

3. CLEISTANTHUS J. D. Hooker ex Planchon, Icon. Pl. 8: t. 779. 1848.

闭花木属 bi hua mu shu

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Leiopyxis Miquel; *Paracleisthus* Gagnepain.

Trees or shrubs, monoecious or dioecious; indumentum of simple hairs. Leaves alternate, petiolate; stipules persistent or caducous; leaf blade simple, entire, venation pinnate. Flowers in axillary glomerules or spikes, small, sessile or sometimes shortly pedicellate. Male flowers: sepals 4–6, valvate; petals 4–6, small, scalelike; disk cupular or cushionlike; stamens 5; filaments connate up to half their length, topped with rudimentary ovary; anthers usually ovoid, dorsifixed, extrorse, anther bilocular, longitudinally dehiscent. Female flowers: sepals and petals as in male; disk cup-shaped or conical, surrounding basal ovary, sometimes as long as ovary, tearing into lobes during fruit development, rarely absent; ovary 3(or 4)-celled; ovules 2 in each cell; styles 3, bifid at apex. Fruit a capsule, subglobose, (bi- or) trivalvate when mature, sometimes stipitate (carpopodium), epicarp thin, endocarp bony, inside fibrous; columella and sepals persistent. Seeds (1 or) 2 in each cell; cotyledons broad, thinly to thickly fleshy; endosperm copious to submembranous. $x = 11$.

About 141 species: tropical Africa, Asia, and Australia; seven species in China.

- 1a. Ovary and capsules pubescent or hirsute.
 - 2a. Branchlets and petioles rusty tomentose; leaves pubescent abaxially 1. *C. tomentosus*
 - 2b. Branchlets (except *C. sumatranus* young branchlets puberulent), petioles, and leaves abaxially glabrous.
 - 3a. Leaf blade 3–10(–15) × 2–5(–7) cm, apex caudate-acuminate; lateral veins usually obscure; bract margins glabrous; petal apex entire 2. *C. sumatranus*
 - 3b. Leaf blade 14–30 × 8–15 cm, apex obtuse; lateral veins prominent; bracts ciliate at margin; petal apex crenulate 3. *C. macrophyllus*
- 1b. Ovary and capsules glabrous.
 - 4a. Female disk as long as or longer than ovary.
 - 5a. Leaf blade apex long acuminate; male pedicels 5–10(–13) mm; female disk apex pubescent 4. *C. pedicellatus*
 - 5b. Leaf blade apex shortly acuminate; male flowers sessile; female disk apex glabrous 6. *C. petelotii*
 - 4b. Female disk much shorter than ovary, only to base of ovary.
 - 6a. Leaf blade apex long acuminate, lateral veins 8–10 pairs; disk margin entire 5. *C. tonkinensis*
 - 6b. Leaf blade apex obtuse or retuse, lateral veins 7–9 pairs; disk margin erose or with 5 crenulations 7. *C. concinnus*

1. *Cleistanthus tomentosus* Hance, J. Bot. 15: 337. 1877.

锈毛闭花木 xiu mao bi hua mu

Cleistanthus eburneus Gagnepain; *C. eburneus* var. *sordidus* Gagnepain.

Treelets, rusty tomentose or pubescent except adaxial leaf surface, petals, disk, stamens, and styles glabrous. Petiole up to 5(–6) mm; leaf blade elliptic, oblong-elliptic, or lanceolate, 5–14 × (1.5–)2–5 cm, papery to thickly papery, abaxially gray-green, adaxially dark green and glossy when dried, base obtuse to rounded, rarely acute, apex acuminate or caudate-acuminate; lateral veins 8–11 pairs, obliquely ascendant, anastomosing near margin. Dense glomerules axillary or inserted on smaller-leaved or leafless branches; peduncles very short (ca. 1 mm) or almost absent; bracts small, ca. 1 × 1 mm, triangular. Male flowers subsessile or pedicels 0–3 mm; sepals 5, oblong-ovate to ovate-lanceolate, ca. 2 mm; petals 5, obovate, ca. 1 mm; disk annular, entire, ca. 1 mm high; stamens 5; filaments ca. 0.6 mm; anthers ovate, ca. 0.5 mm; rudimentary ovary ovoid-trigonal, ca. 0.5 mm. Female flowers: pedicels short but extending to ca. 5 mm in fruit; sepals 5, oblong-ovate to ovate-lanceolate, ca. 8 mm; petals and disk as in male; ovary ovoid; styles 3, apex bifid. Fruiting pedicel to 8 mm; capsule ovoid-trigonal, ca. 9 mm in diam., 3-valved when mature; carpopodium up to 8 mm. Seeds obovoid-trigonal, ca. 6 mm. Fl. Mar–Jun, fr. Jun–Sep.

Dry evergreen forests, tropical rain forests; 100–400 m. Guangdong, Hainan [Cambodia, Thailand, Vietnam].

2. *Cleistanthus sumatranus* (Miquel) Müller Argoviensis in A. Candolle, Prodr. 15(2): 504. 1866.

闭花木 bi hua mu

Leiopyxis sumatrana Miquel, Fl. Ned. Ind., Eerste Bijv. 446. 1861; *Cleistanthus saichikii* Merrill; *Kaluhaburunghos sumatranus* (Miquel) Kuntze; *Paracleisthus subgracilis* Gagnepain.

Evergreen trees up to 18 m tall, to 40 cm d.b.h.; bark red-brown, smooth; plants glabrous except for sparsely pubescent young branches and juvenile fruits and densely hirsute ovary. Stipules ovate-triangular, ca. 0.5 mm, often caducous; petiole 2–7 mm; leaf blade ovate or elliptic, 3–10(–15) × 2–5(–7) cm, papery or stiffly papery, abaxially glaucous or dull, base obtuse to rounded, apex caudate; lateral veins (4 or) 5–7(–8) pairs, slightly obscure. Flowers in axillary few-flowered fascicles (up to ca. 7), subtended by normal leaves, or on smaller-leaved or spikelike leafless axes; bracts triangular. Male flowers: sepals 5, ovate-lanceolate, ca. 2 mm; petals 5, obovate, ca. 0.8 mm; disk annular; rudimentary ovary 3-angled. Female flowers: sepals 5, ovate-lanceolate, 2–3 mm; petals 5, obovate, ca. 1 mm; disk cylindrical, nearly as long as ovary; ovary ovoid to globose; styles 3, bifid. Capsules red, ovoid-trigonal, ca. 1 × 1 cm; carpoderms thin, 3-valved when mature. Seeds usually

1, subglobose to ovoid, up to 6 mm. Fl. Mar–Aug, fr. Apr–Oct.

Dense deciduous or evergreen forests; sea level to 500(–700) m. Guangdong, Guangxi, Hainan, Yunnan [Brunei, Cambodia, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam].

3. *Cleistanthus macrophyllus* J. D. Hooker, Fl. Brit. India 5: 278. 1887.

大叶闭花木 da ye bi hua mu

Kaluhaburunghos macrophyllus (J. D. Hooker) Kuntze.

Trees ca. 6 m tall; branches stouter; plants glabrous except for hispid bracts and ovary. Stipules caducous; petiole 6–7 mm, stouter; leaf blade ovate, oblong-ovate, or elliptic, 14–30 × 8–15 cm, leathery, abaxially glossy, base obtuse to rounded, lucid abaxially, margin slightly revolute, apex obtuse, mucronulate; lateral veins 7 or 8 pairs, elevated above, reticulate veins prominent. Glomerules axillary. Male flowers: sepals 5, lanceolate; petals 5, obovate, margin crenulate; disk annular, smooth, entire. Female flowers: bracts small, margin ciliate; pedicels very short or almost sessile; sepals 5, broadly ovate, ca. 5 × 3.5 mm, leathery dried; petals obovate, smaller than sepals, margin crenulate; disk cylindrical, margin 5-crenulate, as high as or higher than ovary; ovary ovoid, hispid, 3-celled; styles 3, bifid, recurved, flabellate. Fruiting pedicel 1–8 mm; capsules ovoid-trigonal, 1.5–2 cm in diam.; carpodermis thickened, brown; carpodium long. Fl. Apr–Jun, fr. Jun–Aug.

Open forests; 400–700 m. SE Yunnan (Hekou, Jinping) [Indonesia, Malaysia (peninsular), Singapore, Thailand].

4. *Cleistanthus pedicellatus* J. D. Hooker, Fl. Brit. India 5: 281. 1887.

米咀闭花木 mi ju bi hua mu

Cleistanthus integer C. B. Robinson; *C. monocarpus* R. I. Milne; *C. quadrifidus* C. B. Robinson; *Kaluhaburunghos pedicellatus* (J. D. Hooker) Kuntze.

Treelets or trees, up to ca. 16 m tall; bark gray; plants glabrous except for puberulent pedicel, disk of male flowers, ovary, and young fruits. Stipules triangular, shorter than petiole; petiole 3–7 mm; leaf blade elliptic-ovate or elliptic, 4–11(–14.5) × 2–5(–6.5) cm, leathery, base obtuse to rounded, apex long acuminate; lateral veins 4–8 pairs, reticulate venation prominent. Glomerules axillary, sometimes on smaller-leaved or leafless shoots; peduncles short; flowers monoecious, distinctly pedicelled; pedicels 5–10(–13) mm. Male flowers ca. 7 mm in diam.; pedicel more slender than female ones; receptacle flattened; sepals 5, lanceolate; petals 5, ovate, lanceolate, or spatulate, emarginate and crenulate; disk annular; staminal column 1–1.5 mm; free filaments ca. 1 mm; anthers ellipsoid to ovoid, up to 1 mm; rudimentary ovary longer. Female flowers: receptacle cup-shaped; sepals 5, narrowly triangular; petals 5, obovate, shorter than sepals; disk urceolate, membranous, puberulent, covering base of ovary; ovary globose; styles 3, bifid. Fruiting pedicel 12–15 mm; capsule globose-trigonal, 3-celled, 3-valved when mature, 5–8 × 7–10 mm in diam.; carpodermis reticulate when young, later smooth. Seeds semiglobose, up to 4.5 mm. Fl. Apr–May, fr. Jun–Aug.

Primary lowland forests; below 300 m. Guangxi (Longgang) [Indonesia, Malaysia, New Guinea, Philippines].

5. *Cleistanthus tonkinensis* Jablonsky in Engler, Pflanzenr. 65(IV. 147. VIII): 16. 1915.

馒头果 man tou guo

Paracleisthus tonkinensis (Jablonsky) Gagnepain.

Shrubs or treelets usually ca. 3 m tall; branchlets green, lenticellate; plants glabrous except for puberulent young inflorescences, bracts, and male sepals. Stipules linear-oblong [not seen] or ovate-triangular, (1.5–)2–3 mm; petiole 4–8 mm; leaf blade ovate or elliptic, 5–13 × 2–5 cm, leathery, adaxially glossy, base obtuse or rounded, sometimes slightly cordate, apex long acuminate; lateral veins 8–10 pairs. Inflorescences axillary glomerulate spikes, 1.5–4 cm; bracts ovate-triangular, margin membranous and ciliate, abaxially pubescent; buds acuminate. Male flowers: sepals 5, lanceolate, ca. 3 mm, puberulent to glabrous; petals 5, spatulate, ca. 1 mm, margin denticulate and emarginate; disk cup-shaped; stamens 5; filaments connate into a cylinder and surrounding rudimentary ovary; anthers oblong, ca. 1 mm; rudimentary ovary trigonous-ovoid, ca. 0.7 mm, papillose. Female flowers: pedicels to 1 mm or almost absent; sepals 5, ovate-triangular, ca. 3 mm; petals 5, rhomboid or obliquely quadrate, ca. 2 × 2 mm; disk annular, surrounding base of ovary; ovary globose; styles 3, bifid. Fruiting pedicel very short to almost absent; capsules trigonal, purplish red, ca. 1 cm, 3-valved when mature. Seeds ovoid, ca. 7 mm. Fl. Apr–Jun, fr. Jun–Aug.

Forested slopes; 100–800 m. S Guangdong, SE Guangxi, S Yunnan [Vietnam].

6. *Cleistanthus petelotii* Merrill ex Croizat, J. Arnold Arbor. 23: 40. 1942.

假肥牛树 jia fei niu shu

Trees 7–18 m tall, glabrous throughout. Petiole 5–8 mm, transversely striate when dry; leaf blade ovate, elliptic, or oblong, 8–19 × 3–8 cm, leathery, base obtuse or rounded, margin revolute, apex shortly acuminate; lateral veins 6 or 7 pairs, curved-ascending, anastomosing near margin, reticulate veins prominent. Flowers ca. 5 × 4.5 mm in diam., several grouped into axillary glomerules. Sepals 5, ovate-triangular, ca. 3 × 1 mm. Petals 5, obovate, ca. 0.5 mm. Stamens 5, ca. 2 mm; filaments connate below middle into a cylinder surrounding rudimentary ovary; anthers ovate-triangular, ca. 0.6 mm, connective

Fl. China 11: 172–174. 2008.

triangular; disk scales obovate, ca. 1 mm. Rudimentary ovary with trifid apex. Female flowers: sepals and petals as in male; disk urceolate or cylindric, ca. 2 mm high, surrounding ovary, apex with minute ligules; ovary globose, smooth; styles 3. Capsules subglobose, 11–15 × ca. 15 mm, epicarps reticulate-rugose; carpodium 3–5 mm. Seeds ovate. Fl. Apr–Jun, fr. May–Nov.

Limestone forests; 200–400 m. W Guangxi [N Vietnam].

7. *Cleistanthus concinnus* Croizat, J. Arnold Arbor. 23: 41. 1942.

东方闭花木 dong fang bi hua mu

Cleistanthus dongfangensis (P. T. Li) H. S. Kiu; *Phyllanthus dongfangensis* P. T. Li.

Erect shrubs up to 4 m tall; stem and branches terete; branchlets pubescent when young, glabrous at maturity. Stipules angular or subulate, 1–3 mm inserted at bilateral base of petiole, brown; petiole 1–4 mm, pubescent to glabrous; leaf blade papery, elliptic or ovate, 1–7 × 0.5–3 cm, base acute, rounded, obtuse, or slightly cordate, apex acute, obtuse, or retuse, rarely shortly acuminate, glabrous on both surfaces, dark green adaxially, greenish abaxially; lateral veins 7–9 pairs, obliquely ascendant, anastomosing near margin, slightly elevated on both surfaces. Flowers androgynous, often grouped into glomerules; inflorescences axillary or inserted at middle or lower part of aphyllous branchlets, 5–7-flowered; bracts small, broadly ovate, lanate inside. Male flowers: calyx ca. 4 mm, red, glabrous; sepals 5, oblong, acute, valvate; petals 5, small, rhombic, ca. 0.4 mm, membranous, glabrous; disk annular, with 5 crenulations; stamens 5, ca. 3 mm; filaments connate; anthers ca. 2 mm, 2-celled, longitudinally dehiscent. Female flowers: calyx ca. 3 mm, glabrous; sepals 5, triangular, acute; petals 5, spatulate, ca. 1 mm, glabrous; disk cup-shaped, ca. 1 mm, erose at apex; ovary ovoid, ca. 1 mm, glabrous; styles 3, ca. 1 mm, free or connate at base, shallowly bifid. Capsules sessile, oblate-spherical, 7–8 mm in diam., gray-brown, septicial and loculicidal, reticulate-elevated outside when mature, endocarp yellowish. Seeds subangular, ca. 3 mm. Fl. Jan–Mar, fr. Apr–Jun.

Open forests or scrub on sandy or clayey soils; 200–500 m. Hainan (Changjiang, Dongfang, Ledong) [Vietnam].

“*Cleistanthus anomalus* Merrill & Metcalf” (Croizat, J. Arnold Arbor. 23: 39. 1942) lacks a validating description but seems to belong here.

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