

MENYANTHACEAE

睡菜科 shui cai ke

Ho Ting-nung¹; Robert Ornduff²

Herbs perennial [or annual], aquatic or nearly so. Leaves alternate, rarely opposite, simple or 3-foliolate; stipules absent. Flowers (4- or) 5-merous. Calyx lobes free or united. Corolla lobes united, valvate in bud. Stamens 5, free, alternate with petals. Ovary 1-celled. Pollen grains bilaterally compressed, ± triquetrous, with 3 apertures. Ovary superior, 1-celled. Fruit a dehiscent or indehiscent capsule. Seeds few to many, sometimes winged; endosperm abundant.

Five genera and about 60 species: worldwide in temperate and tropics; two genera and seven species in China.

On the basis of differences in anatomy, chemistry, and palynology, recent phylogenetic accounts treat the Menyanthaceae as a separate family from Gentianaceae. Recent molecular evidence (Olmstead *et al.* Ann. Missouri Bot. Gard. 79: 249–265. 1992; Downie & Palmer 79: 266–283. 1992) also supports this conclusion. The Menyanthaceae have been placed in the Gentianales (Takhtajan, Flowering Pl. 230. 1969), Solanales (Cronquist, Evol. Class. Flowering Pl., ed. 2, 420–425. 1988), or Campanulales (Thorne, Aliso 13: 365–389. 1992).

Ho Ting-nung. 1988. Gentianaceae [Menyanthoideae]. Fl. Reipubl. Popularis Sin. 62: 411–418.

- 1a. Leaves 3-foliolate, emergent from water; flowers in racemes; capsules dehiscent 1. *Menyanthes*
1b. Leaves entire, floating on water surface; flowers in sessile clusters; capsules indehiscent 2. *Nymphoides*

1. MENYANTHES Linnaeus, Sp. Pl. 1: 145. 1753.

睡菜属 shui cai shu

Perennials, aquatic or nearly so. Rhizomes long, prostrate, nodes with rootlets and scalelike leaves. Leaves basal except for those at rhizome nodes, emergent from water; petiole base sheathing stem; leaf blade 3-foliolate. Inflorescences scapose, many-flowered racemes produced from stem nodes. Flowers 5-merous, distylous. Calyx lobed almost to base. Corolla lobed to just below middle. Stamens inserted at middle of corolla tube. Style linear. Capsules 2-valved. Seeds smooth.

One species: N temperate regions including China.

1. *Menyanthes trifoliata* Linnaeus, Sp. Pl. 1: 145. 1753.

睡菜 shi cai

Rhizomes usually in mud but sometimes floating. Petiole erect, 12–20(–30) cm; leaf blade base vaginate; leaflets elliptic, 2.5–4(–8) cm, base cuneate, margin entire or crenulate, apex obtuse, midvein distinct. Inflorescences many flowered; racemes including scape 30–35 cm; bracts 5–7 mm, margin entire, apex obtuse. Pedicel spreading, 1–1.8 cm. Calyx 4–5 mm; lobes ovate, apex obtuse. Corolla white, tubular, 1.4–1.7 cm,

outside glabrous, inside long fimbriate pilose; lobes elliptic-lanceolate, 7.5–10 mm, apex obtuse. Filaments linear, 5.5–6.5 mm; anthers sagittate, 1.8–2 mm. Styles linear, short styles 6–7 mm, long styles 1–1.2 cm; stigma lobes oblong. Capsules globose, 6–7 mm in diam. Seeds orbicular, 2–2.5 mm in diam., smooth. Fl. and fr. May–Jul.

Swamps, growing in mud and in open water; 400–3600 m. Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Sichuan, Xizang, Yunnan, NE Zhejiang [Japan, Kashmir, Mongolia, Nepal, Russia; N Africa, N America, C and SW Asia, Europe].

2. NYMPHOIDES Séguier, Pl. Veron. 3: 121. 1754.

荇菜属 xing cai shu

Limnanthemum S. G. Gmelin.

Perennials [or annuals], aquatic, usually carpeting surface of lakes and ponds, with short basal rhizomes producing many, slender, and petiolelike stolons [or lacking rhizomes]. Stems usually long, floating, sometimes producing rootlets from nodes. Leaves alternate, rarely apparently opposite; leaf blade floating, veins palmate. Flowers clustered at nodes, (4- or) 5-merous, distylous or occasionally homostylous. Calyx lobed to near base. Corolla rotate, lobed to near base, rarely less deeply lobed and campanulate, throat with 5 bundles of long fimbriae. Stamens inserted on corolla tube. Style linear. Nectaries 5, attached at ovary base. Capsules indehiscent, few seeded. Seeds compressed or globose, smooth or ornamented.

About 40 species: temperate and tropics; six species in China.

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- 1a. Stem unbranched; leaves apparently opposite at stem apex, alternate at stem node; corolla, 2.5–3 cm in diam., lobe margins broadly membranous; capsules 1.7–2.5 cm; seeds compressed, 4–5 mm, densely ciliate 1. *N. peltata*
- 1b. Stem branched; leaves solitary at stem apex, sometimes also 1–3 leaves at stem nodes; corolla 0.5–1.5 cm in diam., lobe margins not membranous; capsules 0.2–0.6 cm; seeds not compressed, 1–1.5 mm, not ciliate.
- 2a. Flowers 2 per node; corolla yellow; seed coat reticulate 2. *N. aurantiaca*
- 2b. Flowers many per node; corolla white or white with a yellow center; seed coat smooth, scabrous, or spinescent.
- 3a. Leaves densely glandular and abaxially scabrous; corolla white with a yellow center.
- 4a. Corolla lobes densely long pilose inside, without a longitudinal fold 3. *N. indica*
- 4b. Corolla lobes glabrous inside, with a longitudinal fold 4. *N. cristata*
- 3b. Leaves glabrous on both surfaces; corolla pure white.
- 5a. Corolla campanulate, lobes shorter than tube; seed coat irregularly short spinescent 5. *N. hydrophylla*
- 5b. Corolla rotate, lobes longer than tube; seed coat smooth or with a denticulate margin 6. *N. coreana*

1. *Nymphoides peltata* (S. G. Gmelin) Kuntze, Revis. Gen. Pl. 2: 429. 1891.

荇菜 xing cai

Limnanthemum peltatum S. G. Gmelin, Novi Comment. Acad. Sci. Imp. Petrop. 14(1): 527. 1770; *Menyanthes nymphoides* Linnaeus.

Rhizomes horizontal. Stem cylindric, unbranched, sometimes producing rootlets from nodes. Leaves alternate at stem base but opposite at apex; petiole cylindric, 5–10 cm, base widened into an amplexicaul sheath; leaf blade ovate-orbicular to orbicular, 1.5–8 cm in diam., subcoriaceous, abaxially purple-brown and densely glandular, adaxially glabrous, base cordate, margin entire, veins indistinct. Flowers usually densely clustered at nodes, 5-merous, distylous. Pedicel 3–7 cm. Calyx 7–9 mm, lobed to near base; lobes elliptic-lanceolate to elliptic, apex obtuse. Corolla golden yellow, 2.5–3 cm, rotate, lobed to near base; lobes obovate, margin broadly membranous and irregularly lacinate, apex rounded to emarginate. Filaments sparsely pilose. Short styled flowers: ovary 5–7 mm; style 1–2 mm; stigma small, filaments 3–4 mm; anthers curved, sagittate, 4–6 mm. Long styled flowers: ovary 0.7–1.7 cm; style to 1 cm; stigma large, 2-lobed, suborbicular; filaments 1–2 mm; anthers 2–3.5 mm. Glands golden yellow. Capsules elliptic, 1.7–2.5 × 0.8–1.1 cm. Seeds brown, compressed, elliptic, 4–5 mm, densely ciliate. Fl. and fr. Apr–Oct. $2n = 54$.

Standing water; below 100–1800 m. Essentially throughout China except Hainan, Qinghai, and Xizang [Japan, Korea, Mongolia, Russia; C and SW Asia, Europe].

Limnanthemum cordatum Dunn, described from a specimen collected in NE Guangdong, is probably synonymous with *Nymphoides peltata*.

2. *Nymphoides aurantiaca* (Dalzell) Kuntze, Revis. Gen. Pl. 2: 429. 1891.

水金莲花 shui jin lian hua

Limnanthemum aurantiacum Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 136. 1850.

Rhizomes horizontal. Stems cylindric, elongated, without rootlets from nodes, branched. Leaves 2 per node; petiole 3–9 cm; leaf blade orbicular, ca. 4.5 cm in diam., abaxially purple and punctate, base cordate. Flowers 2 per node, 5-merous. Pedicel 1.5–4.5 cm. Calyx lobes 3–6 mm. Corolla yellow, 8–10

mm; lobes cuneate, margin lacinate, apex rounded to emarginate. Capsules globose, ca. 6 mm in diam., 10–15-seeded. Seeds globose, ca. 1.5 mm in diam.; seed coat reticulate.

Standing water. Taiwan [W India, Sri Lanka].

3. *Nymphoides indica* (Linnaeus) Kuntze, Revis. Gen. Pl. 2: 429. 1891.

金银莲花 jin yin lian hua

Menyanthes indica Linnaeus, Sp. Pl. 1: 145. 1753; *Limnanthemum esquirolii* H. Léveillé; *Nymphoides humboldtiana* Kuntze.

Rhizomes horizontal. Stems cylindric, unbranched. Petiole cylindric, 1–2 cm; leaf blade broadly ovate to subcordate, 3–18 cm, subcoriaceous, abaxially densely glandular, base cordate, margin entire; veins indistinct, palmate. Flowers many, clustered at nodes, 5-merous, distylous. Pedicel cylindric, 3–5 cm. Calyx 3–6 mm, lobed to near base; lobes lanceolate to narrowly elliptic, apex obtuse. Corolla white with a yellow center, 7–12 mm; lobes ovate-elliptic, outside densely fimbriate-pilose, apex obtuse. Filaments flattened, linear, 1.5–1.7 mm; anthers sagittate, 2–2.2 mm. Style cylindric; stigma lobes triangular. Capsules elliptic, 3–5 mm, few seeded. Seeds brown, globose, 1.2–1.5 mm; seed coat smooth. Fl. and fr. Aug–Oct. $2n = 18$ [or 36].

Standing water; below 100–1600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Heilongjiang, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, Sri Lanka, Vietnam; Australia, Pacific Islands].

4. *Nymphoides cristata* (Roxburgh) Kuntze, Revis. Gen. Pl. 2: 429. 1891.

水皮莲 shui pi lian

Menyanthes cristata Roxburgh, Pl. Coromandel 2: 3. 1798.

Rhizomes horizontal. Stems cylindric, unbranched, with a terminal leaf. Petiole cylindric, 1–3 cm; leaf blade ovate-orbicular to suborbicular, 3–10 cm, subcoriaceous, abaxially densely glandular, base cordate, margin entire, veins indistinct. Flowers many, grouped on nodes, 5-merous. Pedicel cylindric, 3–4.5 cm. Calyx 3–5.5 mm, lobed to near base; lobes ovate-elliptic to ovate, apex obtuse. Corolla white with a yellow center, 4–8 mm; lobes ovate with a keeled fold from base

to apex, apex obtuse. Filaments linear, 1–2 mm; anthers 0.8–1 mm. Style short; stigma lobes triangular. Capsules subglobose, 3–5 mm in diam., few seeded. Seeds light brown, globose, 1.3–1.5 mm in diam.; seed coat smooth or scabrous. Fl. and fr. Sep. $2n = 18$.

Standing water. Fujian, Guangdong, Hainan, Hubei, Hunan, Jiangsu, Sichuan, Taiwan [E India].

5. *Nymphoides hydrophylla* (Loureiro) Kuntze, Revis. Gen. Pl. 2: 429. 1891.

刺种荇菜 ci zhong xing cai

Menyanthes hydrophylla Loureiro, Fl. Cochinch. 1: 105. 1790.

Stems 10–30 cm, rooting from nodes. Leaves few per node; petiole 4–10 cm, slender; leaf blade cordate, 1–6 × 1–4(–5) cm, submembranous, veins indistinct. Flowers 2–10 per node, 5-merous, homostylous. Pedicel 2–6 cm, slender. Calyx 4–5 mm, lobed to near base; lobes narrowly oblong, apex acute. Corolla white, campanulate, 7–8 mm, lobed to middle, tube 4–5 mm; lobes 3–4 mm, margin lacinate, apex emarginate. Filaments absent; anthers triangular, ca. 1 mm.

Style very short. Capsules globose, ca. 3 mm in diam., 6–10-seeded. Seeds brown, globose, ca. 1 mm in diam.; seed coat spinescent. Fl. and fr. Aug–Sep.

Standing water. Guangdong, Guangxi, Hainan [India, Laos, Thailand, Vietnam].

6. *Nymphoides coreana* (H. Léveillé) H. Hara, J. Jap. Bot. 13: 26. 1937.

小荇菜 xiao xing cai

Limnanthemum coreanum H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 284. 1910.

Stems long, cylindric, rooting from nodes, unbranched. Petiole cylindric, 1–10 cm, articulated, base decurrent; leaf blade ovate-cordate to orbicular, 2–6 cm in diam., base cordate, margin entire. Flowers few to many, 4- or 5-merous. Pedicel cylindric, 1–3 cm. Calyx lobes broadly lanceolate, apex acute. Corolla white, rotate, ca. 8 mm; lobes membranous, margin lacinate. Capsules elliptic, 4–5 mm, persistent style less than 1 mm. Seeds elliptic, ca. 1 mm; seed coat smooth or with a sparsely denticulate margin. $2n = 56$.

Standing water. Liaoning, Taiwan [Japan, Korea, E Russia].