

Herbs, 3–10 cm tall, caulescent, from a multiheaded caudex, with short to elongate subterranean branches. Stipules with an oblong-ovate free part, herbaceous, with appressed sparse white trichomes and black short trichomes when young, adnate to petiole, basal 1/2–2/3 connate. Leaves (1.2–)3–8 cm, (7–)11–19-foliolate; petioles 3–6 mm, with appressed sparse white short trichomes shorter than on rachis; leaflet blades oblong-ovate, oblong, or oblong-lanceolate, 3–7 × (1–)1.5–4 mm, both surfaces or only abaxially with appressed sparse white trichomes. Racemes compact, (1 or)3–5-flowered; peduncle 0.5–4 cm, as long as to much longer than leaves, with appressed sparse white trichomes; bracts oblong to lanceolate, with rather dense trichomes. Calyx cylindrical to campanulate, 6–8.5(–13) mm, with appressed dense black short trichomes, sometimes with white short trichomes intermixed; lobes lanceolate, (1.8–)3–4

mm. Corolla bluish purple; standard 1–1.5(–2.1) cm, lamina orbicular, apex 2-lobed; wings 1.2–1.3(–1.9) cm, lamina obovate-oblong, apex emarginate; keel (1–)1.5–1.6 cm, beak (0.7–)1–1.5 mm. Legume sessile, oblong-cylindric, ca. 20 × 3–4 mm, 1-locular, with appressed white short trichomes. Fl. Jun–Jul, fr. unknown.

Alpine gravelly areas, alpine scrub meadows, valley sides; 4500–5600 m. Gansu, Xinjiang, Xizang [Kazakhstan, Russia].

84. *Oxytropis yanchiensis* X. Y. Zhu, H. Ohashi & L. R. Xu, J. Jap. Bot. 74: 133. 1999.

盐池棘豆 yan chi ji dou

Herbs, to ca. 5 cm tall, acaulescent, from a compact multiheaded spreading branched caudex. Stipules triangular, ca. 7 × 3.5 mm, membranous, conspicuously veined, high connate, margin ciliate. Leaves ca. 5 cm, 15–19-foliolate; leaflet blades ovate, 4–4.5 × 1–1.5 mm, both surfaces with appressed pubescence. Racemes compact, 3–5-flowered; peduncle 4–5 cm, shorter to longer than leaves; bracts broadly ovate, 2.1–4.9 × 1.5–1.7 mm, whitish appressed pubescent. Calyx campanulate, ca. 3.4 × 1.3 mm, with whitish and blackish trichomes intermixed; lobes triangular, ca. 3 mm. Corolla purple; standard 6.5–7.5 mm, lamina transversely broadly ovate, apex emarginate; wings ca. 6.2 mm, lamina obovate, apex 2-lobed; keel ca. 5 mm, beak ca. 1 mm. Legume unknown. Fl. Jun.

• Hillsides; ca. 2200 m. Xinjiang (Yiwu).

85. *Oxytropis cinerascens* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 26. 1874.

灰叶棘豆 hui ye ji dou

Herbs, 7–10 cm tall, acaulescent, from a short few-branched caudex, grayish green. Stipules oblong, membranous, with trichomes when young but glabrescent, adnate to petiole, distinct. Leaves 2.5–6 cm, 11–21-foliolate; petiole and between leaflets on rachis with glands and with sparse white long trichomes when young; leaflet blades oblong, 3–5 × 1–2 mm, abaxially with appressed trichomes, adaxially and margin with appressed sparse white trichomes, base rounded, apex acute. Racemes 3–5-flowered; peduncle shorter than to as long as leaves, with appressed dense white trichomes; bracts linear-oblong, ca. 3 × 1 mm, membranous, with appressed white trichomes. Calyx subcampanulate, 5–6 mm, with white and black long trichomes; lobes lanceolate-subulate, ca. 1/2 as long as tube. Corolla purple; standard 6–9 mm, lamina ovate, apex 2-lobed; wings ca. 8 mm, lamina obcordate-oblong, apex emarginate; keel ca. 7 mm, beak ca. 0.5 mm. Ovary shortly stipitate, pubescent. Legume unknown. Fl. Jul.

Hilly grassland slopes in alpine areas; 3600–4800 m. Xizang [India].

13. *Oxytropis* sect. *Eumorpha* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 59. 1874.

长荚棘豆组 chang jia ji dou zu

Herbs, acaulescent or subacaulescent with a very short stem. Leaves imparipinnate; leaflets not whorled. Racemes many flowered (rarely only 5–10-flowered); peduncle typically much longer than leaves (shorter in *Oxytropis avisoides*). Legume sessile, subsessile, or with a 1.5–5 mm stipe; body cylindric, ellipsoid, ovoid, or subspherical, scarious or membranous.

About 45 species: China, Himalayas, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; S and SW Asia; 17 species (ten endemic) in China.

- 1a. Plants (including leaves and racemes) not or seldom exceeding 10 cm tall.
- 2a. Leaves 0.5–1 cm; calyx 2.5–3 mm 95. *O. holanshanensis*
- 2b. Leaves 1.5–11 cm; calyx (3.5–)4–6 mm.
- 3a. Plants 5–13(–20) cm tall; leaflet blades 5–15 mm; beak of corolla keel (0.7–)1.5–2 mm; legume body 0.8–0.9 cm 90. *O. pagobia*
- 3b. Plants 1–5 cm tall; leaflet blades 2–5 mm; beak of corolla keel (0.4–)0.5–1 mm; legume body 1–1.3 cm (unknown for *O. baxoiensis*).
- 4a. Racemes 5–10-flowered; beak of corolla keel ca. 0.5 mm; leaves 9- or 11-foliolate 91. *O. baxoiensis*
- 4b. Racemes 2–5-flowered; beak of corolla keel (0.4–)0.8–1 mm; leaves (11 or)13–25(–29)-foliolate.
- 5a. Leaves (11 or)13- or 15-foliolate; calyx 4(–4.8) mm; corolla standard (6.5–)8–10 mm, keel beak (0.4–)0.8 mm; legume body ca. 1.3 cm 98. *O. saposhnikovii*
- 5b. Leaves 17–25(–29)-foliolate; calyx 4–6 mm; corolla standard 9–12 mm; keel beak ca. 1 mm; legume body ca. 1 cm 99. *O. krylovii*
- 1b. Plants (including leaves and racemes) at tallest point mostly exceeding 10 cm tall.
- 6a. Calyx 10–15 mm.
- 7a. Leaves (19 or)21–37-foliolate; corolla standard (1.6–)1.7–2(–2.2) cm, keel beak ca. 1 mm 87. *O. alpina*
- 7b. Leaves 13- or 15-foliolate; corolla standard ca. 1.5 cm, keel beak 2–2.5 mm 88. *O. pseudofrigida*
- 6b. Calyx 2.5–7 mm.
- 8a. Peduncle 2–3 cm 92. *O. avisoides*
- 8b. Peduncle 5–40 cm.
- 9a. Calyx 5.3–7 mm.
- 10a. Leaves 19–35-foliolate; leaflet blades 1.9–2.8 cm; pedicel 17–40 cm; calyx lobes 2.3–3.5 mm; corolla standard ca. 1.6 cm 86. *O. qitaiensis*
- 10b. Leaves 11–19-foliolate; leaflet blades 0.4–1 cm; pedicel 10–15 cm; calyx lobes 1.5–2 mm; corolla standard 1.2–1.5 cm 93. *O. ladyginii*
- 9b. Calyx 3–5 mm.
- 11a. Beak of corolla keel 2–3 mm.
- 12a. Plants 6–15 cm tall; racemes dense and globose; legume with a 1.5–2 mm stipe 89. *O. globiflora*
- 12b. Plants to 30 cm tall; racemes lax; legume sessile 101. *O. caerulea*
- 11b. Beak of corolla keel 0.5–2 mm.
- 13a. Calyx lobes 1.5–2.5 mm 100. *O. imbricata*
- 13b. Calyx lobes 0.4–1.3 mm.
- 14a. Peduncle 15–25 cm; racemes to 20 cm; calyx lobes ca. 1.3 mm 96. *O. merkensis*
- 14b. Peduncle 5–15 cm; racemes to 15 cm; calyx lobes 0.4–1.2(–1.3) mm.
- 15a. Leaves at least some of them more than 25-foliolate 94. *O. filiformis*
- 15b. Leaves 25-foliolate or fewer.
- 16a. Calyx 3–3.5 mm, lobes ca. 1 mm; bracts 1.5–4 mm; legume ca. 2 mm in diam. 97. *O. tashkurensis*
- 16b. Calyx ca. 4 mm, lobes ca. 1.2 mm; bracts 0.7–1.5 mm; legume 2.5–4.5 mm in diam. 102. *O. fragiliphylla*

86. *Oxytropis qitaiensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 66. 1999.

奇台棘豆 *qi tai ji dou*

Herbs, 17–40 cm tall, acaulescent, from a short, multi-headed caudex. Stipules narrowly triangular, 8–10 × 2–3 mm, thickly leathery, with appressed dense trichomes, basally connate. Leaves 9–25 cm, 19–35-foliolate; petiole and rachis subglabrous or with appressed sparse trichomes; leaflet blades narrowly ovate to ovate, 1.9–2.8 × 0.4–1 cm, abaxially sometimes with dense glandular trichomes, adaxially subglabrous, apex cuspidate. Racemes capitate but becoming lax, many flowered; peduncle 17–40 cm, much longer than leaves; bracts narrowly triangular, 2.5–4 × ca. 0.6 mm, pubescent. Calyx campanulate, 5.3–6.5 mm, with whitish or blackish trichomes and sometimes with glandular trichomes; lobes linear-triangular, 2.3–3.5 mm, subequal, as long as tube. Corolla violet (when dry); standard

ca. 1.6 cm, lamina orbicular, 8–10 × 6–8 mm, apex rounded and slightly retuse; wings 1.5–1.6 cm, apex emarginate; keel 1.5–1.6 cm, beak 1.5–2 mm. Legume stipitate; stipe 2–4 mm; body cylindric, ca. 1.8 × 0.4 cm, appressed short pubescent, apically attenuate to a long beak. Fl. Jun–Aug, fr. Jun–Aug.

• Meadows, hillsides; 1900–2400 m. Xinjiang.

87. *Oxytropis alpina* Bunge, Delect. Sem. Horti Bot. Dorpat. 1840: 8. 1840.

高山棘豆 *gao shan ji dou*

Oxytropis alpicola Turczaninow; *O. frigida* Karelin & Kirilov; *O. uralensis* (Linnaeus) Candolle var. *pumila* Ledebour.

Herbs, (6–)10–21 cm tall, caulescent, from a multiheaded caudex with many branches, tufted, clothed with persistent peti-

oles and stipules. Stipules ovate to lanceolate, membranous, with appressed white trichomes, adnate to petiole. Leaves (2–)5–17(–19) cm, (19 or)21–37-foliolate; petiole and rachis with appressed sparse white trichomes; leaflet blades lanceolate-ovate to lanceolate, (4–)7–18 × (1–)2–4 mm, white sericeous when young but sparsely so later. Racemes 5- to many flowered; peduncle 4–15(–21) cm, as long as to longer than leaves, thick, erect, sulcate, with spreading trichomes; bracts lanceolate to subulate, 1.2–1.5 cm, with white long trichomes. Calyx broadly cylindrical, 1–1.2 cm, with spreading white and appressed black trichomes; lobes linear-lanceolate, 3–5 mm. Corolla pale purple; standard (1.6–)1.7–2(–2.2) cm, lamina broadly ovate, apex 2-lobed; wings 1.5–1.7 cm, apex emarginate; keel 1.2–1.3 cm, beak ca. 1 mm. Legume sessile, oblong-ovoid, 1.5–3 × 0.5–0.7 cm, thinly leathery, 2-locular, with sparse white and appressed black trichomes, septum wide, apex beaked. Fl. and fr. Jul–Aug.

Hillsides, gravelly areas, alpine areas; ca. 2500 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan].

88. *Oxytropis pseudofrigida* Saposhnikow, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 136. 1923.

阿拉套棘豆 a la tao ji dou

Herbs, 10–18 cm tall, acaulescent, from a multiheaded caudex, sericeous with white long trichomes. Stipules with a broadly triangular free part, scarious, adnate to petiole. Leaves 5–12 cm, 13- or 15-foliolate; petiole and rachis with appressed trichomes; leaflet blades ovate to oblong-lanceolate, 8–10 × 3–4 mm, both surfaces appressed sericeous with long trichomes. Racemes many flowered; peduncle longer than leaves, erect, with white and black trichomes; bracts lanceolate, 1–1.2 cm, sericeous with long trichomes. Calyx tubular-campanulate, 1–1.5 cm, with spreading black and white cottonlike trichomes; lobes lanceolate, ca. 1/2 as long to as long as tube. Corolla purple; standard ca. 1.5 cm, lamina ovate, apex emarginate; wings 1.2–1.3 cm, apex retuse to rounded; keel as long as wings, beak 2–2.5 mm. Legume ovoid, 2.5–3 × 1–1.2 cm, inflated, thinly leathery, 2-locular, with spreading white and black trichomes, septum wide, adaxial suture grooved, beak 1–1.2 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine meadows among shrubs; ca. 1400 m. Xinjiang.

89. *Oxytropis globiflora* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 43. 1869.

球花棘豆 qiu hua ji dou

Herbs, 6–15 cm tall, acaulescent, from a multiheaded caudex, matlike or cushionlike, sericeous. Stipules linear-subulate, sericeous, adnate to petiole, distinct. Leaves 5–12 cm, 11–21-foliolate; petiole and rachis with appressed trichomes; leaflet blades lanceolate, oblong, or oblong-lanceolate, 5–17 × 1.5–4 mm, both surfaces appressed sericeous, apex acute. Racemes globose, dense, many flowered; peduncle longer than leaves, with appressed trichomes; bracts linear, as long as calyx tube, membranous, with dense white long trichomes and stout trichomes, apex acute. Calyx campanulate, ca. 5 mm, with appressed black and white trichomes; lobes linear-subulate, shorter than tube. Corolla bluish purple; standard 8–9 mm, lamina broadly ovate, apex rounded; wings slightly shorter than

standard; keel as long as wings, beak ca. 2.5 mm. Legume stipitate; stipe 1.5–2 mm; body cylindrical-ovoid to narrowly ovoid, 10–12 × 2.5–3 mm, pendulous, membranous, with appressed dense short trichomes, apex beaked. Fl. Jun–Jul, fr. Jul–Aug.

Pastures, alpine gravelly slopes, valleys, grasslands; 3600–4300 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

90. *Oxytropis pagobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 27. 1874.

冰河棘豆 bing he ji dou

Herbs, 5–13(–20) cm tall, acaulescent, from a simple to shortly branched caudex, matlike or cushionlike. Stipules with a lanceolate free part, 5–10 mm, white sericeous, basal half adnate to petiole. Leaves 3–11 cm, rather long petiolate, 13–21-foliolate; leaflet blades lanceolate to oblong-lanceolate, 5–15 × 1–2.5 mm, both surfaces with appressed trichomes, apex acuminate. Racemes initially subglobose but becoming lax in late anthesis and fruit, many flowered; peduncle declined, slightly to much longer than leaves, with appressed trichomes; bracts subulate, as long as tube. Calyx campanulate, (3.5–)4–5 mm; lobes subulate, 1–2 mm, 1/3–1/2 as long as tube. Corolla violet fading to dark purple or yellowish white; standard 7–8.5 mm, lamina suborbicular; wings 7–8 mm, as long as standard, apex rounded; keel 6.5–8 mm, beak (0.7–)1.5–2 mm. Legume stipitate; stipe (0.7–)1.5–2 mm; body cylindrical, 8–9 × ca. 3 mm, declined by flexion of pedicels, membranous, covered with appressed black and white trichomes. Fl. and fr. Jul–Aug. $2n = 16^*$.

• Hillsides, roadsides, shrublands, *Artemisia* steppes, grasslands, subalpine steppes, flooded or wet plains and valleys, dry places between forest margins; 2100–3800 m. Xinjiang.

91. *Oxytropis baxoiensis* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

八宿棘豆 ba su ji dou

Herbs, 3–5 cm tall, acaulescent, from a multiheaded caudex, with densely imbricate thatch of marcescent petioles and stipules. Stipules herbaceous, densely sericeous, adnate below middle to petiole, otherwise distinct. Leaves 1.5–2.5 cm, 9- or 11-foliolate; petiole and rachis densely sericeous; leaflet blades oblong to ovate, 3–4 × 1.5–2 mm, both surfaces densely sericeous. Racemes compact, 5–10-flowered; peduncle ca. 2 × as long as leaves, densely white sericeous. Calyx 4–6 mm, with appressed white and black trichomes; lobes lanceolate, 2–3 mm. Corolla largely purple; standard 8–10 mm, lamina purple with a white center and orbicular, apex rounded to slightly emarginate; wings 7–9 mm, lamina obovate-oblong, apex rounded to emarginate; keel shorter than wings, beak ca. 0.5 mm. Legume shortly stipitate; body oblong-cylindrical when young, with appressed dense black short trichomes. Fl. Jun, fr. Jul–Aug.

• About 3900 m. Xizang.

92. *Oxytropis avisoides* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

鸟状棘豆 niao zhuang ji dou

Herbs, 10–20 cm tall, acaulescent, from a shortly branched

multiheaded caudex. Stipules with a linear-lanceolate free part, ca. 1 cm, herbaceous, with spreading white long trichomes, shortly adnate to petiole. Leaves 3–7 cm, 13–21-foliolate; petiole and rachis densely clothed with spreading white long trichomes; leaflet blades oblong to oblong-lanceolate, ca. 35×6.5 mm, both surfaces with spreading white long trichomes, base rounded, apex acute. Racemes lax, 6–10-flowered; peduncle 2–3 cm, with appressed to spreading dense trichomes. Calyx 5–7 mm, with appressed white and black trichomes; lobes as long as tube. Corolla purple; standard 7–9 mm, lamina suborbicular, apex emarginate; wings shorter than standard, lamina obovate-oblong, apex emarginate; keel shorter than wings, beak ca. 0.5 mm. Ovary long stipitate. Legume unknown. Fl. Jul.

• Hillsides; 4600–4700 m. Xizang (Baxoi).

93. *Oxytropis ladyginii* Krylov, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 5. 1903 [*“ladygini”*].

拉德京棘豆 *la de jing ji dou*

Herbs, 5–30 cm tall, acaulescent, from a multiheaded caudex. Stipules with a lanceolate free part, membranous, with appressed white trichomes, adnate to petiole, margin ciliate. Leaves 4–12 cm, 11–19-foliolate; petiole and rachis white sericeous; leaflet blades lanceolate, lanceolate-oblong, or elliptic, $4–10 \times 1.5–4$ mm, both surfaces with appressed white trichomes, base obtuse to rounded, apex acute. Racemes many flowered, elongating after anthesis; peduncle 10–15 cm, ca. 2 × as long as leaves, with appressed sparse white trichomes apically intermixed with black trichomes; bracts linear-lanceolate, longer than pedicels, with appressed sparse white trichomes. Calyx broadly cylindric, 6–7 mm, with appressed sparse white and black trichomes; lobes lanceolate, 1.5–2 mm. Corolla pale yellow or sometimes pale purple; standard 1.2–1.5 cm, lamina broadly ovate, apex rounded; wings slightly shorter than standard, apex rounded; keel 1–1.2 cm, apically spotted, beak ca. 1 mm. Legume sessile, oblong-ovoid, $1.4–1.7 \times 0.4–0.6$ cm, erect-ascending, 1-locular, with appressed white and black trichomes. Fl. and fr. Jul–Aug.

Stony hillsides, valley bottoms; 1500–2700 m. Xinjiang [Mongolia, Russia].

94. *Oxytropis filiformis* Candolle, Astragalologia, 80. 1802.

线棘豆 *xian ji dou*

Oxytropis coerulea Turczaninow (1842), not *O. caerulea* (Pallas) Candolle (1802).

Herbs, 10–20 cm tall, acaulescent, from a multiheaded caudex, tufted. Stipules narrowly ovate, membranous, densely appressed sericeous, adnate to petiole, basally connate to almost distinct. Leaves 1.5–12 cm, (5–)17–31(–45)-foliolate; petiole and rachis with appressed white trichomes; petiole long and thin, persistent; leaflet blades lanceolate, linear-lanceolate, or ovate-lanceolate, $2–6 \times 0.5–2$ mm, with appressed trichomes, base rounded, margin involute, apex acuminate. Racemes lax, 2.5–5 cm, 10–15-flowered; peduncle 6–11 cm, 1–2 × as long as leaves, thin, usually incurved, with appressed white and black trichomes; bracts linear, longer than pedicels. Calyx broadly campanulate, 2.5–3(–4.9) mm; lobes triangular, $0.4–0.6(–1.3)$

mm, with dense white and black short trichomes. Corolla bluish purple; standard 5.5–7 mm, lamina suborbicular, apex emarginate; wings 5–6 mm, as long as standard, slightly longer than keel, lamina oblong; keel 4.5–6 mm, beak ca. 1.5 mm. Legume subsessile; body broadly ellipsoid to ovoid, $5–10 \times 3–5$ mm, thickly membranous, 1-locular, with appressed sparse white and black short trichomes, apex beaked. Fl. Jul–Aug, fr. Aug. $2n = 16, 32$.

Roadsides on gravelly or stony mountain slopes, meadows; 600–700 m. Nei Mongol [Mongolia, Russia].

95. *Oxytropis holanshanensis* H. C. Fu, Acta Phytotax. Sin. 20: 313. 1982.

贺兰山棘豆 *he lan shan ji dou*

Herbs, 5–10 cm tall, acaulescent, from a much-branched multiheaded caudex, clothed with marcescent stipules and leaf bases. Stipules ovate, membranous, adnate to petiole, basally connate. Leaves 5–10 mm, 7–19-foliolate; leaflet blades ovate to elliptic-ovate, $2–3 \times$ ca. 1 mm, both surfaces densely appressed white pilose, base rounded, apex acute. Racemes rather compact, 10–15-flowered; peduncle 2–8 cm, much longer than leaves, slender; bracts linear-lanceolate. Calyx campanulate, 2.5–3 mm, densely appressed white and black pilose; lobes linear, ca. 1 mm. Corolla yellow; standard ca. 7 mm, lamina obovate, apex emarginate; wings ca. 5 mm; keel slightly shorter than wings, beak ca. 1 mm. Ovary pilose. Legume unknown. Fl. Jul–Aug.

• Valleys, stony hillsides; 2000–2400 m. SW Nei Mongol (Helan Shan), Ningxia.

96. *Oxytropis merkensis* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 65. 1866.

米尔克棘豆 *mi er ke ji dou*

Astragalus loczyi Kanitz var. *scaposa* Kanitz; ?*Oxytropis avis* Saposchnikow; *O. kanitzii* N. D. Simpson.

Herbs, to 30 cm tall or more, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules, grayish pubescent. Stipules with a lanceolate-subulate free part, sparsely to densely appressed pubescent, adnate to petiole, base triangular, margin ciliate. Leaves 5–15 cm, 13–25-foliolate; leaflet blades oblong, broadly elliptic-lanceolate, or lanceolate, $5–20 \times 2–5$ mm, both surfaces sparsely pubescent, margin slightly involute, apex acute. Racemes lax, many flowered, elongating to 10–20 cm after anthesis; peduncle 15–25 cm, $1–2(–3) \times$ as long as leaves, with appressed sparse white trichomes; bracts subulate, with sparse trichomes. Calyx campanulate, 3.6–5 mm, with appressed black trichomes; lobes subulate, ca. 1.3 mm, shorter than tube. Corolla purple to almost white; standard 7–10 mm, lamina suborbicular, apex emarginate; wings as long as or slightly shorter than standard; keel ca. 8.8 mm, as long as or longer than wings, tip spotted, beak 0.5–1.8 mm. Legume stipitate; stipe 4–5 mm; body broadly ellipsoid-oblong, $10–16 \times 5–6$ mm, pendulous, papery, with appressed white trichomes, apex acuminate. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16, 32$.

Grasslands on hillsides, river terraces and floodplains, gravelly areas, roadsides, fields, dry slopes, flooded lands, subalpine meadows;

1700–4600 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

According to the description of *Oxytropis avis* in Fl. URSS (13: 26. 1948), the keel beak is 0.5–0.75 mm, the leaflets are 4–6-paired, the peduncle is to 15 cm and several × longer than the leaves, and the racemes are loose and few flowered. Whether it is really conspecific with *O. merkensis* requires additional investigation.

97. *Oxytropis tashkurensis* S. H. Cheng ex X. Y. Zhu, Y. F. Du & H. Ohashi, J. Jap. Bot. 75: 289. 2000.

塔什库儿干棘豆 ta shi ku er gan ji dou

Herbs, 9–24 cm tall, acaulescent, from a multiheaded caudex, herbage with whitish trichomes. Stipules triangular, 3–4 × ca. 2 mm, leathery, with whitish trichomes, basal part adnate to petiole. Leaves 5–8 cm; leaflets 15–19(–23), opposite or seldom alternate; leaflet blades narrowly ovate to ovate, 2.5–14 × 1–4 mm, both surfaces with appressed whitish trichomes. Racemes lax to compact, 10–15 cm, many flowered; peduncle 5–15 cm, much longer than leaves; bracts triangular, 1.5–4 × ca. 0.5 mm, with whitish trichomes. Calyx campanulate, 3–3.5 × ca. 2 mm, with blackish and whitish trichomes; tube 2–2.5 mm; lobes subulate, ca. 1 × 0.2 mm. Corolla purple but drying to yellowish white; standard 6–9.5 × 3–7 mm, lamina broadly obovate and basally narrowed, apex rounded; wings 5–9.5 mm; keel 6–7 mm, beak 1.5–2 mm. Legume narrowly ellipsoid, 8–10 × ca. 2 mm, with blackish and whitish trichomes. Fl. May–Sep, fr. Jun–Sep.

• Grasslands, S-facing slopes, alpine meadows; 1800–3600 m. Xinjiang.

98. *Oxytropis saposhnikovii* Krylov, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 4. 1903 [*“saposhnikovi”*].

萨氏棘豆 sa shi ji dou

Herbs, acaulescent, from a prostrate or diffuse multiheaded caudex with many 1–3 cm branches. Stipules with a triangular distinct part, membranous, glabrous, adnate to petiole, basally connate, margin ciliate. Leaves (1.5–)3–5 cm, (11 or)13- or 15-foliolate; leaflet blades ovate-lanceolate to lanceolate, 3–6 × 1.5–2.5 mm, abaxially with appressed sparse short trichomes, adaxially subglabrous, margin reflexed, apex acute. Racemes 2–4-flowered; peduncle 1.5–5 cm, mostly longer than leaves, thin, with appressed short trichomes; bracts lanceolate, ca. 2 mm, with appressed sparse trichomes. Calyx tubular-campanulate, 4(–4.8) mm, with appressed black and sparse white trichomes; lobes subulate, 1(–2.3) mm. Corolla purple; standard (6.5–)8–10 mm, lamina orbicular-ovate, apex emarginate; wings (6–)7–8 mm; keel (5.7–)6–7 mm, beak (0.4–)0.8 mm. Legume oblong-ovoid, ca. 13 × 5 mm, with appressed black short trichomes, beak falcate. Fl. and fr. Jul–Aug.

• Gravelly alpine slopes, on frozen lands. Xinjiang.

99. *Oxytropis krylovii* Schipczinski, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 1(7): 1. 1920 [*“krylovi”*].

克氏棘豆 ke shi ji dou

Herbs, 1–4 cm tall, acaulescent, from a multiheaded caudex, matlike or cushionlike, appressed white pubescent. Stip-

ules lanceolate to subulate, adnate to petiole, basal half connate, margin ciliate. Leaves 2–5 cm, 17–25(–29)-foliolate; petiole and rachis sulcate, with appressed trichomes; leaflet blades linear-lanceolate to narrowly ovate, 2–5 × 0.5–2 mm, both surfaces glabrous or adaxially with sparse trichomes, margin involute and abaxially with appressed trichomes. Racemes lax, to ca. 5-flowered; peduncle 2–5 cm, somewhat to much longer than leaves, slender, with appressed trichomes, apically with appressed black trichomes intermixed with white long trichomes; bracts linear to subulate, 2.5–3 mm, with appressed black and white long trichomes. Calyx broadly cylindrical, 4–6 mm, with appressed black trichomes; lobes subulate, ca. 1.5 mm, 1/3–1/2 as long as tube. Corolla purple; standard 0.9–1.2 cm, lamina obovate, apex emarginate; wings 8–11 mm, apex broadly emarginate; keel as long as wings, beak ca. 1 mm. Legume stipitate; stipe 2–3 mm; body cylindrical-ovoid, ca. 10 × 4 mm, 1-locular, with appressed black and sparse white trichomes, apex acuminate. Fl. and fr. Jun–Jul.

Gravelly alpine areas, valleys; 3000–4700 m. Xinjiang [Kazakhstan, Russia (W Siberia)].

100. *Oxytropis imbricata* Komarov, Repert. Spec. Nov. Regni Veg. 13: 232. 1914.

密花棘豆 mi hua ji dou

Herbs, 10–15 cm tall, acaulescent, from a many-branched caudex, tuft-forming. Stipules linear-lanceolate, with dense long trichomes, adnate to petiole. Leaves 3–10 cm, 15–29-foliolate; petiole with appressed trichomes, adaxially sulcate; leaflet blades narrowly elliptic to ovate-lanceolate, (3–)5–11 × (1.2–)3–5 mm, both surfaces gray or white and with appressed trichomes, base rounded, apex acute to retuse. Racemes dense to lax and becoming more lax in fruit, many flowered; peduncle 10–18 cm, longer than leaves, thin, with appressed trichomes; bracts lanceolate, shorter than calyx. Calyx campanulate, 3–5 mm, with black and white trichomes; lobes lanceolate-linear, as long as or somewhat shorter than tube. Corolla purple; standard ca. 8 mm, lamina oblong, apex rounded; wings as long as standard, apex retuse; keel as long as wings, beak 1.7–2 mm. Legume shortly stipitate; body broadly ovoid to subspherical, 5–6 mm, papery, with appressed short trichomes, beak hook-shaped and 5–9 mm. Fl. May–Jul, fr. Jul–Aug.

• Grasslands on hillsides; 1800–3500 m. Gansu, Xinjiang, Xizang.

101. *Oxytropis caerulea* (Pallas) Candolle, Astragalologia, 68. 1802.

蓝花棘豆 lan hua ji dou

Astragalus caeruleus Pallas, Reise Russ. Reich. 3: 293. 1776; *A. baicalensis* Pallas; *Oxytropis baicalensis* (Pallas) Pallas ex Besser; *O. caerulea* f. *albiflora* (H. C. Fu) X. Y. Zhu & H. Ohashi; *O. caerulea* subsp. *subfalcata* (Hance) S. H. Cheng ex H. C. Fu; *O. chinensis* Bunge; *O. curviflora* Turczaninow ex Besser; *O. mandshurica* Bunge; *O. mandshurica* f. *albiflora* H. C. Fu; *O. subfalcata* Hance; *O. subfalcata* var. *albiflora* C. W. Chang.

Herbs, to 30 cm tall or more, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules.

Stipules narrowly triangular, ca. 4 × 3 mm, membranous, with long stout trichomes, basally connate. Leaves 10–20 cm, 15–41-foliolate; leaflet blades ovate to lanceolate-elliptic, 6–19 × 1.5–8 mm, persistent, subglabrous. Racemes lax, 10–20-flowered, elongating 10–20 cm in fruit; peduncle 10–22 cm, much longer than leaves; bracts triangular, 3–5 × ca. 2 mm, pubescent. Calyx campanulate, 3–5 × 1–1.5 mm, with whitish and blackish trichomes; lobes subulate, 2–2.5 × 0.5–1 mm, shorter than to equaling tube. Corolla purple, violet, blue, red, or white; standard (0.8–)0.9–1.3 cm, lamina orbicular, apex rounded; wings (0.7–)0.9–1.1 cm, lamina obliquely oblanceolate, apex obtuse; keel 7–9 mm, beak 2–3 mm. Legume sessile; body ovoid to lanceolate-ovoid, 10–16 × 4–5 mm, inflated, leathery, with whitish and blackish trichomes. Fl. Jun–Sep, fr. Aug–Sep. $2n = 16$.

Rocky areas, hillsides, forests, meadows, roadsides, prairies; 1000–3000 m. Gansu, Hebei, Nei Mongol, Shanxi [Mongolia, Russia].

102. *Oxytropis fragiliphylla* Q. Wang, Chang Y. Yang, X. Y. Zhu & H. Ohashi, J. Jap. Bot. 76: 219. 2001.

14. *Oxytropis* sect. *Janthina* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 20. 1874.

藍花棘豆組 lan hua ji dou zu

Herbs, acaulescent or very shortly caulescent, matlike, moundlike, or cushionlike, with yellowish gray or glandular trichomes. Leaves imparipinnate; leaflets not verticillate; leaflet blades yellowish gray. Racemes 5- to many flowered; peduncle 1.5–9 cm. Corolla purple, bluish purple, blue, red, or yellow. Legume sessile, subsessile, or with a 3–4 mm stipe; body cylindrical to ellipsoid, membranous.

About 40 species: Afghanistan, China, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia; seven species (four endemic) in China.

- 1a. Corolla red 103. *O. tukemansuensis*
 1b. Corolla yellow, purple, blue, or bluish purple.
 2a. Corolla yellow 104. *O. stracheyana*
 2b. Corolla purple, blue, or bluish purple.
 3a. Corolla standard ca. 1.3 cm, keel beak ca. 1 mm 106. *O. vermicularis*
 3b. Corolla standard 0.5–1.3 cm, keel beak ca. 0.5 mm or ca. 2 mm.
 4a. Beak of corolla keel ca. 2 mm 105. *O. longialata*
 4b. Beak of corolla keel ca. 0.5 mm.
 5a. Petiole 1.5–4 cm; leaves 17–25-foliolate; peduncle 5–9 cm 109. *O. valerii*
 5b. Petiole less than 1.5 cm; leaves (9 or)11–19(or 21)-foliolate; peduncle (1.5–)2–5(–8) cm.
 6a. Corolla standard 5–8 mm, apex emarginate 107. *O. densa*
 6b. Corolla standard 8–13 mm, apex subrounded 108. *O. humifusa*

103. *Oxytropis tukemansuensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 66. 1999.

土克曼棘豆 tu ke man ji dou

Herbs, 3.5–4.5 cm tall, acaulescent, from a multiheaded caudex, pulvinate-caespitose, yellowish brown pubescent. Stipules ovate, ca. 5 × 2 mm, scarious, basally connate. Leaves 1–2 cm, 11–17-foliolate; leaflet blades linear to ovate, 3–4 × 1–1.5 mm, with yellowish brown or glandular trichomes. Racemes compact, 5–7-flowered; peduncle 3–4 cm, much longer than leaves; bracts triangular, with yellowish brown trichomes. Calyx campanulate, ca. 3 × 2 mm; tube ca. 1.4 mm; lobes narrowly triangular, ca. 1.6 × 0.4 mm. Corolla red; standard 7–8 × ca. 3.6 mm, lamina obovate, apex rounded; wings ca. 7 mm, lamina obovate, ca. 4 × 1.2 mm, and auriculate; keel ca. 5.7

脱叶棘豆 tuo ye ji dou

Herbs, 8–15 cm tall, acaulescent, from a branching multiheaded ligneous caudex, tuft-forming, green. Stipules obtusely triangular, membranous, covered with dense whitish trichomes, adnate to petiole. Leaves 4–10 cm, fragile, deciduous, 17–25-foliolate; petiole erect, often withered; petiolules extremely short; leaflet blades elliptic to ovate, 2–5 × 1–2 mm, caducous, both surfaces with sparse whitish trichomes. Racemes dense and 2–5 cm but becoming lax and elongating in fruit, 7–13-flowered or more; peduncle 6–12 cm, longer than leaves, with sparse trichomes; bracts linear to narrowly subulate, 0.7–1.5 mm, almost as long as pedicels. Calyx campanulate, ca. 4 mm, with blackish and whitish trichomes; lobes subulate, ca. 1.2 × 0.4 mm. Corolla purple; standard 6–10 mm, apex rounded; wings 7.5–8.5 mm, lamina obovate, apex rounded; keel 7.5–8 mm, beak ca. 1.5 mm. Legume stipitate; stipe 2–2.5 mm; body narrowly ovoid, 8–12 × 2.5–4.5 mm, appressed whitish pubescent. Fl. Jun–Jul, fr. Jul.

- Subalpine meadows; 1800–2800 m. Xinjiang.

mm, beak ca. 1 mm. Legume sessile, fusiform, 9–10 × 2.5–3 mm, with whitish trichomes. Fl. and fr. Jun–Jul.

- About 4200 m. Xinjiang (Taxkorgan).

104. *Oxytropis stracheyana* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 62. 1874.

胀果棘豆 zhang guo ji dou

Herbs, 2–3 cm tall, acaulescent, from a multiheaded caudex, with many marcescent petioles and stipules. Stipules narrowly triangular, ca. 5 × 3 mm, thinly membranous to scarious, glabrous, basally connate. Leaves 1.5–4 cm, 13–19-foliolate; leaflet blades oblong-elliptic, 3–7 × 1–2 mm, densely pubescent. Racemes compact, 3–6-flowered; peduncle 1.5–4 cm, subequal to or slightly longer than leaves; bracts triangular, ca.

2 × 1 mm, with dense trichomes. Calyx cylindric, 10–14 × 2–3 mm, with whitish trichomes; lobes triangular, 2–3 × ca. 2 mm, much shorter than tube. Corolla yellow; standard 2.2–2.5 cm, lamina orbicular, apex emarginate; wings 1.6–1.8 cm, lamina obovate; keel 1.6–1.8 cm, beak ca. 2 mm. Legume sessile, ovoid, ca. 1.2 cm, inflated, densely villous. Fl. Jun–Jul, fr. Jul–Aug. 2n = 48.

Hillsides, meadows, *Stipa* grasslands, floodplains, roadsides; 2200–5000 m. Gansu, Qinghai, Xinjiang, Xizang [India, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

105. *Oxytropis longialata* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

长翼棘豆 chang yi ji dou

Herbs, 6–8 cm tall, acaulescent, from a shortly branched multiheaded caudex. Stipules linear-lanceolate, ca. 1 cm, herbaceous, with appressed white trichomes, adnate on basal ca. 1/3 to petiole, otherwise distinct. Leaves 4–8 cm, 15–21-foliolate; petiole and rachis with spreading white long trichomes; leaflet blades ovate-lanceolate, 3.5–7 × 1–2.5 mm, both surfaces densely spreading white pilose, apex acute. Racemes many flowered; peduncle 2–7 cm, shorter than leaves, with spreading sparse white trichomes. Calyx subcylindric, 6–8 mm, with appressed sparse black trichomes; lobes linear-subulate, as long as tube. Corolla purple; standard 0.9–1.1 cm, lamina broadly ovate, apex emarginate; wings 1–1.2 cm, lamina ovate-oblong, apex emarginate; keel 8–10 mm, beak ca. 2 mm. Ovary stipitate. Legume unknown. Fl. May–Jun.

• Sandy and gravelly areas in valleys; 4000–4100 m. Xizang (Lhari).

Grubov (Fl. Central Asia 8b: 21. 1999) treated *Oxytropis longialata* as a synonym of *O. globiflora*, but the former differs by its standard apically 2-lobed, not rounded as in *O. globiflora*.

106. *Oxytropis vermicularis* Freyn, Bull. Herb. Boissier, sér. 2, 5: 1025. 1905.

维米苦拉棘豆 wei mi ku la ji dou

Herbs, 4–5 cm tall, acaulescent, from a multiheaded branched and sometimes elongated and flexuous caudex, low tufted. Stipules covered with appressed white trichomes, 1-veined, adnate to petiole. Leaves 0.5–1.5 cm, 13–19-foliolate; leaflet blades oblong-elliptic, ca. 2.5 × 1.3–1.4 mm, pubescent. Racemes umbelliform, 2–5-flowered; peduncle 2–5 cm, ca. 2 × as long as leaves, with trichomes; bracts linear, 3–4 mm, densely covered with black and white trichomes. Calyx broadly cylindric, 6–7 mm, black and white pubescent; lobes 3–4 mm, ca. 1/2 as long as tube. Corolla blue; standard ca. 1.3 cm, lamina orbicular, apex emarginate; wings as long as standard; keel as long as wings, beak ca. 1 mm. Ovary substipitate, glabrous or almost so. Legume unknown. Fl. Jun–Jul.

• Hilltops, grasslands, gravelly areas; 3500–4000 m. SW Xinjiang.

107. *Oxytropis densa* Bentham ex Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg. Sér. 7, 22(1): 24. 1874.

密丛棘豆 mi cong ji dou

Oxytropis stipulosa Komarov.

Herbs, 2–7 cm tall, acaulescent, from a multiheaded caudex, cushionlike, with long trichomes. Stipules with a lanceolate free part, 5–7 mm, herbaceous, with spreading dense white long trichomes when young but glabrescent, basal half adnate to petiole. Leaves 1–3 cm, densely (9 or) 11–19-foliolate; petiole and rachis with spreading dense or sparse white long trichomes; leaflet blades ovate, oblong, or oblong-lanceolate, 1.5–4 × 1–2 mm, densely to sparsely sericeous with white long trichomes, base rounded, apex retuse, rounded, or acute. Racemes 2–10-flowered; peduncle (1.5–)2–7 cm, slightly shorter to longer than leaves, with dense or sparse white long trichomes; bracts oblong-lanceolate, 3–4 mm. Calyx campanulate, 4–6 mm, with dense white and black short trichomes; lobes linear, 1–2.1 mm. Corolla purple to bluish purple; standard 5–8 mm, claw very short, lamina suborbicular, apex emarginate; wings as long as or shorter than standard, apex rounded to emarginate; keel 5–6 mm, beak ca. 0.5 mm. Legume shortly stipitate; body oblong-cylindric, 9–12 × 2–3 mm, inflated, 1-locular, with spreading dense white trichomes, septum less than ca. 1 mm wide, adaxial suture deeply grooved, apex acute. Fl. Jun–Jul, fr. Jul–Aug.

Alpine gravelly areas, floodplains, hillsides, grasslands, gravelly terraces, *Carex moorcroftii-Stipa* grasslands, stony slopes; 3500–5200 m. Gansu, Qinghai, Xinjiang, Xizang [Kashmir, Pakistan].

108. *Oxytropis humifusa* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 535. 1842.

铺地棘豆 pu di ji dou

Oxytropis albana Steven; *O. humifusa* var. *grandiflora* Bunge; *O. lapponica* (Wahlenberg) Gay var. *humifusa* (Karelin & Kirilov) Baker; *O. lapponica* var. *jacquemontiana* Bentham ex Baker; *O. melanotricha* Bunge.

Herbs, 2–5(–8) cm tall, acaulescent, from a multiheaded shortly branched caudex, low tuft-forming. Stipules lanceolate with a lanceolate-subulate free part ca. 5 mm, 1–1.2 cm, membranous to leathery, persistent, sericeous with dense long trichomes or glabrous, adnate to petiole. Leaves 2–7 cm, 13–17(–21)-foliolate; petiole and rachis with appressed trichomes; leaflet blades ovate-lanceolate to lanceolate, 3–8 × 2–3 mm, appressed sericeous with long trichomes, apex acute. Racemes rather compact, 6–10-flowered; peduncle 2–5(–8) cm, to 2 × as long as leaves, thin, erect to diffuse, with sparse white short trichomes; bracts linear-subulate, 4–5 mm, with white and black trichomes. Calyx campanulate, 5–6 mm, with dense black short and white long trichomes; lobes linear-subulate, ca. 2 mm. Corolla purple; standard 0.8–1.3 cm, lamina obcordate, apex emarginate; wings 7–10 mm, apex 2-lobed; keel as long as wings, beak ca. 0.5 mm. Legume stipitate; stipe 3–4 mm; body cylindric-ovoid, 1.3–2.5 × 0.4–0.6 cm, pendulous, membranous, 1-locular, with appressed white and black trichomes. Fl. Jul–Aug, fr. Aug–Sep.

Sunny S-facing slopes, floodplains, gravelly areas in valleys; 4000–4400 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

109. *Oxytropis valerii* Vassilczenko, Novosti Sist. Vyssh. Rast. 24: 133. 1987.

维力棘豆 wei li ji dou

Herbs, 5–10 cm tall or taller, acaulescent, from a multi-headed caudex. Stipules adnate to petiole. Leaves 5–8 cm, 17–25-foliolate; petiole 1.5–4 cm, with trichomes; leaflets densely arranged; leaflet blades lanceolate-ovate to ovate, both surfaces villous, base rounded, apex obtuse. Racemes compact, many flowered; peduncle 5–9 cm, longer to somewhat shorter than

leaves. Calyx campanulate, ca. 4 mm, lanate; lobes longer than tube. Corolla purple; standard ca. 7.5 mm, apex subrounded; wings almost as long as standard; keel beak ca. 0.5 mm. Ovary with appressed dense trichomes. Legume unknown. Fl. Jun.

- Hilltops, gravelly areas; 3500–4000 m. Xinjiang.

15. *Oxytropis* sect. *Oxytropis*

棘豆组 ji dou zu

Oxytropis sect. *Protoxytropis* Bunge.

Plants acaulescent (but shortly caulescent in *Oxytropis mollis*), from a simple or branching caudex, with yellowish gray trichomes. Leaves imparipinnate; leaflet blades yellowish gray. Racemes 5–13-flowered or more; peduncle 2–38 cm, somewhat shorter to much longer than leaves. Flowers 0.6–3.5 cm. Legume sessile, subsessile, or with a 2–3 mm stipe; body cylindric to obovoid, 0.8–3 cm.

About 28 species: China, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe; nine species (seven endemic) in China.

- 1a. Corolla standard 0.6–0.8 cm; calyx 5–6 mm 113. *O. qilianshanica*
 1b. Corolla standard (0.9–)1–3 cm; calyx 6.3–14 mm.
 2a. Corolla standard (1.4–)2–3 cm.
 3a. Peduncle stiffly erect, arising from castaneous to dark brown caudex 112. *O. grandiflora*
 3b. Peduncle typically curved-ascending, arising from a pale brown caudex.
 4a. Leaves (13 or)15–23-foliolate; corolla standard 2.1–2.9 cm and apex rounded, keel beak 1–1.5 mm 110. *O. latibracteata*
 4b. Leaves 19–35-foliolate; corolla standard 1.4–2 cm and apex emarginate, keel beak 1–2.5 mm 111. *O. barkolensis*
 2b. Corolla standard (0.9–)1–2.1 cm.
 5a. Calyx 6–7 mm; corolla standard ca. 1 cm, keel beak 0.5–1 mm 118. *O. qingnanensis*
 5b. Calyx (6–)8–12 mm; corolla standard (0.9–)1–2.1 cm, keel beak (0.8–)1–4 mm.
 6a. Beak of corolla keel 3–4 mm 114. *O. pseudocoerulea*
 6b. Beak of corolla keel 0.8–1.5 mm.
 7a. Leaves 3–4 cm, 9- or 11-foliolate 117. *O. reniformis*
 7b. Leaves 10–35 cm, 21–41-foliolate.
 8a. Leaflet blades oblong-ovate to lanceolate; peduncle erect; legume erect-ascending; corolla standard apex emarginate 115. *O. songarica*
 8b. Leaflet blades oblong, lanceolate, elliptic, obovate, or oblong-lanceolate; peduncle erect-ascending; legume declining; corolla standard apex rounded 116. *O. mollis*

110. *Oxytropis latibracteata* Jurtzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 19: 269. 1959.

宽苞棘豆 kuan bao ji dou

Herbs, 10–25 cm tall, acaulescent, from a simple or branched caudex, clothed with marcescent leaf bases and stipules. Stipules ovate to broadly lanceolate, ca. 1.1 cm, membranous, with spreading long trichomes, apex acute. Leaves (3–)10–25 cm; leaflets (13 or)15–23, opposite or sometimes alternate; leaflet blades elliptic, narrowly ovate, or lanceolate, 6–29 × 3–5 mm, sericeous. Racemes rather dense, 5–13-flowered or more, with dense black short trichomes; peduncle (4–)6–25 cm, as long as to longer than leaves, sulcate, with dense short trichomes; bracts elliptic, 8–18 × 2–6 mm, papery, sericeous with appressed black short trichomes intermixed, base rounded, apex acuminate. Calyx cylindric, (9–)11–13 × ca. 3 mm, with dense black and white short trichomes; lobes subulate to triangular, 1.3–3.5 mm. Corolla bluish purple to pale purple; standard 2.1–2.7 cm, lamina narrowly elliptic, apex rounded; wings 1.7–1.9 cm, lamina obliquely obtriangular, apex rounded or obliquely emarginate; keel 1.6–1.7 cm, beak 1–1.5

mm. Legume sessile, ovoid-ellipsoid, ca. 1.5 × 0.6 cm, leathery, pubescent. Fl. and fr. Jul–Aug.

- Sunny slopes, *Betula* forests, hillsides, alpine steppes, grasslands, floodplains, among shrubs; 1700–3800 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang.

- 1a. Leaflet blades 0.6–1.7 cm; bracts 8–11 × ca. 2 mm, shorter than calyx; corolla standard ca. 2.1 cm 110a. var. *latibracteata*
 1b. Leaflet blades to 2.9 cm; bracts 14–18 × ca. 6 mm, longer than calyx; corolla standard to 2.7 cm 110b. var. *longibracteata*

110a. *Oxytropis latibracteata* var. *latibracteata*

宽苞棘豆(原变种) kuan bao ji dou (yuan bian zhong)

Leaflet blades 0.6–1.7 cm. Bracts 8–11 × ca. 2 mm, shorter than calyx. Corolla standard ca. 2.1 cm. Fl. Jul–Aug, fr. Jul–Aug. $2n = 16^*$.

- Sunny slopes, *Betula* forests, hillsides, alpine steppes, grass-

lands, floodplains; 1700–3800 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang.

110b. *Oxytropis latibracteata* var. *longibracteata* Y. H. Wu, Acta Phytotax. Sin. 35: 352. 1997.

长宽苞棘豆 chang kuan bao ji dou

Leaflet blades to 2.9 cm. Bracts 14–18 × ca. 6 mm, longer than calyx. Calyx lobes to ca. 5 mm. Corolla standard to 2.7 cm. Fl. Aug, fr. Aug.

- Among shrubs; 3500–3700 m. Qinghai (Gonghe).

111. *Oxytropis barkolensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 65. 1999.

八里坤棘豆 ba li kun ji dou

Oxytropis flavovirens H. Ohba, S. Akiyama & S. K. Wu.

Herbs, to 35 cm tall, caulescent or essentially acaulescent, from a shortly branched multiheaded caudex, tufted, perennial. Stipules narrowly triangular with a subulate free part, 1.8–2.5 cm × ca. 3 mm, villous, basally connate. Leaves subglabrous, 10–30 cm, 19–35-foliolate; leaflet blades narrowly ovate to lanceolate, 5–12 × 3–5 mm, both surfaces white villous, abaxially more densely villous than adaxially. Racemes 1.5–7 cm but elongating in fruit, compact to lax, 5–12-flowered; peduncle (5.6–)8.5–26(–35) cm, much longer than leaves; bracts triangular, 6–7 × ca. 3 mm, shorter than calyx tube, pubescent. Calyx campanulate, 8–10 × ca. 4 mm, with whitish and blackish trichomes; lobes subulate, 4–5 × ca. 0.5 mm, as long as tube. Corolla purple (when dry) or rarely white; standard 1.4–2 cm, lamina ovate, apex emarginate; wings 1.3–1.7 cm, apex emarginate; keel 1.2–1.3 cm, beak 1–2.5 mm. Legume sessile, subcylindric, to 2.5 cm including a slender beak to 5 mm. Fl. Jun–Jul, fr. Jul.

- Alpine meadows, hillsides, *Juniperus centrasiatica* forest margins, exposed grasslands, dry slopes, riversides; 2000–3400 m. Xinjiang.

112. *Oxytropis grandiflora* Candolle, Astragalogia, 71. 1802.

大花棘豆 da hua ji dou

Astragalus grandiflorus Pallas, Sp. Astragal. 57. 1800, not Linnaeus (1753); *Oxytropis collina* Turczaninow.

Herbs, 20–40 cm tall, acaulescent, from a branching caudex, clothed with marcescent leaf bases and stipules, with appressed white but fading yellow trichomes. Stipules broadly ovate, with dense white trichomes. Leaves 5–25 cm, 15–29-foliolate; leaflet blades oblong-lanceolate to rarely orbicular-ovate, 1–2.5 × 0.5–0.7 cm, both surfaces white sericeous, base rounded, apex acute. Racemes compact, many flowered; peduncle 10–30 cm, longer than leaves; bracts lanceolate to oblong-obovate, 0.7–1.3 cm, with appressed trichomes, apex acuminate. Calyx slightly purple, tubular, 1–1.4 cm; lobes triangular-lanceolate, 1–3 mm. Corolla purple to bluish purple; standard 2.3–3 cm, lamina broadly ovate, apex rounded; wings ca. 2 cm, lamina obliquely obtriangular, apex rounded or emarginate; keel ca. 1.7 cm, beak 2–3 mm. Legume sessile, cylindrical to lanceolate-cylindric, 2–3 × 0.4–0.8 cm, leathery, 2-locular, with appressed white trichomes intermixed with black trichomes,

septum wide, adaxial suture deeply grooved, beak long. Fl. Jun–Jul, fr. Jul–Aug. $2n = 32$.

Prairies on S-facing hillsides, hillsides, gravelly areas, forest margins, grasslands; 800–1700 m. Hebei, Jilin, Nei Mongol, Ningxia [Mongolia, Russia (Siberia)].

113. *Oxytropis qilianshanica* C. W. Chang & C. L. Zhang ex X. Y. Zhu & H. Ohashi, Cathaya 11–12: 154. 2000.

祁连山棘豆 qi lian shan ji dou

Herbs, (4.5–)9–22 cm tall, acaulescent, from a simple or multiheaded caudex. Stipules triangular, 5–13 mm, membranous to herbaceous, basal ca. 1/3 adnate to petiole, distinct, apex acuminate, with spreading sparse white long trichomes. Leaves (4–)6–15 cm, 19–29-foliolate; leaflet blades narrowly ovate, 5–10 × 3–5 mm, with appressed dense pale yellow and white trichomes, base rounded, margin ciliate, apex acute. Racemes compact, 5–14-flowered, elongating after anthesis; peduncle (2.5–)11–19(–30) cm, mainly longer than leaves, erect, sulcate, with white long trichomes apically intermixed with black ones; bracts narrowly lanceolate, ca. 4 × 1 mm, herbaceous, pubescent, apex acuminate. Calyx campanulate, 5–6 × ca. 2 mm, with white and black long trichomes intermixed; lobes subulate, 3–4 mm. Corolla blue; standard 6–8 mm, apex emarginate; wings 6–8 mm, lamina elliptic; keel 5–6 mm, beak 0.3–0.5 mm. Legume shortly stipitate; stipe ca. 1 mm; body brown, cylindric, ca. 13 × 4 mm, pendulous, leathery, 1-locular. Fl. Jun–Jul, fr. Jul–Aug.

- Forests, riverbanks, dry hillsides and grasslands, along roadsides; 2300–5100 m. Gansu, Qinghai, Xizang.

114. *Oxytropis pseudocerulea* P. C. Li, Acta Bot. Yunnan. 11: 300. 1989.

假蓝花棘豆 jia lan hua ji dou

Herbs, acaulescent, 15–25 cm tall, from a multiheaded caudex, laxly caespitose. Caudex branches covered with marcescent stipules. Stipules lanceolate, ca. 1 cm, herbaceous, densely appressed whitish villous, basal part adnate to petiole. Leaves 10–14 cm; leaflets 17–29, alternate or opposite; leaflet blades oblong-lanceolate to lanceolate, 8–12 × 4–5 mm, abaxially densely white villous, adaxially laxly white villous, base rounded, apex acuminate. Racemes oblong, many flowered; peduncle much longer than leaves, densely villous; bracts lanceolate-elliptic, 4–5 mm, densely pilose. Calyx tubular-campanulate, 9–10 mm, densely pilose; lobes linear-subulate, shorter than to rarely as long as tube. Corolla bluish purple; standard 1.3–1.4 × 0.7–0.8 cm, lamina broadly oblong, apex rounded; wings 1.2–1.3 × 0.4–0.5 cm, apex emarginate; keel ca. 1 cm, beak 3–4 mm. Ovary 2.5–3 mm, glabrous. Legume shortly stipitate; body oblong, 1.5–1.8 × ca. 0.5 cm, subleathery, 1-locular, densely pubescent, apex contracted into a long beak. Fl. and fr. May–Jul.

- Grasslands, shrubby slopes; 2000–3800 m. Sichuan, Xinjiang, Xizang.

115. *Oxytropis songarica* (Pallas) Candolle, Astragalogia, 73. 1802.

准噶尔棘豆 zhun ga er ji dou

Astragalus songaricus Pallas, Sp. Astragal. 63. 1800.

Herbs, 20–40 cm tall, acaulescent, from a thickened short branching multiheaded caudex, tuft-forming, sericeous-villous. Stipules broadly ovate, 1–1.2 cm, scarious, coarsely white pilose, 1- or 2-veined, basally adnate to petiole, connate and amplexicaul. Leaves 10–35 cm, 21–39(or 41)-foliolate; petiole and rachis with appressed trichomes; leaflet blades oblong-ovate to lanceolate, 1–2 × 0.3–0.8 cm, both surfaces white sericeous with appressed dense trichomes. Racemes rather lax, several to many flowered, elongating 8–10 cm in fruit; peduncle 7–38 cm, longer than leaves, erect, round, without grooves, covered with white soft trichomes; bracts lanceolate, 7–9 mm, with white trichomes, apex obtuse. Calyx cylindrical, 0.9–1.2 cm, covered with spreading white and black long trichomes; lobes lanceolate, 1–2.2 mm. Corolla purple; standard 1.7–2.1 cm, lamina ovate, apex slightly emarginate; wings 1.5–2 cm, apically broadening; keel 1.8–2 cm, beak ca. 1 mm. Legume sessile or substipitate; stipe to 0.5 mm; body ovoid to lanceolate-ovoid, 1.2–2 × 0.6–0.8 cm, erect-ascending, inflated, pilosulose, beaked. Fl. and fr. Jul–Aug.

• Grasslands and gravelly dry slopes, alpine and subalpine meadows; 1300–2800 m. Xinjiang.

116. *Oxytropis mollis* Royle ex Benth in Royle, Ill. Bot. Himal. Mts. 198. 1835.

软毛棘豆 ruan mao ji dou

Oxytropis iridum Dickoré & Kriechbaum.

Herbs, 15–30 cm tall, shortly caulescent, from a simple or multiheaded caudex, with 1–2 or more apparent internodes, tuft-forming. Stipules lanceolate, 1.4–1.7 cm, papery, with spreading dense trichomes, basally adnate to petiole. Leaves 10–22 cm, 23–31-foliolate; petiole and rachis with spreading dense white long and black short trichomes; leaflet blades oblong, lanceolate, elliptic, obovate, or oblong-lanceolate, 0.7–2.5 × 0.2–0.8 cm, both surfaces with spreading dense white long trichomes, apex acute to subtruncate. Racemes many flowered; peduncle 7–27 cm, shorter to longer than leaves, erect-ascending, with dense white and black trichomes; bracts linear, 4–6 mm. Calyx 6.3–10 mm, with dense black and white long trichomes; lobes 1.5–4 mm. Corolla purple, rarely white or fading to cream; standard 0.9–1.7 cm, lamina suborbicular to broadly ovate, apex rounded; wings 0.8–1.5 cm, apex rounded; keel 0.7–1.4 cm, beak 0.8–1.5 mm. Legume stipitate; stipe ca. 3 mm; body cylindrical, ca. 1.5 × 0.5 cm, declining, 1-locular, with dense black short trichomes, septum ca. 0.5 mm wide, adaxial suture grooved, beak ca. 3 mm. Fl. and fr. May–Sep.

Floodplains near fields; 2700–3400 m. Xizang [India, Kashmir, Nepal, Pakistan].

117. *Oxytropis reniformis* P. C. Li, Acta Phytotax. Sin. 18: 370. 1980.

肾瓣棘豆 shen ban ji dou

16. *Oxytropis* sect. *Sericopetalae* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 9: 40. 1989 [*“Sericopetala”*].

毛瓣棘豆组 mao ban ji dou zu

Herbs, acaulescent (but shortly caulescent in *Oxytropis parasericeopetala*). Leaves imparipinnate; petioles and rachises densely

Herbs, 3–7 cm tall, acaulescent, from a multiheaded caudex. Caudex branches clothed with marcescent stipules and leaf bases, with sparse white long trichomes. Stipules with an ovate-lanceolate distinct part, free from petiole, connate to middle. Leaves 3–4 cm, 9- or 11-foliolate; petiole and rachis with spreading white long trichomes; leaflet blades oblong to lanceolate-oblong, 4–7 × 1.5–2 mm, abaxially almost glabrous but midvein and margin with sparse long trichomes, adaxially densely appressed pubescent, apex acute. Racemes 5–7-flowered; peduncle as long as leaves, with spreading dense white long trichomes and basally with dense black and white long trichomes. Calyx cylindrical, 8–10 mm, with appressed white and black long trichomes; lobes subulate, shorter than tube. Corolla blue; standard 1.1–1.3 cm, lamina orbicular-reniform, apex emarginate; wings 0.9–1.1 cm, lamina obovate-oblong, apex emarginate; keel slightly shorter than wings, beak subulate and ca. 1.5 mm. Legume stipitate; stipe ca. 2 mm; body cylindrical, 10–12 × ca. 4 mm, with sparse white and black short trichomes. Fl. and fr. Jun–Aug.

• Grasslands on mountain slopes; 4300–4600 m. Xizang.

118. *Oxytropis qingnanensis* Y. H. Wu, Acta Bot. Yunnan. 19: 36. 1997 [*“qinghaiensis”* and *“qingnanensis”*].

囊谦棘豆 nang qian ji dou

Oxytropis nangqianensis X. Y. Zhu, nom. illeg. superfl.

Herbs, 10–16 cm tall, acaulescent. Stipules with a triangular-lanceolate distinct part, 0.6–1.3 cm, adnate to petiole in basal ca. 1/3, connate. Leaves 3–10 cm, 15–23-foliolate; petiole and rachis with appressed to spreading sparse white trichomes; petiole 1–5 cm; leaflet blades ovate, oblong, or ovate-lanceolate, 3–13 × 2.5–5 mm, both surfaces with appressed white trichomes, base rounded, apex acute. Racemes dense, many flowered; peduncle 10–14 cm, slightly longer than or subequal to leaves, with spreading long trichomes basally intermixed with dense short trichomes; bracts linear, 4–6 mm, white pilose. Calyx subcylindrical, 6–7 mm, with intermixed dense black short and white long trichomes; lobes subulate, shorter than to almost as long as tube. Corolla bluish purple; standard ca. 1 cm, lamina ovate and 7–8 mm wide, apex emarginate; wings ca. 1 cm, lamina obliquely narrowly obovate and 3–4 mm wide, apex emarginate; keel ca. 8 mm, beak 0.5–1 mm. Legume sessile, pale brown, cylindrical, 8–10 × 3–4 mm, leathery, sparsely pubescent, beak ca. 1.5 mm. Fl. and fr. Jun–Sep.

• Near alpine forests; 3900–4100 m. Qinghai.

The specific epithet was spelled both *“qinghaiensis”* and *“qingnanensis”* in the protologue (heading and figure caption on p. 36, Feb 1997). Later, in the same volume, this was corrected to *Oxytropis qingnanensis* (p. 223, Jun 1997). The name *O. nangqianensis* X. Y. Zhu (Cathaya 11–12: 154. 2000) was published as a nomen novum in the mistaken belief that its replaced synonym was an illegitimate later homonym of *O. qinghaiensis* Y. H. Wu (1996); see the comments under that species (p. 475). In fact, the name *O. nangqianensis* was nomenclaturally superfluous when published and is therefore illegitimate.

white sericeous-villous; leaflets not verticillate; leaflet blades whitish gray villous. Racemes subcapitate, many flowered. Corolla purple, blue, or white; standard and keel sericeous on outside surfaces. Legume narrowly ellipsoid, ellipsoid-ovoid, or ovoid, 1-locular, densely sericeous-villous.

- Three species: China.

- 1a. Corolla white; leaflet blades narrowly elliptic; calyx lobes 3–4 mm 119. *O. lhasaensis*
 1b. Corolla purple, bluish purple, violet, blue, or rarely white; leaflet blades oblong, elliptic, or ovate-lanceolate; calyx lobes 4.5–9 mm.
 2a. Plants 10–35 cm tall; calyx lobes 4.5–5 × ca. 1.2 mm 120. *O. sericopetala*
 2b. Plants 7–9 cm tall; calyx lobes 7–9 × ca. 3 mm 121. *O. parasericeopetala*

119. *Oxytropis lhasaensis* X. Y. Zhu, Ann. Bot. Fenn. 41: 495. 2004.

拉萨棘豆 *la sa ji dou*

Herbs, 10–11 cm tall, acaulescent, from a multiheaded caudex. Stipules triangular, 7.5–10 × 3.5–4.5 mm, herbaceous, with appressed white long trichomes, basally adnate to petiole, apical ca. 2/3 free. Leaves 4–7 cm, 9–17-foliolate; leaflet blades appressed silvery or buff-colored tomentose; young leaflet blades sessile, narrowly elliptic to linear, 7–15.5 × 1–2 mm, usually conduplicate; mature leaflet blades with a 2–3 mm petiolule, narrowly elliptic, 11.5–21 × 1.7–2.5 mm, sometimes with glands. Racemes elongate, lax, many flowered; peduncle 7–12 cm; bracts subulate, 3–4 × ca. 0.2 mm, with appressed white trichomes. Calyx campanulate, 6–8 × ca. 3 mm, with white trichomes; tube 3–4 mm; lobes subulate, 3–4 × 0.2–0.3 mm. Corolla white; standard 10–11 × 6–7 mm, lamina suborbicular, 6–7 × 6–7 mm, and outside densely sericeous, apex slightly emarginate; wings 9–10 mm, lamina obovate, apex rounded; keel 6.5–7.5 mm, sericeous outside near tip, beak 0.2–0.5 mm. Legume unknown. Fl. Aug.

- Sandy riverbanks; ca. 3700 m. Xizang (Lhasa).

120. *Oxytropis sericopetala* Prain ex C. E. C. Fischer, Bull. Misc. Inform. Kew 1937: 95. 1937.

毛瓣棘豆 *mao ban ji dou*

Herbs, 10–35 cm tall, acaulescent, from a branching caudex, tufted, sometimes with persistent petioles and peduncles of previous seasons, ± grayish. Stipules narrowly elliptic, 8–15 × 2.5–3 mm, silvery or buff-colored villous, apex acuminate. Leaves 7–20 cm, 13–31-foliolate; leaflets sessile or subsessile; leaflet blades elliptic to ovate-lanceolate, 0.6–2.5 × 0.2–0.7 cm, both surfaces silvery or buff-colored tomentose, apex acute. Racemes many flowered; peduncle 18–25 cm, usually longer

than leaves, silvery or buff-colored villous-tomentose; bracts linear, 2.5–3 × 1–1.5 mm, villous, apex acuminate. Calyx cylindrical, 8–10 × 2–4 mm, silvery villous; tube ca. 3.5 × 1–2 mm; lobes linear, 4.5–5 × ca. 1.2 mm. Corolla purple, bluish purple, violet, blue, or rarely white; standard 0.9–1.2 cm, lamina obcordate, 8–10 × 6–7 mm, and outside sericeous-villous; wings 1–1.2 cm, apex rounded; keel 8–10 mm, beak ca. 0.3 mm. Legume shortly stipitate; body ellipsoid-ovoid, 6–7 × 4–5 mm, slightly inflated, densely whitish villous. Fl. Jun–Sep, fr. Aug–Sep. $2n = 16^*$.

- Sandy sites and sand dunes, hills, grasslands, gravelly flooded places; 2600–4600 m. Xizang.

121. *Oxytropis parasericeopetala* P. C. Li, Acta Phytotax. Sin. 18: 369. 1980.

长萼棘豆 *chang e ji dou*

Herbs, 7–9 cm tall, shortly caulescent, from a multiheaded caudex. Stipules membranous, densely white tomentose, free from petiole, basal half connate, apex acute. Leaves 3–5 cm, 7–15-foliolate; petiole and rachis densely white tomentose; leaflet blades oblong to ovate-lanceolate, 8–12 × 4–6 mm, both surfaces densely white tomentose. Racemes subcompact, many flowered; peduncle shorter than to as long as leaves, densely white tomentose; bracts linear, almost as long as calyx. Calyx 1–1.2 cm, with dense white and black long trichomes; lobes linear, 7–9 × ca. 3 mm, ca. 2 × as long as tube. Corolla purple; standard 1.8–2 cm, lamina subelliptic and outside white or pale yellow sericeous; wings slightly shorter than keel, outside sericeous or glabrous; keel outside densely sericeous. Legume stipitate; body ovoid, 7–9 × 4–6 mm, with dense white and black short trichomes. Fl. and fr. Aug–Sep.

- Valley grasslands; 4500–5000 m. Xizang (Lhasa).

17. *Oxytropis* sect. *Orobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 73. 1874.

大花棘豆组 *da hua ji dou zu*

Herbs, 3–25 cm tall, acaulescent. Leaves imparipinnate; leaflets not verticillate; leaflet blades pubescent on both surfaces but often adaxially sparingly so. Racemes 2–11-flowered or more; peduncle 2–15(–18) cm. Corolla of various colors, 0.5–2 cm. Legume subsessile or with a stipe to 5 mm; body cylindrical, ovoid, or oblong-ovoid, 0.5–4 cm, erect, exerted from calyx, 1-locular to nearly 2-locular, with developed abaxial and adaxial (or only adaxial) septa.

- About 70 species: Asia, Europe, North America; seven species (two endemic) in China.

- 1a. Corolla white or yellow, sometimes purplish violet, standard 1.7–2 cm; leaves 19–25 cm 122. *O. argentata*
 1b. Corolla purple, pale pink, blue, bluish purple, violet, or white, standard 0.5–1.3(–2) cm; leaves 1.5–12 cm.
 2a. Calyx ca. 3 mm; peduncle shorter than leaves; legume sessile 123. *O. malloryana*
 2b. Calyx 3–12 mm; peduncle longer than leaves; legume with a stipe ca. 5 mm or less.

- 3a. Corolla standard 1.5–2 cm; legume stipe ca. 5 mm 127. *O. rupifraga*
 3b. Corolla standard 0.5–1.3 cm; legume stipe 3 mm or less.
 4a. Corolla standard 0.9–1.3 cm, wings apically rounded 128. *O. immersa*
 4b. Corolla standard (0.5–)0.6–1 cm, wings apically emarginate.
 5a. Peduncle 4–15 cm, 3–4 × as long as leaves; legume 10–15 mm; corolla standard with apex rounded 124. *O. lehmannii*
 5b. Peduncle 1.8–15 cm, not more than 2 × as long as leaves; legume 5–8 mm; corolla standard with apex emarginate or emarginate to rounded.
 6a. Peduncle 1.8–3.5 cm, less than 2 × as long as leaves; leaves 0.5–3 cm 125. *O. savellanica*
 6b. Peduncle 4–15 cm, to 2 × as long as leaves; leaves 2–12 cm 126. *O. proboscidea*

122. *Oxytropis argentata* (Pallas) Persoon, Syn. Pl. 2: 331. 1807.

斋桑棘豆 zhai sang ji dou

Astragalus argentatus Pallas, Sp. Astragal. 60. 1800; *Oxytropis argyraea* Candolle; *O. argyrophylla* Ledebour; *O. recognita* Bunge.

Herbs, 10–15(–20) cm tall, acaulescent, from a multiheaded long-branched caudex. Caudex clothed with persistent petioles and sericeous trichomes. Stipules ovate, membranous, with sparse white trichomes, basal half adnate to petiole and connate. Leaves 3–12(–15) cm, (9–)19–25(–31)-foliolate; petiole and rachis with appressed trichomes; leaflet blades oblong to ovate-lanceolate, 5–10(–15) × 2–5 mm, with appressed white trichomes. Racemes lax, many flowered; peduncle as long as to longer than leaves, erect, with appressed to spreading white trichomes; bracts lanceolate, almost as long as calyx tube, with white and black trichomes. Calyx broadly cylindric, 8–10(–12) mm, with appressed black and spreading white trichomes; lobes lanceolate to subulate, 1/3–1/2 as long as tube. Corolla white or yellow, sometimes purplish violet; standard 1.7–2 cm, lamina obovate, apex emarginate; wings 1.3–1.6 cm; keel shorter than wings, beak 1–1.5 mm. Legume sessile, ovoid-oblong, 1.7–2.5 × 0.4–0.7 cm, adaxial suture deeply grooved, beak 5–7 mm. Fl. May–Jul, fr. May–Aug.

Shrublands, gravelly slopes. Xinjiang [Russia (Siberia)].

123. *Oxytropis malloryana* Dunn, Bull. Misc. Inform. Kew 1927: 250. 1927.

马老亚纳棘豆 ma lao ya na ji dou

Herbs, 3–5 cm tall, acaulescent, with sparse white trichomes. Stipules ovate to lanceolate, ca. 5 mm, adnate to petiole base, margin membranous and ciliate, apex obtuse. Leaves 3–5 cm, 21–25-foliolate; petiole 1–2 cm; leaflet blade oblong-ovate, ca. 3 mm, margin slightly involute, apex obtuse. Racemes compact, 4- or 5-flowered; peduncle shorter than leaves; bracts lanceolate, shorter than calyx. Calyx campanulate, ca. 3 mm; tube ca. 2 mm; lobes lanceolate, ca. 1 mm. Corolla purple to violet; standard ca. 6 mm, lamina ovate; wings as long as standard; keel shorter than wings, apex acutely rostrate. Legume sessile, linear, 1–4 cm, 1-locular, adaxial suture intruded. Fl. and fr. Apr–Jun.

• Stony S-facing slopes; 3800–4600 m. Xizang.

124. *Oxytropis lehmannii* Bunge, Arbeiten Naturf. Vereins Riga 1: 225. 1847.

等瓣棘豆 deng ban ji dou

Oxytropis aequipetala Bunge.

Herbs, 5–20 cm tall, acaulescent, from a multiheaded caudex, pubescence short. Stipules with a lanceolate-subulate distinct part, 5–6 mm, subleathery, densely sericeous and sometimes also with sparse black trichomes, adnate to petiole, basal half connate. Leaves 2–6 cm, 9–31-foliolate; petiole and rachis densely sericeous; leaflets closely arranged; leaflet blades lanceolate, oblong, or elliptic, 1.5–12 × 0.3–4 mm, both surfaces appressed sericeous, apex acute. Racemes 8–11-flowered; peduncle 4–15 cm, 3–4 × as long as leaves, erect to diffuse, with appressed sparse white and black trichomes. Calyx broadly cylindric, 3.5–6(–8) mm, with appressed white and black short trichomes; lobes subulate, 0.8–1.2 mm, ca. 1/2 as long to as long as tube. Corolla purple and pale pink; standard 6–11 mm, lamina orbicular, apex rounded; wings as long as standard, lamina oblong, apex emarginate; keel as long as wings, beak ca. 1 mm. Legume stipitate; stipe ca. 3 mm; body cylindric to ovoid, 10–15 × 3–3.5 mm, slightly flattened, 1-locular, with appressed dense white short trichomes, sometimes with black trichomes intermixed, septum absent, abaxial suture round, adaxial suture concave, beak ca. 1 mm. Fl. Jun–Jul, fr. Jul–Sep. $2n = 16$.

Gravelly alpine meadows, grasslands on hillsides; 2000–4800 m. Xizang [Tajikistan, Uzbekistan].

125. *Oxytropis savellanica* Bunge ex Boissier, Fl. Orient. 2: 503. 1872.

伊朗棘豆 yi lang ji dou

Oxytropis carduchorum Hedge.

Herbs, 3–5 cm tall, acaulescent, from a multiheaded caudex, matlike or cushionlike, with appressed white trichomes. Stipules triangular-ovate, 3–4 mm, herbaceous, glabrous, subglabrous, or with sparse trichomes, adnate to petiole, basally connate, margin ciliate. Leaves 0.5–3 cm, (7–)11–23-foliolate; leaflet blades oblong to elliptic, 1.5–5 × 0.3–2 mm, both surfaces with appressed white trichomes, apex retuse to acute. Racemes capitate, (1 or)2–8-flowered; peduncle 0.8–3.5 cm, mostly longer than leaves, with appressed black and white trichomes; bracts linear to narrowly lanceolate, 1–1.5 mm, with sparse trichomes. Calyx broadly cylindric, 3–5 mm, with appressed white and black trichomes; lobes subulate, 0.8–1.8 mm. Corolla purple; standard 6–10 mm, lamina suborbicular, apex emarginate; wings 5.5–6.3 mm, oblong, slightly shorter than standard, apex emarginate; keel 5.2–6 mm, beak 0.5–1 mm. Legume shortly stipitate; body broadly cylindric, 7–8 × 2–3 mm, slightly inflated, with appressed trichomes, beak ca. 1 mm. Fl. Jul–Aug, fr. Aug–Sep. $2n = 16$.

Rocky N slopes, in *Carex moorcroftii* grasslands, gravelly areas; 3500–5100 m. Qinghai, Xizang [Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

126. *Oxytropis proboscidea* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 17. 1874.

冰川棘豆 bing chuan ji dou

Oxytropis glacialis Bentham ex Bunge; *O. nivalis* Franchet.

Herbs, 3–17 cm tall, acaulescent, from a multiheaded caudex, densely cinereous pubescent. Stipules ovate, membranous, densely sericeous with long trichomes, free from petiole, basally connate. Leaves 2–12 cm, 9–19-foliolate; rachis with small glands; leaflet blades oblong to oblong-lanceolate, 3–10 × 1.5–3 mm, sericeous with spreading long trichomes. Racemes compact, 6–10-flowered; peduncle 4–15 cm, equaling to much longer than leaves, with dense white and black incurved trichomes; bracts linear, slightly shorter than calyx tube, with sparse white and black trichomes. Calyx 4–6 mm, with dense black or white trichomes intermixed with black long trichomes; lobes lanceolate, shorter than tube. Corolla purple, bluish purple, or seldom white; standard 5–9 × ca. 5 mm, lamina orbicular, apex emarginate to rounded; wings ca. 7 mm, lamina obovate to oblong, apex emarginate; keel ca. 6 mm, beak subtriangular, very short. Legume shortly stipitate; body ovoid to oblong-ovoid, 5–7 × 4–6 mm, inflated, membranous, 1-locular, with spreading dense white long and black short trichomes, septum absent, adaxial suture emarginate, beak erect. Fl. and fr. Jun–Sep.

• Desert grasslands, gravelly areas, lakeshores, sunny dry slopes, floodplains, cold meadows, sand dunes; 4100–5300 m. Gansu, Xinjiang, Xizang, Yunnan.

127. *Oxytropis rupifraga* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 24. 1866.

悬岩棘豆 xuan yan ji dou

Herbs, 4–9 cm tall, acaulescent, from a branching multi-headed caudex, appressed white villous-sericeous. Stipules ovate-oblong, membranous, villous-sericeous, adnate to petiole, basally connate. Leaves 2–6 cm, 15–21-foliolate; petiole and rachis densely villous-sericeous; leaflets densely arranged; leaf-

let blades ovate to oblong, 2–5 × 1–2 mm, both surfaces densely white villous-sericeous. Racemes dense, 5–7-flowered; peduncle 4–6 cm, as long as to longer than leaves, with white and black trichomes intermixed; bracts lanceolate, 3–8 mm, with black and white trichomes intermixed on apical part. Calyx broadly cylindrical, 0.8–1.2 cm, with trichomes like those on bracts; lobes lanceolate, 4–5 mm. Corolla blue to bluish purple; standard 1.5–2 cm, lamina almost orbicular, apex emarginate to 2-lobed; wings 1.1–1.6 cm, lamina apex emarginate; keel 1–1.3 cm, beak ca. 1 mm. Legume stipitate; stipe ca. 5 mm; body oblong, oblong-ovoid, or ovoid, 1.5–3 × 0.5–0.7 cm, 1-locular, with appressed white trichomes, beak erect. Fl. Jun–Jul, fr. Jul–Aug.

Gravelly hilltops; ca. 1700 m. Xinjiang [Kyrgyzstan].

128. *Oxytropis immersa* (Baker ex Aitchison) Bunge ex B. Fedtschenko, Beih. Bot. Centralbl. 21: 212. 1907.

和硕棘豆 he shuo ji dou

Astragalus immersus Baker ex Aitchison, J. Linn. Soc., Bot. 18: 45. 1880; *Oxytropis incanescens* Freyn; *O. pamirica* Danguy.

Herbs, 4–11 cm tall, acaulescent, from a multiheaded caudex, cushion- or mat-forming, with whitish trichomes. Stipules narrowly triangular, 5–6 × ca. 3 mm, membranous, basally connate. Leaves (0.8–)2–8 cm, 15–21-foliolate; leaflet blades ovate, 1–5 × 1–2 mm, both surfaces with appressed trichomes. Racemes compact, few to ca. 10-flowered; peduncle 4–10 cm, as long as or somewhat longer than leaves, with appressed trichomes; bracts triangular, 2–3 × ca. 1 mm, scarious, pubescent. Calyx broadly cylindrical, 3–7 × ca. 1 mm, with whitish and blackish trichomes; lobes subulate, 1–3 × ca. 0.5 mm, ca. 1/2 as long as tube. Corolla violet to purple; standard 0.9–1.3 cm, lamina orbicular, apex emarginate; wings ca. 9.5 mm, lamina obovate, apex rounded; keel as long as wings, beak ca. 1 mm. Legume stipitate; stipe 2–3 mm; body cylindrical, 10–18 × 4–7 mm, with appressed blackish and whitish trichomes, beak 1–2 mm. Fl. and fr. Aug.

Sunny gravelly hill slopes, alpine meadows; 3600–4200 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

18. *Oxytropis* sect. *Neimonggolicae* X. Y. Zhu & H. Ohashi, Cathaya 11–12: 161. 2000 [*“Neimonggolica”*].

内蒙古棘豆组 nei meng gu ji dou zu

Herbs, acaulescent, from a simple or branched caudex, compactly caespitose. Leaves 1-foliolate; leaflet borne on a short to elongate petiole. Racemes 1- or 2-flowered; peduncle obsolete or present and shorter than leaves. Legume sessile, spherical-ovoid (unknown in *Oxytropis monophylla*).

Two species: China, Mongolia; two species (one endemic) in China.

1a. Petiole 2–5 cm; corolla light yellow, yellow, yellowish green, red, whitish green, or white; ovary

pubescent 129. *O. neimonggolica*

1b. Petiole 0.5–1 cm; corolla purple; ovary glabrous 130. *O. monophylla*

129. *Oxytropis neimonggolica* C. W. Chang & Y. Z. Zhao, Acta Phytotax. Sin. 19: 523. 1981.

内蒙古棘豆 nei meng gu ji dou

Herbs, 3–9 cm tall, acaulescent, from a simple or multi-headed caudex, with a thatch of marcescent leaf bases. Stipules narrowly triangular, ca. 4 × 2–3 mm, membranous, whitish villous, basally connate. Leaves 3–6.5 cm, 1-foliolate; petiole 2–5

cm; leaflet blade lanceolate to elliptic, ca. $3.2 \times 0.6\text{--}0.8$ cm, densely whitish sericeous. Racemes 1- or 2-flowered; peduncle 1–2 cm, shorter than leaves, whitish villous with long trichomes; bracts triangular, ca. 3×1 mm, whitish villous with long trichomes. Calyx cylindric, $10\text{--}15 \times$ ca. 4 mm, with appressed long whitish trichomes and sometimes also with blackish short trichomes; lobes subulate, $2\text{--}3 \times$ ca. 0.5 mm. Corolla light yellow, yellow, yellowish green, red, whitish green, or white; standard 1.9–2.1 cm, lamina spatulate and ca. 1.4×0.7 cm, apex entire or 2-lobed; wings ca. 1.6 cm, lamina obovate; keel ca. 1.4 cm, beak ca. 0.5 mm. Ovary pubescent. Legume sessile, spherical-ovoid, $1.5\text{--}2 \times 0.8\text{--}1$ cm, inflated, densely whitish villous, apex abruptly beaked. Fl. May–Jun, fr. Jul–Aug.

• Sunny slopes, grasslands, N-facing slopes, *Stipa* community on dry desertic prairie; 1000–2200 m. Nei Mongol.

3. *Oxytropis* subg. *Traganthoxytropis* Vassilczenko in Komarov, Fl. URSS 13: 221. 1948.

猫刺棘豆亚属 *mao ci ji dou ya shu*

Shrublets, usually pulvinate, strongly branching, spiny, tragacanthoid. Racemes 1–5-flowered. Corolla purple or pink. Legume ovoid to subspherical, inflated.

Seven species in two sections: China, Kazakhstan, Mongolia, Russia; three species in two sections in China.

- 1a. Leaves lacking terminal leaflet, rachis apex spinescent; legume nut-form in shape, thickly leathery 19. *O.* sect. *Lycotriche*
 1b. Leaves with a terminal leaflet, rachis ultimately persistent as a thorn; legume vesicular, membranous 20. *O.* sect. *Hystrix*

19. *Oxytropis* sect. *Lycotriche* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 134. 1874.

猫头刺组 *mao tou ci zu*

Shrublets, strongly branched, non-glandular, with appressed silky trichomes often forming pulvinate tufts. Stipules adnate to petiole, connate. Leaves appearing paripinnate by apical leaflet reduced to a spine; petioles and rachis hardened after falling of leaflets and becoming slender spines. Racemes axillary, few flowered; peduncle short. Calyx inflating in fruit, not ruptured by legume. Legume \pm ovoid, thickly leathery, \pm 2-locular.

One species: China, Mongolia, Russia.

131. *Oxytropis aciphylla* Ledebour, Fl. Altaic. 3: 279. 1831.

猫头刺 *mao tou ci*

Oxytropis aciphylla f. *albiflora* Zhao Y. Chang, Z. H. Wu & L. R. Xu; *O. aciphylla* var. *gracilis* Krylov; *O. aciphylla* var. *utriculata* H. C. Fu; *O. kossinskyi* B. Fedtschenko & Basilevskaja; *O. lycotriche* Bunge.

Shrublets, 4–20 cm tall, from a woody base, forming hemispherical cushions. Branchlets bearing persistent leaves modified as thorns. Stipules narrowly triangular, $2\text{--}6 \times$ ca. 3 mm, scarious, connate nearly to apex, margin ciliate. Leaves 2–6 cm, with 4–12 opposite leaflets not including apical spine; pedicel and rachis persistent; leaflet blades linear to narrowly elliptic, $5\text{--}18 \times 1\text{--}2$ mm, apex acuminate and spinescent. Racemes 1- or 2-flowered; peduncle obsolete or to 5 cm; bracts

130. *Oxytropis monophylla* Grubov, Bot. Zhurn. (Moscow & Leningrad) 63: 364. 1978.

单叶棘豆 *dan ye ji dou*

Herbs, 3–8 cm tall, acaulescent, from a multihedged caudex, cushion- or tuft-forming. Stipules obovate, ca. 5 mm, membranous, with white long trichomes, free, basally connate, apex obtuse. Leaves 1-foliolate; petiole 5–10 mm; leaflet blade lanceolate-elliptic, ca. $3.5 \text{ cm} \times 3\text{--}8$ mm, erect, margin entire, base obtuse, apex acute. Flowers solitary, sessile. Calyx cylindric, 0.9–1.4 cm, densely appressed white villous and with white and black trichomes on apical part; lobes triangular-subulate, 2–3 mm. Corolla purple; standard 1.8–2 cm, lamina oblong-obovate; wings ca. 1.5 cm, lamina oblong; keel ca. 1.4 cm, beak short. Ovary glabrous. Legume unknown. Fl. May–Oct.

Deserts; ca. 3700 m. Nei Mongol, Ningxia [Mongolia].

subulate, $3\text{--}5 \times 1\text{--}2$ mm, scarious, pubescent. Calyx cylindric, $8\text{--}14 \times 3\text{--}4$ mm, slightly inflated after anthesis, pilose with whitish and blackish long trichomes or with only whitish long trichomes; lobes subulate, $2\text{--}5 \times$ ca. 0.5 mm. Corolla pink, purple, red, or white; standard 2–2.2 cm, lamina ovate to elliptic, apex rounded; wings 1.8–1.9 cm, lamina obliquely lanceolate, apex rounded; keel 1.4–1.6 cm, beak 1–1.5 mm. Legume ellipsoid, $1\text{--}2.2 \times 0.4\text{--}0.5$ cm, inflated, thickly leathery, \pm 2-locular, with appressed whitish trichomes and sometimes with long whitish trichomes. Fl. May–Aug, fr. Jun–Aug. $2n = 16$.

Sandy areas, stony slopes on hills, gravelly areas on high plains, rocky deserts, N-facing sandy lakeshores, dry hillsides in desert steppes, floodplains in valleys, gravelly and stony areas with *Caragana*; 500–3200 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia, Russia].

20. *Oxytropis* sect. *Hystrix* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 131. 1874.

猬刺棘豆组 *wei ci ji dou zu*

Shrublets, often forming pulvinate tufts, non-glandular, with appressed to spreading trichomes. Leaves imparipinnate; petioles

and rachis hardened after falling of leaflets and becoming slender spines. Racemes axillary, (1 or)2–5-flowered; peduncle shorter to longer than leaves. Calyx not inflating in fruit, ruptured by legume. Legume ovoid to subspherical, membranous.

Five species: China, Kazakhstan, Mongolia; two species in China.

- 1a. Leaves 7–11(or 13)-foliolate; racemes 2–5-flowered; calyx 1–1.4 cm, lobes 2–4 mm 132. *O. tragacanthoides*
 1b. Leaves 19–31-foliolate; racemes 1- or 2-flowered; calyx 0.9–1.1 cm, lobes 1.2–2 mm 133. *O. hystrix*

132. *Oxytropis tragacanthoides* Fischer ex Candolle, Prodr. 2: 280. 1825.

2000–4100 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Kazakhstan, Mongolia].

胶黄耆状棘豆 jiao huang qi zhuang ji dou

Oxytropis paratragacanthoides Vassilczenko.

Shrublets, 25–30 cm in diam., forming hemispherical cushions, branching from a ligneous caudex. Branches 6–10 cm, stout. Stipules narrowly triangular, 3–5 × ca. 3 mm, scarious, basally connate, margin ciliate. Leaves 1–7 cm, 7–11(or 13)-foliolate; rachis persistent, with whitish trichomes, apically spine-bearing; leaflets opposite; leaflet blades ovate, linear, or oblong, 2–15 × 1–2 mm, appressed sericeous, apex acuminate and spinescent. Racemes 2–5-flowered; peduncle 2–5 cm, with dense white trichomes; bracts subulate, 3–5 × ca. 3 mm, scarious, with whitish and blackish trichomes. Calyx cylindric, 10–14 × 3–4 mm, pilose with whitish or sometimes whitish and blackish intermixed long trichomes; lobes subulate, 2–4 × ca. 0.5 mm. Corolla purple, blue, violet-blue, reddish purple, or white; standard 1.8–2.4 cm, lamina obovate to elliptic, apex rounded; wings 1.7–2.3 cm, lamina obliquely obovate, apex rounded; keel 1.9–2.2 cm, beak 1–2 mm. Legume sessile, ovoid to subspherical, 1.7–2.5 × 1–1.2 cm, inflated, ± 2-locular, dense blackish and whitish pilose, septum 1.5–2 mm. Fl. Apr–Aug, fr. Jul–Aug. $2n = 16, 32$.

Floodplains, gravelly hillsides, dry rocky places, dry meadows;

133. *Oxytropis hystrix* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 254. 1842.

猬刺棘豆 wei ci ji dou

Oxytropis spinifer Vassilczenko.

Shrublets, 10–16 cm tall, from a thickened multiheaded caudex, forming a hemispherical cushion. Branches thick and tough. Stipules oblong, scarious, adnate to petiole, basally connate, margin ciliate, apex obtuse. Leaves 2–4 cm, 19–31-foliolate; petiole and rachis persistent, spinescent, with whitish trichomes; leaflets opposite; leaflet blades linear to oblong, 7–8 × 1–1.5 mm, caducous, both surfaces with appressed white trichomes, apex acuminate. Racemes 1- or 2-flowered; peduncle shorter than leaves, with dense whitish trichomes; bracts lanceolate, thinly scarious, with appressed trichomes, apex acute. Calyx tubular, 0.9–1.1 cm, thinly scarious; lobes subulate, 1.2–2 × ca. 0.5 mm. Corolla purple; standard 1.7–2 cm, lamina ovate to elliptic, apex rounded; wings 1.5–1.8 cm, lamina obovate; keel 1.8–1.9 cm, beak 1–2 mm. Legume sessile, ovoid, ca. 2 × 1–1.2 cm, subglabrous with sparse trichomes on abaxial and adaxial sutures, septum ca. 2.5 mm wide, apex acuminate. Fl. Jun–Jul, fr. Aug.

S-facing gravelly slopes in valleys; 2000–4300 m. Xinjiang [Kazakhstan].

141. CHESNEYA Lindley ex Endlicher, Gen. Pl. 1275. 1840.

雀儿豆属 que er dou shu

Zhu Xiangyun (朱相云); Kai Larsen

Spongiocarpella Yakovlev & N. Ulziykhutag.

Plants perennial. Root stout, woody. Stem lignified, short. Leaves imparipinnate, rarely 3-foliolate; stipules herbaceous, adnate to petiole; leaflets entire. Flowers solitary, axillary, rarely 1–4 in a raceme; peduncle with nodes bearing 1 bract. Calyx with 2 bracts at base; tube tubular, gibbous on one side at base, 5-lobed; 2 upper lobes connate, 3 lower lobes free, with brown glands at apex. Corolla yellow or purple; standard suborbicular or oblong, abaxially with dense short appressed hairs, ± longer than wings or keel. Stamens diadelphous; anthers uniform. Ovary sessile; stigma capitate, papillary. Legume oblong to linear, 1-loculed. Seeds reniform. Basic chromosome number $x = 8$.

About 21 species: C and SW Asia, Mediterranean region; seven species (two endemic) in China.

Chesneya dshungarica Goloskokov (Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 117. 1957) was recorded from Xinjiang by Chang Y. Yang (Claves Pl. Xinjiang. 3: 72. 1985). However, the present authors found no relevant specimens and therefore could not substantiate the occurrence of this species in China.

- 1a. Stipules deciduous; plants not cushionlike, with dense whitish appressed hairs; leaflets obovate or obovate-elliptic, apex rounded, emarginate, or truncate; legume 4–6 cm.
 2a. Racemes 1–4-flowered; mature legume glabrous 1. *C. cuneata*
 2b. Flowers solitary; mature legume with dense appressed hairs.
 3a. Leaflets 5–7 × 3–5 mm; pedicels ca. as long as or slightly longer than leaves; legume 35–50 × 4–5 mm 2. *C. crassipes*
 3b. Leaflets 7–15 × 4–10 mm; pedicels ca. as long as or shorter than leaves; legume 50–60 × 9–10 mm 3. *C. acaulis*

- 1b. Stipules persistent; plants cushionlike, with spreading whitish appressed hairs or glabrous; leaflets obovate, elliptic, or suborbicular, apex acute or subrounded; legume shorter than 3 cm.
- 4a. Persistent stipules not becoming spines, darkened when dry, incurved or straight, leaflets without hard spine at apex.
- 5a. Leaflets 19–41, glabrous, base conspicuously oblique 4. *C. polystichoides*
- 5b. Leaflets 15–21, both surfaces with dense spreading appressed hairs, base rounded or slightly so 5. *C. nubigena*
- 4b. Persistent stipules becoming spines; leaflets with hard spine at apex.
- 6a. Corolla purple; bracteoles linear, ca. 8 mm; leaflets 3 or 4 pairs, both surfaces with whitish silky appressed hairs 6. *C. macrantha*
- 6b. Corolla yellow; bracteoles subulate, shorter than 1 mm; leaflets 4–6 pairs, with whitish spreading short appressed hairs 7. *C. spinosa*

1. **Chesneya cuneata** (Benth) Ali, Scientist (Karachi) 3: 3. 1959.

截叶雀儿豆 jie ye que er dou

Gueldenstaedtia cuneata Benth in Royle, Ill. Bot. Himal. Mts. 200. 1835; *Calophaca cuneata* (Benth) Komarov; *Caragana cuneata* (Benth) Baker (1876), not Moench (1794).

Stems 10–15 cm tall, with many branches. Leaves 2–10 cm, 5–17-foliolate; stipules ovate-lanceolate, 5–6 mm, adnate to petiole for ca. 1/2 its length; axis and petiole with dense spreading long hairs or short appressed hairs; leaflet blades obovate or obovate-oblong, 4–16 × 2–4 mm, both surfaces with dense spreading long or short appressed hairs, base rounded, apex rounded, cuneate, or emarginate. Racemes umbellate, 1–4-flowered; peduncles 3–10 mm, with dense white appressed hairs; pedicels 2–4 mm. Calyx tubular, 15–17 mm, gibbous at base, inflated on one side; teeth lanceolate, shorter than tube, with black glands at apex. Corolla purple; standard 20–30 mm, with short appressed hairs abaxially; wings 18–28 mm; keel slightly shorter than wings. Legume linear, 4–6 cm × 8–10 mm, glabrous when mature. Fl. Jul, fr. Aug.

Dry slopes on hills, gravelly areas, between stones; 3300–4300 m. Xinjiang, Xizang [India, Kashmir, Pakistan].

2. **Chesneya crassipes** Borissova, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 207. 1936.

长梗雀儿豆 chang geng que er dou

Plants cushionlike. Stems woody at base, with branches. Leaves 3–8 cm, 11- or 13-foliolate; stipules lanceolate, 6–7 mm, adnate to petiole for ca. 1/2 its length, persistent; axis and petiole slender, with dense long hairs; leaflet blades dense, obovate-oblong, 5–7 × 3–5 mm, both surfaces with dense spreading long hairs, base rounded, apex emarginate or cuneate. Flowers solitary; pedicels 10–60 mm, with dense spreading white short hairs; bracts subulate; bracteoles almost same as bracts. Calyx tubular, 12–13 mm, with dense white short hairs, gibbous at base, inflated on one side; teeth lanceolate, slightly shorter than tube, with red-brown glands at apex. Corolla purple or orange-yellow with purple; standard 13–18 mm, lamina elliptic. Ovary sessile, glabrous. Legume linear, 3.5–4 cm × 4–5 mm, with dense appressed hairs. Fl. Jul, fr. Aug.

Gravelly areas; ca. 3800 m. Xizang [Pakistan, Tajikistan].

3. **Chesneya acaulis** (Baker) Popov, Byull. Sredne-Aziatsk. Gosud. Univ. 15(2, Suppl.): 10. 1927.

无茎雀儿豆 wu jing que er dou

Caragana acaulis Baker, J. Linn. Soc., Bot. 18: 44. 1880; *Calophaca acaulis* (Baker) Komarov.

Plants cushionlike. Stems woody at base, 3–8 cm tall. Leaves 4–8 cm, 13–17-foliolate; stipules ovate-lanceolate, 5–6 mm, adnate to petiole for ca. 1/2 its length; axis and petiole with dense white appressed hairs; leaflet blades obovate or obovate-oblong, 7–15 × 4–10 mm, both surfaces with dense white appressed hairs, base subrounded, apex emarginate, rarely cuneate. Flowers solitary; pedicels 3–4 cm, slightly shorter or ca. as long as leaves, with white short appressed hairs; bracts subulate; bracteoles ca. as long as bracts. Calyx tubular, 12–13 mm, with dense white short hairs, gibbous at base, inflated on one side; teeth lanceolate, slightly shorter than tube, with red-brown glands at apex. Corolla purple or orange-yellow; standard 13–18 mm, lamina elliptical, with dense white short hairs abaxially. Ovary sessile, glabrous. Legume linear, 5–6 cm × 9–10 mm, with dense appressed hairs. Fl. Jul, fr. Aug.

Gravelly areas; 2900–3000 m. Xizang [Afghanistan, Pakistan].

4. **Chesneya polystichoides** (Handel-Mazzetti) Ali, Scientist (Karachi) 3: 10. 1959.

川滇雀儿豆 chuan dian que er dou

Calophaca polystichoides Handel-Mazzetti, Symb. Sin. 7: 552. 1933; *Spongiocarpella polystichoides* (Handel-Mazzetti) Yakovlev.

Plants cushionlike. Stems woody at base, prostrate, ca. 25 mm in diam., branched, bark red-brown, with dense persistent petioles and stipules. Leaves 3–14 cm, 19–41-foliolate; stipules linear, ca. 15 mm, adnate to petiole for ca. 1/2 its length, rarely with short white hairs; axis and petiole rarely with long hairs, incurved after drying, persistent; leaflets sessile; leaflet blades dense, abaxially gray-white, adaxially dark green, oblong, ovate, or nearly orbicular, 3–11 × 2–6 mm, both surfaces hairy, base conspicuously oblique, apex rounded, seldom truncate or emarginate. Flowers solitary; pedicels 10–20 mm, with spreading white long hairs; bracts linear; bracteoles slightly shorter than bracts. Calyx tubular, 12–15 × 5–7 mm, rarely with long hairs, gibbous at base, inflated on one side; teeth triangular-lanceolate, ca. 1/2 as long as tube. Corolla yellow; standard 20–22 mm, lamina oblong, with dense white short hairs abaxially; keel 15–17 mm, auriculate, ca. as long as wings. Ovary sessile, glabrous. Legume narrowly elliptical, 2.5–3.5 cm × ca. 8 mm, leathery, slightly applanate, glabrous. Fl. Jul, fr. Aug.

• Slopes, on rocks, meadows; 3400–4400 m. Sichuan, Xizang, Yunnan.

5. *Chesneya nubigena* (D. Don) Ali, Scientist (Karachi) 3: 4. 1959.

云雾雀儿豆 yun wu que er dou

Plants cushionlike. Stems woody at base, branched, with persistent petioles and stipules. Leaves 3–15 cm, 15–21-foliolate; stipules linear, ca. 10 mm, adnate to petiole for ca. 1/2 its length, upper part rounded or 2- or 3-lobed, with dense long hairs; axis and petiole with dense spreading long hairs, incurved or erect after drying, persistent; leaflet blades dense, oblong, 3–8 × 1–4 mm, both surfaces with dense spreading long hairs, base rounded or slightly oblique, apex acute. Flowers solitary; pedicels 10–40 mm, with dense spreading white long hairs; bracts linear, ca. 10 mm; bracteoles slightly shorter than bracts. Calyx tubular, 10–15 mm, rarely with long hairs, gibbous at base, inflated on one side; teeth lanceolate, ca. 1/2 as long as tube. Corolla yellow or purple; standard 20–30 mm, lamina broadly ovate or suborbicular, with dense white short hairs abaxially, apex emarginate; wings 18–28 mm; keel ca. as long as wings, without auricles. Ovary sessile, with dense white long hairs. Legume narrowly elliptical, 2–3 cm × 7–8 mm, rarely with long white appressed hairs, slightly applanate, leathery. Fl. Jul–Aug, fr. Aug–Sep.

Rocky alpine slopes, within shrubs, slopes, meadows, gravelly areas; 3600–5300 m. Xizang, Yunnan [Bhutan, India, Nepal].

- 1a. Flowers yellow; plants 11–16 cm; leaflets 4–8 × 2–4 mm, with a few persistent petioles 5a. subsp. *nubigena*
 1b. Flowers purple; plants 3.5–6 cm; leaflets 3–5 × 1–2 mm, with many persistent petioles 5b. subsp. *purpurea*

5a. *Chesneya nubigena* subsp. *nubigena*

云雾雀儿豆(原亚种) yun wu que er dou (yuan ya zhong)

Astragalus nubigenus D. Don, Prodr. Fl. Nepal. 245. 1825; *Calophaca crassicaulis* (Benth. ex Baker) Komarov; *Caragana crassicaulis* Benth. ex Baker; *Chesneya intermedia* (Yakovlev) Z. G. Qian; *C. paucifoliolata* (Yakovlev) Z. G. Qian; *C. yunnanensis* (Yakovlev) Z. G. Qian; *Spongiocarpella intermedia* Yakovlev; *S. nubigena* (D. Don) Yakovlev; *S. nubigena* subsp. *kumaoensis* Yakovlev; *S. paucifoliolata* Yakovlev; *S. yunnanensis* Yakovlev.

Plants tall, 11–16 cm. Leaflet blades 4–8 × 2–4 mm, with a few persistent petioles. Flowers yellow. Fl. Jul–Aug, fr. Aug–Sep.

Rocky alpine slopes, within shrubs, slopes, meadows; 3600–5300 m. Xizang, Yunnan [India, Nepal].

5b. *Chesneya nubigena* subsp. *purpurea* (P. C. Li) X. Y. Zhu, Acta Phytotax. Sin. 34: 561. 1996.

紫花雀儿豆 zi hua que er dou

Chesneya purpurea P. C. Li, Acta Phytotax. Sin. 19: 236. 1981; *Spongiocarpella purpurea* (P. C. Li) Yakovlev.

Plants small, 3.5–6 cm. Leaflet blades 3–5 × 1–2 mm, with many persistent petioles. Flowers purple. Fl. Jul, fr. Aug.

Within shrubs, hilly slopes, meadows, gravelly areas; 4700–5200 m. Xizang [Bhutan].

6. *Chesneya macrantha* S. H. Cheng ex H. C. Fu, Fl. Intra-mongol. 3: 291. 1978.

大花雀儿豆 da hua que er dou

Chesneya potaninii (Yakovlev) Govaerts; *Oxytropis grubovii* N. Ulziykhutag (1971), not *Chesneya grubovii* Yakovlev (1979); *Spongiocarpella grubovii* (N. Ulziykhutag) Yakovlev; *S. potaninii* Yakovlev.

Plants cushionlike. Stems shortened, 5–10 cm tall. Leaves 2–4 cm, 7- or 9-foliolate; stipules ovate, ca. 4 mm, submembranous, adnate to petiole for ca. 1/2 its length, persistent, with dense white long appressed hairs; axis and petiole rarely with spreading white long hairs, persistent and forming spines at apex; leaflet blades elliptic or obovate, 5–6 × ca. 3 mm, both surfaces with white silky short appressed hairs, base cuneate, apex acute or spinelike. Flowers solitary; pedicels 4–5 mm; bracts linear, ca. 8 mm; bracteoles similar to bracts. Calyx tubular, ca. 15 mm, with dense long hairs and dark brown glands, gibbous at base, inflated on one side; teeth linear, almost as long as tube, with glands at apex. Corolla purple; standard ca. 25 mm, lamina oblong, with dense short hairs abaxially; wings ca. 20 mm; keel shorter than wings. Ovary sessile, with dense hairs. Legume unknown. Fl. Jun, fr. Jul.

Dry slopes. Nei Mongol, Xinjiang [Mongolia].

7. *Chesneya spinosa* P. C. Li, Acta Phytotax. Sin. 19: 236. 1981.

刺柄雀儿豆 ci bing que er dou

Spongiocarpella spinosa (P. C. Li) Yakovlev.

Plants cushionlike. Stems short, 4–6 cm tall, woody at base, branched, with dense persistent spinelike petioles and stipules. Leaves 2–2.5 cm, 9–13-foliolate; stipules ovate, 2–3 mm, papery, adnate to petiole for ca. 1/2 its length, glabrous, rarely with short white hairs; axis and petiole rarely with long hairs, persistent and forming spines; leaflet blades narrowly oblong, 3–5 × ca. 1.5 mm, both surfaces with dense white short hairs when young, becoming glabrous, base rounded or slightly oblique, apex acute, rounded, or truncate, with short spines. Flowers solitary; pedicels shorter than leaves; bracts lanceolate, ca. 1.5 mm; bracteoles subulate, shorter than 1 mm. Calyx tubular, 14–16 mm, rarely with white short hairs and brown glands, gibbous at base, inflated on one side; teeth lanceolate, with glands and hard acute at apex. Corolla yellow; standard 24–26 mm, lamina suborbicular, with dense white short hairs abaxially; wings 23–25 mm, claw slightly longer than lamina; keel 19–21 mm. Ovary sessile, with dense white short hairs. Legume oblong, 2–2.5 cm × 4–5 mm, rarely with long white hairs. Fl. Jul, fr. Aug.

• On gravelly slopes of hills; 3900–4200 m. Xizang.

142. CHESNIELLA Borissova, *Novosti Sist. Vyssh. Rast.* 1964: 182. 1964.旱雀豆属 *han que dou shu*

Zhu Xiangyun (朱相云); Kai Larsen

Chesneya sect. *Microcarpon* Borissova, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R.* 21: 252. 1961.

Plants perennial. Root stout, woody. Stem prostrate, slender, base woody. Leaves imparipinnate, 5–11-foliolate, entire; stipules membranous, separate from petiole. Flowers solitary, axillary. Corolla pale yellow, pink, or purple; standard orbicular, abaxially with dense short appressed hairs, ± equal to wings or keel. Stamens diadelphous. Ovary sessile; stigma capitate, papillary. Legume ovoid or oblong. Seeds cylindrical-reniform. Basic chromosome number $x = 8$.

Six species: C Asia to NW China; two species (one endemic) in China.

1a. Leaflets 5 or 7, obovate, adaxially rarely with hairs, abaxially with dense white long appressed hairs;

corolla purple 1. *C. mongolica*1b. Leaflets 7–11, obovate-lanceolate, both surfaces with dense spreading white short hairs; corolla pink 2. *C. ferganensis***1. *Chesniella mongolica*** (Maximowicz) Borissova, *Novosti Sist. Vyssh. Rast.* 1964: 184. 1964.蒙古旱雀豆 *meng gu han que dou**Chesneya mongolica* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 27: 462. 1881.

Stems caespitose, prostrate, 15–25 cm, slender, with dense white long appressed hairs. Leaves 15–20 mm, 5- or 7-foliolate; stipules separate from petiole, subulate, ca. 2 mm, with dense white long hairs, with dense white glands at apex; axis and petiole with dense white long appressed hairs; leaflet blades obovate, 6–8 × 5–6 mm, abaxially with dense white long appressed hairs, adaxially with dense blue glands and rarely with hairs, base cuneate, apex blunt. Flowers solitary; pedicel 5–7 mm, with dense white hairs; bracts ca. 0.5 mm; bracteoles same shape as bracts, with glands at apex. Calyx tubular, ca. 7 mm, with dense white hairs, gibbous at base, inflated on one side; teeth lanceolate, slightly shorter than tube, upper 2 lobes almost connate, with brown glands at apex. Corolla purple; standard ca. 13 mm, lamina broadly orbicular, with dense white short hairs abaxially; wings and keel ca. as long as standard. Ovary sessile, with dense white long hairs. Legume oblong, ca. 13 × 2 mm, slightly inflated, with dense white short hairs. Fl. Aug, fr. Aug.

● Gravelly areas. Nei Mongol.

2. *Chesniella ferganensis* (Korshinsky) Borissova, *Novosti Sist. Vyssh. Rast.* 1964: 183, 184. 1964.甘肃旱雀豆 *gan su han que dou**Chesneya ferganensis* Korshinsky, *Zap. Imp. Akad. Nauk Fiz.-Mat. Otd.* 4: 90. 1896; *C. gansuensis* Y. X. Liou; *C. grubovii* Yakovlev; *Chesniella gansuensis* (Y. X. Liou) P. C. Li.

Stems prostrate, 10–20 cm, with many branches, with dense spreading short hairs. Leaves 10–30 mm, 7–11-foliolate; stipules separate from petioles, ovate, ca. 2 mm, with dense short hairs, with dark brown glands at apex; axis and petiole slender, with dense spreading short hairs; leaflets obovate-lanceolate, 7–9 × 3–4 mm, with dense spreading white short hairs, base rounded, apex rounded, emarginate, or truncate. Flowers solitary; pedicel 8–10 mm, slender, with dense spreading short hairs; bracts ca. 1 mm; bracteoles same shape as bracts. Calyx campanulate, ca. 7 mm, rarely with short hairs; teeth linear, longer than tube, with dark brown glands at apex, upper 2 lobes almost connate. Corolla pink; standard 9–10 mm, lamina orbicular, with dense short hairs abaxially, apex emarginate, claw ca. 1 mm; wings 10–11 mm, claw ca. as long as lamina, ca. 1 mm; keel slightly shorter than wings, shortly clawed, without auricles. Ovary sessile, with dense short hairs. Legume narrowly oblong, 18–20 × ca. 5 mm, slightly inflated, with dense spreading long hairs. Fl. Jul, fr. Aug.

Dry slopes; ca. 1800 m. Gansu [Mongolia].

143. COLUTEA Linnaeus, *Sp. Pl.* 2: 723. 1753.鱼鳔槐属 *yu biao huai shu*

Sun Hang (孙航); Kai Larsen

Shrubs or small shrubs. Leaves imparipinnate, rarely 3-foliolate; stipules small; leaflets entire, opposite, estipellate. Racemes axillary, long pedunculate; bract and bracteoles very small or absent. Calyx campanulate; teeth 5, subequal or upper 2 smaller, outside pubescent. Corolla yellow or brownish red; standard suborbicular, upper part of stalk bicallose; wings narrowly falcate-oblong, with short stalk; keel broad, mostly inrolled, blunt at apex, with long connate stalk. Stamens diadelphous, upper 1 free, other 9 connate to tube; anthers homomorphic. Ovary stipitate; ovules numerous; style incurved, barbate along upper ventral suture; stigma inrolled or hook-curved. Legume inflated, bladderlike, acute or tapering at apex, indehiscent or tip 2-valvate, with long stalk at base, segments membranous. Seeds numerous, reniform, without strophiole; funicle filiform.

About 28 species: E and NE Africa, C and SW Asia, S Europe; four species (one endemic, two introduced) in China.

1a. Leaflets 19–25; racemes 8–14(–31)-flowered 4. *C. delavayi*

1b. Leaflets 7–13; racemes 3–8-flowered.

- 2a. Annual branches (excluding young tips) glabrous to subglabrate, bark of branchlets thinly papery, longitudinally split; flowers to 2.4 cm; ovary densely white pubescent 1. *C. nepalensis*
 2b. Annual branches villosulous, bark of branchlets not split; flowers shorter than 1.8 cm; ovary sparsely pubescent.
 3a. Corolla yellow, wings with lower part wide, upper part gradually narrowed, without teeth, keel triangular-suborbicular auriculate, auricle intersecting stalk at an acute angle 2. *C. arborescens*
 3b. Corolla orange-yellow to reddish brown, wings with upper and lower parts subequal, lower part with 1 or 2 teeth, keel oblong auriculate, auricle parallel to stalk 3. *C. ×media*

1. *Colutea nepalensis* Sims, Bot. Mag. 53: t. 2622. 1826.

尼泊尔鱼鳔槐 ni bo er yu biao huai

Colutea arborescens Linnaeus var. *nepalensis* (Sims) Baker.

Shrubs, deciduous, 1–3 m tall. Old branches reddish brown to brunescent, glabrous, glossy; annual branches white to white-green. Leaves pinnate, 7–13-foliolate, often clustered at new branch bases, 4–10 cm; rachis sparsely pubescent; stipules triangular; leaflets often opposite; petiolules ca. 1 mm; leaflet blades elliptic to obovate, 6–16 × 7–11 mm, both surfaces sparsely pubescent or adaxially glabrous, lateral veins inconspicuous, base rounded to nearly truncate, apex with inconspicuous mucro. Racemes subequal to leaves, 3–10-flowered; peduncle 8–10 cm, pubescent; bract ovate-lanceolate, both bracteoles and bract pubescent. Flowers to 2.4 cm. Calyx outside with hairs; upper 2 teeth broadly triangular, lower 3 linear, slightly curved. Corolla yellow; standard deflexed, 20–22 × ca. 19 mm, stalk 5–6 mm, calluses oblong, rounded but margin free at apex; wings ca. 15 mm, stalk ca. 6 mm, upper stalk auriculate, ca. 3 × 1.5 mm, irregular at apex; keel connate, suborbicular, 10–11 × 7–8 mm, apex beaked, stalk 9–10 mm. Ovary complanate, oblong-lanceolate, densely pubescent; stipe ca. 3.5 mm; style ca. 10 mm, curved, hook-curved at apex, ventrally with longitudinal cirrus; stigma terminal, small. Legume oblong, 4–5.5 × 2–2.5 cm, with groove along ventral suture, pubescent, with curved fruit stalk at base, acute to rounded at apex; segments thinly leathery. Seed smooth. Fl. and fr. Jun–Jul.

Mountain slopes, riverside gravel, among shrubs. W Qinghai (Haixi Diqu), W Xizang (Ngari Diqu) [Afghanistan, India, Pakistan].

2. *Colutea arborescens* Linnaeus, Sp. Pl. 2: 723. 1753.

鱼鳔槐 yu biao huai

Shrubs, deciduous, 1–4 m tall. Young branches with fine white hairs. Leaves pinnate, 7–13-foliolate, 6–15 cm, with groove on rachis; stipules triangular or lanceolate-triangular to lanceolate-falcate, 2–3 mm; leaflets abaxially gray-green, adaxially green, oblong to obovate, 1–3 cm × 6–15 mm, thinly leathery, abaxially sparsely shortly hairy, adaxially glabrous, venation clear and free, apex retuse or obtuse, mucronate. Racemes 5–6 cm, 6–8-flowered; bract ovate-lanceolate, ca. 2 mm, blackish brown or intermixed white scattered shortly sericeous, apex obtuse. Pedicel ca. 1 cm. Calyx ca. 5 mm; tube inside upper part densely pallid to brown hairy; teeth triangular, 1/4–1/3 as long as calyx tube, outside sparsely blackish brown and white sericeous, apex argute. Corolla yellow; standard slightly wider than long, 15–17 mm, base rounded, apex retuse, stalk 2–4 mm, calluses crescent-shaped, slightly convex; wings 11–14 mm, widest near base, to 4 mm wide, upper part often attenu-

ate, curved auriculate at one lateral base, equal to stalk, ca. 4 mm, apex obtuse; keel suborbicular to triangular-suborbicular, ± concave, ca. 5 mm wide and triangular-suborbicular auriculate at base, to 11 mm wide at apex, auricle intersecting stalk at an acute angle, stalk 8–9 mm. Ovary densely pubescent; style curved, at slight right angle with ovary, inrolled at apex, adaxially longitudinally white barbate. Legume greenish or slightly red at base, narrowly ovate, 6–8 × 2–3 cm, glabrous to subglabrate, both ends acute. Seeds complanate, blackish to green-brown. Fl. May–Jul, fr. Jul–Oct.

Cultivated for ornament. Beijing, Jiangsu (Nanjing), Liaoning (Dalian), Shaanxi (Wugong), Shandong (Qingdao) [native to C and S Europe].

3. *Colutea ×media* Willdenow, Enum. Pl. 2: 771. 1809.

杂种鱼鳔槐 za zhong yu biao huai

Shrubs, deciduous, ca. 1.8 m tall. Old branches gray, glabrous; young ones gray-yellow, with white hairs. Leaves pinnate, 9–13-foliolate, 7–10 cm; stipules on lower branches often triangular, ca. 1 mm, on upper branches lanceolate, ca. 3 mm, sparsely pubescent to glabrous; leaflets opposite or subopposite; petiolules 0.5–1 mm, densely pubescent; leaflet blades adaxially bluish green, obovate, 1.3–1.9(–2.5) × 0.9–1.2 cm, abaxially appressed white pubescent, adaxially glabrous, base rounded, apex truncate to retuse, shortly mucronate. Racemes 6–6.5 cm, 3–5-flowered; peduncle to 3–4 cm, pubescent; bract lanceolate, ca. 1.5 mm, hairy. Pedicel 7–10 mm; bracteoles fine, pubescent. Calyx ca. 5 × 5 mm, outside with hairs, longitudinal ribs 5; teeth triangular, subequal, ca. 1 mm, inside densely manicate, glabrous below. Corolla orange-yellow to reddish brown; standard reflexed, ca. 15 × 19–20 mm, base rounded, sinus at apex, stalk ca. 2 mm, calluses lunate; wings conspicuous, smaller than standard and keel, upper and lower parts subequal, ca. 1 cm, rounded at apex, auriculate at one lateral upper base, often conduplicate and curved at apex, intersecting stalk to form a ring, lower part with 1 or 2 teeth, stalk ca. 4 mm; keel connate, triangular-suborbicular, ca. 1.2 × 1.2 cm, oblong auriculate and ca. 4 mm wide at base, auricle parallel to stalk, stalk ca. 9 mm. Ovary flattened, linear-lanceolate, ca. 6 mm, pubescent; stipe ca. 4 mm; style curved to nearly right angle, inrolled at apex, glabrous except barbate adaxially. Legume ca. 7.5 cm. Fl. and fr. May–Oct.

Cultivated for ornament. Shandong [of hybrid origin in SW Asia (Caucasus); widely cultivated].

Colutea ×media is a hybrid between *C. arborescens* and *C. orientalis* Miller; the latter is often cultivated in the Mediterranean region.

4. *Colutea delavayi* Franchet, Pl. Delavay. 158. 1889.

膀胱豆 pang guang dou

Shrubs, deciduous, 1–4 m tall, to 4 cm in diam. Stems with gray-green bark and many fibers, throughout with dense to sparse, pallid and brownish appressed hairs. Leaves pinnate, 19–25-foliolate, ca. 15 cm; stipules linear-lanceolate, 3–4 mm, both surfaces densely pubescent, tapering at apex; leaflets adaxially bottle-green, elliptic, ovate-elliptic, or narrowly obovate, 10–20 × 6–10 mm, abaxially sparsely hairy, adaxially with scattered appressed hairs or subglabrous, base rounded to broadly cuneate, apex rounded or retuse, mucronate. Racemes longer than or equal to leaves, 15–17 cm, 8–14(–31)-flowered. Pedicel 3–5 mm. Calyx tube ca. 3 mm; teeth triangular, 1–1.5 mm, outer and inner margin densely pubescent. Corolla yellowish; standard reflexed, 1–1.3 cm wide, base cordate, apex retuse,

stalk 2–3 mm, calluses suborbicular, ca. 1 mm wide; wings ca. 8 mm, auriculate and stipitate at base; keel suborbicular, 6.5–8 mm, broadly triangular auriculate, stalk ca. 7 mm. Ovary flattened, 4–5 mm, outside densely puberulent; stipe ca. 3 mm; style at right angle with ovary, inrolled at apex, adaxially longitudinally barbate; stigma fine. Legume ovoid-fusiform, 3.5–4 × 1.8–2 cm, argute at apex, attenuate at base, stalk 12–18 mm; segments greenish white to yellow-green, outside sparsely appressed blackish brown hairy to glabrous. Seeds brown, not glossy, ca. 4.5 × 3.5 mm; funicle ca. 2 mm. Fl. Aug–Oct, fr. Oct–Dec.

• Mountain slopes, riversides, among shrubs; 1800–3000 m. SW Sichuan (Jiulong, Muli), NW Yunnan.

144. SPHAEROPHYSA Candolle, Prodr. 2: 270. 1825.

苦马豆属 *ku ma dou shu*

Sun Hang (孙航); Kai Larsen

Shrubs, small, or perennial herbs, glabrous or with pallid appressed hairs. Leaves imparipinnate; stipules small; leaflets 3 to numerous, entire, estipellate. Racemes axillary. Calyx teeth subequal or upper 2 connivent. Corolla red; standard orbicular, reflexed at margins; wings falcate-oblong; keel inrolled and blunt at apex. Stamens diadelphous; anthers homomorphic. Ovary long stipitate; ovules numerous; style incurved, adaxially longitudinally barbate; stigma terminal, capitate or oblique. Legume inflated, subglabrous, nearly indehiscent, with long stalk at base, ventral suture slightly sunken, segments membranous or leathery. Seeds numerous, reniform; funicle filiform. $x = 8$.

Two species: mainly in C, E, and SW Asia and Siberia; one species in China.

1. *Sphaerophysa salsula* (Pallas) Candolle, Prodr. 2: 271. 1825.

苦马豆 *ku ma dou*

Phaca salsula Pallas, Reise Russ. Reich. 3: 747. 1776;
Swainsona salsula (Pallas) Taubert.

Subshrubs or perennial herbs. Stems erect or lower part stoloniferous, 0.3–0.6 m tall, rarely to 1.3 m. Branches with longitudinal rib, with sparse to dense pallid appressed hairs. Leaves 11–21-foliolate; stipules linear-lanceolate or triangular to subulate; rachis 5–8.5 cm, adaxially grooved; petiolule short, puberulent; leaflets obovate to obovate-oblong, 5–15(–25) × 3–6(–10) mm, abaxially with appressed white fine hairs, adaxially with scattered hairs or glabrous, lateral veins inconspicuous, base rounded to broadly cuneate, apex retuse to rounded, mucronate. Racemes often longer than leaves, 6.5–13(–17) cm, 6–16-flowered; bract ovate-lanceolate. Pedicel 4–5 mm, densely white pilose, bracteoles linear to subulate. Calyx campanulate;

teeth triangular, upper 2 shorter and wider, others longer and narrower, outside white pilose. Corolla red, becoming purple; standard suborbicular, reflexed outward, 12–13 × 12–16 mm, base shortly stipitate, apex retuse; wings shorter than keel, ca. 12 mm (including stalk), apex rounded, base with slightly curved stalk ca. 3 mm and auriculate lobes ca. 2 mm, lobes rounded at apex; keel ca. 13 × 4–5 mm, blunt at apex, stalk ca. 4.5 mm. Ovary ± linear, densely white pilose; style curved, only inner surface sparsely longitudinally barbate; stigma spheroidal. Legume ellipsoid or broadly ellipsoid, turgid, 1.7–3.5 × 1.7–1.8 cm, apex rounded, stalk ca. 10 mm, segments membranous, outside sparsely white pilose, densely so on suture. Seeds brown, reniform to nearly semicircular, ca. 2.5 mm; funicle 1–3 mm; hilum rounded and sunken. Fl. May–Aug, fr. Jun–Sep.

Mountain slopes, plains, wastelands, sand, oases, ditch sides, around salt ponds; 1000–3200 m. Gansu, Hebei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Mongolia, Russia].

145. EREMOSPARTON Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 75. 1841.

无叶豆属 *wu ye dou shu*

Sun Hang (孙航); Kai Larsen

Shrubs, short. Leaves squamiform. Flowers numerous; racemes slender, sparsely flowered. Calyx campanulate; teeth 5, ca. 1/2 as long as keel, upper 2 wider than lower 3. Standard orbicular or orbicular-reniform, base shortly clawed, apex with a sinus; keel shorter than wings. Stamens diadelphous; anthers homomorphic. Ovary sessile; style inrolled, upper dorsal surface longitudinally barbate; stigma terminal. Legume orbicular or oval, flattened and slightly turgid, 2-valvate, indehiscent. Seeds 1 or 2(or 3), reniform, without strophiole, segments membranous.

About three species: C Asia; one species in China.

1. *Eremosparton songoricum* (Litvinov) Vassilczenko in Komarov, Fl. URSS 11: 311. 1945.

准噶尔无叶豆 zhun ga er wu ye dou

Eremosparton aphyllum (Pallas) Fischer & C. A. Meyer var. *songoricum* Litvinov, Trudy Bot. Muz. Imp. Akad. Nauk 11: 74. 1913.

Shrubs, 50–80 cm tall. Stems much branched at base; old branches fulvous, with peeling bark; young branches green, sparsely pubescent, slender, slightly angulate. Leaves squami-

form, lanceolate, 1–2.5 mm. Flowers solitary, axillary, forming long racemes (10–15 cm) on branches; pedicel 1–1.5 mm. Calyx tube ca. 2 mm; teeth triangular, appressed pubescent. Corolla purple; standard broadly reniform, ca. 4 × 7 mm; wings oblong, claw ca. 1/2 as long as limb; keel shorter than wings, argute at apex, claw slightly shorter than limb. Legume slightly turgid, ovate or oval, 6–13 × 5–8 mm, appressed pubescent, with acute beak, segments membranous. Seed 1(–3), reniform. Fl. May–Jun, fr. Jun–Jul.

Migratory or subfixed dunes. Xinjiang (Junggar Pendi) [Kazakhstan].

146. *GUULDENSTAEDTIA* Fischer, Mém. Soc. Imp. Naturalistes Moscou 6: 171. 1823.

米口袋属 mi kou dai shu

Bao Bojian (包伯坚); Anthony R. Brach

Amblytropis Kitagawa (1936), nom. illeg. superfl., not (Mitten) Brotherus (1907).

Herbs, perennial. Taproot thick. Stem very short or nearly absent, with a rosette of leaves at soil surface. Leaves imparipinnate, rarely 1-foliolate; stipules adnate to petiole or free; stipels absent; petiolule short or leaflets nearly sessile; leaflets ovate, lanceolate, elliptic, oblong, or linear, rarely orbicular. Flowers purple, pink, or yellow, 3–8(–12) per umbel on axillary peduncles. Calyx campanulate, densely appressed villous, rarely glabrous, 5-toothed; upper 2 teeth broader. Standard ovate or orbicular, narrowing to claw at base, retuse at apex; wings free, obovate-oblong, slightly shorter than standard; keel ovate, very short. Stamens diadelphous. Ovary sessile, many ovuled; style short, rolled inward at apex; stigma broad. Legume cylindrical or linear, not septate, with many seeds. Seeds triangular-reniform.

About 12 species: from Russia (Siberia) to the Sino-Himalayan region; three species (two endemic) in China.

- 1a. Leaflets orbicular to ovate or elliptic 3. *G. taihangensis*
 1b. Leaflets obovate to linear.
 2a. Stems short, less than 5 cm, not woody; standard obtuse at apex 2. *G. verna*
 2b. Stems long, ca. 5 cm, woody; standard acuminate at apex 1. *G. henryi*

1. *Gueldenstaedtia henryi* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 59. 1905.

川鄂米口袋 chuan e mi kou dai

Amblytropis henryi (Ulbrich) C. Y. Wu ex H. P. Tsui.

Stems to 5 cm, woody, branched, with basal rosette of leaves. Leaves imparipinnate, 2–9 cm, pilose or glabrescent; stipules narrowly triangular; petiolules very short or leaflets nearly sessile; leaflets oblong or obovate, 3–10 × 2–5 mm, abaxially pubescent, adaxially glabrous, apex rounded, obviously mucronate. Umbels 4- or 5-flowered; rachis ca. 10 cm, sparsely pilose or glabrous; bracts narrowly lanceolate, ca. 3.5 mm. Corolla purple; standard broadly ovate, ca. 14 × 8 mm, apex acuminate, retuse; wings elliptic, ca. 11.5 × 3.5 mm, claw short, ca. 1.8 mm; keel ca. 5.5 × 2.5 mm, claw ca. 2 mm. Ovary oblong, villous. Legume ca. 1.5 cm, pilose. Seeds reniform.

• Grasslands; ca. 100 m. Hubei, Sichuan.

2. *Gueldenstaedtia verna* (Georgi) Borissova, Spisok Rast. Gerb. Fl. S.S.S.R. Bot. Inst. Vsesojuzn. Akad. Nauk 12: 122. 1953.

少花米口袋 shao hua mi kou dai

Astragalus vernus Georgi, Bemerk. Reise Russ. Reich. 1: 226. 1775; *Amblytropis delavayi* (Franchet) C. Y. Wu ex H. P.

Tsui; *A. maritima* (Maximowicz) Kitagawa; *A. pauciflora* (Pallas) Kitagawa; *A. stenophylla* Bunge; *A. verna* (Georgi) Kitagawa; *Astragalus biflorus* Pallas (1776), not Linnaeus (1771); *A. brevicarinatus* Candolle; *A. cavaleriei* H. Léveillé; *A. pauciflorus* Pallas; *Gueldenstaedtia brachyptera* Pampanini; *G. brachyptera* var. *elongata* (Pavolini) Pampanini; *G. delavayi* Franchet; *G. delavayi* f. *alba* H. P. Tsui; *G. gansuensis* H. P. Tsui; *G. giraldii* Harms; *G. giraldii* var. *alba* Jacot Guillarmod; *G. giraldii* f. *elongata* Pavolini; *G. giraldii* subsp. *glabra* Jacot Guillarmod; *G. gracilis* H. P. Tsui; *G. guillonii* Franchet; *G. harmsii* Ulbrich; *G. maritima* Maximowicz; *G. multiflora* Bunge; *G. multiflora* f. *alba* F. Z. Li; *G. multiflora* var. *maritima* (Maximowicz) Jacot Guillarmod; *G. pauciflora* (Pallas) Fischer; *G. stenophylla* Bunge; *G. verna* f. *alba* (H. P. Tsui) P. C. Li; *G. verna* f. *multiflora* (Bunge) H. P. Tsui; *G. verna* subsp. *multiflora* (Bunge) H. P. Tsui.

Taproot straight. Stems short. Leaves imparipinnate, (1.5–) 2–20 cm, (5 or) 7–19-foliolate; stipules persistent, triangular or ovate, joined at base; petiole white pilose; leaflets elliptic, oblong, narrowly obovate, or ovate (in spring) to lanceolate or linear (in autumn), (2–) 5–25(–35) × (1–) 1.5–7(–9) mm, both surfaces pilose or villous, adaxially rarely glabrous, apex variably obtuse, rounded, truncate, retuse, or acute, and with mucro. Umbels 2–4(–8)-flowered; rachis variable in length, ca. 1/2 as long to as long as leaves or longer; bracts narrowly triangular,

lanceolate, or linear, sometimes subulate, 2–3 mm; pedicel 0.5–1(–3) mm; bracteoles linear, shorter than calyx. Calyx (4–)5–7 mm, white pilose; teeth lanceolate, upper 2 longer. Corolla purplish red, purple, pink, rose, or white; standard ovate, elliptic, or obovate to orbicular, (0.6–)1.3(–1.4) cm, apex retuse or acuminate; wings obovate, (0.6–)1.1 cm, auriculate or cuneate, claw (0.8–)3 mm; keel obovate or ovate, (4–)5.5(–7) mm, claw (1.8–)2.5 mm. Ovary elliptic or cylindric, densely pilose or villous; style glabrous, rolled inward. Legume cylindric or narrowly ovoid, (1–)1.5–2 cm × 3–4 mm, villous, pilose, or glabrescent, dehiscent. Seeds reniform, ca. 1.5 mm in diam. Fl. (Mar–)May, fr. (May–)Jun–Jul(–Nov).

Roadsides, grasslands, hillsides, valleys, meadows, terraced fields, margins of farms, riverbanks, sandy soil, sea bluffs; sea level to 2600 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Tianjin, Yunnan, Zhejiang [India, Laos, Mongolia, Myanmar, Pakistan, Russia].

A white-flowered form, *Gueldenstaedtia verna* f. *alba* (H. P. Tsui) P. C. Li (Vasc. Pl. Hengduan Mts. 1: 940. 1993), occurs in Beijing and Shandong.

3. *Gueldenstaedtia taihangensis* H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 40. 1979.

太行米口袋 tai hang mi kou dai

Gueldenstaedtia guangxiensis W. L. Sha & X. X. Chen.

Taproot straight. Stems many from root crown, with basal rosettes of leaves and rachis. Leaves (3–)3.5–7.5(–13) cm, 5–13-foliolate; petiole slender, pilose; petiolules very short; leaflets orbicular to ovate or elliptic, (5–)6–9(–10) × (3–)5–7(–8) mm, both surfaces pilose or abaxially villous and adaxially glabrous, base rounded, apex truncate or notched, or obtuse or acute and with mucro. Umbel 2- or 3(–12)-flowered; rachis equal to leaves or longer, slender; bracts narrowly triangular or linear; pedicel very short; bracteoles adnate to base of calyx. Calyx (5–)7 mm, densely appressed villous, 5-toothed; upper 2 teeth larger. Corolla purple; standard oblong or obovate, ca. 11 × (6–)7 mm; wings obovate, (7–)9 × ca. 3 mm, claw (1.5–)2 mm; keel ovate, (3–)5 mm. Ovary oblong or cylindric, villous; style glabrous, rolled inward. Legume conical or cylindric, (1–)1.5(–1.7) cm, ca. 3 mm in diam., pilose, valves twisted after dehiscence. Seeds reniform. Fl. (Jan–Feb or)May, fr. (Apr–May or)Aug.

• Meadows and bushes on slopes of hills; 1100–1600 m. Guangxi, Hebei, Shanxi.

147. **TIBETIA** (Ali) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 48. 1979.

高山豆属 gao shan dou shu

Bao Bojian (包伯坚); Anthony R. Brach

Gueldenstaedtia subg. *Tibetia* Ali, Candollea 18: 140. 1962.

Herbs, perennial. Taproot conical, strong. Stems many from collar, slender, branched, sometimes with adventitious roots. Leaves imparipinnate; stipules brown, ovate or elliptic, membranous, amplexicaul and opposite to leaves; leaflets elliptic, orbicular, or cordate, apex rounded to retuse, rarely bifid. Umbel 1–4-flowered, on axillary peduncles. Calyx brown, upper 2 teeth larger and joined. Corolla usually dark purple, rarely yellow; standard broadly obovate or obcordate, clawed; wings broadly obovate, equal in length to standard; keel oblong or obovate, small. Stamens diadelphous. Ovary cylindric, pilose or glabrous; style rolled inward. Legume cylindric, with many seeds. Seeds reniform, smooth.

About five species: Bhutan, China, India, Nepal, Pakistan; five species (four endemic) in China.

1a. Plants with dense appressed glandular hairs.

2a. Leaflets villous; stipules acute at apex 2. *T. himalaica*

2b. Leaflets pilose; stipules rounded or sometimes acuminate at apex 3. *T. yadongensis*

1b. Plants subglabrous or with sparse appressed glandular hairs.

3a. Corolla purple, purplish blue, or red; stipules acute at apex 4. *T. yunnanensis*

3b. Corolla yellow; stipules rounded or sometimes acuminate at apex.

4a. Stipules with brown-purple marks; ovary glabrous 1. *T. tongolensis*

4b. Stipules without brown-purple marks; ovary with white appressed hairs 5. *T. forrestii*

1. *Tibetia tongolensis* (Ulbrich) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 50. 1979.

黄花高山豆 huang hua gao shan dou

Gueldenstaedtia tongolensis Ulbrich, Bot. Jahrb. Syst. 50 (Beibl. 110): 11. 1913; *Amblytropis flava* (Adamson) C. Y. Wu ex H. P. Tsui; *G. flava* Adamson; *G. flava* var. *tongolensis* (Ulbrich) Ali.

Stems slender. Leaves ca. 10 cm, 5–9-foliolate; stipules free, with brown-purple spots, broadly ovate, 5–6 mm, mem-

branous; leaflets obovate, broadly elliptic, or broadly ovate, ca. 12 × 9 mm, abaxially pilose, adaxially glabrous, apex truncate or retuse. Umbel 2- or 3-flowered; rachis usually ca. as long as leaves or slightly longer; bract narrowly triangular; pedicel ca. 5 mm, with rigid hairs; bracteole narrowly ovate, glandular on margin. Calyx campanulate or broadly campanulate, ca. 5 × 2.5 mm, densely brown rigidly hairy; upper 2 teeth joined at base. Corolla yellow; standard broadly ovate, ca. 9.5 mm, base narrowed to claw, apex retuse; wings broadly obliquely ovate, ca. 9 × 5 mm, claw linear; keel obovate, ca. 4 × 1.5 mm. Ovary cylindric, glabrous. Legume glabrous. Fl. Apr–Jul, fr. Aug–Sep.

- Hills; above 3000 m. Sichuan, Yunnan.

2. *Tibetia himalaica* (Baker) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 51. 1979.

高山豆 gao shan dou

Gueldenstaedtia himalaica Baker in J. D. Hooker, Fl. Brit. India 2: 117. 1876; *Amblytropis uniflora* (Strachey ex Jacot Guillarmod) Kuang & H. P. Tsui; *G. diversifolia* Maximowicz; *G. santapau* Thothathri; *G. uniflora* Strachey ex Jacot Guillarmod; *Tibetia himalaica* f. *alba* X. Y. Zhu.

Taproot straight. Stems obvious. Leaves 2–7 cm, 9–13-foliolate; stipules ovate, large, to 7 mm, densely villous, apex acute; petiole sparsely villous; leaflets orbicular, elliptic, broadly obovate, or ovate, 1–9 × 1–8 mm, appressed villous, apex retuse. Umbel 1–3-flowered, rarely 4-flowered; rachis usually ca. as long as leaves or slightly longer, sparsely villous; bract narrowly triangular. Calyx campanulate, 3.5–5 mm, villous; upper 2 teeth 1.5–2 mm, joined from base to middle. Corolla bluish purple, purple, blue, mauve, violet, or red; standard ovate-orbicular, 6.5–8 × 4.5–7.5 mm, base with claw ca. 2 mm, apex retuse; wings broadly cuneate, 6–7 × 2–3 mm; keel subrectangular, 3–4 × 1–2 mm. Ovary villous. Legume pilose or glabrescent. Fl. May–Jun, fr. Jul–Aug.

Hilly areas, alpine meadows, rocky slopes, forests; 3000–5000 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Pakistan].

The type was originally collected in India (Sikkim).

3. *Tibetia yadongensis* H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 52. 1979.

亚东高山豆 ya dong gao shan dou

Taproot straight. Stems long, branched. Leaves 3–5.5 cm, 7–15-foliolate; stipules broadly ovate, membranous, abaxially hairy, adaxially glabrous, apex rounded or acuminate; petiole pilose; leaflets elliptic to obovate, 7–10 × 6–8 mm, both surfaces pilose, apex parted to bifid. Umbel 1- or 2-flowered; rachis pilose, usually ca. as long as leaves; bract linear, ca. 1 mm; pedicel ca. 2 mm; bracteole lanceolate, slightly shorter than bract. Calyx brown, narrowly campanulate, ca. 5 mm. Corolla purple; standard orbicular, ca. 10 × 8 mm, base narrowed to claw, apex retuse; wings obliquely obovate, ca. 9 × 4 mm, claw curved, auriculate; keel nearly triangular, ca. 4 × 1.5 mm. Ovary cylindrical, densely villous. Legume ca. 2 cm, pilose. Fl. May–Jun, fr. Jul–Sep.

- Grasslands on hills, thickets; 3000–4100 m. Xizang.

4. *Tibetia yunnanensis* (Franchet) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 54. 1979.

云南高山豆 yun nan gao shan dou

Stems very developed, slender. Leaves 3–7(or 9)-foliolate; stipules amplexicaul, joined at base and opposite to leaf, obovate or broadly elliptic, margin glandular toothed, apex acuminate; leaflets obovate, broadly elliptic, or broadly ovate to obovate, appressed pilose, apex truncate to retuse. Umbel 1- or 2(or 3)-flowered; rachis 5–10 cm, pilose; bract lanceolate or

narrowly triangular, 2(–2.5) mm; bracteole lanceolate or narrowly ovate, ca. 1.5 mm. Calyx campanulate, 4–5 mm; teeth lanceolate, upper 2 teeth joined for up to 2/3 length, villous. Corolla purple, purplish blue, or red; standard obovate or ovate-orbicular, 10.5–11 × ca. 9 mm, base narrowed to claw, apex retuse; wings subcuneate or subelliptic, 9–10 × 3.5–4 mm; keel obovate, 4–4.5 × ca. 1.5 mm. Ovary villous with long appressed hairs or glabrous. Legume ca. 1.2 cm, pilose. Fl. Jun–Jul, fr. Sep.

- Hilly areas, grassy or rocky places at streamsides, disturbed forests, thickets, N-facing ravines; above 2500 m. Sichuan, SE Xizang, Yunnan.

1a. Ovary with long appressed hairs 4a. var. *yunnanensis*

1b. Ovary glabrous 4b. var. *coelestis*

4a. *Tibetia yunnanensis* var. *yunnanensis*

云南高山豆(原变种) yun nan gao shan dou (yuan bian zhong)

Gueldenstaedtia yunnanensis Franchet, Pl. Delavay. 164. 1890; *Amblytropis yunnanensis* (Franchet) C. Y. Wu ex H. P. Tsui.

Ovary with long appressed hairs.

- Hilly areas, grassy places at streamsides, disturbed forests, thickets, N-facing ravines; above 2500 m. Sichuan, Yunnan.

4b. *Tibetia yunnanensis* var. *coelestis* (Diels) X. Y. Zhu, Bot. J. Linn. Soc. 148: 479. 2005.

蓝花高山豆 lan hua gao shan dou

Astragalus coelestis Diels, Notes Roy. Bot. Gard. Edinburgh 5: 244. 1912; *Amblytropis coelestis* (Diels) C. Y. Wu ex H. P. Tsui; *Gueldenstaedtia coelestis* (Diels) N. D. Simpson; *Tibetia coelestis* (Diels) H. P. Tsui; *T. tongolensis* (Ulbrich) H. P. Tsui f. *coelestis* (Diels) P. C. Li; *T. tongolensis* var. *coelestis* (Diels) H. P. Tsui.

Ovary glabrous.

- Grasslands on hills; above 3000 m. Sichuan, SE Xizang, Yunnan.

5. *Tibetia forrestii* (Ali) P. C. Li, Acta Bot. Yunnan. 11: 287. 1989.

中甸高山豆 zhong dian gao shan dou

Gueldenstaedtia forrestii Ali, Candollea 18: 153. 1962; *Tibetia liangshanensis* P. C. Li.

Stems prostrate, elongated. Leaves 7- or 9-foliolate; stipules connate at base, obovate or oblong, abaxially with appressed pale yellow hairs, adaxially glabrous, apex obtuse or subtruncate; petiole 3.5–9 cm; petiolules ca. 1 mm; leaflets obovate or orbicular, 11–19 × 9–15 mm, apex retuse, rarely subtruncate or obtuse. Peduncle 13–14 cm; bracts lanceolate, ca. 4 mm; pedicels 3–4 mm. Calyx ca. 8 mm, with appressed yellow hairs, 2-lobed; upper lobe ca. 3 mm, apex retuse, lower lobe equal, linear, 2–3 mm. Corolla pale yellow; standard ca. 1.6 × 1.2 cm, retuse at apex; wings ca. 1.4 cm, claw 2–3 mm; keel ca. 6 × 2 mm, claw ca. 2 mm, auricle shorter than 1 mm. Ovary

with densely appressed white hairs; style shorter than 1 mm. Fl. and fr. Jun–Sep. chuan, Yunnan.

- Understories of *Pinus* and *Quercus* forests; above 3000 m. Si-

The placement of *Tibetia liangshanensis* here is uncertain, and further study is needed.

148. GLYCYRRHIZA Linnaeus, Sp. Pl. 2: 741. 1753.

甘草属 gan cao shu

Bao Bojian (包伯坚); Kai Larsen

Liquiritia Medikus.

Subshrubs or perennial herbs. Roots and rhizomes very developed. Stem erect, much branched. Leaves imparipinnate, (3 or)5–17-foliolate; stipules 2, free, caducous or persistent; leaflets entire or serrulate. Racemes axillary; bracts caducous. Calyx campanulate or cylindrical, 5-toothed, slightly bilabiate. Corolla white, yellow, purple, or purple-red; standard shortly clawed; wings shorter than standard, obliquely oblong; keels joined. Stamens diadelphous or monadelphous. Ovary sessile, 2–10-ovuled. Legume ovoid, oblong, or linear, rarely moniliform, straight or curved, flat or inflated, prickly or rarely smooth, indehiscent or dehiscent. Seeds reniform or orbicular.

About 20 species: mainly in Asia and Europe, extending to Australia, and in North and South America; eight species (two endemic) in China.

- 1a. Legume orbicular, reniform, or ovoid, yellow spiny or tuberculate, with 2 seeds; leaflets lanceolate to oblong, margin spiny-serrulate.
- 2a. Legume tuberculate; racemes not globose; leaflets retuse or obtuse at apex 8. *G. squamulosa*
- 2b. Legume rigidly spiny; racemes globose or oblong; leaflets acuminate at apex.
- 3a. Racemes oblong or globose; legume abruptly acuminate at apex, sparsely rigidly spiny 6. *G. pallidiflora*
- 3b. Racemes globose or subglobose; legume cuspidate at apex, densely rigidly spiny 7. *G. yunnanensis*
- 1b. Legume linear, oblong, or orbicular, scaly glandular punctate, glandular hairy, or smooth, rarely tuberculate, with 2–8 seeds; leaflets elliptic, oblong, or ovate, rarely lanceolate.
- 4a. Legume moniliform, smooth 5. *G. aspera*
- 4b. Legume not moniliform, scaly glandular punctate, glandular hairy, or tuberculate.
- 5a. Legume zigzag 3. *G. eglanulosa*
- 5b. Legume not zigzag.
- 6a. Legume linear, falcate or curved into a ring 1. *G. uralensis*
- 6b. Legume oblong, straight or slightly curved.
- 7a. Leaflets 3–7(–9); calyx with upper 2 teeth joined to 1/2 from base 2. *G. inflata*
- 7b. Leaflets 11–17; calyx with upper 2 teeth mostly joined 4. *G. glabra*

1. Glycyrrhiza uralensis Fischer ex Candolle, Prodr. 2: 248. 1825.

甘草 gan cao

Glycyrrhiza asperima Linnaeus f. var. *desertorum* Regel; *G. asperima* var. *uralensis* (Fischer ex Candolle) Regel; *G. shiheziensis* X. Y. Li.

Herbs, perennial. Roots and rhizomes strong. Stem 30–120 cm tall, densely scaly glandular punctate and white or brown tomentose. Leaves 5–20 cm, 5–17-foliolate; stipules triangular-lanceolate, ca. 5 × 2 mm, densely white pubescent; petiole densely brown glandular punctate and pubescent; leaflets ovate, narrowly ovate, or orbicular, 1.5–5 × 0.8–3 cm, densely glandular punctate and pubescent, base rounded, margin entire or repand, apex obtuse and mucronate. Racemes much flowered; rachis shorter than leaf, densely brown glandular punctate and pubescent; bracts brown, oblong-lanceolate, 3–4 mm, membranous, yellow glandular and pubescent. Calyx campanulate, 7–14 mm, densely yellow glandular punctate and pubescent, inflated to saccate at base, 5-toothed; upper 2 teeth mostly joined. Corolla purple, white, or yellow, 1–2.4 cm; standard oblong, base shortly clawed, apex retuse; wings shorter than standard;

keel shorter than wings. Ovary densely glandular. Legume falcate to curved into a ring, densely tuberculate and glandular hairy. Seeds 3–11, dark green, orbicular or reniform, ca. 3 mm. Fl. Jun–Aug, fr. Jul–Oct. $2n = 16^*$.

Sandy lands, dry riverbanks, grasslands on hills; 400–2700 m. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan].

2. Glycyrrhiza inflata Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 484. 1891.

胀果甘草 zhang guo gan cao

Glycyrrhiza eurycarpa P. C. Li; *G. hediniana* Harms; *G. paucifoliolata* Hance.

Herbs, perennial. Roots and rhizomes strong. Stem 50–150 cm tall, woody at base. Leaves 4–20 cm, 3–7(or 9)-foliolate; stipules caducous, brown, triangular-lanceolate, small, ca. 1 mm; petiole densely brown glandular punctate, densely pubescent when young; leaflets ovate, elliptic, or oblong, 2–6 × 0.8–3 cm, brown glandular punctate, sparsely pubescent on veins, base rounded, margin somewhat undulate, apex acute or obtuse. Racemes with rachis shorter than or ca. as long as leaves,

densely glandular punctate, densely hairy when young; bracts oblong-lanceolate, ca. 3 mm, densely glandular punctate and pubescent. Calyx campanulate, 5–7 mm, densely glandular punctate and pubescent, 5-toothed; upper 2 teeth joined to 1/2 from base. Corolla purple or light purple; standard narrowly elliptic, 6–9(–12) × 4–7 mm, base shortly clawed, apex rounded; wings ca. as long as standard, obviously auriculate and clawed; keel shorter, auriculate and clawed. Legume straight or slightly curved, elliptic or oblong, 8–30 × 5–10 mm, inflated or somewhat constricted between seeds, brown glandular punctate and glandular hairy, sparsely villous. Seeds 1–4, green, orbicular, 2–3 mm in diam. Fl. May–Jul, fr. Jun–Oct. $2n = 16^*$.

Riverbanks, dry stream banks, margins of farms, wastelands; ca. 1100 m. Gansu, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan].

3. *Glycyrrhiza eglandulosa* X. Y. Li, Bull. Bot. Res., Harbin 13: 29. 1993.

无腺毛甘草 wu xian mao gan cao

Herbs, perennial. Roots and rhizomes strong. Stem 50–90 cm tall, sparsely brown glandular punctate, prickly, white hairy. Leaves 15–22 cm, 11–15-foliolate; petiole sparsely glandular, prickly, white hairy; leaflets ovate or elliptic, 2.3–4.5 × 0.6–1.4 cm, adaxially sparsely puberulent, densely brown glandular, base rounded or slightly cordate, margin undulate, apex obtuse. Racemes 11–19 cm, ca. as long as or longer than leaves, sparsely glandular, prickly, hairy; bracts lanceolate, white hairy. Calyx campanulate, 9–10 mm, densely brown glandular punctate and pilose; upper 2 teeth nearly joined completely. Corolla 1.2–1.6 cm; standard narrowly elliptic, 13–15 × 3–5.5 mm, base shortly clawed; wings oblong, ca. 6.5 × 1.9–2.5 mm, claw linear, auriculate. Ovary straight, densely puberulent. Legume zigzag, oblong, flat, 12–30 × 5–7 mm, pilose. Seeds 1–9. Fl. Jun–Aug, fr. Jul–Oct. $2n = 16^*$.

- Sandy areas, grasslands on hills; 300–2000 m. Xinjiang.

4. *Glycyrrhiza glabra* Linnaeus, Sp. Pl. 2: 742. 1753.

洋甘草 yang gan cao

Glycyrrhiza alalensis X. Y. Li; *G. brachycarpa* Boissier; *G. glabra* var. *caduca* X. Y. Li; *G. glabra* subsp. *glandulifera* (Waldstein & Kitaibel) Ponert; *G. glabra* var. *glandulifera* (Waldstein & Kitaibel) Regel & Herder; *G. glabra* var. *glandulosa* X. Y. Li; *G. glabra* var. *laxifoliolata* X. Y. Li; *G. glabra* var. *violacea* (Boissier & Noë) Boissier; *G. glandulifera* Waldstein & Kitaibel; *G. pallida* Boissier; *G. violacea* Boissier & Noë; *Liquiritia officinarum* Medikus, nom. illeg. superfl.

Herbs, perennial. Stem 50–150 cm tall, woody at base, densely scaly glandular punctate, white hairy. Leaves 5–14 cm, 11–17-foliolate; stipules caducous, linear, 1–2 mm; petiole densely yellow-brown glandular hairy and villous; leaflets ovate-oblong, oblong-lanceolate, or elliptic, 1.7–4 × 0.8–2 cm, abaxially densely yellow scaly glandular punctate and pubescent on veins, adaxially glabrescent or pilose, base rounded, apex rounded or retuse and with mucro. Racemes much and densely flowered; rachis densely brown scaly glandular punctate, white villous and tomentose; bracts lanceolate, ca. 2 mm,

membranous. Calyx campanulate, 5–7 mm, sparsely yellow glandular punctate and pubescent, 5-toothed; upper 2 teeth mostly joined. Corolla purple or light purple, 9–12 mm; standard ovate or oblong, 1–1.1 cm, base clawed, apex retuse; wings 8–9 mm; keel straight, 7–8 mm. Ovary glabrous. Legume oblong, flat, 17–35 × 4.5–7 mm, rarely constricted between seeds, glabrous or sparsely hairy, rarely glandular hairy. Seeds 2–8, dark green, ca. 2 mm in diam., smooth. Fl. May–Jun, fr. Jul–Sep. $2n = 16^*$.

Margins of farms, roadsides, saline areas; 500–1300 m. Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, E and S Europe, Indian Ocean islands (Maldives); introduced in Australia, C Europe, and North America].

5. *Glycyrrhiza aspera* Pallas, Reise Russ. Reich. 1: 499. 1771.

粗毛甘草 cu mao gan cao

Glycyrrhiza asperrima Linnaeus f.; *G. laxiflora* X. Y. Li & D. C. Feng; *G. laxissima* Vassilczenko; *G. macrophylla* X. Y. Li; *G. nutantiflora* X. Y. Li; *G. prostata* X. Y. Li & D. C. Feng; *G. purpureiflora* X. Y. Li.

Herbs, perennial. Roots and rhizomes slender. Stem erect or diffuse, 10–30 cm tall, sparsely pubescent and glandular hairy. Leaves 2.5–10 cm, (5 or) 7- or 9-foliolate; stipules ovate-triangular, 4–6 × 2–4 mm; petiole sparsely pubescent and glandular hairy; leaflets gray-green, ovate, broadly ovate, obovate, or elliptic, 10–30 × 3–18 mm, abaxially sparsely pubescent and glandular hairy, adaxially glabrous, base cuneate, margin small spiny-hairy. Racemes much flowered; rachis longer than leaves, pilose, glandular hairy; bracts linear-lanceolate, 3–6 mm, membranous. Calyx cylindric, 7–12 mm, sparsely pubescent, 5-toothed; upper 2 teeth slightly joined. Corolla light purple or purple; standard oblong, 13–15 × 5–6.5 mm, base narrowed to claw, apex rounded; wings 1.2–1.4 cm; keel 1–1.1 cm. Ovary glabrescent. Legume usually falcate to curved into a ring, brown, moniliform, 1.5–2.5 cm, glabrous. Seeds 2–10, black-brown, orbicular. Fl. May–Jun, fr. Jul–Aug. $2n = 16^*$.

Margins of farms, riverbanks, steppes; 100–800 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; C and SW Asia, Europe (native only in Russia)].

6. *Glycyrrhiza pallidiflora* Maximowicz, Prim. Fl. Amur. 79. 1859.

刺果甘草 ci guo gan cao

Herbs, perennial. Stem 1–1.5 m tall, striped, densely yellow-brown scaly glandular punctate, nearly glabrous. Leaves 6–20 cm, 9–15-foliolate; stipules lanceolate, ca. 5 mm; petiole glabrous, densely glandular punctate; leaflets lanceolate or ovate-lanceolate, 2–6 × 1.5–2 cm, glabrous, densely scaly glandular punctate, base cuneate, margin serrulate, apex acuminate with mucro. Racemes much flowered, oblong or globose; rachis shorter than leaves, densely brown glandular punctate and pubescent; bracts ovate-lanceolate, 6–8 mm, membranous, glandular punctate. Calyx campanulate, 4–5 mm, densely glandular punctate and sparsely pubescent at base, lanceolately 5-toothed. Corolla light purple, purple, or purple-red; standard ovate, 6–8 mm, base shortly clawed, apex rounded; wings 5–6 mm; keel

shorter than wings. Legume ovoid, $10-17 \times 6-8$ mm, rigidly spiny, apex abruptly acuminate. Seeds 2, black, ca. 2 mm. Fl. Jun-Jul, fr. Jul-Sep. $2n = 16^*$.

Riverbanks, open valleys by streams, open slopes, margins of farms, roadsides; 2600-3100 m. Hebei, Heilongjiang, Henan, N and NE Jiangsu, Liaoning, Nei Mongol, Shaanxi, Shandong, Yunnan [Mongolia, Russia].

7. *Glycyrrhiza yunnanensis* S. H. Cheng & L. K. Dai ex P. C. Li, Acta Bot. Boreal.-Occid. Sin. 4: 117. 1984.

云南甘草 yun nan gan cao

Herbs, perennial. Stem 60-100(-120) cm tall, densely scaly glandular punctate, sparsely pubescent. Leaves 8-10 cm, 7-15-foliolate; stipules lanceolate, $5-7 \times 2-3$ mm, glandular punctate, glabrous; petiole densely scaly glandular punctate, densely villous; leaflets lanceolate or ovate-lanceolate, $2-5 \times 0.7-1.5$ cm, densely scaly glandular punctate, sparsely pubescent, base cuneate, apex acuminate. Racemes much flowered, globose or subglobose; rachis shorter than leaf, densely scaly glandular punctate, villous when young; bracts lanceolate, 6-7 mm, densely glandular punctate. Calyx campanulate, ca. 5 mm, sparsely scaly glandular punctate and pubescent, 5-toothed; upper 2 teeth partly joined. Corolla purple; standard narrowly ovate or elliptic, 6-9 mm, very shortly clawed; wings 5-6 mm; keel slightly shorter than wings, clawed, auriculate. Legume dense, narrowly ovoid, $12-18 \times 4-6$ mm, densely spiny, apex cuspidate. Seeds brown, ca. 4 mm. Fl. May-Jun, fr. Jul-Sep. $2n = 16^*$.

• Near forests, open grassy slopes, farms, roadsides; ca. 2700 m. Yunnan.

8. *Glycyrrhiza squamulosa* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 5: 245; Pl. David. 1: 93. 1883.

圆果甘草 yuan guo gan cao

Astragalus glanduliferus Debeaux.

Herbs, perennial. Roots and rhizomes slender. Stem 30-60 cm tall, densely yellow scaly glandular punctate, glabrous or sparsely pubescent. Leaves 5-15 cm, 9-13-foliolate; stipules lanceolate, 2-3 mm, sparsely white pubescent, glandular punctate; petiole densely scaly glandular punctate, sparsely pubescent; leaflets narrowly elliptic to oblong-obovate, densely scaly glandular punctate, base cuneate, margin serrulate, apex usually retuse. Racemes much flowered; rachis longer than leaves, densely scaly glandular punctate, sparsely pubescent; bracts lanceolate, membranous, glandular punctate, pubescent. Calyx campanulate, 2.5-3.5 mm, densely scaly glandular punctate, sparsely pubescent, 5-toothed; upper 2 teeth slightly joined. Corolla white, abaxially densely yellow glandular punctate; standard ovate-oblong, $5-7 \times 2.5-3.5$ mm; wings 4-5 mm; keel straight, slightly shorter than wings. Legume brown, orbicular or broadly reniform, $5-10 \times 4-7$ mm, tuberculate, apex mucronate. Seeds 2, green, ca. 2 mm. Fl. May-Jul, fr. Jun-Sep.

Roadsides, wastelands; 100-1100 m. Hebei, Henan, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang [Mongolia].

26. Tribe HEDYSAREAE

岩黄耆族 yan huang qi zu

Liu Yingxin (刘媯心 Liou Yingxin, Liu Ying-hsin), Xu Langran (徐朗然 Xu Lang-rang),
Chang Zhaoyang (常朝阳), Zhu Xiangyun (朱相云), Sun Hang (孙航);
Gennady P. Yakovlev, Byoung-Hee Choi, Kai Larsen, Bruce Bartholomew

Herbs, shrublets, shrubs, or rarely small trees. Stipules often scarious, usually basally adnate to petiole and sometimes connate around stem. Leaves imparipinnate, paripinnate, 1-foliolate, or sometimes rachis reduced and apparently digitately compound; stipels absent; leaflets opposite, margin entire. Racemes axillary, sometimes shortened and apparently fasciculate or reduced to a solitary flower; bract and bracteoles small. Corolla marcescent or deciduous; standard generally narrowed to a short claw; wings sometimes very reduced; keel with leading edge \pm truncate. Stamens diadelphous (9+1); vexillary stamen free or connate in middle with others; anthers uniform, dorsifixed, with broad connective. Ovary 1- to several ovuled. Legume mostly articulate and moniliform or flattened, some not articulate or reduced to a single article (here termed a loment), indehiscent, often with bristles or spines. Seeds reniform or subreniform, with a small hilum.

Twelve genera and 400–460 species: N and NE Africa, Asia, Europe, North America; eight genera and 121 species (52 endemic, one introduced) in China.

- 1a. Leaves 1-foliolate (but also see *Corethroedendron scoparium*) 153. *Alhagi*
- 1b. Leaves pinnately compound or sometimes rachis reduced and leaves apparently digitately compound.
 - 2a. Leaves paripinnate with rachis often extending beyond last leaflet pair or rachis reduced and leaves apparently digitate.
 - 3a. Flowers solitary with pedicel articulate with a very short peduncle or 2–5 in a fascicle at end of a very short peduncle; legume cylindric or compressed 155. *Caragana*
 - 3b. Flowers 2–5 in a raceme with a 1.5–3 cm peduncle; legume inflated 156. *Halimodendron*
 - 2b. Leaves imparipinnate.
 - 4a. Legume reduced to 1 subglobose loment; annual or perennial herbs; corolla wings ca. 1/4 as long as standard 151. *Onobrychis*
 - 4b. Legume articulate and divided into (1 or) 2–5(–7) loments or else cylindric or linear and multiseeded; perennial herbs, shrublets, shrubs, or rarely small trees; corolla wings 2/5 to as long as standard, or if 1/4–1/3 as long as standard then shrublets.
 - 5a. Legume cylindric or linear and not divided into loments 154. *Calophaca*
 - 5b. Legume articulate and divided into several loments.
 - 6a. Plants spiny 152. *Eversmannia*
 - 6b. Plants unarmed.
 - 7a. Legume adaxial suture grooved; corolla standard not turned backward at anthesis, keel with claw longer than half of lamina; shrublets with stems conspicuous; corolla marcescent on mature legume; stipules deciduous; pollen colpoidate 149. *Corethroedendron*
 - 7b. Legume sutures connate or winged; corolla standard turned backward at anthesis, keel with claw half or less than half as long as lamina; perennial herbs, if shrublets then stems inconspicuous; corolla mostly deciduous at mature legume; stipules marcescent or deciduous; pollen colpate or colpoidate 150. *Hedysarum*

149. CORETHRODENDRON Fischer & Basiner, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 4: 315. 1845.

山竹子属 shan zhu zi shu

Xu Langran (徐朗然 Xu Lang-rang); Byoung-Hee Choi

Shrublets. Stems conspicuous. Stipules 2, opposite petiole, scarious, connate or free, deciduous. Leaves imparipinnate; leaflet blades opposite, margin entire. Racemes axillary, lax, many flowered; bracts marcescent or caducous. Bracteoles 2 at base of calyx. Calyx campanulate or obliquely campanulate; teeth 5, unequal or subequal. Corolla purple or pinkish purple, marcescent on mature legumes; standard longer than wings, slightly longer than keel, not turned backward at anthesis; keel with claw longer than half of lamina. Stamens diadelphous (9+1). Ovary sessile, hairy. Legume articulate, divided into several loments, indehiscent, adaxial suture grooved; loments compressed or biconvex, lanate, pubescent, or glabrous, with or without prickles.

Five species: China, Kazakhstan, Mongolia, Russia; five species (one endemic) in China.

- 1a. Leaves at apex without leaflet to only 1 at terminating rachis; legume densely lanate 1. *C. scoparium*
- 1b. Leaves normally imparipinnate; legume glabrous to pubescent.

- 2a. Calyx tube split between adaxial or lateral teeth; leaflet blades 15–31, broadly ovate to suborbicular.
 3a. Calyx obliquely campanulate, tube split between adaxial teeth 2. *C. multijugum*
 3b. Calyx 2-labiate, tube split between adaxial and lateral teeth 3. *C. krassnowii*
 2b. Calyx tube not split between teeth; leaflet blades (5–)11–19(–21), oblong, elliptic, broadly linear, or lanceolate.
 4a. Legume pubescent and prickly 4. *C. fruticosum*
 4b. Legume glabrous 5. *C. lignosum*

1. *Corethrodedendron scoparium* (Fischer & C. A. Meyer) Fischer & Basiner, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 4: 315. 1845.

细枝山竹子 xi zhi shan zhu zi

Hedysarum scoparium Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 87. 1841; *H. arbuscula* Maximowicz.

Shrublets, 0.7–2(–3) m tall. Stems pale yellow to brown, erect, with fibrous stripping. Stipules ovate-lanceolate, 5–6 mm, basally connate. Leaves 10–25 cm, basal ones 7–11-foliolate, apical ones 3- or 5-foliolate or sometimes none; leaflet blades linear-oblong to narrowly lanceolate, 1.5–3 × 0.3–0.6 cm, abaxially pilose, adaxially pubescent to glabrous. Racemes lax, with many flowers; bracts ovate, 1–1.5 mm; peduncle longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 5–6 mm, pubescent; teeth triangular, unequal, abaxial 3 longer than adaxial 2. Corolla purple; standard obovate-orbicular, 1.5–1.9 cm; wings ca. 1/2 as long as standard; keel slightly shorter than standard. Ovary pubescent. Legume divided into 2–4 loments; loments broadly ovoid, 5–6 × 3–4 mm, inflated, densely white lanate. Fl. Jun–Sep, fr. Aug–Oct. $2n = 16^*$.

Sandy areas in deserts and semideserts; 600–1100 m. Gansu, W Nei Mongol, Ningxia, Qinghai, N Shaanxi, N Xinjiang [Kazakhstan, S Mongolia].

Plants of this species are important in arid regions for dune-fixing.

2. *Corethrodedendron multijugum* (Maximowicz) B. H. Choi & H. Ohashi, Taxon 52: 573. 2003.

红花山竹子 hong hua shan zhu zi

Hedysarum multijugum Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 464. 1881; *H. multijugum* f. *albiflorum* Y. H. Wu.

Shrublets, 30–70 cm tall. Stems caespitose, erect. Stipules ovate-lanceolate, 4–6 mm, basally connate. Leaves 6–18 cm, 15–29-foliolate; leaflet blades broadly ovate to suborbicular, 5–8(–15) × 3–5(–8) mm, abaxially pubescent, adaxially glabrous. Racemes lax, with many flowers; peduncle conspicuously longer than leaves. Pedicel 1–2 mm; bracteoles ± as long as pedicel. Calyx obliquely campanulate, 5–6 mm, pubescent; tube split ca. 1/2 between adaxial teeth; teeth subulate, 1/4–1/3 as long as tube, most abaxial one ca. 2 × as long as others. Corolla purple, pinkish purple, or rarely white; standard broadly ovate, 1.7–2 cm; wings ca. 1/2 as long as standard; keel slightly shorter than wings. Ovary pubescent. Legume usually divided into 2 or 3 loments; loments ellipsoid to semiglobose, 3.5–4.5 × 3–4 mm, pubescent and prickly. Fl. Jun–Aug, fr. Aug–Sep.

• Gravelly areas, stony slopes; 500–3800 m. Gansu, Hebei, W Henan, W Hubei, W Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, NW Sichuan, NE Xizang.

3. *Corethrodedendron krassnowii* (B. Fedtschenko) B. H. Choi & H. Ohashi, Taxon 52: 573. 2003.

帕米尔山竹子 pa mi er shan zhu zi

Hedysarum krassnowii B. Fedtschenko, Bull. Herb. Boissier, sér. 2, 4: 916. 1904.

Shrublets, 60–100 cm tall. Stems erect, many branched, internodes short. Stipules brown, lanceolate, basally connate. Leaves 9–20 cm, 15–31-foliolate; leaflet blades elliptic to almost orbicular, 3–9 × 3–7 mm, abaxially slightly unevenly sericeous, adaxially glabrous, base subrounded to slightly cuneate, apex obtuse to slightly emarginate. Racemes lax, 6–16-flowered; peduncle ca. 2 × as long as leaves. Pedicel ca. 2 mm. Calyx teeth almost as long as tube. Corolla purple, 1.1–1.8 cm; standard obovate, apex emarginate; wings narrowly lanceolate, to almost 2 × as long as keel; keel almost semiorbicular to oblong, shorter than standard. Legume sericeous; loments 1 or 2, 4–7 × 4–6 mm. Fl. Jun–Jul, fr. Jul.

Mountain slopes, roadsides; 2100–3000 m. W Xinjiang (Pamir Shan) [Kyrgyzstan, Tajikistan].

4. *Corethrodedendron fruticosum* (Pallas) B. H. Choi & H. Ohashi, Taxon 52: 573. 2003.

山竹子 shan zhu zi

Shrublets, 30–80 cm tall. Stems caespitose, erect. Stipules ovate-lanceolate, 4–5 mm, basally connate. Leaves 8–14 cm, 11–19-foliolate; leaflet blades elliptic to oblong, 1.4–2.2 × 0.3–0.6 cm, abaxially densely pubescent, adaxially sparsely pubescent. Racemes lax, with many flowers; bracts triangular-ovate, ca. 1 mm; peduncle longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 5–6 mm, pubescent; teeth triangular, ± equal, ca. 1/2 as long as tube. Corolla purple; standard obovate-orbicular, 1.4–2 cm; wings ca. 1/3 as long as standard; keel slightly shorter than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments ellipsoid, 5–7 × 3–4 mm, inflated, pubescent, prickly or not. Fl. Jul–Aug, fr. Aug–Sep.

Sandy areas in steppes; 600–1100 m. Heilongjiang, Jilin, W Liaoning, NE Nei Mongol [E Mongolia, E Russia].

Plants of this species are cultivated for sand-dune stabilization and for fodder.

- 1a. Loments prickly 4a. var. *fruticosum*
 1b. Loments not prickly 4b. var. *mongolicum*

4a. *Corethrodedendron fruticosum* var. *fruticosum*

山竹子(原变种) shan zhu zi (yuan bian zhong)

Hedysarum fruticosum Pallas, Reise Russ. Reich. 3: 753. 1776.

Loments pubescent and prickly.

Sandy areas in steppes; ca. 1100 m. Heilongjiang, Jilin, W Liaoning, NE Nei Mongol [E Mongolia, E Russia].

4b. *Corethrodedron fruticosum* var. *mongolicum* (Turczaninow) Turczaninow ex Kitagawa, Lin. Fl. Manshur. 285. 1939.

蒙古山竹子 meng gu shan zhu zi

Hedysarum mongolicum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 15: 781. 1842; *H. fruticosum* var. *gobicum* Y. Z. Zhao, R. Sha & R. Cao; *H. fruticosum* subsp. *mongolicum* (Turczaninow) B. Fedtschenko; *H. fruticosum* var. *mongolicum* (Turczaninow) Turczaninow ex Kitagawa.

Loments pubescent but not prickly.

- Sandy areas; 600–800 m. W Liaoning, NE Nei Mongol.

Corethrodedron fruticosum var. *mongolicum* was reported from Ningxia (Fl. Ningxiaensis, ed. 2, 1: 487. 2007), but this occurrence needs to be confirmed.

5. *Corethrodedron lignosum* (Trautvetter) L. R. Xu & B. H. Choi, **comb. nov.**

木山竹子 mu shan zhu zi

Shrublets, 60–100 cm tall. Stems caespitose, erect. Stipules ovate-lanceolate, 4–5 mm, basally connate. Leaves 10–20 cm, (5–)11–21-foliolate; leaflet blades broadly linear, lanceolate, or elliptic, 2–3 × 0.2–0.4(–0.6) mm, abaxially pubescent, adaxially sparsely pubescent or glabrous. Racemes lax, with 8–12 flowers; bracts triangular, 1/4–1/3 as long as pedicel; peduncle longer than leaves. Pedicel 3–4 mm. Calyx campanulate, 4–5 mm, pubescent; teeth shortly triangular or triangular, ca. 1/3 or 1/2 as long as tube. Corolla purple; standard obovate, 1.8–2 cm; wings ca. 1/4 or 1/3 as long as standard; keels ± as long as wings. Ovary pubescent. Legume divided into 2 or 3 loments; loments ellipsoid, 4–6 × 3–4 mm, inflated, glabrous. Fl. Jul–Aug, fr. Aug–Sep.

Sandy areas. W Liaoning, Nei Mongol, E Ningxia, N Shaanxi, NW Shanxi [Mongolia].

- 1a. Calyx teeth triangular, ca. 1/2 as long as tube; wings ca. 1/3 as long as standard ... 5a. var. *lignosum*
- 1b. Calyx teeth shortly triangular, ca. 1/3 as long as tube; wings ca. 1/4 as long as standard 5b. var. *laeve*

5a. *Corethrodedron lignosum* var. *lignosum*

木山竹子(原变种) mu shan zhu zi (yuan bian zhong)

Basionym: *Hedysarum lignosum* Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 1: 176. 1872; *H. fruticosum* Pallas var. *hybridum* H. C. Fu; *H. fruticosum* subsp. *lignosum* (Trautvetter) B. Fedtschenko; *H. fruticosum* var. *lignosum* (Trautvetter) Kitagawa.

Calyx teeth triangular, ca. 1/2 as long as tube. Corolla wings ca. 1/3 as long as standard.

Sandy areas. W Liaoning, NE Nei Mongol [Mongolia].

5b. *Corethrodedron lignosum* var. *laeve* (Maximowicz) L. R. Xu & B. H. Choi, **comb. nov.**

塔落山竹子 ta luo shan zhu zi

Basionym: *Hedysarum laeve* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 464. 1881; *H. fruticosum* subsp. *laeve* (Maximowicz) B. Fedtschenko; *H. fruticosum* var. *laeve* (Maximowicz) H. F. Fu ex L. R. Xu.

Calyx teeth shortly triangular, ca. 1/3 as long as tube. Corolla wings ca. 1/4 as long as standard.

- Sandy areas. Nei Mongol, E Ningxia, N Shaanxi, NW Shanxi.

Plants of this taxon are effective for dune-fixing.

150. *HEDYSARUM* Linnaeus, Sp. Pl. 2: 745. 1753, nom. cons.

岩黄耆属 yan huang qi shu

Xu Langran (徐朗然 Xu Lang-rang); Byoung-Hee Choi

Stracheya Benth.

Herbs, rarely shrublets or shrubs. Stipules 2, opposite petiole, scarious, connate or free, marcescent or deciduous. Leaves imparipinnate; leaflet blades opposite, margin entire. Racemes axillary, lax to capitate; bracts marcescent or caducous. Bracteoles 2, at base of calyx. Calyx campanulate to obliquely campanulate; teeth 5, ± equal or unequal. Corolla purple, pink, yellow, or white; standard usually longer than wings, shorter or rarely as long as or longer than keel, turned backward at anthesis; keel with claw half or less than half as long as lamina. Stamens diadelphous (9+1). Ovary sessile to stipitate, with a few ovules. Legume articulate, usually divided into several loments, indehiscent, sutures connate or winged; loments compressed to biconvex, with veins, ribs, bristles, or spines, margin usually distinct.

About 160 species: N Africa, Asia, Europe, North America; 41 species (17 endemic) in China.

- 1a. Adaxial calyx teeth 1.5–4 × as long as tube; legume usually prickly or ribbed (but unknown for some species); leaflet blades leathery, lateral veins obscure.
- 2a. Legume loments without conspicuous septa, with triangular and irregular prickles along margins; stipules apically connate 1. *H. tibeticum*
- 2b. Legume loments with conspicuous septa, without prickles or with linear and regular prickles along margins; stipules mostly apically distinct.
- 3a. Stems longer than 15 cm.
 - 4a. Corolla pale yellow 29. *H. dahuricum*
 - 4b. Corolla purple or pinkish purple.

- 5a. Corolla wings ca. 2/5 as long as standard 30. *H. brachypterum*
- 5b. Corolla wings 1/2–3/4 as long as standard.
- 6a. Stems ascending, 15–20 cm tall; corolla 1.5–1.7 cm 31. *H. gmelinii*
- 6b. Stems erect to ascending at base, 30–90 cm tall; corolla 1–1.4 cm.
- 7a. Leaflet blades narrowly elliptic to lanceolate, 1–1.2 × 0.3–0.5 cm 32. *H. songaricum*
- 7b. Leaflet blades oblong-ovate, 3–3.5 × 0.6–0.7 cm 33. *H. shanense*
- 3b. Stems 4 cm or less.
- 8a. Leaflet blades adaxially glabrous, subglabrous, or with scattered trichomes.
- 9a. Calyx teeth 2–3 × as long as tube; corolla wings 1/4–1/3 as long as standard; leaflets 4–9 mm 34. *H. petrovii*
- 9b. Calyx teeth 1.5–2 × as long as tube; corolla wings ca. 1/5 as long as standard; leaflets 12–16 mm 35. *H. setigerum*
- 8b. Leaflet blades adaxially sparsely pilose, sparsely pubescent, or pubescent.
- 10a. Leaves 13–24-foliolate 36. *H. kumaonense*
- 10b. Leaves 3–13-foliolate.
- 11a. Leaflet blades ovate or broadly ovate; legume tomentose or pubescent.
- 12a. Leaves 3–7-foliolate 37. *H. iliense*
- 12b. Leaves 7- or 9-foliolate 38. *H. splendens*
- 11b. Leaflet blades narrowly ovate-lanceolate, lanceolate-elliptic, ovate-oblong, narrowly elliptic, ovate, or ovate-elliptic; legume with dense hyaline scalelike trichomes (unknown for *H. setosum*).
- 13a. Stems 1–2 cm; leaflet blades narrowly ovate-lanceolate to lanceolate-elliptic, 1.2–1.5 cm 39. *H. krylovii*
- 13b. Stems inconspicuous; leaflet blades ovate-oblong, narrowly elliptic, ovate, or ovate-elliptic, 0.6–0.9 cm.
- 14a. Corolla 1.2–1.4 cm; calyx 7–8 mm; plants 5–15 cm tall 40. *H. ferganense*
- 14b. Corolla 1.7–2 cm; calyx 8–10 mm; plants 15–20 cm tall 41. *H. setosum*
- 1b. Adaxial calyx teeth ± as long as to shorter than tube; legume surfaces without prickles or ribs; leaflet blades membranous, lateral veins conspicuous.
- 15a. Loments with a ca. 1 mm dentate margin 2. *H. dentatoalatum*
- 15b. Loments with a 0.5 mm or less dentate or entire margin (unknown for *H. xizangense*).
- 16a. Loments pyramidal 3. *H. trigonomerum*
- 16b. Loments ovoid, globose, subglobose, ellipsoid, or rhomboid (unknown for *H. xizangense*).
- 17a. Corolla yellow.
- 18a. Calyx teeth ± equal.
- 19a. Leaves 9–15-foliolate; leaflet blades 1–2 cm wide.
- 20a. Racemes distinctly longer than leaves; loment margins entire 6. *H. flavescens*
- 20b. Racemes ± as long as leaves; loment margins dentate 7. *H. semenovii*
- 19b. Leaves 13–33-foliolate; leaflet blades 0.4–0.7 cm wide.
- 21a. Leaves 13–27-foliolate; leaflet blades long ovate to ovate-lanceolate, abaxially dark brownish and adaxially greenish 4. *H. limitaneum*
- 21b. Leaves 27–33-foliolate; leaflet blades ovate-oblong, abaxially and adaxially greenish 5. *H. thiochroum*
- 18b. Most abaxial calyx tooth 2–3 × as long as others.
- 22a. Bracts marcescent, 1/4–2/3 as long as pedicels 8. *H. polybotrys*
- 22b. Bracts caducous, ca. 2/3 as long as to longer than pedicels.
- 23a. Loment wings inconspicuous, entire; calyx densely pubescent 9. *H. citrinum*
- 23b. Loment wings conspicuous, dentate; calyx sparsely pubescent.
- 24a. Adaxial most calyx tooth 0.7–1.5 × as long as tube, others less than 1/2 as long as tube; pedicel 5–6 mm 10. *H. ussuriense*
- 24b. Adaxial most calyx tooth 1.5–2 × as long as tube, others 1/2 to as long as tube; pedicel 3–4 mm 11. *H. taipeicum*
- 17b. Corolla pinkish purple to dark purple (red but apically dark purple in *H. kirghisorum*, unknown for *H. longigynophorum*).
- 25a. Auricle of corolla wing less than 1/2 as long of claw; calyx teeth subulate, apex long cuspidate 18. *H. falconeri*
- 25b. Auricle of corolla wing as long as claw; calyx teeth triangular, triangular-subulate, or lanceolate, apex not long cuspidate.
- 26a. Leaflet blades adaxially pubescent, sericeous, or tomentose.
- 27a. Corolla wings equal to or longer than keel; calyx with adaxial 2 teeth connate 19. *H. campylocarpon*
- 27b. Corolla wings shorter than keel; calyx teeth not connate.
- 28a. Leaflet blades narrowly ovate to ovate, 20–24 × 7–9 mm; bracteoles shorter, 0.4–0.7 mm; lateral veins conspicuous 28. *H. taoriparium*
- 28b. Leaflet blades broadly ovate to suborbicular, 6–10 × 5–10 mm; bracteoles longer, 3.5–5 mm; lateral veins sometimes inconspicuous 20. *H. pseudastragalus*
- 26b. Leaflet blades adaxially glabrous.

- 29a. Corolla keel shorter than standard and wing, wings not curved upward at apex; legume often inconspicuously constricted between lomenta at abaxial suture 12. *H. inundatum*
- 29b. Corolla keel longer than standard or wing, wings curved upward at apex; legume conspicuously constricted between lomenta.
- 30a. Bracts obovate to obtuse, apex usually dentate; rhizomes often with tubercle; leaflet blades obovate, elliptic, or suborbicular 21. *H. algidum*
- 30b. Bracts ovate or obovate, apex acute or acuminate; rhizomes without tubercle; leaflet blades ovate, elliptic, or oblong.
- 31a. Pedicel 1.5–2.5 cm 25. *H. jinchanense*
- 31b. Pedicel 0.2–0.6 cm.
- 32a. Lomenta 1 or 2, rhomboid 24. *H. longigynophorum*
- 32b. Lomenta (1 or)2–5, ovate, obovate, or elliptic.
- 33a. Adaxial calyx teeth 1/5–1/3 as long as tube.
- 34a. Bract marcescent; racemes densely flowered 13. *H. alpinum*
- 34b. Bract caducous; racemes laxly flowered 14. *H. laxiflorum*
- 33b. Adaxial calyx teeth ca. 1/2 as long as to equal to tube.
- 35a. Lomenta acute at apex; stem and leaves sericeous.
- 36a. Corolla wings longer than standard; leaflet blades 2–4 cm; legume pubescent 26. *H. fistulosum*
- 36b. Corolla wings shorter than standard; leaflet blades 1–1.5 cm; legume glabrous 15. *H. nagarzense*
- 35b. Lomenta obtuse at apex; stem and leaves tomentose.
- 37a. Corolla 2.1–2.5 cm 22. *H. tanguticum*
- 37b. Corolla 1.2–2 cm.
- 38a. Leaflet blades 1.9–3 × 0.6–1.4 cm.
- 39a. Corolla red, with dark purple at apex; bracts slightly longer than pedicel; plants 15–30 cm tall 16. *H. kirghisorum*
- 39b. Corolla purple, not dark purple at apex; bracts ca. 2 × as long as pedicel, subequal to calyx teeth; plants 30–60(–90) cm tall 17. *H. neglectum*
- 38b. Leaflet blades 1–1.6 × 0.5–0.9 cm.
- 40a. Racemes dense; pedicel 2–3 mm; calyx teeth narrowly lanceolate; corolla standard long obovate, 1.2–1.4 cm, keel 1–2 mm longer than standard 23. *H. sikkimense*
- 40b. Racemes lax; pedicel 3–4 mm; calyx teeth triangular-lanceolate; corolla standard obovate, 1.4–1.5 cm, keel 2–3 mm longer than standard 27. *H. xizangense*

1. *Hedysarum tibeticum* (Benth) B. H. Choi & H. Ohashi, Taxon 52: 574. 2003.

藏豆 zang dou

Stracheya tibetica Benth, Hooker's J. Bot. Kew Gard. Misc. 5: 307. 1853; *Astragalus toktjenensis* Ulbrich.

Herbs, perennial, 4–5 cm tall. Stems abbreviated, inconspicuous. Stipules brown, ovate, 7–10 mm, membranous, apically connate. Leaves 4–7 cm, 11–15-foliolate; leaflet blades long ovate to elliptic, 8–10 × 3–5 mm, abaxially appressed pubescent, adaxially glabrous. Racemes corymbose, with 3–6 flowers; bracts ovate, ca. 2 × as long as pedicel; peduncle as long as to shorter than leaves. Pedicel 1–2 mm; bracteoles 2, small. Calyx obliquely campanulate, 7–8 mm, pilose; teeth lanceolate, as long as to slightly longer than tube. Corolla reddish; standard obovate, 1.5–1.8 cm; wings slightly shorter than standard; keel ± as long as standard. Ovary glabrous, sessile; ovules 2–5. Legume long obovoid, inconspicuously septate into 2–5 segments, 1.5–2.5 cm, slightly inflated, banded, pubescent, with 1–1.5 mm prickles along margin and lateral midline. Fl. Jul–Aug, fr. Aug–Sep.

Alpine meadows; 4000–4600 m. SW Qinghai, Xizang [India (Sikkim), Kashmir, Nepal, N Pakistan].

2. *Hedysarum dentatoalatum* K. T. Fu, Fl. Tsinling. 1(3): 448. 1981.

齿翅岩黄耆 chi chi yan huang qi

Herbs, perennial, 60–80 cm tall. Stems caespitose, erect. Stipules triangular-lanceolate, 5–6 mm, basally connate. Leaves 12–20 cm, 11–21-foliolate; leaflet blades oblong-ovate to ovate-lanceolate, 2–2.5(–5) × 1–1.7 cm, abaxially sparsely pubescent, adaxially glabrous. Racemes lax, with many flowers; bracts ± as long as pedicel; peduncle longer than to ± as long as leaves. Pedicel 3–4 mm. Calyx campanulate, 5–6(–11) mm; teeth linear-lanceolate, 1.5–2 × as long as tube. Corolla unknown. Legume divided into 2 or 3(or 4) lomenta; lomenta subglobose to ellipsoid, 8–12 × 7–10(–12) mm, compressed, pilose, margin 1(–3) mm and deeply dentate. Fr. Jun.

• Shrublands; ca. 1200 m. Shaanxi (E Qin Ling).

This species is a good fodder plant.

One of us (Choi) has seen no specimens of this species.

3. *Hedysarum trigonmerum* Handel-Mazzetti, Symb. Sin. 7: 562. 1933.

三角莢岩黄耆 san jiao jia yan huang qi

Herbs, perennial, 50–70 cm tall. Stems erect. Stipules small. Leaves 8–13 cm, 7–13-foliolate; leaflet blades elliptic to ovate-oblong, 1.2–2.5 × 0.4–0.8 cm. Racemes lax, with many flowers; peduncle ± as long as leaves. Pedicel 5–8 mm. Calyx obliquely campanulate; teeth unequal, most abaxial tooth linear and ca. 2 × as long as others, other 4 teeth triangular. Legume divided into 4 lomenta; lomenta pyramidal, ca. 7 × 5–6 mm.

- Meadows, shrublands. S Gansu (Zhugqu).

No specimens of this species have been seen by the authors.

4. *Hedysarum limitaneum* Handel-Mazzetti, Symb. Sin. 7: 564. 1933.

滇岩黄耆 *dian yan huang qi*

Herbs, perennial, 20–40 cm tall. Stems caespitose, erect. Stipules broadly lanceolate, 1.5–2 cm, connate farther than middle. Leaves 8–14 cm, 13–27-foliolate; leaflet blades long ovate to ovate-lanceolate, 1.5–2 × 0.5–0.7 cm, abaxially dark brownish and pilose along veins, adaxially glabrous. Racemes lax, with many flowers; bracts subulate-lanceolate, slightly longer than pedicel; peduncle longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 8–10 mm, pubescent; teeth lanceolate-triangular, ± as long as tube, most abaxial tooth slightly longer than others. Corolla yellow; standard long obovate, 1.4–1.6 cm; wings ± as long as standard; keel 1–2 mm longer than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments ellipsoid to long ovoid, 5–6 × 3–4 mm, compressed, pubescent, margin narrow and dentate. Fl. Jun–Aug, fr. Aug–Sep.

- Forests, meadows; 3200–4000 m. Qinghai, SW Sichuan, E Xizang, NW Yunnan.

5. *Hedysarum thiochrom* Handel-Mazzetti, Symb. Sin. 7: 563. 1933.

中甸岩黄耆 *zhong dian yan huang qi*

Herbs, perennial, ca. 75 cm tall. Stems caespitose, erect. Stipules triangular-lanceolate, 1–1.5 cm, connate farther than middle. Leaves 8–12 cm, 27–33-foliolate; leaflet blades ovate-oblong, 1.4–1.7 × 0.4–0.5 cm, abaxially usually pubescent along veins, adaxially glabrous. Racemes lax, with many flowers; bracts subulate-lanceolate, ca. 1.5 × as long as pedicel; peduncle longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 5–6 mm, pubescent; teeth lanceolate-triangular, ca. 1/2 as long as tube, most abaxial tooth slightly longer than others. Corolla yellow; standard long obovate, ca. 1.2 cm; wings slightly longer than standard; keel 2–3 mm longer than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments subglobose, 3–4 mm in diam., compressed, pubescent, margin narrow and entire. Fl. Jul–Aug, fr. Aug–Sep.

- Forests; ca. 3200 m. SW Sichuan, NW Yunnan.

6. *Hedysarum flavescens* Regel & Schmalhausen, Izv. Imp. Obsc. Ljubit. Estestv. Moskovsk. Univ. 34(2): 21. 1882.

乌恰岩黄耆 *wu qia yan huang qi*

Herbs, perennial, 30–40[–150] cm tall. Stems erect. Stipules lanceolate, 1–1.2 cm, basally connate. Leaves 10–15 cm, 9–13-foliolate; leaflet blades ovate-elliptic to ovate-orbicular, 1.2–1.5[–3.5] × 1–1.3[–2] cm, abaxially with appressed trichomes, adaxially glabrous. Racemes lax, with many flowers, distinctly longer than leaves; bracts lanceolate, slightly shorter than pedicel; peduncle longer than leaves. Pedicel 3–4 mm. Calyx shortly campanulate, 4–5 mm, pubescent; teeth subulate to triangular at base, slightly shorter than tube. Corolla yellow; standard long elliptic, 1.4–1.5 cm; wings ± as long as standard; keel ca. 2 mm longer than standard. Ovary pubescent. Legume divided into 2 or 3(or 4) loments; loments globose-ellipsoid, 5–

6 mm in diam., compressed, pubescent, margin narrow and entire. Fl. Jul–Aug, fr. Aug–Sep.

Gravelly areas along rivers; 2900–3100 m. SW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

B. Fedtschenko (in Komarov, Fl. URSS 13: 278. 1948) reported this species to be 1.5 m tall, with leaflet blades 2–3.5 × 1.7–2 cm and the most abaxial calyx tooth longer than the calyx tube.

This species is a good fodder plant.

7. *Hedysarum semenovii* Regel & Herder, Bull. Soc. Imp. Naturalistes Moscou 39(2): 39. 1866.

天山岩黄耆 *tian shan yan huang qi*

Hedysarum junatovii Yakovlev.

Herbs, perennial, 40–60[–120] cm tall. Stems caespitose, erect. Stipules lanceolate, 1–1.5 cm, connate less than to middle. Leaves 10–15 cm, 9–15-foliolate; leaflet blades ovate to elliptic, 2.5–3.5 × 1.5–2.2 cm, abaxially with appressed trichomes, adaxially glabrous. Racemes ± dense, ± as long as leaves, with many flowers; bracts narrowly lanceolate, slightly shorter than leaves; peduncle ± as long as leaves. Pedicel 4–5 mm. Calyx campanulate, ca. 5 mm, glabrous or pubescent at base; teeth subulate, ± equal, pubescent. Corolla yellow; standard long obovate, 1.2–1.4 cm; wings ± as long as standard; keel ca. 2 mm longer than standard. Ovary appressed pubescent. Legume divided into 3 or 4 loments; loments globose, ellipsoid, or obovoid, 6–7 mm in diam., compressed, pubescent to subglabrous, margin irregularly dentate. Fl. Jul–Aug, fr. Aug–Sep.

Gravelly or stony slopes; 1400–1900 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

B. Fedtschenko (in Komarov, Fl. URSS 13: 278. 1948) reported this species to be 50–120 cm tall and (in fig. 47-9) the most abaxial calyx tooth to be only slightly longer than the calyx tube.

8. *Hedysarum polybotrys* Handel-Mazzetti, Symb. Sin. 7: 563. 1933.

多序岩黄耆 *duo xu yan huang qi*

Herbs, perennial, 7–12 cm tall. Stems caespitose, erect. Stipules lanceolate, 5–7 mm, connate less than to middle. Leaves 5–9 cm, 11–19-foliolate; leaflet blades ovate, ovate-lanceolate, or ovate-oblong, 1.5–3 × 0.4–1.5 cm, abaxially with appressed trichomes, adaxially glabrous. Racemes dense, with many flowers; bracts subulate-lanceolate, marcescent, 1/4–2/3 as long as pedicels; peduncle ± as long as to longer than leaves. Pedicel 3–4 mm. Calyx obliquely campanulate, 4–5 mm, pubescent; teeth triangular-subulate, unequal, most abaxial tooth ca. 2 mm and ca. 2 × as long as others. Corolla yellow; standard long obovate, 1.1–1.2 cm; wings as long as to slightly longer than standard; keel 2–3 mm longer than standard. Ovary pubescent. Legume divided into 2–4 loments; loments subglobose to broadly ovoid, (3–)4–5(–6) mm in diam., compressed, pubescent, margin narrow and entire. Fl. Jul–Aug, fr. Aug–Sep.

- Gravelly and stony slopes, forest margins; 1200–3200 m. E and S Gansu, W Hebei, S Nei Mongol, Ningxia, N Shanxi, NW Sichuan.

The roots are used medicinally.

- 1a. Leaflet blades ovate-lanceolate to ovate-oblong, 1.5–2.4 × 0.4–0.6 cm 8a. var. *polybotrys*

- 1b. Leaflet blades ovate,
1.5–3 × 0.6–1.5 cm 8b. var. *alaschanicum*

8a. *Hedysarum polybotrys* var. *polybotrys*

多序岩黄耆(原变种) duo xu yan huang qi (yuan bian zhong)

Leaflet blades ovate-lanceolate to ovate-oblong, 1.5–2.4 × 0.4–0.6 cm. Peduncle ± as long as leaves. Legume divided into 2–4 loments; loments 3–4 mm in diam., sparsely pubescent.

- Gravelly and stony slopes. E and S Gansu, NW Sichuan.

8b. *Hedysarum polybotrys* var. *alaschanicum* (B. Fedtschenko) H. C. Fu & Z. Y. Chu, Fl. Intramongol., ed. 2, 3: 341. 1989.

宽叶岩黄耆 kuan ye yan huang qi

Hedysarum semenovii Regel & Herder var. *alaschanicum* B. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 19: 250. 1902; *H. polybotrys* var. *latifolium* L. Z. Shue; *H. przewalskii* Yakovlev; *H. vicioides* Turczaninow var. *alaschanicum* (B. Fedtschenko) Y. Z. Zhao, R. Sha & R. Cao.

Branchlets pubescent. Leaflet blades ovate, 1.5–3 × 0.6–1.5 cm.

- Forest margins, stony slopes. S Gansu, W Hebei, S Nei Mongol, Ningxia, N Shanxi.

One of us (Choi) has seen no specimens of this variety.

9. *Hedysarum citrinum* E. G. Baker, J. Bot. 73: 296. 1935.

黄花岩黄耆 huang hua yan huang qi

Herbs, perennial, 30–80 cm tall. Stems caespitose, erect. Stipules narrowly lanceolate, 1–1.3 cm, connate farther than middle. Leaves 8–16 cm, 15–19-foliolate; leaflet blades long ovate to ovate-oblong, 1.5–3 × 0.5–1 cm, abaxially sparsely pubescent, adaxially glabrous. Racemes lax, with many flowers; bracts lanceolate, 3–5 mm; peduncle as long as to longer than leaves. Pedicel 5–6 mm. Calyx obliquely campanulate, 5–6 mm, densely pubescent; teeth unequal, most abaxial tooth subulate-lanceolate and ± as long as tube, other 4 teeth lanceolate and ca. 1/2 as long as tube. Corolla yellow; standard long obovate, 1–1.2 cm; wings ± as long as standard; keel ca. 2 mm longer than standard. Ovary glabrous or pubescent. Legume divided into 2–4 loments; loments ellipsoid-obovoid, subglobose, or rhomboid, ca. 2 × 1.5 mm, compressed, glabrous, margin entire or inconspicuous. Fl. Jul–Aug, fr. Aug–Sep. $2n = 14^*$.

- Forests, scrub, stony slopes; 3200–4200 m. W Sichuan, E Xizang.

This is one of the most variable species, particularly in size and shape of parts, which differ between habitats or localities. Even in an individual plant, the loments are usually variable. In the original description, the corolla standard was reported as 1.4–1.5 cm and the loments ca. 6 × 5 mm.

10. *Hedysarum ussuriense* Schischkin & Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada S.S.S.R. 6: 11. 1926.

拟蚕豆岩黄耆 ni can dou yan huang qi

Herbs, perennial, 30–50 cm tall. Stems caespitose, erect.

Stipules broadly lanceolate, 1–1.2 cm, connate farther than middle. Leaves 7–15 cm, 11–19-foliolate; leaflet blades long ovate, 1–2.3 × 0.6–1.1 cm, abaxially pubescent along veins, adaxially glabrous. Racemes dense, with many flowers; bracts lanceolate, slightly shorter than pedicel, caducous; peduncle slightly longer than leaves. Pedicel 5–6 mm. Calyx obliquely campanulate, 5–6 mm, sparsely pubescent; teeth unequal, most abaxial tooth 0.7–1.5 × as long as tube, other 4 teeth triangular and 1/4–1/3 as long as tube. Corolla yellow; standard long obovate, 1.4–1.6 cm; wings ± as long as standard; keel ca. 2 mm longer than standard. Ovary glabrous or pubescent. Legume divided into 2 or 4 loments; loments subglobose to ovoid, 6–7 × 4–5 mm, compressed, glabrous or pubescent, margin narrow and irregularly dentate. Fl. Jul–Aug, fr. Aug–Sep.

Forests, subalpine meadows; 2500–3200 m. Hebei, E Jilin, NE Liaoning, Sichuan [N Korea, Russia (Far East)].

Plants treated as *Hedysarum vicioides* Turczaninow in FRPS (42(2): 190. 1998) belong here.

11. *Hedysarum taibeicum* (Handel-Mazzetti) K. T. Fu, Fl. Tsinling. 1(3): 72. 1981.

太白岩黄耆 tai bai yan huang qi

Hedysarum esculentum Ledebour var. *taibeicum* Handel-Mazzetti, Symb. Sin. 7: 562. 1933; *H. vicioides* Turczaninow var. *taibeicum* (Handel-Mazzetti) Liu ex B. H. Choi & H. Ohashi.

Herbs, perennial, 30–40 cm tall. Stems caespitose, erect. Stipules lanceolate, 1–1.2 cm, connate farther than middle. Leaves 10–13 cm, 15–27-foliolate; leaflet blades long ovate, oblong, or elliptic, 1.2–2 × 0.6–0.9 cm, abaxially pubescent, adaxially glabrous. Racemes dense, with many flowers; bracts narrowly lanceolate, ± as long as pedicel, caducous; peduncle as long as to longer than leaves. Pedicel 3–4 mm. Calyx campanulate, 6–8 mm, candescent; teeth lanceolate, unequal, most abaxial tooth 1.5–2 × as long as tube, lateral 2 teeth ± as long as tube, adaxial 2 teeth ca. 1/2 as long as tube. Corolla yellow; standard long obovate, 1.2–1.4 cm; wings as long as to slightly longer than standard; keel ca. 2 mm longer than standard. Ovary glabrous. Legume divided into 2–5 loments; loments obovoid to globose, 4–5 × 3–4 mm, compressed, glabrous, margin narrow and irregularly dentate. Fl. Jul–Aug, fr. Aug–Sep.

- Stony slopes, meadows; 1500–3300 m. NW Hubei, Shaanxi (Qin Ling).

12. *Hedysarum inundatum* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 11: 366. 1838.

湿地岩黄耆 shi di yan huang qi

Hedysarum connatum (B. Fedtschenko) B. Fedtschenko; *H. obscurum* Linnaeus var. *connatum* B. Fedtschenko; *H. obscurum* var. *inundatum* (Turczaninow) B. Fedtschenko.

Herbs, perennial, 10–15[–40] cm tall. Stems ascending to erect. Stipules lanceolate, 1–1.5 cm, connate farther than middle. Leaves 7–12 cm, 11–17-foliolate; leaflet blades ovate to oblong, 1.2–1.7 × 0.6–0.9 cm, abaxially sparsely pubescent, adaxially glabrous. Racemes dense, with many flowers; bracts lanceolate, slightly longer than pedicel; peduncle slightly longer

than leaves. Pedicel 2–3 mm. Calyx campanulate, 4–5 mm, pubescent; teeth triangular, \pm equal, ca. 1/2 as long as tube. Corolla purple; standard long obovate, 1.4–1.6(–1.8) cm; wings slightly shorter than standard, straight or slightly curved downward at apex; keel shorter than standard and wings. Ovary glabrous. Legume divided into 3 or 4 loments, inconspicuously constricted between loments at abaxial suture; loments ellipsoid, 5–6 \times 4–5 mm, compressed, glabrous, margin entire. Fl. Jun–Jul, fr. Jul–Aug. $2n = 8$.

Subalpine meadows; 2500–3000 m. Hebei (Xiaowutai Shan), N Shanxi [Russia (E Siberia)].

B. Fedtschenko (in Komarov, Fl. URSS 13: 270. 1948) reported this species to be 20–40 cm tall.

13. *Hedysarum alpinum* Linnaeus, Sp. Pl. 2: 750. 1753.

山岩黄耆 shan yan huang qi

Hedysarum alpinum var. *chinense* B. Fedtschenko; *H. chinense* (B. Fedtschenko) Handel-Mazzetti; *H. polybotrys* Handel-Mazzetti var. *robustum* K. T. Fu; *H. smithianum* Handel-Mazzetti.

Herbs, perennial, 50–100 cm tall. Stems numerous, erect. Stipules triangular-lanceolate, 0.8–1.4 cm, connate farther than middle. Leaves 8–12 cm, 9–21-foliolate; leaflet blades ovate-oblong, narrowly elliptic, or oblong-lanceolate, 1.5–3 \times 0.5–0.7 cm, abaxially appressed sparsely pilose to pubescent, adaxially glabrous. Racemes dense, with many flowers; bracts subulate-lanceolate, \pm as long as pedicel; peduncle as long as to longer than leaves. Pedicel 2–4 mm. Calyx campanulate, 3–5 mm, pubescent to pilose; teeth triangular-lanceolate, unequal, most abaxial tooth ca. 2/3 as long as tube, adaxial 2 teeth ca. 1/2 as long as most abaxial one. Corolla purple; standard long obovate, 0.9–1.2 cm; wings as long as to slightly longer than standard; keel 2–3 mm longer than standard. Ovary glabrous or appressed pubescent. Legume divided into 2 or 3(–5) loments; loments ellipsoid to obovoid, 4–8 \times 3–5 mm, compressed, glabrous, margin inconspicuous. Fl. Jun–Aug, fr. Jul–Sep. $2n = 14$.

Swampy meadows, taiga forests, stony slopes, scrub. S Gansu, Hebei, Heilongjiang, S Henan, Jilin, NE Nei Mongol, S Shaanxi, Shanxi, Sichuan [Kashmir, N Korea, N Mongolia, Pakistan, Russia; E and N Europe, North America].

14. *Hedysarum laxiflorum* Benth. ex Baker in J. D. Hooker, Fl. Brit. India 2: 146. 1876.

疏花岩黄耆 shu hua yan huang qi

Hedysarum alpinum Linnaeus subsp. *laxiflorum* (Benth. ex Baker) H. Ohashi & Tateishi.

Herbs, perennial, 30–120 cm tall. Stems numerous, erect. Stipules lanceolate, ca. 7 mm, connate. Leaves 10–15 cm, 17–33-foliolate; leaflet blades elliptic to oblong-elliptic, 1.5–2.5 \times 0.6–1 cm, abaxially pubescent along veins, adaxially glabrous. Racemes lax, with many flowers; bracts ovate, ca. 1/2 as long as pedicel, caducous; peduncle longer than leaves. Pedicel 4–6 mm. Calyx campanulate, 4–6 mm, glabrous or calyx teeth pubescent; teeth lanceolate, unequal, most abaxial tooth longer than others, adaxial and lateral teeth ca. 1/5 as long as tube.

Corolla purple; standard obovate, 1.4–1.5 cm; wings as long as to slightly longer than standard; keel 2–3 mm longer than standard. Ovary glabrous. Legume divided into 3 or 4 loments; loments broadly ellipsoid, 5–6 \times 4–5 mm, compressed, glabrous. Fl. Jul–Aug, fr. Aug–Sep.

W Xizang? [Kashmir, NW Pakistan].

No specimens of this species from China have been seen by the authors. It is likely that the lectotype of *Hedysarum laxiflorum* (Falconer 440), cited as being from near “West Tibet” by Baker (Fl. Brit. India 2: 146. 1846) and by H. Ohashi and Tateishi (Fl. E. Himalaya, 3rd. Rep. 368. 1975), was actually from the Karakoram mountains in NW Pakistan.

15. *Hedysarum nagarzensis* C. C. Ni, Acta Phytotax. Sin. 18: 372. 1980.

浪卡子岩黄耆 lang ka zi yan huang qi

Herbs, perennial, 30–45 cm tall. Stems numerous, erect. Stipules lanceolate, 5–7 mm, connate. Leaves 8–11 cm, 17–23-foliolate; leaflet blades oblong to ovate-elliptic, 10–15 \times 6–8 mm, abaxially pubescent along veins, adaxially glabrous. Racemes somewhat dense, with many flowers; bracts ca. 4 mm; peduncle longer than leaves. Pedicel 5–6 mm. Calyx campanulate, 7–9 mm, pilose; teeth lanceolate, unequal, most abaxial tooth ca. 5 mm and \pm as long as tube, adaxial 2 teeth ca. 4 mm. Corolla purple; standard obovate, 1.6–1.8 cm; wings shorter than standard; keel \pm as long as standard. Ovary glabrous. Legume with 1 or 2 loments; loments obliquely obovoid, 1.5–2 \times 0.8–1 cm, compressed, glabrous, margin entire, apex acute. Fl. Jul–Aug, fr. Aug–Sep.

• Gravelly alpine areas; ca. 4500 m. Xizang (Nagarzê).

16. *Hedysarum kirghisorum* B. Fedtschenko, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 11: 114. 1949.

吉尔吉斯岩黄耆 ji er ji si yan huang qi

Herbs, perennial, 15–30 cm tall. Stems numerous to caespitose, erect. Stipules ovate-lanceolate, 0.8–1.2 cm, connate farther than middle. Leaves 8–12 cm, 9–15-foliolate; leaflet blades broadly lanceolate to oblong-lanceolate, 1.9–2.5 \times 0.6–0.8 cm, abaxially pubescent, adaxially glabrous. Racemes dense, with many flowers; bracts lanceolate, slightly longer than pedicel; peduncle longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 6–8 mm, pubescent; teeth narrowly lanceolate, slightly longer to 1.5[–2.5] \times as long as tube, most abaxial tooth slightly longer than others. Corolla pale red but dark purple at apex; standard obovate, 1.4–1.5 cm; wings \pm as long as to slightly longer than standard; keel ca. 2 mm longer than standard. Ovary pubescent. Legume divided into 2–4 loments; loments globose, compressed, appressed pubescent, margin narrow and dentate. Fl. Jun–Jul, fr. Jul–Aug.

Gravelly areas, meadows, glacial till in alpine areas; 2500–3300 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

B. Fedtschenko (in Komarov, Fl. URSS 13: 274. 1948) reported the calyx teeth to be 2–2.5 \times as long as the calyx tube.

This species is a good fodder plant.

17. *Hedysarum neglectum* Ledebour, Fl. Altaic. 3: 341. 1831.

疏忽岩黄耆 *shu hu yan huang qi*

Hedysarum obscurum Linnaeus var. *lasiocarpum* B. Fedtschenko; *H. obscurum* var. *neglectum* (Ledebour) Krylov.

Herbs, perennial, 30–60(–90) cm tall. Stems several, erect. Stipules lanceolate, 1.5–9 mm, connate farther than middle. Leaves 8–12 cm, 11–15-foliolate; leaflet blades long ovate to ovate-oblong, 2–3 × 0.8–1.4 cm, abaxially sparsely pubescent, adaxially glabrous. Racemes dense, with many flowers; bracts ca. 2 × as long as pedicel, subequal to calyx teeth; peduncle longer than leaves. Pedicel ca. 2 mm. Calyx campanulate, 5–6 mm, pubescent; teeth triangular-lanceolate, ± as long as tube. Corolla purple; standard obovate, 1.3–1.4 × 0.6–0.8 cm; wings as long as to slightly shorter than standard; keel ca. 2 mm longer than standard. Ovary pubescent. Legume divided into 3 or 4 loments; loments globose to ovoid, 5–6 × 4–5 mm, compressed, appressed pubescent, margin ca. 1 mm and entire. Fl. Jul–Aug, fr. Aug–Sep.

Alpine meadows, scrub, forests; 1200–2600 m. Xinjiang (Altay Shan, W Tian Shan) [Kazakhstan, W Mongolia, E Russia].

18. *Hedysarum falconeri* Baker in J. D. Hooker, Fl. Brit. India 2: 146. 1876.

藏西岩黄耆 *zang xi yan huang qi*

Herbs, perennial, 45–60 cm tall. Stems erect, solid. Stipules connate. Leaves 15–20 cm, (11–)15–21(–27)-foliolate; leaflet blades elliptic, ovate, or oblong-elliptic, 1.5–3 × 0.6–1.5 cm, abaxially pubescent, adaxially glabrous or sparsely pubescent. Racemes with many flowers; bracts lanceolate, (1–)3–10 mm; peduncle longer than leaves. Pedicel 3–5 mm. Calyx campanulate, 7–9 mm, pilose; teeth subulate, most abaxial tooth slightly longer than others. Corolla purple; standard obovate, 1.7–2 cm; wings shorter than standard, with auricle less than 1/2 as long as claw; keel ± as long as standard. Ovary pubescent. Legume divided into 1–3 loments; loments ellipsoid, compressed, pubescent, margin irregularly dentate.

Alpine areas. W Xizang? [N Afghanistan, Kashmir, NW Pakistan].

No specimens of this species from China have been seen by the authors. It is likely that all the specimens, including the lectotype of *Hedysarum falconeri* (*Falconer 441*), that were cited as being from “West Tibet” by Baker (Fl. Brit. India 2: 146. 1846) and by H. Ohashi and Tateishi (Fl. E. Himalaya, 3rd. Rep. 377. 1975) are actually from the Karakoram mountains in NW Pakistan.

19. *Hedysarum campylocarpon* H. Ohashi, J. Jap. Bot. 49: 164. 1974.

曲果岩黄耆 *qu guo yan huang qi*

Herbs, perennial, 50–80 cm tall. Stems numerous, erect. Stipules long ovate, 1–1.5 cm, connate less than to middle. Leaves 10–15 cm, 15–19-foliolate; leaflet blades ovate to long ovate, 2–2.5 × 1.2–1.4 cm, both surfaces sparsely to densely pubescent. Racemes somewhat dense, with many flowers; bracts ± as long as pedicel; peduncle slightly longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 5–6 mm, pubescent; teeth triangular, unequal, slightly longer than tube, adaxial teeth connate

and slightly shorter than others. Corolla dark purple; standard obovate-oblong, 1.4–1.6 cm; wings slightly longer than standard; keel as long as to slightly longer than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments ellipsoid, 5–7 × 4–5 mm, compressed, appressed pubescent, margin irregularly dentate or entire. Fl. Jul–Aug, fr. Aug–Sep.

Meadows, forests; 3300–4100 m. Xizang (Gyirong) [Nepal].

20. *Hedysarum pseudastragalus* Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 427. 1922.

紫云英岩黄耆 *zi yun ying yan huang qi*

Hedysarum blepharopterum Handel-Mazzetti.

Herbs, perennial, 3–15 cm tall. Stems ascending to erect but almost acaulescent. Stipules oblong, 0.9–1.5 cm, connate farther than middle. Leaves 4–6 cm, 11–17-foliolate; leaflet blades broadly ovate to suborbicular, 6–10 × 5–10 mm, both surfaces usually sericeous, lateral veins sometimes inconspicuous. Racemes lax, with 5–8 flowers; bracts narrowly elliptic, 4–5 × as long as pedicel; peduncle ca. 2 × as long as leaves. Pedicel 1–2 mm; bracteoles 3.5–5 mm. Calyx campanulate, 0.8–1.4 cm, pilose; teeth narrowly lanceolate, equal, 2–3 × as long as tube. Corolla purple; standard broadly obovate, 1.7–2.1 cm; wings 1–2 mm longer than standard; keel 3–4 mm longer than standard. Ovary pubescent. Legume with 2–4 loments; loments obovoid to ellipsoid, 6–7 × 4–5 mm, compressed, canescent, margin narrow and entire. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows; 4300–5000 m. W Sichuan, SE Xizang, NW Yunnan.

21. *Hedysarum algidum* L. Z. Shue in W. T. Wang et al., Vasc. Pl. Hengduan Mts. 1: 974. 1993.

块茎岩黄耆 *kuai jing yan huang qi*

Herbs, perennial, 5–20 cm tall. Rhizome inflated torose. Stems several, ascending. Stipules lanceolate, 6–10 mm, connate farther than middle. Leaves 4–8 cm, 5–13-foliolate; leaflet blades obovate, elliptic, or suborbicular, 8–10 × 4–7 mm, abaxially appressed pubescent, adaxially glabrous. Racemes lax, with 6–12 flowers; bracts obovate, slightly longer than pedicel, apex obtuse and usually dentate; peduncle conspicuously longer than leaves. Pedicel 3–4 mm. Calyx campanulate, 5–6 mm, pilose; teeth triangular-lanceolate, ± as long to 1.5 × as long as tube, most abaxial tooth slightly longer than others. Corolla purple; standard obovate, 1.3–2.4 cm; wings ± as long as standard; keel slightly longer than standard. Ovary pubescent. Legume divided into 2–4 loments; loments ovoid to ellipsoid, 5–6 × 4–5 mm, compressed, pubescent, margin narrow and denticulate. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows, alpine gravelly areas; 3000–4500 m. SW Gansu, Qinghai, Sichuan, E Xizang, Yunnan.

- 1a. Corolla standard 1.3–1.6 cm; calyx teeth ± as long as tube; leaflet blades obovate to elliptic 21a. var. *algidum*
- 1b. Corolla standard (1.8–)2–2.4 cm; calyx teeth 1.2–1.5 × as long as tube; leaflet blades suborbicular 21b. var. *speciosum*

21a. *Hedysarum algidum* var. *algidum*

块茎岩黄耆(原变种) kuai jing yan huang qi (yuan bian zhong)

Hedysarum algidum var. *thyrsum* Y. H. Wu; *H. tuberosum* B. Fedtschenko (1900), not Roxburgh ex Willdenow (1825).

Leaflet blades obovate to elliptic. Corolla standard 1.3–1.6 cm. Calyx teeth \pm as long as tube.

• Alpine meadows, alpine gravelly areas; 3000–4200 m. SW Gansu, Qinghai, Sichuan.

21b. *Hedysarum algidum* var. *speciosum* (Handel-Mazzetti) Y. H. Wu, Fl. Qinghai. 2: 264. 1999.

美丽岩黄耆 mei li yan huang qi

Hedysarum tuberosum Roxburgh ex Willdenow var. *speciosum* Handel-Mazzetti, Symb. Sin. 7: 567. 1933; *H. speciosum* (Handel-Mazzetti) Yakovlev.

Leaflet blades suborbicular. Corolla standard (1.8–)2–2.4 cm. Calyx teeth 1.2–1.5 \times as long as tube.

• Alpine meadows; 3900–4500 m. SW Gansu, SE Qinghai, Sichuan, E Xizang, Yunnan.

22. *Hedysarum tanguticum* B. Fedtschenko, Bot. Centralbl. 84: 274. 1900.

唐古特岩黄耆 tang gu te yan huang qi

Hedysarum sikkimense Benth. ex Baker var. *megalanthum* H. Ohashi & Tateishi; *H. tongolense* Ulbrich.

Herbs, perennial, 15–30 cm tall. Stems several, erect to ascending from base. Stipules lanceolate, 0.8–1.2 cm, connate farther than middle. Leaves 8–15 cm, 15–25-foliolate; leaflet blades ovate-oblong, narrowly elliptic, or elliptic, 8–15 \times 4–6 mm, abaxially villous, adaxially glabrous. Racemes dense, with many flowers; bracts broadly lanceolate, ca. 2 \times as long as pedicel; peduncle conspicuously longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 6–8 mm, villous; teeth lanceolate, \pm as long as to slightly longer than tube. Corolla pinkish purple; standard broadly obovate, 2.1–2.5 cm; wings as long as standard; keel 3–4(–5) mm longer than standard. Ovary villous. Legume divided into 3 or 5 loments; loments globose to ellipsoid, 4–5 \times 3–4 mm, inflated, villous, margin inconspicuous. Fl. Jul–Aug, fr. Aug–Sep. $2n = 16^*$.

Alpine meadows, alpine scrub; 3300–4200 m. S Gansu, E Qinghai, Sichuan, E Xizang, N Yunnan [N Nepal].

This species is a good fodder plant.

23. *Hedysarum sikkimense* Benth. ex Baker in J. D. Hooker, Fl. Brit. India 2: 145. 1876.

锡金岩黄耆 xi jin yan huang qi

Hedysarum limprichtii Ulbrich; *H. sikkimense* var. *rigidum* Handel-Mazzetti; *H. sikkimense* var. *xiangchengense* L. Z. Shue.

Herbs, perennial, 5–100 cm tall. Stems several to caespitose,

ascending to erect. Stipules broadly lanceolate, 6–8(–12) mm, connate farther than middle. Leaves 5–7(–15) cm, (13–)17–23-foliolate; leaflet blades ovate-oblong, (0.7–)1.3–1.6 \times (0.3–)0.9 cm, abaxially pilose along veins and margin, adaxially glabrous. Racemes secund, dense, with many flowers; bracts lanceolate-ovate, \pm as long as pedicel; peduncle longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 4–6(–8) mm, pilose; teeth narrowly lanceolate, \pm as long as to slightly longer than tube, most abaxial tooth slightly longer than others. Corolla purple to violet; standard long obovate, 1.2–1.4 cm; wings \pm as long as standard; keel 1–3 mm longer than standard. Ovary densely pubescent. Legume with 1 or 2 loments; loments obovoid, 8–9 \times 6–7 mm, compressed, pubescent, margin irregularly dentate. Fl. Jul–Aug, fr. Aug–Sep. $2n = 14^*$.

Alpine gravelly areas, alpine meadows, forests; 3100–4500 m. S Gansu, S Qinghai, W Sichuan, E Xizang, NW Yunnan [Bhutan, India (Sikkim), E Nepal].

24. *Hedysarum longigynophorum* C. C. Ni, Acta Phytotax. Sin. 18: 373. 1980.

长柄岩黄耆 chang bing yan huang qi

Herbs, perennial, 40–80 cm tall. Stems caespitose, erect. Stipules ovate, 8–10 mm, connate farther than middle. Leaves 8–10 cm, 15–21-foliolate; leaflet blades ovate-oblong, 1.7–2.1 \times 0.4–0.6 cm, abaxially sparsely pilose, adaxially glabrous. Racemes lax, with many flowers; bracts lanceolate, \pm as long as pedicel; peduncle conspicuously longer than leaves. Pedicel 3–4 mm. Calyx campanulate, 4–5 mm, pilose; teeth lanceolate, \pm equal, slightly longer than tube. Corolla unknown. Legume divided into 2 or 3 loments, stipe 8–10 mm; loments basally obovoid and apically rhomboid, 12–15 \times 5–7 mm, compressed, pilose, margin irregularly dentate. Fl. Jul–Aug, fr. Aug–Sep.

• Subalpine stony slopes and forests; 3800–4300 m. E Xizang (Gongbo'gyamda).

One of us (Choi) has seen no specimens of this species.

25. *Hedysarum jinchuanense* L. Z. Shue, Bull. Bot. Res., Harbin 5(3): 134. 1985.

金川岩黄耆 jin chuan yan huang qi

Herbs, perennial, 40–80 cm tall. Stems numerous, erect. Stipules long ovate, 8–10 mm, connate farther than middle. Leaves 8–12 cm, 11- or 13-foliolate; leaflet blades broadly ovate, 1.5–1.9 \times ca. 0.8 cm, abaxially sparsely pilose, adaxially glabrous. Racemes dense, with many flowers; bracts lanceolate, \pm as long as pedicel; peduncle as long as to slightly longer than leaves. Pedicel 1.5–2.5 mm. Calyx campanulate, 6–8 mm, pubescent; teeth lanceolate, \pm as long as tube, most abaxial tooth slightly longer than others. Corolla purple; standard long obovate, 1.5–1.7 cm; wings \pm as long as standard; keel 1–3 mm longer than standard. Ovary appressed pubescent. Legume divided into 3 or 4 loments; loments subglobose to ellipsoid, 5–6 \times 4–5 mm, compressed, pubescent, margin inconspicuous. Fl. Jul–Aug, fr. Aug–Sep.

• Stony slopes, scrub, forest margins; ca. 3000 m. NW Sichuan.

One of us (Choi) has seen no specimens of this species.

26. *Hedysarum fistulosum* Handel-Mazzetti, Symb. Sin. 7: 564. 1933.

空茎岩黄耆 kong jing yan huang qi

Herbs, perennial, 40–120 cm tall. Stems numerous, erect to caespitose. Stipules ovate-lanceolate, 1–2.5 cm, connate farther than middle. Leaves 9–16 cm, 15–21-foliolate; leaflet blades long ovate to oblong-ovate, 2–4 × 0.6–1 cm, abaxially densely pubescent, adaxially glabrous. Racemes lax, with many flowers; bracts ± as long as pedicel; peduncle longer than leaves. Pedicel 4–5 mm. Calyx campanulate, 6–7 mm, appressed pubescent; teeth lanceolate, ± equal, as long as or slightly longer than tube. Corolla dark purple; standard obovate, 1.3–1.5 cm; wings 2–3 mm longer than standard; keel ± as long as wings. Ovary pubescent. Legume divided into 1–3 loments; loments ellipsoid to obovoid, 1.3–1.8 × 0.7–0.8 cm, compressed, pubescent, margin irregularly dentate, apex acute. Fl. Jun–Jul.

- Cliffs; ca. 3300 m. NW Yunnan.

27. *Hedysarum xizangense* C. C. Ni, Acta Phytotax. Sin. 18: 373. 1980 [*“xizangensis”*].

西藏岩黄耆 xi zang yan huang qi

Herbs, perennial, 30–40 cm tall. Stems numerous, erect. Stipules triangular, 6–10 mm, connate farther than middle. Leaves 6–10 cm, 9–17-foliolate; leaflet blades oblong to ovate-elliptic, 10–15 × 5–7 mm, abaxially pilose, adaxially glabrous. Racemes lax, with many flowers; bracts ± as long as pedicel; peduncle conspicuously longer than leaves. Pedicel 3–4 mm. Calyx campanulate, 6–8 mm, pilose; teeth triangular-lanceolate, ± as long as to slightly longer than tube, most abaxial tooth slightly longer than others. Corolla dark purple; standard obovate, 1.4–1.5 cm; wings ± as long as standard; keel 2–3 mm longer than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments (juvenile) densely appressed pubescent. Fl. Jul–Aug, fr. Aug–Sep.

- Scrub; ca. 3100 m. Xizang (Nangxian).

One of us (Choi) has seen no specimens of this species.

28. *Hedysarum taoriparium* B. H. Choi & H. Ohashi, Notes Roy. Bot. Gard. Edinburgh 45: 107. 1988.

洮河岩黄耆 tao he yan huang qi

Herbs, perennial, ca. 40 cm tall. Stems several, slender, erect, pubescent. Stipules lanceolate, 1.5–2 cm, connate farther than middle. Leaves 12–16 cm, 17–19-foliolate; leaflet blades narrowly ovate or ovate, 20–24 × 7–9 mm, abaxially and adaxially tomentose. Racemes dense, with 10–20 flowers; bracts narrowly lanceolate, 7–11 × 0.7–1 mm; peduncle as long as or longer than leaves. Pedicel 2–3.5 mm; bracteoles 0.4–0.7 mm. Calyx campanulate, 8–10 mm, pilose; teeth lanceolate, adaxial teeth slightly shorter than tube, abaxial teeth slightly longer than tube. Corolla dark purple; standard obovate, 1.8–2 cm; wings as long as standard; keel ca. 8 mm longer than standard. Ovary appressed pubescent; ovules 3 or 4. Legume unknown. Fl. Jun–Jul.

- Riverbanks; ca. 3000 m. SW Gansu.

This species was treated by X. Y. Zhu et al. (Legumes China, 416. 2007) as a synonym of *Hedysarum tanguticum*.

29. *Hedysarum dahuricum* Turczaninow ex B. Fedtschenko in Komarov, Fl. URSS 13: 290. 1948.

刺岩黄耆 ci yan huang qi

Herbs, perennial, 20–25 cm tall. Stems numerous, ascending to decumbent. Stipules ovate-lanceolate, 6–8 mm, connate farther than middle. Leaves 8–15 cm, 9–17-foliolate; leaflet blades oblong to lanceolate-ovate, 1.2–2.2 × 0.4–0.6 cm, abaxially densely appressed pubescent, adaxially glabrous. Racemes dense, capitate to ovoid, with many flowers; bracts lanceolate, slightly longer than pedicel; peduncle longer than leaves. Pedicel ca. 1 mm. Calyx campanulate, 5–6 mm, pubescent; teeth lanceolate-subulate, 2–3 × as long as tube. Corolla pale yellow; standard obovate, 1.2–1.3 cm; wings ca. 4/5 as long as standard; keel ca. 1 mm longer than standard. Ovary pubescent. Legume divided into 3–7 loments; loments subglobose, inflated, pubescent, prickly, margin inconspicuous. Fl. Jul–Aug, fr. Aug–Sep.

Gravelly areas in steppes; ca. 1000 m. E Nei Mongol [N Mongolia, E Russia].

This species is a good fodder plant.

30. *Hedysarum brachypterum* Bunge, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 2: 92. 1835.

短翼岩黄耆 duan yi yan huang qi

Herbs, perennial, 15–25 cm tall. Stems caespitose, decumbent. Stipules lanceolate, 3–4 mm, connate farther than middle. Leaves 3–5 cm, 11–19-foliolate; leaflet blades ovate, elliptic, or oblong, 4–6(–10) × 2–3 mm, abaxially appressed pubescent, adaxially glabrous. Racemes dense, ovoid, with many flowers; bracts subulate-lanceolate, ± as long as pedicel; peduncle longer than leaves. Pedicel ca. 1 mm. Calyx campanulate, 5–6 mm, pubescent; teeth lanceolate-subulate, ca. 2 × as long as tube. Corolla purple; standard broadly obovate, 7–9 mm; wings ca. 2/5 as long as standard; keel 2–3 mm longer than standard. Ovary subglabrous. Legume divided into 2–4 loments; loments globose to ellipsoid, inflated, densely pubescent, prickly, margin inconspicuous. Fl. May–Aug, fr. Jul–Sep.

- Steppes; 600–800 m. NW Hebei, C Nei Mongol, Ningxia.

31. *Hedysarum gmelinii* Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 551. 1812.

华北岩黄耆 hua bei yan huang qi

Hedysarum gmelinii var. *lineiforme* H. C. Fu.

Herbs, perennial, 15–20 cm tall. Stems numerous, decumbent to ascending. Stipules lanceolate, 7–9 mm, connate farther than middle. Leaves 6–10 cm, 11- or 13-foliolate; leaflet blades long ovate, ovate-oblong, or ovate-elliptic, 8–20 × 4–6 mm, abaxially appressed pubescent, adaxially glabrous. Racemes dense, ovoid to oblong, with many flowers; bracts ca. 2 × as long as pedicel; peduncle longer than leaves. Pedicel ca. 1 mm. Calyx campanulate, 7–10 mm, pubescent; teeth subulate-lanceolate, 1.5–2.5 × as long as tube. Corolla pinkish purple; stan-

ard obovate, 1.5–1.7 cm; wings 2/3–3/4 as long as standard; keel slightly longer than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments globose to broadly ovoid, inflated, pubescent, usually prickly, margin inconspicuous. Fl. May–Aug, fr. Jul–Sep.

Gravelly areas in steppes; 800–1800 m. C Gansu, N Hebei, Henan, Nei Mongol, Ningxia, Shanxi, N Xinjiang [Kazakhstan, Mongolia, E Russia].

Hedysarum gmelinii var. *tongtianhense* Y. H. Wu (Bull. Bot. Res., Harbin 19: 8. 1999), described from Qinghai, is unlikely to belong to this species and may not even be a *Hedysarum*.

32. *Hedysarum songaricum* Bongard, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4: 30. 1841.

准噶尔岩黄耆 zhun ga er yan huang qi

Herbs, perennial, (20–)30–70 cm tall. Stems caespitose, ascending to erect. Stipules triangular-lanceolate, 0.8–1.2 cm, connate less than to middle. Leaves 7–12 cm, 9–17-foliolate; leaflet blades narrowly elliptic to lanceolate, 1–2.5 × 0.3–0.5 cm, abaxially sparsely pilose, adaxially glabrous. Racemes dense, oblong, with many flowers; bracts lanceolate, 1–2 × as long as pedicel; peduncle longer than leaves. Flowers ascending to erect, rarely nodding. Pedicel ca. 2 mm. Calyx campanulate, 6–7 mm, pubescent; teeth lanceolate-subulate or triangular-subulate, 2–3 × as long as tube. Corolla pinkish purple; standard obovate, 1–1.2 cm; wings ca. 1/2 as long as standard; keel slightly shorter than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments globose-ovoid, 4–5 × 3–4 mm, inflated, pubescent, prickly, margin inconspicuous. Fl. Jun–Jul, fr. Jul–Aug.

Steppes, gravelly areas; 700–1200 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

This species is a good fodder plant.

- 1a. Stems ascending, 30–70 cm tall; flowers ascending to erect; calyx teeth lanceolate-subulate 32a. var. *songaricum*
 1b. Stems erect, 20–30 cm tall; flowers nodding; calyx teeth triangular-subulate 32b. var. *urumqiense*

32a. *Hedysarum songaricum* var. *songaricum*

准噶尔岩黄耆(原变种) zhun ga er yan huang qi (yuan bian zhong)

Stems ascending, 30–70 cm tall. Flowers ascending to erect. Calyx teeth lanceolate-subulate.

Steppes; 700–1200 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

32b. *Hedysarum songaricum* var. *urumqiense* L. Z. Shue, Bull. Bot. Res., Harbin 5(3): 135. 1985.

乌鲁木齐岩黄耆 wu lu mu qi yan huang qi

Stems erect, 20–30 cm tall. Flowers nodding. Calyx teeth triangular-subulate.

- Gravelly areas in steppes; 800–1000 m. N Xinjiang (Ürümqi).

33. *Hedysarum shanense* L. R. Xu & B. H. Choi, **nom. nov.**

山地岩黄耆 shan di yan huang qi

Replaced synonym: *Hedysarum songaricum* Bongard var. *montanum* B. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 19: 281. 1902; *Hedysarum montanum* (B. Fedtschenko) B. Fedtschenko in Komarov, Fl. URSS 13: 292. 1948, not *Hedysarum montanum* (Candolle) Persoon, Syn. Pl. 2: 324. 1807 [*Onobrychis montana* Candolle in Lamarck & Candolle, Fl. Franç., ed. 3, 4: 611. 1805].

Herbs, perennial, 50–90 cm tall. Stems numerous, erect. Stipules triangular-lanceolate, 0.8–1.2 cm, connate less than to middle. Leaves 8–12 cm, 11–17-foliolate; leaflet blades oblong-ovate, 3–3.5 × 0.6–0.7 cm, abaxially sparsely pilose, adaxially glabrous. Racemes dense, oblong, with many flowers; bracts lanceolate, slightly longer than pedicel; peduncle conspicuously longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 6–7 mm, pubescent; teeth lanceolate-subulate, ca. 2 × as long as tube. Corolla pinkish purple; standard 1.5–1.7 cm; wings ca. 1/2 as long as standard; keel ± as long as standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments ellipsoid to globose, 4–5 × 3–4 mm, inflated, pubescent, prickly, margin thickened. Fl. Jun–Jul, fr. Jul–Aug.

Steppes, scrub; 1100–1700 m. NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

This species is a good fodder plant.

34. *Hedysarum petrovii* Yakovlev, Novosti Sist. Vyssh. Rast. 19: 116. 1982.

贺兰山岩黄耆 he lan shan yan huang qi

Hedysarum alaschanicum Y. Z. Zhao; *H. liupanshanicum* L. Z. Shue.

Herbs, perennial, 8–15 cm tall. Stems abbreviated, inconspicuous. Stipules triangular-lanceolate, 3–5 mm, connate farther than middle. Leaves 4–8 cm, 7–11-foliolate; leaflet blades long ovate to elliptic, 4–7(–9) × 3–5 mm, abaxially densely appressed pilose, adaxially subglabrous to scattered pilose. Racemes dense, ovoid to oblong, with many flowers; bracts lanceolate, 2–3 mm; peduncle longer than leaves. Pedicel less than 1 mm. Calyx campanulate, 0.8–1.2 cm, sericeous; teeth lanceolate-subulate, 2–3 × as long as tube. Corolla pinkish purple; standard obovate, 1.2–1.4 mm; wings 1/4–1/3 as long as standard; keel as long as to slightly longer than standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments ovoid-globose, ca. 3 mm in diam., inflated, densely pubescent, prickly, margin inconspicuously thickened. Fl. Jun–Jul, fr. Jul–Aug.

- Steppes; 1100–1600 m. C Gansu, SW Nei Mongol (Helan Shan), Ningxia, N Shaanxi.

35. *Hedysarum setigerum* Turczaninow ex Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 29. 1835.

短茎岩黄耆 duan jing yan huang qi

Herbs, perennial, 10–15 cm tall. Stems abbreviated, inconspicuous. Stipules lanceolate. Leaves 8–15 cm, 9–13-foliolate; leaflet blades ovate to elliptic, 1.2–1.6 × 0.5–0.7 cm, abaxially

with dense silvery appressed trichomes, adaxially glabrous. Racemes dense, ovoid, with many flowers; bracts ovate-lanceolate, ca. 2 × as long as pedicel; peduncle longer than leaves. Pedicel less than 1 mm. Calyx campanulate, 5–6 mm, pubescent; teeth lanceolate-subulate, 1.5–2 × as long as tube. Corolla pinkish purple; standard obovate, 1–1.2 cm; wings ca. 4/5 as long as standard; keel slightly shorter than standard. Ovary pubescent. Legume divided into 3–5 loments; loments pubescent, prickly. Fl. Jul–Aug, fr. Aug–Sep.

Sandy steppes; ca. 1100 m. E Nei Mongol [Mongolia, Russia].

No specimens have been seen by the authors.

36. *Hedysarum kumaonense* Benth. ex Baker in J. D. Hooker, Fl. Brit. India 2: 145. 1876.

库茂恩岩黄耆 ku mao en yan huang qi

Herbs, perennial, 7–12 cm tall. Stems abbreviated, inconspicuous. Stipules lanceolate-ovate, 0.7–1.5 cm, connate farther than middle. Leaves [5–]7–10[–32] cm, 13–25-foliolate; leaflet blades obovate to elliptic-ovate, 7–10 × 5–7 mm, abaxially densely pilose, adaxially glabrous or sparsely pilose. Racemes dense, long ovoid, with many flowers; bracts 1.5–2 × as long as pedicel; peduncle conspicuously longer than leaves. Pedicel 2–3 mm. Calyx campanulate, 6–8 mm, grayish pilose; teeth lanceolate-subulate, ca. 2 × as long as tube. Corolla pinkish purple; standard obovate, 1.2–1.4[–1.6] cm; wings slightly shorter than standard; keel 1–2 mm longer than standard. Ovary pubescent. Legume divided into 1 or 2 loments; loments elliptic, sparsely pubescent, reticulately veined on both surfaces. Fl. Jun–Jul, fr. Jul–Sep.

Alpine steppes; 3500–3600 m. Xizang (Gyirong) [NW India, Nepal].

37. *Hedysarum iliense* B. Fedtschenko, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 14. 1937.

伊犁岩黄耆 yi li yan huang qi

Herbs, perennial, ca. 10 cm tall. Stems abbreviated, inconspicuous. Stipules basally on stems ovate, completely connate; stipules apically on stems lanceolate, basally connate. Leaves 3–5 cm, 3–7-foliolate; leaflet blades ovate, 12–14 × 5–8 mm, abaxially densely appressed pubescent, adaxially sparsely appressed pubescent. Racemes dense, long ovoid to oblong, with many flowers; bracts lanceolate; peduncle conspicuously longer than leaves. Pedicel ca. 1 mm. Calyx campanulate, 1.4–1.5 cm, pubescent; teeth linear-subulate, 2–2.5 × as long as tube. Corolla pinkish purple; standard obovate, 1.4–1.5 cm; wings ca. 1/4 as long as standard; keel as long as to slightly longer than standard. Ovary pubescent. Legume divided into 3–5 loments; loments orbicular-elliptic, shortly tomentose, with inconspicuous tubercles. Fl. May–Jul.

Steppes; ca. 600 m. NW Xinjiang [Kazakhstan].

38. *Hedysarum splendens* Fischer ex Candolle, Prodr. 2: 340. 1825.

光滑岩黄耆 guang hua yan huang qi

Hedysarum qinggilense Chang Y. Yang & N. Li.

Herbs, perennial, 15–40 cm tall. Stems abbreviated, incon-

spicuous. Stipules broadly lanceolate, 0.8–1.2 cm, connate to middle. Leaves 0.6–1.6 cm, 7- or 9-foliolate; leaflet blades broadly ovate, 1.5–2 × 1–1.6 cm, both surfaces densely silvery pubescent. Racemes lax, with many flowers; bracts lanceolate, ca. 2 × as long as pedicel; peduncle inconspicuously longer than leaves. Pedicel ca. 2 mm. Calyx campanulate, 7–9 mm, pubescent; teeth lanceolate-subulate, 3–4 × as long as tube. Corolla pinkish purple; standard broadly obovate, 1.2–1.5 cm; wings ca. 1/3 as long as standard; keel ± as long as standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments globose, 5–6 mm in diam., inflated, pubescent, with curved prickles, margin thickened. Fl. Jun–Jul, fr. Jul–Aug.

Stony slopes to gravelly areas; 600–800 m. Xinjiang (Altay Shan) [Kazakhstan].

39. *Hedysarum krylovii* Sumnevich, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1931(4): 2. 1931.

克氏岩黄耆 ke shi yan huang qi

Herbs, perennial, 10–20 cm tall. Stems 1–2 cm, ascending. Stipules ovate, 6–8 mm, connate farther than middle. Leaves 1–1.8 cm, 11–15-foliolate; leaflet blades narrowly ovate-lanceolate to lanceolate-elliptic, 12–15 × 4–7 mm, both surfaces densely silvery pubescent. Racemes lax, with many flowers; bracts narrowly lanceolate, ca. 2 × as long as pedicel; peduncle conspicuously longer than leaves. Pedicel 1.5–2 mm. Calyx campanulate, 7–10 mm, pilose; teeth lanceolate-subulate, 3–4 × as long as tube. Corolla pinkish purple; standard obovate, 1.4–1.5 cm; wings ca. 1/2 as long as standard; keel slightly shorter than standard. Ovary subglabrous. Legume divided into 2 or 3 loments; loments subglobose, 4–5 mm in diam., inflated, with densely hyaline scales, margin thickened. Fl. Jun–Jul, fr. Jul–Aug.

Stony slopes, gravelly areas; ca. 1300 m. Xinjiang (W Altay Shan) [Kazakhstan].

This species is a good fodder plant.

40. *Hedysarum ferganense* Korshinsky, Zap. Imp. Akad. Nauk Fiz.-Mat. Otd. 4: 93. 1896.

费尔干岩黄耆 fei er gan yan huang qi

Shrublets or perennial herbs, 5–15 cm tall. Stems abbreviated, inconspicuous, sometimes ligneous at base. Stipules triangular-lanceolate, 4–6 mm, connate farther than middle. Leaves 3–10 cm, 7–11(or 13)-foliolate; leaflet blades ovate-oblong to narrowly elliptic, 6–8 × 2–4 mm, abaxially densely appressed pilose, adaxially sparsely pilose. Racemes dense, oblong or capitate, with many flowers; bracts 2–3 × as long as pedicel; peduncle conspicuously longer than leaves. Pedicel ca. 1 mm. Calyx shortly campanulate, 7–8 mm, sparsely pilose; teeth lanceolate-subulate, 2–3 × as long as tube. Corolla pinkish purple; standard obovate, 1.2–1.4 cm; wings ca. 1/4 as long as standard; keel ± as long as standard. Ovary pubescent. Legume divided into 2 or 3 loments; loments subglobose, 3–4 mm in diam., inflated, with hyaline scales, usually papillate prickly, margin inconspicuously thickened. Fl. Jun–Jul, fr. Jul–Aug.

Steppes, gravelly areas; 800–4500 m. Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, N Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

Hedysarum jaxartucirdes Y. Liu ex R. Sha (Ann. Bot. Fenn. 44: 157. 2007) was described from Xinjiang (Qinghe, ca. 2400 m) as a species related to *H. ferganense*. The authors have not seen any material of this species and cannot confirm whether or not the species should be recognized.

- 1a. Racemes oblong; plants 10–15 cm tall;
leaves 8–10 cm 40a. var. *ferganense*
1b. Racemes capitate; plants 5–12 cm tall;
leaves 3–8 cm.
2a. Herbs, perennial 40b. var. *poncinsii*
2b. Shrublets 40c. var. *minjanense*

40a. *Hedysarum ferganense* var. *ferganense*

费尔干岩黄耆(原变种) fei er gan yan huang qi (yuan bian zhong)

Hedysarum polymorphum Ledebour var. *pumilum* Ledebour.

Herbs, perennial, 10–15 cm tall. Stems numerous. Leaves 8–10 cm. Racemes oblong.

Steppes; 800–1700 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

40b. *Hedysarum ferganense* var. *poncinsii* (Franchet) L. Z. Shue, Fl. Reipubl. Popularis Sin. 42(2): 215. 1998.

河滩岩黄耆 he tan yan huang qi

Hedysarum poncinsii Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 344. 1896.

Herbs, perennial, 8–12 cm tall. Stems caespitose. Leaves 6–8 cm. Racemes capitate.

Steppes; 2800–3200 m. SW Xinjiang (S Tian Shan) [Tajikistan].

40c. *Hedysarum ferganense* var. *minjanense* (K. H. Rechinger) L. Z. Shue, Fl. Reipubl. Popularis Sin. 42(2): 217. 1998.

敏姜岩黄耆 min jiang yan huang qi

Hedysarum minjanense K. H. Rechinger, Biol. Skr. 9: 185. 1958.

Shrublets, 5–6 cm tall. Stems densely caespitose, strongly ligneous at base. Leaves 3–5 cm. Racemes capitate.

Gravelly areas; ca. 4500 m. W Xinjiang (Pamir Shan) [Afghanistan, Kashmir, N Pakistan, Tajikistan].

41. *Hedysarum setosum* Vvedensky, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. S.S.R. 13: 24. 1952.

刚毛岩黄耆 gang mao yan huang qi

Herbs, perennial, 15–20 cm tall. Stems numerous, abbreviated, inconspicuous. Stipules triangular, 8–10 mm, connate farther than middle. Leaves 6–10 cm, 9–13-foliolate; leaflet blades ovate to ovate-elliptic, 6–9 × 3–5 mm, abaxially densely appressed pilose, adaxially sparsely pilose. Racemes dense, broadly ovoid, with many flowers; bracts lanceolate, 6–8 mm; peduncle conspicuously longer than leaves. Pedicel ca. 1 mm. Calyx campanulate, 8–10 mm, sericeous; teeth subulate-lanceolate, 2–2.5 × as long as tube. Corolla pinkish purple; standard broadly obovate, 1.7–2 cm; wings ca. 1/4 as long as standard; keel dark purple at apex, slightly shorter than standard. Ovary pilose. Legume not seen. Fl. Jul–Aug, fr. Aug–Sep.

Alpine steppes; 3200–3800 m. Xinjiang (S Tian Shan) [Kyrgyzstan].

151. ONOBRYCHIS Miller, Gard. Dict. Abr., ed. 4. 1754.

驴食豆属 lü shi dou shu

Xu Langran (徐朗然 Xu Lang-rang); Byoung-Hee Choi

Herbs [or shrublets]. Stipules dry membranous, connate or rarely distinct. Leaves imparipinnate; leaflet blades opposite, margin entire. Racemes axillary, with a long peduncle, with bracts and bracteoles. Calyx campanulate. Corolla purple, pinkish purple, or pale yellow. Stamens diadelphous (9+1); anthers uniform. Ovary sessile, with 1 or 2 ovules; style filiform; stigma capitate. Legume usually with 1 loment, subglobose, inflated, indehiscent, with elevated veins, usually prickly.

About 130 species: N Africa, C and SW Asia, Europe; three species (one introduced) in China.

Species of this genus are good fodder plants.

- 1a. Annuals; loment with a broad membranous margin 1. *O. pulchella*
1b. Perennials; loment with a non-membranous margin.
2a. Native species; racemes without caespitose trichomes before anthesis 2. *O. tanaïtica*
2b. Cultivated species; racemes with caespitose trichomes before anthesis 3. *O. viciifolia*

1. *Onobrychis pulchella* Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 87. 1841.

美丽红豆草 mei li hong dou cao

Herbs, annual, 40–80 cm tall. Stems simple, erect. Stipules broadly triangular, 8–11 mm, hyaline, basally connate. Leaves 6–11 cm, 9–13-foliolate; leaflet blades narrowly lanceolate to linear-oblong, 1.5–3 cm × 2–3 mm, abaxially densely pilose,

adaxially glabrous. Racemes lax, with many flowers; bracts ± as long as pedicel; peduncle inconspicuously longer than leaves. Pedicel ca. 3 mm. Calyx campanulate, 4–4.5 mm, glabrous; teeth subulate, 2–3 × as long as tube, margin pilose. Corolla pinkish purple; standard obovate, 5–6 mm; wings ca. 1/4 as long as standard; keel slightly longer than standard. Ovary glabrous. Legume with 1 loment; loment subglobose, 8–10 mm in diam., subglabrous, margin membranous and entire but repand. Fl. May–Jun, fr. Jun–Jul.

Steppes in low mountains; 600–900 m. Xinjiang (Huocheng) [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; N Africa].

2. *Onobrychis tanaitica* Sprengel, Neue Entdeck. Pflanzenk. 2: 162. 1821.

顿河红豆草 *dun he hong dou cao*

Herbs, perennial, 40–60 cm tall. Stems numerous, erect. Stipules triangular-ovate, 6–8 mm, connate farther than middle. Leaves 1–1.5(–2.2) cm, 9–13-foliolate; leaflet blades narrowly elliptic to oblong-linear, 1.2–2.5 × 0.3–0.6 cm, abaxially appressed pubescent, adaxially glabrous. Racemes densely spicate, with many flowers; bracts lanceolate, ca. 2 × as long as pedicel; peduncle conspicuously longer than leaves. Pedicel ca. 1 mm. Calyx campanulate, 6–7 mm, villous; teeth subulate-lanceolate, 2–2.5 × as long as tube. Corolla pinkish purple; standard obovate, 8–10 mm; wings ca. 1/4 as long as standard; keel ± as long as standard. Ovary pubescent. Legume with 1 loment; loment subglobose, 5–6 mm in diam., inflated, pubescent, papillose-prickly, margin narrowly thickening. Fl. Jun–Jul, fr. Jul–Aug.

Meadows, scrub on steppes; 1400–1800 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Russia (W Siberia), Turkmenistan, Uzbekistan; SW Asia, SE Europe].

3. *Onobrychis viciifolia* Scopoli, Fl. Carniol., ed. 2, 2: 76. 1772.

驴食草 *lü shi cao*

Onobrychis sativa Lamarck.

Herbs, perennial, 0.5–1.2 m tall. Stems erect, caespitose. Stipules triangular-ovate, 7–9 mm, connate farther than middle. Leaves 10–18 cm, 13–19-foliolate; leaflet blades oblong-lanceolate to lanceolate, 2–3 × 0.4–1 cm, abaxially appressed pubescent, adaxially glabrous. Racemes densely spicate, with many flowers; bracts lanceolate, ca. 2 × as long as pedicel; peduncle conspicuously longer than leaves. Pedicel ca. 1 mm. Calyx campanulate, 6–8 mm, villous; teeth subulate-lanceolate, 2–2.5 × as long as tube. Corolla pinkish purple; standard obovate, 8–10 mm; wings ca. 1/4 as long as standard; keel ± as long as standard. Ovary densely appressed pubescent. Legume with 1 loment; loment subglobose, 5–6 mm in diam., inflated, margin thickened and adaxially with prickles. Fl. Jun–Jul, fr. Jul–Aug.

Cultivated. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Shanxi [probably native to C Europe].

This species is a good fodder plant and is also important for water and soil conservation in loess plateau areas.

152. *EVERSMANNIA* Bunge in Goebel, Reise Steppen Südl. Russlands 2: 267. 1838.

刺枝豆属 *ci zhi dou shu*

Sun Hang (孙航); Bruce Bartholomew

Shrublets, spiny. Leaves imparipinnate. Racemes axillary, many flowered. Flowers shortly pedicellate. Calyx campanulate-tubular; teeth 5, lanceolate, adaxial one shorter than abaxial ones. Corolla standard oblong-obovate, as long as keel, base tapered; wings small, nearly 1/4 as long as standard; keel oblique. Stamens diadelphous (9+1). Ovary glabrous; style filiform, incurved at apex and with small stigma. Legume broadly linear, compressed, curved, leathery, glabrous; loments 1-seeded, separated from persistent thin sutures at maturity.

Four species: C Asia, E Europe, Russia; one species in China.

1. *Eversmannia subspinosa* (Fischer ex Candolle) B. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 24: 173. 1905.

刺枝豆 *ci zhi dou*

Hedysarum subspinosum Fischer ex Candolle, Prodr. 2: 343. 1825; *Eversmannia astragaloides* Regel & Schmalhausens; *E. hedysaroides* Bunge, nom. illeg. superfl.

Shrublets, 10–60 cm tall. Stems ascending, with yellowish gray peeling bark; branches sparsely spreading, with curved acute prickles to 1.7 cm, entirely covered with appressed short trichomes. Stipules lanceolate, basally nearly connate, apex acute. Leaves imparipinnate, 2–8 cm, 7–15-foliolate; petiole short; petiolules ca. 0.5 mm; leaflet blades oblong-elliptic to

obovate, 0.5–1 × 3–4 cm, base tapering into petiolule, apex acuminate. Racemes many flowered, oblong, 7–10 × 3–3.5 cm; peduncle elongate; bracts oblong, shorter than pedicels, margin scarious, apex obtuse. Flowers shortly pedicellate; bracteoles 2, at base of calyx, linear, ca. 2 mm. Calyx 4–5 × 2.5–3 mm; teeth lanceolate, apex acute. Corolla purple; standard oblong-obovate, 1.2–1.5 × 0.6–0.7 cm, apex retuse; wings lanceolate, 3.5–4 mm, base with elongate oblong auricles. Legume brown, elongate, 3–5 cm, curved, tuberculate-granular. Seeds light brown, ovoid, ± flattened, ca. 3 mm, smooth, shiny. Fl. May–Jun, fr. Jun–Jul. $2n = 16$.

Sandy steppes, dry meadows; 800–3100 m. N Xinjiang (N and W Junggar Pendi) [Afghanistan, Kazakhstan, SE Russia; SW Asia].

153. *ALHAGI* Gagnebin, Acta Helv. Phys.-Math. 2: 59. 1755.

骆驼刺属 *luo tuo ci shu*

Xu Langran (徐朗然 Xu Lang-rang); Kai Larsen

Subshrubs [or perennial herbs]. Stipules subulate. Leaves alternate, 1-foliolate; leaf blade margin entire. Racemes axillary, with bracts and bracteoles. Calyx campanulate; teeth 5, subequal. Corolla red to purple. Stamens diadelphous (9+1); anthers uniform. Ovary with many ovules; stigma capitate. Legume articulate and moniliform, indehiscent.

About five species: C Asia to Mongolia, China, and Nepal, Mediterranean region including N Africa; one species in China.

This genus contains good foliage plants and sand-fixing plants. Sugar secreted on the leaves can be used medicinally for treating headaches.

1. *Alhagi sparsifolia* Shaparenko ex Keller & Shaparenko, Sovetsk. Bot. 3–4: 167. 1993.

骆驼刺 luo tuo ci

Subshrubs, 25–50 cm tall. Stems erect, caespitose. Stipules subulate, ca. 1 mm. Leaves sessile; leaflet blade ovate, obovate, or obovate-orbicular to elliptic, 8–15 × 6–10 mm, glabrous, base cuneate, apex rounded to slightly acute. Racemes lax, 3–8-flowered; peduncle ligneous; rachis hardened, terminating in a strong spine; bracts subulate, ca. 1 mm. Pedicel 1–3 mm; bracteoles 2, at base of calyx. Calyx campanulate, 4–5 mm, pubescent; teeth triangular to subulate-triangular, 1/4–1/3

as long as tube. Corolla reddish purple; standard narrowly obovate, 8–9 mm; wings ca. 3/4 as long as standard; keel subequaling standard. Ovary sessile, glabrous. Legume straight to slightly curved, 1.2–2.5 cm, glabrous. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Desert plains, low hills; 100–700 m. C and N Gansu, W Nei Mongol, E Qinghai, E Xinjiang [Kazakhstan, Kyrgyzstan, W Mongolia, Tajikistan, Turkmenistan, Uzbekistan].

The calyx teeth are variable, even on the same plant; therefore, it is difficult to distinguish from other species westward in neighboring countries.

154. *CALOPHACA* Fischer ex Candolle, Prodr. 2: 270. 1825.

丽豆属 li dou shu

Zhu Xiangyun (朱相云); Kai Larsen

Shrubs or subshrubs. Stipules lanceolate or broadly lanceolate, large, membranous or herbaceous, adnate to base of petiole. Leaves imparipinnate, 5–27-foliolate; stipules absent; leaflet blades leathery, margin entire. Raceme 4-flowered or more; bracts and bractlets rarely persistent. Calyx tubular, oblique on pedicel; teeth 5, almost equal or adaxial 2 connate. Corolla yellow, large; standard ovate or suborbicular, erect, reflexed at margins; wings obovate-oblong or subfalcate; keel incurved, equal to wings, apex blunt. Stamens diadelphous (9+1); anthers orbicular. Ovary sessile, with glandular trichomes or pubescent; style filiform; stigma small. Legume cylindrical or linear, pubescent or with glandular trichomes, 1-loculed, inside pubescent or glabrous, 2-valved, with persistent calyx. Seeds subreniform, without a caruncle.

Five species: China, Russia; C Asia; three species (two endemic) in China.

Calophaca tianschanica (B. Fedtschenko) Boissier (Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 137. 1933; *C. nigricans* var. *tianschanica* B. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 24: 178. 1905) was recorded from Xinjiang by S. H. Cheng and L. K. Dai (Ill. Treatm. Princ. Pl. China (Leguminosae), 357–359. 1955). However, the present authors found no relevant specimens and therefore could not substantiate the occurrence of this species in China.

- 1a. Legume without glandular trichomes 1. *C. chinensis*
 1b. Legume with glandular trichomes.
 2a. Stipules 0.5–0.8 cm; peduncle densely lanuginous; calyx ca. 1 cm, appressed sericeous; seeds dark brown ... 2. *C. soongorica*
 2b. Stipules ca. 2 cm; peduncle with glandular and white long trichomes; calyx 1.5–2 cm, with glandular and white long trichomes; seeds olive-green 3. *C. sinica*

1. *Calophaca chinensis* Borissova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 243. 1961.

华丽豆 hua li dou

Shrubs, 20–40 cm tall. Stems with many branches; bark bright, glabrous, with pale yellow grains; young branches pale brown, with dense short trichomes. Stipules linear, 4–5 mm, brown, with dense short trichomes, basally connate, apex acuminate. Leaves 2–4 cm, 5–11-foliolate; leaflet blades orbicular to ovate, 4–9 × 3–6 mm, leathery, grayish white, both surfaces with dense appressed trichomes, veins conspicuous, base rounded, apex shortly acute. Inflorescences subcapitate, 4- or 5-flowered; peduncle 3–4 cm, hard, with dense spreading long trichomes; bracts 2–4 mm, base triangular, apex acuminate. Flowers ca. 2 cm; pedicel 1–2 mm, with dense trichomes; bracteoles 2, ovate or oblong, 1–2 mm, caducous, abaxially with dense short trichomes. Calyx broadly campanulate, 7–9 mm, with short white trichomes, base slightly gibbous; teeth tri-

angular-lanceolate, 1/3–1/2 as long as tube, both surfaces with dense trichomes. Corolla yellow; standard ca. 2 cm, outside with dense trichomes, lamina orbicular, ca. 1.5 cm wide, base cuneate and with a ca. 4 mm claw, apex emarginate; wings ca. 1.8 cm, lamina ca. 14 × 5 mm, outside rarely with white trichomes, basally narrowed with ca. 1.5 mm auricles and a ca. 5 mm incurved claw, apically enlarged, apex truncate to obtuse; keel ± as long as wings, outside rarely with white long trichomes, basally with a ca. 7 × 2 mm claw, auricles short and blunt, lamina ca. 6 mm wide, apex truncate. Stamens 1.5–1.8 cm; anthers orbicular, ca. 0.5 mm in diam. Ovary oblong, with appressed white trichomes; style with semiappressed trichomes but glabrous at apex. Legume 1.5–1.8 cm, ca. 5 mm wide in apical part, with dense white short trichomes, apex beaked. Seeds olive-green, ellipsoid-reniform, ca. 3 × 2 mm, glabrous, smooth. Fl. Jul–Aug, fr. Aug.

• Sunny slopes, meadows within *Spiraea*, *Artemisia*, and *Poa*; 900–1400 m. Xinjiang.

2. *Calophaca soongorica* Karelín & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 401. 1841.

新疆丽豆 *xin jiang li dou*

Calophaca hovenii Schrenk.

Shrubs 20–100 cm tall. Stems with many branches; bark pale grayish yellow, glabrous, exfoliating; young branches pale brown, sericeous or lanuginous. Stipules linear-lanceolate, 5–8 mm, membranous, pale brown, rarely with short trichomes. Leaves 3–7 cm, 7–11-foliolate; rachis and petiole rarely with short trichomes; leaflet blades orbicular to narrowly orbicular-elliptical, 4–14 × 4–10 mm, both surfaces bluish gray with a waxy layer and rarely with appressed short trichomes, veins protruding on both surfaces, base rounded, apex shortly acute. Inflorescences 5–8-flowered; peduncle 7–10 cm, hard, densely lanuginous. Flowers ca. 2.5 cm; pedicel 2–4 mm; bracteoles 2, pale brown, triangular, 2–3 mm, with dense silky appressed trichomes. Calyx campanulate, ca. 1 cm, outside rarely densely sericeous, inside rarely appressed sericeous, base oblique; teeth triangular-lanceolate to triangular, ± as long as tube. Corolla yellow, pale brown when dry; standard 2–2.5 cm, outside with dense short trichomes, base shortly clawed, lamina orbicular, apex emarginate; wings slightly shorter than standard, lamina oblong; keel shorter than wings. Legume narrowly cylindrical, 2–3 cm × 6–8 mm, with acute hard glandular appressed trichomes, with short trichomes dorsally, segments disciform. Seeds dark brown, reniform, 3–6 × 2–4 mm, glabrous, smooth. Fl. Jul–Aug, fr. Jul–Aug. $2n = 32$.

Sunny slopes in valleys, among shrubs; 1300–1400 m. Xinjiang [Kazakhstan].

3. *Calophaca sinica* Rehder, J. Arnold Arbor. 14: 210. 1933.

丽豆 *li dou*

Shrubs, 20–40 cm tall. Stems many branched; bark bright, glabrous, with pale yellow grains; young branches pale brown sericeous. Stipules linear, ca. 2 cm, brown, with dense short trichomes, basally connate, apex acuminate. Leaves 2–9 cm, 5–11-foliolate; leaflet blades orbicular to ovate, 1–2.5 × 0.7–1.8 cm, leathery, both surfaces grayish white and with dense appressed trichomes, veins conspicuous, base rounded, apex shortly acute. Inflorescences subcapitate, 4- or 5-flowered; peduncle 5–12 cm, hard, with dense spreading long trichomes; bracts 2–4 mm, base triangular, apex acuminate. Flowers ca. 2.5 cm; pedicel 3–6 mm, with dense trichomes; bracteoles 2, ovate, linear, or oblong, ca. 5 mm, caducous, abaxially with dense short trichomes. Calyx broadly campanulate, 1.5–2 cm, with short white trichomes, base slightly gibbous; teeth triangular-lanceolate, 1/3–1/2 as long as tube, both surfaces with dense trichomes. Corolla yellow; standard ca. 2.5 cm, outside with dense trichomes, lamina orbicular, ca. 1.5 cm wide, base broadly cuneate and with a ca. 4 mm claw, apex emarginate; wings ca. 2.2 cm, lamina ca. 14 × 5 mm, outside rarely with white trichomes, basally narrowed with ca. 1.5 mm auricles and a ca. 5 mm incurved claw, apically enlarged, apex truncate to obtuse; keel ca. as long as wings, outside rarely with long white trichomes, lamina ca. 6 mm wide, basally with short blunt auricles and with a ca. 7 × 2 mm claw, apex truncate. Stamens 1.5–1.8 cm; anthers orbicular, ca. 0.5 mm in diam. Ovary oblong, with white appressed trichomes; style with semiappressed trichomes but glabrous at apex. Legume 1.5–4.5 cm, ca. 9 mm wide in apical part, with dense white short trichomes and with glandular trichomes, apex beaked. Seeds olive-green, ellipsoid-reniform, ca. 3 × 2 mm, glabrous, smooth. Fl. May–Jun, fr. Jun–Aug. $2n = 16^*$.

• N-facing valley slopes, among shrubs, dunes of loess; 900–1800 m. W Hebei, Nei Mongol, Shanxi.

155. CARAGANA Fabricius, Enum., ed. 2, 421. 1763.

锦鸡儿属 *jin ji er shu*

Liu Yingxin (刘焜心 *Liou Yingxin*, *Liu Ying-hsin*), Chang Zhaoyang (常朝阳); Gennady P. Yakovlev

Shrubs or very rarely small trees. Stipules small, caducous or persistent and spinelike. Leaves paripinnate with rachis often extending beyond last leaflet pair or rachis reduced and leaves apparently digitate, 4–20-foliolate; petiole and rachis persistent or caducous, when persistent often becoming woody and spinelike; leaflet blades with margin entire, apex often cuspidate. Flowers axillary, usually solitary but sometimes 2–5 in a fascicle. Pedicel articulate; bracteoles absent or 1 to many. Calyx tubular or campanulate; teeth 5, adaxial 2 usually smaller, base saccate or not. Corolla yellow, rarely purple, pinkish, or white; standard sometimes pale yellow or orangish red; wings and keel often auriculate. Stamens diadelphous (9+1). Ovary sessile, rarely with a distinct carpodium; ovules many. Legume cylindrical or compressed, sessile or rarely stipitate.

About 100 species: temperate Asia, E Europe; 66 species (32 endemic) in China.

This genus is planted as an ornamental, as a hedge row, for soil and water conservation, for fuels, and for sand-dune stabilization.

1a. Leaves digitate, 4-foliolate.

2a. Leaves on short branchlets subsessile; calyx tube 4–7 mm; claw of corolla wings shorter than limb.

3a. Branches yellowish white, yellow, or golden yellow.

4a. Ovary glabrous; legume 3–3.5 cm, glabrous; plants to 150 cm tall 43. *C. leucophloea*

4b. Ovary densely pubescent; legume 2–3 cm, pubescent when young but glabrescent; plants to 50 cm tall 44. *C. pygmaea*

3b. Branches whitish green, grayish green, yellowish green, dark gray, greenish brown, yellowish brown, brown, or dark brown.

5a. Leaflet blades narrowly obovate to oblanceolate, 2–3 mm wide; auricle of corolla wings 1/5–1/4 as long as claw 45. *C. altaica*

5b. Leaflet blades lanceolate, lanceolate-linear, or linear, 0.5–2 mm wide; auricle of corolla wings longer.

- 6a. Leaflet blades falcate; legume 2.5–4 cm 46. *C. aurantiaca*
 6b. Leaflet blades straight; legume 2–2.5 cm.
 7a. Leaflet blades dark green but abaxially tinged ± reddish; auricle of corolla wings ca. 2/3 as long as claw 47. *C. pumila*
 7b. Leaflet blades green to grayish green; auricle of corolla wings 1/4–1/2 as long as claw.
 8a. Corolla 1.1–1.2 cm; pedicel ca. 5 mm, articulate basally; stipule spines 1–4 mm on long branchlets 48. *C. versicolor*
 8b. Corolla 0.8–1.8(–2) cm; pedicel 5–10 mm, articulate slightly basally from middle; stipule spines 4–7 mm on long branchlets 49. *C. stenophylla*
- 2b. Leaves on short branchlets petiolate (but petiole as short as 1 mm in some species and absent in *C. brachypoda*); calyx tube 6–13 mm; claw of corolla wings as long as or shorter than limb.
 9a. Calyx tube saccate or gibbous.
 10a. Corolla 2.7–3.2 cm; calyx tube 1.2–1.3 cm 50. *C. kirghisorum*
 10b. Corolla 2–2.5(–2.8) cm; calyx tube 0.6–1.1 cm.
 11a. Leaflet blade apices acute.
 12a. Pedicel 2–5 mm, articulate basally; leaflet blades oblanceolate 51. *C. brachypoda*
 12b. Pedicel 5–12 mm, articulate apically; leaflet blades linear-oblanceolate 52. *C. kansuensis*
 11b. Leaflet blade apices rounded, truncate, or emarginate.
 13a. Legume densely villous; corolla 2.5–2.8 cm; standard obovate-oblong; bark dark brown; branchlets grayish brown 53. *C. leveillei*
 13b. Legume glabrous; corolla 2–2.5 cm; standard broadly obovate; bark grayish brown; branchlets bright gray 54. *C. opulens*
- 9b. Calyx tube not or only slightly enlarged (but gibbous in *C. camilloi-schneideri*).
 14a. Corolla pinkish to reddish at least when wilted; standard oblong-obovate 55. *C. rosea*
 14b. Corolla yellow (but some species with an orange spot in middle of standard and some reddish yellow inside); standard broader (obovate, broadly obovate, ovate, broadly ovate, suborbicular, or orbicular).
 15a. Young ovary or both young ovary and young legume pubescent.
 16a. Corolla 1.5–1.8 cm; auricle of corolla wings 1/2–2/3 as long as claw 56. *C. qingheensis*
 16b. Corolla 2–3.1 cm; auricle of corolla wings 1/3–2/5 as long as claw.
 17a. Corolla 2.8–3.1 cm 57. *C. camilloi-schneideri*
 17b. Corolla 2–2.2 cm.
 18a. Pedicel 2–6 mm 60. *C. polourensis*
 18b. Pedicel 6–20 mm.
 19a. Leaflet blades obovate to oblanceolate, both surfaces densely pubescent 58. *C. licentiana*
 19b. Leaflet blades obovate-cuneate, only abaxial surface sparsely pubescent 59. *C. shensiensis*
- 15b. Ovary and legume glabrous (ovary rarely with trichomes in *C. laeta*).
 20a. Corolla 2.6–3.5 cm 65. *C. laeta*
 20b. Corolla 1.3–2.3 cm.
 21a. Corolla standard suborbicular; pedicel 9–21 mm 66. *C. frutex*
 21b. Corolla standard obovate, broadly obovate, or broadly ovate; pedicel 2–8 mm.
 22a. Legume 1–2.5(–3.5) cm; corolla 1.4–1.6 cm 61. *C. brevifolia*
 22b. Legume 3–4.5 cm; corolla 1.6–2.3 cm.
 23a. Auricle of corolla wings nearly as long as claw; standard broadly obovate, apex emarginate 62. *C. chinghaiensis*
 23b. Auricle of corolla wings 1/5–1/3 as long as claw; standard ovate or obovate, apex obtuse.
 24a. Leaflet blades 6–13 mm; legume 3–4 mm in diam. 63. *C. densa*
 24b. Leaflet blades 4–6 mm; legume 4–6 mm in diam. 64. *C. turfanensis*
- 1b. Leaves all pinnate or only pinnate on long branchlets and digitate on short branchlets, 4–20-foliolate.
 25a. All leaves 4-foliolate.
 26a. Leaves on long branchlets pinnate but on short branchlets sessile and digitate; claw of corolla wings ca. 1/3 as long as limb, auricle ± as long as claw 1. *C. dasyphylla*
 26b. Leaves on long and short branches pinnate or sometimes digitate or only on short branches sometimes digitate; claw of corolla wings ca. 1/2 as long as limb, auricle short and obtuse.
 27a. Corolla 2.8–3 cm; calyx tube 1.2–1.4 cm; apical pair of leaflets larger than others 2. *C. sinica*
 27b. Corolla 2.2–2.5 cm; calyx tube 0.6–0.8 cm; leaflets all of equal size 3. *C. ussuriensis*
- 25b. Leaves 4–20-foliolate (at least some leaves on plant with more than 4 leaflets).
 28a. Short branchlets with digitate or pinnate leaves and 4-foliolate, long branchlets with pinnate leaves and 4–8-foliolate.
 29a. Old branches yellow; legume densely villous 4. *C. tragacanthoides*
 29b. Old branches yellowish brown, reddish brown, or greenish brown; legume glabrous or pilose.

- 30a. Leaflet blades 1.5–2(–3) cm 5. *C. spinosa*
 30b. Leaflet blades 0.3–1.2 cm.
 31a. Flowers solitary or 2 or 3 in a fascicle; calyx tube 1–1.3 cm; corolla standard suborbicular 6. *C. pruinosa*
 31b. Flowers solitary or to 4 in a fascicle; calyx tube 0.8–1 cm; corolla standard broadly ovate to oblong-obovate 7. *C. erinacea*
- 28b. All branches with pinnate leaves and 4–20-foliolate.
 32a. Petiole and rachis caducous (only often caducous in *C. boisii*, rarely persistent in *C. turkestanica*).
 33a. Calyx tube campanulate (campanulate-tubular in *C. zahlbruckneri*, tubular to broadly campanulate in *C. manshurica*), length and width nearly equal; leaflet blades often longer than 1 cm.
 34a. Flowers usually in pairs on a peduncle, rarely solitary; leaves 4–8-foliolate; ovary sericeous 27. *C. soongorica*
 34b. Flowers solitary (or 2 in a fascicle in *C. zahlbruckneri*, rarely 2 in a fascicle in *C. fruticosa* and *C. manshurica*, to 3 in a fascicle in *C. boisii*, to 5 in a fascicle in *C. arborescens*); leaves 8–20-foliolate; ovary pubescent or glabrous (densely sericeous in *C. stipitata*).
 35a. Ovary and legume stipitate 28. *C. stipitata*
 35b. Ovary and legume not stipitate.
 36a. Pedicel 0.8–1.5 cm.
 37a. Leaves 10–18-foliolate; current-year branchlets reddish brown; corolla 2.3–2.5 cm 29. *C. zahlbruckneri*
 37b. Leaves 8–12-foliolate; current-year branchlets greenish brown; corolla 1.6–1.9 cm 30. *C. fruticosa*
 36b. Pedicel 1–5 cm.
 38a. Flowers solitary or 2–5 in a fascicle.
 39a. Corolla 1.6–2 cm; spinelike stipules 5–10 mm; trees 2–6 m tall 31. *C. arborescens*
 39b. Corolla 2–2.5 cm; spinelike stipules 8–15 mm; shrubs to 1.3 m tall 32. *C. boisii*
 38b. Flowers solitary (rarely 2 in a fascicle in *C. manshurica*).
 40a. Leaves 10–20-foliolate; limb of corolla keel ± cuneate 33. *C. manshurica*
 40b. Leaves 6–10-foliolate; limb of corolla keel not cuneate 34. *C. turkestanica*
- 33b. Calyx tube campanulate or tubular, length longer than width; leaflet blades often shorter than 1 cm.
 41a. Ovary and legume stipitate.
 42a. Legume falcately curved; old branches brown and glaucous; leaflets, pedicels, and current-year branchlets with dense trichomes, not glabrescent, glaucous 35. *C. davazamcii*
 42b. Legume straight; old branches bright yellow and not glaucous; leaflets, pedicels, and current-year branchlets pubescent, glabrescent, not glaucous 36. *C. purdomii*
- 41b. Ovary and legume not stipitate.
 43a. Ovary and legume densely pubescent 37. *C. pekinensis*
 43b. Ovary and legume glabrous, rarely sparsely pubescent.
 44a. Spinelike stipules 10–13 mm; claw of corolla wings ca. 1/3 as long as limb; leaflet blades glabrous 38. *C. litwinowii*
 44b. Spinelike stipules 1.5–7 mm; claw of corolla wings ca. 1/2 as long to almost as long as limb; leaflet blades with trichomes (sometimes glabrous in *C. microphylla*).
 45a. Leaflet blades obovate, obovate-oblong, or rarely almost elliptic, apex obtuse, truncate, or emarginate; legume cylindric, 4–5 cm × 4–5 mm.
 46a. Stipules usually obliquely erect; leaflet blades obovate to obovate-oblong, apex obtuse to truncate; ovary often glabrous 39. *C. microphylla*
 46b. Stipules ± deflexed hooklike; leaflet blades obovate to rarely almost elliptic, apex emarginate; ovary sparsely appressed pubescent 40. *C. potaninii*
 45b. Leaflet blades lanceolate to narrowly oblong or elliptic to obovate-elliptic, apex acute, obtuse, rounded, or rarely truncate; legume lanceolate to oblong-lanceolate, 2–3.5 cm × 5–7 mm.
 47a. Legume 2.5–3.5 cm × 5–6 mm; leaflet blades whitish green, both surfaces villous 41. *C. liouana*
 47b. Legume 2–2.5 cm × 6–7 mm; leaflet blades whitish, both surfaces densely appressed sericeous 42. *C. korshinskii*
- 32b. Petiole and rachis persistent and spinelike at least on long branchlets.
 48a. Spinelike petiole and rachis persistent on long branchlets but caducous on short branchlets.
 49a. Leaves 4–10-foliolate 8. *C. acanthophylla*
 49b. Leaves 8–18-foliolate.
 50a. Leaflet blades obovate-lanceolate, apex acuminate; calyx tube 1–1.5 cm 9. *C. crassispinia*
 50b. Leaflet blades obovate-oblong, oblong, or elliptic, apex obtuse or acute; calyx tube 0.8–1.2 cm.
 51a. Leaflet blade apices obtuse to acute; flowers solitary or in pairs on a peduncle; calyx tube dark brown; corolla standard emarginate at apex; wings with 1 auricle 10. *C. bicolor*
 51b. Leaflet blade apices obtuse; flowers solitary, rarely in pairs on a peduncle; calyx tube yellowish brown; corolla standard either slightly emarginate or not at apex; wings with 2 auricles 11. *C. franchetiana*

- 48b. Spinelike petiole and rachis persistent on both long and short branchlets.
- 52a. Corolla rosy, reddish purple, bright purple, pink, or white; calyx tube 1.4–1.7 cm 12. *C. jubata*
- 52b. Corolla yellow (yellowish white with reddish claws in *C. chumbica*, yellow but standard sometimes purple in *C. roborovskyi*); calyx tube 0.7–1.5 cm (to 2.1 cm in *C. pleiophylla*).
- 53a. Corolla standard villous on both surfaces 13. *C. chumbica*
- 53b. Corolla standard glabrous on both surfaces.
- 54a. Ovary glabrous or nearly so.
- 55a. Leaflet blades lanceolate to oblanceolate, 8–15 × 3–6 mm; legume lanceolate to narrowly obovoid 14. *C. kozlowii*
- 55b. Leaflet blades elliptic, 5–7 × 2–3 mm; legume cylindrical 25. *C. tekesiensis*
- 54b. Ovary distinctly pubescent.
- 56a. Corolla wings narrowly cuneate, auricle short to inconspicuous.
- 57a. Standard oblong; calyx tubular, ca. 1 cm; leaves 6(or 8)-foliolate; leaflet blades oblong, apex acute; plant densely white villous 15. *C. cuneatoalata*
- 57b. Standard suborbicular; calyx campanulate, ca. 1.7 cm; leaves 8–10-foliolate; leaflet blades elliptic-obovate, apex blunt; plant densely fulvous villous 16. *C. aliensis*
- 56b. Corolla wings not cuneate, with a distinct auricle.
- 58a. Legume inside glabrous.
- 59a. Leaves (4 or)6-foliolate, apical pair often largest 23. *C. tangutica*
- 59b. Leaves 6–14-foliolate, all nearly equal.
- 60a. Leaf rachis 1–2.5 cm; calyx tube 10–12 mm; auricle of corolla wings slightly shorter than claw 24. *C. roborovskyi*
- 60b. Leaf rachis 2–3(–6.5) cm; calyx tube 7–10 mm; auricle of corolla wings only ca. 1 mm and much shorter than claw 26. *C. changduensis*
- 58b. Legume inside with trichomes.
- 61a. Leaf rachis glaucous and glabrous or whitish pubescent 17. *C. leucospina*
- 61b. Leaf rachis neither glaucous nor whitish pubescent.
- 62a. Shrubs less than 30 cm tall; claw of corolla wing as long as or longer than limb.
- 63a. Shrubs cushion-shaped; leaflet blades linear, 8–12 mm; flowers subsessile; legume 0.7–0.8 cm 18. *C. tibetica*
- 63b. Shrubs caespitose but not cushion-shaped; leaflet blades oblong-elliptic, 4–5 mm; flowers with a 5–7 mm pedicel; legume 1.5–2 cm 19. *C. aegacanthoides*
- 62b. Shrubs more than 40 cm tall; claw of corolla wing shorter than limb.
- 64a. Pedicel 5–7 mm; calyx 1.5–2.1 cm; legume 3–3.5 cm 20. *C. pleiophylla*
- 64b. Pedicel 2–4 mm; calyx 1–1.3 cm; legume 1.5–2.5 cm.
- 65a. Leaves (4 or)6- or 8(or 10)-foliolate; leaflet blades elliptic to obovate, pubescent on both surfaces; claw of corolla keel shorter than limb; legume lanceolate to narrowly ovoid 21. *C. gerardiana*
- 65b. Leaves 8–12-foliolate; leaflet blades oblong, narrowly oblong, or obovate-oblong, pubescent only on abaxial surface; claw of corolla keel longer than limb; legume cylindrical 22. *C. junatovii*

1. *Caragana dasyphylla* Pojarkova in Komarov, Fl. URSS 11: 400. 1945.

粗毛锦鸡儿 *cu mao jin ji er*

Shrubs to 30 cm tall. Bark grayish brown to bright brown. Leaves 4-foliolate, pinnate on long branchlets, digitate and sessile on short branchlets; petiole 0.8–1.5 cm on long branchlets, persistent; leaflet blades oblanceolate to obovate, 3–12 × 2–3 mm, both surfaces appressed pubescent, base cuneate, apex rounded to truncate. Flowers solitary. Pedicel 2–4 mm, articulate basally. Calyx tube tubular-campanulate, 6–7 mm. Corolla yellow, 1.6–1.8 cm; standard suborbicular to broadly ovate; wings with claw ca. 1/3 as long as limb, auricle ± as long as claw; keel claw ca. 1/2 as long as limb, auricle small. Ovary glabrous. Legume cylindrical, 2–3.5 cm, glabrous. Fl. Apr–May, fr. Jun–Jul.

- Valleys, riverbanks, slopes; 1200–2800 m. Xinjiang.

2. *Caragana sinica* (Buc'hoz) Rehder, J. Arnold Arbor. 22: 576. 1941.

锦鸡儿 *jin ji er*

Robinia sinica Buc'hoz, Pl. Nouv. Decouv. 24. 1784; *Caragana chamlagu* Lamarck; *C. longiunguiculata* C. W. Chang; *C. rosea* Turczaninow ex Maximowicz var. *longiunguiculata* (C. W. Chang) Y. X. Liou.

Shrubs to 2 m tall. Bark dark brown. Current-year branchlets glabrous. Leaves pinnate or sometimes digitate, 4-foliolate; petiole and rachis 0.7–1.5(–2.5) cm, caducous or persistent; leaflet blades obovate to oblong-obovate, 1–3.5 × 0.5–1.5 cm, apical pairs often largest, apex rounded and mucronate. Flowers solitary. Pedicel ca. 1 cm, articulate at middle. Calyx tube campanulate, 1.2–1.4 cm. Corolla yellow, 2.8–3 cm; standard narrowly obovate, claw short; wings basally auriculate, claw nearly as long as limb; keel broadly blunt. Ovary glabrous. Legume cylindrical, 3–3.5 cm. Fl. Apr–May, fr. Jul. *2n* = 16, 24.

Mountain hills; below 400–1800 m. Anhui, Fujian, S Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [Korea; cultivated and naturalized in Japan].

3. *Caragana ussuriensis* (Regel) Pojarkova in Komarov, Fl. URSS 11: 395. 1945.

乌苏里锦鸡儿 wu su li jin ji er

Caragana frutescens Linnaeus var. *ussuriensis* Regel, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 4(1): 44. 1862.

Shrubs to 2 m tall. Bark dark brown. Current-year branchlets brown, glabrous. Leaves pinnate, on short branchlets sometimes digitate, 4-foliolate; petiole and rachis 2–15 mm, often caducous; leaflet blades oblong-obovate to oblanceolate, 10–17 × 4–7 mm, base cuneate, apex rounded to mucronate. Flowers solitary or rarely 2 in a fascicle. Pedicel 1.2–2 cm, articulate apically from middle. Calyx tube campanulate, 6–8 × 4–5 mm. Corolla yellow, later becoming reddish; standard narrowly obovate, 2.2–2.5 cm, apex slightly emarginate; wings with claw ca. 1/2 as long as limb, auricle small and obtuse; keel claw ca. 1/2 as long as limb, auricle small. Ovary glabrous. Legume 3–3.5 cm, slightly compressed. Fl. May–Jun, fr. Jul–Aug. $2n = 16, 48$.

Hillsides; below 100 m. SE Heilongjiang [Russia (Far East)].

4. *Caragana tragacanthoides* (Pallas) Poiret in Lamarck, Encycl., Suppl. 2: 90. 1811.

中亚锦鸡儿 zhong ya jin ji er

Robinia tragacanthoides Pallas, Nova Acta Acad. Sci. Imp. Petrop. Hist. Acad. 10: 371. 1797; *Caragana hololeuca* Bunge ex Komarov.

Shrubs to 1 m tall. Old branches yellow. Leaves pinnate on long branchlets and 4- or 6-foliolate, pinnate or digitate on short branchlets and 4-foliolate; petiole and rachis 0.8–2.5 cm, arched to spreading, and persistent on long branchlets, 5–12 mm and persistent or caducous on short branchlets; leaflet blades narrowly oblanceolate to elliptic-lanceolate, 6–12(–15) × (1.5–)2–4 mm. Flowers solitary. Pedicel 2.5–4 mm, articulate basally. Calyx tube tubular, 1–1.2 cm. Corolla yellow, 2–2.2 cm; standard obovate, claw ± as long as limb; wings with claw ± as long as limb, auricle ca. 1/2 as long as or slightly shorter than claw; keel claw ± as long as limb, auricle short. Ovary densely pubescent. Legume cylindrical, 1.2–2.5(–3) cm, densely villous. Fl. May, fr. Jul.

Rocky slopes in mountains, scrub in mixed steppes; 700–1300 m. Xinjiang [Kazakhstan, Mongolia, Russia].

Only the typical variety occurs in China. *Caragana tragacanthoides* var. *himalaica* Komarov occurs in Kashmir and Nepal, but its taxonomic status is uncertain.

Plants misidentified as *Caragana bongardiana* (Fischer & C. A. Meyer) Pojarkova in FRPS (42(1): 35. 1993) belong here.

5. *Caragana spinosa* (Linnaeus) Hornemann, Hort. Bot. Hafn. 2: 694. 1815.

多刺锦鸡儿 duo ci jin ji er

Robinia spinosa Linnaeus, Mant. Pl. 2: 269. 1771.

Shrubs to 50 cm tall. Old branches yellowish brown; branchlets reddish brown, pubescent when young. Leaves clustered, pinnate and 6-foliolate on long branchlets, digitate and 4-foliolate on short branchlets; petiole 2–3 mm or absent; rachis 1–5 cm and persistent on long branchlets; leaflet blades narrowly oblanceolate to linear, 1.5–2(–3) cm × 2–4 mm, appressed pubescent. Flowers solitary or 2 in a fascicle. Pedicel 2–4 mm, articulate basally. Calyx tube tubular, 7–10 mm. Corolla yellow, 2–2.2 cm; standard obovate, claw 3–4 mm, apex obtuse; wings with claw ± as long as limb, scarcely auricled; keel claw ± as long as limb, auricle absent, apex acute. Ovary glabrous. Legume 2–2.5 cm × 3–4 mm, glabrous. Fl. Jun–Jul, fr. Sep. $2n = 32$.

Hillsides, riversides, bottomlands; 1200–1300 m. Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

6. *Caragana pruinosa* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 265. 1909.

粉刺锦鸡儿 fen ci jin ji er

Shrubs to 1 m tall. Old branches greenish brown to yellowish brown; current-year branchlets brown, pubescent when young. Leaves pinnate on long branchlets and 4- or 6-foliolate, digitate on short branchlets and 4-foliolate; petiole and rachis 1–2 cm and persistent on long branchlets, 3–7 mm and caducous on short branchlets; leaflet blades oblanceolate to obovate-lanceolate, 5–10 × 1–3 mm, apex acute to obtuse. Flowers solitary or to 3 in a fascicle. Pedicel 2–3 mm, articulate basally. Calyx tube tubular, 1–1.3 cm. Corolla yellow; standard suborbicular, 2.2–2.7 cm, claw narrow; wings linear, claw ± as long as limb, auricle ca. 1 mm; keel scarcely auriculate, apex acute to rounded. Ovary pilose or rarely glabrous. Legume cylindrical, 1.5–2 cm, pilose or rarely glabrous. Fl. May, fr. Jul.

Dry hillsides; 1900–3100 m. Xinjiang [Kazakhstan, Kyrgyzstan].

7. *Caragana erinacea* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 268. 1909.

川西锦鸡儿 chuan xi jin ji er

Caragana maximovicziana Komarov; *C. spinifera* Komarov.

Shrubs to 60 cm tall. Old branches greenish brown; current-year branchlets yellowish brown to reddish brown. Leaves pinnate on long branches and 4–8-foliolate, digitate on short branches and 4-foliolate; petiole and rachis 1.5–2 cm and persistent on long branchlets, 2–15 mm and persistent or caducous on short branchlets; leaflet blades linear-oblanceolate to obovate-oblong, 3–12 × 1–2.5 mm, abaxially pilose, adaxially glabrous, apex acute. Flowers solitary or to 4 in a fascicle. Pedicel very short, appressed pubescent or glabrous. Calyx tube tubular, 8–10 mm. Corolla yellow but standard sometimes reddish purple, 1.8–2.5 cm; standard broadly ovate to oblong-obovate; wings with claw ± as long as limb, auricle very small; keel with claw longer than limb. Ovary glabrous or sparsely to densely pubescent. Legume 1.5–2 cm, glabrous or pilose. Fl. May–Jun, fr. Jul–Sep. $2n = 16^*, 32^*$.

• Forest margins, slopes in grasslands, riverbanks, sand dunes; 2000–4600 m. Gansu, Ningxia, Qinghai, W Sichuan, Xizang, NW Yunnan.

8. *Caragana acanthophylla* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 311. 1909.

刺叶锦鸡儿 *ci ye jin ji er*

Caragana acanthophylla subsp. *macrocalyx* Yakovlev; *C. arcuata* Y. X. Liou.

Shrubs to 1.5 m tall. Bark dark gray. Current-year branchlets bright brown. Leaves pinnate, 4–10-foliolate; petiole and rachis 1.5–4 cm, persistent on long branchlets, caducous on short branchlets; leaflet blades obovate, narrowly obovate, or oblong, 4–12 × 3–5 mm, glabrous or appressed pubescent, apex obtuse. Flowers solitary, very rarely 2 in a fascicle. Pedicel 1–2.5 cm, articulate apically or basally from middle. Calyx tube campanulate-tubular, 6–10 mm. Corolla yellow, 2.6–3 cm; standard broadly ovate; wings oblong, claw 1/3–1/2 as long as limb, auricle dentiform; keel with claw ca. 3/4 as long as limb, auricle small. Ovary glabrous. Legume 2–3 cm, glabrous. Fl. Apr–May, fr. Jul. $2n = 16$.

Hillsides, river valleys, sandy areas; 1000–1300 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Caragana arcuata is known only from the type, and it is obviously related to *C. acanthophylla*. The type specimen is depauperate, with only a few leaflets remaining and with a branch probably from the lower part of an old stem. A field study has not found any materials to support this species, thus it is treated here as a synonym of *C. acanthophylla*.

9. *Caragana crassispinia* C. Marquand, J. Linn. Soc., Bot. 48: 170. 1929.

粗刺锦鸡儿 *cu ci jin ji er*

Shrubs to 1.2 m tall. Leaves pinnate, ca. 10-foliolate; petiole and rachis 4–7 cm × ca. 2 mm, persistent on long branchlets, caducous on short branchlets; leaflet blades obovate-lanceolate, 7–15 × 5–7 mm, abaxially pubescent, apex acuminate. Flowers solitary. Calyx tube tubular-campanulate, 1–1.5 cm, base subgibbous. Corolla bright yellow but standard yellow to orangish yellow; standard suborbicular, ca. 2.5 cm; wings bright yellow, limb ca. 12 × 4–6 mm, auricle curved and slightly longer than claw; keel with a broad auricle. Ovary densely villous. Legume linear, ca. 3 cm, densely villous. Fl. Jun–Jul, fr. Aug–Sep. $2n = 16$.

Woodlands, scrub; 2900–3100 m. Xizang [Nepal].

10. *Caragana bicolor* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 299. 1909.

二色锦鸡儿 *er se jin ji er*

?*Caragana limprichtii* Harms.

Shrubs to 3 m tall. Old branches grayish brown to dark gray; current-year branchlets brown. Leaves pinnate, 8–16-foliolate; petiole and rachis 1.5–5 cm, persistent on long branchlets, caducous on short branchlets; leaflet blades obovate-oblong to elliptic, 3–8 × 2–4 mm, appressed pubescent when young but later only abaxially pilose, apex obtuse to acute. Flowers solitary or in pairs on a peduncle. Pedicel 1–2 cm, articulate near middle. Calyx tube dark brown, campan-

ulate, 0.8–1.2 cm. Corolla yellow but standard violet-purple when dry, 2–2.2 cm; standard obovate, claw ca. 1/2 as long as limb, apex emarginate; wings with claw shorter than limb, auricle 1, slender, and slightly shorter than claw; keel with a claw ± as long as limb, auricle dentiform and small. Ovary densely pubescent. Legume cylindric, 3–4 cm, outside pilose, inside densely pubescent, apex acuminate. Fl. Jun–Jul, fr. Sep–Oct. $2n = 16^*$.

• Slopes, scrub in mixed forests; 2400–3600 m. W Sichuan, E Xizang, NW Yunnan.

Caragana limprichtii from E Xizang may be conspecific with this species but needs to be studied further.

11. *Caragana franchetiana* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 300. 1909.

云南锦鸡儿 *yun nan jin ji er*

Shrubs to 3 m tall. Old branches grayish brown; young branchlets brown. Leaves pinnate, 10–18-foliolate; petiole and rachis 2–5 cm, persistent on long branchlets, caducous on short branchlets; leaflet blades obovate-oblong to oblong, 5–9 × 3–3.5 mm, pubescent when young, apex obtuse. Flowers solitary or rarely in pairs on a peduncle. Pedicel 0.5–2 cm, articulate basally from middle. Calyx tube yellowish brown, tubular, 0.8–1.2 cm, base gibbous. Corolla yellow but standard sometimes purple; standard suborbicular to obovate, ca. 2.3 cm, apex emarginate or not; wings with claw slightly shorter than limb, auricles 2, basal auricle ± as long as claw, apical auricle dentiform or ca. 5 mm; keel with claw ± as long as limb, apex obtuse, auricle dentiform. Ovary densely pubescent. Legume cylindric, 2–4.5(–5) cm, outside appressed pubescent, inside brown tomentose. Fl. May–Jun, fr. Jul–Aug. $2n = 16^*$.

• Slopes, forest margins; 2800–4000 m. SW and W Sichuan, Xizang, N and NW Yunnan.

- 1a. Corolla standard suborbicular, apex not emarginate; wings with apical auricle dentiform 11a. var. *franchetiana*
- 1b. Corolla standard obovate, apex slightly emarginate; wings with apical auricle ca. 5 mm 11b. var. *gyirongensis*

11a. *Caragana franchetiana* var. *franchetiana*

云南锦鸡儿(原变种) *yun nan jin ji er* (yuan bian zhong)

Caragana gerardiana Benth var. *glabrescens* Franchet; ?*C. oreophila* W. W. Smith.

Corolla standard suborbicular, apex not emarginate; wings with apical auricle dentiform.

• Slopes in scrub, under trees at forest margins; 2800–4000 m. SW and W Sichuan, Xizang, N and NW Yunnan.

Caragana oreophila from NW Yunnan may be conspecific with this species but needs to be studied further.

11b. *Caragana franchetiana* var. *gyirongensis* (C. C. Ni) Y. X. Liou, Fl. Reipubl. Popularis Sin. 42(1): 25. 1993.

吉隆锦鸡儿 *ji long jin ji er*

Caragana gyirongensis C. C. Ni, Acta Phytotax. Sin. 18: 367. 1980; *C. jilungensis* C. C. Ni.

Corolla standard obovate, apex slightly emarginate; wings with apical auricle ca. 5 mm.

- Mountain slopes; ca. 2900 m. Xizang (Gyirong).

12. *Caragana jubata* (Pallas) Poiret in Lamarck, Encycl., Suppl. 2: 89. 1811.

鬼箭锦鸡儿 *gui jian jin ji er*

Shrubs 0.3–2 m tall. Bark dark brown, dark gray, or grayish brown. Leaves pinnate, 8–12-foliolate; petiole and rachis 5–7 cm, persistent; leaflet blades oblong, 11–15 × 4–6 mm, base rounded, apex rounded to acute. Flowers solitary. Pedicel ca. 0.5 mm, articulate basally. Calyx tube tubular, 1.4–1.7 cm. Corolla rosy, reddish purple, bright purple, pink, or white, 2.5–3.9 cm; standard broadly ovate; wings oblong, claw 2/3–3/4 as long as limb, auricles 1 or 2 and linear, subulate, or triangular. Ovary villous. Legume to 3 cm, densely villous. Fl. Jun–Jul, fr. Aug–Sep. $2n = 16$.

Slopes, forest margins; 2400–4700 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, N Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, N Yunnan [Bhutan, India (Sikkim), Mongolia, Nepal, E Russia].

The distribution of this species is wide. The morphological characters are variable and are found under several varieties.

- 1a. Corolla wings with auricle on claw; flowers reddish purple 12d. var. *recurva*
- 1b. Corolla wings with auricle on limb; flowers rosy.
 - 2a. Corolla wings with 1 auricle 12a. var. *jubata*
 - 2b. Corolla wings with 2 auricles.
 - 3a. Corolla wings with auricles subulate to triangular 12b. var. *czetyrkininii*
 - 3b. Corolla wings with auricles linear 12c. var. *biaurita*

12a. *Caragana jubata* var. *jubata*

鬼箭锦鸡儿(原变种) *gui jian jin ji er (yuan bian zhong)*

Robinia jubata Pallas, Nova Acta Acad. Sci. Imp. Petrop. Hist. Acad. 10: 370. 1797; *Caragana jubata* f. *seczuanica* Komarov.

Corolla rosy; wings with 1 auricle on limb. $2n = 16$.

Slopes, forest margins; 2400–4700 m. Gansu, Hebei, W Nei Mongol, Ningxia, Qinghai, N Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, N Yunnan [Bhutan, India (Sikkim), Mongolia, Nepal, E Russia].

12b. *Caragana jubata* var. *czetyrkininii* (Sanchir) Y. X. Liou, Acta Phytotax. Sin. 22: 214. 1984.

浪麻鬼箭 *lang ma gui jian*

Caragana czetyrkininii Sanchir, Bot. Zhurn. (Moscow & Leningrad) 59: 232. 1974; *C. forrestii* Sanchir.

Corolla wings with 2 auricles, basal auricle linear and slightly shorter than claw, apical auricle subulate to triangular and 1–2 mm.

- Slopes; 3800–4400 m. Qinghai, Xizang, NW Yunnan.

12c. *Caragana jubata* var. *biaurita* Y. X. Liou, Acta Phytotax. Sin. 22: 214. 1984.

两耳鬼箭 *liang er gui jian*

Leaflet blades 5–7 mm wide. Corolla 3.6–3.9 cm; wings with 2 auricles, longest auricle linear and 2–6 mm.

• Slopes; 3000–4700 m. Hebei (Zhuolu), Nei Mongol, Ningxia, Qinghai, S Xinjiang.

12d. *Caragana jubata* var. *recurva* Y. X. Liou, Acta Phytotax. Sin. 22: 214. 1984.

弯耳鬼箭 *wan er gui jian*

Corolla reddish purple, ca. 2.5 cm; wings with auricle on claw and recurved.

• Slopes; 2700–4600 m. Gansu, Ningxia, Qinghai, W Sichuan, E Xizang.

13. *Caragana chumbica* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 370. 1897.

高山锦鸡儿 *gao shan jin ji er*

Caragana alpina Y. X. Liou.

Shrubs to 1.5 m tall. Old branches dark brown to yellowish brown; current-year branchlets densely villous. Leaves pinnate, 6-foliolate; petiole and rachis 2.5–6 cm, persistent, densely villous when young; leaflet blades linear to narrowly lanceolate, 12–16 × 2–3 mm, villous on both surfaces, apex acute. Flowers solitary. Pedicel 3–4 mm, articulate basally. Calyx tube campanulate-tubular, ca. 8 mm. Corolla yellowish white but petal claws reddish, 2.4–2.5 cm; standard suborbicular, both surfaces villous, claw ca. 1/2 as long as limb; wings with claw ca. 2/5 as long as limb, auricles 2, basal auricle slightly longer than claw, apical auricle triangular to dentiform; keel with claw slightly shorter than limb, auricle not prominent. Ovary densely villous. Legume 2–3 cm, densely villous. Fl. Jun, fl. Jul.

Rocky slopes of alpine mountains; 4600–5000 m. S Xizang [India (Sikkim), Nepal].

Treated as a synonym of *Caragana jubata* by Grierson and Long (Fl. Bhutan 1(3): 713. 1987), this species may just represent a high-elevation form of *C. jubata*.

14. *Caragana kozlowii* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 283. 1909.

沧江锦鸡儿 *cang jiang jin ji er*

Caragana tangutica Maximowicz var. *yushuensis* Y. H. Wu.

Shrubs to 1.5 m tall. Old branches grayish brown to brown. Leaves pinnate, (4 or)6(or 8)-foliolate; petiole and rachis 2–4 cm, persistent; leaflet blades lanceolate to oblanceolate, 8–15 × 3–6 mm, apex acute. Flowers solitary. Pedicel 1–6 mm, articulate basally. Calyx tube tubular-campanulate, 0.9–1.3 cm. Corolla yellow, (1.7–)2–2.3 cm; standard oblong-obovate, claw short, apex rounded; wings with claw as long as limb, auricle ca. 2 mm; keel with claw slightly longer than limb. Ovary glabrous. Legume lanceolate to narrowly ovoid, 2.5–3.5 cm, glabrous. Fl. May–Jul, fr. Aug–Sep.

- River basins, slopes; 3100–4300 m. S Qinghai, E Xizang.

According to the original diagnosis, the leaves have six or eight leaflets, but in the specimens we have seen, the leaflets are never more than six.

15. *Caragana cuneatoalata* Y. X. Liou, Acta Phytotax. Sin. 22: 212. 1984.

楔翼锦鸡儿 xie yi jin ji er

Shrubs to 2 m tall. Old branches bright brown; current-year branchlets villous. Leaves pinnate, 6(or 8)-foliolate; petiole and rachis 2.5–3.5 mm, persistent; leaflet blades oblong, 7–10 × 2–3 mm, both surfaces villous, apex acute. Flowers solitary. Pedicel very short. Calyx tube tubular-campanulate, ca. 1 cm. Corolla 2.7–2.8 cm; standard oblong; wings cuneate, claw ca. 1/2 as long as limb, auricle inconspicuous; keel with claw slightly longer than limb. Ovary densely villous. Legume unknown. Fl. Jul–Aug.

- Slopes, river valleys; ca. 4700 m. Xizang.

This species is dubious in that it is known only from the type specimen.

16. *Caragana aliensis* Y. Z. Zhao, Kew Bull. 63: 345. 2008.

阿里锦鸡儿 a li jin ji er

Shrubs. Bark gray-brown; branches short and crowded together, cinereous. Stipules rufous, ovate, membranous, densely fulvous villous. Leaves paripinnate, 8–10-foliolate; rachis persistent, rigid to springy, 2–4 cm; leaflet blades yellowish green, elliptic-obovate, 6–10 × 3–5 mm, both surfaces densely fulvous villous, apex blunt. Flowers solitary, sessile. Calyx campanulate, ca. 1.7 × 0.7 cm, densely fulvous villous; lobes triangular, ca. 6 mm. Corolla yellow; standard ca. 2.7 cm, limb nearly orbicular ca. 1.8 cm in diam., gradually narrowed at base to claw; wings ca. 2.6 cm, wider in upper part, claw ca. 1/2 as long as limb, auricle short, linear, incurved, ca. 1 mm; keel ca. 2.4 cm, claw slightly shorter than limb, auricle short, tooth-like. Ovary densely fulvous villous outside, glabrous inside. Legume unknown.

- Hillsides. Xizang (Zanda).

Caragana aliensis seems to be related to *C. aegacanthoides*, but whether the former species should be recognized or not requires further study. This treatment is based on the protologue; we have not seen the type specimen (at NWBI).

17. *Caragana leucospina* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 281. 1909.

白刺锦鸡儿 bai ci jin ji er

Shrubs to 1 m tall. Bark yellowish gray. Leaves pinnate, 6–8-foliolate; petiole and rachis ca. 3 cm, persistent, glaucous, glabrous or white pubescent; leaflet blades narrowly elliptic to oblong-lanceolate, (5–)10–16(–17) × 2–4.5(–5) mm, densely pubescent, apex rounded. Flowers solitary. Pedicel 4–6 mm, articulate basally. Calyx tube broadly tubular, ca. 1.3 cm. Corolla yellow, 2.5–3 cm; standard obovate, claw narrow; wings oblong, auricle shortly linear; keel base nearly truncate. Ovary densely pubescent. Legume 2–2.5 cm, outside pubescent, inside with trichomes. Fl. Jun, fr. Jul.

Slopes; 1200–2500 m. Xinjiang [Kyrgyzstan].

18. *Caragana tibetica* (Maximowicz ex C. K. Schneider) Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 282. 1909.

毛刺锦鸡儿 mao ci jin ji er

Caragana tragacanthoides (Pallas) Poiret var. *tibetica* Maximowicz ex C. K. Schneider, Ill. Handb. Laubholz. 2: 100. 1907; *C. ordosica* Y. Z. Zhao, Zong Y. Zhu & L. Q. Zhao.

Shrubs to 30 cm tall, cushion-shaped. Old branches grayish yellow to grayish brown; current-year branchlets bright grayish brown, densely pubescent. Leaves pinnate, 6- or 8-foliolate; petiole and rachis 2–3.5 cm, persistent, densely pubescent when young; leaflet blades linear, 8–12 × 0.5–1.5 mm, densely villous, apex acute. Flowers solitary, subsessile. Calyx tube tubular, 0.8–1.5 cm. Corolla yellow, 2.2–2.5 cm; standard obovate, claw ca. 1/2 as long as limb, apex slightly emarginate; wings with claw as long as or slightly longer than limb; keel with claw slightly longer than limb, auricle dentiform. Ovary densely pubescent. Legume ellipsoid, 7–8 mm, outside pubescent, inside tomentose. Fl. May–Jul, fr. Jul–Aug. 2n = 16.

Dry slopes, sandy areas; 1400–3500 m. Gansu, W Nei Mongol, Ningxia, Qinghai, N Shaanxi, W Sichuan, Xizang [Mongolia].

Y. Z. Zhao et al. (Bull. Bot. Res., Harbin 25: 385. 2005) believed that *Caragana ordosica* differs from this taxon by having leaflet blades involute, thus tubular in cross section, and auricle of corolla wings obtuse. However, from the general morphology, we believe it is conspecific with *C. tibetica*.

19. *Caragana aegacanthoides* (R. Parker) L. B. Chaudhary & S. K. Srivastava, Taiwan 52: 31. 2007.

萨迦锦鸡儿 sa jia jin ji er

Astragalus aegacanthoides R. Parker, Indian Forester 49: 78. 1923; *Caragana sajaensis* C. C. Ni.

Shrubs 6–10 cm tall, caespitose. Bark grayish yellow, glabrous. Branches short and dense, pubescent. Leaves pinnate, (6–)12- or 14(or 16)-foliolate; petiole and rachis 3–8 cm, persistent, densely pubescent when young, later glabrescent; leaflet blades oblong-elliptic, 4–5 × ca. 2 mm, both surfaces pubescent, apex emarginate to truncate. Flowers solitary. Pedicel 5–7 mm. Calyx tube tubular, 1–1.2 cm, pubescent. Corolla yellow, 2–2.4 cm; standard ovate-oblong, 2.2–2.4 cm, claw ca. 1/2 as long as limb, apex emarginate; wings with limb ca. 1.2 cm, claw distinctly longer than limb; keel with claw distinctly longer than limb, auricle short. Ovary densely pubescent. Legume oblong-ellipsoid, 1.5–2 cm, outside densely pubescent or when mature glabrescent, inside with trichomes. Fl. Jun–Jul, fr. Jul–Aug.

Valleys in grasslands or meadows; 4000–4800 m. S Xizang [N India].

20. *Caragana pleiophylla* (Regel) Pojarkova in Komarov, Fl. URSS 11: 401. 1945.

多叶锦鸡儿 duo ye jin ji er

Caragana tragacanthoides (Pallas) Poiret var. *pleiophylla* Regel, Izv. Imp. Obsc. Ljubit. Estestv. Moskovsk. Univ. 34(2): 19. 1882.

Shrubs to 1 m tall. Old branches yellowish brown; branchlets pubescent. Leaves pinnate, 8–14-foliolate; petiole and rachis 1.5–4(–5.5) cm, persistent; leaflet blades oblong to obovate-oblong, 6–12 × 3–4 mm, both surfaces appressed pubescent when young, base broadly cuneate, apex acute. Flowers solitary. Pedicel 5–7 mm, articulate basally. Calyx tube narrowly tubular, 1.5–2.1 cm. Corolla yellow, 3–3.6 cm; standard elliptic-ovate, claw 1/3–1/2 as long as limb, apex slightly emarginate; wings with claw ca. 2/3 as long as limb, auricle 2/5–1/2 as long as claw and often with an additional apical 1–2 mm auricle; keel with claw ± as long as limb. Ovary densely pubescent. Legume tubular, 3–3.5 cm, outside pubescent, inside with trichomes. Fl. May, fr. Jun–Jul. $2n = 16$.

Rocky slopes, river terraces; 1500–2500 m. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

Yakovlev (Rast. Tsentral. Azii 8a: 35. 1988) considered this taxon to be synonymous with *Caragana roborovskiyi*, but it differs from *C. roborovskiyi* by its wing auricle 1/3–1/2 as long as limb, standard elliptic-obovate, calyx 1.5–2.1 cm, and corolla 3–3.6 cm. The latter has wing auricle nearly as long as limb, standard obovate, calyx 1–1.2 cm, and corolla 2.3–2.7 cm.

21. *Caragana gerardiana* Benth in Royle, Ill. Bot. Himal. Mts. 198. 1835.

印度锦鸡儿 yin du jin ji er

Shrubs to 1 m tall. Old branches yellowish brown to gray; branchlets reddish brown, villous. Leaves pinnate, (4 or)6- or 8(or 10)-foliolate; petiole and rachis 1.5–3.5 cm, persistent, densely tomentose; leaflet blades elliptic to obovate, 5–10 × 2–5 mm, both surfaces tomentose, base cuneate, apex rounded to obtuse. Flowers solitary or sometimes 2 in a fascicle. Pedicel 2–4 mm, articulate basally. Calyx tube tubular, 1–1.3 cm. Corolla yellow, 2.3–2.5 cm; standard broadly obovate, claw ca. 1/3 as long as limb, apex emarginate to rounded; wings with claw slightly shorter than limb, auricle shortly dentiform; keel with a claw shorter than limb, auricle orbicular. Ovary tomentose. Legume lanceolate to narrowly ovoid, 1.5–2 cm, turgid, outside and inside tomentose. Fl. May–Jul, fr. Jul–Aug. $2n = 16, 18$.

Slopes in scrub; 3700–4200 m. S Qinghai, W Xizang [Afghanistan, NW India, Kashmir, Nepal, Pakistan; SW Asia].

22. *Caragana junatovii* Gorbunova, Novosti Sist. Vyssh. Rast. 21: 89. 1984.

通天河锦鸡儿 tong tian he jin ji er

Shrubs 40–50 cm tall. Old branches grayish brown; branchlets reddish brown, sparsely villous. Leaves pinnate, 8–12-foliolate; petiole and rachis 2.5–3.5 cm on short branchlets, 3.5–4.5 cm on long branchlets, persistent, villous when young; leaflet blades oblong, narrowly oblong, or obovate-oblong, 6–8 × 3–4 mm, abaxially pilose, apex obtuse to acute. Flowers solitary. Pedicel 2–3 mm. Calyx tube tubular, 1–1.2 cm, pubescent. Corolla yellow; standard obovate, ca. 2.5 cm, apex emarginate; wings as long as standard, claw ca. 3/5 as long as limb, auricle ca. 1/2 as long as claw; keel ca. 2.1 cm, claw longer than limb. Ovary white pubescent. Legume cylindrical, 1.5–2 cm, outside densely pubescent to glabrescent, inside tomentose. Fl. Jun, fr. Jun–Jul.

• Sunny slopes; 3800–4100 m. SW Qinghai.

Plants misidentified as "*Caragana przewalskii*" in FRPS (42: 33. 1993) belong here. Although treated in FRPS, "*C. przewalskii*" is an invalid name that is synonymous with *C. roborovskiyi* (see comment under that species).

23. *Caragana tangutica* Maximowicz in Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 286. 1909.

青甘锦鸡儿 qing gan jin ji er

Caragana leduensis Y. Z. Zhao, Y. H. Wu & L. Q. Zhao.

Shrubs to 4 m tall. Bark exfoliating in sheets. Old branches greenish brown. Leaves pinnate, (4 or)6-foliolate; petiole and rachis 1.5–4 cm, persistent; leaflet blades oblanceolate to oblong-ovate, 8–15 × 3–8 mm, with apical pair often largest, abaxial surface and margin villous, apex acute. Flowers solitary. Pedicel 0.8–1.5 cm, articulate basally. Calyx tube campanulate-tubular, 0.8–1.3 cm. Corolla yellow, 2.3–2.7 cm; standard obovate, apex emarginate; wings with claw slightly shorter than limb, auricle linear and 1/2–3/4 as long as claw; keel with claw ca. 3/4 as long as limb. Ovary densely pubescent. Legume linear, 3–4 cm, outside appressed pubescent, inside glabrous. Fl. May–Jun, fr. Jul–Sep. $2n = 16^*$.

• Shrubby slopes, sunny slopes, woodlands; 2000–4000 m. Gansu, S Ningxia, Qinghai, W Sichuan.

24. *Caragana roborovskiyi* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 280. 1909.

荒漠锦鸡儿 huang mo jin ji er

Shrubs to 1 m tall. Branches yellowish brown, pubescent when young. Leaves pinnate, 6–12-foliolate; petiole and rachis 1–2.5 cm, persistent; leaflet blades broadly obovate to oblong, 4–10 × 3–5 mm, all equal in size, densely pubescent, apex rounded to acute. Flowers solitary. Pedicel ca. 4 mm, articulate near middle to basally. Calyx tube tubular, 1.1–1.2 cm. Corolla yellow but standard sometimes purple; standard obovate, 2.3–2.7 × 1.2–1.3 cm; wings with claw ca. 1/2 as long as limb, auricle linear and slightly shorter than claw; keel with claw ± as long as limb, auricle obtuse and small. Ovary densely pubescent. Legume cylindrical, 2.5–3 cm, outside white villous, inside glabrous. Fl. May, fr. Jun–Jul. $2n = 16^*$.

• Dry slopes, valleys, sunny areas, loess hills; 1200–3100 m. Gansu, W Nei Mongol, Ningxia, E Qinghai, Xinjiang.

"*Caragana przewalskii*" (Pojarkova in Komarov, Fl. URSS 11: 353. 1945) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

25. *Caragana tekesiensis* Y. Z. Zhao & D. W. Zhou, Bull. Bot. Res., Harbin 10(2): 83. 1990.

特克斯锦鸡儿 te ke si jin ji er

Shrubs to 1 m tall. Branches grayish yellow, pubescent when young. Leaves pinnate, 6–12-foliolate; petiole and rachis 1.5–3 cm, persistent, pubescent when young; leaflet blades elliptic, 5–7 × 2–3 mm, densely pubescent. Flowers solitary or to 3 in a fascicle. Pedicel ca. 4 mm, articulate basally. Calyx tube tubular-campanulate, 1–1.5 cm. Corolla yellow; standard

broadly oblanceolate to narrowly obovate, 1.5–2 × 0.6–0.8 cm; wings with claw ca. 1/4 as long as limb, auricle linear and slightly shorter than claw; keel auricle small, dentiform, apex obtuse. Ovary glabrous or nearly so. Legume cylindric, 2.5–4 × ca. 0.4 cm, glabrous. Fl. Jun, fr. Jul.

- Dry slopes; 1200–2000 m. Xinjiang (Tekes, Zhaosu).

26. *Caragana changduensis* Y. X. Liou, Acta Phytotax. Sin. 22: 212. 1984.

昌都锦鸡儿 *chang du jin ji er*

Shrubs to 2 m tall. Old branches yellowish brown to grayish brown. Leaves pinnate, 10–14-foliolate; petiole and rachis tender, 2–3(–6.5) cm, persistent; leaflet blades ovate-oblong to oblong, 5–7 × ca. 2.5 mm, all equal in size, both surfaces pubescent, apex acute. Flowers solitary. Pedicel 2–3 mm, articulate basally. Calyx reddish brown; tube tubular, 7–10 mm. Corolla yellow, 2.2–2.3 cm; standard obovate, apex ± rounded; wings with claw longer than 1/2 to slightly shorter than limb, auricle ca. 1 mm; keel with claw longer than limb, auricle inconspicuous. Ovary densely pubescent. Legume lanceolate, ca. 2.5 cm, outside pubescent, inside glabrous. Fl. Jun, fr. Jul–Aug.

- Slopes in scrub, riverbanks; 3100–4300 m. S Qinghai, NW Sichuan, Xizang.

Y. Z. Zhao (Acta Sci. Nat. Univ. Intramongol. 24: 648. 1993) and Y. H. Wu (Fl. Qinghai. 2: 182. 1999) considered this species to be synonymous with *Caragana gerardiana* because the inner side of the fruits of this taxon, with or without trichomes, overlaps with those of *C. gerardiana*. This needs further study.

27. *Caragana soongorica* Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 19: 543. 1959.

准噶尔锦鸡儿 *zhun ga er jin ji er*

Shrubs to 2 m tall. Branches dark gray to purplish black. Leaves pinnate, 4–8-foliolate; petiole and rachis 1.5–4.5 cm, caducous; leaflet blades obovate, 7–15 × 5–9 mm, both surfaces glabrous or abaxially appressed pubescent, apex slightly emarginate to truncate. Flowers usually in pairs or very rarely 1-flowered on a peduncle. Pedicel 1–3.5 cm, articulate apically from middle. Calyx tube campanulate, 7–9 mm. Corolla yellow, 3–3.5 cm; standard broadly ovate, claw ca. 1 cm; wings with claw ca. 1/2 as long as limb, auricle linear and 2–3 mm; keel 3–5 mm shorter than wings, claw ca. 4/5 as long as limb. Ovary sericeous to glabrescent. Legume 4–5.5 cm. Fl. May, fr. Jul–Aug.

- Slopes in scrub, river terraces; 900–1800 m. Xinjiang.

28. *Caragana stipitata* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 343. 1909.

柄荚锦鸡儿 *bing jia jin ji er*

Caragana reticulata Rehder; *C. sericea* Pampanini ex Komarov.

Shrubs to 2 m tall. Branches dark grayish brown to bright brown. Leaves pinnate, 8–12-foliolate; petiole and rachis 3–7 cm, caducous; leaflet blades oblong, elliptic, or ovate-lanceolate, 1.5–2(–2.8) × 0.7–1(–1.5) cm, densely sericeous when young. Flowers solitary. Pedicel 0.6–1.5 cm, articulate apically

from middle. Calyx tube campanulate, 5–7 mm. Corolla yellow, 1.3–1.5 cm; standard rhombic to broadly ovate, claw ca. 1/3 as long as limb; wings with claw ± as long as limb, auricle ca. 1/3 as long as claw; keel with claw slightly longer than limb, auricle spurlike. Ovary densely sericeous, with a carpopodium. Legume lanceolate, 2.5–3 cm, stipe nearly as long as to slightly longer than calyx. Fl. Apr–May, fr. Jun–Jul.

- Slopes, valleys, shrubby forest margins; 1000–2100 m. E Gansu, W Henan, Shaanxi, S Shanxi.

29. *Caragana zahlbruckneri* C. K. Schneider, III. Handb. Laubholz. 2: 96. 1907.

南口锦鸡儿 *nan kou jin ji er*

Shrubs to 1.5 m tall. Branches brownish black to greenish brown; current-year branchlets reddish brown. Leaves pinnate, 10–18-foliolate; petiole and rachis 3–8 cm, caducous; leaflet blades obovate-oblong, oblanceolate, or narrowly oblanceolate, 6–18 × 4–6 mm, nearly glabrous to appressed pubescent, apex rounded to obtuse. Flowers solitary or 2 in a fascicle. Pedicel 0.8–1.5 cm, articulate at or apically from middle. Calyx tube campanulate-tubular, 7–8 mm. Corolla yellow; standard obovate to suborbicular, 2.3–2.5 cm, claw short; wings with claw slightly longer than or equal to limb, auricle dentiform; keel with claw slightly longer than limb, auricle inconspicuous. Ovary glabrous. Legume 4–4.5 cm, glabrous. Fl. May, fr. Jul.

- Slopes in scrub; 500–1900 m. N Hebei, S Heilongjiang, NW Shanxi.

30. *Caragana fruticosa* (Pallas) Besser, Cat. Hort. Cremeneci, 116. 1816.

极东锦鸡儿 *ji dong jin ji er*

Robinia altagana Pallas var. *fruticosa* Pallas, Fl. Ross. 1: 69. 1784.

Shrubs to 2 m tall. Branches grayish green-brown; current-year branchlets greenish brown. Leaves pinnate, 8–12-foliolate, long petiolate; petiole and rachis 2.5–4 cm, caducous; leaflet blades oblong, 10–15 × 4–6 mm, glabrous, apex sometimes emarginate. Flowers solitary or rarely 2 in a fascicle. Pedicel 0.8–1.2 cm, articulate apically. Calyx tube campanulate, 5–6 mm. Corolla bright yellow, 1.6–1.9 cm; standard rhombic to broadly ovate, claw ca. 1/4 as long as limb, apex slightly emarginate; wings oblong, claw ca. 1/2 as long as limb, auricle dentiform; keel with claw nearly as long as limb. Ovary glabrous. Legume cylindric, 3–3.5 cm. Fl. Jun, fr. Jul. *2n* = 16.

Slopes in scrub; below 100–1800 m. Heilongjiang [Korea, E Russia].

31. *Caragana arborescens* Lamarck, Encycl. 1: 615. 1785.

树锦鸡儿 *shu jin ji er*

Robinia caragana Linnaeus, Sp. Pl. 2: 722. 1753; *Caragana fruticosa* (Pallas) Besser var. *multiflora* H. Xie & Y. T. Zhao; *C. sibirica* Medikus.

Trees or large shrubs, 2–6 m tall. Branches dark gray; branchlets green to yellowish brown. Stipules spinelike, 5–10 mm. Leaves pinnate, 8–16-foliolate; petiole and rachis 3–7 cm,

caducous; leaflet blades oblong-obovate to elliptic, 1–2(–2.5) × 0.5–1(–1.3) cm, pubescent when young or only abaxially pubescent, base mostly rounded or rounded-cuneate, apex obtuse. Flowers solitary or to 5 in a fascicle. Pedicel 2–5 cm, articulate apically. Calyx tube often broadly campanulate, 6–8 mm. Corolla yellow, 1.6–2 cm; standard rhombic to broadly ovate, apex rounded-obtuse; wings with claw ca. 3/4 as long as limb, auricle spurlike and no longer than 1/3 length of claw; keel with claw slightly shorter than limb, auricle obtuse to deltoid. Ovary glabrous or appressed pubescent. Legume 3.5–6 cm, glabrous. Fl. May–Jun, fr. Aug–Sep. $2n = 16$.

Forest margins, woodlands; 1000–1900 m. Heilongjiang, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

Caragana sibirica as a pre-Linnaean name was used by Royen (Fl. Leyd. Prodr. 537. 1740) and considered by Linnaeus (loc. cit.) to be a synonym of *Robinia caragana*. Although Fabricius used the name *C. sibirica* (Enum., ed. 2, 421. 1763), which would appear to have priority over *C. arborescens*, only generic names are validly published there, and so the first valid publication of *C. sibirica* as a binomial was in the later publication by Medikus (Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 365. 1787).

32. *Caragana boisii* C. K. Schneider, Ill. Handb. Laubholz. 2: 96. 1907 [“*boisi*”].

扁刺锦鸡儿 *bian ci jin ji er*

Caragana boisii var. *platycarpa* Yakovlev; *C. microphylla* Lamarck var. *crasseaculeata* Bois.

Shrubs to 1.3 m tall. Branches brown; current-year branchlets purplish brown. Stipules spinelike, 0.8–1.5 cm. Leaves pinnate, 8–20-foliolate; petiole and rachis often caducous; leaflet blades elliptic-oblong to obovate-elliptic, 5–18(–20) × 4–12 mm, sericeous when young but later only sericeous along abaxial veins, apex obtuse to emarginate. Flowers solitary or sometimes to 3 in a fascicle. Pedicel 1.5–2.8 cm, articulate apically. Calyx tube campanulate, 6–11 mm. Corolla yellow, 2–2.5 cm; standard broadly ovate, claw ca. 1/2 as long as limb or shorter; wings with claw ± as long as limb, auricle ca. 1/3 as long as claw; keel with claw ± as long as limb. Ovary pubescent. Legume 2.5–5 cm × 4–6 mm, glabrous. Fl. May, fr. Jul–Aug. $2n = 16^*$.

• Slopes, valleys, terraces; 2200–3200 m. S Gansu, S Shaanxi, Sichuan.

33. *Caragana manshurica* (Komarov) Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 336. 1909.

东北锦鸡儿 *dong bei jin ji er*

Caragana microphylla Lamarck f. *manshurica* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 22: 582. 1904.

Shrubs to 2 m tall. Branches brown to grayish brown. Leaves pinnate, 10–20-foliolate; petiole and rachis 4–9 cm, caducous; leaflet blades obovate-elliptic to oblong, 1–2 × 0.6–1 cm, pubescent or glabrous, base mostly cuneate, apex obtuse, truncate, or emarginate. Flowers solitary or rarely 2 in a fascicle. Pedicel 1–3 cm, articulate apically. Calyx tube tubular to broadly campanulate, 8–9 mm. Corolla yellow, ca. 2.3 cm; standard suborbicular, claw ca. 1/3 as long as limb; wings with

claw ca. 1/2 as long as limb, auricle long and dentiform; keel with claw slightly longer than limb, limb ± cuneate. Ovary nearly glabrous. Legume turgid to cylindrical, ca. 5.5 cm, glabrous. Fl. May, fr. Jul–Aug.

Dry slopes, forest margins; ca. 700 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Korea, E Russia].

34. *Caragana turkestanica* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 314. 1909.

新疆锦鸡儿 *xin jiang jin ji er*

Shrubs to 2 m tall. Branches gray to grayish green. Leaves pinnate, 6–10-foliolate; petiole and rachis 3–6 cm, caducous or rarely persistent; leaflet blades broadly obovate to elliptic, 1–2 × 0.5–1 cm, glabrous or appressed pilose, apex rounded to truncate. Flowers solitary. Pedicel 2–5 cm, articulate apically from middle. Calyx tube campanulate, 6–8 mm. Corolla yellow; standard broadly ovate, 2.4–2.7 cm, base narrow to shortly clawed; wings 2.7–3 cm, claw ca. 2/5 as long as limb, auricle narrow and ca. 1/3 as long as claw; keel with claw ca. 2/3 as long as limb, auricle short and obtuse. Ovary glabrous. Legume cylindrical, 3–5 cm, glabrous. Fl. May, fr. Jul. $2n = 16$.

Sunny slopes, dry scrub; 1100–1200 m. Xinjiang [Kyrgyzstan].

35. *Caragana davazamcii* Sanchir, Bot. Zhurn. (Moscow & Leningrad) 59: 233. 1974.

沙地锦鸡儿 *sha di jin ji er*

Caragana davazamcii var. *viridis* Y. X. Liou; *C. erenensis* Y. X. Liou; *C. korshinskii* Komarov var. *davazamcii* (Sanchir) Yakovlev.

Shrubs to 1.5 m tall. Leaflets, pedicels, and current-year branchlets with dense trichomes, not glabrescent, glaucous. Old branches brown and glaucous; branchlets bright yellow. Leaves pinnate, 8–18-foliolate; petiole and rachis 2.5–4 cm, caducous; leaflet blades oblong to obovate-lanceolate, 5–10 × 3–6 mm, both surfaces appressed sericeous to pilose, apex rounded. Flowers solitary or 2 in a fascicle. Pedicel 1–2 cm, articulate basally or apically from middle. Calyx tube broadly tubular, 8–10 mm. Corolla yellow, 2–3 cm; standard suborbicular to orbicular-ovate, claw short, apex emarginate; wings 1.4–2 cm, claw long, auricle dentiform to narrowly linear and 1–3 mm; keel 0.9–1.4 cm, claw ± as long as limb. Ovary with a carpopodium, glabrous or appressed pilose. Legume linear, 3.5–5 cm, falcate, stipitate, glabrous. Fl. May–Jun, fr. Jun–Jul.

Sandy areas, sand dunes in desert steppes; 300–1000 m. Liaoning, Nei Mongol [Mongolia].

36. *Caragana purdomii* Rehder, J. Arnold Arbor. 7: 168. 1926.

秦晋锦鸡儿 *qin jin jin ji er*

Shrubs to 3 m tall. Leaflets, pedicels, and current-year branchlets pubescent, glabrescent, and not glaucous. Old branches bright yellow, not glaucous; branchlets dark grayish green to brown. Leaves pinnate, 10–16-foliolate; petiole and rachis 2–4 cm, caducous; leaflet blades obovate, elliptic, or oblong, 3–8 × 3–5 mm, both surfaces pilose, apex rounded, emarginate, or acute. Flowers solitary or to 4 in a fascicle. Pedi-

cel 1–2 cm, articulate apically. Calyx tube campanulate-tubular, 8–10 mm, pubescent to nearly glabrous. Corolla yellow, 2.5–2.8 cm; standard broadly obovate, 2–2.7 cm, claw short; wings with a claw ca. 2/3 as long as limb, auricle spurlike and ca. 1/3 as long as claw; keel with claw nearly as long as limb, auricle obtuse. Ovary with a 2.5–4 mm carpogonium, glabrous. Legume 4–5 cm, stipitate, glabrous. Fl. May, fr. Jul–Sep.

- Sunny slopes, loess hills; 700–1700 m. N Shaanxi, W Shanxi.

Plants misidentified as *Caragana sericea* Pampanini ex Komarov by D. W. Zhou et al. (J. NorthE. Normal Univ. 26: 65. 1994) belong here.

37. *Caragana pekinensis* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 339. 1909.

北京锦鸡儿 bei jing jin ji er

Caragana hopeiensis Yakovlev; *C. zahlbruckneri* C. K. Schneider var. *pekinensis* (Komarov) Yakovlev; *C. zahlbruckneri* var. *pilosa* Yakovlev.

Shrubs to 2 m tall. Branches brown to dark brown. Leaves pinnate, 12–16-foliolate; petiole and rachis 2–6 cm, caducous; leaflet blades elliptic to obovate-elliptic, 5–12 × 5–7 mm, both surfaces appressed pubescent, apex obtuse to rounded. Flowers solitary or 2(–4) in a fascicle. Pedicel 0.6–1.5 cm, articulate apically. Calyx tube tubular-campanulate, 7–8 mm. Corolla yellow, ca. 2.5 cm; standard broadly ovate to broadly elliptic; wings slightly longer than standard, claw ca. 2/3 as long as limb, auricle ca. 3 mm; keel slightly shorter than wings, claw longer than limb, auricle inconspicuous. Ovary sericeous. Legume compressed, 4–6 cm, densely pubescent. Fl. May, fr. Jul. $2n = 16^*$.

- Hillsides, loess hills; 400–1000 m. Hebei, N Shanxi.

38. *Caragana litwinowii* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 340. 1909.

金州锦鸡儿 jin zhou jin ji er

Caragana zahlbruckneri C. K. Schneider subsp. *litwinowii* (Komarov) Yakovlev.

Shrubs to 60 cm tall. Branches bright brown to yellowish gray. Stipules spinelike, 1–1.3 cm. Leaves pinnate, 16–20-foliolate; petiole and rachis caducous; leaflet blades obovate-oblong, 6–7 × 2–4 mm, glabrous, apex acute. Flowers solitary. Pedicel 7–8 mm, articulate near middle. Calyx tube tubular-campanulate. Corolla yellow, ca. 2.2 cm; standard broadly ovate, limb ca. 1.7 × 1.4 cm, claw short; wings oblong, claw ca. 1/3 as long as limb, auricle dentiform and ca. 3 mm; keel with claw ca. 1/2 as long as limb, auricle inconspicuous. Ovary glabrous. Legume not seen. Fl. May.

- Slopes; ca. 500 m. Liaoning (Jinxian).

39. *Caragana microphylla* Lamarck, Encycl. 1: 615. 1785.

小叶锦鸡儿 xiao ye jin ji er

Caragana microphylla f. *cinerea* Komarov; *C. microphylla* f. *daurica* Komarov; *C. microphylla* f. *pallasiana* Komarov; *C. microphylla* f. *viridis* Komarov.

Shrubs to 2(–3) m tall. Branches dark gray to dark green;

branchlets glabrous or tomentose. Stipules spinelike, 1.5–5 mm, usually obliquely erect. Leaves pinnate, 10–20-foliolate; petiole and rachis caducous; leaflet blades obovate to obovate-oblong, 3–10 × 2–8 mm, glabrous, pubescent, or tomentose, apex obtuse to truncate. Flowers solitary. Pedicel ca. 1 cm, articulate near middle. Calyx tube tubular-campanulate, 0.9–1.2 cm, glabrous or tomentose. Corolla yellow, ca. 2.5 cm; standard broadly ovate, claw short, apex minutely emarginate; wings with claw ca. 1/2 as long as limb, auricle short and dentiform; keel with a claw as long as limb, auricle inconspicuous. Ovary often glabrous. Legume cylindric, 4–5 cm × 4–5 mm. Fl. May–Jun, fr. Jul–Aug. $2n = 16$.

Consolidated and semiconsolidated sand dunes, rocky mountain slopes; 1000–2000 m. Jilin, Liaoning, Nei Mongol [Mongolia, Russia (Siberia)].

Caragana microphylla is a polymorphic species and in some cases with transitional forms. Hybrids between this species and *C. korshinskii* may occur where these species are sympatric.

This species is planted for dune stabilization and for soil and water conservation.

40. *Caragana potaninii* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 352. 1909.

五台锦鸡儿 wu tai jin ji er

Caragana microphylla Lamarck var. *potaninii* (Komarov) Y. X. Liou ex L. Z. Shue.

Shrubs, small, thorny. Branches brownish to brownish olive. Stipules spinelike, 1.5–5 mm, ± deflexed hooklike. Leaves pinnate, 8–12(or 14)-foliolate; petiole and rachis caducous; leaflet blades obovate to rarely almost elliptic, 5–17 × 3.5–7 mm, grayish when dry, both surfaces appressed pubescent, apex emarginate. Flowers 1 or 2 in a fascicle. Pedicel 7–12 mm. Calyx usually broadly campanulate to rarely tubular-campanulate, ± pubescent or rarely glabrous. Corolla 2–2.3 cm; standard ovate, gradually or sharply narrowed into a relatively wide to narrow claw; wings with claw shorter than limb; keel with a claw as long as limb. Ovary glabrous or sparsely appressed pubescent. Legume cylindric, 4–6 cm × ca. 5 mm, usually obliquely erect. Fl. Apr–May, fr. Jun–Jul.

- Rocky mountain slopes; 1000–1400 m. N Shanxi (Hunyuan, Wutai).

41. *Caragana liouana* Zhao Y. Chang & Yakovlev, **nom. nov.**

中间锦鸡儿 zhong jian jin ji er

Replaced synonym: *Caragana korshinskii* Komarov var. *ordosica* Yakovlev, Bot. Zhurn. (Moscow & Leningrad) 69: 358. 1984, not *Caragana ordosica* Y. Z. Zhao, Zong Y. Zhu & L. Q. Zhao, Bull. Bot. Res., Harbin 25: 386. 2005.

Shrubs to 1.5(–2) m tall. Branches yellowish gray-green. Stipules spinelike, 4–7 mm. Leaves pinnate, 6–16-foliolate; petiole and rachis 1–5 cm, caducous; leaflet blades elliptic to obovate-elliptic, 3–10 × 4–6 mm, whitish green, both surfaces villous, apex rounded, acute, or rarely truncate. Flowers solitary. Pedicel 1–1.6 cm, articulate apically from middle. Calyx tube campanulate, 7–12 mm. Corolla yellow, 2–2.5 cm; standard broadly ovate to suborbicular, claw ca. 1/4–1/3 as long as

limb; wings oblong, claw nearly as long as limb, auricle not prominent. Ovary glabrous. Legume lanceolate to oblong-lanceolate, 2.5–3.5 cm × 6–7 mm, flat, apex acute. Fl. May, fr. Jun. $2n = 16^*$.

• Consolidated and semiconsolidated sand dunes; 900–2400 m. Gansu, N Hebei, Nei Mongol, Ningxia, Shaanxi, W Shanxi.

Most plants identified in herbaria as *Caragana intermedia* and treated as such in FRPS (42(1): 47. 1993) belong here, but the type of *C. intermedia* is synonymous with *C. korshinskii*. Because the specific epithet “*ordosica*” is already occupied in *Caragana*, a replacement name is used in recognition of Professor Liou Yingxin (刘焯心) for her work on the *Caragana* of China.

42. *Caragana korshinskii* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 351. 1909.

柠条锦鸡儿 ning tiao jin ji er

Caragana intermedia Kuang & H. C. Fu; *C. korshinskii* f. *brachypoda* Y. X. Liou; *C. korshinskii* var. *intermedia* (Kuang & H. C. Fu) M. L. Zhang & G. H. Zhu; *C. microphylla* Lamarck var. *tomentosa* Komarov.

Shrubs or trees, 1–4 m tall. Branches golden yellow, shiny; branchlets pubescent. Stipules spinelike, 3–7 mm. Leaves pinnate, 12–16-foliolate; petiole and rachis 3–5 cm, caducous; leaflet blades lanceolate to narrowly oblong, 7–8 × 2–7 mm, whitish, both surfaces densely appressed sericeous, apex acute to obtuse. Flowers solitary. Pedicel 0.6–1.5 cm, articulate apically. Calyx tube tubular-campanulate, 8–9 mm. Corolla 2–2.3 cm; standard broadly ovate to suborbicular, claw short, apex truncate to slightly emarginate; wings with claw slightly shorter than limb, auricle small and dentiform; keel with long claw, auricle very small. Ovary glabrous. Legume lanceolate, 2–2.5 cm × 6–7 mm, flat. Fl. May–Jun, fr. Jun–Jul. $2n = 16$.

Semiconsolidated sand dunes; 900–2400 m. Gansu, Nei Mongol, Ningxia, Qinghai, W Shanxi, Xinjiang [Mongolia].

Although the type of *Caragana intermedia* is synonymous with *C. korshinskii*, most specimens identified in herbaria as *C. intermedia* and treated as such in FRPS (42(1): 47. 1993) are misidentified and actually are *C. liouana*.

43. *Caragana leucophloea* Pojarkova in Komarov, Fl. URSS 11: 399. 1945.

白皮锦鸡儿 bai pi jin ji er

Caragana aurantiaca Koehne var. *deserticola* Komarov.

Shrubs to 1.5 m tall. Branches yellowish white to yellow; current-year branchlets purplish red. Leaves digitate, 4-foliolate; petiole 5–8 mm and persistent on long branchlets, absent and leaves clustered on short branchlets; leaflet blades narrowly oblanceolate, 4–12 × 1–3 mm, green, pale green, or reddish, both surfaces glabrous or appressed pubescent, apex acute to obtuse. Flowers solitary or 2 in a fascicle. Pedicel 3–15 mm, glabrous, articulate basally or apically from middle. Calyx tube campanulate, 5–6 mm. Corolla yellow; standard broadly obovate, 1.3–1.8 cm, claw short; wings with claw ca. 1/3 as long as limb, auricle ca. 2/3 as long as claw; keel with claw slightly shorter than limb, auricle obtuse and ca. 2 mm. Ovary glabrous. Legume cylindrical, 3–3.5 cm, glabrous. Fl. May–Jun, fr. Jul–Aug.

Dry slopes, desert valleys; 900–2700 m. N Gansu, Nei Mongol, Xinjiang [Kazakhstan, Mongolia].

44. *Caragana pygmaea* (Linnaeus) Candolle, Prodr. 2: 268. 1825.

矮锦鸡儿 ai jin ji er

Shrubs to 50 cm tall. Branches golden yellow, shiny, pubescent when young but gradually glabrescent. Leaves digitate, 4-foliolate; petiole 4–6 mm and persistent on long branchlets, absent and leaves clustered on short branchlets; leaflet blades oblanceolate to linear, (5–)7–17(–30) × 1–3 mm, both surfaces glabrous, apex obtuse to acute. Flowers solitary. Pedicel 0.6–2 cm, articulate basally or apically from middle, glabrous or pubescent. Calyx tube tubular-campanulate, 5–6 mm. Corolla yellow, 1–1.6 cm; standard broadly obovate, claw ca. 1/3 as long as limb; wings oblong, inflated toward apex, auricle short; keel with claw as long as limb, auricle obtuse. Ovary densely pubescent. Legume linear, 2–3 cm, pubescent when young, glabrescent. Fl. May, fr. Jun. $2n = 16$.

Sandy areas, rocky slopes, hilly areas among rocks; 900–1300 m. Hebei, Nei Mongol, Xinjiang [Mongolia, E Russia].

- 1a. Pedicel articulate basally from middle; corolla 1–1.5 cm 44c. var. *parviflora*
- 1b. Pedicel articulate near middle; corolla 1.5–1.6 cm.
 - 2a. Branchlets stout, pubescent when young, gradually glabrescent; leaflet blades narrowly oblanceolate, ca. 3 mm wide 44a. var. *pygmaea*
 - 2b. Branchlets slender, densely pubescent; leaflet blades linear, ca. 1 mm wide 44b. var. *angustissima*

44a. *Caragana pygmaea* var. *pygmaea*

矮锦鸡儿(原变种) ai jin ji er (yuan bian zhong)

Robinia pygmaea Linnaeus, Sp. Pl. 2: 723. 1753; *Caragana pygmaea* f. *longifolia* Komarov.

Branchlets stout, pubescent when young, glabrescent. Leaflet blades narrowly oblanceolate, ca. 3 mm wide. Pedicel articulate near middle. Corolla 1.5–1.6 cm. $2n = 16$.

Sandy areas; ca. 1200 m. Nei Mongol, Xinjiang [Mongolia, E Russia].

44b. *Caragana pygmaea* var. *angustissima* C. K. Schneider, Ill. Handb. Laubholz. 2: 102. 1907.

窄叶矮锦鸡儿 zhai ye ai jin ji er

Caragana stenophylla Pojarkova var. *sericea* H. C. Fu.

Branchlets slender, glaucous, densely pubescent. Leaflet blades linear, 5–10(–30) × ca. 1 mm. Pedicel articulate near middle. Corolla 1.5–1.6 cm.

• Sandy areas; 900–1300 m. Nei Mongol.

44c. *Caragana pygmaea* var. *parviflora* H. C. Fu, Fl. Intramongol. 3: 287. 1978.

小花矮锦鸡儿 xiao hua ai jin ji er

Leaflet blades linear-oblongate, 5–10 mm. Pedicel articulate basally from middle. Corolla 1–1.5 cm.

- Rocky slopes, hilly areas among rocks. Nei Mongol.

45. *Caragana altaica* (Komarov) Pojarkova in Komarov, Fl. URSS 11: 345. 1945.

阿尔泰锦鸡儿 *a er tai jin ji er*

Caragana pygmaea (Linnaeus) Candolle var. *altaica* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 242. 1909; *C. pygmaea* subsp. *altaica* (Komarov) Bondareva.

Shrubs to 1 m tall. Bark yellow. Branchlets whitish green when young, glabrous. Leaves digitate, 4-foliolate; petiole 4–8 mm on long branchlets but absent on short branches; leaflet blades narrowly obovate to oblanceolate, 5–15(–23) × 2–3 mm, pubescent when young and glabrate when mature. Flowers solitary. Pedicel 1.2–2.5 cm, articulate somewhat basally from middle. Calyx tube tubular-campanulate, 5–7 × 4–5 mm. Corolla yellow, 1.8–2 cm; standard obovate to suborbicular, claw 1/4–1/3 as long as limb; wings oblong, somewhat dilated toward apex, claw ca. 1/2 as long as limb, auricle 1/5–1/4 as long as claw; keel with claw 1/3–1/2 as long as limb, auricle short. Legume cylindric, 2–3.5 cm, glabrous. Fl. May–Jun, fr. Jun–Jul. $2n = 16$.

Stony slopes, rocky areas; 800–1300 m. N Xinjiang [Mongolia].

46. *Caragana aurantiaca* Koehne, Deut. Dendrol. 340. 1893.

镰叶锦鸡儿 *lian ye jin ji er*

Caragana aurantiaca var. *conferta* Komarov.

Shrubs to 1 m tall. Bark greenish brown to dark gray, shiny. Branchlets strong and long. Leaves digitate, 4-foliolate; petiole and rachis 3–5 mm on long branchlets but absent on short branchlets; leaflet blades linear to lanceolate-linear, 4–16 × 1–2 mm, falcate, glabrous. Flowers solitary. Pedicel 6–9 mm, articulate basally from middle. Calyx tube campanulate, 6–7 mm. Corolla orange, 1.8–2 cm; standard suborbicular, claw 1/4–1/3 as long as limb, apex rounded to emarginate; wings narrowly oblong, claw ca. 1/2 as long as limb, auricle ca. 3/4 to ± as long as claw; keel with claw shorter than limb, auricle short. Ovary glabrous. Legume cylindric, 2.5–4 cm, slightly compressed, glabrous. Fl. Jun–Jul, fr. Aug. $2n = 16$.

Rocky slopes, bottomlands near riversides, forest margins; 1000–1100 m. Xinjiang [Afghanistan, Kazakhstan, Pakistan, Uzbekistan; SW Asia].

47. *Caragana pumila* Pojarkova in Komarov, Fl. URSS 11: 346. 1945.

草原锦鸡儿 *cao yuan jin ji er*

Shrubs 30–60 cm tall. Branchlets yellowish green with brown stripes, puberulent when young. Leaves digitate, 4-foliolate; petiole 4–6 mm and persistent on long branchlets, absent on short branchlets; leaflet blades narrowly oblanceolate to linear-oblongate, 4–12 × 0.5–1.2 mm, dark green but abaxially tinged ± reddish, pubescent when young. Flowers solitary. Pedicel 0.8–1.5 cm, articulate at or near middle. Calyx tube tubular, 4–6 mm. Corolla yellow, 1.5–2 cm; standard ovate to

obovate, claw 1/6–1/5 as long as limb; wings with claw ca. 1/3 as long as limb, auricle ca. 2/3 as long as claw; keel with claw slightly shorter than limb, auricle small, short, and obtuse. Ovary linear, ca. 1.5 cm, glabrous. Legume ca. 2.5 cm. Fl. May–Jun, fr. Jun–Jul.

Mountain steppes, rocky slopes; 1200–1500 m. Xinjiang (Bole, Wenquan) [Kazakhstan].

48. *Caragana versicolor* Bentham in Royle, Ill. Bot. Himal. Mts. 198. 1835.

变色锦鸡儿 *bian se jin ji er*

Shrubs to 80 cm tall. Bark brown to dark brown. Stipule spines 1–4 mm on long branchlets. Leaves digitate, 4-foliolate; petiole 5–10 mm and persistent on long branchlets, absent on short branchlets; leaflet blades narrowly lanceolate, obovate-cuneate, or linear, 5–7 × 1–1.5 mm, green to grayish green, glabrous. Flowers solitary. Pedicel ca. 5 mm, articulate basally. Calyx tube tubular, 5–6 mm. Corolla yellow, 1.1–1.2 cm; standard suborbicular, abaxially reddish brown, claw ca. 1/2 as long as limb; wings with claw shorter than limb, auricle ca. 1/4 as long as claw; keel with claw ± as long as limb, auricle ca. 1 mm. Legume 2–2.5 cm, apex acute. Fl. May–Jun, fr. Jul–Aug. $2n = 16 + 2B, 18$.

Rocky slopes, riversides, among shrubs; 3000–4900 m. Qinghai, W Sichuan, Xizang [Afghanistan, NW India, Kashmir, Nepal, Pakistan; SW Asia].

49. *Caragana stenophylla* Pojarkova in Komarov, Fl. URSS 11: 397. 1945.

狭叶锦鸡儿 *xia ye jin ji er*

Caragana pygmaea (Linnaeus) Candolle var. *pallasiana* Komarov; *C. stenophylla* var. *parviflora* Zhan Wang & H. C. Fu.

Shrubs to 80 cm tall. Bark grayish green, yellowish brown, or dark brown. Stipule spines 4–7 mm on long branchlets. Leaves digitate, 4-foliolate; petiole 4–7 mm and persistent on long branchlets, absent on short branchlets; leaflet blades linear-lanceolate to linear, 4–11 × 1–2 mm, both surfaces green to grayish green. Flowers solitary. Pedicel 5–10 mm, articulate slightly basally from middle. Calyx tube campanulate-tubular, 4–6 mm. Corolla yellow but standard orangish brown at middle; standard orbicular to broadly obovate, 0.8–1.8(–2) cm, claw broad and short; wings with claw ca. 1/2 as long as limb, auricle elliptic and 1/4–1/2 as long as claw; keel with a claw longer than limb, auricle obtuse. Ovary glabrous. Legume cylindric, 2–2.5 cm. Fl. Apr–Jun, fr. Jul–Aug. $2n = 32$.

Sandy areas, stony slopes, loess hills; 600–2500 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, E Qinghai, Shaanxi, N Shanxi [Mongolia, E Russia].

50. *Caragana kirghisorum* Pojarkova in Komarov, Fl. URSS 11: 396. 1945.

囊萼锦鸡儿 *nang e jin ji er*

Shrubs to 1 m tall. Branches grayish brown; current-year branchlets grayish brown to bright gray. Leaves digitate, 4-foliolate; petiole 4–12 mm and persistent on long branchlets, 1–

3 mm and caducous on short branchlets; leaflet blades obovate, elliptic-obovate, or oblanceolate, 4–9 × 1.5–3 mm, glabrous, base cuneate, apex sharply acute. Flowers solitary or rarely 2 in a fascicle. Pedicel 1.2–1.4 cm, articulate near middle. Calyx tube tubular, 1.2–1.3 cm, base saccate. Corolla yellow but standard and keel purple at anthesis, 2.7–3.2 cm; standard obovate, 1.3–1.7 cm, base gradually narrowing into a claw, apex rounded to slightly emarginate; wings with claw nearly as long as limb, auricle acute; keel with claw longer than limb, auricle obtusely dentiform. Ovary glabrous. Legume linear, 2.5–5 cm, glabrous, apex acuminate. Fl. May–Jun, fr. Jul–Aug.

Rocky slopes on foothills, stony lands, riverbanks; 700–1100 m. Xinjiang [Kazakhstan, Kyrgyzstan].

51. *Caragana brachypoda* Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 135. 1950.

矮脚锦鸡儿 ai jiao jin ji er

Shrubs to 30 cm tall. Bark yellowish brown to grayish brown. Current-year branchlets brown to yellowish brown. Leaves digitate, 4-foliolate; petiole 4–10 mm and persistent on long branchlets, absent on short branchlets; leaflet blades oblanceolate, 2–10 × 1–3 mm, both surfaces pubescent, apex acute. Flowers solitary. Pedicel 2–5 mm, articulate basally. Calyx reddish purple to greenish brown, 0.9–1.1 cm, base gibbous. Corolla yellow but with orange or purple at middle, 2–2.5 cm, apex slightly emarginate; wings with claw ± as long as limb, apex obliquely truncate, auricle small and short; keel as long as wings, claw long, auricle short. Ovary glabrous. Legume spindlelike, 2–3.5 cm, turgid, glabrous, apex acuminate. Fl. Apr–May, fr. Jun–Jul. $2n = 16, 32$.

Bases of hills, stony areas, sand dunes; 900–2000 m. Gansu, Nei Mongol, Ningxia, Shaanxi (Dingbian) [S Mongolia].

52. *Caragana kansuensis* Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 138. 1950.

甘肃锦鸡儿 gan su jin ji er

Shrubs to 60 cm tall. Branches grayish brown. Leaves digitate, 4-foliolate; petiole 4–10 mm and persistent on long branchlets, 2–4 mm and caducous on short branchlets; leaflet blades linear-oblanceolate, 5–12 × 1–2 mm, both surfaces glabrous or pilose, apex acute. Flowers solitary. Pedicel 5–12 mm, articulate apically. Calyx tube tubular, 6–9 mm, base gibbous. Corolla yellow but standard with straw-colored spots at middle, 2–2.5 cm; standard ovate to broadly ovate, 2–2.5 cm, claw ca. 1/3 as long as limb, apex emarginate; wings ± as long as standard, claw ± as long as limb, auricle ca. 2 mm; keel ± as long as wings, with a longer claw and short auricle. Ovary glabrous. Legume cylindrical, 2–3.5 cm, glabrous, apex acute. Fl. Apr–Jun, fr. Jun–Aug.

- Loess hills, hillsides; 900–1900 m. E Gansu, Ningxia.

Y. Z. Zhao (Acta Sci. Nat. Univ. Intramongol. 22: 97–100. 1991) considered that collections attributed to this species from Nei Mongol, N Shaanxi, and N Shanxi in FRPS (42(1): 57. 1993) are actually representatives of *Caragana opulens*, with leaflet blade narrower and acute at apex. However, they seem more related to *C. licentiana* in their leaflets pubescent and abaxially tinged reddish when dried.

53. *Caragana leveillei* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 207. 1909.

毛掌叶锦鸡儿 mao zhang ye jin ji er

Caragana sinica (Buc'hoz) Rehder var. *longipedunculata* C. W. Chang.

Shrubs to 1 m tall. Bark dark brown. Current-year branchlets grayish brown, densely pubescent. Leaves digitate, 4-foliolate; petiole 4–12 mm, persistent or caducous; leaflet blades obovate, 5–20(–30) × 2–10(–15) mm, densely pubescent, apex rounded, truncate, or emarginate. Flowers solitary. Pedicel 0.8–1.2 cm, articulate basally from middle. Calyx tube ca. 1 cm, base gibbous. Corolla yellow to pinkish, 2.5–2.8 cm; standard obovate-cuneate, claw ca. 5 mm, apex obtuse to emarginate; wings with claw ± as long as limb, auricle small; keel with claw ± as long as limb, auricle small. Ovary densely villous. Legume cylindrical, 2–3(–4) cm, densely villous. Fl. Apr–May, fr. Jun.

- Hilly slopes; 500–1300 m. Hebei, Henan, Shaanxi, Shandong, Shanxi.

54. *Caragana opulens* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 208. 1909.

甘蒙锦鸡儿 gan meng jin ji er

Caragana opulens var. *perforata* Merrgen & Y. Q. Ma; *C. opulens* var. *trichophylla* Z. H. Gao & S. C. Zhang.

Shrubs to 60 cm tall. Bark grayish brown. Branchlets bright gray. Leaves digitate, 4-foliolate; petiole 2–5 mm, persistent on long branchlets, caducous on short branchlets; leaflet blades obovate to oblanceolate, 3–12(–15) × 1–4(–8) mm, glabrous or pubescent, apex rounded to truncate. Flowers solitary. Pedicel 0.7–2.5 cm, articulate apically. Calyx tube campanulate-tubular, 8–10 mm, base gibbous. Corolla yellow but standard sometimes reddish; standard broadly obovate, 2–2.5 cm, apex emarginate; wings with claw slightly shorter than limb, auricle oblong; keel with claw slightly shorter than limb, auricle dentiform. Ovary glabrous. Legume cylindrical, 2.5–4 cm, glabrous, apex acute. Fl. May–Jun, fr. Jun–Jul. $2n = 16^*$.

- Dry slopes, valleys, hills; 1200–4700 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, W Sichuan, Xizang.

This is a polymorphic species with great variation. Whether *Caragana opulens* var. *perforata* and *C. opulens* var. *trichophylla* should be recognized requires further study.

55. *Caragana rosea* Turczaninow ex Maximowicz, Prim. Fl. Amur. 470. 1859.

红花锦鸡儿 hong hua jin ji er

Shrubs to 1 m tall. Bark greenish brown to grayish brown. Leaves digitate, 4-foliolate; petiole 5–10 mm, caducous or persistent; leaflet blades obovate, 1–2.5 × 0.4–1.2 cm, glabrous, apex obtuse to emarginate. Flowers solitary. Pedicel 0.8–1.9 cm, articulate basally to apically. Calyx tube purplish red, tubular, 7–9 mm. Corolla yellow, purplish red, or pinkish, later reddish, 2–2.5 cm; standard oblong-obovate, apex emarginate; wings oblong-linear, claw slightly shorter than limb, auricle shortly dentiform; keel with claw equal to limb, auricle incon-

spicuous. Ovary glabrous. Legume cylindric, 3–6 cm, apex acuminate. Fl. May–Jun, fr. Jun–Jul. $2n = 16^*$.

• Slopes, valleys; 200–2100 m. Anhui, S Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, N Sichuan.

56. *Caragana qingheensis* Zhao Y. Chang, L. R. Xu & F. C. Shi, *Ann. Bot. Fenn.* 43: 445. 2006.

青河锦鸡儿 qing he jin ji er

Shrubs 50–100 cm tall. Bark yellowish brown, with grayish corky stripes. Leaves digitate, 4-foliolate; petiole 3–5 mm and persistent on long branchlets, 1–3 mm and caducous on short branchlets; leaflet blades obovate to elliptic-obovate, $3-8 \times 2-3.5$ mm, both surfaces pubescent, base cuneate, apex obtuse. Flowers solitary. Pedicel 0.8–1.5 cm, articulate usually apically from middle, densely pubescent. Calyx tube tubular-campanulate, 6–7 mm, pubescent. Corolla yellow, 1.5–1.8 mm; standard broadly ovate, claw $1/6-1/5$ as long as limb, apex emarginate; wings narrowly oblong, claw ca. $1/3$ as long as limb, auricle linear and $1/2-2/3$ as long as claw; keel broader than wings, claw $1/2-2/3$ as long as limb, auricle obtuse. Ovary linear, densely pubescent. Legume oblanceolate when young, 1.5–2 cm, pubescent. Fl. May–Jun, fr. Jun–Jul.

• Rocky mountain slopes; ca. 1300 m. Xinjiang (Qinghe).

57. *Caragana camilloi-schneideri* Komarov, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 29: 217. 1909 [*“camilli-schneideri”*].

北疆锦鸡儿 bei jiang jin ji er

Shrubs to 2 m tall. Bark brown. Leaves digitate, 4-foliolate; petiole 2–10 mm and persistent on long branchlets, caducous on short branchlets; leaflet blades obovate to broadly lanceolate, $1-2(-3) \times 0.6-0.7(-1)$ cm, glabrous, apex obtuse to acute. Flowers solitary or 2 in a fascicle. Pedicel 1–1.5(–2) cm, articulate apically. Calyx tube 9–10 mm, base gibbous. Corolla yellow, 2.8–3.1 cm; standard suborbicular to ovate, claw ca. $1/4$ as long as limb; wings with claw ca. $1/3$ as long as limb, auricle ca. 4 mm; keel with claw \pm as long as limb, auricle inconspicuous. Ovary densely pubescent. Legume cylindric, 4–5 cm, pubescent. Fl. May–Jun, fr. Jul–Aug. $2n = 32$.

Rocky dry slopes, valleys; 600–1800 m. Xinjiang [Kyrgyzstan].

58. *Caragana licentiana* Handel-Mazzetti, *Oesterr. Bot. Z.* 82: 249. 1933.

白毛锦鸡儿 bai mao jin ji er

Caragana opulens Komarov var. *licentiana* (Handel-Mazzetti) Yakovlev.

Shrubs to 60 cm tall. Bark greenish brown to reddish brown. Leaves digitate, 4-foliolate; petiole 2–3 mm, persistent; leaflet blades obovate to oblanceolate, $5-12 \times 2-4$ mm, both surfaces densely pubescent, apex rounded and sometimes emarginate. Flowers solitary or 2 in a fascicle. Pedicel 0.6–2 cm, articulate apically. Calyx tube tubular, 7–10 mm. Corolla yellow but standard with orange spots at middle, 2–2.2 cm; standard broadly obovate to suborbicular, apex emarginate; wings with claw \pm as long as limb, auricle dentiform and ca. 2 mm;

keel with claw longer than limb, auricle dentiform. Ovary densely pubescent. Legume cylindric, 2.5–3.5 cm, pubescent. Fl. Apr–Jun, fr. Jul–Aug. $2n = 32^*$.

• Dry slopes; 1500–2400 m. Gansu, Ningxia, Qinghai.

Yakovlev (*Rast. Tsentral. Azii* 8a: 38. 1988) considers this taxon to be a variety of *Caragana opulens*, although this is not supported by chromosome data. However, between the two taxa there seem to exist hybrids with which it is difficult to deal. At least one variety could be separated whose leaflets are oblanceolate to obcuneate, with apex acute to obtuse. It is often wrongly identified as *C. kansuensis* in major herbaria of China (see also note under *C. kansuensis*, p. 542).

59. *Caragana shensiensis* C. W. Chang, *Acta Phytotax. Sin.* 17(2): 83. 1979.

秦岭锦鸡儿 qin ling jin ji er

Caragana wenhsienensis C. W. Chang; *C. wenhsienensis* var. *inermis* C. W. Chang.

Shrubs to 1.5 m tall. Branches purplish brown; branchlets grayish brown. Leaves digitate, 4-foliolate; petiole 1–1.5 cm, caducous; leaflet blades obovate-cuneate, $1-2.2 \times 0.4-0.7$ cm, with apical ones largest, abaxially sparsely white pubescent, adaxially glabrous, base cuneate, apex rounded to nearly truncate. Flowers solitary. Pedicel 8–9 mm, articulate apically. Calyx tube tubular, ca. 6 mm. Corolla yellow but adaxially reddish yellow; standard orbicular, ca. 2.2 cm, claw broad and short; wings narrowly oblong, ca. 2.4 cm, claw slightly shorter than limb, auricle short; keel broader than wing, auricle obtuse. Ovary pubescent. Legume cylindric, 2.5–3.5 cm, pubescent to glabrescent. Fl. Apr–May, fr. Jun–Jul.

• Riverbanks; 400–900 m. Gansu, Shaanxi.

60. *Caragana polourensis* Franchet, *Bull. Mus. Hist. Nat. (Paris)* 3: 321. 1897.

昆仑锦鸡儿 kun lun jin ji er

Shrubs to 50 cm tall. Branches brown to bright brown. Leaves digitate, 4-foliolate; petiole 8–10 mm and persistent on long branchlets, 4–6 mm and caducous on short branchlets; leaflet blades obovate, $6-10 \times 2-4$ mm, both surfaces appressed pubescent, apex acute, obtuse, or sometimes emarginate. Flowers solitary. Pedicel 2–6 mm, articulate basally to apically. Calyx tube tubular, 8–10 mm. Corolla yellow but standard sometimes with orange spots, ca. 2 cm; standard suborbicular to obovate; wings with claw shorter than limb, auricle short; keel with claw shorter than limb, auricle short. Ovary pubescent. Legume cylindric, 2.5–3.5 cm, pubescent to glabrescent. Fl. Apr–May, fr. Jun–Jul.

• Hillsides, plains; 1700–3200 m. C Gansu, S Xinjiang.

61. *Caragana brevifolia* Komarov, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 29: 211. 1909.

短叶锦鸡儿 duan ye jin ji er

Shrubs to 2 m tall, glabrous. Bark dark grayish brown. Branchlets sometimes arched. Leaves digitate, 4-foliolate; petiole 3–8 mm on long branchlets, nearly absent on short branchlets; leaflet blades lanceolate to obovate-lanceolate, $2-8 \times 1-4$

mm, base cuneate, apex acute. Flowers solitary. Pedicel 5–8 mm, articulate basally to near middle. Calyx tube tubular-campanulate, 5–6 mm, glaucous. Corolla yellow, 1.4–1.6 cm; standard broadly ovate, ca. 1.4 cm, claw ca. 4 mm; wings with claw \pm as long as limb, auricle dentiform and small; keel with claw \pm as long as limb, auricle dentiform. Ovary glabrous. Legume dark brown when mature, cylindrical, 1–2.5(–3.5) cm. Fl. Jun–Jul, fr. Aug–Sep. $2n = 16$.

Riverbanks, valleys, mixed scrub; 1800–3800 m. Gansu, Ningxia, Qinghai, W Sichuan, SE Xizang, NW Yunnan [N India, Kashmir, Pakistan].

62. *Caragana chinghaiensis* Y. X. Liou, Acta Phytotax. Sin. 22: 209. 1984.

青海锦鸡儿 qing hai jin ji er

Shrubs 20–100 cm tall. Branches greenish brown to dark brown. Leaves digitate, 4-foliolate; petiole 5–7 mm, persistent; leaflet blades narrowly oblanceolate, 5–13 \times 0.5–3 mm, glabrous, base cuneate, apex acute to slightly acuminate. Flowers solitary. Pedicel 4–5 mm, articulate basally. Calyx tube campanulate, 5–6 \times ca. 4 mm. Corolla yellow, ca. 1.3 cm or 1.6–2 cm; standard broadly obovate, claw short, apex emarginate; wings oblong, claw slightly shorter than 1/2 of limb, auricle linear and nearly as long as claw; keel with claw slightly longer than 1/2 of limb, auricle inconspicuous. Ovary glabrous. Legume cylindrical, 3–4 cm, glabrous. Fl. May, fr. Sep.

• Terraces, sand dunes, sunny scrub, grasslands; 2600–4100 m. Gansu, Qinghai, Sichuan.

- 1a. Shrubs 50–100 cm tall; leaflet blades 6–13 \times 2–3 mm; calyx tube ca. 6 \times 4 mm; corolla 1.6–2 cm 62a. var. *chinghaiensis*
 1b. Shrubs to 20 cm tall; leaflet blades 5–9 \times ca. 0.5 mm; calyx tube ca. 5 \times 4 mm; corolla ca. 1.3 cm 62b. var. *minima*

62a. *Caragana chinghaiensis* var. *chinghaiensis*

青海锦鸡儿(原变种) qing hai jin ji er (yuan bian zhong)

Shrubs 50–100 cm tall. Leaflet blades 6–13 \times 2–3 mm. Calyx tube ca. 6 \times 4 mm. Corolla 1.6–2 cm.

• Terraces, sand dunes, sunny scrub; 2600–3600 m. Gansu, Qinghai.

62b. *Caragana chinghaiensis* var. *minima* Y. X. Liou, Acta Phytotax. Sin. 22: 209. 1984.

小青海锦鸡儿 xiao qing hai jin ji er

Shrubs to 20 cm tall. Leaflet blades 5–9 \times ca. 0.5 mm. Calyx tube ca. 5 \times 4 mm. Corolla ca. 1.3 cm.

• Grasslands; 3600–4100 m. SE Qinghai, Sichuan.

63. *Caragana densa* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 258. 1909.

密叶锦鸡儿 mi ye jin ji er

Shrubs to 1.5 m tall. Bark dark brown, greenish brown, or yellowish brown. Branchlets arched. Leaves digitate, 4-folio-

late; petiole 1–1.2 cm and persistent on long branchlets, 5–10 mm and caducous on short branchlets; leaflet blades obovate to linear, 6–13 \times 2–3 mm, abaxially sparsely pilose, base narrowly cuneate, apex acute. Flowers solitary. Pedicel 3–4 mm, articulate basally. Calyx tube campanulate, 7–10 mm. Corolla yellow, 1.8–2.3 cm; standard broadly ovate, claw shorter than limb, apex obtuse; wings oblong, claw slightly longer than limb, auricle linear and ca. 1/3 as long as claw; keel with claw \pm as long as limb, auricle small. Ovary glabrous. Legume cylindrical, 3–3.5 cm \times 3–4 mm, glabrous. Fl. May–Jun, fr. Jul–Aug. $2n = 16^*$.

• Dry slopes in mixed woodlands; 1700–4000 m. Gansu, Qinghai, W Sichuan, Xinjiang, NW Yunnan.

64. *Caragana turfanensis* (Krasnov) Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 213. 1909.

吐鲁番锦鸡儿 tu lu fan jin ji er

Caragana frutescens Linnaeus var. *turfanensis* Krasnov, Zap. Russk. Geogr. Obshch. Obshchei Geogr. 19: 336. 1888.

Shrubs to 1 m tall. Branches yellowish brown; branchlets pale brown. Leaves digitate, 4-foliolate; petiole 0.7–1.3 cm and persistent on long branchlets, persistent or caducous on short branchlets; leaflet blades obovate to obovate-cuneate, 4–6 \times 2–3 mm, glabrous or pubescent, apex acute. Flowers solitary. Pedicel 2–5 mm, articulate basally. Calyx tube tubular, 6–8 mm. Corolla yellow; standard obovate, 1.7–2.2 cm, claw 1/3–1/2 as long as limb, apex obtuse; wings linear-oblong, claw more than 1/2 as long as limb, auricle 1/5–1/4 as long as claw; keel with claw shorter than limb, auricle very short. Ovary glabrous. Legume 3–4.5 cm \times 4–6 mm. Fl. May, fr. Jul.

• Slopes, terraces, steep slopes; 1300–2100 m. Xinjiang.

65. *Caragana laeta* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 29: 215. 1909.

阿拉套锦鸡儿 a la tao jin ji er

Shrubs 1–2 m tall. Bark greenish gray or brownish gray. Branchlets brownish yellow, spinose. Leaves digitate, 4-foliolate; petiole (0.5–)0.7–1.3(–1.5) cm and persistent on long branchlets, caducous on short branchlets; leaflet blades broadly obovate, 4–13(–17) \times 2.5–7 mm, base narrowly cuneate, apex rounded to truncate and shortly cuspidate. Flowers solitary or 2 in a fascicle. Pedicel 5–10 mm, articulate near middle. Calyx tube campanulate-tubular or tubular, 10–14 mm. Corolla yellow; standard obovate, 2.6–3.5 cm, claw ca. 1/3 as long as limb; wings sublinear, claw ca. 3/4 as long as limb, auricle 1/5–1/4 as long as claw; keel obtuse, claw nearly as long as limb, auricle small. Ovary glabrous or rarely with trichomes. Legume cylindrical, 3–5 cm, glabrous. Fl. Jul–Aug, fr. Aug. $2n = 16$.

Dry slopes of gullies, stony taluses; 2100–3200 m. Xinjiang [Kazakhstan, Kyrgyzstan].

66. *Caragana frutex* (Linnaeus) K. Koch, Dendrologie 1: 48. 1869.

黄刺条锦鸡儿 huang ci tiao jin ji er

Robinia frutex Linnaeus, Sp. Pl. 2: 723. 1753; *Caragana frutex* var. *latifolia* C. K. Schneider.

Shrubs to 2 m tall. Branches brown, yellowish gray, or dark grayish green. Leaves digitate, 4-foliolate; petiole 2–10 mm and persistent on long branchlets, caducous on short branchlets; leaflet blades obovate-oblongate, 6–10 × 3–5 mm, glabrous or sparsely pilose, apex rounded to emarginate. Flowers solitary or 2 in a fascicle. Pedicel 0.9–2.1 cm, articulate apically. Calyx tube tubular-campanulate, 6–8 mm. Corolla yellow, 2–2.2 cm; standard suborbicular, ca. 1.6 cm

wide, claw ca. 5 mm; wing with claw ca. 1/2 as long as limb, auricle 1/4–1/3 as long as claw, apex emarginate; keel ca. 2.2 cm, claw shorter than limb, auricle inconspicuous. Ovary glabrous. Legume cylindrical, 2–3 cm. Fl. May–Jun, fr. Jul. $2n = 32$.

Dry slopes, woodlands; 1000–2500 m. Xinjiang [Kazakhstan, Mongolia, Russia; E Europe].

156. HALIMODENDRON Fischer ex Candolle, Prodr. 2: 269. 1825.

铃铛刺属 *ling dang ci shu*

Zhu Xiangyun (朱相云); Kai Larsen

Shrubs, deciduous. Stipules persistent and becoming spines. Leaves paripinnate; rachis and petiole becoming a spine after leaflets have fallen. Raceme on reproductive branchlets, few flowered; peduncle slender. Calyx campanulate, base oblique; teeth 5, very short. Corolla pale purple or purplish red; standard suborbicular, slightly reflexed at margins; wings clawed, claw equal to auricle; keel semicircular, slightly curved, apex blunt at apex. Stamens diadelphous (9+1). Ovary stipitate, inflated; style incurved; stigma small. Legume inflated, valve thick.

One species: China, Mongolia, Russia.

1. *Halimodendron halodendron* (Pallas) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4: 626. 1917.

铃铛刺 *ling dang ci*

Robinia halodendron Pallas, Reise Russ. Reich. 2: 741. 1773; *Caragana argentea* Lamarck, nom. illeg. superfl.; *C. halodendron* (Pallas) Dumont de Courset; *Halimodendron argenteum* Candolle, nom. illeg. superfl.; *H. argenteum* var. *albiflorum* Karelin & Kirilov; *H. halodendron* var. *albiflorum* (Karelin & Kirilov) Prjachin.

Shrubs, 0.5–2 m tall. Bark dark grayish brown. Branches many, vegetative and reproductive; reproductive branches brown to grayish yellow, sulcate, glabrous; young branches with dense white appressed trichomes. Rachis and petiole persistent,

spine-shaped; petiole and petiolules very short; leaflet blades oblongate, 1.2–3 × 0.6–1 cm, with dense silvery white trichomes at first, glabrescent, base cuneate, apex rounded or emarginate. Racemes 2–5-flowered; peduncle 1.5–3 cm, densely sericeous. Flowers 1–1.6 cm; pedicel 5–7 mm; bracteoles subulate, ca. 1 mm. Calyx 5–6 mm, with dense appressed trichomes, base oblique; teeth triangular. Corolla pale purple or purplish red; standard slightly reflexed at margins, ± as long as wings; wings slightly longer than keel. Ovary glabrous, long stipitate. Legume flattened, 1.5–2.5 × 0.5–1.2 cm, dorsal and ventral line impressed, without septa, apex with a short beak. Seeds reniform. Fl. Jul, fr. Aug. $2n = 16$.

Saline sand, saline soils along rivers, forests. Gansu, Nei Mongol, Xinjiang [Mongolia, Russia].

27. Tribe CICEREAЕ

鷹嘴豆族 ying zui dou zu

Bao Bojian (包伯坚); Nicholas J. Turland

Herbs annual or perennial, glandular hairy. Leaves imparipinnate with rachis terminating in a leaflet, or paripinnate with rachis terminating in a tendril; stipules toothed at margin; leaflets 3 to many, margin serrate. Inflorescence axillary, a 2–5-flowered raceme or solitary flower. Calyx somewhat gibbous at base, 5-toothed; teeth equal or unequal. Stamens diadelphous. Style curved, glabrous. Legume inflated, 1–10-seeded, glandular hairy. Seeds subspheroid, beaked.

One genus and ca. 43 species: Mediterranean region to C Asia, extending to the Canary Islands and NE tropical Africa, one species widely cultivated; two species (one introduced) in China.

157. CICER Linnaeus, Sp. Pl. 2: 738. 1753.

鷹嘴豆属 ying zui dou shu

Morphological characters and geographic distribution are the same as those of the tribe.

- 1a. Leaves with a terminal leaflet, leaflets 3–8-paired, elliptic; corolla 8–10 mm; seeds 5–15 mm 1. *C. arietinum*
1b. Leaves with a terminal tendril, leaflets 6–15-paired, obovate-cuneate; corolla ca. 25 mm; seeds ca. 2.5 mm ... 2. *C. microphyllum*

1. *Cicer arietinum* Linnaeus, Sp. Pl. 2: 738. 1753.

鷹嘴豆 ying zui dou

Herbs annual, 12–80 cm tall. Stem much branched, erect, glandular hairy. Leaves imparipinnate with a terminal leaflet; stipules leaflike, unequal, margin toothed; leaflets 3–8-paired, elliptic, 7–17 × 3–10 mm, glandular hairy, margin dentate at least in distal half. Raceme 1- or 2-flowered; pedicels 5–25 mm. Calyx campanulate, deeply toothed, glandular hairy. Corolla white, light blue, or purple-red, 8–10 mm, glandular hairy. Legume pendulous, inflated, ovate in outline, (1.5–)2–3.5 × 1–1.7 cm, 1–4-seeded, pubescent and glandular hairy. Seeds 5–15 × 5–10 mm. Fl. Jun–Jul, fr. Aug–Sep. $2n = 16$.

Cultivated as a crop; 2000–2700 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang [widely cultivated elsewhere; of cultivated origin].

Cicer arietinum was possibly derived from *C. reticulatum* Ladizinsky in Neolithic SE Turkey (Mabberley, Plant-Book, ed. 3, 187, 2008).

The seeds are edible (chick peas, garbanzo beans).

2. *Cicer microphyllum* Royle ex Benth in Royle, III. Bot. Himal. Mts. 200. 1835.

小叶鷹嘴豆 xiao ye ying zui dou

Cicer jacquemontii Jaubert & Spach.

Herbs annual, 15–40 cm tall. Stem much branched, erect, glandular hairy. Leaves paripinnate with a terminal tendril; stipules leaflike, glandular hairy, margin 5–7-toothed; leaflets 6–15-paired, obovate-cuneate, 4–12 × 3–7 mm, both surface glandular hairy, margin dentate only in distal half, apex mucronate. Flower solitary; pedicel 5–25 mm, glandular hairy. Calyx ca. 12 mm, deeply toothed, densely glandular hairy. Corolla blue-purple or light blue, ca. 25 mm. Legume elliptic in outline, 2.5–3.5 cm, densely white pubescent. Seeds ca. 2.5 mm. $2n = 16$.

Hill slopes, meadows on sunny slopes, riverbanks, gravels, sands; 1600–4600 m. Xinjiang, W Xizang [E Afghanistan, N India (Himachal Pradesh, Punjab, Uttar Pradesh), Kashmir, W Nepal, N Pakistan].

The name *Cicer songaricum* Stephan ex Candolle (Prodr. 2: 354, 1825) has been misapplied to this species by some authors (e.g., Baker in Hooker, Fl. Brit. India 2: 176, 1876). Chang Y. Yang (Claves Pl. Xinjiang. 3: 187, 1985) recorded both *C. jacquemontii* (i.e., *C. microphyllum*) and *C. songaricum* from Xinjiang. However, the present authors found no relevant specimens and therefore could not substantiate the occurrence in China of true *C. songaricum*, which is distributed in E Kazakhstan, Kyrgyzstan, Mongolia, Russia (Altai), Tajikistan, and Uzbekistan and is very similar morphologically to *C. microphyllum*.

28. Tribe TRIFOLIEAE

车轴草族 che zhou cao zu

Wei Zhi (韦直); Michael A. Vincent

Herbs, rarely shrubs. Leaves pinnately or digitately 3-foliolate, rarely 1- or 5–7-foliolate; stipules mostly adnate to petiole, rarely nearly free (*Parochetus*); leaflets estipellate, veins mostly extended to teeth on margin. Inflorescences various, often capitate or spicate racemes, rarely flowers 1–3 axially; bracts present; bracteoles absent. Calyx campanulate, 5-lobed. Corolla papilionaceous. Stamens diadelphous (9+1) or monadelphous; free parts of filaments filiform or dilated upward; anthers dimorphic or monomorphic (*Ononis*). Ovary with 1 to numerous ovules; style glabrous. Legumes various: straight, falcate, spirally coiled, or ovate, included in or exerted from calyx, dehiscing by one or both sutures or indehiscent. Seeds estrophiolate.

Six genera and ca. 485 species: mainly distributed in the N temperate regions of the Old World; six genera and 45 species (one endemic, 19 introduced) in China.

- 1a. Anthers dimorphic, alternately dorsifixed or basifixed, either all equal or alternately longer and shorter; perennial herbs or shrubs, usually glandular and villous, sometimes spiny 158. *Ononis*
- 1b. Anthers uniform in size and shape, not alternately basifixed and dorsifixed; annual or perennial herbs, not glandular, variably glabrous or hairy, not spiny.
 - 2a. Petals persisting after flowering; legume included in or slightly exerted from persistent corolla, inflorescence generally an umbel or dense raceme, sometimes headlike; filaments dilated upward 159. *Trifolium*
 - 2b. Petals deciduous after flowering; legume as long as or longer than calyx; inflorescence various; filaments not dilated upward.
 - 3a. Keel petals acute; prostrate herbs rooting at the nodes; leaves palmately 3-foliolate; flowers 1–3 in long-pedunculate axillary umbels 160. *Parochetus*
 - 3b. Keel petals obtuse; upright or sprawling herbs, not generally rooting at nodes; leaves pinnately trifoliolate; flowers in dense to lax terminal or axillary racemes, or in axillary sessile or shortly pedunculate heads, short racemes, umbels, or rarely solitary.
 - 4a. Flowers in slender racemes; ovules few; legumes indehiscent or tardily 2-valved, ovoid, straight, ca. same length as calyx 161. *Melilotus*
 - 4b. Flowers in heads, short racemes, sessile umbels, rarely solitary; ovules mostly numerous; legumes indehiscent or dehiscent, linear or coiled, flattened or cylindric, longer than calyx.
 - 5a. Keel and wing petals possessing an explosive pollination mechanism, due to interlocking projections on adjoining faces of petals; legumes mostly spirally coiled, some flattened and curved, scarcely dehiscent, mostly prickly 162. *Medicago*
 - 5b. Keel and wing petals lacking explosive pollination mechanism; legumes straight or curved, mostly linear, dehiscent or indehiscent, not prickly 163. *Trigonella*

158. ONONIS Linnaeus, Sp. Pl. 2: 716. 1753.

芒柄花属 mang bing hua shu

Perennial herbs or shrubs, usually glandular and villous, sometimes spiny. Leaves pinnately 1–3(–5)-foliolate, lateral often reduced or absent; stipules herbaceous, usually adnate to petiole, cauline stipules basally connate, bifid; stipels absent; leaflets toothed, lateral veins extending into teeth. Flowers 1–3 in short axillary racemes; peduncle often bristlelike; floral leaves sometimes reduced to bracts with flowers crowded into a spike. Calyx campanulate or tubular; teeth \pm equal. Petals free from staminal tube, claw short; keel \pm beaked. Stamens monadelphous; filaments dilated at apex; anthers dimorphic, alternately basifixed and dorsifixed. Ovary shortly stipitate; ovules 2 to many. Legume linear-oblong or ovate. Seed reniform, smooth or punctate.

About 75 species: N Africa, SW Asia, Europe; four species (two introduced) in China.

- 1a. Flowers yellow; legume linear-oblong, 10–25 mm 4. *O. natrix*
- 1b. Flowers pink, reddish purple, or purple; legume ovate to elliptic or rhomboid, more than 10 mm.
 - 2a. Plants without spines; flowers in pairs at nodes in dense leafy racemes 2. *O. arvensis*
 - 2b. Plants with spines; flowers usually solitary at nodes in lax leafy racemes.
 - 3a. Corolla 6–10 mm, equal to or slightly longer than calyx 1. *O. antiquorum*
 - 3b. Corolla 10–20 mm, 1.5–2 \times as long as calyx 3. *O. spinosa*

1. *Ononis antiquorum* Linnaeus, Sp. Pl., ed. 2, 2: 1006. 1763.

Greuter; *O. spinosa* Linnaeus subsp. *antiquorum* (Linnaeus) Briquet; *O. spinosa* var. *antiquorum* (Linnaeus) Arcangeli.

伊犁芒柄花 yi li mang bing hua

Ononis repens Linnaeus subsp. *antiquorum* (Linnaeus)

Perennial shrubs, erect, 50–80(–100) cm tall, with inter-

mixed long and short glandular hairs. Stem flexuous, terete, much branched, spiny. Leaves 1-foliolate, sometimes 3-foliolate at base of stem; stipules 6–8 mm; petiole 2–3 mm, slender; leaflets oblong or ovate, 6–12 × 2–5 mm, glandular on both surfaces, base rounded, margins irregularly serrulate, apex acute. Flowers in lax, leafy racemes, solitary at nodes; pedicel short. Calyx 5–8 mm; teeth ca. 2 × as long as tube. Corolla pink with purple stripes, 6–10 mm, not or slightly exceeding calyx. Legume ovoid, 5–6 mm, hidden in persistent calyx. Seeds 1 or 2 (or 3), tuberculate. Fl. May–Aug, fr. Jul–Sep.

Sandy meadows, margins of coniferous woodlands. Xinjiang [N Africa, C and SW Asia, S Europe].

2. *Ononis arvensis* Linnaeus, Syst. Nat., ed. 10, 2: 1159. 1759.

芒柄花 mang bing hua

Ononis hircina Jacquin; *O. repens* Linnaeus subsp. *arvensis* (Linnaeus) Greuter; *O. spinosa* Linnaeus subsp. *arvensis* (Linnaeus) Greuter & Burdet.

Perennial herbs, shrubby, 30–80 cm tall, with glandular and simple hairs. Stem straight, longitudinally ridged, much branched, unarmed. Leaves 3-foliolate, at apical part of stem 1-foliolate; stipules 6–10 mm, equal to petiole; terminal leaflet ovate to broadly oblong, 15–30 × 5–15 mm, sessile, base rounded to broadly cuneate, apex acute, lateral leaflets ca. 1/2 length of terminal one, glandular and villous on both surfaces, more dense abaxially. Flowers in dense, terminal, leafy racemes, (1 or) 2 at nodes; pedicel short. Calyx 8–12 mm; teeth 3–4 × as long as tube. Corolla red with purple stripes, rarely white, 10–20 mm. Legume broadly oblong or ovoid, ca. 7 × 5–6 mm, hidden in calyx, apex slightly reflexed. Seeds 2–4, tuberculate. Fl. and fr. Jun–Aug.

Moist sandy soil in meadows. Xinjiang, Xizang [Afghanistan, Kashmir; C and SW Asia, C and N Europe].

3. *Ononis spinosa* Linnaeus, Sp. Pl. 2: 716. 1753, nom. cons.

红芒柄花 hong mang bing hua

Ononis campestris W. D. J. Koch & Ziz; *O. repens* Linnaeus subsp. *spinosa* (Linnaeus) Greuter.

Perennial shrubs, 30–60 cm tall, with long and short glandular hairs, often arranged in 2 opposite lines. Stem erect, branched at base, spiny. Leaves 3-foliolate, sometimes 1-foliolate toward tip of stem; terminal leaflet oblong-elliptic, 5–10 × 3–5 mm, base rounded, margins irregularly serrulate, apex acute. Flowers in lax, leafy racemes, solitary at nodes, subsessile. Calyx 7–8 mm; teeth longer than tube. Corolla pale red to mauve, 10–20 mm. Legume oblong to rhomboid, 8–9 mm, equal to or slightly exserted from persistent calyx, apex beaked. Seeds 2 or 3, brown to black, tuberculate. Fl. and fr. Apr–Sep.

Cultivated as ornamentals [introduced from Europe].

4. *Ononis natrix* Linnaeus, Sp. Pl. 2: 717. 1753.

黄芒柄花 huang mang bing hua

Perennial subshrubs, 10–70 cm tall, densely glandular hairy. Stem erect, much branched, unarmed. Leaves 3-foliolate, lower rarely 5-foliolate, upper rarely 1-foliolate; leaflets oblong, obovate, to broadly linear, 1–3 cm, base cuneate, apex acute. Flowers in lax, leafy racemes or panicles, solitary at nodes, or at tips of lateral branchlets; pedicel 5–20 mm; bract aristate. Calyx 8–12 mm; teeth linear-lanceolate, 2.5–4 × length of tube. Corolla yellow, with veins scarlet or purple, 12–20 mm. Legume linear-elliptic, 10–25 × 3–4 mm, 2–3 × as long as persistent calyx, beaked. Seeds 6–9, globose, minutely tuberculate. Fl. May–Oct.

Cultivated as ornamentals [introduced from S and W Europe].

159. TRIFOLIUM Linnaeus, Sp. Pl. 2: 764. 1753.

车轴草属 che zhou cao shu

Ursia Vassilczenko.

Annual or perennial herbs, glabrous to pubescent. Stems erect to ascending or prostrate. Leaves pinnately 3-foliolate or palmately 3 (or 5–9)-foliolate; stipules entire or toothed, partly adnate to petiole; leaflets toothed or entire. Inflorescences axillary or terminal. Flowers sessile or shortly pedicellate, in heads, short racemes, umbels, or rarely solitary; bracts small or absent, often connate into a dentate and membranous involucre. Calyx 5–10[–30]-veined, regular or bilabiate, after flowering sometimes strongly inflated; teeth equal or unequal. Corolla persistent, white, pink, purple, or yellow, sometimes inflated in fruit. Filaments some or all dilated at apex; anthers uniform. Ovary with 1–12 ovules. Legume indehiscent, enclosed by marcescent calyx and petals. Seeds 1 or 2 (–9), ovoid to spherical or reniform.

About 250 species: temperate and subtropical Africa, America, Asia, and Europe; 13 species (nine introduced) in China.

- 1a. Stipules almost completely adnate to petiole.
 - 2a. Stem erect; leaflets (3–)5(–9); flowers 20–35, inflorescence capitate 1. *T. lupinaster*
 - 2b. Stem prostrate or decumbent; leaflets 3; flowers 1–5, inflorescence umbellate.
 - 3a. Stem prostrate, thick and short; leaflets with 6 pairs of lateral veins 2. *T. eximium*
 - 3b. Stem decumbent, thin and long; leaflets with 18–24 pairs of lateral veins 3. *T. gordeievii*
- 1b. Stipules adnate to petiole for 1/2 its length or less.
 - 4a. Petioles slender, shorter than or equal to leaflets; flowers less than 8 mm; ovary stipitate.
 - 5a. Leaflets all ± sessile; stipules lanceolate, 1–1.5 cm, adnate to petiole for ca. 1/2 their length 6. *T. aureum*
 - 5b. At least terminal leaflet stalked; stipules ovate to oblong, 4–8 mm, adnate to petiole for less than 1/2 their length.

- 6a. Flowers 5–15; pedicels larger than or equal to calyx tube; corolla 3–4 mm, standard boat-shaped, acute, smooth; leaflets 5–10 mm 8. *T. dubium*
- 6b. Flowers 20–40; pedicels smaller than calyx tube; corolla (3–)5–6 mm, standard broadly flattened, emarginate, striate; leaflets 8–16 mm 7. *T. campestre*
- 4b. Petioles, especially in lower leaves, much longer than leaflets; flowers more than 6 mm; ovary sessile.
- 7a. Calyx inflated in fruit, veins reticulate, 2 upper teeth longer than 3 lower teeth 9. *T. fragiferum*
- 7b. Calyx not inflated in fruit, veins not reticulate, teeth subequal or lower longest.
- 8a. Flowers pedicellate, bracts present; calyx throat glabrous inside.
- 9a. Stem prostrate, stoloniferous, rooting at nodes; stipules thin and membranous; calyx teeth shorter than tube 4. *T. repens*
- 9b. Stem erect-ascending; stipules herbaceous; calyx teeth longer than or equal to tube 5. *T. hybridum*
- 8b. Flowers ± sessile, bracts absent; calyx throat with a thickened hairy ring inside.
- 10a. Floral heads sessile or very shortly pedunculate, ovoid to globose, involucre by stipules of upper leaves 12. *T. pratense*
- 10b. Floral heads pedunculate, subglobose to elongate, involucre of small bracts or none.
- 11a. Plants perennial, rhizomatous; stems flexuous; leaf veins arcuate, running into small marginal teeth 11. *T. medium*
- 11b. Plants annual, lacking rhizomes; stems upright, straight; leaf veins straight.
- 12a. Floral heads conic to cylindrical, 3–6 cm, involucre absent; calyx teeth ± equal; corolla red or pink, rarely white; stipules broad, apex blunt, dark green to purple 10. *T. incarnatum*
- 12b. Floral heads ovoid or globose, 1.2–2.5 cm, involucre of small fused bracts; calyx teeth unequal, lower much longer than others; corolla creamy white; stipules narrow, apex attenuate, pale green 13. *T. alexandrinum*

1. *Trifolium lupinaster* Linnaeus, Sp. Pl. 2: 766. 1753.

野火球 ye huo qiu

Trifolium lupinaster f. *albiflorum* (Seringe) P. Y. Fu & Y. A. Chen; *T. lupinaster* var. *albiflorum* Seringe.

Perennial herbs, glabrous to slightly pubescent. Stems erect, 30–60 cm, unbranched or branched above. Leaves palmately (3–)5(–9)-foliolate; stipules adnate to petiole for most of their length, membranous, apex long triangular; petiolule ca. 1 mm; leaflets lanceolate to linear-oblong, 25–50 × 5–16 mm, lateral veins 50 or more pairs, running to serrulate margin, base narrowly cuneate, apex acute or obtuse. Flowers 20–35, in terminal or axillary heads subtended by a membranous, caducous involucre; peduncle 1–3(–5) cm. Calyx 6–10 mm, sparsely pubescent, veins 10; teeth filiform, 1–2 × length of tube. Corolla purple or white, (10–)12–20 mm. Ovary stipitate, glabrous; ovules 5–9. Legume gray-brown, oblong, 6–10 × 2–3 mm; style persistent. Seeds (2 or)3–9, brown, ovoid, 1.5–2 mm, smooth. Fl. and fr. Jun–Oct.

Forest margins, hillsides, grasslands, moist lowlands. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, Xinjiang [Japan, Korea, Mongolia, Russia; E Europe].

2. *Trifolium eximium* Stephan ex Seringe, Prodr. 2: 203. 1825.

大花车轴草 da hua che zhou cao

Perennial herbs, pubescent to glabrescent. Stems prostrate to ascending, 3–15 cm, branches 3–10, arising from a taproot, bases covered by persistent stipules and old leaves. Leaves palmately 3-foliolate, sessile to shortly petiolate; stipules ovate-oblong to lanceolate, membranous, connate for most of their length, apex acute; leaflets obovate-elliptic, 5–20 × 4–14 mm, lateral veins 6 pairs, forked and running to serrulate margin, base broadly cuneate, apex obtuse. Flowers 1–5, in axillary um-

bels subtended by scarious involucre; peduncle 5–40 mm; pedicels 1–4 mm, reflexed in fruit. Calyx 6–8 mm, pubescent to glabrescent, veins 10; teeth broadly triangular, 1–2 × length of tube. Corolla red, rarely white, 15–20 mm. Ovary sessile to shortly stipitate; ovules 6–8. Legume slightly falcate, 11–15 mm. Seeds 3–5, brown, ovoid, 1.8–2 mm, smooth. Fl. Jun–Jul, fr. Jul–Aug.

Moist belt along subalpine coniferous forests, rocky places in alpine valleys, glacial moraines; above 1500 m. N Xinjiang [Mongolia, Russia (Siberia)].

3. *Trifolium gordeievii* (Komarov) Z. Wei, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(9): 82. 1980 [*“gordejevi”*].

延边车轴草 yan bian che zhou cao

Medicago gordeievii Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 2: 133. 1921 [*“gordeievi”*]; *Trigonella gordeievii* (Komarov) Grossheim; *Ursia gordeievii* (Komarov) Vassilczenko.

Perennial herbs, villous to glabrescent. Stems 40–80 cm, decumbent-stoloniferous or procumbent-ascending, slender, branched. Leaves palmately 3-foliolate, very shortly petiolate to sessile; stipules lanceolate, membranous, entire, adnate to petiole for most of their length, base sheathing, apex subulate; leaflets obovate to elliptic, (5–)8–15(–18) × 4–8(–12) mm, finely pubescent abaxially, glabrous adaxially, lateral veins 18–24 pairs, prominent on both surfaces, extending into teeth, base broadly cuneate, apex rounded, retuse. Flowers 1(–3), in axillary umbel; involucre absent; peduncle shorter than or equal to leaves; bracts minute, caducous; pedicels (3–)5–7(–9) mm. Calyx 8–9 × ca. 2 mm, veins 10; teeth subulate, 2–3 × length of tube. Corolla white or pink, becoming red to purple, 14–16 mm; standard oblanceolate-elliptic, claw short; wings and keel slightly shorter, with long claw equal to limbs. Ovary shortly

stipitate. Legume ovate-oblong, 8–9 × ca. 3 mm, flat, apex with hooked beak. Seeds 1 or 2(–4), broadly ovoid. Fl. Jun–Sep.

Cold coniferous forests, rocky stream banks; 500–800 m. Heilongjiang, Jilin [Russia (Far East)].

4. *Trifolium repens* Linnaeus, Sp. Pl. 2: 767. 1753.

白车轴草 bai che zhou cao

Perennial herbs, stoloniferous, glabrous to glabrescent. Stems 10–30 cm, prostrate, rooting at nodes. Leaves long petiolate, palmately 3-foliolate; stipules ovate-lanceolate, membranous, with veins green or red, sheathing at base, apex subulate; petiolule 1–1.5 mm; leaflets obovate to ovate, 6–20(–40) × 8–16(–25) mm, lateral veins 13 pairs, prominent on both surfaces, base cuneate, apex emarginate to broadly rounded. Flowers 20–50(–80), in terminal, globose umbels, 1.5–4 cm; peduncle equal to or longer than petiole; involucre absent; bracts lanceolate-ovate, membranous; pedicels 2–5 mm, reflexed after anthesis. Calyx 3–5 mm, veins 6–10; teeth shorter than tube. Corolla white, rarely pink-tinged, 5–12 mm, fragrant; standard elliptic, ca. 2 × wings and keel. Ovary sessile; ovules 3 or 4. Legume linear-oblong. Seeds 2–4, ovoid to reniform. Fl. and fr. May–Oct.

Cultivated, escaped, and naturalized; grasslands, ravines, roadsides. Throughout China [native to N Africa, C and SW Asia, and Europe].

5. *Trifolium hybridum* Linnaeus, Sp. Pl. 2: 766. 1753.

杂种车轴草 za zhong che zhou cao

Perennial herbs, glabrous or glabrescent. Stems few to several from crown, erect or ascending, 15–60 cm, ridged vertically. Leaves palmately 3-foliolate; stipules ovate to ovate-lanceolate, base fused for ca. 1/3 of length, free blade long acuminate, tip subulate; petioles very long in lower leaves, gradually reduced in upper leaves; petiolule 1–1.5 mm; leaflets broadly elliptic to ovate-elliptic or obovate, 1–3 × 1–2 cm, lateral veins 15–20 pairs, base broadly cuneate, margins entire to serrulate, apex obtuse (rarely emarginate). Flowers 10–50, in axillary and terminal, globose umbels, 1–2.5 cm; peduncle longer than adjacent leaves; involucre absent; bracts lanceolate, 0.5–1 mm; pedicels 3–5 mm, reflexed after anthesis. Calyx with 5 major and 5 minor veins; teeth subulate, 1–2 × length of tube. Corolla pink to white, 7–10 mm; standard elliptic, longer than wings and keel. Ovary linear; ovules 2. Legume elliptic. Seeds 2, brown to reddish, ovoid, tuberculate. Fl. and fr. Jun–Oct.

Cultivated, escaped, and naturalized; forest margins, grasslands, roadsides. Gansu, Hebei, Heilongjiang, Henan, Hubei, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang [native to SW Asia and Europe; cultivated worldwide].

6. *Trifolium aureum* Pollich, Hist. Pl. Palat. 2: 344. 1777.

黄车轴草 huang che zhou cao

Trifolium agrarium Linnaeus, nom. utique rej.; *T. strepens* Crantz, nom. illeg. superfl.

Annual herbs, appressed puberulent. Stems erect or ascending, branched at middle, (10–)20–50 cm. Leaves palmately 3-foliolate; stipules lanceolate, 1–1.5 cm, veins prominent, adnate to petiole for ca. 1/2 their length, apex long acuminate;

petioles equal to leaflets in lower leaves, shorter in upper leaves; leaflets obovate-oblong to narrowly elliptic, ± sessile, 10–23 × 5–8 mm, papery, lateral veins 10–18 pairs, base cuneate, margins entire at base, serrate distally, apex obtuse (rarely emarginate). Flowers 25–40, imbricate in dense, globose to shortly cylindrical racemes, 1.5–2 cm, axillary and terminal; peduncle as long as or longer than racemes; involucre and bracts absent; pedicels ca. 1 mm, reflexed after anthesis. Calyx 2–2.5 mm, veins 5; tube short; lower 3 teeth 2–2.5 × length of upper 2. Corolla yellow, turning brown, 6–8 mm; standard elliptic. Ovary long stipitate, oblong; style longer than ovary. Legume narrowly ovoid, 2.5–3 mm, stipitate, apex with persistent style. Seed 1, yellow-brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun–Jul.

Cultivated, escaped, and naturalized; roadsides, weedy areas. Hebei, Jiangsu, Shaanxi [native to SW Asia and C and N Europe].

7. *Trifolium campestre* Schreber in Sturm, Deutschl. Fl., Abt. 1, Band 4, Heft 16. 1804.

草原车轴草 cao yuan che zhou cao

Annual herbs, pubescent to glabrescent. Stems erect, ascending, or prostrate. Leaves pinnately 3-foliolate; stipules ovate to oblong, 5–8 mm, adnate to petiole for 1/2 their length, apex acuminate; petioles shorter than or equal to leaflets; lateral leaflets sessile, terminal petiolule 3–7 mm; leaflets obovate to oblong-elliptic, 8–16 × 4–8 mm, lateral veins 5–8 pairs, base cuneate, margins entire proximally, serrate distally, apex rounded to emarginate. Flowers 20–40, imbricate in globose or cylindrical racemes, 8–13 × 7–10 mm; peduncle 1–3 cm; involucre and bracts absent; pedicels 1–1.8 mm, reflexed after anthesis. Calyx white, 2–2.8 mm, membranous, glabrous to sparsely pubescent, veins 5. Corolla yellow, turning brown, (3–)5–6 mm; standard broadly spatulate, striate, apex emarginate. Legume long ovoid, ca. 3 mm; stipe ca. 1 mm. Seed 1, brown, convex-ovoid, ca. 1 mm. Fl. and fr. Feb–Apr.

Cultivated, escaped, and naturalized; roadsides, grasslands, disturbed areas. Hebei, Jiangsu, Shaanxi [native to N Africa, SW Asia, and Europe].

8. *Trifolium dubium* Sibthorp, Fl. Oxon. 231. 1794.

钝叶车轴草 dun ye che zhou cao

Annual herbs, glabrous to sparsely pubescent. Stems erect to decumbent, (5–)10–30(–40) cm. Leaves pinnately 3-foliolate; stipules obliquely ovate, 4–8 mm, base rounded, margins finely dentate, apex acute; petiole shorter than or equal to leaflets; terminal petiolule longer than lateral petioles; leaflets obovate, 5–10(–12) × 3–8 mm, veins 6–8 pairs, base cuneate, margins entire proximally, obscurely serrulate distally, apex rounded or emarginate. Flowers 5–15, in axillary heads; peduncle 0.5–3(–4) cm, pubescent; pedicels less than 1 mm, after flowering pendulous. Calyx ca. 2 mm, veins 5. Corolla pale yellow, turning brown, 3–4 mm; standard narrowly boat-shaped, smooth, apex acute. Legume oblong, 1.5–2 mm, shortly beaked; stipe ca. 1 mm. Seed 1, pale brown, globose. Fl. and fr. Apr–Sep.

Cultivated, escaped, and naturalized. Jiangsu, Shaanxi, Taiwan [native to SW Asia and Europe].

9. *Trifolium fragiferum* Linnaeus, Sp. Pl. 2: 772. 1753.

草莓车轴草 cao mei che zhou cao

Perennial herbs, stoloniferous, glabrous or hairy. Stems prostrate or decumbent, 10–30(–50) cm, rooting at nodes. Leaves palmately 3-foliolate, long petiolate; stipules linear-lanceolate to lanceolate-ovate, 1–2 cm, membranous, base sheathing, tip acuminate to subulate; leaflets obovate to obovate-elliptic, ± sessile, (5–)10–25 × 5–15 mm, glabrous or sparsely pubescent on veins, lateral veins 10–15, base broadly cuneate, apex rounded, retuse. Flowers 10–30, in crowded hemispheric or ovoid heads, 0.8–2.5 cm; peduncle axillary, to 2 × petiole; involucre bracts fused, lobes lanceolate, entire or toothed. Calyx bilabiate, strongly inflated in fruit, veins reticulate; teeth filiform, 2 upper longer than 3 lower, 2 upper and distal 1/2 of tube densely sericeous. Corolla white or pink, 6–8 mm; standard oblong. Ovary linear. Legume ovate-oblong, enclosed in inflated calyx. Seeds 1 or 2, brown, reniform. Fl. and fr. May–Aug.

Alkaline soils, swamps, ditches, roadsides. Xinjiang [N Africa, C and SW Asia, Europe].

10. *Trifolium incarnatum* Linnaeus, Sp. Pl. 2: 769. 1753.

绛车轴草 jiang che zhou cao

Annual herbs, pubescent. Stems erect or ascending, 30–100 cm, simple to sparingly branched, striate. Leaves palmately 3-foliolate, long petiolate in lower leaves, shortly petiolate in upper leaves; stipules dark green to purple, elliptic, connate and adnate to petiole for ca. 3/4 their length, membranous, veins 3–5, base sheathing, apex broadly triangular or rounded; leaflets broadly obovate to suborbicular, 1.5–3.5 cm, lateral veins 5–10, base cuneate, margins irregularly crenate, apex retuse to obtuse. Flowers 50–80(–120), in dense, cylindric, terminal heads, 3–6 × 1–1.5 cm; peduncle 2.5–7 cm, stout. Calyx densely hirsute, veins 10; teeth subulate, longer than or equal to tube. Corolla red, pink, or white, 10–15 mm; standard narrowly elliptic, acute. Ovary oblate. Legume ovoid. Seed 1, greenish brown, ovoid. Fl. and fr. May–Jul.

Cultivated as an adaptable forage crop with hopeful prospects in China, escaped. Hebei, Jiangsu, Shaanxi, Shandong [native to Mediterranean region].

11. *Trifolium medium* Linnaeus, Amoen. Acad. 4: 105. 1759.

中间车轴草 zhong jian che zhou cao

Perennial herbs, rhizomatous, pubescent to glabrescent. Stems decumbent or ascending, 20–50 cm, branches flexuous. Leaves palmately 3-foliolate, lower long petiolate, upper shortly petiolate; stipules linear-lanceolate, adnate to petiole for ca. 1/2 their length, free blade acuminately lanceolate; leaflets elliptic to broadly lanceolate, 15–55 × 6–20 mm, lateral veins 10–12, arching, branched, running into small marginal teeth, base

rounded, margins entire to obscurely serrate, apex obtuse to acute. Flowers numerous, in globose to broadly ovate, terminal, solitary or paired, sessile or shortly pedunculate heads. Calyx 5–6 mm, veins 10; teeth subulate, unequal, lower tooth longest. Corolla purple, 15–18 mm; standard oblong-ovate. Legume ovoid. Seed 1, brown, angled. Fl. May–Jul, fr. Jun–Aug.

Cultivated, persisting after cultivation. Hebei, Shaanxi [native to SW Asia and Europe].

12. *Trifolium pratense* Linnaeus, Sp. Pl. 2: 768. 1753.

红车轴草 hong che zhou cao

Perennial herbs, sparsely villous or glabrescent. Stems numerous from crown, erect or ascending, 20–70 cm, stout, striate. Leaves palmately 3-foliolate, basal and cauline, long petiolate in lower leaves, shortly petiolate in upper leaves; stipules ovate-lanceolate, membranous, base adnate to petiole, apex acuminate-subulate; leaflets ovate-elliptic or obovate, rarely elliptic, 1.5–3.5(–5) × 1–2 cm, lateral veins 15, base broadly cuneate, margins obscurely serrulate, apex obtuse, rarely retuse. Flowers 30–70, in dense globose or ovoid, terminal, sessile to shortly pedunculate heads, subtended by involucre of stipules of reduced leaves. Calyx slightly pubescent or glabrous, veins 10; teeth subulate, unequal, lower tooth ca. 2 × others. Corolla purple, rarely pink or white, 12–14(–18) mm; standard spatulate, apex rounded, retuse. Ovary elliptic. Legume ovoid. Seed 1, yellow or brown, ovoid. Fl. and fr. May–Sep.

Cultivated and naturalized; woodland margins, wet meadows, roadsides. Anhui, Fujian, Guangdong, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Taiwan, Xinjiang, Yunnan [native to N Africa, SW Asia, and Europe].

13. *Trifolium alexandrinum* Linnaeus, Cent. Pl. I. 25. 1755.

埃及车轴草 ai ji che zhou cao

Annual herbs, sparsely pubescent to glabrescent. Stems erect or ascending, 20–60 cm, striate, branched at base. Leaves palmately 3-foliolate, alternate on lower part of stem, opposite on upper part; petioles equal to leaflets in lower leaves, shorter in upper leaves; stipules lanceolate, adnate to petiole for 1/2 their length, veins 4 or 5, pale green, margins sparsely ciliate, apex subulate; leaflets obovate or broadly elliptic to oblong-lanceolate, 15–30(–50) × 6–15 mm, lateral veins 6–10, base broadly cuneate to obtuse, margins of apical 1/2 serrate, apex obtuse, rarely retuse. Flowers numerous, in ovoid or conic, terminal or axillary heads, 12–25 × 10–15 mm; peduncles 1–2 × heads; involucre of short bracts, united at base. Calyx 3.5–4 mm, veins 10; teeth unequal, plumose, lower tooth equal to tube, others shorter. Corolla creamy white, 8–13 mm. Legume 22–25 mm. Seed 1, yellow, ovoid. Fl. Apr–May, fr. May–Jun.

Cultivated. Guangdong, Jiangsu, Taiwan [native range unknown; cultivated in N Africa and SW Asia].

160. PAROCHETUS Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 240. 1825.

紫雀花属 zi que hua shu

Perennial herbs, prostrate to ascending, rooting at nodes, sometimes with tubers. Leaves palmately 3-foliolate; stipules entire, free to basally adnate to petiole; petiole long; leaflets obcordate, base narrowly to broadly cuneate, margin entire or toothed. Inflo-

rescence umbellate; peduncle axillary, erect or deflexed in fruit; pedicel bases bracteate; flowers 1–3. Calyx teeth \pm equal to tube, upper 2 connate for most of their length. Corolla not adnate to stamens; standard obovate, tapering into a claw; wings falcate-oblong, auriculate; keel broadly triangular-falcate, shorter than wings, apex straight or abruptly inflexed, acute. Stamens diadelphous; filaments capillary. Ovary sessile, glabrous; ovules numerous. Legume linear-ovate, longer than calyx, apex obliquely acute. Seeds numerous, brown, reniform, often spotted; hilum small, round and lateral.

Two species: E Africa, C and S Asia; one species in China.

1. Parochetus communis Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 240. 1825.

紫雀花 *zi que hua*

Stems prostrate to ascending, 10–20 cm, tubers lacking. Stipules 4–5 mm, membranous, entire, free; petiole 8–15 cm, slender, pubescent; petiolule less than 1 mm; leaflets 8–20 \times 10–20 mm, lateral veins 4 or 5 pairs, base narrowly cuneate, margins entire or minutely serrate. Inflorescence umbellate; pe-

duncle longer than or equal to petiole; pedicels 5–10 mm; flowers 1–3. Calyx 6–9 mm, pubescent. Corolla blue or purple, rarely white or pink, ca. 20 mm; standard 1.4–2 cm, claw 3–5 mm; wings falcate-oblong, auricle 2–4 mm; keel abruptly inflexed, acute. Legume linear-ovate, 20–25 \times 3–4 mm. Seeds 8–12, ca. 2 \times 1 mm. Fl. and fr. Apr–Nov.

Thickets, woodland margins, grasslands, roadsides; 1800–3000 m. Sichuan, Xizang, Yunnan [Bhutan, India, Malaysia, Myanmar, Nepal, Sri Lanka, N Thailand, Vietnam].

161. MELILOTUS (Linnaeus) Miller, Gard. Dict. Abr., ed. 4. 1754.

草木犀属 *cao mu xi shu*

Trifolium [unranked] *Melilotus* Linnaeus, Sp. Pl. 2: 764. 1753 [*“Meliloti”*]; *Brachylobus* Dulac.

Annual or biennial herbs, taprooted, upright. Leaves pinnately 3-foliolate; stipules entire or nearly so, basally adnate to petiole; leaflets serrulate, lateral veins ending in teeth; stipels absent. Racemes axillary, slender, elongate; flowers numerous; bracts minute; bracteoles absent. Calyx teeth subequal. Corolla yellow or white, petals free from staminal tube, deciduous; standard ovate-oblong; wings narrowly oblong; keel broadly falcate. Stamens diadelphous; filaments capillary. Ovary sessile or shortly stipitate; ovules 2–8; style filiform, curved upward, often persistent. Legume obovoid or globose, slightly exerted from calyx, surface reticulate veined or wrinkled. Seeds 1 or 2, broadly ovoid, smooth or papillate.

About 20 species: temperate and subtropical N Africa, Asia, and Europe; four species in China.

These are fragrant herbs grown as green manure, forage crops, or bee plants.

- 1a. Flowers white 1. *M. albus*
 1b. Flowers yellow.
 2a. Flowers up to 3 mm, pedicels less than 1 mm; legumes globose, ca. 2 mm 4. *M. indicus*
 2b. Flowers (3–)7 mm, pedicels 1.5 mm or more; legumes ovoid-elliptic, 3–5 mm.
 3a. Stipules lanceolate, base hastate and split into several teeth or incised; leaflets serrate, teeth 15–20 on a side 3. *M. dentatus*
 3b. Stipules linear-falcate, base entire or with 1 minute tooth; leaflets obscurely to strongly serrate, teeth fewer than 15 on a side 2. *M. officinalis*

1. Melilotus albus Medikus, Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 382. 1787.

白花草木犀 *bai hua cao mu xi*

Annual or biennial herbs, glabrescent. Stems erect, 70–200 cm, terete, hollow, much branched. Stipules subulate, 6–10 mm, entire; petiole slender, shorter than leaflet; leaflets lanceolate, oblong, or oblanceolate-oblong, 15–30 \times (4–)6–12 mm, puberulent abaxially, glabrous adaxially, lateral veins running into teeth, 12–15 pairs, margins shallowly serrate. Racemes 8–20 cm; flowers 40–100; bracts 1.5–2 mm; pedicels 1–2 mm. Corolla white, 3.5–5 mm; standard larger than wings and keel. Ovary narrowly ovate; ovules 2–4. Legume elliptic to oblong, 3–3.5 mm, veins reticulate, thin, brown, dark when ripe, apex acute, beaked. Seeds 1 or 2, brown, ovoid, papillate. Fl. May–Jul, fr. Jul–Sep.

Moist soil in fields, roadsides, wastelands. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Liaoning, Nei

Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Asia, Europe].

2. Melilotus officinalis (Linnaeus) Lamarck, Fl. Franç. 2: 594. 1779.

草木犀 *cao mu xi*

Trifolium officinale Linnaeus, Sp. Pl. 2: 765. 1753 [*T. “M. officinalis”*]; *Brachylobus officinalis* (Linnaeus) Dulac; *Melilotus graveolens* Bunge; *M. officinalis* f. *suaveolens* (Ledebour) H. Ohashi & Tateishi; *M. suaveolens* Ledebour.

Biennial herbs, sparsely puberulent to glabrescent. Stems erect, 40–100(–250) cm, longitudinally ridged. Stipules linear-falcate, 3–5(–7) mm, entire or with 1 tooth at base; petiole slender; leaflets obovate, broadly ovate, oblanceolate, to linear, 15–25(–30) \times 5–15 mm, lateral veins running into teeth, 8–12 pairs, margins shallowly serrate. Racemes 6–15(–20) mm, 30–70-flowered, dense at first, becoming lax in anthesis; bracts equal to pedicels, 1.5–2 mm. Corolla yellow, 4.5–7 mm; stan-

dard ± equal to wings and keel. Ovary narrowly ovate; ovules (4–)6(–)8. Legume ovoid, 3–5 × ca. 2 mm, veins transversely reticulate, dark brown, apex with persistent style. Seeds 1 or 2, yellowish brown, ovoid, ca. 2.5 mm, smooth. Fl. May–Sep, fr. Jun–Oct.

Sandy grasslands, hillsides, ravine shores, margins of mixed woodlands. Throughout China [Asia, Europe].

3. *Melilotus dentatus* (Waldstein & Kitaibel) Persoon, Syn. Pl. 2: 348. 1807.

细齿草木犀 xi chi cao mu xi

Trifolium dentatum Waldstein & Kitaibel, Descr. Icon. Pl. Hung. 1: 41. 1802; *Melilotus dentatus* prol. *sibiricus* O. E. Schulz; *M. dentatus* subsp. *sibiricus* (O. E. Schulz) Suvorov.

Biennial herbs, glabrous. Stems erect, 20–50(–80) cm, terete, longitudinally ridged. Stipules lanceolate to narrowly triangular, 6–12 mm, base hastate, with 2 or 3 teeth or incised; petiole slender, usually shorter than leaflets; leaflets oblong-lanceolate to suborbicular, 20–30 × 5–13 mm, lateral veins 15–20 pairs, parallel and branching into teeth, prominent on both surfaces, especially obvious near margins, base rounded or cuneate, apex rounded, apiculate. Racemes 3–5 cm, elongated to 8–10 cm when fruiting, scattered 20–50-flowered; pedicels ca. 1.5 mm. Corolla yellow, 3–4 mm; standard slightly longer than wings and keel. Ovary narrowly ovate; ovules 2. Legume globose to ovoid, 4–5 × 2–2.5 mm, veins reticulate, gibbous on ventral suture, brown. Seeds 1 or 2, olive-green, globose, ca. 1.5 mm. Fl. Jun–Sep, fr. Jul–Oct.

Woodland margins, alkaline meadows. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Xinjiang [C Asia, Europe].

4. *Melilotus indicus* (Linnaeus) Allioni, Fl. Pedem. 1: 308. 1785.

印度草木犀 yin du cao mu xi

Trifolium indicum Linnaeus, Sp. Pl. 2: 765. 1753 [*T. "M. indica"*]; *Melilotus parviflorus* Desfontaines.

Annual herbs, slightly pubescent to glabrescent. Stems erect or ascending, 20–50 cm, terete, simple or branching from base. Stipules lanceolate, 4–6 mm, base auriculate, with 2 or 3 tiny teeth, margin membranous; leaflets obovate-cuneate to narrowly oblong, 10–25(–30) × 8–10 mm, appressed hairy abaxially, glabrous adaxially, lateral veins 7–9 pairs, parallel running into teeth, base cuneate, margins serrulate toward apex, apex obtuse or truncate, sometimes retuse. Racemes slender, dense, 1.5–4 cm; peduncle long; flowers 15–25; bracts filiform; pedicels ca. 1 mm. Corolla yellow, 2.2–2.8 mm; standard broadly ovate, retuse, equal to wings and keel, or sometimes keel slightly longer. Ovary narrowly ovate; ovules 2. Legume olive-green, becoming red-brown when ripe, globose, ca. 2 mm, slightly exserted from calyx, glabrous, veins reticulate. Seed 1, dark brown, broadly ovoid, ca. 1.5 mm. Fl. Mar–May, fr. May–Jun.

Open places, alkaline soil in meadows, roadsides. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangsu, Sichuan, Taiwan, Yunnan, Zhejiang [S and C Asia, Europe].

162. **MEDICAGO** Linnaeus, Sp. Pl. 2: 778. 1753, nom. cons.

苜蓿属 mu xu shu

Annual or perennial herbs, rarely shrubs. Leaves pinnately 3-foliolate; stipules adnate to petiole at base; leaflets denticulate, lateral veins running out into teeth. Racemes axillary, flowers crowded into heads; bracts small and caducous. Calyx 5-toothed, subequal. Petals free from staminal tube; standard oblong to obovate, usually reflexed; wings and keel with hooked appendages involved in explosive tripping mechanism for pollination. Stamens diadelphous; filaments not dilated, apical portion of staminal column arched; anthers uniform. Ovary sessile or shortly stipitate; ovules numerous; style subulate; stigma subcapitate, oblique. Legume compressed, coiled, curved, or straight, surface reticulate, sometimes armed with spines. Seed small, reniform, smooth or rough.

About 85 species: Africa, C and SW Asia, Europe, Mediterranean region; 15 species (one endemic, six introduced) in China.

1a. Legume spirally coiled.

2a. Perennial herbs or shrubs; legume spineless.

3a. Shrubs 9. *M. arborea*

3b. Herbs.

4a. Legume tightly coiled in 2–4(–6) spirals, center solid or nearly so; corolla variable in color, white, deep blue, to dark purple 7. *M. sativa*

4b. Legume loosely coiled in 1–1.5 spirals, center hollow; corolla yellow to brownish purple 8. *M. × varia*

2b. Annual or biennial herbs; legume with spines or tubercles.

5a. Leaflets obviously hairy; legume globose, less than 4.5 mm in diam.

6a. Petiole shorter than peduncle, stipule entire or obscurely serrate, leaflets densely hairy; inflorescence 2–10-flowered 10. *M. minima*

6b. Petiole longer than peduncle, stipule small, incised, leaflets sparsely pilose; inflorescence 1- or 2-flowered 11. *M. praecox*

5b. Leaflets glabrous or glabrescent; legume discoid, 4–10 mm in diam.

7a. Petiole not more than 2 × as long as peduncle, stipule lacinate or lacerate, leaflets without dark blotch 12. *M. polymorpha*

7b. Petiole 2–5 × as long as peduncle, stipule triangular, incised to lacinate, leaflets with a dark central blotch 13. *M. arabica*

- 1b. Legume not spirally coiled.
- 8a. Legume less than 3 mm 1. *M. lupulina*
- 8b. Legume more than 8 mm.
- 9a. Legume falcate or linear, straight or curved to arcuate, less than 3 mm wide.
- 10a. Plants perennial; flowers in crowded pedunculate racemes 6. *M. falcata*
- 10b. Plants annual; flowers solitary to few in sessile to shortly stalked clusters.
- 11a. Flowers 1 or 2(or 3), 6–8 mm, sessile; legume more than 40 mm 14. *M. monantha*
- 11b. Flowers 2–5, 4–5 mm, shortly pedunculate; legume less than 30 mm 15. *M. orthoceras*
- 9b. Legume oblong to semilunar, more than 4 mm wide.
- 12a. Plants densely pubescent; flowers yellow, ca. 5 mm 5. *M. edgeworthii*
- 12b. Plants glabrous or slightly puberulent; flowers yellow with scarlet spot, more than 6 mm.
- 13a. Legume 5–9 mm wide; stems glabrous; leaflets rather larger 2. *M. platycarpus*
- 13b. Legume less than 6 mm wide; stems ± puberulent; leaflets rather smaller.
- 14a. Flowers 4 or 5 in a scattered thyrese; leaflets ovate to orbicular; stipules hastate 3. *M. archiducis-nicolaii*
- 14b. Flowers (4–)6–9(–15) in dense fascicles; leaflets cuneate-linear to oblanceolate; stipules lanceolate 4. *M. ruthenica*

1. *Medicago lupulina* Linnaeus, Sp. Pl. 2: 779. 1753.

天蓝苜蓿 *tian lan mu xu*

Annual or short-lived perennial herbs, 15–60 cm, glabrescent to pubescent, sometimes glandular. Stems decumbent, prostrate or ascending, much branched. Stipules ovate-lanceolate, to 10 mm, entire or toothed, base rounded or hastate, apex acuminate; petiole 1–2 cm; leaflets elliptic, ovate, or obovate, 5–20 × 4–6 mm, papery, pubescent, lateral veins to 10 pairs, base cuneate, margin distally obscurely serrate, apex truncate or retuse, apiculate. Flowers 10–20 in small heads; peduncles slender, straight, longer than subtending leaves, glabrate to densely appressed pubescent; bracts bristlelike, minute; pedicel less than 1 mm. Calyx ca. 2 mm, glabrate to densely hairy. Corolla yellow, 2–2.2 mm; standard suborbicular, apex retuse, longer than wings and keel. Ovary broadly ovate; ovule 1. Legume reniform, ca. 3 × 2 mm, sculptured with concentric arcuate veins, sparsely hairy, black when ripe. Seed 1, brown, ovoid, smooth. Fl. Apr–Sep, fr. Jun–Oct.

Stream banks, roadsides, waste fields, woodland margins. Throughout China [Asia, Europe].

2. *Medicago platycarpus* (Linnaeus) Trautvetter, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 8: 271. 1841.

阔荚苜蓿 *kuo jia mu xu*

Trigonella platycarpus Linnaeus, Sp. Pl. 2: 776. 1753; *Melilotoides platycarpus* (Linnaeus) Soják; *Melissitus platycarpus* (Linnaeus) Goloskokov; *Trigonella karkarensis* Semenov ex Vassilczenko; *Turukhania platycarpus* (Linnaeus) Vassilczenko.

Perennial herbs, (25–)40–80(–100) cm. Stems erect, quadrangular, base often purplish, glabrous or puberulent. Stipules broadly triangular-lanceolate, 5–8 mm, shallowly serrate, base subhastate; petiole slender, 2.5–3.5(–5) cm, shorter above; leaflets broadly ovate, orbicular, to broadly elliptic, (15–)20–30 × (8–)15–25 mm, papery, sparsely hairy or glabrescent abaxially, glabrous adaxially, lateral veins ca. 10 pairs, inconspicuous, base rounded to broadly cuneate, margin irregularly dentate, apex rounded or truncate. Flowers (4 or)5–8(–15) in umbels;

peduncle shorter than or equal to subtending leaf, slender; bracts minute, ovate, apiculate, ca. 1 mm; pedicels 3–5 mm. Corolla yellow with purple stripes, bluish when dry, (7–)9–12(–14) mm; standard oblong-spatulate, slightly constricted at middle. Ovary linear; ovules 12–14. Legume oblong-falcate to semilunar, (10–)12–18(–24) × 5–9 mm, flat, veins crosswise long reticulate, black when ripe, dorsal suture straight, apex rounded, shortly beaked. Seeds (5–)8–12, brown, broadly ovoid, ca. 3 × 2 mm, smooth to rugose. Fl. Jun–Jul, fr. Jul–Aug.

Ravines, meadows by margins of coniferous forests; 1200–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia].

3. *Medicago archiducis-nicolaii* Širjaev, Bull. Misc. Inform. Kew 1928: 270. 1928 [*“archiducis-nicolaii”*].

青海苜蓿 *qing hai mu xu*

Kamiella archiducis-nicolaii (Širjaev) Vassilczenko; *Melilotoides archiducis-nicolaii* (Širjaev) Yakovlev.

Perennial herbs, 8–20 cm. Stems prostrate or ascending, slender, ridged, much branched, sparsely hairy. Stipules hastate, 4–7(–10) mm, veins obvious, margin dentate, apex narrowly triangular; petiole 4–12 mm; leaflets broadly ovate to orbicular, 6–18 × 6–12 mm, papery, puberulent abaxially, glabrescent adaxially, lateral veins 6–10 pairs, base rounded, margin obscurely irregularly denticulate, apex truncate or retuse, apical leaflet and petiolule longest. Flowers 4 or 5, scattered in axillary umbels; peduncle slightly longer than subtending leaf; bracts ca. 1 mm; pedicels slender, 2–5(–7) mm. Corolla yellow-orange, with central mauve spot, 7–9(–10) mm; standard obovate-elliptic, retuse. Ovary linear, glabrous; ovules 7–9(–13). Legume oblong-semilunar, 10–15(–18) × 4–6 mm, flat, veins crosswise reticulate, black when ripe, apex shortly beaked. Seeds 5–7, brown, broadly ovoid, ca. 2.5 × 1.5 mm, smooth. Fl. Jun–Aug, fr. Jul–Sep.

• Alpine slopes, valleys, grasslands; (2500–)3000–4000 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan, NE Xizang.

4. *Medicago ruthenica* (Linnaeus) Trautvetter, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 8: 271. 1841.

花苜蓿 *hua mu xu*

Trigonella ruthenica Linnaeus, Sp. Pl. 2: 776. 1753; *Medicago liaosiensis* (P. Y. Fu & Y. A. Chen) X. Y. Zhu & Y. F. Du; *M. ruthenica* var. *inschanica* (H. C. Fu & Y. Q. Jiang) X. Y. Zhu; *Melilotoides ruthenica* (Linnaeus) Soják; *M. ruthenica* var. *inschanica* (H. C. Fu & Y. Q. Jiang) H. C. Fu & Y. Q. Jiang; *M. ruthenica* var. *liaosiensis* (P. Y. Fu & Y. A. Chen) H. C. Fu & Y. Q. Jiang; *Melissitus liaosiensis* (P. Y. Fu & Y. A. Chen) Yakovlev; *M. ruthenicus* (Linnaeus) Peschkova; *M. ruthenicus* var. *inschanicus* (H. C. Fu & Y. Q. Jiang) H. C. Fu & Y. Q. Jiang; *M. ruthenicus* var. *liaosiensis* (P. Y. Fu & Y. A. Chen) H. C. Fu & Y. Q. Jiang; *Pocockia liaosiensis* P. Y. Fu & Y. A. Chen; *P. ruthenica* (Linnaeus) Boissier; *P. ruthenica* var. *inschanica* H. C. Fu & Y. Q. Jiang.

Perennial herbs, 20–70(–100) cm. Stems erect or ascending, branched at base, quadrangular. Stipules lanceolate, cuspidate, veins obvious, base rounded, auriculate, with 1–3 shallow denticles, apex slightly curved; petiole 2–7(–12) mm; leaflets varied in shape with different habitats, oblong, oblanceolate, cuneate, linear, and oblong-ovate, (6–)10–15(–25) × (1.5–)3–7(–12) mm, terminal largest, lateral veins 8–18 pairs, prominent on both surfaces, base cuneate, broadly cuneate, to rounded, margin entire below, slightly to irregularly serrulate in upper 3/4, apex truncate, obtuse, or retuse. Flowers (4–)6–9(–15) in umbels, sometimes to 2 cm; peduncles straight, usually longer than subtending leaf; bracts 1–2 mm; pedicels 1.5–4 mm. Corolla yellow-brown, with scarlet to purple stripes in center, (5–)6–9 mm; standard oblong-obovate, obcordate, or spatulate; wings oblong; keel shortest, ovate. Ovary linear; ovules 4–8. Legume oblong or oblong-ovate, 8–15(–20) × 3.5–5(–7) mm, flat, veins inclined transversely, black when ripe, base tapering and slightly curved, stipitate, apex obtuse, apiculate. Seeds 2–6, brown, elliptic-ovoid, ca. 2 × 1.5 mm, smooth. Fl. Jun–Sep, fr. Aug–Oct.

Sandy soil of stream banks, slopes, grasslands. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan [Mongolia, Russia (Far East, Siberia)].

5. *Medicago edgeworthii* Širjaev, Oesterr. Bot. Z. 87: 123. 1938.

毛茛苜蓿 mao jia mu xu

Trigonella pubescens Edgeworth ex Baker in J. D. Hooker, Fl. Brit. India 2: 88. 1876; *Medicago pubescens* (Edgeworth ex Baker) Širjaev (1928), not Candolle (1813); *Melilotoides pubescens* (Edgeworth ex Baker) Yakovlev.

Perennial herbs, 30–40 cm. Stems erect or ascending, branched at base, terete, densely hairy. Stipules ovate-lanceolate, 5–8(–10) mm, base rounded to hastate, margin entire, apex acuminate; petiole 2–6 mm; leaflets obovate to long obovate, (6–)10(–15) × (4–)7(–10) mm, scattered pubescent on both surfaces, especially dense on midrib abaxially, lateral veins 8–13 pairs, straightly running to teeth, base broadly cuneate, margin serrulate in upper 1/2, apex rounded, abruptly shortly acuminate. Flowers (1 or)2 or 3(–6) scattered in axillary heads; peduncles slightly longer than leaves; bracts ca. 1.5 mm; pedicels less than 2 mm. Corolla yellow, ca. 5 mm. Ovary oblong, densely tomentose; ovules 12–14. Legume oblong, 12–16 × 4–5 mm, flat, densely appressed pubescent, veins close, trans-

verse, base rounded, sessile, apex acute, shortly beaked, sutures obvious. Seeds 10–12, dark brown, ovate-elliptic, ca. 2 × 1 mm, smooth. Fl. Jun–Aug, fr. Jul–Sep.

Grasslands, open fields, roadsides; 2500–3500 m. Qinghai, Sichuan, Xizang, Yunnan [Afghanistan, India, Pakistan].

6. *Medicago falcata* Linnaeus, Sp. Pl. 2: 779. 1753.

野苜蓿 ye mu xu

Perennial herbs, (20–)40–100(–120) cm. Stems erect or ascending, terete, branchy. Stipules lanceolate to linear-lanceolate, base hastate, apex acuminate; leaflets obovate to linear, (5–)8–15(–20) × (1–)2–5(–10) mm, pubescent abaxially, glabrous or appressed puberulent adaxially, margin serrulate in apical 1/4 or margin 2- or 3-serrate, lateral veins 5–15 pairs, base cuneate, apex rounded, obtuse, or acute, mucronate. Racemes 10–20(–40) mm, with 6–20(–25) flowers, crowded; peduncles axillary, straight, equal to or slightly longer than leaves; bracts ca. 1 mm; pedicels 2–3 mm. Corolla yellow, 6–9(–11) mm; standard long obovate. Ovary linear; ovules 2–5. Legume falcate or straight, (8–)10–15 × 2.5–3.5(–4) mm, appressed puberulent, veins oblique and thin. Seeds 2–4, brown, ovate-elliptic, ca. 2 × 1.5 mm. Fl. Jun–Aug, fr. Jul–Sep.

Grassy places, slopes, ravines, dry sandy fields. Gansu, Hebei, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Asia, Europe].

- 1a. Stems ascending, appressed puberulent; leaflets obovate to linear-oblongate, margin serrulate in apical 1/4, apex obtuse, mucronulate, glabrous adaxially, appressed puberulent abaxially, lateral veins 12–15 pairs; legume falcate 6a. subsp. *falcata*
- 1b. Stems erect, densely yellow tomentose; leaflets linear, margin 2- or 3-serrate, sparsely appressed puberulent adaxially, densely tomentose abaxially, lateral veins 5–7 pairs; legume straight 6b. subsp. *romanica*

6a. *Medicago falcata* subsp. *falcata*

野苜蓿(原亚种) ye mu xu (yuan ya zhong)

Medicago sativa Linnaeus subsp. *falcata* (Linnaeus) Arcangeli.

Stems ascending, appressed puberulent. Leaflets obovate to linear-oblongate, appressed puberulent abaxially, glabrous adaxially, lateral veins 12–15 pairs, margin serrulate in apical 1/4, apex obtuse, mucronulate. Legume falcate.

Grassy places, slopes, ravines, dry sandy fields. Gansu, Hebei, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Asia, Europe].

6b. *Medicago falcata* subsp. *romanica* (Prodan) O. Schwartz & Klinkowski, Verh. Bot. Vereins Prov. Brandenburg 74: 182. 1933.

草原苜蓿 cao yuan mu xu

Medicago romanica Prodan, Fl. Român. 1: 617. 1923; *M. falcata* var. *romanica* (Prodan) Hayek.

Stems erect, densely yellow tomentose. Leaflets linear, densely tomentose abaxially, sparsely appressed pubescent adaxially, lateral veins 5–7 pairs, margins 2- or 3-serrate. Legume straight.

Dry grasslands, slopes. Xinjiang [Russia (W Siberia); C Asia, E Europe].

7. *Medicago sativa* Linnaeus, Sp. Pl. 2: 778. 1753.

紫苜蓿 *zi mu xu*

Medicago afghanica Vassilczenko; *M. alaschanica* Vassilczenko; *M. asiatica* Sinskaya subsp. *sinensis* Sinskaya; *M. beipinensis* Vassilczenko; *M. pekinensis* Vassilczenko; *M. rivularis* Vassilczenko; *M. roborovskii* Vassilczenko; *M. sativa* var. *tibetana* Alefeld; *M. tibetana* (Alefeld) Vassilczenko.

Perennial herbs, 30–100 cm. Stems erect, ascending, rarely prostrate, quadrangular, glabrous or puberulent, much branched. Stipules ovate-lanceolate, base entire or with 1 or 2 denticles, apex acute; leaflets long ovate, obovate, to linear-ovate, (5–)10–25(–40) × 3–10 mm, papery, appressed pubescent abaxially, glabrous adaxially, lateral veins 8–10 pairs, base tapering, margin serrulate in upper 1/3, apex rounded, mucronate with a denticle from midrib. Heads or racemes with 5–30 flowers, 1–2.5 cm; peduncles straight, longer than leaves; bracts equal to pedicels, ca. 2 mm. Corolla variable in color, white, deep blue, to dark purple; standard oblong, retuse. Ovary linear; ovules numerous. Legume tightly coiled in 2–4(–6) spirals, 5–9 mm in diam., center solid or nearly so, brown when ripe, veins thin and inconspicuous. Seeds 10–20, yellow or brown, ovoid, 1–2.5 mm, smooth. Fl. May–Jul, fr. Jun–Oct.

Cultivated throughout China, often escaped to roadsides, fields, grasslands, and stream banks [native to N and SW Asia, probably also S Europe; now cosmopolitan].

8. *Medicago* × *varia* Martyn, Fl. Rust. 3: t. 87. 1793.

杂交苜蓿 *za jiao mu xu*

Medicago sativa Linnaeus subsp. *varia* (Martyn) Arcan-geli.

Perennial herbs, 60–80(–120) cm. Stems erect, prostrate, or ascending, quadrangular, much branched. Stipules lanceolate, base obscurely dentate, apex acuminate; leaflets oblong-obovate to elliptic, 10–20(–25) × (3–)5–10 mm, papery, sparsely appressed puberulent abaxially, glabrous adaxially, lateral veins 8 pairs, base rounded or broadly cuneate, margin shallowly serrate in upper 1/2. Flowers 8–15 in capitate racemes, crowded, becoming more widely spaced after anthesis; peduncles straight, longer than leaves; bracts shorter than pedicels. Corolla yellow, yellow-brown, to brownish purple, 9–10(–11) mm; standard oblong-ovate, usually with darker stripes, retuse. Ovules 6–8. Legume loosely coiled in (0.5–)1–1.5(–2) spirals, (4–)7–9(–12) mm in diam., center hollow, veins inconspicuous. Seeds 3–6, brown, ovoid. Fl. Jun–Aug, fr. Aug–Oct.

Cultivated throughout China, escaping to fields and roadsides [widely cultivated elsewhere].

This is a hybrid between *Medicago sativa* and *M. falcata*.

9. *Medicago arborea* Linnaeus, Sp. Pl. 2: 778. 1753.

木本苜蓿 *mu ben mu xu*

Rhodusia arborea (Linnaeus) Vassilczenko.

Shrubs, 1–2(–4) m, pale yellow sericeous; bark split longitudinally. Stems erect, terete. Stipules narrowly triangular, 5–8 mm, acute, entire; petioles 2–4 cm; leaflets obovate to obcordate, 10–18 × 8–14 mm, sericeous abaxially, glabrous adaxially, lateral veins 5–7 pairs, base broadly cuneate, margin entire, apex obtuse or retuse. Flowers 6–10 scattered in racemes, 2–2.5 cm; peduncles axillary, 3–5 cm, densely silky; bracts ca. 2 mm; pedicels ca. 5 mm. Corolla orange, 12–15 mm. Ovary stipitate; ovules 12–15. Legume loosely coiled in 0.5–1.5 spirals, 12–15 mm in diam., center hollow, appressed pubescent, veins radially reticulate, netted in external circle. Seed reniform, ca. 4 mm. Fl. May.

Cultivated as an ornamental. Hebei, Jiangsu [native to the Mediterranean region].

10. *Medicago minima* (Linnaeus) Bartalini, Cat. Piante Siena, 61. 1776.

小苜蓿 *xiao mu xu*

Medicago polymorpha Linnaeus var. *minima* Linnaeus, Sp. Pl. 2: 780. 1753.

Annual herbs, 5–30 cm, spreading hairy, sometimes with glandular hairs. Stems diffuse, prostrate or ascending, branched at base. Stipules ovate, base rounded, margin entire or obscurely shallowly serrate, apex acute; petioles slender, 5–10(–20) mm; leaflets obovate, 5–8(–12) × 3–7 mm, papery, villous on both surfaces, base cuneate, margin serrulate in apical 1/3, apex rounded or retuse, apiculate. Flowers 2–10 in capitate racemes; peduncles slender and straight; pedicels short or sessile. Corolla pale yellow, 3–4 mm; standard broadly ovate, longer than wings and keel. Legume globose, 2.5–4.5 mm, tightly coiled in 3–5 spirals; spines straight with hooked tip, equal to radius of legume. Seed long reniform, brown, 1.5–2 mm, smooth. Fl. Mar–Apr, fr. Apr–May.

Sandy slopes, waste fields, stream banks. Anhui, Gansu, Hebei, Henan, Hubei, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Africa, Asia, Europe].

11. *Medicago praecox* Candolle, Cat. Pl. Horti Monsp. 123. 1813.

早花苜蓿 *zao hua mu xu*

Annual herbs, (5–)10–20(–50) cm. Stems prostrate or ascending, quadrangular, branched at base, sparsely hairy. Stipules ovate, incised or lacerate; leaflets obovate or obcordate, (2–)4–8(–12) × (2–)5–9(–13) mm, papery, sparsely hairy abaxially, glabrous adaxially, base broadly cuneate, margin only obscurely serrate apically, apex truncate or emarginate. Flowers 1 or 2 in axillary umbel; peduncles shorter than petiole, bracts ca. 1.5 mm; pedicels less than 1 mm. Corolla yellow, 3–4 mm; standard broadly orbicular. Ovary linear. Legume usually only 1 per umbel, scarlet to dark brown, discoid, 3–4 mm, loosely coiled in 2–4(or 5) spirals, coil edge wide, deeply grooved, spines 10 in each row. Seed brown, reniform, 2–2.8 × 1–1.3 mm. Fl. Mar–Apr, fr. May–Jul.

Introduced and cultivated. Anhui, Fujian, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Sichuan [native to the N Mediterranean region].

12. *Medicago polymorpha* Linnaeus, Sp. Pl. 2: 779. 1753.

南苜蓿 *nan mu xu*

Annual or biennial herbs, 20–90 cm. Stems prostrate or ascending, branched at base, subquadrangular, glabrescent. Stipules ovate-oblong, 4–7 mm, base auriculate, margin irregularly lacinate or deeply incised, apex acuminate; petioles long and thin, 1–5 cm; leaflets obovate or triangular-obovate, 7–20 × 5–15 mm, papery, sparsely hairy abaxially, glabrous adaxially, base broadly cuneate, margin shallowly serrate in apical 1/3, apex obtuse, truncate, or emarginate, apiculate. Flowers (1 or) 2–10 in axillary racemes; peduncles slender, 3–15 mm, usually longer than leaves; pedicel less than 1 mm. Corolla yellow, 3–4 mm; standard obovate, emarginate. Legume ash-green to greenish brown, discoid, 4–6(–10) mm, tightly coiled in 1.5–2.5(–6) spirals, turning clockwise, radial veins connected near edge on coil face, spines or tubercles 15 in each row. Seed brown, reniform, ca. 2.5 × 1.25 mm, smooth. Fl. Mar–May, fr. May–Oct.

Cultivated or escaped to fields, hillsides, and roadsides. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [native at least to N Africa, SW Asia, and S Europe; widely introduced elsewhere].

13. *Medicago arabica* (Linnaeus) Hudson, Fl. Angl. 288. 1762.

褐斑苜蓿 *he ban mu xu*

Medicago polymorpha Linnaeus var. *arabica* Linnaeus, Sp. Pl. 2: 780. 1753; *M. maculata* Willdenow; *M. oxalioides* Schur.

Annual herbs, 40–65 cm. Stems decumbent or spreading, longitudinally ridged, sparsely hairy, hairs simple and multicellular-glandular. Stipules ovate-lanceolate, 5–12 mm, incised, with 6–8 deep lobes; petioles slender, 2–8(–12) cm, 2–5 × as long as peduncle; leaflets usually with a dark colored patch at center, obcordate to broadly obovate, 7–25(–30) × 14–32 mm, sparsely hairy abaxially, glabrous adaxially, base broadly cuneate, margin subentire or shallowly serrate, apex rounded or emarginate. Flowers (1 or) 2–5(or 6) in axillary racemes; peduncles with a terminal cusp; bracts ca. 1 mm; pedicels longer than or equal to bracts. Corolla yellow, 5–6.5 mm; standard broadly obovate, retuse. Legume cylindrical to globose, 5–7 mm, tightly coiled in 3–7 spirals, turning counterclockwise, 5–8 radial veins on coil face, spines 13–15 in each row. Seed yellowish brown,

oblong-elliptic, 2.5–3.5 × 1.2–1.5 mm, smooth. Fl. Mar–May, fr. May–Aug.

Cultivated, rather moist stream banks, grasslands. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangsu [native to the Mediterranean region].

14. *Medicago monantha* (C. A. Meyer) Trautvetter, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 8: 272. 1841.

单花胡卢巴 *dan hua hu lu ba*

Trigonella monantha C. A. Meyer, Verz. Pfl. Casp. Meer. 137. 1831; *T. geminiflora* Bunge.

Annual herbs, 20–40 cm. Stems prostrate or ascending, branched at base, ridged, pilose. Leaves 3-foliolate; stipules lanceolate-hastate, 5–7 mm; petioles 1–2.5 cm; leaflets oblong-obovate to obtriangular, (3–)5–12 × (3–)4–8 mm, pilose at least on midrib abaxially, subglabrous adaxially, lateral veins 5–8 pairs, base cuneate, margin denticulate in apical 2/3, apex truncate. Flower axillary, solitary at basal portion of stem, 2(or 3) in apical portion, sessile or peduncles developed, 6–8 mm, with straight dense hairs. Corolla yellow, 6–8 mm; standard evidently longer than wings and keel. Ovary linear; ovules 18–24; style short and flat. Legume straight, cylindrical, 40–50(–80) × 1–2 mm, appressed pubescent, veins reticulate, forming a pattern of squares or pentagons, apex hooked. Seeds numerous, brown, oblong-elliptic, ca. 2 mm. Fl. May–Jul, fr. Jun–Aug.

Clay soils in deserts, wilderness tracts, or roadsides. Xinjiang [Afghanistan, Mongolia, Pakistan; C and SW Asia].

15. *Medicago orthoceras* (Karelin & Kirilov) Trautvetter, Trudy Glavn. Bot. Sada 5: 421. 1877.

直果胡卢巴 *zhi guo hu lu ba*

Trigonella orthoceras Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 399. 1841.

Annual herbs, 15–25(–40) cm. Stems prostrate or ascending, subquadrangular, sparsely pilose. Leaves 3-foliolate; stipules subhastate, 5–6 mm; leaflets obovate to obovate-triangular, 6–15 × 3–8 mm, pilose at least on midrib abaxially, glabrous adaxially, lateral veins 6–9 pairs, base cuneate, margin denticulate in upper 2/3, apex truncate. Flowers 2–5 in subumbellate heads; peduncles undeveloped, but sometimes to 3–5 mm. Corolla yellow, 4–5 mm; standard longer than wings and keel. Ovary linear; ovules numerous; style short and flat. Legume cylindrical, 20–30 × 1–1.5 mm, appressed pubescent, veins reticulate. Seeds numerous, brown, oblong to ovoid, ca. 2 × 1 mm, warty. Fl. Apr–Jun, fr. May–Jul.

Sandy slopes, grasslands; 1200–1900 m. W Xinjiang [Pakistan, Russia (W Siberia); C and SW Asia].

163. TRIGONELLA Linnaeus, Sp. Pl. 2: 776. 1753.

胡卢巴属 *hu lu ba shu*

Annual or perennial herbs. Stem erect, spreading or prostrate, much branched. Leaves pinnately 3-foliolate; stipules adnate to petiole, conspicuously veined; terminal leaflet usually larger, margin ± serrulate or incised, lateral veins running out into teeth. Inflorescence axillary, shortly racemose, capitate, subumbellate, or flower solitary; peduncles elongate in fruit. Pedicels short, often less than 5 mm, thickened after flowering; bracts minute; bracteoles absent. Calyx teeth ± equal. Petals yellow, blue, purple, or white, free from staminal tube; standard obovate or oblong, broad at base, sometimes broadly clawed; wings elliptical; keel obtuse, shorter than

wings. Stamens diadelphous or nearly monadelphous; filaments not dilated; anthers uniform. Legume straight, falcate, or arcuate, compressed or terete, tapering at both ends, with reticulate coat. Seeds 1 to many, scabrous, warty or pitted.

About 55 species: mostly in Africa, Asia, Europe, Mediterranean region, and Oceania; eight species (two introduced) in China.

1a. Perennial herbs; legume linear-oblong.

2a. Wings shorter than keel.

3a. Corolla 10–12 mm; branches erect, arising from subshrubby base 3. *T. cachemiriana*

3b. Corolla 7–9(–10) mm; branches prostrate to ascending, arising from large woody base 4. *T. pamirica*

2b. Wings longer than keel.

4a. Legume covered with oblique veins; standard suborbicular, equal to wings; leaflet margin sparsely serrate 1. *T. emodi*

4b. Legume covered with crosswise veins; standard long obovate, reflexed, slightly longer than wings; leaflet margin densely biserrate 2. *T. fimbriata*

1b. Annual herbs; legume cylindrical or ovoid.

5a. Legume conical or ovoid, more than 2.5 mm wide; plants over 30 cm.

6a. Legume ovoid, 2.5–5 mm; inflorescence long pedunculate, capitate, with 10–25 flowers; petiole 10–40 mm 7. *T. caerulea*

6b. Legume conical, 70–120 mm; inflorescence subsessile, flowers solitary or in pairs; petiole 6–15 mm 8. *T. foenum-graecum*

5b. Legume linear-cylindrical, less than 2 mm wide; plants under 30 cm.

7a. Peduncles as long as leaves or longer, usually over 15 mm 5. *T. cancellata*

7b. Peduncles shorter than leaves, usually under 10 mm 6. *T. arcuata*

1. *Trigonella emodi* Benth in Royle, Ill. Bot. Himal. Mts. 197. 1835.

喜马拉雅胡卢巴 xi ma la ya hu lu ba

Perennial herbs, 20–60(–80) cm. Stem erect or ascending, terete, branching at base, yellow pubescent when young. Leaves 3-foliolate; stipules broadly lanceolate, incised; leaflets broadly obovate, (7–)10–25 × (4–)7–15 mm, sparsely pilose abaxially, glabrous adaxially, base cuneate, margin sparsely serrate, apex obtuse or truncate, apiculate. Flowers 5–8(–10) in short racemes; peduncle slender and axillary, 1–2 cm, after flowering prolonged to 2–3 cm, straight; bracts minute; pedicels 1.5–2.5 mm. Calyx 3–4 mm; teeth lanceolate, shorter than tube. Corolla yellow, 6–9 mm; standard suborbicular, equal to wings; keel ca. 1/2 length of wings. Ovary as long as style; ovules 8–10. Legume oblong, 14–20 × 4–5 mm, glabrous, veins prominent, oblique, base rounded, apex acute, with persistent style. Seeds 4–6, brown, ellipsoid, ca. 2.5 × 1.5 mm, smooth. Fl. and fr. Jun–Sep.

Ravine shores or meadows by woodlands of the Himalayan valleys; 2700–3800 m. Xizang [India, Kashmir, Nepal, Pakistan].

2. *Trigonella fimbriata* Royle ex Benth in Royle, Ill. Bot. Himal. Mts. 197. 1835.

重齿胡卢巴 chong chi hu lu ba

Perennial herbs, 25–30 cm. Stem erect, spreading branching, subquadrangular, sparsely pilose. Leaves 3-foliolate; stipules ovate-lanceolate, incised, 4–6 mm, pilose; petiole 3–5 mm; leaflets broadly obovate, 6–10(–12) × 3–6(–8) mm, pilose at least on midrib abaxially, glabrous adaxially, base cuneate, margin irregularly biserrate. Flowers (3–)6–8(–12) in subumbellate heads; peduncle 20–40 mm, pilose, straight; pedicels ca. 2 mm. Calyx ca. 3.5 mm; teeth subulate-lanceolate. Corolla yellow, (5–)6–7 mm. Ovary linear, sparsely pilose; ovules 7–9. Legume elliptic-oblong, 8–10 × ca. 4 mm, veins crosswise, thin and conspicuous, both ends rounded. Seeds 2–4. Fl. and fr. Jul–Aug.

Ravine shores or meadows by woodlands of the Himalayan valleys; 3800–4300 m. Xizang [India, Kashmir, Nepal].

3. *Trigonella cachemiriana* Cambessèdes in Jacquemont, Voy. Inde 4(Bot.): 36. 1835–1844.

克什米尔胡卢巴 ke shi mi er hu lu ba

Perennial herbs, 20–40 cm. Stems erect, terete, branching from base, leafy. Leaves 3-foliolate; stipules of lower part triangular-lanceolate, 3–5 mm; leaflets obovate, (5–)7–12 × (4–)6–8 mm, base broadly cuneate, margin serrulate. Flowers (5–)8–10, in subumbellate heads; peduncle slender, 20–35 mm, straight after flowering; pedicels 1–2.5 mm. Calyx 3–4 mm; teeth triangular. Corolla yellow, 10–12 mm; standard suborbicular, equal to keel; wings short and narrow. Ovary linear; ovules 10. Legume oblong, (10–)12–15(–18) × ca. 4 mm, veins prominent, oblique, base stipitate, apex rounded. Seeds 2–4, brown, reniform to ovoid, 2.5–3 mm, smooth. Fl. Jun–Aug, fr. Aug–Sep.

Sandy ravines, grasslands in valleys; 2400–3800 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Pakistan; SW Asia (Iran)].

4. *Trigonella pamirica* Borissova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 225. 1938.

帕米尔胡卢巴 pa mi er hu lu ba

Melilotoides pamirica (Borissova) Soják; *Melissitus pamiricus* (Borissova) Goloskokov.

Perennial herbs, (15–)30–40(–50) cm, from a woody caudex. Stem procumbent or ascending, terete, branching at base. Leaves 3-foliolate; leaflets obovate, 9–18 × 5–9 mm, glabrate to sparsely pubescent, base cuneate, margin sharply few toothed, apex truncate to broadly rounded, sometimes retuse or apiculate. Flowers (2–)5–8(–10) in umbels; peduncle axillary, longer than subtending leaf; pedicels 2–3 mm, recurving after anthesis. Calyx 4–5(–7) mm; teeth linear-lanceolate, as long as tube. Corolla yellow, 7–9(–10) mm; standard oblong to oblong-ovate, 7–10 × 4–5 mm, longer than keel. Ovary linear; ovules 3–5. Legume oblong-elliptic, (10–)11–13(–16) × (3–)4.5

mm, straight or slightly curved, flattened laterally, glabrous or rarely pubescent, veins prominent, oblique, base broadly cuneate, apex acute, with persistent style. Seeds 3 or 4, smooth. Fl. and fr. May–Sep.

Dry slopes and stony wastelands, middle and upper montane regions; below 4500 m. Xinjiang [C Asia, SW Asia (Iran)].

5. *Trigonella cancellata* Desfontaines, Tabl. École Bot. 3: 218. 1829.

网脉胡卢巴 wang mai hu lu ba

Annual herbs, 10–20(–40) cm. Stems prostrate or ascending, puberulent. Leaves 3-foliolate; stipules linear-lanceolate, dentate at base; leaflets obtriangular or obovate-triangular, (4–)7–10 × 4–7 mm, appressed pubescent abaxially, glabrous adaxially, lateral veins 5–8 pairs, base cuneate, margin dentate in upper 1/2, apex truncate. Flowers 4–7 in umbellate heads; peduncle axillary, 10–18 mm. Calyx 3–4 mm, veins 5, prominent. Corolla yellow, ca. 5 mm; standard ovate-oblong, longer than wings and keel. Ovary linear; ovules numerous. Legume cylindrical, 15–20 × ca. 1.5 mm, 4 or 5 in umbel, curved to semi-circular, white pubescent, veins reticulate, beak hooked. Seeds 6–8, brown, oblong, ca. 2.5 × 1 mm, papillose; papillae deep brown. Fl. May–Aug, fr. Jun–Sep.

Alkaline soils on sandy slopes or ravine edges. Xinjiang [Russia (W Siberia); C and SW Asia].

6. *Trigonella arcuata* C. A. Meyer, Verz. Pfl. Casp. Meer. 136. 1831.

弯果胡卢巴 wan guo hu lu ba

Annual herbs, 10–25 cm. Stems prostrate or ascending, terete, branching at base, scattered villous. Leaves 3-foliolate; stipules lanceolate, base subhastate; leaflets obtriangular or obovate, 5–10 × 3–7 mm, scattered villous abaxially, scabrous and glabrous adaxially, lateral veins 5–7 pairs, running out into teeth, parallel, base broadly cuneate, margin dentate above middle, apex truncate. Flowers 4–6(–8) in umbellate heads; peduncle less than 5 mm, thick, densely villous. Corolla yellow, 4–5 mm. Ovary linear villous; ovules numerous. Legume cylindrical, 15–20 × 1.25–1.5 mm, 4 or 5 in umbel, falcate, scattered villous, veins crosswise reticulate, beak pointed. Seeds 7 or 8, oblong, ca. 2.5 mm, brown warty. Fl. Mar–Jun, fr. May–Jul.

Alkaline soil on ravines or hillsides. Xinjiang [C and SW Asia].

7. *Trigonella caerulea* (Linnaeus) Seringe in Candolle, Prodr. 2: 181. 1825.

藍胡卢巴 lan hu lu ba

Trifolium caeruleum Linnaeus, Sp. Pl. 2: 764. 1753 [*T. "M. caerulea"*]; *Melilotus caeruleus* (Linnaeus) Desrousseau.

Annual herbs, 30–60(–80) cm. Stems straight, thick, terete, glabrescent, branched. Leaves pinnately 3-foliolate; stipules subulate-lanceolate; petioles 1–4 cm; leaflets ovate to broadly elliptic, 15–35 × 4–15 mm, sparsely pubescent on midrib abaxially, glabrous adaxially, lateral veins 8–10 pairs, base cuneate or rounded, margin serrate, apex obtuse or acute. Racemes capitate or ovoid, 10–25-flowered; peduncles axillary, ca. 6 cm, straight, glabrous; bracts bristlelike, ca. 1.5 mm; pedicel ca. 1 mm. Calyx ca. 3 mm, membranous, veins 5. Corolla blue, 5–6 mm; standard longest petal, keel shortest. Ovary ovate, glabrous; ovules 5–7. Legume ovoid, 2.5–5 × ca. 2.5 mm, apex tapering and beaked, longer than body. Seeds 1 or 2, brown, broadly ovoid, ca. 2 mm, tuberculate. Fl. Jun–Aug, fr. Jul–Sep.

Cultivated or escaped on wastelands. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shaanxi [widely cultivated in Asia and Europe; of cultivated origin].

Trigonella caerulea is apparently nowhere indigenous and was probably derived from *T. procumbens* (Besser) Reichenbach (Ivimey-Cook in Tutin et al., Fl. Eur. 2: 152. 1968).

8. *Trigonella foenum-graecum* Linnaeus, Sp. Pl. 2: 777. 1753.

胡卢巴 hu lu ba

Annual herbs, 30–80 cm. Taproot to 80 cm, fibrous roots lateral. Stem erect, terete, branched. Leaves 3-foliolate; stipules entire, membranous, base adnate to petiole, apex acute; petiole spreading, 6–15 mm; leaflets narrowly obovate, ovate, to oblong-elliptic, terminal equal to laterals, 15–40 × 4–15 mm, sparsely pubescent or glabrescent abaxially, glabrous adaxially, lateral veins 5 or 6 pairs, base cuneate, margin dentate in upper 1/2. Flowers sessile, axillary, solitary or in pairs. Calyx 7–8 mm, villous. Corolla creamy or pale yellow, base violet, 13–18 mm. Ovary puberulent; ovules numerous. Legume long conical, 7–12 × 0.4–0.5 cm, straight or slightly curved, glabrescent, veins longitudinally reticulate, apex with long beak to 2 cm, distal suture thickened. Seeds 10–20, brown, oblong-ovoid, 3–5 × 2–3 mm, surface uneven. Fl. Apr–Jul, fr. Jul–Sep.

Cultivated throughout China, escaped in fields as a semi-wild weed in Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [Himalayan region; SW Asia].

The seeds are used medicinally. The tender leaves and stems are used as vegetables; and the dried stems, leaves, and seeds are used as flavoring for foods and in baking. The dried plant also is used as insect repellent.

29. Tribe FABEAE

野豌豆族 ye wan dou zu

Bao Bojian (包伯坚); Nicholas J. Turland, Gregory Kenicer

Herbs annual or perennial. Stems erect, trailing, or climbing by means of tendrils. Leaves usually paripinnate, with rachis terminating in a tendril, bristle, or mucro, very rarely imparipinnate or reduced to a phyllode; stipules often leaflike, oblique or semisagittate; leaflets 1- to many paired, margin entire, rarely dentate; stipels absent. Inflorescence an axillary raceme, or flowers in axillary fascicles or solitary. Calyx ± campanulate, equally or unequally 5-toothed. Corolla papilionaceous. Stamens 10; vexillary filament free or ± connate with others into an adaxially split sheath, free part of filaments filiform or distally dilated; anthers versatile, uniform. Ovary with 2 or more ovules; style hairy or glabrous. Legume usually laterally compressed, 2-valved, (1 or)2- to many seeded. Seeds globose, oblate, lenticular, or oblong.

Five genera and ca. 330 species: N temperate zone, extending to tropical E Africa, Pacific islands (Hawaii), and South America; four genera (two introduced) and 60 species (16 endemic, eight introduced) in China.

The fifth genus of the tribe is *Vavilovia* Fedorov, with one species, *V. formosa* (Steven) Fedorov, distributed in SW Asia.

The tribe Fabeae was incorrectly named Vicieae in FRPS. It must be called Fabeae because it includes the type of the family Fabaceae, *Faba* Miller (a synonym of *Vicia*); see the *Vienna Code* (Art. 19.4).

- 1a. Staminal tube oblique at apex; filaments filiform.
 - 2a. Style terete; seeds 2–8 164. *Vicia*
 - 2b. Style dorsally compressed; seeds 1 or 2 166. *Lens*
- 1b. Staminal tube not oblique at apex; filaments filiform or distally dilated.
 - 3a. Style distally dilated, upper side hairy; filaments filiform or distally dilated; stipules sagittate or semisagittate, usually smaller than leaflets 165. *Lathyrus*
 - 3b. Style distally dilated and margin recurved forming a laterally compressed body, upper side hairy; filaments distally slightly dilated; stipules cordate, larger than leaflets 167. *Pisum*

Alternative key

- 1a. Calyx teeth all equal and at least 2 × as long as calyx tube 166. *Lens*
- 1b. At least 2 calyx teeth less than 2 × as long as calyx tube.
 - 2a. Calyx teeth ± leaflike; stipules to 10 cm and larger than leaflets 167. *Pisum*
 - 2b. Calyx teeth not leaflike; stipules not as above.
 - 3a. Style hairy all round distal part, hairy on lower side, or glabrous 164. *Vicia*
 - 3b. Style hairy on upper side only 165. *Lathyrus*

164. VICIA Linnaeus, Sp. Pl. 2: 734. 1753.

野豌豆属 ye wan dou shu

Bao Bojian (包伯坚); Nicholas J. Turland

Ervum Linnaeus; *Faba* Miller; *Vicioides* Moench.

Herbs annual or perennial. Stem usually branched, erect, trailing, or climbing by means of tendrils, usually slender, wingless. Leaves paripinnate with rachis terminating in a tendril, bristle, or mucro, rarely imparipinnate with rachis terminating in a leaflet (*Vicia subvillosa*); stipules entire or toothed at margin; leaflets 1–13-paired, margin entire. Inflorescence a raceme, or flowers in axillary fascicles or solitary; bracts usually absent or caducous. Calyx ± campanulate, equally or unequally toothed, often hairy; teeth not leaflike, at least 2 teeth less than 2 × as long as tube. Corolla various shades of blue, purple, red, yellow, or white; standard with a proximal claw and distal limb, apex retuse. Stamens diadelphous; staminal tube oblique at apex; filaments filiform. Ovary stalked or sessile; ovules 2–8; style terete, hairy all round distal part, hairy on lower side, or glabrous. Legume usually compressed, dehiscent along sutures. Seeds 2–8, globose, oblate, or oblong; hilum often elongate.

About 160 species: N temperate zone, extending to tropical E Africa, Pacific islands (Hawaii), and South America; 40 species (13 endemic, three introduced) in China.

- 1a. Leaf rachis terminating in a leaflet, bristle, or mucro.
 - 2a. Herbs annual; legume 50–100 × 20–30 mm; raceme rachis very short to nearly absent; plants cultivated 40. *V. faba*
 - 2b. Herbs perennial; legume 20–50 × 5–8 mm; raceme rachis usually obvious; plants wild.
 - 3a. Leaflets 1-paired.
 - 4a. Raceme ± cylindrical, usually obviously longer than leaf; calyx glabrescent; leaflets ovate to lanceolate or rhombic-elliptic 30. *V. unijuga*
 - 4b. Raceme abbreviated to capitate, shorter than leaf; calyx villous; leaflets broadly ovate to subrhomboid 31. *V. ohwiana*

- 3b. Leaflets 2–7-paired.
- 5a. Plants 15–30 cm tall; leaflets 5–20 × 1–4 mm (Xinjiang).
- 6a. Leaflets linear, 10–20 × 1–2 mm; stipules divided nearly to middle into 5–7 unequal teeth; plants of steppes or foothills 1. *V. subvillosa*
- 6b. Leaflets elliptic-lanceolate, 5–11 × 1.5–4 mm; stipules only dentate at base; plants of high mountains (2500–4200 m) *V. semenovii* (see note under 1. *V. subvillosa*)
- 5b. Plants 30–100 cm tall; leaflets 20–85(–90) × 3–35 mm (mostly E and NE China, not Xinjiang).
- 7a. Raceme branched.
- 8a. Leaflets linear to narrowly lanceolate; stipules 10–15 × 3–5 mm 28. *V. venosa*
- 8b. Leaflets lanceolate or ovate-lanceolate; stipules 8–12(–16) × 10–13 mm 29. *V. ramuliflora*
- 7b. Raceme unbranched.
- 9a. Bracts persistent at base of pedicels 25. *V. kulingana*
- 9b. Bracts absent or caducous.
- 10a. Stipules triangular or lanceolate, 3–6 × 1–3 mm; leaflets 3- or 4-paired, narrowly oblong to oblong-lanceolate; stem zigzagged 26. *V. deflexa*
- 10b. Stipules obliquely ovate, 12–15 × 6–8 mm; leaflets 2-paired, ovate; stem straight 27. *V. chianschanensis*
- 1b. Leaf rachis terminating in a tendril.
- 11a. Raceme very short, peduncle shorter than flowers.
- 12a. Herbs perennial 37. *V. sepium*
- 12b. Herbs annual.
- 13a. Corolla white or yellow-white; plants densely yellow to brown villous; legume densely brown villous 38. *V. pannonica*
- 13b. Corolla blue-purple or purple to red; plants puberulent to pubescent; legume glabrous to pubescent 39. *V. sativa*
- 11b. Raceme long, peduncle often long.
- 14a. Raceme 1–4(–7)-flowered.
- 15a. Flowers to 5 mm.
- 16a. Legume glabrous; seeds 4; raceme 1- or 2-flowered; corolla 4–8 mm 35. *V. tetrasperma*
- 16b. Legume hirsute; seeds 2; raceme 2–4(–7)-flowered; corolla 2–4 mm 36. *V. hirsuta*
- 15b. Flowers 10–25 mm.
- 17a. Leaflets 8–11-paired 33. *V. tetrantha*
- 17b. Leaflets 2–5-paired.
- 18a. Herbs perennial; leaflets linear, 2–3 mm wide; stipules linear-lanceolate 32. *V. geminiflora*
- 18b. Herbs annual or short-lived perennial; leaflets linear-oblong, oblong, or narrowly oblong-oblongate to oblong-obovate, 2–8 mm wide; stipules semihastate 34. *V. bungei*
- 14b. Raceme 5- to many flowered.
- 19a. Leaflets 5–10 × as long as wide; raceme 8–40-flowered.
- 20a. Herbs annual.
- 21a. Leaves (5–)10–15 cm; stipules 2–4(–10) mm; legume linear, 40–42 mm; corolla 11–12 mm 6. *V. bakeri*
- 21b. Leaves 3–6 cm; stipules 7–12 mm; legume oblong or oblong-rhomboid, 20–40 mm; corolla 10–18 mm 7. *V. villosa*
- 20b. Herbs perennial.
- 22a. Lateral veins of leaflets dense 5. *V. megalotropis*
- 22b. Lateral veins of leaflets sparse and/or not obvious.
- 23a. Corolla 12–18 mm, limb of standard longer than claw 4. *V. tenuifolia*
- 23b. Corolla 8–13(–15) mm, limb of standard subequaling claw.
- 24a. Leaflets linear, linear-lanceolate, or oblong, 11–30 × 2–4 mm 2. *V. cracca*
- 24b. Leaflets oblong-ovate, 25–45 × 5–8 mm 3. *V. lilacina*
- 19b. Leaflets 2.5–5 × as long as wide; raceme 5–15-flowered.
- 25a. Stipules 8–20 mm.
- 26a. Leaflets 2–6(–10) × 1–3.5 cm, apex obtuse or acuminate, mucronate 8. *V. pseudo-orobus*
- 26b. Leaflets 1.3–4 × 0.5–1.8 cm, apex rounded and retuse 9. *V. amoena*
- 25b. Stipules 3–12 mm.
- 27a. Corolla white to yellow, brown-yellow, or pink or purple (in *V. sinogigantea*), sometimes veined or marked with purple, purple-blue, or violet.
- 28a. Corolla standard ca. 7 mm; legume 10–20 mm; plants persistently white pilose 18. *V. sinogigantea*
- 28b. Corolla standard 7–13 mm; legume 20–40 mm; plants pilose, puberulent, or glabrous, sometimes youngest growth densely brownish villous (in *V. dichroantha*).
- 29a. Leaflets 4–18(–34) × 1–6 mm.

- 30a. Raceme shorter than or subequaling leaf; corolla yellow; leaflets elliptic 23. *V. nummularia*
 30b. Raceme obviously longer than leaf; corolla yellow, light yellow, or white; leaflets
 oblong-lanceolate or elliptic 24. *V. costata*
 29b. Leaflets 15–50 × 5–15 mm.
 31a. Raceme shorter than leaf; corolla white with fine purple-blue veins 22. *V. wushanica*
 31b. Raceme longer than leaf; corolla pale greenish cream, yellow, or brown-yellow, sometimes
 marked purple or veined violet on standard.
 32a. Stipules entire at margin; raceme 5–15-flowered, rachis slender; leaflets elliptic to
 ovate-oblong 19. *V. taipaiica*
 32b. Stipules 2- or 3-toothed at margin; raceme 20–25-flowered, rachis strong and straight;
 leaflets linear to linear-lanceolate 20. *V. dichroantha*
 27b. Corolla blue, blue-purple, purple, or red.
 33a. Lateral veins of leaflets inclined forward, sparse.
 34a. Raceme obviously shorter than leaf, bracts present 13. *V. latibracteolata*
 34b. Raceme subequaling or longer than leaf, bracts absent.
 35a. Leaflets linear to oblong; corolla 13–17 mm 14. *V. multicaulis*
 35b. Leaflets narrowly lanceolate to ovate; corolla 10–14 mm.
 36a. Leaflets markedly discolored, abaxially pale green, adaxially green, narrowly
 lanceolate to lanceolate-ovate 16. *V. chinensis*
 36b. Leaflets not markedly discolored, lanceolate-ovate to ovate or elliptic, rarely narrowly
 lanceolate-elliptic 15. *V. japonica*
 33b. Lateral veins of leaflets spreading horizontally, dense.
 37a. Raceme densely 15–30-flowered; leaflets oblong or oblong-ovate to elliptic.
 38a. Raceme subequaling leaf; leaflet apex retuse and entire; corolla blue-purple or white, rarely
 purple; legume rhomboid or suboblong 12. *V. amurensis*
 38b. Raceme obviously longer than leaf; leaflet apex truncate, 3- or 4-toothed, and mucronate;
 corolla blue; legume linear 21. *V. ternata*
 37b. Raceme sparsely 4–16(–20)-flowered; leaflets narrowly oblong to narrowly ovate-elliptic.
 39a. Corolla 7–8(–14) mm, strongly bent upward at middle forming a 90° angle 17. *V. kiochanica*
 39b. Corolla 10–11 mm, not bent as strongly as above.
 40a. Stipules triangular, margin 3–5-toothed; raceme longer than leaf; leaflet apex obtuse,
 mucronate 10. *V. tibetica*
 40b. Stipules small, bifid; raceme subequaling leaf; leaflet apex truncate or rounded,
 mucronate 11. *V. perelegans*

1. *Vicia subvillosa* (Ledebour) Boissier, Fl. Orient. 2: 580. 1872–1873.

疏毛野豌豆 shu mao ye wan dou

Orobis subvillosus Ledebour, Fl. Altaic. 3: 359. 1831;
Lathyrus subvillosus (Ledebour) Aitchison & Hemsley; *O. triflorus* Beck ex Stapf; *Vicia subvillosa* var. *stenophylla* M. Popov.

Herbs perennial, 15–30 cm tall, sparsely to densely vil-
 lous. Leaves usually imparipinnate, 1.5–4 cm; stipules digitate-
 hastate, divided nearly to middle into 5–7 narrowly triangular,
 unequal teeth; leaflets 2–4-paired and usually also 1 terminal,
 linear, 10–20 × 1–2 mm, apex acute, mucronate; tendril absent.
 Raceme 4–8 cm, longer than leaf, 2–4-flowered. Calyx tube ca.
 5 mm; teeth ca. 2 mm. Corolla purple, with dark patch on abax-
 ial surface of standard and pale yellow wings, 1.8–2 cm; stan-
 dard longer than wings and keel. Legume light brown, narrowly
 oblanceolate, gradually narrowed toward base, abruptly nar-
 rowed at apex, 25–40 × 6–10 mm, glabrous; persistent style
 curved, 5–7 mm. Seeds 2–4. Fl. Apr–May, fr. May–Jun.

Steppes or foothills. W Xinjiang [Afghanistan, Kazakhstan, Kyr-
 gyzstan, Mongolia, Russia (Altai), Tajikistan, Turkmenistan, Uzbeki-
 stan; SW Asia (Iran)].

Vicia subvillosa is included here on the basis of two specimens
 collected during the 19th century in what is now Xinjiang: “Songaria
 chinensis, ad lacum Saisang-Nor,” 1838, *C. A Meyer 18095* (BM!) and
 “Songaria chin. ad lacum Saisang-Nor” [without date or collector] (K!).
 Confirmation of its continued presence in China is needed. The species
 was also recorded from Xinjiang by Chang Y. Yang (*Claves Pl. Xin-
 jiang*. 3: 193. 1985).

Very similar plants in Afghanistan, Iran, and Turkmenistan are
 separated as *Vicia iranica* Boissier (Fl. Orient. 2: 581. 1872–1873;
Orobis persicus Boissier, *Diagn. Pl. Orient.*, ser. 1, 2: 107. 1843, not *V.
 persica* Boissier, 1843).

Vicia semenovii (Regel & Herder) B. Fedtschenko (Trudy Imp. S.-
 Peterburgsk. Bot. Sada 24: 245. 1905, “*semenowi*”; *Orobis semenovii*
 Regel & Herder, *Bull. Soc. Imp. Naturalistes Moscou* 39(2): 35. 1866)
 was recorded from Xinjiang by Chang Y. Yang (*Claves Pl. Xinjiang*. 3:
 194. 1985). This species differs from *V. subvillosa* in having stipules
 only dentate at the base and leaflets elliptic-lanceolate and larger (5–11
 × 1.5–4 mm). It is otherwise known from high mountains (2500–4200
 m) in Kazakhstan, Kyrgyzstan, Mongolia, and Tajikistan. However, the
 present authors found no relevant specimens and therefore could not
 substantiate the occurrence of this species in China.

2. *Vicia cracca* Linnaeus, Sp. Pl. 2: 735. 1753.

广布野豌豆 guang bu ye wan dou

Ervum cracca (Linnaeus) Trautvetter; *Vicia cracca* f.

canescens Maximowicz; *V. cracca* var. *canescens* (Maximowicz) Franchet & Savatier; *V. cracca* subsp. *heteropus* Freyn; *V. cracca* var. *japonica* Miquel.

Herbs perennial, 40–150 cm tall. Stem climbing or trailing, hairy (sometimes densely gray-white villous) or glabrescent. Leaves paripinnate; stipules semihastate; leaflets 5–12-paired, linear, linear-lanceolate, or oblong, 11–30 × 2–4 mm, margin entire, apex rounded or acute, mucronate; lateral veins sparse, not obvious; tendrils 2- or 3-branched. Raceme subequaling leaf, 10–40-flowered. Calyx campanulate. Corolla purple, blue-purple, or purple-red, 8–13(–15) mm; standard violin-shaped, equaling wings and longer than keel, limb (distal part) of standard subequaling claw (proximal part). Ovary stalked; ovules 4–7. Legume oblong or oblong-rhomboid, 20–25 × ca. 5 mm, apex beaked. Seeds 3–6. Fl. (Dec), Apr–Sep, fr. May–Oct. $2n = 12, 14, 21, 22, 24, 28$.

Forest margins, thickets, scrub, hill slopes, valleys, grasslands, meadows, streambanks, wet sandy land, alluvium, fields, roadsides; below 4200 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanghai, Shanxi, Sichuan, Taiwan (?introduced), Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, N Vietnam; SW Asia, Europe; introduced and naturalized elsewhere].

3. *Vicia lilacina* Ledebour, Fl. Altaic. 3: 348. 1831.

阿尔泰野豌豆 a er tai ye wan dou

Ervum cracca (Linnaeus) Trautvetter var. *lilacinum* (Ledebour) Trautvetter; *Vicia cracca* Linnaeus f. *lilacina* (Ledebour) Krylov; *V. cracca* var. *lilacina* (Ledebour) Krylov.

Herbs perennial, 50–100 cm tall. Stem erect, white puberulent. Leaves paripinnate, 13–14 cm; stipules semihastate, bifid; leaflets 6- or 7-paired, oblong-ovate, 25–45 × 5–8 mm, apex obtuse or acuminate, mucronate; lateral veins not obvious; tendrils 2- or 3-branched. Raceme ca. 15 cm, slightly longer than leaf, sparsely ca. 15-flowered. Calyx campanulate, hairy outside. Corolla blue-purple; standard violin-shaped, 11–12 mm, subequaling wings and longer than keel, limb (distal part) of standard subequaling claw (proximal part). Ovary fusiform, glabrescent; ovules ca. 8. Legume not seen. Fl. Jun–Sep.

Xinjiang [Russia (Siberia)].

This taxon is perhaps not distinct from the very variable and widespread *Vicia cracca*.

4. *Vicia tenuifolia* Roth, Tent. Fl. Germ. 1: 309. 1788.

细叶野豌豆 xi ye ye wan dou

Ervum tenuifolium (Roth) Trautvetter (1875), not Lagas y Segura (1816); *Vicia brachytropis* Karelin & Kirilov; *V. cracca* Linnaeus subsp. *tenuifolia* (Roth) Gaudin; *V. cracca* var. *tenuifolia* (Roth) Beck.

Herbs perennial, to 100 cm tall. Stem erect, strong, puberulent. Leaves paripinnate; stipules semihastate, bifid; leaflets 6–13-paired, linear or linear-lanceolate, 10–30 × 2–6 mm, subleathery, abaxially white hairy, adaxially glabrous, margin entire, apex obtuse, mucronate; lateral veins sparse; tendrils 2- or

3-branched. Raceme 15–30 cm, 20–30-flowered, densely hairy. Calyx shortly campanulate. Corolla purple, rarely white, 12–18 mm; standard violin-shaped, ca. 14 × 4 mm, equaling wings and longer than keel, limb (distal part) of standard longer than claw (proximal part). Ovary linear; ovules 5–9. Legume oblong-lanceolate, 18–30 × 3–7 mm, both ends acuminate. Seeds 4–7. Fl and fr. Jun–Sep. $2n = 12, 14, 24$.

Forests, dry grasslands, slopes. Xinjiang [Afghanistan, N India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, N Mongolia, Nepal, N Pakistan, Russia, Tajikistan, Uzbekistan, Vietnam; NW Africa, SW Asia, Europe].

5. *Vicia megalotropis* Ledebour, Fl. Altaic. 3: 344. 1831.

大龙骨野豌豆 da long gu ye wan dou

Ervum megalotropis (Ledebour) Trautvetter; *Vicia humilis* Rong He (1994), not Kunth (1824); *V. megalotropis* f. *stenophylla* Franchet.

Herbs perennial, erect, 50–80 cm tall. Leaves paripinnate; stipules lanceolate or semihastate, 5–8 mm, margin 1- or 2-toothed proximally; leaflets 7–12-paired, linear to lanceolate, 20–35(–40) × 1.5–4(–6) mm, appressed hairy, apex obtuse or acute; lateral veins dense; tendrils branched, 1–3 cm. Raceme subequaling leaf, densely 10–20-flowered. Calyx campanulate; lower tooth longer. Corolla purple-red, 12–15 mm; standard longer than wings and keel. Legume rhomboid or oblong, 20–25 × ca. 5 mm. Seeds 3–6. Fl. and fr. Mar–Jul. $2n = 14$.

Rocky or sandy land; 600–1000 m. Gansu, Hebei, Shaanxi, Sichuan, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

6. *Vicia bakeri* Ali, Bot. Not. 120: 52. 1967.

察隅野豌豆 cha yu ye wan dou

Vicia longidentata Z. D. Xia.

Herbs annual, (30–)60–80 cm tall. Stem puberulent, rarely villous. Leaves paripinnate, (5–)10–15 cm; stipules semitriangular or triangular-hastate, 2–4(–10) × 6–10 mm, margin 3- or 4-toothed; leaflets (5–)7–11-paired, narrowly oblong to elliptic or obovate, (14–)16–25 × (4–)5–7 mm, membranous, abaxially hairy, rarely both surfaces villous, margin sometimes thickened, apex obtuse or truncate, mucronate; lateral veins dense, obvious; tendrils branched. Raceme subequaling (rarely obviously longer than) leaf, (6–)10–14 cm, (8–)10–14-flowered. Calyx campanulate or obliquely so, unequally toothed. Corolla purple or light purple; standard oblong, 11–12 × 4–6 mm, subequaling wings and longer than keel. Ovary fusiform or nearly so; ovules 4(–6). Legume linear, 40–42 × 8–9 mm, glabrous. Seeds 3 or 4. Fl. Apr–Sep, fr. Jul–Sep.

Forests, bush woods, among shrubs, hill slopes, grasslands, roadsides; 2300–3600 m. Sichuan, Xizang, Yunnan [N India (Himachal Pradesh, Uttar Pradesh), Kashmir, Nepal, Pakistan].

Plants in Sichuan with stem shorter (30–70 cm), villous, leaves smaller (5–8 cm), leaflets fewer (5–9 paired), narrowly oblong to elliptic, slightly smaller (1.4–1.8 × 0.4–0.6 cm), villous on both surfaces, and raceme shorter (6–10 cm, longer than leaf) have been called *Vicia longidentata* (misspelled as “*V. longicuspis*” in FRPS 42(2): 233, 239, 240, 455. 1998). These characters overlap considerably with those of *V. bakeri*, with which it seems best, therefore, to unite *V. longidentata*.

7. *Vicia villosa* Roth, Tent. Fl. Germ. 2(2): 182. 1793.

长柔毛野豌豆 chang rou mao ye wan dou

Herbs annual, 30–150 cm tall, villous or sericeous, or puberulent to glabrous. Stem climbing, much branched. Leaves paripinnate, 3–6 cm; stipules lanceolate to semitruncate or bifid to semihastate, 7–12 mm; leaflets 4–12-paired, linear to oblong or lanceolate, 10–30 × 3–7 mm, apex obtuse, acute, or acuminate, mucronate; lateral veins dense or not obvious; tendril 2- or 3-branched. Raceme shorter than to slightly longer than leaf, 10–30-flowered. Calyx obliquely campanulate, unequally toothed; lower teeth equaling or longer than tube or all teeth shorter than tube. Corolla purple-blue, purple, light purple, light red, light blue, or rarely white, 10–18 mm; standard linear or oblong, constricted at middle; wings shorter than standard and longer than keel. Legume oblong or oblong-rhomboid, 20–40 × 4–12 mm, apex beaked. Seeds 2–8, globose or obovate-globose, ca. 3 mm in diam. Fl. and fr. Apr–Oct. $2n = 14, 28$.

Cultivated and possibly naturalized; scrub, streamsides, farms, fields and field margins, roadsides; near sea level to 1800 m. Gansu, Guangdong, Guizhou, Hebei, Hunan, Jiangsu, Nei Mongol, Shandong, Taiwan, Xinjiang, Zhejiang [native to N Africa, C and SW Asia, N Atlantic islands (Canary Islands), and Europe; widely introduced and naturalized elsewhere].

- 1a. Plants villous or sericeous; lower calyx teeth equaling or longer than calyx tube; raceme subequaling or slightly longer than leaf 7a. subsp. *villosa*
 1b. Plants puberulent to glabrous; all calyx teeth shorter than calyx tube; raceme usually shorter than or equaling leaf 7b. subsp. *varia*

7a. *Vicia villosa* subsp. *villosa*

长柔毛野豌豆(原亚种) chang rou mao ye wan dou (yuan ya zhong)

Ervum villosum (Roth) Trautvetter (1875), not Pomel (1874); *Vicia villosa* var. *alba* Y. Q. Zhu.

Plants villous or sericeous. Raceme subequaling or slightly longer than leaf. Calyx: lower teeth equaling or longer than tube. Fl. and fr. Apr–Oct. $2n = 14, 28$.

Cultivated and possibly naturalized; streamsides, field margins; near sea level to 1800 m. Gansu, Guangdong, Guizhou, Hebei, Hunan, Jiangsu, Nei Mongol, Shandong, Xinjiang, Zhejiang [native to SW Asia and Europe, but exact native distribution uncertain; widely cultivated and naturalized].

7b. *Vicia villosa* subsp. *varia* (Host) Corbière, Nouv. Fl. Normandie, 181. 1894.

欧洲苕子 ou zhou tiao zi

Vicia varia Host, Fl. Austriac. 2: 332. 1831.

Plants puberulent to glabrous. Raceme usually shorter than or equaling leaf. Calyx: all teeth shorter than tube. Fl. and fr. Jun–Aug. $2n = 14, 28$.

Cultivated and possibly naturalized; scrub, farms, fields, roadsides. Guangdong, Shandong, Taiwan [native to N Africa, SW Asia, N

Atlantic islands (Canary Islands), and Europe; widely introduced and naturalized elsewhere].

8. *Vicia pseudo-orobus* Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 41. 1835.

大叶野豌豆 da ye ye wan dou

Ervum pseudo-orobus (Fischer & C. A. Meyer) Trautvetter; *Vicia pseudo-orobus* f. *albiflora* (Nakai) P. Y. Fu & Y. A. Chen; *V. pseudo-orobus* var. *albiflora* Nakai; *V. pseudo-orobus* f. *breviramea* P. Y. Fu & Y. C. Teng; *V. pseudo-orobus* var. *semistipulata* Handel-Mazzetti.

Herbs perennial, 50–150(–200) cm tall. Stem erect or climbing, green or yellow with black-brown spots, puberulent when young, later glabrescent. Leaves paripinnate, 2–17 cm; stipules hastate, 8–15 mm, margin toothed; leaflets 2–5-paired, elliptic or lanceolate, often narrowly so, 20–60(–100) × 10–35 mm, membranous, abaxially pilose or glabrescent, adaxially glabrous, apex obtuse or acuminate, mucronate; lateral veins obvious; tendril well-developed, 2- or 3-branched. Raceme unbranched, longer than leaf, 5–18 cm, rarely branched and very short, 15–30-flowered. Calyx obliquely campanulate, shortly toothed. Corolla blue-purple, purple, pink, pale yellow, or white, 10–15 mm; standard subequaling wings and keel. Ovary glabrous; ovules 2–6. Legume brown-yellow, oblong, flat, 20–35 × 6–8 mm. Seeds 2–6. Fl. Jun–Sep, fr. Jul–Oct. $2n = 12, 14$.

Forests, forest margins, thickets, scrub, hill slopes, sunny slopes, valleys, ravines, meadows, pastures, dry limestone areas, fields; 400–3000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

9. *Vicia amoena* Fischer ex Seringe in Candolle, Prodr. 2: 355. 1825.

山野豌豆 shan ye wan dou

Ervum amoenum (Fischer ex Seringe) Trautvetter; *Vicia amoena* f. *albiflora* P. Y. Fu & Y. A. Chen; *V. amoena* var. *angusta* Freyn; *V. amoena* var. *lanata* Franchet & Savatier; *V. amoena* var. *macrophylla* Litvinov ex B. Fedtschenko; *V. amoena* var. *oblongifolia* Regel; *V. amoena* subsp. *sericea* (Kitagawa) Kamelin & Gubanov; *V. amoena* var. *sericea* Kitagawa.

Herbs perennial, 30–100(–180) cm tall, pilose, rarely densely white sericeous. Stem much branched, slender. Leaves subsessile, paripinnate, 5–12 cm; stipules semihastate, 8–20 mm, margin 3- or 4-toothed; leaflets 4–7-paired, elliptic to ovate-lanceolate, rarely oblong or lanceolate, 13–40 × 5–18 mm, adaxially appressed villous, apex rounded and retuse; lateral veins obvious; tendril 2- or 3-branched. Raceme usually longer than leaf, densely 10–20(–30)-flowered. Calyx obliquely campanulate, unequally toothed. Corolla blue, blue-purple, red-purple, or white; standard obovate, 10–16 × 5–6 mm, subequaling wings and longer than keel. Ovary glabrous; ovules ca. 6. Legume oblong, 18–28 × 4–6 mm, glabrous, both ends acuminate. Seeds 1–6. Fl. Apr–Sep, fr. Jul–Oct. $2n = 12, 14, 24$.

Forests, forest margins, woods, bush woods, scrub, dry slopes with *Juniperus*, grasslands, hills, hill slopes, riverbanks, sides of irrigation ditches, dry rocky banks, fixed sand dunes, fields, abandoned fields, wastelands, roadsides; near sea level to 4000 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan [Japan, Kazakhstan, Korea, Mongolia, Russia (Far East, Siberia)].

10. *Vicia tibetica* Prain ex C. E. C. Fischer, Bull. Misc. Inform. Kew 1938: 285. 1938.

西藏野豌豆 xi zang ye wan dou

Herbs perennial, 10–250 cm tall. Stem branched, puberulent or glabrescent. Leaves paripinnate, 4–7 cm; stipules triangular, margin 3–5-toothed; leaflets 3–6-paired, oblong, (4–)10–20 × (1.5–)3–7 mm, apex obtuse and mucronate; veins dense, raised on both surfaces; tendril 2- or 3-branched. Raceme 6–7.5 cm, longer than leaf, sparsely 4–13-flowered. Calyx obliquely campanulate, ca. 6 mm, unequally toothed, rarely villous. Corolla red, through purple, to blue, or paler, sometimes with deeper venation and orange in throat, 10–11 mm; standard constricted at middle, subequaling wings and longer than keel. Ovary fusiform, ca. 3 mm; ovules 2–6. Legume oblong, flat, ca. 20 × 6 mm, glabrous, both ends narrowed. Seeds 1–4, oblong. Fl. Apr–Sep, fr. May–Sep.

Forests, scrub, under *Juniperus* on limestone ridges, hill slopes, open meadows and pastures, ravines, rocky places, along irrigation channels, cultivated land, margins of cultivation; 1300–4300 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, NE India].

11. *Vicia perelegans* K. T. Fu, Fl. Tsinling. 1(3): 449. 1981.

精致野豌豆 jing zhi ye wan dou

Herbs perennial, 20–40 cm tall, pilose. Stem much branched, puberulent. Leaves paripinnate, 2–6 cm; stipules small, bifid; leaflets 5–8-paired, narrowly oblong or narrowly ovate-elliptic, 5–17 × 3–5 mm, subleathery, abaxially hairy along midrib, apex truncate or rounded, mucronate; lateral veins 8–15-paired; petiolules ca. 1 mm; tendril 2- or 3-branched. Raceme subequaling leaf, 4–7 cm, sparsely 7–10-flowered; pedicels hairy. Calyx obliquely campanulate, ca. 4 mm, pilose. Corolla purple or blue, 10–11 mm; standard oblong or narrowly obovate, ca. 10 × 4 mm, slightly longer than wings and shorter than keel, apex retuse. Ovary glabrous; ovules 4 or 5. Legume oblong, ca. 25 × 7 mm, both ends acute. Seeds 2 or 3. Fl. Apr–May, fr. Jul–Oct.

• Hill slopes, valleys, grasslands, roadsides; 800–1300 m. Gansu, Shaanxi, Sichuan.

12. *Vicia amurensis* Oettingen, Trudy Bot. Sada Imp. Yur'evsk. Univ. 6: 143. 1906.

黑龙江野豌豆 hei long jiang ye wan dou

Vicia amurensis f. *alba* H. Ohashi & Tateishi; *V. amurensis* var. *pratensis* (Komarov) H. Hara; *V. amurensis* f. *sanheensis* Y. Q. Jiang & S. M. Fu; *V. amurensis* var. *silvatica* (Komarov) H. Hara; *V. japonica* A. Gray subsp. *amurensis* (Oettingen) Kitamura; *V. japonica* var. *pratensis* Komarov; *V. japonica* var. *silvatica* Komarov; *V. pallida* Turczaninow var. *pratensis* (Komarov) Nakai; *V. vaniotii* H. Léveillé.

Herbs perennial, 50–100 cm tall, glabrescent. Stem climbing. Leaves sessile, paripinnate, 5–15 cm; stipules semihastate, bifid, margin 3–5-toothed; leaflets 3–6-paired, oblong-ovate to elliptic, 16–30 × 9–16 mm, puberulent at first, later glabrescent, apex retuse and entire; lateral veins dense; tendril 2- or 3-branched. Raceme subequaling leaf, densely 15–30-flowered. Calyx obliquely campanulate, unequally toothed. Corolla blue-purple or white, rarely purple; standard oblong or nearly obovate, ca. 10 × 6 mm, subequaling wings and longer than keel. Ovary glabrous; ovules 1–6. Legume rhomboid or suboblong, 15–25 mm. Seeds 1–5. Fl. Jun–Sep, fr. Aug–Sep. $2n = 12, 14$.

Forests, forest margins, hill slopes, grasslands, meadows, sandy land along rivers, weed communities; 400–800 m. Beijing, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

13. *Vicia latibracteolata* K. T. Fu, Fl. Tsinling. 1(3): 449. 1981.

宽苞野豌豆 kuan bao ye wan dou

Vicia latibracteolata var. *acerosa* K. T. Fu.

Herbs perennial, 60–120 cm tall. Stem erect, few branched, pilose. Leaves paripinnate, 9–11 cm; stipules semihastate, rhomboid to lanceolate, bifid, 5–12 mm; leaflets usually 9-paired, linear-lanceolate, ovate-lanceolate, or oblong, 12–27 × 7–11 mm, apex rounded or acuminate, mucronate; lateral veins 9–13-paired, joined at margin; tendril 2- or 3-branched. Raceme obviously shorter than leaf, 6–10 cm, densely 10–20-flowered; bracts present. Calyx subcampanulate, unequally toothed, pilose. Corolla purple, purple-red, or light purple with some pink; standard oblong, ca. 14 × 5 mm, subequaling wings and longer than keel. Ovary linear, ca. 5 mm, glabrous; ovules ca. 6. Legume narrowly oblong, 20–25 mm, apex beaked. Seeds 3–6. Fl. and fr. Jun–Aug.

• Hill slopes, grasslands, riverbanks; 900–2800 m. Gansu, Henan, Ningxia, Shaanxi.

14. *Vicia multicaulis* Ledebour, Fl. Altaic. 3: 345. 1831.

多茎野豌豆 duo jing ye wan dou

Ervum megalotropis (Ledebour) Trautvetter var. *multicaulis* (Ledebour) Trautvetter; *Vicia megalotropis* Ledebour var. *multicaulis* (Ledebour) Krylov; *V. nervata* Siplivinsky.

Herbs perennial, 10–60 cm tall. Stem much branched, puberulent or glabrescent. Leaves paripinnate; stipules semihastate, 3–6 mm; leaflets 4–8-paired, linear to oblong, 10–20 × ca. 3 mm, abaxially pilose, apex mucronate; lateral veins very obvious; tendril unbranched or branched. Raceme longer than leaf, 14- or 15-flowered; bracts absent. Calyx campanulate, unequally toothed. Corolla purple or blue-purple, 13–17 mm; standard oblong-obovate, constricted at middle, longer than wings and keel. Ovary linear. Legume flat, 30–35 mm, apex beaked. Seeds dark brown, obovate-spheroid. Fl. and fr. Jun–Sep. $2n = 12, 24$.

Scrub, mountain summits, dry and hilly slopes, grasslands, clay cliffs, gravels, sandy land; below 4300 m. Beijing, Gansu, Heilongjiang, Jilin, Nei Mongol, Qinghai, Shaanxi, Tianjin, Xinjiang, Xizang [Japan, E Kazakhstan, Mongolia, Russia (European part, Siberia)].

15. *Vicia japonica* A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 385. 1858.

东方野豌豆 *dong fang ye wan dou*

Ervum amoenum (Fischer ex Seringe) Trautvetter var. *pallidum* Trautvetter; *Vicia amurensis* Oettingen var. *pallida* Kitagawa; *V. japonica* var. *comosa* Boissier; *V. japonica* var. *laxiracemis* Ohwi; *V. japonica* subsp. *pallida* Voroschilov; *V. japonica* var. *pallida* H. Hara; *V. pallida* Turczaninow (1842), not Hooker & Arnott (1833); *V. pallida* Turczaninow var. *japonica* (A. Gray) Matsumura; *V. woroschilovii* N. S. Pavlova.

Herbs perennial, 60–120 cm tall. Stem climbing or trailing, yellow-white hairy at first, later glabrescent. Leaves paripinnate, 5–15 cm; stipules linear or linear-lanceolate, 5–7 × ca. 1 mm, margin toothed; leaflets 5–8-paired, not markedly discolorous, lanceolate-ovate to ovate or elliptic, rarely narrowly lanceolate-elliptic, 10–30 × 6–14 mm, abaxially puberulent, adaxially glabrous, apex obtuse and retuse, mucronate; lateral veins sparsely 7–9-paired; tendril 2- or 3-branched. Raceme subequaling or slightly longer than leaf, 7–15-flowered, villous; bracts absent. Calyx campanulate, unequally toothed, villous. Corolla blue or purple; standard oblong, 10–14 mm, subequaling wings and longer than keel, apex retuse. Ovary linear, 6–12 mm; ovules 2–7. Legume oblong-rhomboid, 15–25 mm, apex beaked. Seeds 1–3, oblate-spheroid. Fl. and fr. Jun–Sep. $2n = 12, 14, 24$.

Forest margins, hill slopes, valleys, meadows, riverbanks; 600–3700 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

16. *Vicia chinensis* Franchet, Pl. Delavay. 177. 1890.

华野豌豆 *hua ye wan dou*

Lathyrus hupehensis (Pampanini) E. Peter; *L. sargentianus* Craib; *Orobis hupehensis* (Pampanini) Stankevicz; *Vicia hupehensis* Pampanini.

Herbs perennial, 150–200 cm tall. Stem branched from base, slender, sparsely pilose or glabrescent. Leaves subsessile, paripinnate, 8–16 cm; stipules semihastate, bifid, margin entire or toothed; leaflets 4–7-paired, markedly discolorous, abaxially pale green, adaxially green, narrowly lanceolate to lanceolate-ovate, 10–45 × 7–15 mm, leathery, both surfaces sparsely villous or glabrescent, apex obtuse or retuse, mucronate; tendril 2- or 3-branched. Raceme 6–17 cm, subequaling or longer than leaf, 5–25-flowered, puberulent or glabrous; bracts absent. Calyx subcampanulate, shortly and unequally toothed. Corolla blue-purple to purple-red, red, yellow, or pale yellow, 10–13 mm; standard slightly longer than keel. Ovary stalk ca. 4 mm; ovules 3–6. Legume fusiform, 28–37 × 8–9 mm, glabrous. Seeds 2 or 3, dark brown, oblate, ca. 5 mm in diam. Fl. Jun–Aug, fr. Aug–Sep.

• Thickets, scrub, valleys; 600–3300 m. Hubei, Hunan, Shaanxi, Sichuan, Xizang, Yunnan.

Lathyrus sargentianus and *Vicia hupehensis* are here treated as synonyms of *V. chinensis*. They were treated as synonyms of *L. dielsianus* in Fl. Xizang. (2: 765–766. 1985), where the plant described and illustrated is in fact *V. chinensis*.

17. *Vicia kioshanica* L. H. Bailey, Gentes Herb. 1: 32. 1920.

确山野豌豆 *que shan ye wan dou*

Ervum kioshanicum (L. H. Bailey) Stankevicz.

Herbs perennial, 20–80 cm tall. Stem much branched. Leaves paripinnate, 5–9 cm; stipules semihastate, bifid, margin toothed; leaflets 3–7-paired, abaxially brownish, narrowly elliptic-oblong, 12–40 × 5–13 mm, leathery, adaxially densely villous or both surfaces glabrous, apex rounded or acuminate, mucronate; lateral veins densely 10–13-paired; tendril unbranched or branched. Raceme curved, to 20 cm, obviously longer than leaf, sparsely 6–16(–20)-flowered. Calyx campanulate, unequally toothed, very sparsely pilose; teeth narrowly oblong, apex acuminate. Corolla purple or purple-red, 7–8(–14) mm, strongly bent upward at middle forming a 90° angle; standard 10–11 × ca. 6 mm, longer than wings; wings longer than keel. Ovary stalked, linear; ovules 3 or 4. Legume dark brown or reddish brown, rhomboid or oblong, 20–25 mm, glabrous. Seeds 1–4, black, oblong-cuboid, 4–5 mm. Fl. Apr–Jun, fr. Jun–Sep.

• Hill slopes, valleys, wet grasslands, farms, field margins, roadsides, stone walls; 100–1000 m. Anhui, Gansu, Hebei, Henan, Hubei, Jiangsu, Shaanxi, Shandong, Shanxi, Zhejiang.

18. *Vicia sinogigantea* B. J. Bao & Turland, *nom. nov.*

大野豌豆 *da ye wan dou*

Replaced synonym: *Vicia gigantea* Bunge, Enum. Pl. China Bor. 19. 1833, not *Vicia gigantea* Hooker, Fl. Bor.-Amer. 1: 157. 1831; *Ervum giganteum* Stankevicz.

Herbs perennial, 40–100 cm tall. Stem much branched, persistently white pilose. Leaves paripinnate; stipules bifid; leaflets 3–6-paired, elliptic or obovate-elliptic, 15–30(–35) × 6–17(–20) mm, both surfaces persistently white pilose, apex obtuse, mucronate; lateral veins 7- or 8-paired; tendril 2- or 3-branched, or unbranched. Raceme longer than leaf; sparsely 6–16-flowered. Calyx campanulate, 2–2.5 mm, hairy. Corolla white, pink, or purple; standard obovate, ca. 7 mm, subequaling wings and longer than keel, apex retuse. Ovary long stalked, glabrous; ovules 2 or 3. Legume oblong or rhomboid, 10–20 × 4–5.5 mm, both ends acute. Seeds 2 or 3, reniform. Fl. Jun–Aug, fr. Jul–Oct.

• Forests, scrub, hedges, grasslands, slopes, stony land; 600–3000 m. Gansu, Guizhou, Hebei, Henan, Hubei, Nei Mongol, Shaanxi, Shanxi, Sichuan, Yunnan.

Vicia ramosissima Franchet (J. Bot. (Morot) 4: 305. 1890), described from Beijing (Baihua Shan), was said in the protologue to be close to Bunge's *V. gigantea*. If the two entities proved to be conspecific, then *V. ramosissima* would be the earliest legitimate (and correct) name for the species. However, the present authors have not examined the type of Franchet's name and therefore cannot confirm its identity.

19. *Vicia taipaica* K. T. Fu, Fl. Tsinling. 1(3): 448. 1981.

太白野豌豆 *tai bai ye wan dou*

Herbs perennial, 60–100 cm tall, glabrous. Stem thick. Leaves paripinnate, 7–16 cm; stipules 5–9 mm, margin entire; leaflets 3–5-paired, elliptic to ovate-oblong, 15–50 × 6–15 mm, papery, apex obtuse, mucronate; lateral veins 8–15-paired; tendril 3- or 4-branched. Raceme longer than leaf, sparsely 5–15-

flowered; rachis slender. Calyx obliquely campanulate, shortly and unequally toothed. Corolla yellow or brown-yellow; standard narrowly obovate-oblong, constricted at middle, ca. 13 mm, apex retuse; wings and keel ca. 1 cm. Ovary long stalked; ovules 6 or 7. Legume oblong-rhomboid, 20–30 × ca. 5 mm. Seeds 2–5, oblong. Fl. and fr. Jul–Oct.

- Forests, hill slopes, valleys; 1100–2000 m. Shaanxi.

20. *Vicia dichroantha* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 246. 1912.

二色野豌豆 *er se ye wan dou*

Vicia mairei H. Léveillé; *V. tenera* Wallich ex Bentham var. *yunnanensis* Franchet.

Herbs perennial, 60–300 cm tall, densely brownish villous on youngest growth (stems, leaves, and raceme before expansion). Stem erect, climbing, pilose. Leaves paripinnate, 8–12 cm; stipules fan-shaped or lanceolate, margin 2- or 3-toothed; leaflets 4–6-paired, linear to linear-lanceolate, 25–50 × 6–9 mm, papery, apex rounded or obtuse, mucronate; lateral veins 7- or 8-paired; petiolules densely hairy; tendrils present. Raceme 6–16 cm, obviously longer than leaf, 20–25-flowered; rachis strong and straight. Calyx obliquely campanulate, hairy. Corolla yellow, dark yellow, or dull orange, marked purple at apex of standard, or at first pale greenish cream with violet veins on inner surface of standard; standard oblong, 7–12 × ca. 5 mm, subequaling wings and slightly longer than keel. Ovary stalked; ovules 4–6. Legume stalked, falcate, 35–40 × 7–9 mm. Seeds 2–4, oblate-spheroid. Fl. and fr. May–Sep.

- Forests, thickets, scrub, grassy slopes, grasslands, limestone gullies, riverbanks, wastelands at roadsides; 1600–3600 m. Sichuan, Yunnan.

21. *Vicia ternata* Z. D. Xia, Acta Phytotax. Sin. 34: 425. 1996.

三尖野豌豆 *san jian ye wan dou*

Herbs perennial, 60–80 cm tall, hairy. Stem few branched. Leaves paripinnate, 7–11 cm; stipules hastate, bifid in distal part, margin 3- or 4-toothed; leaflets 3–7-paired, oblong to elliptic, 13–23 × 8–10 mm, both surfaces hairy when young, apex truncate, 3- or 4-toothed, and mucronate; lateral veins dense but not obvious; tendrils 2- or 3-branched. Raceme obviously longer than leaf, 15–20-flowered. Calyx obliquely campanulate, 5–7 mm, unequally toothed, villous. Corolla blue; standard oblong, 10–12 × 5–6 mm, subequaling wings and longer than keel. Ovary shortly stalked, linear, ca. 5 mm; ovules ca. 6. Legume brown, linear, 20–25 × ca. 6 mm, subleathery. Seeds 2 or 3, terete. Fl. May–Jun, fr. Jul–Aug.

- Forests, bush woods, among shrubs, hill slopes, grasslands; 2200–3000 m. Sichuan, Yunnan.

“*Vicia nummularia* var. *macrophylla*” (P. C. Li in W. T. Wang et al., Vasc. Pl. Hengduan Mts. 1: 1001. 1993) belongs here according to X. Y. Zhu et al. (Legumes China, 224. 2007) but was not validly published because no Latin description or diagnosis was provided and no type was indicated (*Vienna Code*, Art. 36.1 and 37.1).

22. *Vicia wushanica* Z. D. Xia, Acta Phytotax. Sin. 34: 430. 1996.

五山野豌豆 *wu shan ye wan dou*

Herbs perennial, 60–70 cm tall. Stem erect or climbing, few branched. Leaves paripinnate, to 15 cm; stipules hastate or lanceolate, 3–5 × 2–5 mm, margin unequally toothed; leaflets 6–10-paired, oblong-lanceolate, 17–27 × 5–8 mm, puberulent, apex acuminate, mucronate; lateral veins not obvious; tendrils branched. Raceme branched from base, 3–4.5 cm, obviously shorter than leaf, 6–10-flowered. Flowers 15–17 mm. Calyx subcampanulate, unequally toothed, hairy. Corolla white with fine purple-blue veins; standard oblong, shortly clawed, ca. 13 × 6 mm, subequaling auriculate wings and longer than keel. Ovary stalked, linear, ca. 5 mm; ovules ca. 5. Legume unknown. Fl. May.

- Hill slopes; ca. 1600 m. S Gansu (Wushan).

23. *Vicia nummularia* Handel-Mazzetti, Symb. Sin. 7: 577. 1933.

西南野豌豆 *xi nan ye wan dou*

Herbs perennial, 15–50(–100) cm tall, pilose. Stem much branched. Leaves paripinnate, 3.5–8 cm; stipules semihastate, margin 2–4-toothed; leaflets 2–7-paired, elliptic, 4–13(–20) × 2–6 mm, abaxially densely hairy, adaxially sparsely papilliferous, apex obtuse or truncate, mucronate; lateral veins 7–12-paired, not obvious; tendrils branched, slender. Raceme 2–4 cm, shorter than or subequaling leaf, 6–9(–12)-flowered. Calyx campanulate. Corolla yellow; standard ca. 9 mm, subequaling wings and keel, apex retuse. Ovary shortly stalked, linear, glabrous; ovules 2–6. Legume oblong-rhomboid, 20–25 × 4–7 mm, both ends acute. Seeds 2–4. Fl. Jun–Sep, fr. Jul–Oct.

- Forests, *Pinus*-forested steppes on schistose clay, thickets, grassland slopes, sandy riverbanks; 1400–3700 m. Gansu, N and SW Sichuan, Xizang, NW Yunnan.

24. *Vicia costata* Ledebour, Icon. Pl. 2: 7. 1830.

新疆野豌豆 *xin jiang ye wan dou*

Ervum costatum (Ledebour) Trautvetter; *Vicia sinkiangensis* H. W. Kung.

Herbs perennial, 20–80 cm tall. Stem suberect, climbing, much branched, puberulent or glabrescent. Leaves paripinnate; stipules semihastate, both surfaces with raised veins; leaflets 3–8-paired, oblong-lanceolate or elliptic, 6–18(–35) × 1–5 mm, abaxially pilose, adaxially glabrous, apex obtuse or acute, mucronate; lateral veins obvious; tendrils present. Raceme obviously longer than leaf, 3–11-flowered. Calyx campanulate, unequally toothed, pilose or glabrescent. Corolla yellow, light yellow, or white; standard obovate, constricted at middle, subequaling wings and longer than keel, apex retuse. Ovary linear; ovules 1–5. Legume linear, 26–35 × 5–8 mm. Seeds 1–4. Fl. and fr. Jun–Aug. $2n = 12$.

- Hill slopes, gravels, sandy land, deserts; 500–3700 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia (Altai, Tuva)].

25. *Vicia kulingana* L. H. Bailey, Gentes Herb. 1: 33. 1920.

牯岭野豌豆 *gu ling ye wan dou*

Herbs perennial, 50–90 cm tall. Stem erect. Leaves paripinnate, 2–3.5 cm; stipules semihastate or lanceolate, 8–13 × 3–5 mm, margin toothed; leaflets 2- or 3(–5)-paired, lanceolate to

narrowly elliptic, 40–85 × 15–35 mm, both surfaces puberulent, apex often acuminate, mucronate; lateral veins 5–8-paired, extending to margin; tendril absent, replaced by a mucro. Raceme unbranched, 2–5 cm, subequaling or longer than leaf, 5–18-flowered; pedicels ca. 1.5 mm; bracts persistent at base of pedicels. Flowers ca. 15 mm. Calyx obliquely campanulate. Corolla purple-red, purple, or blue; standard violin-shaped or sub-oblong, subequaling wings and longer than keel. Ovary long stalked, linear; ovules ca. 5. Legume oblong, 40–50 × 7–8 mm, both ends acuminate. Seeds 1–4. Fl. Apr–Aug, fr. Jun–Sep. $2n = 14^*$.

• Bamboo thickets, valleys, grassy places, damp banks, wet places, sandy land; 200–1200 m. Henan, Hunan, Jiangxi, ?Liaoning, Shandong, Zhejiang.

The inclusion of Liaoning in the distribution is based on a specimen from “Ts’ien-shan: Fengtien,” which may refer to Fengtian, an old name for Liaoning province or a prefecture that included Shenyang city.

“*Vicia edentata*” (W. T. Wang & Tang, Ill. Treatm. Princ. Pl. China (Leguminosae), 607. 1955) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

Vicia fauriei Franchet (Bull. Soc. Philom. Paris, sér. 7, 10: 139. 1886, “*fauriae*”; *Orobis fauriei* (Franchet) Stankevitz; *V. venosa* (Willdenow ex Link) Maximowicz var. *fauriei* (Franchet) Okuyama), described from N Japan, somewhat resembles *V. kulingana* in having leaflets 2- or 3-paired and bracts persistent at the base of the pedicels.

26. *Vicia deflexa* Nakai, Bot. Mag. (Tokyo) 37: 12. 1923.

弯折巢菜 wan zhe chao cai

Herbs perennial, 30–100 cm tall. Stem erect, zigzagged. Leaves paripinnate, 3–7.5 cm; stipules triangular or lanceolate, 3–6 × 1–3 mm; leaflets 3- or 4-paired, narrowly oblong to oblong-lanceolate, 30–65 × 11–20 mm, margin repand; lateral veins obvious; tendril absent, replaced by a mucro. Raceme unbranched, 2–7 cm, subequaling leaf, 7–10-flowered; bracts absent or caducous; pedicels ca. 2 mm. Flowers 15–20 mm. Calyx subcampanulate, very shortly toothed. Corolla dark purple-red or light purple; standard oblong, ca. 15 mm, subequaling wings and keel. Ovary linear, ca. 6 mm. Legume oblong-rhomboid, 25–40 × ca. 6 mm, leathery. Seeds 2–6. Fl. Jun–Oct.

Forests, bamboo thickets, valleys, riverbanks, along streams; 200–1400 m. Anhui, Hubei, Hunan, Jiangsu, Zhejiang [Japan].

Vicia deflexa may be better treated within *V. venosa*, as was done by H. Ohashi and Y. Endo (in Iwatsuki et al., Fl. Japan IIb: 229. 2001).

27. *Vicia chianschanensis* (P. Y. Fu & Y. A. Chen) Z. D. Xia, Acta Phytotax. Sin. 34: 431. 1996 [“*chianshanensis*”].

千山野豌豆 qian shan ye wan dou

Vicia ramuliflora (Maximowicz) Ohwi f. *chianschanensis* P. Y. Fu & Y. A. Chen, Fl. Pl. Herb. Chin. Bor.-Orient. 5: 177. 1976.

Herbs perennial, 40–60 cm tall. Stem erect, straight, unbranched or few branched, slightly hairy. Leaves paripinnate, 4–5 cm; stipules obliquely ovate, 12–15 × 6–8 mm, margin entire; leaflets 2-paired, ovate, 20–40 × 18–20 mm, glabrous,

apex acute, mucronate; lateral veins 8–10-paired, obvious; tendril absent, replaced by a mucro. Raceme unbranched, slightly longer than leaf, densely 6–12-flowered; bracts absent or caducous; pedicel ca. 4 mm, hairy. Calyx cylindrical, 10–12 mm. Standard ovate-oblong, slightly constricted at middle, subequaling wings and longer than keel. Ovary stalked, linear; ovules 5 or 6. Legume unknown. Fl. May–Jul.

• Mixed forests, hill slopes, roadsides. Liaoning, Shandong.

This species is provisionally maintained here. Further study is needed to ascertain its appropriate position and rank.

28. *Vicia venosa* (Willdenow ex Link) Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 18: 395. 1873.

柳叶野豌豆 liu ye ye wan dou

Orobis venosus Willdenow ex Link, Enum. Hort. Berol. Alt. 2: 236. 1822; *O. venosus* var. *willdenowianus* Turczaninow; *Vicia venosa* var. *willdenowiana* (Turczaninow) Maximowicz.

Herbs perennial, 40–80 cm tall. Stem erect, pilose at first, later glabrescent. Leaves paripinnate; stipules semihastate, 10–15 × 3–5 mm, margin toothed, apex long acuminate; leaflets 2–6-paired, linear to narrowly lanceolate, those on upper part of stem often broader (sometimes to lanceolate) than those on lower part, 40–65(–90) × 3–13(–25) mm, abaxially slightly hairy, apex acuminate or long caudate, mucronate; tendril absent, replaced by a mucro. Raceme 2- or 3-branched, 3–7 cm, subequaling or longer than leaf, 4–9-flowered. Calyx campanulate. Corolla red, purple-red or blue; standard obovate-oblong, ca. 13 mm, longer than wings and keel, apex retuse. Ovary glabrous; ovules 5 or 6. Legume oblong, flat, 25–33 mm, both ends acuminate. Seeds 3–6. Fl. Jun–Sep, fr. Jul–Sep. $2n = 12, 24$.

Mixed forests, grasslands on hill slopes, meadows; 600–1800 m. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

29. *Vicia ramuliflora* (Maximowicz) Ohwi, J. Jap. Bot. 12: 331. 1936.

北野豌豆 bei ye wan dou

Orobis ramuliflorus Maximowicz, Prim. Fl. Amur. 83. 1859; ?*O. baicalensis* (Turczaninow ex Maximowicz) Stankevitz & Roskov; *O. venosus* Willdenow ex Link var. *albiflorus* Turczaninow; ?*O. venosus* var. *baicalensis* Turczaninow ex Maximowicz; ?*O. venosus* var. *latifolius* Turczaninow; *O. venosus* var. *ramuliflorus* (Maximowicz) Stankevitz; ?*Vicia baicalensis* (Turczaninow ex Maximowicz) B. Fedtschenko; *V. ramuliflora* f. *abbreviata* P. Y. Fu & Y. A. Chen; ?*V. ramuliflora* f. *baicalensis* (Turczaninow ex Maximowicz) P. Y. Fu & Y. A. Chen; *V. venosa* (Willdenow ex Link) Maximowicz var. *albiflora* (Turczaninow) Turczaninow; ?*V. venosa* var. *baicalensis* (Turczaninow ex Maximowicz) Turczaninow; ?*V. venosa* var. *latifolia* (Turczaninow) Turczaninow.

Herbs perennial, 40–100 cm tall. Stem puberulent or glabrescent. Leaves paripinnate, 5–8 cm; stipules semihastate, obliquely ovate, or oblong, 8–12(–16) × 10–13 mm, margin

entire or toothed at base; leaflets (2 or)3(or 4)-paired, lanceolate or ovate-lanceolate, 25–80 × 10–30 mm, abaxially hairy along midrib, apex acuminate or long caudate; tendril absent, replaced by a mucro. Raceme usually 2- or 3-branched, 4–5 cm, shorter than leaf (rarely caespitose or capitate on a much-reduced peduncle), sparsely 4–9-flowered. Calyx obliquely campanulate. Corolla blue, blue-purple, or purple-red, rarely white; standard oblong or long obovate, constricted at middle, 11–14(–18) mm, subequaling wings and keel, apex retuse. Ovary shortly stalked, linear; ovules 5 or 6. Legume oblong-rhomboid, 25–50 × 5–7 mm, both ends acuminate. Seeds 1–4, elliptic. Fl. and fr. Jun–Sep. $2n = 12, 14$.

Forests, forest margins, bush woods, among shrubs, hill slopes, grasslands, meadows, along rivers, weed communities; 200–1600 m. Anhui, Beijing, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

30. *Vicia unijuga* A. Braun in A. Braun et al., Index Sem. Hort. Berol. 1853: 22. 1853.

歪头菜 wai tou cai

Orobis lathyroides Linnaeus, Sp. Pl. 2: 728. 1753, not *Vicia lathyroides* Linnaeus (1753); *Ervum unijugum* (A. Braun) Alefeld; *Lathyrus messerschmidii* Franchet & Savatier; *Vicia unijuga* f. *albiflora* Nakai; *V. unijuga* var. *angustifolia* Nakai; *V. unijuga* var. *breviramea* Nakai; *V. unijuga* var. *ciliata* H. Léveillé; *V. unijuga* var. *integristipula* H. Léveillé; *V. unijuga* var. *kaussanensis* H. Léveillé; *V. unijuga* var. *lobata* Seok & B. H. Choi; *V. unijuga* subsp. *minor* (Nakai) Y. N. Lee; *V. unijuga* f. *minor* Nakai; *V. unijuga* var. *ouensanensis* H. Léveillé.

Herbs perennial, (15–)40–100(–180) cm tall. Stem shrubby, pilose when young. Leaves paripinnate; stipules hastate or sub lanceolate, 8–20 × 3–5 mm, margin unequally toothed; leaflets 1-paired, ovate to lanceolate or rhombic-elliptic, (15–)30–90(–115) × (6–)15–40(–50) mm, both surfaces pilose, apex sometimes acuminate; tendril rarely present, usually replaced by a mucro. Raceme rarely branched, ± cylindric, 4.5–7 cm, usually obviously longer than leaf, densely 8–20-flowered. Calyx campanulate or obliquely so, glabrescent. Corolla deep or light blue to purple to red, rarely white; standard violin-shaped, constricted at middle, 11–15 mm; wings 13–14 mm, longer than keel. Ovary linear, glabrous; ovules 2–8. Legume oblong, flat, 20–35 × 5–7 mm, glabrous, apex beaked. Seeds 3–7, oblate-spheroid. Fl. Feb (in S Yunnan), Jun–Sep, fr. Jul–Oct. $2n = 12, 14, 24$.

Forests, forest margins, thickets, scrub, hedges, mountain and hill slopes and summits, damp valleys, pastures, grassy places, river and stream banks, ravines, rocky places on slopes, roadside banks, field margins; below 4000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East, Siberia)].

Vicia unijuga may be the commonest species of *Vicia* in China, or at least it is the most often collected. The morphological variation is considerable. Several specimens from Hubei are distinctive in having leaflets lanceolate, large (55–115 × 25–45 mm), with a long-acuminate apex (A. Henry 6596, BM!, E!, K!; E. H. Wilson 1230, K!; E. H. Wilson 2036, E!; E. H. Wilson 3486, BM!, E!, K!; and *Silvestri* 1185, K!). A specimen apparently from the Beijing area (“Fl. Pekinensis,” *Bret-*

schneider 209, K!) is similar, as is one from S Korea (*Chung In-Cho's collector* 9555, E!). Two specimens from Shandong (*German name* 218, K!; E. Faber 245, K!) have leaflets narrowly elliptic and unusually narrow (30–50 × 6–12 mm). A specimen from S Yunnan (*J. F. Rock* 2548, K!) has leaves approaching this narrowness.

Vicia unijuga var. *trifoliolata* Z. D. Xia (Acta Phytotax. Sin. 34: 433. 1996; *V. unijuga* f. *trifoliolata* (Z. D. Xia) Y. Endo & H. Ohashi), described from Shaanxi, Shanxi, and Sichuan, was diagnosed in the protologue as “A typo foliolis 3 cirrho 4–5 cm longo, floribus minoribus laxioribusque differt” (differs from the type [by having] leaflets 3 with tendril 4–5 cm long, with flowers smaller and laxer). Further study is needed to ascertain its status.

“*Vicia unijuga* var. *waldeniana*” (S. Y. Hu in B. M. Walden & S. Y. Hu, Wild Fl. Yunnan Centr. China, 131. 2000) belongs here but was not validly published because no type was indicated (*Vienna Code*, Art. 37.1).

31. *Vicia ohwiana* Hosokawa, J. Soc. Trop. Agric. 5: 288. 1933.

头序歪头菜 tou xu wai tou cai

Orobis ohwianus (Hosokawa) Stankevitz & Roskov; *Vicia unijuga* A. Braun var. *apoda* Maximowicz; *V. unijuga* var. *ohwiana* (Hosokawa) Nakai.

Herbs perennial, ca. 70 cm tall. Stem erect, unbranched or few branched, puberulent. Leaves subsessile, paripinnate; stipules ovate-lanceolate, margin entire; leaflets 1-paired, broadly ovate to subrhomboid, 40–70(–100) × 35–50(–170) mm, glabrous or pilose at margin and along veins, apex acute; tendril absent, replaced by a mucro. Raceme abbreviated to capitate, shorter than leaf, densely flowered. Calyx campanulate, 8–10 mm, villous. Corolla purple, rarely white; standard oblong-obovate, 10–14 mm, equaling wings and longer than keel. Legume obliquely oblong, 25–30 × ca. 5 mm, glabrous, apex beaked. Fl. and fr. Jul–Sep. $2n = 12, 24$.

Forests, forest margins, bush woods, among shrubs, hill slopes, sunny slopes, grasslands, meadows; below 4000 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi, Shandong, Shanxi [Japan, Korea, Russia (Far East, Siberia)].

32. *Vicia geminiflora* Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(1): 42. 1875.

索伦野豌豆 suo lun ye wan dou

Herbs perennial, 25–50 cm tall. Stem slender, hairy when young. Leaves paripinnate; stipules linear-lanceolate; leaflets 2–5-paired, linear, 25–30 × 2–3 mm, apex mucronate; lateral veins not obvious; tendril unbranched. Raceme longer than leaf, 2- or 3(or 4)-flowered; rachis 7–8 cm. Calyx campanulate. Corolla blue-purple or purple, 16–26 mm; standard obovate-oblong, longer than wings and keel, apex retuse. Ovary long stalked; ovules many. Legume not seen. Fl. Jun–Jul. $2n = 14$.

Grasslands on riverbanks. Heilongjiang, Jilin, Liaoning, Nei Mongol [Mongolia, Russia (E Siberia)].

33. *Vicia tetrantha* H. W. Kung, Contr. Inst. Bot. Natl. Acad. Peiping 3: 391. 1935.

四花野豌豆 si hua ye wan dou

Vicia multijuga Z. D. Xia (1996), not (Boissier) K. H. Rechinger (1951).

Herbs perennial, 60–120 cm tall. Stem slender, glabrous or pilose. Leaves paripinnate, 5–11 cm; stipules hastate to lanceolate or elliptic, 3–7 × 1–5 mm; leaflets 8–11-paired, narrowly oblong or narrowly lanceolate, 12–27 × 3–6 mm, glabrous or hairy, apex acuminate, mucronate; tendril unbranched or branched. Raceme shorter than leaf, 2–7-flowered; bracts caducous; pedicels hispidulous. Calyx campanulate or subcampanulate, 4.5–6 mm, sometimes tomentose. Corolla blue-purple or purple; standard violin-shaped or oblong, 10–12 × ca. 5 mm, subequaling wings and longer than keel. Ovary stalked, fusiform, glabrous; ovules ca. 6. Legume oblong, ca. 23 × 6 mm, glabrous. Seeds 1–5, spheroid. Fl. Jun–Sep, fr. Aug–Sep.

• Hill slopes, hill grasslands, roadsides; 1000–2500 m. Gansu, Hubei, Shaanxi.

Plants with pilose stem and long (15–27 mm), hairy leaflets have been called *Vicia multijuga* Z. D. Xia, which is a later homonym and therefore illegitimate.

34. *Vicia bungei* Ohwi, J. Jap. Bot. 12: 330. 1936.

大花野豌豆 da hua ye wan dou

Vicia tridentata Bunge, Enum. Pl. China Bor. 19. 1833, not Gaterau (1789), nor Schweinitz (1824); *V. americana* Muhlberg ex Willdenow var. *bungei* (Ohwi) Stankevicz; *V. americana* var. *sinensis* C. R. Gunn.

Herbs annual or short-lived perennial, 15–50 cm tall. Stem climbing or trailing, much branched, glabrescent. Leaves paripinnate; stipules semihastate, 3–7 mm, margin toothed; leaflets 3–5-paired, linear-oblong, oblong, or narrowly oblong-oblancoleate to oblong-obovate, 10–25 × 2–8 mm, abaxially pilose, apex usually emarginate and mucronate, thereby often appearing 3-toothed, sometimes truncate or rounded, rarely distal margin also toothed; tendril branched. Raceme subequaling or longer than leaf, 2–4(or 5)-flowered. Calyx campanulate, pilose. Corolla red-purple, blue-purple, or pale violet, sometimes white on keel; standard obovate-lanceolate, longer than wings. Ovary long stalked, sericeous along sutures. Legume oblong, 25–35 mm, glabrous. Seeds 2–8, spheroid. Fl. Apr–Jul, fr. May–Aug. $2n = 24, 26, 42$.

Forests, mountain and hill slopes, valleys, grasslands, meadows, banks above lakes, streamsides, steep rocky sides of river gorges, walls, fields and field margins, wastelands, roadsides, sandy and rocky seashores; sea level to 4200 m. Anhui, Gansu, Hebei, Henan, Jiangsu, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan [Korea].

35. *Vicia tetrasperma* (Linnaeus) Schreber, Spic. Fl. Lips. 26. 1771.

四籽野豌豆 si zi ye wan dou

Ervum tetraspermum Linnaeus, Sp. Pl. 2: 738. 1753.

Herbs annual, 20–60 cm tall. Stem climbing, much branched, slender, puberulent. Leaves paripinnate, 2–4 cm; stipules sagittate or semitriangular, 2–3 mm; leaflets 2–6-paired, oblong or linear, 6–7 × ca. 3 mm; tendril present. Raceme ca. 3 cm, 1- or 2-flowered. Calyx obliquely campanulate. Corolla pale blue, pale violet, pale rose, or white, 4–8 mm; standard oblong-obovate; wings subequaling keel. Ovary stalked, oblong,

3–4 mm; ovules 4. Legume oblong, 8–12 × 2–4 mm, glabrous. Seeds 4, oblate-spheroid. Fl. Feb–Aug, fr. Mar–Aug. $2n = 14$.

Hill slopes, valleys, grasslands, fields, cultivated areas, open ground, wastelands, roadsides; near sea level to 2900 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, Bhutan, N India, Japan, Kazakhstan, Korea, Kyrgyzstan, N Pakistan, Russia, Tajikistan, Uzbekistan; N Africa, C and SW Asia, N Atlantic islands, Europe; widely introduced and naturalized elsewhere].

36. *Vicia hirsuta* (Linnaeus) Gray, Nat. Arr. Brit. Pl. 2: 614. 1821.

小巢菜 xiao chao cai

Ervum hirsutum Linnaeus, Sp. Pl. 2: 738. 1753; *Vicia coreana* H. Léveillé; *V. hirsuta* var. *hefeiiana* J. Q. He; *V. taquetii* H. Léveillé; *Vicioides hirsuta* (Linnaeus) Moench.

Herbs annual, 15–90(–120) cm tall. Stem climbing, slender, glabrescent. Leaves paripinnate; stipules semisagittate or lanceolate, margin 2- or 3-toothed at base; leaflets 4–8-paired, linear or narrowly oblong, 5–15 × 1–3 mm, glabrous; tendril branched. Raceme obviously shorter than leaf, densely 2–4(–7)-flowered at apex of rachis. Calyx campanulate. Corolla white to light purple, rarely pink, 2–4(–5) mm; standard elliptic, subequaling wings and longer than keel. Ovary sessile, densely rigidly hairy; ovules 2. Legume oblong-rhomboid, 5–10 × 2–5 mm, hirsute. Seeds 2, oblate-spheroid. Fl. Feb–Jun, fr. Feb–Aug. $2n = 12, 14$.

Valleys, grassy slopes, grasslands, creek banks, along streams, farms, fields and field margins, villages, gardens, cultivated areas, roadsides; sea level to 2900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Jiangsu, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, Bhutan, N India, Japan, Korea, Nepal, N Pakistan, Russia, Turkmenistan; Africa, C and SW Asia, N Atlantic islands, Europe; introduced and naturalized elsewhere].

“*Ervum filiforme*” (Wallich, Numer. List, no. 5955. 1831) belongs here but is a nomen nudum and was therefore not validly published.

37. *Vicia sepium* Linnaeus, Sp. Pl. 2: 737. 1753.

野豌豆 ye wan dou

Vicioides sepium (Linnaeus) Moench.

Herbs perennial, 30–100 cm tall. Stem erect or climbing, slender, pilose. Leaves paripinnate, 7–12 cm; stipules semihastate, margin 2–4-toothed; leaflets 5–7-paired, oblong-ovate or oblong-lanceolate, 6–30 × 4–13 mm, pilose, apex obtuse or truncate, mucronate; tendril branched. Flowers 2–4(–6) in axillary fascicles. Calyx campanulate. Corolla pale violet-purple, red, or nearly purple to pink, 10–15 mm; standard nearly violin-shaped; wings shorter than standard; keel curved inward. Ovary shortly stalked, linear, glabrous; ovules ca. 5. Legume broadly oblong to subrhomboid, slightly curved, 20–40 × 5–7 mm, apex beaked. Seeds 5–7, oblate-spheroid. Fl. Mar–Jun, fr. Mar–Aug. $2n = 12, 14$.

Forest margins, hedges, hillocks, hill slopes, grasslands, fields, roadsides; 1000–2200 m. Gansu, Guizhou, Shaanxi, Sichuan, Xinjiang, Yunnan [Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikistan; SW Asia (Caucasus, E Turkey), Europe; introduced and naturalized in temperate regions elsewhere].

38. *Vicia pannonica* Crantz, Stirp. Austr. Fasc., ed. 2, 2: 393. 1769.

褐毛野豌豆 he mao ye wan dou

Herbs annual, 20–60(–100) cm tall, densely yellow to brown villous. Stem 2–4-branched from base, erect. Leaves paripinnate; stipules ovate-lanceolate or semihastate, small; leaflets 6–9-paired, linear or oblong-linear, 10–15 × 2–3 mm, apex mucronate; lateral veins not obvious; tendril 2- or 3-branched. Flowers 1–3 in axillary fascicles. Calyx obliquely campanulate, ca. 11 mm, densely yellow villous. Corolla white or yellow-white; standard 15–16 mm, equaling wings and longer than keel, abaxially villous. Ovary shortly stalked, villous. Legume broadly oblong to subrhomboid, 20–35 × 7–11 mm, densely brown villous, apex beaked. Seeds 2–8, suboblate-spheroid. Fl. and fr. Jul–Sep. $2n = 12$.

Cultivated. Almost throughout China [native to SW Asia and Europe; introduced and naturalized elsewhere].

The Chinese plants correspond to *Vicia pannonica* subsp. *pannonica*, characterized by a white or yellow-white corolla, with limb of standard shorter than claw, and black seeds. *Vicia pannonica* subsp. *striata* (M. Bieberstein) Nyman has a dirty purple corolla, with limb of standard subequaling claw, and black seeds marbled with brown.

39. *Vicia sativa* Linnaeus, Sp. Pl. 2: 736. 1753.

救荒野豌豆 jiu huang ye wan dou

Herbs annual, 15–100 cm tall. Stem unbranched to much branched, decumbent or climbing, puberulent or pilose. Leaves paripinnate, 2–10 cm; stipules hastate, semisagittate, or lanceolate, ca. 1.5 mm, 2–5-toothed, puberulent; leaflets 2–7-paired, linear to oblong-cuneate to obcordate, 9–25 × 2–10 mm, hairy, apex acute, obtuse, truncate, or emarginate, mucronate; lateral veins not obvious; tendril 2- or 3-branched. Flowers 1 or 2(–4) in axillary fascicles. Calyx campanulate, hairy; teeth shorter than to longer than tube. Corolla blue-purple or purple to red, (8–)10–30 mm; standard long obovate or obovate, constricted at middle, subequaling or longer than wings; wings longer than keel. Ovary shortly stalked, linear or fusiform, puberulent or hairy; ovules 5–8. Legume black, brownish black, brown, or yellow-brown, linear or linear-oblong, slightly curved, contracted or not contracted between seeds, 25–70 × (2.5–)3–11 mm, pubescent to glabrous, apex beaked. Seeds 4–8, spheroid. Fl. Jan–Aug, fr. Feb–Sep. $2n = 10, 12, 14$.

Wild or cultivated and possibly naturalized, forests, hedges, hill slopes, valleys, grasslands, dry pastures, damp grassy places, river and creek banks, river beds, farms, orchards, fields, cultivated land, margins of cultivation, wastelands, roadsides; sea level to 3700 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Hubei, Hunan, Jiangsu, Nei Mongol, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, N Atlantic islands, Europe; widely introduced and naturalized elsewhere].

1a. Corolla 18–30 mm; calyx teeth equaling or longer than calyx tube; legume brown or yellow-brown, contracted between seeds,

35–70 × 6–11 mm, usually hairy; leaflets oblong-cuneate to obcordate, apex truncate or emarginate 39a. subsp. *sativa*

1b. Corolla (8–)10–18 mm; calyx teeth shorter than calyx tube; legume black or brownish black, not contracted between seeds, 25–55 × (2.5–)3–6 mm; usually glabrous; leaflets linear to oblong-cuneate, apex acute, obtuse, or truncate 39b. subsp. *nigra*

39a. *Vicia sativa* subsp. *sativa*

救荒野豌豆(原亚种) jiu huang ye wan dou (yuan ya zhong)

Vicia sativa var. *ecirrhosa* J. Q. He.

Leaflets oblong-cuneate to obcordate, apex truncate or emarginate. Calyx: teeth equaling or longer than tube. Corolla 18–30 mm. Legume brown or yellow-brown, contracted between seeds, 35–70 × 6–11 mm, usually hairy. Fl. Jan–Aug, fr. Feb–Sep. $2n = 10, 12$.

Cultivated and possibly naturalized, forests, hedges, hill slopes, grasslands, dry pastures, creek banks, farms, orchards, fields, cultivated land, margins of cultivation, wastelands, roadsides; sea level to 3000 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Hubei, Jiangsu, Nei Mongol, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [exact native distribution uncertain; widely cultivated and naturalized].

39b. *Vicia sativa* subsp. *nigra* Ehrhart, Hannover Mag. 15: 229. 1780.

窄叶野豌豆 zhai ye ye wan dou

Vicia sativa var. *angustifolia* Linnaeus, Fl. Suec., ed. 2, 255. 1755; *V. angustifolia* Linnaeus; *V. pilosa* M. Bieberstein; *V. sativa* subsp. *angustifolia* (Linnaeus) Battandier; *V. sativa* var. *nigra* Linnaeus, nom. illeg. superfl.

Leaflets linear to oblong-cuneate, apex acute, obtuse, or truncate. Calyx: teeth shorter than tube. Corolla (8–)10–18 mm. Legume black or brownish black, not contracted between seeds, 25–55 × (2.5–)3–6 mm, usually glabrous. Fl. Mar–Jul, fr. Mar–Sep. $2n = 10, 12, 14$.

Damp grassy places, valleys, riverbanks and beds, farms, fields, open wastelands, roadsides; 200–3700 m. Fujian, Guizhou, Hunan, Sichuan, Taiwan, Xinjiang, Xizang [Afghanistan, Bhutan, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Europe; introduced and naturalized in temperate regions elsewhere].

40. *Vicia faba* Linnaeus, Sp. Pl. 2: 737. 1753.

蚕豆 can dou

Faba vulgaris Moench.

Herbs annual, 30–120 cm tall. Stem erect, thick, glabrous. Leaves paripinnate; stipules hastate or triangular-ovate, 10–25 mm, margin slightly toothed; leaflets 1–5-paired, oblong, elliptic, or obovate, 40–60(–100) × 15–40 mm, glabrous, apex mucronate; tendril absent, replaced by a mucro. Flowers 2–4(–6) in axillary fascicles. Calyx campanulate, unequally toothed. Corolla white with purple veins, 20–35 mm; standard con-

stricted at middle, longer than wings; wings longer than keel. Ovary sessile, linear; ovules 2–4(–6). Legume stout, 50–100 × 20–30 mm, tomentose. Seeds 2–4(–6), oblong, compressed, 8–30 mm. Fl. and fr. Mar–Sep. $2n = 12, 14$.

Cultivated; near sea level to 3700 m. Throughout China [widely cultivated elsewhere; of cultivated origin].

The seeds (broad beans, fava beans) are edible.

165. LATHYRUS Linnaeus, Sp. Pl. 2: 729. 1753.

山黧豆属 shan li dou shu

Bao Bojian (包伯坚); Gregory Kenicer

Herbs annual or perennial. Stem erect or climbing by means of tendrils, winged or wingless. Leaves paripinnate, with rachis terminating in a branched or simple tendril or a bristle, rarely phyllodic or reduced to modified stipules; stipules sagittate or semisagittate, usually smaller than leaflets, sometimes large and leaflike; leaflets 1- to many paired, elliptic, ovate, ovate-oblong, lanceolate, or linear; veins parallel, pinnate, or reticulate. Inflorescence an axillary, pedunculate, 1- to many flowered raceme. Calyx campanulate, unequally or equally toothed; teeth not leaflike, at least 2 teeth less than $2 \times$ as long as tube. Corolla purple, pink, yellow, or white, sometimes crimson, brick red, or orange. Staminal tube not oblique at apex; filaments filiform or distally dilated. Style linear or distally dilated, dorsally compressed, pubescent on upper side. Legume laterally compressed, dehiscent. Seeds 2 to many.

About 160 species: mainly in Asia, Europe, and North America, with some South American endemics; 18 species (three endemic, three introduced) in China.

The yellow-flowered species of SE China are a particularly difficult and poorly understood group, represented by only limited gatherings.

- 1a. Leaves without tendril at apex (aristate).
- 2a. Stem slightly winged; leaflets with 3(–5) parallel veins 13. *L. komarovii*
- 2b. Stem wingless; leaflets with reticulate veins.
- 3a. Corolla purple-red; stipules linear or spurlike (subulate) 8. *L. vaniotii*
- 3b. Corolla orange-yellow or yellow; stipules leaflike (more than 3 mm wide).
- 4a. Leaflets ovate or elliptic 6. *L. gmelinii*
- 4b. Leaflets linear to linear-lanceolate 7. *L. krylovii*
- 1b. Leaves with simple or branched tendril at apex.
- 5a. Stem winged (more than 1 mm).
- 6a. Leaves with 1 pair of leaflets; style twisted.
- 7a. Raceme 5–15-flowered 17. *L. latifolius*
- 7b. Raceme 1–3(or 4)-flowered.
- 8a. Leaflets ovate-oblong or elliptic; corolla 20–30 mm; legume wingless 16. *L. odoratus*
- 8b. Leaflets lanceolate to linear; corolla 12–15(–24) mm; legume winged at sutures 15. *L. sativus*
- 6b. Leaves with more than 1 pair of leaflets; style not twisted.
- 9a. Stipules similar to leaflets, 35 mm or longer; leaflets oval to oblong 2. *L. pisiformis*
- 9b. Stipules less than 35 mm; leaflets linear, linear-lanceolate, or elliptic-lanceolate.
- 10a. Leaflets with pinnate or subparallel veins, stipules without reflexed basal spur 11. *L. palustris*
- 10b. Leaflets with 5 prominent parallel veins, stipules with reflexed basal spur 12. *L. quinquerivius*
- 5b. Stem wingless.
- 11a. Leaves with 1 pair of leaflets.
- 12a. Corolla yellow; stipules sagittate 18. *L. pratensis*
- 12b. Corolla purple-red; stipules semisagittate 14. *L. tuberosus*
- 11b. Leaves with more than 1 pair of leaflets.
- 13a. Stipules large, subequaling or equaling leaflets; leaflets ovate to broadly ovate 1. *L. davidii*
- 13b. Stipules obviously smaller than leaflets.
- 14a. Leaflets large, 9–12 cm, ovate-lanceolate, strongly caudate at apex 9. *L. caudatus*
- 14b. Leaflets less than 9 cm, not strongly caudate at apex.
- 15a. Stem procumbent; stipules sagittate 5. *L. japonicus*
- 15b. Stem erect; stipules semisagittate.
- 16a. Longest calyx tooth equaling tube 11. *L. palustris*
- 16b. Longest calyx tooth shorter than tube.
- 17a. Leaflets narrowly elliptic or narrowly ovate; corolla yellow 10. *L. anhuiensis*
- 17b. Leaflets elliptic, ovate, or oblong; corolla pink or purple.
- 18a. Plant 20–30 cm high; raceme 2–5-flowered 3. *L. humilis*
- 18b. Plant 80–100 cm high; raceme 9–11(–13)-flowered 4. *L. dielsianus*

1. *Lathyrus davidii* Hance, J. Bot. 9: 130. 1871.

大山黧豆 da shan li dou

Herbs perennial, with tuberous roots, 1–1.8 m tall. Stem strong, erect or decumbent, glabrous, wingless, hollow in lower parts. Leaves with strong, branched tendrils; stipules large, often similar to leaflets, semisagittate, ovate, 40–60 mm, entire or sometimes dentate at base; leaflets (2 or)3- or 4(or 5)-paired, usually ovate, 40–70 × 50–110 mm, glabrous, with reticulate veins, margin entire, apex mucronate. Raceme subequaling leaf, 10–40-flowered. Calyx campanulate, ca. 5 mm, glabrous, shortly toothed. Corolla yellow, maturing to orange, 1.5–2 cm; standard elliptic, with claw; wings subequaling standard, auriculate at base. Ovary linear, glabrous. Legume orange-brown, linear, 8–15 cm. Seeds purple-brown, broadly oblong, smooth. Fl. May–Jul, fr. Aug–Oct.

Forest margins, scrub forests, slopes; below 1800 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Nei Mongol, Shaanxi, Shandong, Shanxi [Japan, Korea, Russia].

2. *Lathyrus pisiformis* Linnaeus, Sp. Pl. 2: 734. 1753.

大托叶山黧豆 da tuo ye shan li dou

Herbs perennial, to 2 m tall. Stem erect, glabrous, winged. Leaves with branched tendril at apex; stipules large, ovate or elliptic, 35–65 mm, glabrous, often with dentate basal lobe; leaflets 3–5-paired, narrowly ovate, ovate-lanceolate, or elliptic-lanceolate, 55–90 × 20–30 mm, glabrous, with subparallel veins. Raceme 8–14-flowered. Calyx campanulate, ca. 12 mm, glabrous, unequally toothed. Corolla red-purple; standard ca. 13 mm, retuse at apex, often with darker venation; wings auriculate at base; keels ca. 12 mm. Ovary linear, glabrous. Legume dark brown, ca. 4.5 × 5.5 mm. Seeds light yellow, obovate-spherical, smooth. Fl. May–Jun, fr. Jul–Aug.

Forests, valleys, riverbanks; 1100–1500 m. Xinjiang [Russia; C and E Europe].

3. *Lathyrus humilis* (Seringe) Sprengel, Syst. Veg. 3: 363. 1826.

矮山黧豆 ai shan li dou

Orobanchium humilis Seringe in Candolle, Prodr. 2: 378. 1825; *Lathyrus altaicus* Ledebour.

Herbs perennial, 20–30 cm tall. Stem slender, erect, sometimes branching, puberulent, wingless. Leaves paripinnate; tendril weakly branched or simple; stipules foliose, semisagittate, 10–16 mm, dentate; leaflets (2 or)3- or 4-paired, ovate or elliptic, 15–30(–50) × 10–20 mm, glabrous or abaxially puberulent, with reticulate veins. Raceme shorter than leaf, 2–5-flowered. Calyx campanulate; longest tooth ca. 1/2 length of tube. Corolla purple-red, 1.5–2 cm; standard orbicular, with claw; wings and keels auriculate at base. Ovary linear, glabrous. Legume linear, 4.3–5 cm. Seeds red-brown, elliptic, smooth. Fl. May–Jul, fr. Aug–Sep.

Forest margins, scrub forests, hill grasslands; below 2500 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, Xinjiang [Korea, Mongolia, Russia].

4. *Lathyrus dielsianus* Harms, Bot. Jahrb. Syst. 29: 417. 1900.

中华山黧豆 zhong hua shan li dou

Lathyrus davidii Hance var. *roseus* C. W. Chang; *L. wilsonii* Craib.

Herbs perennial, 80–100 cm tall. Stem erect, glabrous, wingless. Leaves with simple or branched tendril; stipules obliquely ovate, toothed, on upper leaves often lanceolate, entire; leaflets (2 or)3- or 4(or 5)-paired, ovate to ovate-lanceolate, 35–55(–65) × 13–20(–35) mm, glabrous, with reticulate veins. Raceme shorter than or subequaling leaf, 9–11(–13)-flowered. Calyx campanulate, 7–8 mm, glabrous, shortly toothed; longest tooth shorter than tube, 1.5–2 mm. Corolla pink or purple, 1.8–1.9 cm; standard orbicular, with claw; wings obovate, auriculate at base. Ovary linear, glabrous. Legume brown, linear, 5.5–8 cm. Seeds elliptic, ca. 5 mm, smooth. Fl. May–Jun, fr. Jul–Aug.

• Forests, slopes, riverbanks. Chongqing, Hubei, Shaanxi, Shanxi, Sichuan.

5. *Lathyrus japonicus* Willdenow, Sp. Pl. 3: 1092. 1802.

海滨山黧豆 hai bin shan li dou

Pisum maritimum Linnaeus, Sp. Pl. 2: 727. 1753; *Lathyrus aleuticus* (Greene ex T. G. White) Pobedimova; *L. japonicus* var. *aleuticus* (Greene ex T. G. White) Fernald; *L. japonicus* subsp. *maritimum* (Linnaeus) P. W. Ball; *L. japonicus* var. *maritimum* (Linnaeus) Kartesz & Gandhi; *L. japonicus* f. *pubescens* (Hartman) H. Ohashi & Tateishi; *L. japonicus* subsp. *pubescens* (Hartman) Korobkov; *L. japonicus* var. *pubescens* (Hartman) Karlsson; *L. maritimum* Bigelow (1824); *L. maritimum* (Linnaeus) Fries (1835); *L. maritimum* var. *aleuticus* Greene ex T. G. White; *L. maritimum* f. *pubescens* (Hartman) Saelán; *L. maritimum* subsp. *pubescens* (Hartman) C. Regel; *L. maritimum* var. *pubescens* (Hartman) X. Y. Zhu; *L. maritimum* var. *velutinum* Fries; *P. maritimum* var. *pubescens* Hartman.

Herbs perennial, 15–50 cm tall. Stem stoloniferous, creeping, wingless. Leaves with branched or simple tendril; stipules sagittate, 10–30 mm, glabrous; leaflets 3–5-paired, long elliptic or obovate, 25–33 × 11–18 mm, glabrous, with reticulate veins visible on both surfaces. Raceme shorter than leaf, 2–5-flowered. Calyx campanulate, 9–10(–12) mm, glabrous; teeth unequal, longest tooth 5–6 mm. Corolla purple, ca. 21 mm; standard orbicular, with claw; wings narrowly obovate, occasionally white. Ovary linear, glabrous or rarely hairy. Legume brown or purple-brown, compressed, ca. 5 cm, glabrous or puberulent. Seeds subglobose. Fl. May–Jul, fr. Jul–Aug.

Seashores. Hebei, Jiangsu, Liaoning, Shandong, Zhejiang [widely distributed on coasts of temperate Asia, Europe, North America, and South America (Chile)].

Plants glabrous or slightly hairy have been called *Lathyrus japonicus* f. *japonicus*, whereas plants obviously hairy have been called *L. japonicus* f. *pubescens*. The two forms are sympatrically distributed in China and elsewhere. Although widely recognized, they appear to intrograde, so they are not formally recognized in this account. Plants with white wings and keels have been described as *L. japonicus* f. *albiflorus* Miyabe & Tatewaki (Trans. Sapporo Nat. Hist. Soc. 14: 185. 1936).

6. *Lathyrus gmelinii* (Fischer ex Candolle) Fritsch, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 104: 516. 1895.

新疆山黧豆 xin jiang shan li dou

Orobus gmelinii Fischer ex Candolle, Prodr. 2: 378. 1825; *Lathyrus laevigatus* (Waldstein & Kitaibel) Grenier subsp. *gmelinii* (Fischer ex Candolle) Hendrych; *L. luteus* (Linnaeus) Moench var. *gmelinii* (Fischer ex Candolle) Reichenbach.

Herbs perennial, 60–150 cm tall. Stem erect, glabrous, wingless. Leaves aristate at apex; stipules foliose, semisagittate, 15–30 × 4–10 mm, glabrous, toothed; leaflets 3- or 4-paired, ovate, elliptic, or long elliptic, rarely lanceolate, 30–60(–90) × 10–50 mm, glabrous, with pinnate veins. Raceme longer than leaf, 7–12-flowered, glabrous. Calyx campanulate, ca. 1 cm, glabrous; longest tooth ca. 2 mm. Corolla orange-yellow, 2.5–3 cm; standard ovate, with claw; wings obovate, auriculate at base. Ovary linear, ca. 1.8 cm, glabrous. Legume brown, linear, 6–8 cm. Seeds light brown, smooth. Fl. May–Jul, fr. Jul–Aug.

Forests, riverbanks; 1400–2400 m. Xinjiang [Russia].

This and a number of other Eurasian taxa may represent entities in *Lathyrus laevigatus*, from which they are poorly distinguished.

7. *Lathyrus krylovii* Sergievskaya, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1933(3–4): 3. 1933.

狭叶山黧豆 xia ye shan li dou

Lathyrus laevigatus (Waldstein & Kitaibel) Grenier subsp. *krylovii* (Sergievskaya) Hendrych.

Herbs perennial, 60–80 cm tall. Stem erect, glabrous, wingless. Leaves aristate at apex; stipules semisagittate, lanceolate or linear, 10–25 × 3–7 mm; leaflets 2–4-paired, linear to linear-lanceolate, 50–130 × 3–16 mm, glabrous, with pinnate veins. Raceme longer than leaf, 2–4-flowered. Calyx campanulate, ca. 8 mm, glabrous; longest tooth ca. 1.5 mm. Corolla yellow, 2–5 cm; standard orbicular, ca. 2.7 cm, with claw; wings narrowly obovate, auriculate at base. Ovary linear, glabrous. Legume brown, linear, 8–9 cm. Seeds elliptic, 3–4 mm. Fl. Jun–Jul, fr. Aug–Sep.

Hill forests; ca. 1800 m. Xinjiang [Russia].

8. *Lathyrus vaniotii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 7: 230. 1909.

东北山黧豆 dong bei shan li dou

Herbs perennial, 40–70 cm tall. Stem erect, glabrous, wingless. Leaves aristate at apex; stipules semisagittate, subulate, occasionally linear, falcate with a short (ca. 2 mm) basal spur, 5–15 × 1–3 mm; leaflets glaucous-gray abaxially, dark green adaxially, (2 or)3- or 4(–6)-paired, lanceolate or narrowly lanceolate on lower stem leaves, narrowly ovate, rarely oblong on upper stem leaves, 40–60 × 15–25 mm, glabrous, with reticulate veins, apex shortly mucronate. Raceme 4–8-flowered. Calyx campanulate, ca. 11 mm, glabrous; longest tooth ca. 4 mm. Corolla purple-red, 1.8–2.5 cm; standard ca. 21 mm, with claw; wings equaling standard, ovate. Ovary linear, glabrous. Fl. May–Jun.

Forested slopes. Heilongjiang, Jilin [Korea].

9. *Lathyrus caudatus* Z. Wei & H. P. Tsui, Bull. Bot. Res., Harbin 4(1): 49. 1984.

尾叶山黧豆 wei ye shan li dou

Herbs perennial, to 120 cm tall. Stem strong, erect, branched, sparsely glandular, wingless. Leaves with simple or weakly branching tendril; stipules semisagittate, linear-lanceolate, 12–18 × 1.5–2 mm; leaflets 4- or 5-paired, ovate-lanceolate, 90–120 × 25–40 mm, glabrous, with 5 prominent veins, strongly caudate at apex. Raceme ca. 10 cm, many flowered. Calyx campanulate; teeth unequal, longest tooth ca. 7 mm. Corolla light yellow, 1.8–2 cm; standard orbicular, with claw; wings slightly shorter than keels. Ovary linear, glabrous, brown glandular. Legume linear, 6–8 cm, brown glandular. Seeds 8–12.

• Scrub forests; 100–200 m. Zhejiang (Jiande).

This species is known only from the type gathering.

10. *Lathyrus anhuiensis* Y. J. Zhu & R. X. Meng, Acta Phytotax. Sin. 24: 402. 1986.

安徽山黧豆 an hui shan li dou

Lathyrus henanensis S. Y. Wang.

Herbs perennial, 80–120 cm tall. Stem erect, much branched, glabrous, wingless. Leaves 10–30 cm, mucronate or with a simple tendril at apex; stipules semisagittate, 8–15 × 2–5 mm; leaflets 3–8-paired, narrowly elliptic or narrowly ovate, 30–70 × 10–30 mm, glabrous, with pinnate veins, margin entire. Raceme subequal or shorter than leaf, ca. 10-flowered. Calyx campanulate, unequal; longest tooth ca. 1/5 length of tube. Corolla yellow, 14–18 mm; standard broadly obovate, with claw; wings shorter than standard, obovate, subequaling keel. Ovary linear, ca. 11 mm, purple-brown glandular hairy; style curved inward. Legume light brown, linear, 6–8 cm. Seeds brown, oblong. Fl. May–Jul, fr. Jun–Sep.

• SE Anhui (Xuancheng), Henan.

This species is known from few gatherings: from the type gatherings of the species and its synonym *Lathyrus henanensis* (neither of which were available for this revision). Two incomplete specimens collected by Augustine Henry may represent additional gatherings of this: *Aug. Henry 6595* (BM) and a specimen dated 1889 (K).

11. *Lathyrus palustris* Linnaeus, Sp. Pl. 2: 753. 1753.

欧山黧豆 ou shan li dou

Herbs perennial, 15–100 cm tall. Stem climbing, branched, pubescent or glabrous, winged or unwinged. Leaves with simple or branched tendril at apex; stipules semisagittate, 12–25(–30) × 2–10 mm; leaflets 2–4-paired, linear to broadly lanceolate, without reflexed basal spur, 30–60 × 4–10(–15) mm, pubescent, veins pinnate or subparallel, abaxially prominent. Raceme longer than leaf, (2 or)3- or 4(–10)-flowered. Calyx campanulate, unequally toothed; longest tooth equaling tube. Corolla purple, 13–15(–20) mm; standard obovate, with claw; wings shorter than standard, obovate and longer than keels. Ovary linear. Legume linear, 3–4 cm, beaked at apex. Fl. and fr. Jul–Sep.

Marshes, wet meadows, a weed of rice fields; sea level to 3500 m. Gansu, Hebei, Heilongjiang, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia; Europe, North America].

Lathyrus palustris is widely distributed in the N temperate zone in Europe, Russia, E Asia, and North America. It is a highly variable taxon with many entities described from it, although few of these stand up to scrutiny. East Asian specimens are often referred to *L. palustris* subsp. *pilosus*, but this is based purely on pubescence, a character with no other correlates. Consequently, we treat pubescent individuals at the varietal level. This species is often confused with *L. quinquerivius*. See under that species for the distinguishing characters.

- 1a. Stem wingless (subsp. *exalatus* H. P. Tsui) 11c. var. *exalatus*
 1b. Stem winged (subsp. *palustris*).
 2a. Leaves with branched tendrils; leaflets 2–4-paired; raceme (2 or)3- or 4(or 5)-flowered; plants pubescent 11a. var. *pilosus*
 2b. Leaves with unbranched, short tendrils; leaflets 1- or 2(or 3)-paired; raceme 1- or 2(–4)-flowered; plants puberulent or glabrous ... 11b. var. *linearifolius*

11a. *Lathyrus palustris* var. *pilosus* (Chamisso) Ledebour, Fl. Ross. 1: 686. 1843.

毛山黧豆 mao shan li dou

Lathyrus pilosus Chamisso, Linnaea 6: 548. 1831; *L. palustris* subsp. *pilosus* (Chamisso) Hultén.

Plants pubescent. Stem winged. Leaves with branched tendrils; stipules semisagittate; leaflets 2–4-paired. Raceme (2 or)3- or 4(or 5)-flowered.

Gansu, Hebei, Heilongjiang, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia].

Glabrous plants with the characteristics of *Lathyrus palustris* var. *pilosus* can be referred to the typical variety, *Lathyrus palustris* var. *palustris*, but such individuals have not been reported from China.

11b. *Lathyrus palustris* var. *linearifolius* Seringe in Candolle, Prodr. 2: 371. 1825.

线叶山黧豆 xian ye shan li dou

Plants puberulent or glabrous, 10–40 cm tall. Stem usually narrowly winged. Leaves with short, simple tendrils at apex; stipules linear; leaflets 1- or 2(or 3)-paired, linear, rarely elliptic-lanceolate. Raceme 1- or 2(–4)-flowered.

- Sichuan, Yunnan.

Plants of *Lathyrus palustris* from the mountains of Sichuan and Yunnan appear as depauperate specimens of the European *L. palustris* var. *palustris*, having reduced numbers of leaflets and flowers. This is morphologically consistent with Seringe's *L. palustris* var. *linearifolius* from Denmark and Switzerland, but it is unclear if these are convergent traits or represent a genuine disjunction. Pending molecular evidence, we treat these SW Chinese specimens under *L. palustris* var. *linearifolius*. Specimens of *L. quinquerivius* are sometimes labeled *L. palustris* var. *linearifolius*, but *L. quinquerivius* is a far larger plant with parallel veins in the leaflets and linear, acute stipules with a falcate basal spur.

11c. *Lathyrus palustris* var. *exalatus* (H. P. Tsui) X. Y. Zhu in X. Y. Zhu et al., Legumes China, 204. 2007.

无翅山黧豆 wu chi shan li dou

Lathyrus palustris subsp. *exalatus* H. P. Tsui, Bull. Bot. Res., Harbin 4(1): 54. 1984; *L. palustris* f. *exalatus* H. P. Tsui; *L. palustris* f. *pubescens* H. P. Tsui; *L. palustris* var. *pubescens* (H. P. Tsui) X. Y. Zhu.

Plants glabrous to pubescent. Stem wingless. Stipules large, 12–25(–30) × 2–8 mm; leaflets usually broadly lanceolate, 30–60 × 5–10(–15) cm, veins subparallel. Raceme lax, (2 or)3–8(–10)-flowered.

- Shanxi, Sichuan, Xinjiang, Xizang, Yunnan.

Pubescent plants have been separated at the form and varietal levels, but close observation shows a continuum from glabrous to puberulent to pubescent individuals, with no clear separation into two groups. Consequently, we treat this as a single variety under the subspecies.

12. *Lathyrus quinquerivius* (Miquel) Litvinov in Komarov & Alissova-Klobukova, Opred. Rast. Dal'nevost. Kraia 2: 683. 1932.

山黧豆 shan li dou

Vicia quinquerivius Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 50. 1867.

Herbs perennial, 20–80 cm tall. Stem erect or clambering over surrounding vegetation, rarely branched, winged. Leaves with simple tendrils; stipules linear, with reflexed basal spur, often falcate, 7–23 × 0.2–2 mm; leaflets 1- or 2(or 3)-paired, elliptic-lanceolate or linear-lanceolate, 35–80 × 5–8 mm, pubescent, with 5 stiff, prominent parallel veins, rigid when dry. Raceme 5–8-flowered. Calyx campanulate, pubescent; longest tooth equaling tube. Corolla purple-blue or purple, sometimes with white wings and keel, (12–)15–20 mm; standard orbicular, with claw; wings narrowly obovate, auriculate at base. Ovary densely hairy. Legume linear, 3–5 cm. Fl. May–Jul, fr. Aug–Sep.

Forests, hill slopes, roadsides; below 2500 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Nei Mongol, Qinghai, Shandong, Shanxi, Sichuan [Japan, Korea, Russia].

This species is often confused with *Lathyrus palustris* but can be distinguished by the five strong, parallel veins in long, slender leaflets. The linear, acute stipules with a reflexed basal spur, the strong wings on the stems, and the simple tendrils also aid in identification.

Herbarium specimens are often mislabeled as *Lathyrus palustris* var. *linearifolius*.

13. *Lathyrus komarovii* Ohwi, J. Jap. Bot. 12: 329. 1936.

三脉山黧豆 san mai shan li dou

Orobanchaceae *Orobanchaceae* Maximowicz, Prim. Fl. Amur. 83. 1859; *Lathyrus alatus* (Maximowicz) Komarov (1904), not Tenore (1811), nor Smith (1813); *O. vernus* Linnaeus var. *alatus* (Maximowicz) Regel.

Herbs perennial, 40–70 cm tall. Stem erect, rarely branched, glabrous, narrowly winged. Leaves aristate at apex; rachis narrowly winged; stipules semisagittate, 15–25 × 3–8(–12) mm, rarely dentate; leaflets (2 or)3–5-paired, narrowly ovate to oblanceolate, glabrous, with 3(–5) parallel veins raised

abaxially and sunken adaxially, apex acuminate. Raceme shorter than leaf, 3–8-flowered; bracts membranous, persistent. Calyx campanulate, glabrous; longest tooth ca. 5 mm, equaling tube. Corolla purple, 13–18 mm; standard orbicular, with claw; wings shorter than standard, auriculate at base. Ovary linear, glabrous. Legume black-brown, linear, 3.7–4.5 cm, glabrous. Seeds brown, subglobose, smooth. Fl. May–Jun, fr. Jun–Aug.

Forests, grasslands. Heilongjiang, Jilin, Nei Mongol [Korea, Russia].

14. *Lathyrus tuberosus* Linnaeus, Sp. Pl. 2: 732. 1753.

玫红山黧豆 mei hong shan li dou

Herbs perennial; rhizomes bearing small tubers. Stem 30–120 cm tall, erect, glabrous, wingless. Leaves with simple or branched tendril at apex; stipules semisagittate, 5–20 × 1–4 mm; leaflets 1-paired, elliptic, oblong, or obovate, glabrous, with parallel veins. Raceme 2–7-flowered. Calyx campanulate, 6–7 mm; longest tooth shorter than tube. Corolla purple-red, 1.5–2 cm; standard subovate, with claw; wings obovate, auriculate at base. Ovary linear; style twisted. Legume brown, linear, 2–4 cm, glabrous. Seeds brown, elliptic, tuberculate. Fl. Jun–Aug, fr. Aug–Sep.

Water meadows, riverbanks; 500–2400 m. Xinjiang [Kazakhstan, Russia; Europe].

15. *Lathyrus sativus* Linnaeus, Sp. Pl. 2: 730. 1753.

家山黧豆 jia shan li dou

Annual herbs, 30–50(–70) cm tall. Stem suberect, glabrous, winged. Leaves with tendril at apex; rachis winged; stipules semisagittate, 18–25 × 2–5 mm; leaflets 1-paired, lanceolate to linear, 18–25 × 2–5 mm, with parallel veins, margin entire. Raceme 1(or 2)-flowered; rachis 3–6 cm. Calyx campanulate, subequally toothed, 2–3 × as long as tube. Corolla white, blue, or pink, 12–15(–24) mm. Ovary linear; style twisted. Legume subelliptic, 2.5–3.5(–4) cm, 2-winged along sutures. Seeds smooth. Fl. Jun–Jul, fr. Aug.

Cultivated as a fodder crop in N China, casual elsewhere [widely cultivated and naturalized; of uncertain origin].

16. *Lathyrus odoratus* Linnaeus, Sp. Pl. 2: 732. 1753.

香豌豆 xiang wan dou

Annual herbs, 50–200 cm tall. Stem climbing, much branched, somewhat hairy, winged. Leaves with branched tendril at apex; rachis winged; stipules semisagittate; leaflets 1-paired, ovate-oblong or elliptic, 20–60 × 7–30 mm, with pinnate veins, rarely subparallel veins, margin entire. Raceme longer than leaf, 1–3(or 4)-flowered. Calyx campanulate, equally toothed and longer than tube. Corolla usually purple, or other colors, 20–30 mm. Ovary linear; style twisted. Legume brown-yellow, linear, 5–7 cm, pubescent. Seeds smooth. Fl. and fr. Jun–Sep.

Widely cultivated in China and worldwide as an ornamental and cut flower [native to Italy (Sicily)].

17. *Lathyrus latifolius* Linnaeus, Sp. Pl. 2: 733. 1753.

宽叶山黧豆 kuan ye shan li dou

Herbs perennial, to 3 m tall. Stem erect, quadrangular, pubescent or glabrous, winged. Leaves with branched tendril at apex; stipules semisagittate, lanceolate to ovate; leaflets 1-paired, elliptic to elliptic-orbicular, or ovate to linear, (30–)40–150 × 3–50 mm, with parallel veins. Raceme 5–15-flowered. Calyx campanulate, ca. 6 mm, equally 5-toothed. Corolla purple to pink, (15–)20–30 mm. Style twisted. Legume brown, 5–11 cm, glabrous. Seeds 10–15.

Cultivated in Shaanxi [native to C and S Europe; cultivated worldwide in temperate areas as an ornamental and fodder crop].

18. *Lathyrus pratensis* Linnaeus, Sp. Pl. 2: 733. 1753.

牧地山黧豆 mu di shan li dou

Herbs perennial, 30–120 cm tall. Stem decumbent or climbing, wingless. Leaves with simple or branched tendril at apex; stipules sagittate, (5–)10–45 × 3–10(–15) mm; leaflets 1-paired, elliptic, lanceolate, or linear-lanceolate, 10–30(–50) × 2–9(–13) mm, puberulent, with parallel veins. Raceme 3–6 × as long as leaf, 5–12-flowered. Calyx campanulate, pubescent; longest tooth longer than tube. Corolla yellow, 12–18 mm; standard orbicular, ca. 14 mm, with claw; wings slightly shorter than standard. Legume black, linear, 2.5–4.5 cm. Seeds yellow or brown, orbicular, smooth. Fl. Jun–Aug, fr. Aug–Oct.

Forests, hill slopes, roadsides. Gansu, Heilongjiang, Hubei, Qinghai, Shaanxi, Sichuan, Xinjiang, Yunnan [Asia, Europe].

166. LENS Miller, Gard. Dict. Abr., ed. 4, [765]. 1754, nom. cons.

兵豆属 bing dou shu

Bao Bojian (包伯坚); Nicholas J. Turland

Herbs annual. Stem erect or procumbent. Leaves paripinnate with rachis terminating in a tendril or mucro; stipules obliquely lanceolate; leaflets 2- to many paired, obovate, obovate-oblong, or obovate-lanceolate, margin entire. Inflorescence a 1- to many-flowered raceme. Flowers small. Calyx deeply divided into equal teeth at least 2 × as long as tube. Corolla white or otherwise colored; standard obovate; wings and keel with claw and auricle. Stamens diadelphous; staminal tube oblique at apex; filaments filiform. Ovary shortly stalked or subsessile; style dorsally compressed, pubescent on upper side. Legume short, strongly compressed. Seeds 1 or 2, brown, lenticular.

Four to six species: Mediterranean region to C Asia, extending to the Canary islands and tropical Africa: one species (introduced) in China.

1. *Lens culinaris* Medikus, Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 361. 1787.

兵豆 bing dou

Ervum lens Linnaeus, Sp. Pl. 2: 738. 1753; *Lens esculenta* Moench; *Vicia lens* (Linnaeus) Cosson & Germain; *V. pisicarpa* H. Léveillé.

Plants 10–50 cm tall. Stem branched from base, pubescent. Leaves: stipules 3–7 mm, white villous; leaflets sessile, 4–12-

paired, 6–20 × 2–5 mm, both surfaces villous. Raceme 1–3-flowered; rachis densely white hairy. Calyx densely villous. Corolla white or blue-purple, 4.5–6.5 mm. Ovary shortly stalked, glabrous. Legume yellow, oblong, inflated, 10–15 mm. Fl. Apr–Sep, fr. May–Sep. $2n = 14, 21, 26$.

Cultivated; 800–3600 m. Gansu, Hebei, Henan, Hubei, Jiangsu, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [widely cultivated elsewhere; of cultivated origin].

The seeds (lentils) are edible.

167. **PISUM** Linnaeus, Sp. Pl. 2: 727. 1753.

豌豆属 wan dou shu

Bao Bojian (包伯坚); Nicholas J. Turland

Herbs annual or perennial. Stem often climbing by means of tendrils, terete, glabrous. Leaves paripinnate with rachis terminating in a tendril; stipules leaflike, cordate, larger than leaflets (to 10 cm); leaflets 1–3-paired, ovate to elliptic, margin entire or dentate. Inflorescence a 1- to many flowered raceme. Calyx campanulate; teeth ± leaflike, at least 2 teeth less than $2 \times$ as long as tube. Corolla white or otherwise colored; standard obovate. Stamens diadelphous; staminal tube not oblique at apex; filaments distally slightly dilated. Ovary sessile; ovules many; style curved inward, distally dilated and margin recurved forming a laterally compressed body, longitudinally grooved, hairy on upper side. Legume long elliptic, inflated, apex acute. Seeds many, spheroid.

Two or three species: Mediterranean region to SW Asia, one species cultivated in temperate regions worldwide, including China.

1. *Pisum sativum* Linnaeus, Sp. Pl. 2: 727. 1753.

豌豆 wan dou

Pisum arvense Linnaeus; *P. sativum* subsp. *arvense* (Linnaeus) Ascherson & Graebner; *P. sativum* var. *arvense* (Linnaeus) Poiret.

Herbs annual, 0.5–2 m tall, glabrous. Stem climbing. Leaves: stipules to 10×6 cm, margin toothed; leaflets ovate, 2–7 × 1–4 cm. Raceme 1–3-flowered. Corolla variable in color,

usually white and/or purple, 15–35 mm. Ovary glabrous; style flat. Legume 2.5–12 × 1–2.5 cm. Seeds 2–10. Fl. Feb–Sep, fr. Feb–Sep. $2n = 14$.

Cultivated, sometimes persisting as a relic or escape from cultivation; sea level to 3800 m. Throughout China [cultivated in temperate regions worldwide; of cultivated origin].

The seeds (peas) are edible, as are the young legumes of some cultivars (snow pea, mange-tout).