

HYPODEMATIACEAE

肿足蕨科 zhong zu jue ke

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Plants rupestral or rarely terrestrial, medium-sized. Rhizomes shortly creeping, ascending, or long creeping, stout, densely covered with scales and hairs or only scales; scales ovate-lanceolate or rarely linear-lanceolate. Fronds approximate, subclustered, or remote; stipe stramineous, base swollen into shuttle form and concealed in scales (*Hypodematium*), or articulate to rhizome, glabrous (*Leucostegia*); lamina deltoid or ovate-oblong to pentagonal-ovate, 3-pinnate to finely 4-pinnate-pinnatifid, anadromous, herbaceous or papery, both surfaces, rachises, and costules frequently covered with acicular and/or glandular hairs, rarely glabrous. Veins free, pinnate, branches simple or forked. Sori orbicular; indusia large, reniform, ± covered with acicular or glandular hairs, rarely glabrous. Spores ellipsoid, monolet. $x = 41$.

Three genera and ca. 20 species: Old World, mainly in tropical, subtropical, and warm-temperate regions of Asia and Africa; two genera and 13 species (eight endemic) in China.

Leucostegia has long been assigned to Davalliaceae because of its creeping, dorsiventral rhizome densely covered by scales, its dissected leaves, and its indusia. Molecular phylogenetic analysis has shown that *Leucostegia* is closely related to *Hypodematium*.

Ching Ren-chang, Fu Shu-hsia, Wang Chu-hao & Shing Gung-hsia. 1959. *Leucostegia*. In: Ching Ren-chang, ed., *Fl. Reipubl. Popularis Sin.* 2: 296–297; Shing Kung-hsia, Chiu Peishi & Yao Guanhu. 1999. Hypodematiaceae. In: Shing Kung-hsia, ed., *Fl. Reipubl. Popularis Sin.* 4(1): 1–14; Wu Shiewhung. 1999. *Leucostegia*. In: Wu Shiewhung, ed., *Fl. Reipubl. Popularis Sin.* 6(1): 177–179.

- 1a. Rhizomes shortly creeping or ascending; stipe base swollen into shuttle form and concealed in scales 1. *Hypodematium*
1b. Rhizomes long creeping; stipe articulate at base, glabrous 2. *Leucostegia*

1. HYPODEMATIUM Kunze, *Flora* 16: 690. 1833.

肿足蕨属 zhong zu jue shu

Zhang Gangmin (张钢民); Kunio Iwatsuki

Plants mostly rupestral (on rocks or walls), medium-sized or small. Rhizomes shortly creeping or ascending, stout, dictyostelic, densely covered with large scales; scales persistent, light brown, lustrous, ovate-lanceolate or rarely linear-lanceolate, margin entire or seldom denticulate, apex acuminate. Fronds approximate or subclustered; stipe stramineous, base swollen into shuttle form and concealed in scales, with 2 vascular bundles, upward usually glabrous, pubescent, or glandular; lamina ovate-oblong to pentagonal-ovate, truncate at base, 3-pinnate to finely 4-pinnate-pinnatifid, anadromous, basal pinnae largest, upper ones gradually reduced, herbaceous or papery, both surfaces, rachises, and costules frequently covered with acicular and/or glandular hairs, rarely glabrous. Veins free, pinnate, branches simple or forked, ending at margin. Sori orbicular, located at middle of veinlets; indusia persistent, large, reniform or horseshoe-shaped, membranous, ± covered with acicular or glandular hairs, rarely glabrous. Spores ellipsoid, bearing prominent, inflated folds with papillate elements. $x = 41, 40$.

About 16 species: mainly in subtropical and warm-temperate regions of Asia and Africa; 12 species (eight endemic) in China.

- 1a. Fronds ± covered with rod-shaped, glandular hairs abaxially.
2a. Rachis and costae with grayish white soft hairs mixed together with glandular hairs.
3a. Plants up to 85 cm tall; fronds 5-pinnatifid; stipes glabrous; indusia large, covered with long soft hairs 8. *H. daochengense*
3b. Plants up to 56 cm tall; fronds 4-pinnatifid; stipes and indusia covered with short hairs and golden glandular hairs 9. *H. glanduloso-pilosum*
2b. Fronds only covered with rod-shaped, glandular hairs abaxially, without grayish white soft hairs.
4a. Fronds thickly papery; stipes usually shorter than fronds; sori usually confluent when mature; indusia light brown, glabrous or with 1 or 2 glandular hairs 12. *H. glandulosum*
4b. Fronds thin, herbaceous; stipes usually longer than fronds; sori separate from each other when mature; indusia grayish white, sparsely glandular hairy.
5a. Stipes glabrous; second and upper pairs of pinnae oblong-lanceolate, apex acuminate, base rounded-cuneate 10. *H. sinense*

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- 5b. Stipes sparsely glandular hairy; second and upper pairs of pinnae oblong, apex obtuse or acute, base cordate 11. *H. fordii*
- 1b. Fronds not covered with rod-shaped, glandular hairs abaxially.
- 6a. Fronds and indusia glabrous 7. *H. glabrum*
- 6b. Fronds and indusia ± covered with hairs.
- 7a. Indusia densely covered with grayish white acicular hairs.
- 8a. Stipe and rachis densely covered with hairs 1. *H. crenatum*
- 8b. Stipes except base glabrous.
- 9a. Pinnule lobes acute, apex without teeth; lamina without reddish brown and lanceolate scales abaxially 2. *H. villosum*
- 9b. Pinnule lobes oblong, apex with 2–4 teeth; lamina with reddish brown and lanceolate scales abaxially 3. *H. hirsutum*
- 7b. Indusia sparsely shortly hairy.
- 10a. Plants up to 60 cm tall; stipes except base glabrous; indusia reddish brown 4. *H. taiwanense*
- 10b. Plants 20–40 cm tall; stipes covered with grayish white hairs; indusia pale gray.
- 11a. Rachis and costae densely covered with short hairs 5. *H. gracile*
- 11b. Rachis and costae densely covered with hairs and sparsely mixed with reddish brown, linear-lanceolate scales 6. *H. squamuloso-pilosum*

1. *Hypodematium crenatum* (Forsskål) Kuhn & Decken in Kersten, Reisen. Ost-Afr. 3(3): 37. 1879.

肿足蕨 *zhong zu jue*

Polypodium crenatum Forsskål, Fl. Aegypt.-Arab. 185. 1775; *Aspidium crenatum* (Forsskål) Kuhn (1868), not Sommerfelt (1834), nor Mettenius (1856); *Dryopteris crenata* (Forsskål) Kuntze; *Hypodematium onustum* Kunze; *H. pilosum* Ching; *Nephrodium crenatum* Baker (1877), not Stokes (1812), nor Desvaux (1827), nor Keyserling (1873).

Plants (12–)20–50(–60) cm tall. Rhizomes creeping, ca. 3 cm in diam., densely scaly together with stipe base; scales reddish brown, narrowly lanceolate to oblong-lanceolate, 0.5–3 cm, membranous, margin entire, apex acuminate. Fronds approximate; stipe stramineous, (5–)10–25(–30) cm × 1–3 mm, swollen base covered with scales, upward with grayish white hairs; lamina pentagonal-ovate, 20–30 × 18–30 cm, 3-pinnate-pinnatifid, herbaceous, densely covered with long hairs on both surfaces, rachis, costae, and costules, base truncate or cordate, apex acuminate; pinnae 8–12 pairs, slightly oblique, lower 1 or 2 pairs subopposite, upper pairs alternate; basal pinnae largest, deltoid-oblong, (3.5–)10–20 × (3–)5–10 cm, 2-pinnate-pinnatifid; upper pairs of pinnae gradually reduced and confluent; pinnules 6–10 pairs, anadromous, alternate, acroscopic ones smaller, proximal basiscopic pair largest, ovate-triangular, (1.5–)3–7 × (1–)2–5 cm, shortly stalked, base cuneate, margin pinnate-pinnatifid, apex acuminate; ultimate segments oblong, margin entire or undulate, apex obtuse. Veins obvious on both surfaces, pinnate, simple, ending at margin. Sori dorsal, 1–3 per segment, at middle of veinlets, orbicular; indusia persistent, pale gray, reniform, large, membranous, densely covered with hairs. Spores ellipsoid, bearing prominent, inflated folds. $2n = 82$.

Crevices of limestone rocks in xeric areas, on brick walls; sea level to 1800 m. Anhui, Beijing, E Gansu, Guangdong, Guangxi, Guizhou, Henan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [N India, Japan, Malaysia, Myanmar, Philippines; Africa, SW and subtropical regions of Asia].

2. *Hypodematium villosum* F. G. Wang & F. W. Xing, Bot. Stud. 51: 100. 2010.

毛叶肿足蕨 *mao ye zhong zu jue*

Plants slender, 50–65 cm tall. Rhizomes shortly creeping, scaly; scales reddish brown, narrowly lanceolate, 0.6–1 cm, ca. 1 mm broad near base, membranous. Fronds approximate; stipe stramineous, 25–30 cm, ca. 1 mm in diam., with scales similar to those on rhizome, glabrous upward; lamina ovate-pentagonal, 25–30 × 35–40 cm, papery, greenish when dry, densely covered with gray long acicular hairs ca. 1 mm, especially on rachis and costa, quadripinnate, tripinnate upward, apex acuminate and pinnatifid; pinnae 12–15 pairs, basal two pairs subopposite, alternate upward, oblique, first basiscopic pair enlarged, 5–6 cm apart from upper one, triangular-ovate, 16–20 × 6–8 cm, with stalk ca. 1.5 cm, tripinnate, apex acuminate; pinnules ca. 12 pairs, alternate, anadromous, oblique, closely spaced, basiscopic pinnule larger than acroscopic ones; secondary pinnules 8–10 pairs, alternate, first basal pairs opposite and enlarged, ca. 4 cm, base decurrent with narrow wing, margin pinnate; tertiary pinnules ca. 6 pairs, base decurrent, margin lobed to 1/2, apex acute, each lobe 3 or 4 pairs, margin densely covered with long acicular hairs, apex acute, entire. Veins prominent abaxially, veinlet simple, 1 or 2 on each lobe, ending in margin. Sori small, dorsal on middle of veinlet, 1 on each lobe; indusium grayish, orbicular-reniform, membranous, densely covered with long acicular hairs, persistent. Spores monolet.

• Rock tunnels on limestone mountain; below 100 m. Guangdong (Jiaoling).

3. *Hypodematium hirsutum* (D. Don) Ching, Indian Fern J. 1(1–2): 49. 1985.

光轴肿足蕨 *guang zhou zhong zu jue*

Nephrodium hirsutum D. Don, Prodr. Fl. Nepal. 6. 1825; *Aspidium eriocarpum* Wallich ex Mettenius; *Hypodematium eriocarpum* (Wallich ex Mettenius) Ching; *H. microlepioides* Ching ex K. H. Shing; *Lastrea eriocarpa* (Wallich ex Mettenius) C. Presl; *N. eriocarpum* (Wallich ex Mettenius) Decaisne.

Plants (23–)35–60(–80) cm tall. Rhizomes prostrate, densely scaly together with swollen stipe base; scales reddish brown, linear-lanceolate, 1–1.5 cm × 1–1.3 mm. Fronds approximate; stipe light brownish stramineous, lustrous, (7–)15–25(–40) cm × 1.5–3.5 mm, upward glabrous; lamina broadly ovate to pentagonal-ovate, (12–)17–45 cm, thinly herbaceous, both surfaces with sparse short, grayish white hairs, 4-pinnate at base, 3-pinnate or 3-pinnatifid upward, apex acuminate; costae and costules sometimes abaxially covered with reddish brown, linear-lanceolate scales; pinnae 8–12 pairs, slightly oblique, basal pair largest, deltoid-oblong, 9–25(–30) × 8–12(–20) cm, (0.5–)1–2 cm stalked, 3-pinnate, apex shortly acuminate; pinnules (7 or)8–20 pairs, anadromous, oblique, acroscopic ones smaller, proximal basicopic pair largest, triangular-lanceolate, (3–)6–12 × (2–)4–6 cm, shortly stalked, base cuneate, 2-pinnate, apex acuminate; ultimate pinnules (4 or)5–8 pairs, oblong, base cuneate and decurrent, connected to each other by narrow wings, 3–5-lobed, each lobe with 2–4 serratures at apex, apex obtuse. Veins obvious on both surfaces, pinnate, ending at margin. Sori orbicular, 1–3 per ultimate pinnule, at middle of veinlets; indusia grayish brown, reniform, large, densely covered with hairs. Spores ellipsoid, bearing inflated folds, with echinate ornaments.

Mountain slopes, limestone crevices within forests; 400–2000 m. SE Gansu (Kangxian, Wenxian), Guizhou (Hezhang), W Henan, Shaanxi (Ningshan), Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

4. *Hypodematium taiwanense* Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 318. 1999 [*"taiwanensis"*].

台湾肿足蕨 tai wan zhong zu jue

Plants 55–70 cm tall. Rhizomes prostrate, stout, densely scaly together with swollen stipe base; scales reddish brown, lustrous, linear-lanceolate, 1–2.5 cm, membranous, margin entire. Fronds subclustered; stipe stramineous, lustrous, 25–30 cm × ca. 2 mm, upward glabrous; lamina triangular-ovate, 30–40 cm, up to 30 cm wide at base, thinly herbaceous, densely covered with short hairs on both surfaces, rachis, costae, and costules, 4-pinnate at base, 3-pinnate upward, acuminate and pinnatifid at apex; pinnae ca. 12 pairs, spreading; lower 1 or 2 pairs opposite, separated from each other for ca. 8 cm, long stalked; upper pairs alternate or subopposite, 2–3 cm apart, shortly stalked; basal pair largest, narrowly triangular, ca. 20 cm, up to ca. 12 cm wide at base, base rounded, with ca. 1.5 cm stalk, 3-pinnate, apex acuminate; pinnules ca. 12 pairs, anadromous, alternate, spreading, acroscopic ones slightly smaller, proximal basicopic pair largest, oblong-deltoid, ca. 8 × 6 cm, shortly stalked, base subcordate, 2-pinnate, apex acuminate; ultimate pinnules 5–8 pairs, oblique, oblong, basal one 4–5 × ca. 2.5 mm, margin pinnate into oblong lobes or crenate. Veins obvious on both surfaces, pinnate, ending at margin. Sori small, orbicular, 2 or 3 pairs per ultimate pinnule, located at middle of veinlets; indusia reddish brown, orbicular or reniform, sparsely hairy or sometimes glabrous. Spores ellipsoid, bearing few inflated folds, glabrous.

• Taiwan.

Reviewer Ralf Knapp notes that *Hypodematium taiwanense* may

fall within the range of variation of *H. crenatum*, which is rather widespread in Taiwan, but further study is needed to ascertain whether or not the two taxa are distinct.

5. *Hypodematium gracile* Ching, Fl. Tsinling. 2: 220. 1974.

修株肿足蕨 xiu zhu zhong zu jue

Hypodematium laxum Ching ex He.

Plants 22–40 cm tall. Rhizomes creeping, slender, densely scaly together with swollen stipe base; scales reddish brown, lustrous, lanceolate, 5–15 × 1–3 mm, membranous. Fronds approximate; stipe 8–19 cm × 1–2 mm, glabrous or sometimes sparsely grayish white hairy; lamina triangular-ovate, 14–20 × 8–14 cm, herbaceous, abaxially densely covered with grayish white long hairs, adaxially glabrous or sparsely hairy along veins, 3-pinnate-pinnatifid at base, acuminate and pinnatifid at apex; costae and costules with same hairs as frond and mixed with short, golden glandular hairs; pinnae 8–12 pairs, oblique, basal pair largest, triangular-lanceolate, 7.5–14 × 3.5–6 cm, base truncate, with a 1–2 cm stalk, 2-pinnate-pinnatifid, apex shortly acuminate; pinnules ca. 10 pairs, anadromous, alternate, oblique, shortly stalked, acroscopic ones smaller, proximal basicopic pair largest, triangular-lanceolate, 3.5–4.5 × 1.2–2.5 cm, shortly stalked, base truncate, 1-pinnate-pinnatifid, apex obtuse; ultimate pinnules 6–8 pairs, oblong, 6–15 × 5–10 mm, base decurrent, pinnatifid; segments oblong, base broadly truncate, entire or with a few crenations, apex obtuse. Veins obvious on both surfaces, pinnate, ending at margin. Sori orbicular, 1–3 per segment, at middle of veinlets; indusia grayish brown, reniform, medium-sized, sparsely hairy. Spores ellipsoid, bearing inflated folds, with granular ornaments.

• Rock crevices in valleys; 300–1000 m. Anhui, Hebei, Henan, Hunan, Jiangxi, Shaanxi, Shandong, Zhejiang.

6. *Hypodematium squamuloso-pilosum* Ching, Fl. Jiangsu. 1: 465. 1977.

鳞毛肿足蕨 lin mao zhong zu jue

Hypodematium squamuloso-pilosum var. *ishingensis* Y. C. Lan.

Plants 12–30 cm tall. Rhizomes prostrate, densely scaly together with swollen stipe base; scales reddish brown, lustrous, narrowly lanceolate, 1–1.5 cm × 1–1.5 mm, membranous. Fronds approximate; stipe stramineous, 5–18 cm × ca. 1 mm, densely covered with grayish white hairs; lamina ovate-oblong, 7–15 × 6–12 cm, herbaceous, both surfaces densely hairy, base cordate, 3- or 4-pinnatifid, acuminate and pinnatifid at apex; rachis and costae densely covered with long hairs, sometimes mixed with glandular hairs and reddish brown, curly, linear scales; pinnae 8–12 pairs, slightly oblique, lower 2 pairs 2–3.5 cm apart, basal pair opposite and largest, oblong-lanceolate, 5–8 × 2.5–3.5 cm, 2- or 3-pinnatifid, base cordate, with a short stalk, apex shortly acuminate; pinnules 6–8 pairs, anadromous, alternate, oblique, shortly stalked, acroscopic ones smaller, proximal basicopic pair largest, oblong to ovate-oblong, 1.5–3 × 1–1.5 cm, base truncate, decurrent and forming narrow wings, 1- or 2-pinnatifid, apex obtuse; ultimate pinnules 5–8 pairs, alternate, slightly oblique, oblong, base cuneate and decurrent,

pinnatifid, apex obtuse; segments ovate, with 1 or 2 serratures at apex; second and upper pairs of pinnae gradually shorter, alternate, oblong-lanceolate, 2-pinnatifid. Veins obvious on both surfaces, pinnate, ending at margin. Sori orbicular, 1–3 per segment, located at middle of veinlets; indusia persistent, grayish brown, reniform, medium-sized, densely covered with hairs. Spores ellipsoid, bearing inflated, transparent folds.

- Limestone crevices within forests. Anhui, Fujian, Guizhou (Tongren), Hebei, Hubei, Hunan, S Jiangsu, Jiangxi, Shandong, Shanxi, Zhejiang.

7. *Hypodematium glabrum* Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 319. 1999.

无毛肿足蕨 *wu mao zhong zu jue*

Plants ca. 35 cm tall. Rhizomes short, densely scaly together with swollen stipe base; scales reddish brown, lustrous, lanceolate, ca. 1.5 cm × 1–1.5 mm, membranous. Fronds sub-clustered; stipe stramineous, 12–15 cm × 1.5–2 mm, glabrous; lamina pentagonal-ovate, ca. 20 × 15 cm, herbaceous, glabrous or sparsely hairy along rachis, costae, and veins adaxially, base cordate, 4-pinnate, apex acuminate and pinnatifid; pinnae ca. 8 pairs, slightly oblique, stalked, lower 1 or 2 pairs opposite, 4.5–5.5 cm apart, upper pairs alternate or subopposite; basal pair largest, triangular-lanceolate, ca. 11 × 7 cm, base sub-rounded, stalk ca. 1 cm, 3-pinnate, apex acuminate; pinnules ca. 10 pairs, anadromous, alternate, oblique, shortly stalked, acroscopic ones smaller, proximal basisopic pair largest, oblong, ca. 5 × 3 cm, base cordate, asymmetrical, 2-pinnate, apex acuminate; ultimate pinnules 4 or 5 pairs, basal one ca. 5 × 3 mm, shallowly pinnatifid or undulate; segments with 1 or 2 crenations at apex; second and upper pairs of pinnae gradually shorter, oblong-lanceolate, base cordate or broadly cuneate, apex acuminate. Veins obvious on both surfaces, pinnate, ending at margin. Sori small, orbicular, 1 per segment, located at middle of veinlets; indusia pale gray, reniform, medium-sized, glabrous.

- Limestone rock crevices on sunny slopes; ca. 1800 m. S Yunnan (Yuanmou).

Hypodematium glabrum is similar to *H. hirsutum* but is distinguished by its small stature and glabrous fronds.

8. *Hypodematium daochengense* K. H. Shing, Acta Phytotax. Sin. 31: 570. 1993.

稻城肿足蕨 *dao cheng zhong zu jue*

Plants up to 85 cm tall. Stipe stramineous, nearly as long as lamina, glabrous; lamina ± covered with rod-shaped, glandular hairs abaxially, 5-pinnatifid at base; pinnules closely connected, herbaceous, abaxially densely covered with glandular hairs, and mixed with grayish white hairs along rachis and costae, adaxially with sparse acicular hairs along rachis, costae, or veins. Indusia large, reniform, covered with long hairs.

- Rock crevices within forests; ca. 3100 m. S Sichuan (Daocheng).

Hypodematium daochengense is very similar to *H. glanduloso-pilosum*.

9. *Hypodematium glanduloso-pilosum* (Tagawa) Ohwi, Bull. Natl. Sci. Mus., Tokyo, n.s., 3: 98. 1956.

球腺肿足蕨 *qiu xian zhong zu jue*

Hypodematium fauriei (Kodama) Tagawa f. *glanduloso-pilosum* Tagawa, J. Jap. Bot. 27: 321. 1952.

Plants 12–56 cm tall. Rhizomes prostrate, densely scaly together with swollen stipe base; scales reddish brown, lanceolate, 1–1.5 cm × 1–3 mm, membranous, margin entire, apex acuminate. Fronds approximate; stipe brownish stramineous, 4–27 cm × 1–3 mm, densely covered with white, short hairs and golden, rod-shaped glands; lamina broadly ovate, 7–29 × 4–25 cm, herbaceous, both surfaces sparsely hairy, densely covered with hairs and rod-shaped glands along rachis, costae, and costules, sometimes mixed with reddish brown, linear-lanceolate scales, cordate and 4-pinnatifid at base, acuminate and pinnatifid at apex; pinnae 6–12 pairs, oblique, lower 1 or 2 pairs opposite, 1.5–5.5 cm apart, upper pairs alternate or subopposite; basal pinnae largest, ovate-oblong, 3–19 × 1.5–10 cm, 3-pinnatifid, base cordate, with a short stalk, apex shortly acuminate; ultimate pinnules 5–9 pairs, basal pairs largest, oblong, 5–20 × 2–10 mm, base cuneate and decurrent, pinnatifid, apex obtuse; segments oblong, entire or with a few crenations at base; second and upper pairs of pinnae gradually shorter, oblong-lanceolate, base subtruncate, 2-pinnatifid, apex shortly acuminate or acute. Veins obvious on both surfaces, oblique, ending at margin. Sori orbicular, 1–3 per segment, at middle of veinlets; indusia grayish brown or grayish white, reniform, densely covered with short hairs, usually mixed with a few glands.

- Limestone crevices. SW Fujian, S Henan, S Jiangsu [Japan, Korea, Thailand].

10. *Hypodematium sinense* K. Iwatsuki, Acta Phytotax. Geobot. 21: 54. 1964.

山东肿足蕨 *shan dong zhong zu jue*

Hypodematium cystopteroides Ching, Icon. Filic. Sin. 3: t. 123. 1935, not Kuhn (1889).

Plants 17–45 cm tall. Rhizomes creeping, slender, densely scaly together with swollen stipe base; scales reddish brown, lanceolate, 8–15 × 2–3 mm, margin entire or sometimes crenulate, apex acuminate. Fronds approximate; stipe stramineous, 10–25 cm × ca. 1.3 mm, thin, glabrous; lamina ovate-pentagonal, 7–10 × 6–18 cm, herbaceous, both surfaces with sparse, golden, rod-shaped, glandular hairs, glandular hairs much more dense along rachis, costae, and veins, lamina cordate and 4-pinnatifid at base, acuminate and pinnatifid at apex; pinnae ca. 8 pairs, oblique, lower 1 or 2 pairs opposite, 3–4 cm apart, upper pairs alternate; basal pair largest, ovate-triangular, up to 10 cm, up to 6 cm wide at base, base broadly cuneate, with a 7–15 mm stalk, 3-pinnatifid, apex acuminate; ultimate pinnules ca. 7 pairs, subopposite, anadromous, oblique, oblong-lanceolate; proximal basisopic one largest, 1–1.5 cm × 4–6 mm, base cuneate and decurrent, pinnatifid, apex shortly acuminate; segments 4–6 pairs, oblong, entire or with 1 or 2 crenations at margins; second and upper pairs of pinnae gradually shorter, oblong-lanceolate, base rounded-cuneate, apex acuminate. Veins obvious on both surfaces, oblique, ending at margin. Sori orbicular, 1 per segment, at middle of veinlets; indusia persistent, grayish white, reniform, medium-sized or small, with sparse

glandular hairs. Spores ellipsoid, bearing inflated folds, with granular ornaments.

- Limestone crevices in shaded places. Shandong.

11. *Hypodematium fordii* (Baker) Ching, Icon. Filic. Sin. 3: t. 122. 1935; Sunyatsenia 3(1): 12. 1935.

福氏肿足蕨 fu shi zhong zu jue

Nephrodium fordii Baker, J. Bot. 27: 177. 1889; *Hypodematium humile* F. G. Wang & F. W. Xing.

Plants (8–)35–50 cm tall. Rhizomes prostrate, densely scaly together with swollen stipe base; scales reddish brown, lustrous, narrowly lanceolate, (0.9–)1–1.5 cm × 1–2 mm, membranous. Fronds approximate; stipe stramineous, (4–)15–20 cm × ca. 1.5 mm, thin, upward with sparse golden, rod-shaped, short glandular hairs; lamina ovate-pentagonal, (4.5–)15–20 × (5–)12–18 cm, herbaceous, both surfaces with sparse golden glandular hairs, densely covered on rachis, costae, and costules with glands, broadly cordate and 4-pinnate at base, acuminate and pinnatifid at apex; pinnae (6 or)7 or 8 pairs, subopposite, oblique; basal pair largest, triangular-ovate, 8–13 × 6–9 cm, base subcordate, with a 1–2 cm stalk, 3-pinnate, 4–5.5 cm apart from second pinnae, apex acuminate; ultimate pinnules ca. 15 pairs, nearly connected, oblong, cuneate and decurrent at base, pinnatifid, apex obtuse; segments 3 or 4 pairs, oblong, margin entire or with 1 or 2 crenations; second and upper pairs of pinnae gradually shorter, oblong, base cordate, apex obtuse or acute. Veins obvious on both surfaces, ending at margin. Sori 1 or 2 per segment, orbicular, small, at middle of veinlets; indusia grayish white, reniform, small, with sparse glandular hairs es-

pecially along margins. Spores ellipsoid, bearing inflated folds.

Limestone crevices; below 900 m. Anhui, Fujian, Guangdong, Guizhou (Guiyang), Jiangxi [Japan].

12. *Hypodematium glandulosum* Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 319. 1999.

腺毛肿足蕨 xian mao zhong zu jue

Plants 12–20 cm tall. Rhizomes prostrate, short, stout, densely scaly together with swollen stipe base; scales reddish brown, lustrous, narrowly lanceolate, ca. 1 cm × 1 mm, thin membranous. Fronds approximate; stipe dark stramineous, 4.5–8 cm × 1–1.5 mm, glabrous below middle, upward covered with short, golden, and glandular hairs; lamina ovate, 7.5–13 × 8–10 cm, thickly papery, densely covered with golden glandular hairs on both surfaces especially along rachis, costae, and costules, 3-pinnate-pinnatifid at base, shortly acuminate and pinnatifid at apex; pinnae ca. 8 pairs, slightly oblique; basal pair largest, ovate-triangular, 4–7 × 2.8–4 cm, base truncate, with a 0.5–1 cm stalk, 2-pinnate-pinnatifid, ca. 2 cm apart from second pinnae, apex shortly acuminate; ultimate pinnules ca. 5 pairs, spreading, ovate-triangular, base cuneate and decurrent, pinnatifid, apex obtuse; segments 3 or 4 pairs, oblong, asymmetrical; second and upper pairs of pinnae gradually shorter, ovate-oblong. Veins obvious on both surfaces, ending at margin. Sori large, orbicular, 1–3 per segment, nearly confluent when mature; indusia light brown, reniform, small, seldom with 1 or 2 glandular hairs, ± submerged in sori. Spores ellipsoid, bearing inflated folds.

- Rock crevices on slopes; 300–1200 m. N Guizhou (Zunyi), Hunan.

2. LEUCOSTEGIA C. Presl, Tent. Pterid. 94. 1836.

大膜盖蕨属 da mo gai jue shu

Xing Fuwu (邢福武), Wang Faguo (王发国); Hans P. Nooteboom

Rhizome bearing scales and hairs or only scales; roots borne on all sides of rhizome. Scales glabrous or with multiseptate hairs, basifixed, base not cordate. Stipe articulate at base to phyllopodia, grooved or not, glabrous; lamina compound, tripinnate or quadri-pinnate (rarely in small plants bipinnate) toward base and in middle part, deltoid and broadest toward base, glabrous (sometimes minute hairs present), not or slightly dimorphic (often fertile fronds more strongly dissected); pinnae deltoid or narrowly triangular; pinnules of at least larger pinnae anadromous; pinnules or pinna lobes narrowly ovate. Leaf axes glabrous (sometimes a few minute hairs present). Veins in ultimate lobes simple, not reaching margin; false veins not present. Sori indusiate, frequently single on a segment, terminal on veins; indusium scalelike, either attached at narrow, cordate base only, or attached at base and only part of sides, very long stalked, 3-seriate; annulus longitudinal, consisting of ca. 16 thickened cells. Spores elliptic, monoletic, closely tuberculate, translucent. $x = 41$.

Two species: S and SE Asia to Pacific islands; one species in China.

1. *Leucostegia immersa* C. Presl, Tent. Pterid. 95. 1836.

大膜盖蕨 da mo gai jue

Acrophorus immersus (C. Presl) T. Moore; *Davallia immersa* Wallich ex Hooker; *Humata dryopteridifrons* Hayata; *H. immersa* (C. Presl) Mettenius.

Rhizome robust, long creeping, 3.5–5 mm in diam., densely covered with scales and yellowish brown hairs. Scales brown, lanceolate or ovate-lanceolate, ca. 3 mm, membranous,

margin subentire, apex long acuminate. Fronds remote, 2–5 cm apart; stipe stramineous, 25–35 cm; lamina slightly green when dry, deltoid, 25–35 cm, nearly as wide, anadromous, papery, glabrous, tripinnate, apex acuminate; pinnae 10–12 pairs, basal pair subopposite, 4–6 cm apart, narrowly triangular and broadest toward base, with stalk 5–20 mm, base broadly cuneate, largest pinnae ovate-lanceolate, 12–22 × 6.5–12 cm, apex acuminate; pinnules 8–10 pairs, shortly stalked, alternate, ovate to elliptic, deflexed, basal pinnule 5–8 cm, base asymmetrical; ultimate leaflets rhombic, only shallowly lobed; ultimate segments

(lobes) 3–4 mm wide, margin serrate; veins distinct, forking, in ultimate lobes simple, ending in submarginal orbicular hydathodes. Sori separate, 1 or 2 per segment, terminal on acroscopic veinlet; indusium attached by base only, oval or elliptic, 1–1.5 × 1–2 mm, thinly papery.

Epiphytic and terrestrial on shaded hillsides; 1000–2800 m.

Guangxi, Taiwan, Xizang, Yunnan [Bhutan, Cambodia, India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Thailand; Pacific islands (Polynesia)].

“Davallia dryopteridifrons” (Hayata, Icon. Pl. Formosan. 6: 159. 1916) is a nomen nudum and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)).