CALYCANTHACEAE

蜡梅科 la mei ke

Li Bingtao (李秉滔 Li Ping-tao)[1]; Bruce Bartholomew[2]

Shrubs or small trees, deciduous or evergreen. Branchlets dichotomous, quadrangular to subterete, with oil cells; buds covered with scales or naked and hidden [or not hidden] by base of petiole. Stipules absent. Leaves opposite, simple, petiolate; leaf blade pinnately veined, margin entire or subentire. Flowers bisexual, axillary or terminal on branchlets, usually solitary, radially symmetric, usually fragrant, generally appearing before leaves for deciduous taxa, undifferentiated into calyx and corolla but sometimes tepals of more than one form. Pedicel short. Tepals 15–27[–30], yellow, yellowish white, or white flushed pink [or brownish red], spirally arranged on outer surface of a cup-shaped or urceolate receptacle, shape variable, outer usually bractlike, inner petaloid. Stamens numerous, spirally inserted on apical surface of receptacle, in 2 series, outer series fertile, inner series aborted; fertile stamens spirally arranged; filaments short and free; anthers 2-locular, incumbent against connective, extrorse, dehiscing lengthwise by slits; connective exserted, apex apiculate; staminodes linear, linear-lanceolate, or oblong, pubescent or puberulous. Carpels few to numerous, distinct, spirally arranged on basal inner surfaces of hollow cuplike receptacle, 1-loculed; ovules 2 per carpel but usually 1 abortive, anatropous; styles filamentous and extended. Pseudocarp polygynaecial, fleshy when young but becoming dry and sometimes woody, composed of achenes contained within an expanded torus, apex with appendages from persistent staminodes. Achenes 1-seeded; endosperm little or absent; embryo large; cotyledons convolute, foliose.

Two genera and nine species: E Asia and North America; two genera (one endemic) and seven species (all endemic) in China.

Sometimes the monotypic genus *Idiospermum* Blake, endemic to Queensland, Australia, is included in Calycanthaceae (see S. L. Zhou et al., Molec. Phylogenetic. Evol. 39: 1–15. 2006).

Li Ping-t'ao. 1979. Calycanthaceae. *In:* Tsiang Ying & Li Ping-t'ao, eds., Fl. Reipubl. Popularis Sin. 30(2): 1–10.

1a. Vegetative buds with imbricate scales; flowers axillary, subsessile or very shortly pedicellate; tepals varying in size and shape from outer to inner but not distinctly dimorphic; fertile stamens 5–8 ..... 1. *Chimonanthus*
1b. Vegetative buds naked, hidden by base of petiole; flowers terminal, long pedicellate; tepals distinctly dimorphic in size and shape; fertile stamens 16–19 ..... 2. *Calycanthus*

1. CHIMONANTHUS Lindley, Bot. Reg. 5: t. 404. 1819, nom. cons.

蜡梅属 la mei shu

Butneria Duhamel (1755), not *Byttneria* Loefling (1758), nom. cons.; *Meratia* Loiseleur-Deslongchamps.

Shrubs or small trees, erect, deciduous or evergreen. Branchlets dichotomous, quadrangular to subterete; winter buds with imbricate scales but exposed in summer. Leaf blade papery or subleathery, adaxially scabrous or ± smooth. Flowers axillary, fragrant, subsessile to very shortly pedicellate. Tepals numerous, yellow, yellowish white, or white and sometimes with purple markings, membranous, varying in size and shape from outer to inner but not distinctly dimorphic. Stamens 5–8, arranged on cuplike receptacle; filaments filamentous but basally broad and connate, usually puberulent; staminodes few to numerous, puberulous, arranged inside stamens on receptacle. Carpels 5–15, distinct; ovules 2 per carpel but 1 ovule usually abortive. Pseudocarp urceolate, ovoid-ellipsoid, obovoid-ellipsoid, or campanulate, pubescent. Achenes oblong, oblong-ellipsoid, ellipsoid, oblong-ovoid, or reniform.

● Six species: China.

It is estimated that the Chinese species diverged from each other perhaps as recently as 1–2 million years ago, and the presently available molecular evidence distinguishes all six species but groups *Chimonanthus campanulatus* and *C. praecox* separately (with a bootstrap support of 100) from the other four species (S. L. Zhou et al., Molec. Phylogenetic. Evol. 39: 1–15. 2006). However, the molecular evidence is based on a limited number of samples, mostly from botanical gardens. It is difficult to morphologically circumscribe differences to distinguish all six species. Because the molecular evidence does distinguish all six species, it seems best to treat all six in this account but to point out that additional research may well change this interpretation. It is the opinion of one co-author (Bartholomew) that perhaps there are really only two species, *C. praecox* and *C. nitens*, with the other named species being attributable to one or the other or introgressions between the two.

1a. Leaf blade adaxially scabrous.
2a. Leaf blade usually elliptic to broadly elliptic; tepals yellow and usually with purplish red pigment at base inside, shiny ..... 1. *C. praecox*
2b. Leaf blade usually linear-lanceolate to oblong-lanceolate; tepals yellow but without purplish red pigment at base inside, not shiny ..... 2. *C. salicifolius*
1b. Leaf blade adaxially not or only slightly scabrous.

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3a. Leaf blade abaxially glaucous; fruiting receptacles urceolate to ellipsoidal, usually constricted at apex ..... 3. *C. nitens*
3b. Leaf blade abaxially greenish, not glaucous; fruiting receptacles campanulate, not constricted or only slightly so at apex.
4a. Tepals 25–27; surface of fruiting receptacle with clearly prominent reticulations ..... 4. *C. grammatus*
4b. Tepals 16–24; surface of fruiting receptacle with obscurely prominent reticulations.
5a. Carpels 6–9; fruiting receptacles 2.5–3.5 × 1.4–1.8 cm ..... 5. *C. zhejiangensis*
5b. Carpels 3 or 4; fruiting receptacles 4–6 × 2.5–4 cm ..... 6. *C. campanulatus*

1. Chimonanthus praecox (Linnaeus) Link, Enum. Pl. Hort. Berol. 2: 66. 1822.

蜡梅 la mei

Calycanthus praecox Linnaeus, Sp. Pl., ed. 2, 1: 718. 1762; *Butneria praecox* (Linnaeus) C. K. Schneider; *Chimonanthus baokanensis* D. M. Chen & Z. I. Dai; *C. baokanensis* var. *yupiensis* D. M. Chen & Z. I. Dai; *C. caespitosus* T. B. Chao et al.; *C. fragrans* Lindley, nom. illeg. superfl.; *C. fragrans* var. *grandiflorus* Lindley; *C. parviflorus* Rafinesque; *C. praecox* var. *concolor* Makino; *C. praecox* var. *grandiflorus* (Lindley) Makino; *C. praecox* var. *intermedius* Makino; *C. praecox* var. *reflexus* B. Zhao; *C. yunnanensis* W. W. Smith; *Meratia fragrans* Loiseleur-Deslongchamps, nom. illeg. superfl.; *M. praecox* (Linnaeus) Rehder & E. H. Wilson; *M. yunnanensis* (W. W. Smith) S. Y. Hu.

Shrubs or small trees, 3–13 m tall, deciduous or sometimes with persistent leaves. Branchlets grayish brown, quadrangular when young but becoming subterete, glabrous or slightly puberulent, lenticellate; buds usually axillary on branches of previous year; bud scales subcircular, imbricate, outside pubescent. Petiole 0.3–1.8 cm, pubescent; leaf blade ovate, elliptic, broadly elliptic, ovate-elliptic, oblong-elliptic, or sometimes oblong-lanceolate, 5–29 × 2–12 cm, papery to subleathery, abaxially glabrous except for occasional scattered trichomes on veins, adaxially roughly scabrous, secondary veins 4–6 on each side of midvein, base cuneate to rounded, apex acute, acuminate, or sometimes caudate. Flowers on branches of previous year, solitary or paired, appearing generally before leaves, 1.5–4 cm in diam., sweetly fragrant. Pedicel 2–8 mm. Tepals 15–21, yellow but inner ones usually with purplish red pigment, 0.5–2 × 0.5–1.5 cm; outer tepals orbicular to obovate, puberulent, apex truncate or rounded; median tepals elliptic to oblong-elliptic, glabrous or sometimes margin ciliate, apex rounded to acute; inner tepals orbicular to oblong, glabrous or sometimes margin ciliate, base distinctly clawed, apex rounded. Stamens 5–8, 2.5–4 mm; filaments broad, longer, equal, or rarely shorter than anthers, basally pubescent or glabrous; anthers glabrous; connective puberulous or glabrous, apex acute; staminodes 2–15, subulate to linear-lanceolate, 2–3 mm, pubescent. Carpels 5–15, hirtellous at base; style ca. 3 × as long as ovary, pubescent at base. Pseudocarp urceolate, ovoid-ellipsoid, or obovoid-ellipsoid, 2–6 × 1–2.5 cm, subwoody, apex constricted, apical appendages 9 or 10, tapered lanceolate, with trichomes. Achenes 3–11, brown, ellipsoid to reniform, 15–16.5 × 5–5.6 mm, pubescent at base. Fl. Oct–Mar, fr. Apr–Nov. 2*n* = 22*.

● Montane forests; 500–1100 m. Anhui, Fujian, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang.

This species is cultivated throughout most of China as well as in other temperate areas of the world as a decorative plant, particularly for its sweetly fragrant flowers. The leaves, roots, flowers, and seeds are used medicinally.

Because of its extensive and long cultivation in China, some of the reported distribution is uncertain as to it actually being native.

2. Chimonanthus salicifolius S. Y. Hu, J. Arnold Arbor. 35: 197. 1954.

柳叶蜡梅 liu ye la mei

Chimonanthus nitens Oliver var. *salicifolius* (S. Y. Hu) H. D. Zhang; *C. praecox* (Linnaeus) Link var. *pilosus* L. Q. Chen.

Shrubs, semi-evergreen. Branchlets quadrangular when young but becoming subterete, hirsute. Petiole 3–6 mm, puberulent; leaf blade oblong-elliptic, linear-lanceolate, or oblong-lanceolate, 6–13 × 2–2.8 cm, subleathery, base cuneate, apex obtuse to acuminate, both surfaces scabrous, abaxially hispidulous on veins and margin, adaxially light grayish green and with inconspicuous pubescence. Flowers solitary or rarely paired, small. Pedicel short. Tepals 15–17, yellowish; outer tepals elliptic, pubescent outside and on margin; median tepals linear, puberulous; inner tepals lanceolate, base clawed. Stamens 4 or 5. Carpels 6–8. Pseudocarp ovoid-ellipsoid to ellipsoid, 2.3–3.6 cm, constricted at apex. Achenes deep brown, oblong, 1–1.4 cm, puberulous. Fl. Aug–Oct, fr. May.

● Montane forests; 600–800 m. Anhui, Jiangxi, Zhejiang.

The leaves are used as medicine for influenza in Jiangxi.

"*Chimonanthus anhuiensis* T. B. Chao & Zhi X. Chen" (Acta Agric. Univ. Henan. 21: 419. 1987) belongs here but was not validly published because no type was indicated (*Vienna Code*, Art. 37.1).

3. Chimonanthus nitens Oliver, Hooker's Icon. Pl. 16: t. 1600. 1887.

山蜡梅 shan la mei

Calycanthus nitens (Oliver) Rehder; *Chimonanthus nitens* var. *ovatus* T. B. Chao & Z. Q. Li; *Meratia nitens* (Oliver) Rehder & E. H. Wilson.

Shrubs or trees, 1–6 m tall, evergreen. Branchlets quadrangular when young but becoming subterete, puberulous but glabrescent. Petiole 3–10 mm, glabrous or sometimes with short hirsute pubescence; leaf blade elliptic, elliptic-lanceolate, broadly elliptic, or ovate-lanceolate, 2–13 × 1.5–5.5 cm, papery to subleathery, both surfaces green to occasionally very pale green and subscabrous, abaxially glabrous or sometimes with a minute short hirsute pubescence, adaxially shiny and with inconspicuous glandular trichomes, secondary veins abaxially convex and adaxially flattened, reticulate veins obscure, base obtuse to cuneate, apex acuminate, long acuminate, or shortly caudate. Flowers solitary, 0.7–1 cm in diam. Tepals 20–24,

yellow to yellowish white, rounded, ovate, obovate, ovate-lanceolate, or oblong, 3–15 × 2.5–10 mm, outside pubescent, inside glabrous. Stamens ca. 2 mm; filaments short, pubescent; anthers ovate, incumbent, longer than filaments; staminodes ca. 1.5 cm, base and base of style with scattered hirsute pubescence. Pseudocarp grayish brown at maturity, urceolate to subcampanulate, 2–5 × 1–2.5 cm, velutinous, apex constricted. Achenes ellipsoid, 1–1.3 cm. Fl. Oct–Jan, fr. Apr–Aug. 2*n* = 22*.

● Sparse woodlands in mountains, montane limestone areas; 200–2500 m. Anhui, Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Yunnan, Zhejiang.

Chimonanthus nitens is a good horticultural plant because of its beautiful yellow flowers and evergreen leaves. Its roots are used medicinally, and the dried young leaves are commonly used as tea in Jiangxi and Zhejiang.

4. Chimonanthus grammatus M. C. Liu, J. Nanjing Inst. Forest. 1984(2): 78. 1984.

突托蜡梅 tu tuo la mei

Shrubs or trees, 4–6 m tall, evergreen. Branches slender, angular, glabrous, with convex lenticels. Petiole 0.7–1.7 cm, thick, glabrous; leaf blade elliptic-ovate to broadly elliptic, 7–18 × 5–8 cm, leathery, abaxially light greenish and glabrous, adaxially green and shiny, secondary veins 7–9 on each side of midvein, reticulate veins adaxially elevated, base broadly cuneate to rounded, apex long acuminate to shortly caudate. Flowers solitary. Tepals 25–27, yellowish, outside pubescent; outer tepals ovate-orbicular to ovate-elliptic, 3–9 × 3–5 mm; medial tepals ca. 13, linear-lanceolate, 10–17 × 2–3 mm; inner tepals ca. 9, long lanceolate, 6–10 × 1–2 mm, base obscurely clawed. Stamens 6–8; staminodes 14–16, pale, pubescent. Pseudocarp campanulate, 2.5–4 × 2–2.7 cm, torus thick, surface with clearly prominent reticulation, apex not constricted, apical appendages ± woody. Achenes brown, oblong-ellipsoid, 1–1.6 × 0.6–0.8 cm, pubescent. Fl. Oct–Dec, fr. Dec–Jun.

● Woodlands; 200–700 m. Jiangxi (Anyuan).

5. Chimonanthus zhejiangensis M. C. Liu, J. Nanjing Inst. Forest. 1984(2): 79. 1984.

浙江蜡梅 zhe jiang la mei

Shrubs, evergreen. Bark grayish brown to fulvous brown, with elevated lenticels. Branchlets grayish brown, slightly angular, puberulent. Petiole reddish brown, 5–8 mm, pubescent or glabrous; leaf blade elliptic, ovate-elliptic, oblong-elliptic, broadly ovate, or rarely obovate-lanceolate, 5–13 × 2.5–4 cm, leathery, both surfaces glabrous, abaxially greenish and not glaucous, adaxially green and shiny, secondary veins 6–8 on each side, reticulate veins obscure, base cuneate to broadly cuneate, apex acuminate. Flowers axillary, fragrant. Tepals 16–20, yellowish, outside pubescent; outer tepals 2–4, ovate to oblong-elliptic, 6–10 × 4–6 mm; median tepals 7–9, falcately lanceolate, 1.8–2 × 0.3–0.5 cm; inner tepals 4–6, lanceolate, 6–15 × 1–3 mm, basally clawed. Stamens 5–7; staminodes 8–15, subulate, pubescent. Carpels 6–9; style filamentous, apex exserted. Pseudocarp slightly campanulate, 2.5–3.5 × 1.4–1.8 cm, surface reticulation slightly elevated, apex constricted, apical appendages ± woody. Achenes brown, ellipsoid, 10–13 × 4–5 mm. Fl. Oct–Nov, fr. Jun.

● Sparse montane forests; 200–900 m. Zhejiang (Fengyang Shan, Longquan).

6. Chimonanthus campanulatus R. H. Chang & C. S. Ding, Acta Phytotax. Sin. 18: 330. 1980.

西南蜡梅 xi nan la mei

Chimonanthus campanulatus var. *guizhouensis* R. H. Chang.

Shrubs 3–5 m tall, evergreen. Branchlets pubescent. Petiole 0.5–1.8 cm; leaf blade elliptic-lanceolate to oblong, 6.3–13.5 × 1.8–4.2 cm, thinly leathery to papery, both surfaces glabrous, secondary veins 2–6 on each side of midvein, base cuneate, broadly cuneate, or rounded, apex long acuminate. Flowers solitary, ca. 1.8 cm in diam. Pedicel 2–3 mm. Tepals 18–20; outer tepals 4 or 5, brownish yellow, rotund, 3–4 mm, outside densely pubescent; median tepals yellowish, oblong-elliptic to elliptic-lanceolate, 7–12 × 2–4 mm; inner tepals yellowish, ovate to obliquely elliptic, 3–5 × 1.5–3 mm, glabrous except for margin puberulous, base nearly clawless. Stamens 5, ca. 4–5 mm; filaments whitish, 1–1.5 mm, basally puberulous; anthers yellowish, 1.8–2 mm; connective 0.5–0.8 mm, apex acuminate; staminodes 7–9, linear, ca. 4 mm or more, as long as or slightly longer than stamens. Carpels 3 or 4(or more). Pseudocarp campanulate, 4–6 × 2.5–4 cm, outside densely brown pubescent, apex not constricted or rarely slightly constricted, apical appendages 4–6. Achenes 3 or 4, brown, ellipsoid to oblong-ovoid, 1.4–2.6 × 0.7–1.2 cm, shiny, pubescent, apex rounded to acute. Fl. Aug–Dec, fr. Sep–Oct of following year.

● Scrub on limestone mountains, riverbanks, along trails; 1000–2900 m. Guizhou (Xingyi), Yunnan (Luquan).

Y. Fei (Fl. Yunnan. 15: 6. 2003) considered *Chimonanthus campanulatus* to be a synonym of *C. nitens*. However, recent molecular phylogenetic evidence shows *C. campanulatus* to be closer to *C. praecox* (S. L. Zhou et al., Molec. Phylogenet. Evol. 39: 1–15. 2006).

2. CALYCANTHUS Linnaeus, Syst. Nat., ed. 10, 2: 1053, 1066, 1371. 1759, nom. cons.

夏蜡梅属 xia la mei shu

Basteria Miller; *Calycanthus* sect. *Sinocalycanthus* W. C. Cheng & S. Y. Chang; *Sinocalycanthus* (W. C. Cheng & S. Y. Chang) W. C. Cheng & S. Y. Chang.

Shrubs, deciduous, aromatic. Branchlets dichotomous; buds naked, hidden [or not hidden] by base of petiole. Leaf blade membranous. Flowers terminal on branchlets, solitary, not aromatic, distinctly pedicellate. Tepals numerous, distinctly dimorphic [or

not]. Stamens numerous; filaments short; staminodes few. Carpels numerous, with silky hairs. Pseudocarp campanulate, base with an attenuate long stalk, apex constricted. Achenes oblong.

Three species: China, North America; one species (endemic) in China.

The North American taxa *Calycanthus floridus* Linnaeus var. *floridus*, *C. floridus* var. *glaucus* (Willdenow) Torrey & A. Gray (*C. floridus* var. *laevigatus* (Willdenow) Torrey & A. Gray), and *C. occidentalis* Hooker & Arnott are sometimes cultivated as garden plants in China.

1. Calycanthus chinensis (W. C. Cheng & S. Y. Chang) W. C. Cheng & S. Y. Chang ex P. T. Li, Fl. Reipubl. Popularis Sin. 30(2): 3. 1979.

夏蜡梅 xia la mei

Sinocalycanthus chinensis W. C. Cheng & S. Y. Chang, Acta Phytotax. Sin. 9: 135. 1964.

Shrubs 1–3 m tall, deciduous. Bark glaucous or grayish brown, with convex lenticels. Branchlets glabrous or puberulous when young; buds hidden by base of petiole. Petiole 1.2–1.8 cm, yellowish hispidulous, glabrescent; leaf blade broadly ovate-elliptic, ovate, or obovate, 11–26 × 8–16 cm, both surfaces shiny, abaxially brown hispidulous but glabrescent, adaxially scabrous and glabrous, base broadly cuneate and slightly asymmetric, margin entire or irregularly serrulate, apex acute. Flowers terminal, solitary, 4.5–7 cm in diam. Pedicel 2–4.5 cm; bracteoles 5–7, deciduous, scarred on pedicels after dropping. Tepals distinctly dimorphic; outer tepals 10–14, white flushed slightly pink toward margin, obovate to obovate-spatulate, 1.4–3.6 × 1.2–2.6 cm, apex rounded; inner tepals 7–16, pale yellow becoming white toward base, elliptic, erect, 11–17 × 9–13 mm, apex rounded and incurved. Stamens 16–19, ca. 8 mm; anthers pubescent; connective apex acute; staminodes 11 or 12, puberulous. Carpels 11 or 12, with silky hair. Pseudocarp campanulate, 3–4.5 × 1.5–3 cm, pubescent, apex slightly constricted, apical appendages 14–16 and lanceolate-conical. Achenes oblong, 10–12 × 5–8 mm, with silky trichomes. Fl. May, fr. Oct. $2n = 22$*.

● Under trees near streams in mountainous areas; 600–1000 m. N Zhejiang (Lin'an, Tiantai).

The name *Calycanthus chinensis* was not validly published by W. C. Cheng and S. Y. Chang (Sci. Silvae Sin. 8(1). 1963) because they cited both a flowering and a fruiting type representing two gatherings (*Vienna Code*, Art. 37.2). When the same authors republished the species in *Sinocalycanthus*, they cited a single type, thus validly publishing a new species name in *Sinocalycanthus* rather than transferring it from *Calycanthus* to *Sinocalycanthus*. Subsequent Chinese authors used the name *S. chinensis* until P. T. Li published the species as *C. chinensis* in FRPS, thus transferring the species back to the genus in which it was originally proposed (although not validly published) by W. C. Cheng and S. Y. Chang.