

ANNONACEAE

番荔枝科 fan li zhi ke

Li Bingtao (李秉滔 Li Ping-tao)¹; Michael G. Gilbert²

Trees, shrubs, or climbers, wood and leaves often aromatic; indument of simple or less often (*Uvaria*, *Annona*) stellate hairs. Leaves alternate, normally distichous. Stipules absent. Petiole usually short; leaf blade simple, venation pinnate, margin entire. Inflorescences terminal, axillary, leaf-opposed, or extra-axillary [rarely on often underground suckerlike shoots]. Flowers usually bisexual, less often unisexual, solitary, in fascicles, glomerules, panicles, or cymes, sometimes on older wood, usually bracteate and/or bracteolate. Sepals hypogynous, [2 or]3, imbricate or valvate, persistent or deciduous, rarely enlarging and enclosing fruit, free or basally connate. Petals hypogynous, 3–6(–12), most often in 2 whorls of 3 or in 1 whorl of 3 or 4[or 6], imbricate or valvate, sometimes outer whorl valvate and inner slightly imbricate. Stamens hypogynous, usually many, rarely few, spirally imbricate, in several series; filaments very short and thick; anther locules 2, contiguous or separate, rarely transversely locular, adnate to connective, extrorse or lateral, very rarely introrse, opening by a longitudinal slit; connectives often apically enlarged, usually ± truncate, often overtopping anther locules, rarely elongated or not produced. Carpels few to many, rarely solitary, free or less often connate into a 1-locular ovary with parietal placentas; ovules 1 or 2 inserted at base of carpel or 1 to several in 1 or 2 ranks along ventral suture, anatropous; styles short, thick, free or rarely connate; stigmas capitate to oblong, sometimes sulcate or 2-lobed. Fruit usually apocarpous with 1 to many free monocarps, these sometimes moniliform (constricted between seeds when more than 1-seeded), often fleshy, indehiscent, rarely dehiscent (*Anaxagorea*, *Xylophia*), and often with base extended into stipe, rarely on slender carpophore (*Disepalum*), less often syncarpous with carpels completely connate and seeds irregularly arranged and sometimes embedded in fleshy pulp. Seeds 1 to many per monocarp or many per syncarp, often arillate; endosperm copious, ruminate; embryo minute, near hilum.

About 129 genera and over 2,300 species: tropics and subtropics, especially in Old World; 24 genera (one endemic, three introduced) and 120 species (41 endemic, 11 introduced) in China.

The flowers often open before the petals have fully expanded making it easy to underestimate floral dimensions.

One of the major studies of the Annonaceae of tropical Asia was by Suzanne Jovet-Ast (1914–2006), who published an account of the Indochinese species under her maiden name, Ast (Fl. Indo-Chine, Suppl. 1: 62–121. 1938). Unfortunately, she failed to provide Latin descriptions for her many new taxa, none of the names of which was therefore validly published. Her new combinations were validly published, however, and she did subsequently validate a few species of *Goniothalamus* under her maiden name; but she did not validate most of her new species until after she married and took up the name “Jovet-Ast.” These later names form the major part of all her publications, so we have chosen to cite her as “Jovet-Ast [“Ast”]” for those taxa validated under her maiden name.

Tsiang Ying & Li Ping-t’ao. 1979. Annonaceae. In: Tsiang Ying & Li Ping-t’ao, eds., Fl. Reipubl. Popularis Sin. 30(2): 10–175.

- 1a. Fruit syncarpous, with completely united carpels and seeds embedded in pulp (usually cultivated as fruit trees).
 - 2a. Outer petals usually free, abaxially flat 23. *Annona*
 - 2b. Outer petals connate at base, abaxially spurred or winged 24. *Rollinia*
- 1b. Fruit apocarpous, with carpels forming free, often stipitate, monocarps.
 - 3a. Sepals or inner petals and sometimes also outer petals clearly imbricate; stellate hairs often present.
 - 4a. Trees or self-supporting shrubs; stellate hairs absent; sepals imbricate; petals valvate or very minutely imbricate; ovules 1 per carpel 15. *Trivalvaria*
 - 4b. Climbing shrubs; stellate hairs present; sepals valvate; inner petals and sometimes also outer petals imbricate; ovules 2 or more per carpel.
 - 5a. Petals spreading at anthesis; torus depressed 2. *Uvaria*
 - 5b. Petals incurved at anthesis, not opening widely; torus flattened, margin prominent 3. *Cyathostemma*
 - 3b. Sepals and inner and outer petal whorls all valvate or rarely very narrowly imbricate at tip only (only 1 whorl of petals present in *Dasymaschalon*); simple hairs usually present, less often plant glabrous.
 - 6a. Climbing shrubs.
 - 7a. Peduncles and fruiting pedicels hooklike 20. *Artabotrys*
 - 7b. Peduncles and fruiting pedicels not hooklike.
 - 8a. Monocarps ellipsoid, moniliform when more than 1-seeded; petals basally constricted to form enclosed floral chamber around stamens and carpels 6. *Desmos*
 - 8b. Monocarps globose to cylindrical, never moniliform; petals not constricted.

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In addition, extensive contributions were received from Richard M. K. Saunders (*Dasymaschalon*, *Desmos*, *Mitrephora*, and *Pseuduvaria*), Wang Jing (王静; *Dasymaschalon*), Aruna D. Weerasooriya (*Mitrephora*), Yvonne C. F. Su (许传芳; *Pseuduvaria*), and Ng Kwok Wun (吴帼媛; *Desmos*); School of Biological Sciences, The University of Hong Kong, Pokfulam Road, Hong Kong, People’s Republic of China.

- 9a. Monocarp stipes 5.3–7.5 cm; outer petals usually much larger than inner petals; stamen connectives apically truncate (flowers of *F. hainanensis* unknown) 21. *Friesodielsia*
- 9b. Monocarp stipes 0.3–4 cm; outer petals only slightly larger than inner petals; stamen connectives apically acuminate to obtuse 22. *Fissistigma*
- 6b. Trees or erect shrubs.
- 10a. Petals (2 or)3, in 1 whorl 7. *Dasymaschalon*
- 10b. Petals 6, in 2 whorls.
- 11a. Inner petals basally clawed or stipitate, laminas vaulted and connate into an apical cap at least initially.
- 12a. Outer petals 2–7 mm, usually smaller than inner petals and similar to sepals (inner and outer petals subequal in *Orophea hainanensis* and *O. yunnanensis*).
- 13a. Inner petals with a long basal claw, usually apically lozenge-shaped and cohering by their margins into a cap over stamens and carpels, sometimes with their tips conspicuously recurved; pedicel 0.2–1.2 cm 4. *Orophea*
- 13b. Inner petals with a short basal claw, shallowly saccate, at first cohering by their margins but soon free; pedicel usually 1.4–10 cm (0.5–0.7 cm in *M. glochidioides*) 5. *Milium*
- 12b. Outer petals more than 12 mm, equaling or longer than inner petals, conspicuously different from sepals.
- 14a. Stamens linear-oblong; inner petals each with a short claw or stipe 8. *Goniothalamus*
- 14b. Stamens cuneate; inner petals each with a long claw or stipe.
- 15a. Outer petals 1.6–2.5(–3.4) cm, longer than inner petals 9. *Mitrephora*
- 15b. Outer petals 1–1.5 cm, shorter than inner petals 10. *Pseuduvaria*
- 11b. Inner petals not basally clawed, spreading or connivent and apically 3-edged.
- 16a. Stamen connectives apically acuminate.
- 17a. Petals 5–8 cm, linear to linear-lanceolate 19. *Cananga*
- 17b. Petals 0.7–1 cm, ovate-triangular to ovate-oblong, usually saccate and incurved at base
- 18a. Monocarps dehiscent, stipe clavate; ovules 2 per carpel 1. *Anaxagorea*
- 18b. Monocarps indehiscent, stipe not clavate; ovules 5–22 per carpel 18. *Alphonsea*
- 16b. Stamen connectives apically truncate, rounded, or broadly 3-angular.
- 19a. Ovules 1 or 2(or 3) per carpel, basally or nearly basally inserted.
- 20a. Inner petals concave and incurved to cover stamens; fruiting carpels free but usually connivent 17. *Popowia*
- 20b. Inner petals spreading; fruiting carpels free and not connivent
- 21a. Monocarp bases extended into stipes, not articulate at base 14. *Polyalthia*
- 21b. Monocarps on slender carpophores, articulate between apex of carpophore and base of monocarp 16. *Disepalum*
- 19b. Ovules many per carpel, ventrally inserted.
- 22a. Flower buds lanceolate, apically long beaked and 3-angled; sepals connate at base or beyond into a cup; petals elongated, concave at base, narrowly convex below middle; anther locules transversely septate 11. *Xylopia*
- 22b. Flower buds ovoid, apically rounded; sepals connate at base but not into a cup; petals flat or cucullate; anther locules not transversely septate.
- 23a. Petals flat; stamen connectives apically rounded; stigmas subcapitate, not constricted at base; monocarps almost sessile (Chinese species) 12. *Meiogyne*
- 23b. Petals cucullate; stamen connectives apically truncate to subtruncate; stigmas ovoid, constricted at base; monocarps long stipitate 13. *Chieniodendron*

1. ANAXAGOREA A. Saint-Hilaire, Nouv. Bull. Sci. Soc. Philom. Paris 1825: 91. 1825.

蒙蒿子属 meng hao zi shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Shrubs or small trees. Inflorescences terminal, leaf-opposed, axillary, or extra-axillary, fasciculate or 1-flowered. Flowers pedicellate. Torus convex. Sepals 3, valvate, connate at base. Petals 6, in 2 whorls, with each whorl valvate, erect to spreading flat, subequal or outer larger than inner. Stamens many, all fertile or inner stamens sometimes reduced to staminodes; anther locules

linear-oblong; connectives apically apiculate. Carpels few to many; ovules 2 per carpel, basal; stigmas subglobose to oblong. Fruit apocarpous; monocarps long stipitate, clavate, dehiscent. Seeds 1 or 2 per monocarp, black and very shiny, without an aril.

About 27 species: tropical Asia and America; one species in China.

Both molecular (Richardson et al., *Philos. Trans.*, Ser. B, 359: 1495–1508. 2004) and morphological studies (Scharaschkin & Doyle, *Amer. J. Bot.* 93: 36–54. 2006) show that *Anaxagorea* is the sister group to the rest of the family.

1. *Anaxagorea luzonensis* A. Gray, U.S. Expl. Exped., Phan. 27. 1854.

蒙蒿子 meng hao zi

Shrubs 1–2 m tall, erect, glabrous except for flowers. Petiole 0.6–2 cm; leaf blade oblong to broadly elliptic, 9–16 × 3–7 cm, membranous, yellowish when dry, secondary veins 7 or 8 on each side of midvein, base rounded, apex acute to obtuse. Inflorescences leaf-opposed, 1- or 2-flowered. Flowers ca. 1.2 cm. Pedicel ca. 6 mm. Sepals rounded to ovate, outside puber-

lent. Petals greenish; outer petals ovate, slightly longer and ca. 2 × broader than inner petals; inner petals 8–9 × 4–5 mm. Stamens many. Carpels 2–4, ovoid-oblong, puberulent. Monocarp stipes clavate; monocarps 2–3 × 0.5–0.7 cm, dehiscent on dorsal side, apex acute. Seeds reddish when young, shiny dark brown upon maturity, obovate, flat, 8–11 × 6–7 mm. Fl. Jun–Oct, fr. Oct–Jan.

Densely forested slopes; 500–700 m. S Guangxi, Hainan [India, Indonesia, Laos, Myanmar, Philippines, Sri Lanka, Thailand].

2. *UVARIA* Linnaeus, Sp. Pl. 1: 536. 1753.

紫玉盘属 zi yu pan shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Narum Adanson; *Uva* Kuntze.

Shrubs, climbing, sometimes erect or small trees, indument with stellate hairs. Inflorescences terminal, axillary, extra-axillary, leaf-opposed, or rarely on older branches; flowers mostly solitary or paired, rarely in short racemes or few-flowered cymes. Torus depressed, pubescent or tomentose. Sepals 3, valvate, usually connate at base. Petals 6, in 2 whorls, sometimes connate at very base, each whorl imbricate. Stamens many; anther locules often oblong or linear; connectives apically truncate to rounded. Carpels many, rarely few, linear-oblong; ovules many per carpel or rarely 2 or 3, in 1 or 2 series; styles outside often pilose; stigmas usually apically 2-cleft, involute. Fruit apocarpous; monocarps mostly ± stipitate, oblong, ovoid, or subglobose, fleshy and berrylike. Seeds several per monocarp or 1 by abortion, subhorizontal, with or without a short aril.

About 150 species: Old World tropics; eight species (one endemic) in China.

L. L. Zhou et al. (*Syst. Biodivers.* 7: 249–258. 2009) include *Cyathostemma* in *Uvaria* on the basis of a recent molecular study, but this is not accepted by one of us (Li). See the account of *Cyathostemma* for more details.

- 1a. Leaf blade abaxially glabrous or inconspicuously and sparsely stellate pubescent but soon glabrescent.
 - 2a. Leaf blade oblong to oblong-ovate, abaxially glabrous; ovules 6–8 per carpel 1. *U. boniana*
 - 2b. Leaf blade obovate-lanceolate, abaxially inconspicuously and sparsely stellate pubescent, glabrescent; ovules 2 per carpel.
 - 3a. Fruit ca. 1 cm in diam., smooth; leaf blade secondary veins 8–12 on each side of midvein 2. *U. tonkinensis*
 - 3b. Fruit ca. 3.5 cm in diam., densely tuberculate; leaf blade secondary veins 12–14 on each side of midvein 3. *U. kweichowensis*
- 1b. Leaf blade abaxially distinctly tomentose or pubescent, hairs simple or stellate.
 - 4a. Flowers 9–10 cm in diam.; monocarps cylindric, 4–6 cm, slightly constricted between seeds 6. *U. grandiflora*
 - 4b. Flowers 1.5–4 cm in diam.; monocarps globose to ovoid-ellipsoid, 2–3.8 cm, not constricted between seeds.
 - 5a. Monocarps with soft and dense spines; petals yellowish and leaf blade thinly leathery to thickly papery 4. *U. calamistrata*
 - 5b. Monocarps unarmed; petals dark red to purple, or if yellow then leaf blade membranous.
 - 6a. Leaf blade membranous; petals yellow to yellowish 5. *U. kurzii*
 - 6b. Leaf blade thinly leathery or leathery; petals dark red to purple.
 - 7a. Leaf blade apex acuminate, secondary veins adaxially flat; flowers ca. 1.5 cm in diam. 7. *U. rufa*
 - 7b. Leaf blade apex acute, obtuse, or rounded, secondary veins adaxially impressed; flowers 2.5–4 cm in diam. 8. *U. macrophylla*

1. *Uvaria boniana* Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 71. 1906.

光叶紫玉盘 guang ye zi yu pan

Shrubs to 5 m tall, climbing, glabrous except for flowers. Petiole 2–8 mm; leaf blade oblong to oblong-ovate, 4–15 × 1.8–5.5 cm, papery, secondary veins 8–10 on each side of midvein and slightly prominent on both surfaces, base cuneate to

rounded, apex acuminate to acute. Inflorescences extra-axillary, often leaf-opposed, 1- or 2-flowered. Pedicel 2.5–5.5 cm, bracteolate below middle. Sepals ovate, 2.5–3 mm, margin ciliate. Petals purple, leathery, puberulent; outer petals broadly ovate, ca. 1 × 1 cm; inner petals slightly smaller than outer petals, inside concave. Stamen connectives apically truncate, papillary. Carpels oblong, incurved, densely yellow pubescent; ovules 6–8 per carpel; stigmas horseshoe-shaped, apex 2-cleft. Monocarp stipes 4–5.5 cm; monocarps purple, globose to ellipsoid-ovoid, ca. 1.3 cm in diam. Fl. May–Oct, fr. Jun–Apr.

Moist secondary forests, thickets; 100–800 m. Guangdong, Guangxi, Guizhou, Hainan, Jiangxi [Vietnam].

2. *Uvaria tonkinensis* Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 74. 1906.

东京紫玉盘 dong jing zi yu pan

Melodorum subglabrum Bân; *M. vietnamense* Bân; *M. vietnamense* var. *calcareum* Bân; *Uvaria tonkinensis* var. *subglabra* Finet & Gagnepain.

Shrubs to 6 m tall, climbing. Branchlets sparsely stellate pubescent, glabrescent. Petiole 5–10 mm; leaf blade obovate, obovate-lanceolate, oblong, or elliptic, 12–21 × 4–7 cm, papery, abaxially sparsely stellate hairy but soon glabrescent, adaxially glabrous, secondary veins 8–12 on each side of midvein, base rounded to slightly cordate, apex long to shortly acuminate or rarely acute. Inflorescences terminal or leaf-opposed, 1-flowered. Pedicel 1.5–4.5 cm, sparsely stellate hairy. Sepals broadly obovate, 3–4 mm, outside densely stellate, inside concave and glabrous. Petals purple, 1.5–1.9 × 1.5–1.9 cm; outer petals obovate, broadly ovate, or orbicular, outside densely stellate pubescent; inner petals smaller than outer petals. Stamen connectives glabrous or hairy. Carpels cylindrical, stellate pubescent or with hairs only at base and apically; ovules 2 per carpel; stigmas apically entire or 2-cleft. Monocarp stipes 2.5–5 cm; monocarps purple, globose, ca. 1 cm in diam.; epicarp smooth. Fl. Feb–Sep, fr. Aug–Dec.

Thickets, open forests; 200–600 m. Guangdong, W Guangxi, Hainan, S Yunnan [Vietnam].

3. *Uvaria kweichowensis* P. T. Li, Acta Phytotax. Sin. 14(1): 107. 1976.

贵州紫玉盘 gui zhou zi yu pan

Shrubs to 5 m tall, climbing. Branchlets sparsely stellate pubescent, glabrescent, lenticellate. Petiole 5–6 mm; leaf blade obovate to elliptic, 8–18 × 3.5–8 cm, papery, glossy, glabrous except for sparsely stellate pubescent veins, secondary veins 10–14 on each side of midvein and at ca. 45° to midvein, base rounded to broadly cuneate, apex acute and mucronate. Inflorescences leaf-opposed. Flowers not seen. Monocarp stipes ca. 1 cm, stout; monocarps ovoid, ca. 5.5 × 3.5 cm, densely stellate tomentose, apex rounded; epicarp tuberculate. Fl. Aug, fr. Sep–Oct.

• Secondary forests; ca. 1000 m. W Guangxi, SW Guizhou, Yunnan.

Uvaria kweichowensis is listed as Endangered (EN A2c) by the

IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 6 Oct 2010).

4. *Uvaria calamistrata* Hance, J. Bot. 20: 77. 1882.

刺果紫玉盘 ci guo zi yu pan

Shrubs to 8 m tall, climbing. Branchlets sparsely stellate pubescent, glabrescent. Petiole 5–10 mm, stellate tomentose; leaf blade oblong, elliptic, or obovate-oblong, 5–17 × 2–7 cm, thinly leathery to thickly papery, abaxially densely stellate pubescent, adaxially sparsely stellate pubescent, secondary veins 8–10 on each side of midvein, base obtuse, apex long acuminate to acute. Inflorescences axillary or leaf-opposed, fasciculate, 1–4-flowered. Flowers ca. 1.8 cm in diam. Sepals ovate, ferruginous tomentose. Petals yellowish; outer petals oblong, ca. 8 × 5 mm, ± equal to or slightly larger than inner petals, pubescent. Stamen connectives apically rounded to obtuse, puberulent. Carpels 7–15, pubescent; ovules 6–9 per carpel. Monocarp red, ellipsoid, 2–3.5 × 1.5–2.5 cm; epicarp densely softly spiny. Seeds brown, compressed, 3-angular, 10–12 × 8–9 mm. Fl. May–Jul, fr. Jul–Dec.

Forests or scrub on very steep slopes; 200–800 m. Guangdong, Guangxi, Hainan [Vietnam].

The fine, strong bast fibers obtained from the inner bark of *Uvaria calamistrata* is used for cordage and sack manufacturing.

5. *Uvaria kurzii* (King) P. T. Li, Acta Phytotax. Sin. 14(1): 106. 1976.

黄花紫玉盘 huang hua zi yu pan

Uvaria hamiltonii J. D. Hooker var. *kurzii* King in Ridley, Mat. Fl. Malay. Penins. 1(4): 263. 1892.

Shrubs to 16 m tall, climbing, densely stellate tomentose to stellate pubescent throughout. Petiole ca. 5 mm; leaf blade oblong-obovate, oblong-elliptic, or obovate, 9.5–21 × 4–8.5 cm, membranous, secondary veins 13–18 on each side of midvein, base narrowly and shallowly cordate, apex acuminate, obtuse, or sometimes rounded. Inflorescences leaf-opposed, 1- or 2-flowered; bracts ovate, ca. 7 × 3.5 mm. Flowers ca. 3.5 cm in diam. Pedicel 2.5–4 cm, bracteolate at middle. Sepals broadly ovate, ca. 5 × 5–6 mm. Petals yellow to yellowish; outer petals ovate to obovate-oblong, ca. 1.6 × 1.1–1.2 cm, apex rounded; inner petals as large as outer petals. Anthers oblong, ca. 3 mm; connectives apically truncate, puberulent. Carpels oblong, ca. 4 mm; ovules 10 per carpel, in 2 series; stigmas horseshoe-shaped, apex 2-cleft. Monocarp ovoid to subglobose, 2–3 × ca. 2 cm; epicarp densely tawny brown pubescent, not spiny. Fl. May, fr. Jul–Aug.

Dense forests; 400–1300 m. Guangxi, Yunnan [India].

Material of this species has been misidentified as *Cyathostemma yunnanense*.

6. *Uvaria grandiflora* Roxburgh ex Hornemann, Suppl. Hort. Bot. Hafn. 141. 1819.

大花紫玉盘 da hua zi yu pan

Unona grandiflora Leschenault ex Candolle; *Uvaria platypetala* Champagnon ex Benth; *U. purpurea* Blume; *U. rhodantha* Hance.

Shrubs to 10 m tall, climbing, densely stellate pubescent to ferruginous tomentose throughout. Petiole 5–8 mm; leaf blade oblong-obovate, 7–30 × 3.5–12.5 cm, papery to thinly leathery, secondary veins 10–17(–24) on each side of midvein and at ca. 60° to midvein, base shallowly cordate, apex acute, shortly acuminate, or sometimes caudate. Inflorescences leaf-opposed, cymose, 1(–3)-flowered; bracts 2, ovate to obovate, ca. 3 × 2.5 cm. Flowers 7–10 cm in diam. Pedicel 0.5–5 cm. Sepals broadly ovate, 2–2.5 × 2.5–3.5 cm, connate for basal third, membranous, inside glabrous, apex obtuse to acute. Petals dark red to vermilion red, turning purplish with age, obovate to oval-obovate, 4–4.5 × 2.5–3.5 cm, puberulent. Stamens oblong to linear, 6–7 mm; connectives apically truncate, glabrous. Carpels oblong to linear, ca. 8 mm; ovules 30–50 per carpel, in 2 series; stigmas apically involute and 2-cleft. Monocarp stipes 1.5–3 cm; monocarps orange, cylindrical, 4–6 × 1.5–2 cm, slightly constricted between seeds, fleshy, apex mucronate; epicarp not spiny, minutely tomentose. Seeds pale brown, ovoid, flattened. Fl. Mar–Nov, fr. May–Dec.

Open forests, thickets; 400–1000 m. S Guangdong, SE Guangxi, Hainan [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

7. *Uvaria rufa* Blume, Fl. Javae, Annonaceae, 19. 1830.

小花紫玉盘 xiao hua zi yu pan

Shrubs to 5 m tall, climbing. Branches stellate tomentose, hairs rust-colored when dry. Petiole 5–10 mm; leaf blade elliptic to ovate-oblong, 5–15 × 2.5–6 cm, thinly leathery, abaxially stellate tomentose, secondary veins ca. 12 on each side of midvein, base cordate, apex acuminate. Inflorescences leaf-opposed or extra-axillary, cymose, 1–4-flowered. Flowers ca. 1.5 cm in diam., stellate pubescent. Petals purple to dark red, ovate, 8–12 × 6–7 mm, apex rounded. Stamens oblong; connectives apically truncate, glabrous. Carpels oblong; stigmas apically 2-cleft. Monocarp stipes 1–2 cm; monocarps ovoid-ellipsoid to sometimes globose, ca. 2 × 1–1.5 cm, not constricted between seeds, apex rounded; epicarp not spiny. Fl. Mar–Jun, fr. Jun–Oct.

Sparsely forested slopes; 400–1700 m. Hainan, Yunnan [Cam-

bodia, India, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam].

8. *Uvaria macrophylla* Roxburgh, Fl. Ind. 2: 663. 1824.

紫玉盘 zi yu pan

Guatteria cordata Dunal; *Uvaria badiiflora* Hance; *U. cordata* (Dunal) Alston (1931), not Schumacher & Thonning (1827); *U. dolichoclada* Hayata; *U. macclurei* Diels; *U. macrophylla* var. *microcarpa* (Champion ex Benth) Finet & Gagnepain; *U. microcarpa* Champion ex Benth; *U. obovatifolia* Hayata; *U. synsepala* Miquel.

Shrubs to 18 m tall, climbing, stellate pubescent throughout or stellate tomentose when young and glabrescent, hairs ferruginous in dried specimens. Petiole 5–10 mm; leaf blade ovate, oblong-obovate, elliptic, or broadly oblong, 9–30 × 3–15 cm, leathery, secondary veins 9–14(–22) on each side of midvein, abaxially elevated, and usually adaxially impressed when dry, base shallowly cordate, truncate, rounded, or rarely cuneate, apex acute, obtuse, or rounded and mostly apiculate. Inflorescences leaf-opposed or rarely extra-axillary, sometimes cymose, 1- or 2(or more)-flowered; bracts ovate to broadly elliptic, 4–7 mm. Flowers 2–3.8 cm in diam. Pedicel 0.5–4 cm. Sepals ovate to broadly ovate, 4–5 × 4–5 mm. Petals dark red, purple, or purplish, subovate to oblong-elliptic, 1.2–2 × 0.6–1.3 cm, spreading, apex rounded to obtuse. Stamens oblong, ca. 9 mm; connectives ovoid, apex puberulent or glabrous; outer stamens sterile, oblanceolate, ca. 7 mm. Carpels oblong, ca. 5 mm; stigmas horseshoe-shaped, apex 2-cleft and involute. Monocarps orange, ovoid to subterete, 1–3 × 1–1.5 cm, not constricted between seeds; epicarp not spiny, hairy or glabrous. Seeds globose, 6.5–7.5 mm in diam. Fl. Mar–Sep, fr. Jul–Mar. $2n = 22$.

Open forests, scrub; 400–1400 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, SE Yunnan [Bangladesh, Indonesia, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

The fine strong bast fiber obtained from the bark of *Uvaria macrophylla* is used for making sacks. The roots are used as a sedative, to stop vomiting, and for rheumatism. The leaves are used to relieve pain and to reduce swellings.

3. *CYATHOSTEMMA* Griffith, Not. Pl. Asiat. 4: 707. 1854.

杯冠木属 bei guan mu shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Shrubs, climbing. Inflorescences terminal, extra-axillary, or often leaf-opposed; flowers solitary or in pendulous and few-flowered cymes from branches or trunk. Flowers bisexual or unisexual, subglobose. Pedicel bracteate. Torus flattened, margins prominent. Sepals 3, valvate, connate at base, usually hirsute. Petals 6, biseriate, short, subequal or inner smaller, imbricate at apex, valvate at base remaining incurved. Stamens numerous, oblong; anthers subintrorse; connectives oblique, incurved. Carpels numerous; ovules few to numerous per carpel, in 2 series; styles cylindrical, glabrous; stigma conical, 2-cleft at apex. Fruit apocarpous, pedicellate; monocarps stipitate, oblong or ovoid. Seeds several per monocarp, in 2 series.

About ten species: China, Indonesia, Malaysia, Thailand, Vietnam; one species in China.

Cyathostemma was included in *Uvaria* on the basis of a recent molecular study by L. L. Zhou et al. (Syst. Biodivers. 7: 249–258. 2009). This study included 25 species of *Uvaria* and seven species of *Cyathostemma* (but not *C. yunnanense*) and showed the *Cyathostemma* spp. to form two separate groups nested within *Uvaria* and separated by four species of *Uvaria*. One of us (Gilbert) believes that this shows Zhou et al. were right to transfer all species of *Cyathostemma* to *Uvaria*.

1. *Cyathostemma yunnanense* Hu, Bull. Fan Mem. Inst. Biol. 10: 121. 1940.

杯冠木 bei guan mu

Cyathostemma vietnamense Bân; *Uvaria yunnanensis* (Hu) L. L. Zhou, Y. C. F. Su & R. M. K. Saunders (2009), not Li (1978).

Shrubs to 5 m tall, climbing, brownish pubescent throughout, often glabrescent. Petiole 5–8 mm; leaf blade obovate, 13–20 × 4.5–9 cm, membranous to papery, secondary veins 13–15 on each side of midvein, abaxially distinctly elevated, and adaxially slightly elevated and sparsely stellate pubescent or glabrous, base rounded to shallowly cordate, apex acute to obtuse. Inflorescences axillary, cymose, several flowered. Flowers small. Pedicel 1–1.5 cm, densely stellate pubescent; bracteoles 1 or 2, oblong to obovate, 4–13 mm. Calyx cupular; sepals reni-

form, densely stellate pubescent. Petals yellowish green; outer petals broadly ovate, ca. 7 × 7 mm; inner petals ca. 6 × 5 mm. Stamens ca. 3.5 mm; connectives broadly conic, puberulent. Carpels ca. 3.5 mm, densely pubescent; ovules 4–14 per carpel, in 2 series; stigmas conic, glabrous. Fruiting pedicel 0.7–4 cm; monocarp ellipsoid, 4–7 × 3–4 cm; epicarp tubercular and densely tomentose to glabrous. Fl. Jun–Jul, fr. Aug–Oct.

Scrub on slopes; ca. 1000 m. S Yunnan [Vietnam].

Cyathostemma yunnanense is known in China only from the type collection. Other Chinese records are based on misidentifications of material of *Uvaria kurzii*. *Uvaria yunnanensis* (Hu) L. L. Zhou, Y. C. F. Su & R. M. K. Saunders (Syst. Biodivers. 7: 255. 2009) appears to be a later homonym of *U. yunnanensis* Li (Pl. Fossils China: Tertiary 3: 19, pl. 24, t. 7, f. 4. 1978, not seen), based on fossil material. A new epithet would be required if *Cyathostemma* was included within *Uvaria* because of the blocking name *U. vietnamensis* Meade (2005).

4. OROPHEA Blume, Bijdr. 18. 1825.

澄广花属 cheng guang hua shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Mezzettiopsis Ridley.

Trees or erect shrubs. Leaf blade often with pellucid dots. Inflorescences axillary or superaxillary, cymose, pedunculate or sessile, 1- or several flowered. Flowers bisexual. Sepals 3, smaller than outer petals. Petals 6, in 2 whorls, free, each whorl valvate; outer petals ovate or obovate, usually smaller than inner petals (\pm equal in *Orophea hainanensis* and *O. laui*); inner petals with base narrowly clawed, apical limbs lozenge-shaped and cohering by margins to form a mitriform cap, apex usually acute or acuminate and sometimes extended, thickened, and recurved. Stamens 3–14; anther locules ovoid, extrorse; connectives apically acute or obtuse but not truncate. Carpels 3–15, free; ovules 1–4 per carpel; stigmas sessile or subsessile, capitate or ellipsoid. Fruit apocarpous; monocarps shortly stipitate, usually globose or oblong, sometimes constricted between seeds. Seeds 1–4 per monocarp.

About 37 species: S and SE Asia; six species (three endemic) in China.

All the Chinese species of *Orophea* belong to *O.* subg. *Sphaerocarpon* Kessler, distinguished by carpels with 2(or 3) ovules per carpel producing globose monocarps with hemispherical seeds. *Mezzettiopsis* is included here following Leonardia and Kessler (Blumea 46: 141–163. 2001).

1a. Leaf blade base oblique; petals reddish or reddish yellow.

2a. Shrubs to 4 m tall; leaf blade base shallowly cordate, abaxially hirsute; carpels 3–6; monocarps villous 1. *O. hirsuta*

2b. Trees to 10 m tall; leaf blade base rounded, abaxially glabrous or glabrescent; carpels 12; monocarps glabrous 2. *O. polycarpa*

1b. Leaf blade base equilateral; petals white, yellowish green, or greenish.

3a. Leaf blade leathery; stamens 9–14; carpels hairy.

4a. Secondary veins of leaves 10–15 on each side of midvein; carpels 3; inner petals \pm as long as outer petals 3. *O. yunnanensis*

4b. Secondary veins of leaves 7–11 on each side of midvein; carpels 9–18; inner petals much longer than outer petals, tips conspicuously recurved and thickened 6. *O. laui*

3b. Leaf blade papery; stamens 6–9; carpels glabrous.

5a. Shrubs 2–4 m tall; petioles, leaf blades abaxially, sepals, and petals outside pubescent; inner petals clearly longer than outer petals; carpels 3 4. *O. multiflora*

5b. Trees 6–8 m tall; petioles, leaf blades, sepals, and petals glabrous; inner and outer petals subequal; carpels 6 5. *O. hainanensis*

1. *Orophea hirsuta* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2): 81. 1892.

毛澄广花 mao cheng guang hua

Shrubs to 4 m tall. Branchlets, petioles, leaf blades abaxially, and peduncles persistently ferruginous hispid. Petiole 1–2 mm; leaf blade elliptic to oblong, 3.5–12 × 1.5–5 cm, papery, secondary veins 7–11 on each side of midvein, base obliquely shallowly cordate, apex acuminate to acute. Inflorescences superaxillary, cymose, 1–3-flowered; peduncle 1–1.5 cm. Pedicel

ca. 4.5 mm, with 1 or 2 bracteoles at base. Sepals broadly ovate, puberulent. Petals reddish; outer petals broadly ovate, 3–4 mm, outside puberulent; inner petals ca. 8 mm, inside sparsely puberulent, basally long clawed, apically lozenge-shaped. Stamens 6. Carpels 3–6, glabrous; ovules 2 or 3 per carpel. Monocarp stipes 1–2 mm; monocarps globose, 0.8–1.3 cm in diam., sparsely villous. Fl. Apr–Jul, fr. Jul–Dec.

Forested slopes; 300–600 m. Hainan, S Yunnan [Cambodia, India, Laos, Malaysia, Vietnam].

2. *Orophea polycarpa* A. Candolle, Mém. Soc. Phys. Genève 5: 215. 1832.

广西澄广花 *guang xi cheng guang hua*

Orophea anceps Pierre; *O. gracilis* King; *O. polycarpa* var. *anceps* (Pierre) Jovet-Ast ["Ast"]; *O. polycarpa* var. *undulata* (Pierre) Jovet-Ast ["Ast"]; *O. polycephala* Pierre; *O. undulata* Pierre.

Trees to 10 m tall. Branchlets grayish brown, pubescent when young, glabrescent. Petiole 1.5–3 mm, glabrous or glabrescent; leaf blade elliptic to oblong-elliptic, 4–10 × 1.5–4.5 cm, thickly papery, glabrous or abaxially glabrescent, secondary veins 8–10 on each side of midvein, base obliquely rounded, apex shortly acuminate to obtuse. Inflorescences axillary, 1-flowered. Flowers small. Pedicel filiform, 5–10 mm, bracteolate near base. Sepals triangular, ca. 2 × 1.5 mm, outside puberulent, inside glabrous. Petals reddish; outer petals elliptic to orbicular, 4–5 × 3–4 mm, outside puberulent, inside glabrous; inner petals rhombic, 8–9 × ca. 5 mm, glabrous, base long clawed, margin apically ciliate and revolute toward apex. Stamens 6; connectives apically conic. Carpels 12, glabrous; ovules 2 per carpel. Monocarp stipes 5–7 mm; monocarps globose, 0.5–1.9 cm in diam. Fl. Jul–Sep, fr. Aug–Nov.

Open forests; ca. 600 m. Guangxi, Hainan, SE Yunnan [Bangladesh, Cambodia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam].

3. *Orophea yunnanensis* P. T. Li, Acta Phytotax. Sin. 14(1): 106. 1976.

云南澄广花 *yun nan cheng guang hua*

Shrubs ca. 2 m tall. Bark grayish black. Branchlets glabrous. Petiole ca. 3 mm; leaf blade oblong-elliptic to oblong-ovate, 2.5–7.5 × 1–2.3 cm, leathery, glabrous except abaxially puberulent on midvein, midvein adaxially flat, secondary veins 10–15 on each side of midvein and slightly elevated on both surfaces, base attenuate to broadly cuneate, apex acuminate. Inflorescences axillary, 1- or 2-flowered. Flowers ca. 3 mm in diam. Pedicel 2–5 mm, bracteolate at base or to near middle. Sepals triangular, outside puberulent, inside glabrous. Petals greenish yellow; outer petals ovate-triangular, 2.5–3 × 1.5–2 mm, outside pubescent, inside glabrous; inner petals ± as long as outer petals. Stamens ca. 12, ovoid; connectives apically acute. Carpels 3, densely villous; ovules 3 per carpel; stigmas capitate. Fruit not seen. Fl. Apr, fr. May–Jul.

• Forested slopes; ca. 600 m. Yunnan (Jiangchuan).

Orophea yunnanensis is listed as Critically Endangered (CR B1ab(i,ii,v)) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 6 Oct 2010).

4. *Orophea multiflora* Jovet-Ast, Notul. Syst. (Paris) 9: 85. 1940.

多花澄广花 *duo hua cheng guang hua*

Orophea chinensis S. Z. Huang.

Shrubs to 4 m tall, erect. Bark grayish brown. Branchlets hispid when young, glabrescent. Petiole ca. 2 mm, hispid; leaf blade elliptic to oblong-elliptic, 5–9 × 2–3.5 mm, thickly pa-

pery, abaxially sparsely hispid or glabrous, adaxially glabrous, secondary veins 6–9 on each side of midvein, base rounded, apex acuminate. Inflorescences axillary, cymose, 1–3-flowered. Flowers ca. 5 mm in diam. Pedicel ca. 2 mm, hispid. Sepals ovate-triangular, 1–2 × ca. 1 mm, outside pubescent, inside glabrous. Petals greenish yellow; outer petals orbicular, ca. 3 × 2–3 mm, outside pubescent, inside glabrous; inner petals ovate-triangular, 5–8 × 2–4 mm, outside densely pubescent, inside glabrous. Stamens 9; filaments very short. Carpels 3, glabrous; ovules 2 or 3 per carpel; stigmas capitate. Monocarps globose, ca. 1 cm in diam. Fl. Mar, fr. Apr–Jun.

Forests on limestone; ca. 500 m. SW Guangxi [Vietnam].

The name *Orophea multiflora* was first published in 1938 (Fl. Indo-Chine, Suppl. 1: 121) but not validly so.

5. *Orophea hainanensis* Merrill, J. Arnold Arbor. 6: 132. 1925.

澄广花 *cheng guang hua*

Trees to 8 m tall. Branchlets sparsely pubescent or glabrous. Petiole 2–3 mm, glabrous or glabrescent; leaf blade elliptic to ovate, 4–9.5 × 2–4 cm, thickly papery, glabrous, secondary veins 4–7 on each side of midvein, base broadly cuneate, apex shortly acuminate to acute. Inflorescences axillary or superaxillary, usually 1–3-flowered, sparsely pubescent; peduncle 4–20 cm; bracts ciliate. Flowers 3–5 mm in diam. Pedicel 4–10 mm. Sepals ovate-triangular, 1.5–2 × 1–1.5 mm, golden pubescent, apex acute. Petals greenish white; outer petals broadly ovate to orbicular, ca. 4 × 4 mm, margin ciliate, apex acute; inner petals 7–8 mm, basal half a long and incurved claw, apex rhombic to ovate-triangular. Stamens 6; connectives apically incurved and mucronulate. Carpels 6–10, glabrous; ovules 2 per carpel; stigmas subcapitate, puberulent. Monocarp stipes 2–5 mm; monocarps globose, 7–8 mm in diam. Fl. Apr–Jul, fr. Jun–Dec.

• Dense woodlands; 400–700 m. Hainan, Guangxi.

6. *Orophea laui* Leonardía & Kessler, Blumea 46: 157. 2001.

蚁花 *yi hua*

Shrubs or small trees, 2.5–15 m tall. Branchlets slender, sparsely pubescent or glabrous. Petiole 3–7 mm; leaf blade oblong, narrowly oblong, or lanceolate, 5.5–19 × 2.2–7.5 cm, ± thickly papery to thinly leathery, sparsely pubescent or glabrous, midvein abaxially sometimes hispid and adaxially flat to slightly sunken, secondary veins 7–11 on each side of midvein, base cuneate, apex acute to shortly acuminate. Inflorescences axillary, cymose, 6-flowered or more, densely pubescent; peduncle 4–15 mm. Pedicel 0.9–1.2 cm, bracteolate near base. Sepals triangular to broadly ovate, 2–2.5 × ca. 2 mm, outside densely puberulent. Outer petals sepal-like, ovate, 3–4 × 3–4 mm, outside greenish white, slightly warty, and pubescent; inner petals 13–16 × 2–4 mm, slightly warty, sparsely hairy, basally clawed, limb strongly recurved and thickened. Stamens 9 in a single whorl or 12 (or 14) in 2 whorls; connectives apically rounded. Carpels 9–18, sparsely hairy, glabrescent; ovules 2–6 per carpel; stigmas capitate. Fruiting pedicel 4–9 mm, 1.5–2 mm thick; monocarp stipes 6–10 × ca. 1 mm; monocarps ca. 10, globose, 1–1.3(–2) cm in diam., glabrous. Seeds 1 or 2 per monocarp.

- Forested slopes; 400–1200 m. Hainan, S Yunnan.

This species was originally included within *Orophea creaghii* (Ridley) Leonardia & Kessler (*Mezzetiopsis creaghii* Ridley), but Leonardia and Kessler believe that the Chinese material originally iden-

tified as that species (Merrill, Lingnan Sci. J. 14: 5. 1935) is better treated as a distinct species endemic to China. *Orophea creaghii* s.s. differs by the leaves drying dark reddish brown and with shortly caudate tips and is found in Indonesia, Malaysia, and the Philippines.

5. MILIUSA Leschenault ex A. Candolle, Mém. Soc. Phys. Genève 5: 213. 1832.

野独活属 ye du huo shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Saccopetalum Bennett.

Trees or erect shrubs. Inflorescences axillary or superaxillary, fasciculate or cymose, 1-flowered. Flowers mostly bisexual. Pedicel slender, usually elongate. Torus elevated, usually long pubescent. Sepals 3, small, valvate, connate at base. Petals 6, in 2 whorls, with each whorl valvate; outer petals similar to sepals; inner petals large, erect, thin, base shallowly saccate and shortly clawed, margin initially cohering but readily free, apex usually revolute. Stamens many; connectives narrow and not concealing anther locules, apex subapiculate. Carpels many, oblong; ovules 1–8 per carpel; stigmas capitate, ovoid, or globose. Fruit apocarpous; monocarps many, subsessile to long stipitate, globose to ovoid. Seeds 1 to several per monocarp.

About 38 species: tropical and subtropical Asia and Australia; seven species (three endemic) in China.

- 1a. Leaf blade broadest above middle; ovules 1 per carpel.
 - 2a. Leaf blade apex acuminate to shortly acuminate, secondary veins obscure and 7–9 on each side of midvein; pedicel 1–1.4 cm 1. *M. tenuistipitata*
 - 2b. Leaf blade apex obtuse, secondary veins raised and 12–15 on each side of midvein; pedicel 2–3 cm 2. *M. cuneata*
- 1b. Leaf blade broadest at or below middle; ovules 2–8 per carpel.
 - 3a. Shrubs; leaf blade glabrous or with larger veins only sparsely puberulent and glabrescent; sepals and petals sparsely pubescent.
 - 4a. Leaf blade secondary veins 13–20 on each side of midvein; pedicel 0.5–0.7 cm, superaxillary; inner petals ca. 0.3 cm 3. *M. glochidioides*
 - 4b. Leaf blade secondary veins 10–12 on each side of midvein; pedicel 4–6.5 cm, axillary; inner petals ca. 1.8 cm 4. *M. balansae*
 - 3b. Trees; leaf blade abaxially pubescent or tomentose; sepals and petals pubescent or tomentose.
 - 5a. Leaf blade 5–10 cm wide, base obliquely cordate; flowers 3–6 in leaf-opposed cymes or on short and few-leaved branches; carpels glabrous 5. *M. velutina*
 - 5b. Leaf blade 1.8–5 cm wide, base obtuse to rounded and slightly oblique; flowers 1–3 and axillary; carpels pubescent.
 - 6a. Pedicel 3.5–7.5 cm; outer petals as long as sepals; ovules 2 per carpel; monocarps glabrous 6. *M. sinensis*
 - 6b. Pedicel 1.5–3 cm; outer petals longer than sepals; ovules 8 per carpel; monocarps puberulent 7. *M. horsfieldii*

1. *Miliusa tenuistipitata* W. T. Wang, Acta Phytotax. Sin. 6: 200. 1957.

云南野独活 yun nan ye du huo

Trees to 12 m tall, d.b.h. to 30 cm, most parts pubescent. Petiole 1–4 mm; leaf blade obovate-elliptic to obovate-oblong, 7.5–19 × 2.8–7 cm, membranous, secondary veins 7–9 on each side of midvein and inconspicuous on both surfaces, base rounded to broadly cuneate and sometimes slightly oblique, apex acuminate to shortly acuminate. Inflorescences axillary, 1-flowered; bracts lanceolate, ca. 3 mm. Flowers ca. 1 cm. Pedicel 1–1.4 cm. Sepals ovate-oblong, ca. 4 × 1.5 mm. Outer petals 2.5–5 × ca. 2 mm; inner petals ovate, ca. 9 × 5 mm, puberulent. Stamen connectives slightly elevated. Carpels 4–8, oblong, puberulent; ovule 1 per carpel; stigmas globose, glabrous. Fruiting pedicel 1.7–3.5 cm; monocarp stipes 0.9–2.1 cm; monocarps globose, ca. 7 mm in diam., glabrous, tuberculate. Seeds 1 per monocarp. Fl. May, fr. Jun.

- Mixed forests, scrub; 700–1500 m. SE Xizang, S Yunnan.

2. *Miliusa cuneata* Craib, Bull. Misc. Inform. Kew 1912: 145. 1912.

楔叶野独活 xie ye ye du huo

Miliusa bannaensis X. L. Hou.

Trees to 6 m tall. Branchlets grayish brown, reticulately striate brown tomentose or glabrous. Petiole 3–4(–8) mm; leaf blade oblanceolate to broadly oblanceolate, 4–18(–26) × 1.5–8(–10) cm, papery, more densely pubescent on veins but sometimes glabrous, secondary veins 12–15 on each side of midvein, base cuneate to rounded, apex obtuse to bluntly acuminate. Inflorescences axillary at leafless nodes, 2–6-flowered; peduncle 1–2 mm; bracts 1 or 2, broadly ovate, 1.5–2 × 1.5–2 mm. Pedicel (1–)2–3 cm, pendulous; bracteoles 1 or 2 at base of pedicel and 1 below middle, similar to bracts, persistent. Sepals triangular to broadly lanceolate, ca. 2 mm, outside pubescent. Petals pale purple; outer petals similar to sepals, ca. 3.5 × 0.7–1 mm, pubescent; inner petals broadly lanceolate to oblong, ca. 2 × 1.3 cm, outside pubescent, inside puberulent and basally

concave. Stamens 14–16, in 2 series, ca. 1.5 mm; connectives apically shortly cuspidate. Carpels many, ellipsoid to ovoid, sparsely white pubescent; ovule 1 per carpel; stigmas terete, glabrous. Fruiting peduncle ca. 2 mm, thicker than long; monocarp stipes 0.7–1.4 cm; monocarps 8–14, drying blackish, subglobose to ellipsoid-ovoid, 7–9 × ca. 5 mm, glabrous; epicarp tuberculate, glabrous. Seed 1 per monocarp. Fl. Apr–Sep, fr. Jun–Feb.

Open forests; 500–1500 m. S Yunnan [N Thailand].

3. *Milium glochidioides* Handel-Mazzetti, *Sinensia* 3: 185. 1933.

广西野独活 *guang xi ye du huo*

Shrubs to 1.5 m tall. Branchlets terete, ferruginous pilose to glabrescent. Petiole to 2 mm; leaf blade elliptic to narrowly ovate-lanceolate, 3–8 × 1–3 cm, sparsely pilose to glabrescent, secondary veins 13–20 on each side of midvein, base obliquely rounded, apex shortly acuminate. Inflorescences superaxillary, 1- or 2-flowered; bracts ovate, 0.5–1 mm, sericeous. Pedicel filiform, 0.5–0.7 cm, glabrous. Sepals broadly ovate, ca. 1 mm, outside minutely strigose, inside glabrous. Outer petals as long as sepals; inner petals ovate, ca. 3.5 × 2.5 mm, outside minutely strigose, inside glabrous. Stamens ca. 20; filaments as long as anther locules; connectives broader than anther locules, subangular. Carpels ca. 10, glabrous. Fruit not seen. Fl. Jul, fr. Aug–Oct.

• Forested slopes; below 900 m. Guangxi.

The Annonaceae Checklist (Rainer & Chatrou, eds., AnnonBase in Species 2010 & ITIS Catalogue of Life; <http://herbarium.botanik.univie.ac.at/annonaceae/listTax.php>; accessed on 1 Oct 2010) treats this species as a synonym of *Orophea polycarpa*. The short pedicels are certainly anomalous among other Chinese species of *Milium* and more typical of *Orophea*, but there are serious discrepancies in the descriptions of these two taxa within China, most notably in petal sizes and stamen numbers, such that we do not wish to follow the checklist here.

4. *Milium balansae* Finet & Gagnepain, *Bull. Soc. Bot. France* 53(Mém. 4): 149. 1906.

野独活 *ye du huo*

Milium chunii W. T. Wang; *M. filipes* Merrill & Chun (1935), not Ridley (1920).

Shrubs 2–5 m tall. Branchlets slightly pubescent. Petiole 2–3 mm; leaf blade elliptic, elliptic-oblong, or oblong, 7–15 × 2.5–4.5 cm, membranous, glabrous or sparsely puberulent on midvein and secondary veins but glabrescent, secondary veins 10–12 on each side of midvein, base cuneate to rounded and oblique, apex acuminate to shortly acuminate. Inflorescences axillary, 1-flowered. Flowers 1.3–1.6 cm in diam. Pedicel filiform, 4–6.5 cm, pendulous, glabrous. Sepals ovate, ca. 2 mm, slightly pubescent. Petals red; outer petals slightly longer than sepals; inner petals ovate, 1.2–2.5 × 0.7–1.5 cm, apex reflexed. Anthers ovoid to obovoid. Carpels oblong to lens-shaped, slightly pubescent; ovules 2 or 3 per carpel; stigmas terete, puberulent. Fruiting peduncle 4–7.5 cm, slender; monocarp stipes 1–2 cm; monocarps globose, 7–10 mm in diam. Seeds 1–3 per monocarp. Fl. Apr–Jul, fr. Jul–Dec.

Forests or scrub in valleys; 500–1800 m. Guangdong, Guangxi, Guizhou, Hainan, S Yunnan [Vietnam].

5. *Milium velutina* (Dunal) J. D. Hooker & Thomson, *Fl. Ind.* 1: 151. 1855.

大叶野独活 *da ye ye du huo*

Uvaria velutina Dunal, *Monogr. Anonac.* 91. 1817; *Guateria velutina* (Dunal) A. Candolle; *U. villosa* Roxburgh.

Trees to 20 m tall. Branches tomentose when young. Petiole 2–7 mm, tomentose; leaf blade elliptic, ovate, or oblong, 8–15[–30] × 5–10[–16] cm, secondary veins ca. 16 on each side of midvein, base obliquely rounded to cordate, apex acute to shortly acuminate. Inflorescences leaf-opposed or on short few-leaved branches, cymose, 3–6-flowered. Peduncle 6–25 mm, tomentose; bracts minute, caducous. Pedicel 5–10 cm, slender; bracteoles similar to bracts. Torus glabrous. Sepals and outer petals ovate-triangular, 2–8 × 1.5–3.5 mm; inner petals dark brown, ovate-lanceolate to lanceolate-rhombic, ca. 10[–18] × 6[–10] mm, outside with very dense appressed golden hairs, inside glabrous. Carpels many, pubescent; ovules 2 per carpel, stigma clavate. Monocarp stipes 5–8 mm; monocarps globose to ovoid, ca. 20 × 16 mm, pilose. Fl. May, fr. Jul. $2n = 18$.

Forested slopes; 500–700 m. S Yunnan [Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

6. *Milium sinensis* Finet & Gagnepain, *Bull. Soc. Bot. France* 53(Mém. 4): 151. 1906.

中华野独活 *zhong hua ye du huo*

Evodia lvi H. Léveillé.

Trees to 6 m tall, most parts pubescent and densely so when young. Petiole 2–3 mm; leaf blade elliptic, oblong-elliptic, or rarely oblong, 5–13 × 2–5 cm, thinly papery to membranous, secondary veins 9–11 on each side of midvein, base obtuse to rounded and slightly oblique, apex acuminate to obtuse. Inflorescences axillary, erect to pendulous, 1-flowered; bracts 2–4, pubescent. Flowers 1–1.5 cm in diam. Pedicel 3.5–7.5 cm; bracteoles 2–4, near pedicel base. Sepals lanceolate, ca. 3 mm, apex obtuse and spreading. Outer petals as long as sepals; inner petals purplish red, ovate, 10–15 × 6–8 mm. Stamen connectives apically apiculate. Carpels ovoid, pubescent; ovules 2 per carpel; stigmas ovoid to subcapitate, glabrous. Monocarp stipes 1.3–2.1 cm, pendulous, puberulent; monocarps globose to obovoid, 7–10 × 7–8 mm, glabrous. Seeds 1 or 2 per monocarp. Fl. Apr–Sep, fr. Jul–Dec.

• Dense forests, scrub; 500–1500 m. Guangdong, Guangxi, Guizhou, S Yunnan.

7. *Milium horsfieldii* (Bennett) Pierre, *Fl. Forest. Cochinch.* t. 38. 1881.

囊瓣木 *nang ban mu*

Saccopetalum horsfieldii Bennett, *Pl. Jav. Rar.* 165. 1840; *Alphonsea prolifica* Chun & F. C. How; *Milium prolifica* (Chun & F. C. How) P. T. Li; *M. tectona* C. E. Parkinson; *S. arboreum* Elmer; *S. lineatum* Craib; *S. prolificum* (Chun & F. C. How) Tsiang; *S. unguiculatum* Fischer.

Trees to 15[–35] m tall, evergreen, d.b.h. to 50 cm. Bark ochre-colored. Branches villous. Petiole ca. 2 mm, villous; leaf blade elliptic to oblong, 4–13 × 1.8–4 cm, papery, abaxially villous, adaxially sparsely pubescent but densely so on veins, secondary veins 10–14 on each side of midvein, base rounded and slightly oblique, apex acute to acuminate. Inflorescences axillary, cymose, 1–30-flowered. Pedicel 1.5–3 cm, recurved. Sepals broadly triangular, ca. 3(–10) × 1–2 mm. Petals dark red; outer petals lanceolate, ca. 7(–13) × 1–2 mm, reflexed at anthesis; inner petals ovate-lanceolate, 20–26(–40) × 5–10(–15) mm, incurved, with a conspicuous midvein. Stamens ca. 1 mm. Carpels incurved crescent, densely sericeous; ovules 8 per carpel, in 2 series; stigmas ovoid, glabrous. Monocarp stipes 1–

1.5 cm; monocarps 5–20, dark red at maturity, globose to subglobose, 1–2 cm in diam., puberulent. Seeds 2–8 per monocarp, reniform, ca. 11 × 5 mm. Fl. Mar–Jun, fr. Jul–Aug.

Dense forests, woodlands; 300–1000 m. Guangdong, Hainan [India (Andaman and Nicobar Islands), Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand; Australia].

The timber from *Milusa horsfieldii* is straight, hard, non-splitting, and fine grained and is used for vehicle construction, agricultural implements, machinery, etc. Merrill and Chun (Sunyatsenia 2: 230. 1935) misidentified material of this species as *Alphonsea mollis* Dunn.

Milusa horsfieldii is listed as Vulnerable (VU A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 6 Oct 2010, as *Saccopetalum prolificum*).

6. DESMOS Loureiro, Fl. Cochinch. 1: 329 [“*Desmis*”], 352. 1790.

假鹰爪属 jia ying zhua shu

Li Bingtao (李秉滔 Li Ping-tao); Ng Kwok Wun (吴帼媛), Richard M. K. Saunders

Shrubs, erect or scandent, rarely treelets, indument of simple hairs. Petiole short; leaf blade venation arcuately looped near margin. Inflorescences solitary, axillary, superaxillary, or leaf-opposed, 1- or 2-flowered. Flowers bisexual. Sepals 3, valvate. Petals 6, in 2 whorls; each whorl valvate, subequal or outer whorl slightly larger than inner whorl; inner whorl basally constricted around reproductive organs to form enclosed floral chamber. Stamens many; connectives apically truncate or rounded; pollen inaperturate, in monads. Carpels many, free; ovary densely hairy; ovules 1–8 per carpel; stigmas oblong or ovoid, bent, with 1 U-shaped opening and a groove continued down adaxial side of carpel. Fruit apocarpous; monocarps many, shortly stipitate, fleshy, ellipsoid when 1-seeded or moniliform (rarely only slightly so) when more than 1-seeded. Seeds subglobose or ellipsoid.

About 25–30 species: tropical and subtropical Asia; five species (two endemic) in China.

- 1a. Outer petals significantly smaller than inner petals; sepals ca. 1 mm; multi-seeded monocarps only slightly moniliform.
- 2a. Leaf blade secondary veins 10–14 on each side of midvein; monocarps hairy 4. *D. yunnanensis*
- 2b. Leaf blade secondary veins 7–11 on each side of midvein; monocarps glabrous 5. *D. saccopetaloides*
- 1b. Outer petals slightly larger than or subequal to inner petals; sepals 4–11 mm; multi-seeded monocarps distinctly moniliform.
- 3a. Young branches densely hairy; leaf blade abaxially with erect hairs 1. *D. dumosus*
- 3b. Young branches subglabrous to hairy; leaf blade abaxially with appressed hairs.
- 4a. Leaf blade 15–28 × 5.5–8 cm, secondary veins 12–17 on each side of midvein; inflorescences to 4-flowered; fruit pedicel 6–8 cm 2. *D. grandifolius*
- 4b. Leaf blade 6–14 × 2–6.5 cm, secondary veins 7–12 on each side of midvein; inflorescences 1-flowered; fruit pedicel 2–6 cm 3. *D. chinensis*

1. *Desmos dumosus* (Roxburgh) Safford, Bull. Torrey Bot. Club 39: 506. 1912.

毛叶假鹰爪 mao ye jia ying zhua

Unona dumosa Roxburgh, Fl. Ind. 2: 670. 1824.

Climbers to 4 m tall, woody. Branches densely hairy when young. Petiole 5–10 mm; leaf blade obovate-elliptic to oblong, 5–16 × 2–7 cm, membranous to thinly papery, abaxially densely erect hairy, secondary veins 9–15 on each side of midvein, base shallowly cordate to truncate, apex shortly acuminate to acute. Inflorescences extra-axillary or leaf-opposed, 1-flowered. Pedicel 1–3 cm. Flowers pendulous. Sepals ovate to lanceolate, 4–11 × 2.5–6.5 mm. Outer petals ovate to obovate, 4–6.5 × 1.5–3.5 cm; inner petals ovate to lanceolate, 3–4(–6.5) × 0.5–0.8(–2) cm. Stamen connectives apically truncate to rounded. Carpels many; stigmas clavate, apex 2-cleft. Fruiting pedicel 2–4 cm; monocarp stipes 4–7 mm; monocarps ellipsoid or monili-

form, 0.8–5.5 × 0.5–0.8 cm, sparsely to densely hairy. Fl. Apr–Aug, fr. Jul–Apr.

Open forests, thickets; 500–1700 m. Guangxi, Guizhou, S Yunnan [Bhutan, India, Laos, Singapore, Thailand, Vietnam].

2. *Desmos grandifolius* (Finet & Gagnepain) C. Y. Wu ex P. T. Li, Acta Phytotax. Sin. 14(1): 104. 1976.

大叶假鹰爪 da ye jia ying zhua

Unona desmos Dunal var. *grandifolia* Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 81. 1906; *Desmos cochinchinensis* Loureiro var. *grandifolius* (Finet & Gagnepain) Jovet-Ast [“Ast”].

Climbers to 5 m tall, woody. Branches subglabrous to hairy when young. Petiole 5–10 mm; leaf blade oblong, 15–28 × 5.5–8 cm, papery to thinly leathery, abaxially sparsely to densely appressed hairy, secondary veins 12–17 on each side of

midvein and adaxially flattened, base shallowly cordate to truncate, apex shortly acuminate. Inflorescences fasciculate, (1–)4-flowered. Flowers pendulous. Pedicel 2.5–8 cm, puberulent, glabrescent; bracteoles near pedicel base, ovate, ca. 2.5 mm, abaxially puberulent, adaxially sparsely puberulent. Sepals ovate, 4–10 × 4–7 mm. Outer petals elliptic to lanceolate, 3.5–6 × 1.5–3 cm; inner petals lanceolate, 3–5 × 0.6–1 cm, puberulent on both surfaces. Anthers oblong, ca. 1.5 mm; connectives apically truncate to rounded. Carpels ca. 15; stigmas clavate, apex 2-cleft. Fruiting pedicel 6–8 cm; monocarp stipes ca. 1.6 cm; monocarps ellipsoid or moniliform, 1–5 × ca. 0.6 cm, hairy. Fl. Mar–Apr, fr. May–Sep.

Dense forests or thickets in valleys; 100–500 m. Guangxi, S Yunnan [Vietnam].

3. *Desmos chinensis* Loureiro, Fl. Cochinch. 1: 352. 1790.

假鹰爪 *jia ying zhua*

Artabotrys esquirolii H. Léveillé; *Unona chinensis* (Loureiro) Candolle; *U. discolor* Vahl.

Climbers to 4 m tall, woody. Branches stout, sparsely hairy when young, with raised grayish white lenticels. Petiole 3–8 mm; leaf blade oblong to elliptic, rarely broadly ovate, 6–14 × 2–6.5 cm, membranous to thinly papery, abaxially glaucous and sparsely appressed hairy, adaxially glossy, secondary veins 7–12 on each side of midvein, base rounded to slightly oblique, apex acute to acuminate. Inflorescences superaxillary or leaf-opposed, 1-flowered. Flowers 3–6 cm wide, pendulous. Pedicel 2–6.5 cm. Sepals ovate to lanceolate, 4–10 × 2–4.5 mm. Outer petals oblong to oblong-lanceolate, 3–6.5 × 1–2 cm; inner petals lanceolate, 4–7 × 1–2 cm. Stamen connectives apically truncate to rounded. Carpels 25–35; stigmas clavate, apex 2-cleft. Fruiting pedicel 2–6 cm; monocarp stipes 4–14 mm; monocarps ellipsoid or moniliform, 0.8–6 cm × 4–6 mm, with 2–6 joints; joints yellowish brown, subglobose, ca. 7 × 6 mm, sparsely hairy, apex of terminal obtuse to shortly rostrate. Fl. Apr–Oct, fr. Jun–Dec. $2n = 20$.

Wastelands and thickets in valleys; 100–1500 m. Guangdong, Guangxi, S Guizhou, Hainan, SE Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Thailand, Vietnam].

The bast fibers of *Desmos chinensis* are used for cordage; the roots and leaves are used medicinally; and the leaves are used in brewing liquor in Hainan.

4. *Desmos yunnanensis* (Hu) P. T. Li, Fl. Reipubl. Popularis Sin. 30(2): 51. 1979.

7. *DASYMASCHALON* (J. D. Hooker & Thomson) Dalla Torre & Harms, Gen. Siphon. 174. 1901.

皂帽花属 *zao mao hua shu*

Li Bingtao (李秉滔 Li Ping-tao); Wang Jing (王静), Richard M. K. Saunders

Unona sect. *Dasymaschalon* J. D. Hooker & Thomson, Fl. Ind. 1: 134. 1855.

Small trees [rarely climbers], indument of simple hairs. Petiole short; leaf blade venation arcuately looped near margin. Inflorescences axillary, 1-flowered. Flowers bisexual. Sepals 3, valvate. Petals (2 or)3, in 1 whorl alternate with sepals, valvate, apically connivent to form a mitriform dome (floral chamber) over reproductive organs and often with very small basal apertures between

云南假鹰爪 *yun nan jia ying zhua*

Phaeanthus yunnanensis Hu, Bull. Fan Mem. Inst. Biol. 10: 125. 1940; *Dasymaschalon yunnanense* (Hu) Bán.

Climbers, to 6 m tall, woody. Branches densely hairy when young. Petiole 3–8 mm; leaf blade oblong to obovate-oblong, 10–16 × 3.5–6.8 cm, membranous to thinly papery, abaxially appressed hairy, secondary veins 10–14 on each side of midvein and adaxially elevated, base rounded, apex acuminate. Inflorescences axillary, 1-flowered. Pedicel to 2.5 cm. Sepals broadly ovate, ca. 1 mm. Outer petals ovate, ca. 3 mm; inner petals ovate to obovate, ca. 2.8 × 2 cm, outside densely puberulent, inside sparsely puberulent. Stamen oblong, ca. 2 mm; connectives apically truncate. Carpels ca. 13, oblong, ca. 2 mm, glabrous, very sparsely hairy, or pilose; ovules 2–5 per carpel; stigmas globose. Monocarp stipes ca. 1 cm; monocarps slightly moniliform, to 3.5 × 0.5 cm, with 2 or 3 joints; joints cylindrical to ellipsoid, pilosulose. Fl. Oct, fr. Aug.

• Mixed forests; 1000–1400 m. S Yunnan (Xishuangbanna).

The taxonomic placement of this species within *Desmos* is questionable and requires further research.

5. *Desmos saccopetaloides* (W. T. Wang) P. T. Li, Guihaia 13: 314. 1993.

亮花假鹰爪 *liang hua jia ying zhua*

Phaeanthus saccopetaloides W. T. Wang, Acta Phytotax. Sin. 6: 199. 1957.

Trees or woody climbers, to 6 m tall. Branches appressed ferruginous pubescent when young, glabrescent. Petiole 3.5–5 mm; leaf blade elliptic, oblong, or ovate-oblong, 5.5–13.5 × 2–4.5 cm, membranous, abaxially sparsely hairy but glabrescent, adaxially glabrous except for puberulent midvein, secondary veins 7–11 on each side of midvein, base cuneate, apex acuminate. Inflorescences leaf-opposed, 1-flowered. Pedicel 2–2.2 cm. Sepals ovate-triangular, ca. 1 × 1 mm. Outer petals ovate-triangular, ca. 4 mm; inner petals ovate-oblong to lanceolate, 2.7–3.5 × 1–1.3 cm, outside pubescent, inside densely pubescent. Stamen connectives apically truncate. Carpels ca. 12, ca. 2.2 mm, densely tomentose; ovules ca. 8 per carpel; stigmas sessile, globose. Monocarp stipes 4–6 mm; monocarps slightly moniliform, 1.8–2.7 × 1–1.2 cm, with 3–5 joints, glabrous. Fl. Aug–Sep, fr. Oct–Nov.

• Forested slopes; 1200–2300 m. S Yunnan (Xishuangbanna).

The taxonomic placement of this species within *Desmos* is questionable and requires further research.

petals. Stamens many; connectives apically truncate or apiculate; pollen inaperturate, in monads. Carpels many, free; ovary densely hairy; ovules 1 to many per carpel. Fruit apocarpous; monocarps stipitate, ellipsoid when 1-seeded or moniliform when more than 1-seeded, fleshy, with a terminal apiculus. Seeds 1–6 per monocarp, globose or ellipsoid.

About 30 species: tropical and subtropical Asia; six species (two endemic) in China.

Dasymaschalon was included within *Desmos* in FRPS (30(2): 45–53. 1979) but is supported by molecular studies and is easily distinguished morphologically by the absence of an inner whorl of petals (J. Wang et al., Syst. Bot. 34: 252–265. 2009).

- 1a. Leaf blade midvein adaxially hairy; petiole densely hairy; sepals ovate, 7–16 × 4–9 mm; fruiting pedicel densely hairy 1. *D. trichophorum*
- 1b. Leaf blade midvein adaxially glabrous; petiole glabrous or sparsely hairy; sepals triangular, 1–4 × 1.5–4 mm; fruiting pedicel glabrous or sparsely hairy.
- 2a. Leaf blade 6–8.5 cm; petiole 2.3–3.3 mm; stamen connectives apically apiculate; pollen verrucate; monocarp stipes 2.5–3 mm; seeds 5–6 mm 2. *D. robinsonii*
- 2b. Leaf blade 10.5–21.5 cm; petiole 4.4–11 mm; stamen connectives apically truncate to rounded; pollen echinate; monocarp stipes 4–18 mm; seeds 6.5–24 mm.
- 3a. Leaf blade base slightly cordate; floral chamber ca. 20% of petal length 3. *D. glaucum*
- 3b. Leaf blade base rounded or slightly attenuate; floral chamber 50%–90% of petal length.
- 4a. Petiole glabrous; petals ca. 7 cm; monocarps 8.5–10 mm wide; monocarp stipes ca. 1.8 cm 4. *D. tibetense*
- 4b. Petiole sparsely hairy; petals 2–4.5 cm; monocarps 4.5–8 mm wide; monocarp stipes 0.6–1.3 cm.
- 5a. Floral chamber ca. 50% of petal length; monocarps 1.1–2 cm; seeds globose, ca. 1.3 × as long as wide 5. *D. rostratum*
- 5b. Floral chamber ca. 90% of petal length; monocarps 3–5 cm; seed ellipsoid, 3.5–6 × as long as wide 6. *D. sootepense*

1. *Dasymaschalon trichophorum* Merrill, Lingnan Sci. J. 6: 326. 1930.

皂帽花 zao mao hua

Trees to 3.5 m tall. Branches very densely hairy when young. Petiole 2.5–5.5 mm, densely hairy; leaf blade elliptic to obovate, 7–15 × (2.5–)4–8 cm, papery, abaxially glaucous and sparsely to densely hairy, adaxially glabrous or sparsely hairy, midvein hairy and abaxially more densely so, secondary veins 10–14 on each side of midvein and adaxially impressed, base rounded to shallowly cordate, apex acute. Flowers axillary or terminal on young growth. Pedicel 1–2 cm, densely hairy. Sepals 7–16 × 4–9 mm. Petals purplish red, triangular to ovate, 1.6–3 × 0.7–1 cm, papery, not twisted, outside densely hairy; floral chamber 4–6.5 mm, 20%–30% of petal length. Stamens 40–70 per flower; connectives apically apiculate; pollen echinate. Carpels 15–25, hispid; stigmas sparsely papillate. Fruiting pedicel 1–2.4 cm, densely hairy; monocarp stipes 3.5–6.5 mm; monocarps dark purple, subglobose when 1-seeded or moniliform when more than 1-seeded, 8.5–13 × 2.7–5.5 mm, with grayish white bristles, glabrescent, terminal apiculus 0.2–0.8 mm; joints 3–8, subglobose, 5–6 × ca. 5 mm, constrictions 1.2–2.3 mm wide, 25%–35% of monocarp width. Seeds 3–8 per monocarp, subglobose, 5.2–6 × 4.8–5 mm. Fl. Apr–Jul, fr. Jul–Dec.

• Sparsely forested slopes on sandy soil; below 100 m. Guangdong, Guangxi, Hainan.

Specimens of *Dasymaschalon trichophorum* have previously been misidentified as *D. macrocalyx* Finet & Gagnepain (*Desmos macrocalyx* (Finet & Gagnepain) P. T. Li), which does not occur in China.

2. *Dasymaschalon robinsonii* Jovet-Ast, Notul. Syst. (Paris) 9: 84. 1940.

钝叶假鹰爪 dun ye jia ying zhua

Desmos robinsonii (Jovet-Ast) P. T. Li.

Trees to 2 m tall. Branches sparsely hispid when young, glabrescent. Petiole 2.3–3.3 mm, sparsely hairy; leaf blade elliptic, 4–10 × 1.5–3.5 cm, thinly leathery, both surfaces glabrous, abaxially glaucous, midvein abaxially very sparsely hairy and adaxially glabrous, secondary veins 7–9(–11) on each side of midvein and adaxially impressed, base rounded to slightly cordate, apex acute, obtuse, or subrounded. Flowers axillary or subterminal on young growth. Pedicel ca. 4.5(–11) mm, very sparsely hairy. Sepals 2.7–3.7 × 2.2–2.7 mm. Petals triangular, 2.3–2.6 × ca. 0.6 cm, leathery, not twisted, outside very sparsely hairy; floral chamber ca. 1.2 cm, ca. 50% of petal length. Stamens ca. 60; connectives apically apiculate; pollen verrucate. Carpels ca. 12; stigmas densely papillate. Fruiting pedicel 6–8 mm, very sparsely hairy; monocarp stipes 2.5–3 mm; monocarps moniliform, with 3–5 subglobose joints, glabrous, ca. 4.5 mm wide, constrictions 2.5–2.9 mm wide, terminal apiculus ca. 0.8 mm. Seeds 3–5 per monocarp, subglobose, 5.3–5.8 × 4.4–4.9 mm. Fl. Apr–Jun, fr. Jun–Oct.

Open forests on limestone; ca. 600 m. Guizhou (Libo) [Vietnam].

The name *Dasymaschalon robinsonii* was first published in 1938 (Fl. Indo-Chine, Suppl. 1: 115) but not validly so.

3. *Dasymaschalon glaucum* Merrill & Chun, Sunyatsenia 2: 227. 1935.

白叶皂帽花 bai ye zao mao hua

Dasymaschalon rostratum Merrill & Chun var. *glaucum* (Merrill & Chun) Bân.

Trees to 8 m tall. Branches glabrous or hairy when young. Petiole 4.5–10 mm, sparsely hairy; leaf blade elliptic to obovate, 10.5–21 × 4–8 cm, leathery to subleathery, both surfaces glabrous, abaxially glaucous, midvein abaxially glabrous and

adaxially sparsely hairy, secondary veins 8–15 on each side of midvein and flush or adaxially slightly impressed, base slightly cordate, apex acuminate. Flowers on young growth. Pedicel 1.7–1.9 cm, very sparsely hairy. Sepals 2.5–3 × 2.5–3 mm. Petals purplish red, ovate, 2.6–4.2 × 0.8–1 cm, leathery, spirally twisted, outside densely hairy; floral chamber ca. 6 mm, ca. 20% of petal length. Stamens many; connectives apically truncate to rounded; pollen echinate. Carpels many; stigmas with sparse hairs. Fruiting pedicel 0.7–5.5 cm, glabrous or sparsely hairy; monocarp stipes 4–15 mm; monocarps red to brown, ellipsoid when 1-seeded or moniliform when more than 1-seeded, 1.6–5.5 cm × 5–8 mm, terminal apiculus 0.3–4 mm; constrictions 1.2–3.5 mm wide. Seeds 1–6 per monocarp, ellipsoid, 6.5–13 × 4.8–7 mm. Fl. Aug–Oct, fr. Apr–Feb.

Forested slopes on limestone or sandstone; 200–2400 m. Guangxi, Hainan [Laos, Thailand, Vietnam].

4. *Dasymaschalon tibetense* X. L. Hou, *Nordic J. Bot.* 23: 276. 2005.

西藏皂帽花 xi zang zao mao hua

Trees to 5 m tall. Branches glabrous or hairy when young. Petiole 0.9–1.1 cm, glabrous; leaf blade oblong, 13.5–20 × 4.5–5.5 cm, papery, both surfaces glabrous, abaxially glaucous, midvein glabrous on both surfaces, secondary veins ca. 12 on each side of midvein and adaxially flush, base slightly cuneate, apex acuminate. Flowers on young growth. Pedicel 1.2–1.5 cm, sparsely hairy. Sepals ca. 1.5 × 1.5 mm. Petals triangular, ca. 7 × 1.2 cm, leathery, not twisted, outside sparsely hairy; floral chamber ca. 5.5 mm, ca. 80% of petal length. Stamens ca. 100; connectives apically rounded; pollen echinate. Carpels not seen. Fruiting pedicel 1–2.3 cm, glabrous; monocarp stipes ca. 1.8 cm; monocarps ellipsoid when 1-seeded or moniliform when more than 1-seeded, ca. 2.1 × 1 cm, terminal apiculus ca. 0.2 mm; constrictions ca. 6 mm wide. Seeds 1 or 2 per monocarp, ellipsoid, 16–19 × ca. 10 mm. Fl. Mar–Jul, fr. Jun–Aug.

• Semi-evergreen subtropical forests; 500–1300 m. SE Xizang.

5. *Dasymaschalon rostratum* Merrill & Chun, *Sunyatsenia* 2: 8. 1934.

喙果皂帽花 hui guo zao mao hua

Desmos rostratus (Merrill & Chun) P. T. Li.

Trees to 4 m tall. Branches sparsely hairy when young. Petiole 5–10 mm, sparsely hairy; leaf blade elliptic to oblong, 13–21.5 × 3.5–7.5 cm, papery, both surfaces glabrous or very sparsely hairy, abaxially glaucous, midvein abaxially sparsely

hairy and adaxially glabrous, secondary veins 10–16 on each side of midvein and adaxially flush, base rounded to slightly attenuate, apex acute to acuminate. Flowers on young growth. Pedicel 1.2–4 cm, sparsely hairy. Sepals 2–3.5 × 1.5–3.5 mm. Petals ovate, 2–4 × 0.7–1.2 cm, leathery, generally not twisted, outside densely hairy; floral chamber 1–2 cm, ca. 50% of petal length. Stamens ca. 120; connectives apically truncate; pollen echinate. Carpels ca. 10; stigmas glabrous. Fruiting pedicel 2–5 cm, very sparsely hairy; monocarp stipes 6–13 mm; monocarps orangish red, subglobose when 1-seeded or moniliform when more than 1-seeded, 1.1–2 × 0.6–0.8 cm, terminal apiculus 2–4 mm; constrictions 2–3 mm wide. Seeds 1 or 2 per monocarp, subglobose, 8–9 × 6–7 mm. Fl. Apr–Oct, fr. Jul–Dec.

Sparsely forested slopes; 300–1000 m. ?Fujian, Guangdong, Guangxi, Hainan, SE Xizang, S Yunnan [Vietnam].

Dasymaschalon rostratum has been reported from Fujian (X. L. Hou & S. J. Li, *J. Trop. Subtrop. Bot.* 11: 171–173. 2003), but two of us (Wang and Saunders) believe the identity of this report is suspect and needs to be confirmed.

6. *Dasymaschalon sootepense* Craib, *Bull. Misc. Inform. Kew* 1912: 144. 1912.

黄花皂帽花 huang hua zao mao hua

Desmos sootepensis (Craib) J. F. Maxwell.

Trees to 10 m tall. Branchlets pilose, glabrous or glabrescent with age. Petiole 5–9 mm, sparsely hairy; leaf blade elliptic, 10–18 × 3–7 cm, papery, abaxially glaucous and very sparsely hairy, adaxially glabrous or very sparsely hairy, midvein abaxially sparsely hairy and adaxially glabrous, secondary veins 9–12(–18) on each side of midvein and flush or adaxially impressed, base rounded to very slightly attenuate, apex acuminate. Flowers on young growth. Pedicel 1–3 cm, sparsely hairy, bracteolate at base. Sepals broadly ovate, 1–2.5(–3) × 2.2–2.6(–3) mm. Petals yellow, ovate, 2.5–4.5 × 1.1–1.3(–2) mm, papery, not twisted, outside sparsely hairy; floral chamber to 3.7 mm, ca. 90% of petal length. Stamens ca. 140; connectives apically truncate; pollen echinate. Carpels ca. 20, oblong, ca. 3 mm; ovules 2–7 per carpel; stigmas glabrous or sparsely hairy. Fruiting pedicel 1.5–3 cm, glabrous or sparsely hairy; monocarp stipes 6–12 mm; monocarps red, ellipsoid when 1-seeded or moniliform when more than 1-seeded, 3–6 × 0.4–0.7 cm, terminal apiculus 1.5–2.5 mm; constrictions 2–2.5 mm wide. Seeds 1–4 per monocarp, ellipsoid, 17–24 × 4–5 mm. Fl. Apr–Jul, fr. Jun–Sep.

Evergreen broad-leaved forests on rocky/sandy alluvium; 600–1300 m. S Yunnan [N Thailand].

8. GONIOTHALAMUS (Blume) J. D. Hooker & Thomson, *Fl. Ind.* 1: 105. 1855.

哥纳香属 ge na xiang shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Polyalthia sect. *Goniothalamus* Blume, *Fl. Javae, Annonaceae*, 71, 79. 1830.

Trees or erect shrubs. Petiole short; leaf blade large, secondary veins arcuately looped near margin. Inflorescences axillary or extra-axillary, 1-flowered or several flowers in fascicles. Pedicel bracteolate at base. Sepals 3, valvate. Petals 6, in 2 whorls, with each whorl valvate; outer petals flat, thick; inner petals small, base shortly clawed, apex forming a cap. Stamens many; anther locules linear or oblong, extrorse; connectives oblong or clavate, 3-angular, apex truncate or rarely rounded. Carpels many; ovules 1–10 per

carpel, ± basal; styles elongate; stigmas entire or apex 2-lobed. Fruit apocarpous; monocarps sessile to shortly stipitate, oblong-ellipsoid or ovoid. Seeds 1–10 per monocarp.

About 130–140 species: tropical and subtropical Asia; 11 species (five endemic) in China.

A record of *Goniothalamus macrophyllus* (Blume) J. D. Hooker & Thomson from the Flora area (X. L. Hou, <http://www.abclunwen.com/lunwen-free-387606/>; accessed on 25 Nov 2010) was based on a misidentification of *Polyalthia simiarum*.

- 1a. Leaf blade margin and midvein abaxially densely rust-colored hirsute.
 2a. Leaf blade 56–76 × 13–19 cm; monocarps 6–9 × ca. 2 cm 1. *G. cheliensis*
 2b. Leaf blade 20–41 × 5.5–11.5 cm; monocarps 2–3 × 0.6–0.8 cm 2. *G. donnaiensis*
- 1b. Leaf blade glabrous throughout.
 3a. Inflorescences 3- or 4-flowered; leaf blade abaxially grayish green; inner petals ca. 2 × as long as outer petals 11. *G. laoticus*
 3b. Inflorescences 1- or 2-flowered; leaf blade abaxially green, sometimes drying brownish; inner petals much shorter than outer petals.
 4a. Leaf blade narrowly lanceolate to oblong-lanceolate.
 5a. Branchlets and petioles pubescent; stigmas deeply 2-cleft 3. *G. chinensis*
 5b. Branchlets and petioles glabrous; stigmas entire or shallowly 2-cleft.
 6a. Ovaries pubescent; ovules 2 per carpel 4. *G. gardneri*
 6b. Ovaries glabrous; ovules 1 per carpel 5. *G. gabriacianus*
- 4b. Leaf blade oblong, oblong-elliptic, elliptic, or obovate.
 7a. Leaf blade thinly papery, secondary veins adaxially flat to depressed; inflorescences 2-flowered.
 8a. Pedicel ca. 4 mm; styles ca. 2 × as long as ovaries; ovules basal; leaf blade secondary veins 7–9 on each side of midvein 6. *G. yunnanensis*
 8b. Pedicel 9–15 mm; styles 1–1.5 × as long as ovaries; ovules lateral; leaf blade secondary veins 9–21 on each side of midvein 7. *G. leiocarpus*
- 7b. Leaf blade papery to leathery, secondary veins adaxially raised; inflorescences 1-flowered.
 9a. Petioles and monocarps pubescent to puberulent 8. *G. amuyon*
 9b. Petioles and monocarps glabrous.
 10a. Flowers to 7 cm, ca. 5.5 cm in diam.; outer petals oblong-lanceolate; ovules 2 per carpel; monocarps ca. 1.5 × 1.3 cm 9. *G. calvicarpus*
 10b. Flowers to 2.5 cm, ca. 2.5 cm in diam.; outer petals broadly ovate; ovules 6 per carpel; monocarps 3–6 × 2–2.5 cm 10. *G. howii*

1. *Goniothalamus cheliensis* Hu, Bull. Fan Mem. Inst. Biol. 10: 122. 1940.

景洪哥纳香 jing hong ge na xiang

Trees to 5 m tall. Branches dark gray hispid. Petiole 2–2.5 cm, stout, rust-colored hirsute; leaf blade obovate, 56–76 × 13–19 cm, papery, abaxially sparsely hispid, adaxially glabrous, midvein densely rust-colored hirsute, secondary veins 26–30 on each side of midvein and prominent on both surfaces, base cuneate, margin densely rust-colored hirsute, apex caudate with a ca. 5 cm acumen. Flowers not seen. Fruiting carpels oblong-elliptic, 6–9 × 1.5–2 cm, densely rust-colored hirsute, lenticellate, acuminate on both ends. Seeds 4, oblong, ca. 2.5 × 1.5 cm. Fl. Mar, fr. Apr–Sep.

- Forested slopes; ca. 1500 m. S Yunnan.

Goniothalamus cheliensis is listed as Endangered (EN A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 6 Oct 2010).

2. *Goniothalamus donnaiensis* Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 121. 1906.

田方骨 tian fang gu

Trees to 5 m tall, most parts densely rust-colored hirsute when young. Petiole 1–1.5 cm, stout; leaf blade obovate-lanceolate to oblong-lanceolate, 20–41 × 5.5–11.5 cm, papery,

adaxially glabrous or hirsute along midvein, secondary veins 17–22 on each side of midvein, base cuneate, apex caudate with a 1–3 cm acumen. Flowers solitary. Pedicel short. Sepals broadly ovate, ca. 8 × 6 mm, inside glabrous. Petals reddish; outer petals ovate-lanceolate to oblong-lanceolate, ca. 2.3 × 0.5 cm; inner petals ovate-triangular, ca. 1.5 × 0.5 cm, inside glabrous, base attenuate into a ca. 3 mm claw. Stamens oblong, ca. 2 mm; anther locule with transverse stripes; connectives apically rounded to subtruncate. Carpels cylindrical-ovoid, ca. 4.5 mm, hirsute; ovules 2 per carpel, subbasal; style oblong, ± long as ovary, glabrous. Monocarps 4–12, connate, ovate-oblong, 2–3 × 0.6–0.8 cm, both ends acuminate. Seeds 1 or 2 per monocarp, yellowish, ovoid, ca. 1.5 × 5 mm, ribbed at bilateral plane. Fl. May–Sep, fr. Aug–Oct.

Densely forested slopes; 200–800 m. SW Guangxi, S Guizhou, SE Yunnan [Vietnam].

The bark of *Goniothalamus donnaiensis* is used as medicine for traumatic injuries and fractures.

3. *Goniothalamus chinensis* Merrill & Chun, Sunyatsenia 2: 6. 1934.

哥纳香 ge na xiang

Shrubs to 4 m tall. Branchlets pubescent when young, glabrescent. Petiole 5–12 mm, robust, pubescent or glabrous; leaf blade oblong-elliptic to oblong-lanceolate, 13–30 × 3–8 cm,

papery, glabrous, secondary veins 12–14 on each side of midvein, base broadly cuneate, apex shortly acuminate to obtuse. Inflorescences axillary, 1- or 2-flowered. Pedicel ca. 1 cm, with several bracteoles at base. Sepals broadly ovate, 5–6 × 5–6 mm, puberulent. Petals yellowish green; outer petals narrowly lanceolate, 2.2–3 × ca. 0.7 cm, outside puberulent; inner petals ovate, ca. 1.2 cm, apex acute to acuminate. Stamens linear-oblong, ca. 2 mm; connectives apically truncate. Carpels cylindrical, brown hispid; ovules 2 per carpel; styles as long as ovary; stigmas apically 2-cleft. Monocarps shortly stipitate, oblong-ellipsoid, 10–18 × 5–6 mm, sparsely hispid to glabrescent, apex obtuse. Fl. Jul–Sep, fr. Jul–Oct.

- Forested slopes; 300–600 m. S Guangxi, Hainan.

4. *Goniothalamus gardneri* J. D. Hooker & Thomson, Fl. Ind. 1: 107. 1855.

长叶哥纳香 chang ye ge na xiang

Trees to 5 m tall, all parts glabrous. Branches brown when young, striate with age. Petiole 0.4–2 cm, swollen; leaf blade narrowly oblong-lanceolate, 10–39 × 2.5–8 cm, leathery, midvein adaxially depressed, secondary veins 14–20 on each side of midvein and inconspicuous, base cuneate, apex acuminate to acute. Inflorescences axillary, 1-flowered. Pedicel 5–10 mm, bracteolate at base. Sepals broadly ovate, ca. 1.5 × 1 cm. Petals green turning brownish yellow, leathery; outer petals oblong-lanceolate, 5–6 × 1–1.5 cm; inner petals elliptic, ca. 1.5 × 1 cm. Stamens linear but obconic when dry, ca. 1.8 mm; connectives apically flat to very slightly convex, puberulent. Carpels cylindrical, pubescent; ovules 2 per carpel; styles slender; stigmas entire. Monocarps to 20, ovoid, 1–1.7 × 0.5–0.8 cm. Seeds 1 or 2 per monocarp, pale reddish brown, ovoid, slightly compressed. Fl. May–Nov, fr. Nov–Feb.

Densely forested slopes; 200–700 m. Hainan [India, Sri Lanka, Vietnam].

R. M. K. Saunders (in litt.) believes that *Goniothalamus gardneri* is endemic to Sri Lanka and that the Chinese and other material so named has been misidentified. The Sri Lankan material differs by the sparsely puberulent stems, slightly smaller sepals (0.8–1.2 cm), and shorter petals (outer 2.4 to less than 5 cm, abaxially puberulent; inner 0.9–1.4 cm).

5. *Goniothalamus gabriacianus* (Baillon) Jovet-Ast ["Ast"] in Lecomte, Fl. Indo-Chine, Suppl. 1: 95. 1938.

保亭哥纳香 bao ting ge na xiang

Oxymitra gabriaciana Baillon, Adansonia 10: 106. 1871; *Goniothalamus saigonensis* Pierre ex Finet & Gagnepain.

Trees to 5 m tall, glabrous except for flowers. Petiole 5–8 mm; leaf blade narrowly oblong-lanceolate, 12.5–22 × 2–4 cm, leathery, midvein adaxially depressed, secondary veins obscure, base cuneate, apex obtuse. Inflorescences axillary, 1-flowered. Pedicel short, bracteolate at base. Sepals broadly ovate, outside puberulent, inside glabrous. Petals greenish; outer petals oblong-triangular, ca. 1.2 cm, hispidulous; inner petals ovate, ca. 1 cm, outside hispidulous, inside glabrous. Stamens oblong; anther locules longitudinally striate; connectives apically subcapitate, puberulent. Carpels cylindrical, glabrous; ovule 1 per carpel,

basal; styles terete; stigmas apically shallowly 2-cleft. Monocarps oblong-ellipsoid to ellipsoid, 1–1.8 × 0.5–0.8 cm, glabrous. Seed 1 per monocarp. Fl. May–Jul, fr. May–Nov.

Densely forested slopes; 300–800 m. Hainan [Cambodia, Laos, Thailand, Vietnam].

6. *Goniothalamus yunnanensis* W. T. Wang, Acta Phytotax. Sin. 6: 209. 1957.

云南哥纳香 yun nan ge na xiang

Goniothalamus lii X. L. Hou & Y. M. Shui.

Trees to 5 m tall. Bark brown. Branches pale brown, glabrescent. Petiole 5–13 mm, drying blackish, slightly rugose; leaf blade oblong-elliptic, oblong, or sometimes obovate-oblong, 7–23 × 2.8–7 cm, thinly papery, glabrous, secondary veins 7–15(–21) on each side of midvein and adaxially depressed to slightly raised, base broadly cuneate, apex acute to acuminate. Inflorescences axillary, sometimes from leafless nodes, 1- or 2-flowered; peduncle 1–2 mm; bracts 2–4, ovate, 1–2 mm. Pedicel (2–)4–9(–13) mm, sparsely pubescent. Sepals broadly ovate-triangular, 5–8 × 4–8 mm, outside puberulent, inside glabrous. Petals reddish yellow; outer petals broadly lanceolate, 2–2.5 × 0.7–1.3 cm, rust-colored pubescent, inside densely rust-colored tomentulose; inner petals obovate to oblong-ovate, 7–11 × 4–5 mm, connate above middle, pubescent, base attenuate to a ca. 2 mm claw. Stamens many, (1.5–)2.2–3 mm; connectives apically truncate. Carpels ca. 14, ca. 3 mm, puberulent or glabrous; ovules 2 per carpel, basal; styles ca. 2 × as long as ovaries. Monocarp stipes ca. 4 mm; monocarps 5–16, ellipsoid, 1.8–2.5 × 0.8–0.9 cm, glabrous, minutely punctate, apex shortly cuspidate. Seeds (1 or)2 per monocarp. Fl. Apr–Jun, fr. Nov.

- Forested slopes; 100–800 m. S Yunnan.

7. *Goniothalamus leiocarpus* (W. T. Wang) P. T. Li, Acta Phytotax. Sin. 14(1): 112. 1976.

金平哥纳香 jin ping ge na xiang

Mitrephora leiocarpa W. T. Wang, Acta Phytotax. Sin. 6: 207. 1957.

Trees to 5 m tall, glabrous except for flowers. Branches lenticellate. Petiole 6–10 mm, ca. 2 mm thick; leaf blade obovate-oblong to sometimes oblong, 6–29 × 4.5–9 cm, papery, secondary veins 9–18 on each side of midvein, base cuneate to broadly cuneate, apex shortly acuminate to acute. Inflorescences axillary, 2-flowered. Flowers ca. 1.6 cm. Pedicel ca. 1.5 cm, puberulent, bracteolate at base. Sepals broadly ovate, ca. 5 mm, outside sparsely puberulent, inside glabrous. Petals reddish yellow; outer petals ovate, 1.8–2.3 × 1.1–1.5 cm, thickly leathery, outside sparsely puberulent, inside rust-colored tomentulose, base shortly clawed, apex acute; inner petals obovate, ca. 1.3 × 0.8 cm, leathery, outside glabrous, inside pubescent, base with a ca. 3.5 mm claw, margin densely pubescent, apex acute. Stamens ca. 1.5 mm; connectives apically truncate. Carpels ca. 18, linear, ca. 4 mm, glabrous; ovules 10 per carpel, in 2 series; styles clublike, as long as ovaries. Monocarps solitary or several fasciculate, ovoid, 4–7 × 2.2–4.2 cm, glabrous. Seed 1 per monocarp, reniform, 2.5–3 × ca. 2 cm. Fl. May–Jul, fr. Aug–Nov.

- Forested slopes; 700–1600 m. S Yunnan.

8. *Goniothalamus amuyon* (Blanco) Merrill, Philipp. J. Sci., C, 10: 264. 1915.

台湾哥纳香 tai wan ge na xiang

Uvaria amuyon Blanco, Fl. Filip. 463. 1837; *Polyalthia sasakii* Yamamoto.

Shrubs or small trees, 2–5 m tall. Petiole 6–8 mm, sparsely pubescent; leaf blade oblong-elliptic to elliptic, 8–16 × 3–5.5 cm, papery, glabrous, abaxially with brown specks, secondary veins 8–11 on each side of midvein and adaxially slightly prominent, base broadly cuneate, apex obtuse. Inflorescences axillary. Pedicel ca. 6 mm. Sepals ovate-triangular, outside pubescent. Outer petals lanceolate, ca. 3.5 × 0.7 cm, thick, outside pubescent; inner petals ovate, smaller than outer petals. Stamens many; connectives broadly 3-angular. Carpels cylindrical; ovules 1–3 per carpel; styles linear, ca. 3.5 mm. Fruiting carpels ovoid to ellipsoid, 1–1.8 × 0.6–0.9 cm. Seeds 1 or 2 per monocarp. Fl. May–Jul, fr. Jul–Oct.

Mixed woods; 300–500 m. S Taiwan [Philippines].

9. *Goniothalamus calvicarpus* Craib, Bull. Misc. Inform. Kew 1922: 227. 1922.

大花哥纳香 da hua ge na xiang

Trees to 8 m tall. Branchlets pubescent, glabrescent. Petiole 0.7–1.5 cm, robust; leaf blade oblong, 17–35 × 5.5–9 cm, papery, glabrous, midvein stout and adaxially depressed, secondary veins 14–20 on each side of midvein and slightly elevated on both surfaces, base rounded to broadly cuneate, apex obtuse to shortly acuminate. Inflorescences axillary or extra-axillary, 1-flowered. Pedicel 1–1.5 cm, glabrous, many bracteolate at base. Sepals broadly ovate, 2–2.5 cm, glabrous. Outer petals oblong-lanceolate, 5–6.5 × ca. 1.5 cm, puberulent; inner petals oblong-ovate, ca. 2 × 0.8 cm, puberulent. Stamens oblong, ca. 4 mm; connectives 3-angular. Carpels cylindrical, ca. 6 mm, pubescent; ovules 2 per carpel; styles elongate; stigmas apically 2-cleft. Monocarps fasciculate, subsessile, ovoid, ca. 1.5 × 0.8 cm, puberulent. Seed 1 per monocarp. Fl. Apr–Aug, fr. Aug–Nov.

Forested slopes; 800–1500 m. S Yunnan [N Thailand].

Saunders and Chalermglin (Bot. J. Linn. Soc. 156: 359–363. 2008) regard the Chinese material identified as *Goniothalamus griffithii* J. D. Hooker & Thomson to be more correctly placed in *G. calvicarpus*, treating *G. griffithii* as a local species restricted to S Myanmar and adjacent W Thailand. The Chinese material is somewhat intermediate

between the two, and clearly the situation needs more detailed investigation.

10. *Goniothalamus howii* Merrill & Chun, Sunyatsenia 5: 60. 1940.

海南哥纳香 hai nan ge na xiang

Trees to 15 m tall, glabrous except for flowers. Petiole 7–10 mm; leaf blade oblong to sometimes elliptic, 10–25 × 4–8 cm, papery, brownish when dry, secondary veins 10–15 on each side of midvein, base cuneate to rounded, apex shortly acuminate to obtuse. Inflorescences axillary, 1-flowered. Pedicel 1–2 cm, puberulent, several bracteolate at base. Sepals broadly ovate, ca. 5 mm, outside puberulent. Petals yellowish green; outer petals broadly ovate, 2.2–2.5 × 1.6–1.8 cm, leathery, sparsely pubescent; inner petals broadly ovate to subrhomboid, 1.3–1.5 cm, thickly leathery, densely hispid. Stamens oblong; connectives orbicular. Carpels 15–18, pubescent; ovules 6 per carpel, in 1 series; styles oblong, as long as ovary; stigmas apically 2-cleft. Monocarps ovoid to cylindrical-ovoid, 3–6 × 2–2.5 cm, glabrous. Fl. Mar–Sep, fr. May–Jan.

- Forested slopes; 300–800 m. Hainan, S Yunnan.

11. *Goniothalamus laoticus* (Finet & Gagnepain) Bân, Bot. Zhurn. (Moscow & Leningrad) 59: 554. 1974.

柄芽银钩花 bing ya yin gou hua

Mitrephora laotica Finet & Gagnepain, Bull. Soc. Bot. France 54(Mém. 5): 87. 1907.

Trees to 10 m tall, glabrous except for flowers. Branches robust. Petiole ca. 7 mm; leaf blade oblong, 13–18 × 3–5 cm, leathery, abaxially pale gray/glaucous, adaxially glossy, midvein adaxially concave, secondary and reticulate veins obscure, base attenuate, apex obtuse and shortly cuspidate. Inflorescences 3- or 4-flowered. Flowers ca. 1.2 cm. Pedicel 6–7 mm, robust, bracteolate at base. Sepals broadly ovate to suborbicular, erect, outside puberulent, inside glabrous. Outer petals lanceolate, suberect, both surfaces pubescent; inner petals obovate, ca. 2 × as long as outer petals, both surfaces pubescent, base clawed, margin ciliate. Stamens many; connectives semiorbicular, papillose. Carpels 10, cylindrical, glabrous; ovules 8–10 per carpel; stigmas fusiform, papillose. Fruit not seen. Fl. Apr–Jun, fr. Jul–Oct.

Dense woods; ca. 700 m. S. Yunnan [Laos, C and N Thailand].

Weerasooriya and Saunders (Syst. Bot. 30: 262. 2005) follow Bân and exclude this species from *Mitrephora*.

9. MITREPHORA J. D. Hooker & Thomson, Fl. Ind. 1: 112. 1855, not *Mitrephora* Necker ex Rafinesque (1813), nor Lévêillé (1846) [Fungi].

银钩花属 yin gou hua shu

Li Bingtao (李秉滔 Li Ping-tao); Aruna D. Weerasooriya, Richard M. K. Saunders

Uvaria sect. *Mitrephorae* Blume, Fl. Javae, Annonaceae, 13. 1830; *Kinginda* Kuntze.

Trees to 40 m tall. Petiole short; leaf blade venation arcuately looped near margin, secondary veins 4–24 on each side of midvein. Flowers terminal, leaf opposed, or extra-axillary, solitary or in cymes; sympodial rachides simple or branched, internodes short or long. Flowers bisexual, pendent. Pedicel short or long, with basal bracts and submedian bracteoles. Sepals 3, valvate, basally ±

connate. Petals 6, in 2 whorls, free, with each whorl valvate; outer petals usually smaller than inner petals, without a basal claw; inner petals with base clawed, apically connivent to form a mitriform dome. Stamens many; anthers cuneate, extrorse; connectives apically truncate. Carpels few to many, free; ovules several per carpel, in 2 series. Fruit apocarpous; monocarps sessile or stipitate, globose, obovoid, or cylindrical, sometimes longitudinally ridged, smooth or rarely warty.

About 47 species: tropical and subtropical Asia; three species in China.

- 1a. Petioles and abaxial surface of leaf blades densely hairy; bracteoles 4.5–7.5 × 3.5–9 mm; sepals 5–9 × 5–9 mm; carpels 12–17; monocarps subglobose, without a longitudinal ridge 1. *M. tomentosa*
 1b. Petioles and abaxial surface of leaf blades subglabrous to sparsely hairy; bracteoles 1.5–3.5 × 1–4 mm; sepals 3–4 × 3–4.5 mm; carpels 7–10; monocarps ± elongate, with a longitudinal ridge.
 2a. Leaf blade secondary veins 7–9 on each side of midvein; outer petal margin never undulate; monocarp stipes 1.4–1.8 cm 2. *M. macclurei*
 2b. Leaf blade secondary veins 10–14 on each side of midvein; outer petal margin undulate in older flowers; monocarp stipes 0.9–1.3 cm 3. *M. wangii*

1. *Mitrephora tomentosa* J. D. Hooker & Thomson, Fl. Ind. 1: 113. 1855.

银钩花 yin gou hua

Kinginda thorelii (Pierre) Kuntze; *K. tomentosa* (J. D. Hooker & Thomson) Kuntze; *Mitrephora bousigoniana* Pierre; *M. collinsae* Craib; *M. edwardsii* Pierre; *M. thorelii* Pierre; *M. thorelii* var. *bousigoniana* (Pierre) Finet & Gagnepain; *M. thorelii* var. *microphylla* Finet & Gagnepain; ?*M. vandiflora* Kurz.

Trees to 20 m tall. Branches densely hairy when young. Petiole 4–12.5 mm, densely hairy; leaf blade ovate, lanceolate, or rarely oblong, 6.5–21.5 × 3–10 cm, leathery, abaxially densely hairy, adaxially glabrous, secondary veins (8–)14–20 on each side of midvein, base rounded to slightly cordate, apex acute to shortly acuminate. Inflorescence rachides unbranched, internodes short. Pedicel 1.1–2.3 cm; bracteoles 4.5–7.5 × 3.5–9 mm. Sepals ovate, 5–9 × 5–9 mm. Outer petals pale yellow turning dark yellow, lanceolate to oblanceolate, 1.6–2(–3.4) × 0.7–1.8 cm, margin undulate on older flowers; inner petals cream to yellow with apical purple streaks, 0.8–1.7 × 0.7–1.3 cm. Stamens 1–1.3 mm. Carpels 12–17, 1.5–1.7 mm; ovules 10–12 per carpel. Fruiting pedicel 1.5–3.4 cm; monocarp stipes 1.6–3(–3.9) cm; monocarps subglobose, 1.2–2.3 × 0.8–2 cm, densely hairy, smooth, without longitudinal ridge. Seeds ca. 12 × 8 mm. Fl. Jan–Apr, fr. May–Sep.

Wet and dry evergreen broad-leaved forests; below 100–1200 m. W Guangxi, S Guizhou, Hainan, S Yunnan [Cambodia, India (Assam), Laos, Thailand, Vietnam].

The wood of *Mitrephora tomentosa* is used for building carts and as structural timbers. The bark is a source of saponins and is used as a soap.

2. *Mitrephora macclurei* Weerasooriya & R. M. K. Saunders, Syst. Bot. 30: 251. 2005.

山蕉 shan jiao

Trees to 10 m tall. Branches densely hairy when young. Petiole 6–8.5 mm, sparsely hairy; leaf blade lanceolate, (8–)10–14 × 3–4.5 cm, leathery, abaxially subglabrous to sparsely hairy, adaxially glabrous, secondary veins 7–9 on each side of midvein, base broadly cuneate, apex acute. Inflorescence rachides unbranched, internodes short. Pedicel 1.2–2 cm; bracte-

oles 1.5–3.5 × 2–4 mm. Sepals ovate, 3–4 × 3–3.5 mm. Outer petals white turning yellow, elliptic to ovate, 1.8–2.5 × 1.1–2 cm, margin never undulate; inner petals purple, 1.1–1.3 × 0.6–0.9 cm. Stamens 1.5–1.9 mm. Carpels 7 or 8, 2–2.5 mm; ovules 8–10 per carpel. Fruiting pedicel ca. 1.3 cm; monocarp stipes 1.4–1.8 cm; monocarps obovoid, ca. 3.8 × 2.5 cm, sparsely hairy, smooth, with longitudinal ridge. Seeds ca. 1.2 × 1 cm. Fl. Mar–May, fr. Sep–Oct.

Riverine forests; ca. 800 m. Guangxi, S Guizhou, Hainan, S Yunnan [Laos, Malaysia (peninsular), Vietnam].

Previous workers (e.g., FRPS 30(2): 58. 1979) have confused *Mitrephora macclurei* with *M. teysmannii* Scheffer (generally under the synonym *M. maingayi* J. D. Hooker & Thomson). They are most easily distinguished by the outer petals, which in *M. teysmannii* are cream-colored with reddish streaks (becoming dark yellow with reddish brown streaks with age) and have undulate margins, whereas in *M. macclurei* the outer petals are uniformly white (becoming yellow with age) and lack undulate margins. The Chinese material corresponds to *M. macclurei*. It is cultivated in Guangdong.

3. *Mitrephora wangii* Hu, Bull. Fan Mem. Inst. Biol. 10: 123. 1940.

云南银钩花 yun nan yin gou hua

Trees to 10 m tall. Branches densely hairy when young. Petiole 6.5–11.5 mm, sparsely hairy; leaf blade oblong-lanceolate, 10.5–24(–27) × 3.5–8 cm, leathery, abaxially sparsely hairy, adaxially glabrous, secondary veins 10–14 on each side of midvein, base cuneate to broadly cuneate, apex shortly acuminate to acuminate. Inflorescence rachides unbranched, internodes short. Pedicel 1.2–1.7 cm; bracteoles 1.5–2 × 1–1.5 mm. Sepals ovate, 3–3.5 × 3–4.5 mm. Outer petals white turning bright yellow, ovate, 1.6–2.3 × 1–1.9 cm, margin ± undulate on older flowers; inner petals purplish, 1.1–1.9 × 0.6–1.3 cm. Stamens 0.8–1 mm. Carpels 8–10, 1.8–2 mm; ovules 6–8 per carpel. Fruiting pedicel 1–1.6 cm; monocarp stipes 0.9–1.3 cm; monocarps oblong, 2.4–3.8 × 1.4–2.6 cm, sparsely hairy, smooth, with longitudinal ridge. Seeds ca. 9 × 6 mm. Fl. Jan–May, fr. Jun–Sep.

Densely forested slopes; 500–1600 m. S Yunnan [N Thailand].

Mitrephora wangii is listed as Vulnerable (VU A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 6 Oct 2010).

10. PSEUDUVARIA Miquel, Fl. Ned. Ind. 1(2): 32. 1858.金钩花属 *jin gou hua shu*

Li Bingtao (李秉滔 Li Ping-tao); Yvonne C. F. Su (许传芳), Richard M. K. Saunders

Trees to 40 m tall, dioecious, monoecious, andro-dioecious, or hermaphroditic. Petiole short or absent; leaf blade venation arcuately looped near margin. Inflorescences on young branches [rarely on trunks], rhipidial, solitary or in clusters; peduncle short [or long]; sympodial rachis internodes short [or long]. Flowers unisexual [or bisexual], pendent. Pedicel short or long, with submedian bracteoles. Sepals 3, valvate, free or basally connate, membranous. Petals 6, in 2 whorls, free, with each whorl valvate; outer petals generally shorter than inner petals, generally without basal claw, membranous; inner petals sometimes with adaxial glands, base generally clawed, apically connivent to form a mitriform dome. Male flowers: stamens [7–]46–56[–153], cuneate, extrorse, often with a ring of staminodes; connectives apically truncate. Female flowers: staminodes [0–]7–9[–20]; carpels [1–]7–14[–30], free; ovules [1–]5 or 6[–20] per carpel, in [1 or]2 series. Fruit apocarpous; monocarps shortly stipitate [or sessile], generally globose [or ellipsoid], mostly with longitudinal groove, [smooth or] rugose. Seeds smooth or rugose.

About 56 species: tropical and subtropical Asia; one species in China.

1. *Pseuduvaria trimera* (Craib) Y. C. F. Su & R. M. K. Saunders, Syst. Bot. Monogr. 79: 174. 2006.

金钩花 *jin gou hua*

Mitrephora trimera Craib, Bull. Misc. Inform. Kew 1913: 65. 1913; *Pseuduvaria indochinensis* Merrill.

Trees to 20 m tall, monoecious. Branches pale gray, densely puberulent when young, glabrescent. Petiole 3–11 mm, very densely puberulent; leaf blade obovate-elliptic to elliptic, 10–23 × 3.5–8.5 cm, thinly leathery, abaxially bluish green and glabrous, adaxially glossy and sparsely puberulent, secondary veins 10–12(–18) on each side of midvein and pubescent on both surfaces, base broadly cuneate to obtuse, apex acuminate. Inflores-

cences on young branches, in clusters of 3–6, each 1- or 2-flowered; peduncle inconspicuous; sympodial rachides short. Flowers unisexual. Pedicel 1–3 cm. Sepals ovate, 1–1.5 × 2–2.5 mm. Petals yellow; outer petals ovate, 2–3 × 1.5–3 mm; inner petals clawed-triangular, 5–8 × 3–5.5 mm, basal claw 2.5–5 mm. Male flowers: stamens 46–56. Female flowers: staminodes 7–9; carpels 7–14; ovules 5 or 6 per carpel, in 2 series. Fruiting pedicel 2–3 cm; monocarp stipes 1–1.4 cm; monocarps green, globose, 1.6–2.2 × 1.6–2.1 cm, densely puberulent. Seeds rugose. Fl. Feb–Apr, fr. Apr–Jul.

Evergreen and deciduous broad-leaved forests at base of limestone mountains; 200–700(–1500) m. S Yunnan [Myanmar, Thailand, Vietnam].

11. XYLOPIA Linnaeus, Syst. Nat., ed. 10, 2: 1241, 1250, 1378. 1759, nom. cons.木瓣树属 *mu ban shu shu*

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Xylopicrum P. Browne.

Trees [or shrubs]. Flowers axillary, solitary [or fasciculate]. Flower buds lanceolate [to subulate]. Pedicel usually short, bracteolate at apex [or base]. Sepals 3, valvate, thick, connate at base sometimes into a cup-shaped calyx. Petals 6, in 2 whorls, with each whorl valvate, connivent or scarcely open, elongated, thick, woody when dry, inside basally concave, middle narrowly convex; outer petals larger and longer than inner petals. Stamens many; anther locules oblong, extrorse, transversely septate; connectives 3-angular, apex truncate-dilated. Carpels few to many, free; ovules 2–6 per carpel, sutural; styles elongated; stigmas clavate [capitate, or oblong], extended. Fruit apocarpous; monocarps stipitate, oblong [to elongated], moniliform, often dehiscent. Seeds [1–]3–8[to many] per monocarp, ovoid; aril present but often inconspicuous.

About 160 species: Africa, America, SE Asia; one species in China.

1. *Xylopia vielana* Pierre, Fl. Forest. Cochinch. t. 34. 1881.

木瓣树 *mu ban shu*

Trees to 20 m tall. Branches dark brown, densely tomentulose when young, glabrescent, densely lenticellate. Petiole 4–8 mm, tomentose to glabrescent; leaf blade elliptic to ovate, 3–7 × 1.2–3 cm, papery, abaxially tomentulose, adaxially appressed pubescent, secondary veins 6 or 7 on each side of midvein, base obtuse to rounded, apex obtuse to shortly acuminate. Inflorescences axillary, 1-flowered. Flower buds lanceolate, with 3 longitudinal ribs. Flower ca. 2 × 0.5–0.8 cm, recurved. Pedicel 2–3 mm, tomentulose, bracteolate at apex. Calyx shallowly 3-

lobed; sepals broadly ovate, ca. 4 × 4 mm, outside densely tomentulose, inside glabrous. Outer petals lanceolate, ca. 15 × 3 mm, concave, thick, woody when dry, tomentulose; inner petals linear-lanceolate, ca. 14 × 2 mm, tomentulose, with adaxially elevated central rib. Stamens oblong, ca. 2.5 mm; anther locules transversely septate; connectives narrowly 3-angular, pubescent. Carpels ca. 4 mm, densely villous; styles slender; stigmas clavate, villous. Monocarp stipes ca. 1.5 cm; monocarps oblong, 2.5–3.5 × 0.8–1 cm. Seeds 3–8 per monocarp, ovoid. Fl. Mar–Jun, fr. Jun–Oct.

Forested slopes; 400–700 m. S Guangxi [Cambodia, N Thailand, Vietnam].

12. MEIOGYNE Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 12. 1865.

鹿茸木属 *lu rong mu shu*

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Shrubs [or trees], with simple hairs. Leaves with closely spaced oblique secondary veins. Inflorescences axillary, 1–3-flowered. Flowers bisexual. Torus conic. Sepals 3, valvate, united at base. Petals 6, in 2 whorls, with each whorl valvate, flat; outer petals slightly longer than or \pm as long as inner. Stamens many; anther locules cuneate; connectives apically rhomboidal. Carpels 2–7(–12), sessile, villous; ovules several per carpel, in 2 series; stigmas sessile, subcapitate. Fruit apocarpous; monocarps 1–3[–5], usually sessile, ovoid [oblong or ellipsoid]. Seeds [several to] many per monocarp.

About nine species: S and SE Asia; one species (endemic) in China.

1. *Meiogyne kwangtungensis* P. T. Li, Acta Phytotax. Sin. 14(1): 104. 1976.

鹿茸木 *lu rong mu*

Shrubs to 3 m tall. Bark dark gray. Branches densely villous when young, glabrescent. Petiole 2–3 mm, villous; leaf blade oblong to elliptic, 6–18 \times 2.5–5.5 cm, membranous, abaxially glaucous and villous, adaxially glossy and glabrous except for pubescent midvein, midvein adaxially impressed, secondary veins ca. 10 on each side of midvein and prominent on both surfaces, base rounded to sometimes shallowly cordate, apex acuminate. Flowers axillary, reportedly light red. Fruiting pedicel much longer than monocarps. Monocarps 1–3, sessile, ovoid,

1.8–3 \times 1–1.5 cm, obscurely moniliform, very shallowly transversely constricted between seed, densely tomentose, base rounded, apex apiculate. Seeds 10 per monocarp, in 2 series. Fl. Jul, fr. Jul–Aug.

- Open woodland in valleys; ca. 600 m. Hainan.

Flowers are needed to confirm the generic placement of this taxon. The Annonaceae Checklist (Rainer & Chatrou, eds., AnnonBase in Species 2010 & ITIS Catalogue of Life; <http://herbarium.botanik.univie.ac.at/annonaceae/listTax.php>; accessed on 1 Oct 2010) suggests that it might be better placed within *Pseuduvaria* or *Mitrephora*. *Meiogyne kwangtungensis* is only known from the type collection, which is in fruit although the protologue does report the flower color to be light red.

13. CHIENIODENDRON Tsiang & P. T. Li, Acta Phytotax. Sin. 9: 374. 1964.

蕉木属 *jiao mu shu*

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Trees, with simple hairs. Inflorescences axillary or superaxillary, 1- or 2-flowered. Flowers bisexual. Pedicel short, bracteolate at base. Sepals 3, valvate, connate at base. Petals 6, in 2 whorls, with each whorl valvate, subequal but inner petals narrower than outer petals, thick and fleshy to leathery when dry, inside basally concave to cucullate. Stamens many; anther locules oblong-obovoid; connectives broad and thickened, apex truncate to subtruncate. Carpels 2–12; ovules 6–10 per carpel, in 2 series; styles subsessile; stigmas large, erect, base constricted, apex entire. Fruit apocarpous; monocarps stipitate, slightly constricted between seeds, rust-colored tomentulose. Seeds many per monocarp, in 2 series.

- One species: China.

The *IUCN Red List of Threatened Species* (Version 2010.3; <http://www.iucnredlist.org>; accessed on 6 Oct 2010) treats the only member of this genus, *Chieniodendron hainanense* (under the name *Oncodostigma hainanense*), as Endangered (EN A2c).

Heusden (Blumea 38: 492–494. 1994) includes *Chieniodendron* within *Meiogyne*.

1. *Chieniodendron hainanense* (Merrill) Tsiang & P. T. Li, Acta Phytotax. Sin. 9: 375. 1964.

蕉木 *jiao mu*

Fissistigma hainanense Merrill, J. Arnold Arbor. 6: 131. 1925; *Desmos hainanensis* (Merrill) Merrill & Chun; *F. mac-lurei* Merrill (1923), not Merrill (1922); *Meiogyne hainanensis* (Merrill) Bân; *Oncodostigma hainanense* (Merrill) Tsiang & P. T. Li.

Trees to 16 m tall, evergreen, d.b.h. to 50 cm. Branchlets, bracteoles, pedicels, outer petals on both surfaces, inner petals outside, and fruit rust-colored pubescent. Petiole 4–5 mm, pubescent; leaf blade oblong to oblong-lanceolate, (4–)6–10(–16) \times (1.5–)2–3.5(–5) cm, thinly papery, drying brown or brownish green, glabrous except for veins, midvein adaxially impressed,

secondary veins 6–10 on each side of midvein, base rounded, apex shortly acuminate. Bracts ovate, 2–4 mm. Flowers ca. 1.5 cm in diam. Pedicel 6–7 mm; bracteoles ovate, 2–4 mm. Bud globose. Sepals ovate-triangular, 4–5 mm. Petals yellowish green; outer petals oblong-ovate, 1.4–1.7 \times 1–1.1 cm; inner petals slightly thicker and shorter, ca. 1.4 \times 0.8–0.9 cm, cucullate, inside basally concave and glabrous. Stamens ca. 2 mm. Carpels oblong, densely villous; stigmas clavate, erect, apex entire and puberulent. Monocarps to 8, shortly stipitate, ellipsoid, cylindrical, or obovoid, 2–5 \times 2–2.5 cm, constricted between seeds, longitudinally ridged on one side. Seeds 6–10 per monocarp, pale yellowish brown, obliquely quadrate. Fl. Apr–Dec, fr. Aug–Mar.

- Dense forest in valleys; 300–600 m. S Guangxi, Hainan.

14. POLYALTHIA Blume, Fl. Javae, Annonaceae, 68. 1830.

暗罗属 an luo shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Trees or shrubs. Inflorescences axillary, internodal, or leaf-opposed, sessile or shortly pedunculate, 1- to many flowered. Flowers usually bisexual. Sepals 3, usually small, valvate or rarely subimbricate in bud, free. Petals 6, in 2 whorls, free, valvate or rarely subimbricate in bud, subequal, flat and spreading; inner petals sometimes slightly larger or smaller than outer, concave and arched over stamens. Stamens usually many; anther locules cuneate; connectives apically orbicular or rhomboidal, concealing anther locules, apex flat-topped or slightly convex. Carpels rather few to many, free; ovules 1 or 2(or 3) per carpel, basal or sutural; styles absent, very short, or long; stigmas mostly dilated. Fruit apocarpous; monocarps few to many, short to long stipitate, mostly globose or ovoid, fleshy. Seeds 1 or 2(or 3) per monocarp, with a longitudinal circumferential groove.

About 120 species: Old World tropics from Africa to the W Pacific, with the center of distribution in SE Asia; 17 species (six endemic, one introduced) in China.

Molecular data (Mols et al., Amer. J. Bot. 91: 590–600. 2004) have shown that *Polyalthia* as traditionally delineated is polyphyletic and will eventually have to be divided among several genera.

Key to flowering material

- 1a. Inner petals 0.2–1 cm.
- 2a. Sepals 8–9 mm 8. *P. cerasoides*
- 2b. Sepals 2–2.5 mm.
- 3a. Leaf blade leathery, glabrous; carpels at least partly hairy 9. *P. littoralis*
- 3b. Leaf blade membranous to papery, adaxially minutely hairy along midrib; carpels glabrous or pubescent.
- 4a. Inner petals ca. 3.5 mm; carpels ca. 7, glabrous 10. *P. florulenta*
- 4b. Inner petals ca. 10 mm; carpels many, pubescent.
- 5a. Leaf blade 5–11 × 2–4 cm, secondary veins inconspicuous; stigmas glabrous 12. *P. suberosa*
- 5b. Leaf blade 13.5–24 × 4–5 cm, secondary veins raised; stigmas villous 15. *P. lancilimba*
- 1b. Inner petals (1–)1.3–9 cm.
- 6a. Petals 6–9 cm.
- 7a. Sepals ca. 12 mm 2. *P. litseifolia*
- 7b. Sepals 3–5 mm 17. *P. liukuensis*
- 6b. Petals (1–)1.3–5.5 cm.
- 8a. Petals 0.6–3 cm wide.
- 9a. Leaf blade secondary veins 24–28 on each side of midvein 7. *P. pingpienensis*
- 9b. Leaf blade secondary veins 7–18 on each side of midvein.
- 10a. Petiole puberulent; leaf blade secondary veins 7–10 on each side of midvein; inflorescences several flowered; petals 2–3.5 × 1–1.5 cm 11. *P. laui*
- 10b. Petiole glabrous; leaf blade secondary veins 14–18 on each side of midvein; inflorescences 1-flowered; petals 3–5.5 × 1.5–3 cm 16. *P. rumphii*
- 8b. Petals 0.2–0.5 cm wide.
- 11a. Pedicel 1–1.8 cm; petals white, 1–1.3 cm 14. *P. obliqua*
- 11b. Pedicel 2–4 cm; petals green to yellow, 1.3–3.8(–5) cm.
- 12a. Leaf blade margin undulate, secondary veins 18–24 on each side of midvein 13. *P. longifolia*
- 12b. Leaf blade margin not undulate, secondary veins 13–20 on each side of midvein.
- 13a. Petals densely minutely hairy, to 3.8(–5) cm 4. *P. fragrans*
- 13b. Petals glabrous or only very sparsely hairy on inside, 1.3–3.5 cm.
- 14a. Leaf blade with pellucid dots; ovaries pubescent and with 1 basal ovule 5. *P. simiarum*
- 14b. Leaf blade without pellucid dots; ovaries glabrous and with 2 ovules.
- 15a. Branches and leaf midvein and secondary veins pubescent; leaf blade 18–28 × 5–8.5 cm, smooth; petals ca. 3 cm 6. *P. viridis*
- 15b. Branches and leaf midvein and secondary veins glabrous; leaf blade 9–17 × 2.5–5 cm; petals ca. 1.3 cm.
- 16a. Leaf blade membranous, densely verrucate, secondary veins 15–18 on each side of midvein, apex acuminate 1. *P. verrucipes*
- 16b. Leaf blade thinly papery, not verrucate, secondary veins 8–10 on each side of midvein, apex caudate 3. *P. chinensis*

Key to fruiting material (not seen for *P. lancilimba*)

- 1a. Monocarps 0.5–0.8 cm, spherical.
 2a. Monocarp stipes 1.5–2 cm 8. *P. cerasoides*
 2b. Monocarp stipes 0.3–1 cm.
 3a. Monocarps to 7, stipes 3–4.5 mm 10. *P. florulenta*
 3b. Monocarps to 18, stipes 8–10 mm 12. *P. suberosa*
- 1b. Monocarps 1–5 cm, globose, ovoid, or cylindrical.
 4a. Monocarps globose, densely minutely verrucate 14. *P. obliqua*
 4b. Monocarps ovoid or cylindrical, smooth or more coarsely verrucose.
 5a. Monocarps 1–1.5 cm.
 6a. Leaf blade secondary veins 24–28 on each side of midvein, parallel 7. *P. pingpienensis*
 6b. Leaf blade secondary veins 7–13 on each side of midvein, arcuately ascending.
 7a. Monocarp stipes 0.2–0.5 cm 9. *P. littoralis*
 7b. Monocarp stipes 1–7 cm 16. *P. rumphii*
- 5b. Monocarps 1.7–5 cm.
 8a. Young stems glabrous.
 9a. Pedicel 0.5–0.7 cm; petals ca. 1.3 cm; monocarp stipes 0.5–0.7 cm.
 10a. Leaf blade membranous, densely verrucate, secondary veins 15–18 on each side of midvein, apex acuminate 1. *P. verrucipes*
 10b. Leaf blade thinly papery, not verrucate, secondary veins 8–10 on each side of midvein, apex caudate 3. *P. chinensis*
- 9b. Pedicel 2–3.5 cm; petals 2.2–9 cm; monocarp stipes 1–7 cm.
 11a. Leaf blade secondary veins 10–16 on each side of midvein 2. *P. litseifolia*
 11b. Leaf blade secondary veins 8 or 9 on each side of midvein 17. *P. liukiensis*
- 8b. Young stems hoary or minutely hairy.
 12a. Monocarp stipes 1–2 cm 13. *P. longifolia*
 12b. Monocarp stipes 2.5–5 cm.
 13a. Young branches hoary; monocarps hoary 4. *P. fragrans*
 13b. Young branches pubescent or puberulent; monocarps glabrous.
 14a. Leaf blade with pellucid dots, membranous to papery 5. *P. simiarum*
 14b. Leaf blade without pellucid dots, thinly leathery to leathery.
 15a. Leaf blade 18–28 cm, secondary veins pubescent 6. *P. viridis*
 15b. Leaf blade 8–20 cm, secondary veins glabrous 11. *P. laui*

1. *Polyalthia verrucipes* C. Y. Wu ex P. T. Li, Acta Phytotax. Sin. 14(1): 110. 1976.

疣叶暗罗 you ye an luo

Trees to 12 m tall. Branches grayish black, glabrous. Petiole 3–7 mm, with transverse striations; leaf blade oblong to oblong-lanceolate, 10–17 × 2.5–5 cm, membranous, both surfaces glabrous and densely verrucate, midvein abaxially elevated and adaxially flat, secondary veins 15–18 on each side of midvein, delicate, and prominent on both surfaces, base broadly cuneate to obtuse, apex acuminate. Inflorescences axillary, 1- or 2-flowered. Pedicel 5–7 mm; bracteoles at middle and base, ovate to semiorbicular. Sepals orbicular to broadly ovate, apex rounded. Petals yellowish, linear-lanceolate, ca. 13 × 2–3 mm, membranous, glabrous; outer petals larger than inner petals. Stamens numerous; connectives slightly convex. Carpels 10–15, oblong, glabrous; ovary with 2 basal ovules; stigma ovoid. Fruiting pedicel 5–7 × ca. 3 mm; monocarp stipes 5–8 mm, verrucate; monocarps ovoid, 2–2.5 × 1–1.5 cm, glabrous. Seed 1 per monocarp, yellowish, ovoid, 18–20 × 8–11 mm. Fr. Apr–Jul.

- Densely forested slopes; 1000–1900 m. S Yunnan.

Polyalthia verrucipes is listed as Endangered (EN A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 7 Oct 2010).

X. L. Hou and P. T. Li (Acta Phytotax. Sin. 45: 369. 2007) included *Polyalthia chinensis* within *P. verrucipes*, but this is no longer accepted.

2. *Polyalthia litseifolia* C. Y. Wu ex P. T. Li, Acta Phytotax. Sin. 14(1): 110. 1976.

木姜叶暗罗 mu jiang ye an luo

Trees to 40 m tall. Bark grayish brown. Branches brown, glabrous. Petiole 6–10 mm, adaxially furrowed, glabrous, [with axillary bud at base]; leaf blade elliptic to broadly elliptic, 9–20 × 4.5–8 cm, membranous to subleathery, both surfaces glabrous and densely papillose, secondary veins 10–16 on each side of midvein, reticulate veins elevated on both surfaces, base rounded to broadly cuneate, apex shortly acuminate to obtuse. Inflorescences axillary, 1-flowered. Pedicel 2–3.5 cm, glabrous. Sepals triangular-lanceolate, ca. 12 mm, outside puberulent, inside glabrous. Petals broadly linear, 6–9 × 0.7–1.1 cm, subequal, glabrous, margin slightly revolute, with a midrib and 2–4 parallel secondary veins. Stamens many, ca. 1.5 mm; connectives apically truncate. Carpels 5 or 6, glabrous; ovules 3 per carpel; stigmas clavate, puberulent. Monocarp stipes 1–3 cm; monocarps oblong to ovoid, 3–3.5 × 2–2.5 cm, constricted between seeds, glabrous, verrucose. Seeds 3 per monocarp. Fl. Apr–Jul, fr. May–Sep.

- Sparsely forested slopes, moist valleys; ca. 600 m. S Yunnan.

Polyalthia liseifolia is listed as Endangered (EN A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 7 Oct 2010).

3. *Polyalthia chinensis* S. K. Wu & P. T. Li, Acta Phytotax. Sin. 14(1): 108. 1976.

西藏暗罗 xi zang an luo

Trees to 10 m tall. Bark grayish white. Branches gray, with many lenticellate and irregular stripes. Petiole ca. 5 mm; leaf blade oblong-elliptic to obovate-lanceolate, 9–13 × 2.5–3.8 cm, thinly papery, glabrous, adaxially glossy, secondary veins 8–10 on each side of midvein, reticulate veins abaxially slightly elevated, base cuneate to broadly cuneate, apex caudate. Inflorescences axillary, 1- or 2-flowered. Pedicel ca. 7 mm; bracteoles at middle and base, semiorbicular to ovate. Sepals broadly ovate, apex rounded. Petals green, linear, ca. 13 × 2–3 mm, subequal, membranous, flat, glabrous. Stamens many; connectives apically rounded to subtruncate. Carpels many, oblong, glabrous; stigma slightly oblique. Carpels each with 2 ovules. Fruit not seen. Fl. Aug.

• Montane forests; ca. 1000 m. SE Xizang (Médog).

4. *Polyalthia fragrans* (Dalzell) Benth. & J. D. Hooker in J. D. Hooker, Fl. Brit. India 1: 63. 1872.

伞花暗罗 san hua an luo

Guatteria fragrans Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 206. 1851.

Trees to 18 m tall. Branches hoary when young. Petiole 1–1.8 cm; leaf blade ovate-oblong to oblong-lanceolate, 10–24 × 5–12.5 cm, membranous, abaxially minutely puberulent on major veins but glabrescent, adaxially glabrous or puberulent, secondary veins 14–16 on each side of midvein, oblique, close-set, parallel, and abaxially very prominent, reticulate veins inconspicuous, base rounded, apex rounded to long acuminate. Inflorescences in axils of fallen leaves or on woody tubercles on branches, cymose, pedunculate, few to many flowered, hoary-tomentose. Flowers fragrant. Pedicel to 2.5 cm, slender; bracteoles inserted below middle of pedicel, orbicular. Sepals orbicular, ca. 3 mm in diam., recurved at anthesis, outside densely felted puberulent. Petals greenish yellow to pale yellow, linear, 3.8(–5) × ca. 0.5 cm, subequal, densely minutely hairy. Stamens many; connectives apically truncate. Carpels many, hairy. Fruiting pedicel to 3.5 cm; monocarp stipes to 5 cm, densely pubescent; monocarp broadly ovoid, 2.5–4 cm, walls thin and brittle, surface hoary. Seed 1 per monocarp. Fl. Apr–May, fr. Jun–Aug.

Forested slopes; ca. 700 m. S Yunnan [India].

5. *Polyalthia simiarum* (Buchanan-Hamilton ex J. D. Hooker & Thomson) Benth. ex J. D. Hooker & Thomson in J. D. Hooker, Fl. Brit. India 1: 63. 1872.

腺叶暗罗 xian ye an luo

Guatteria simiarum Buchanan-Hamilton ex J. D. Hooker & Thomson, Fl. Ind. 1: 142. 1855; *Polyalthia cheliensis* Hu; *P. simiarum* subsp. *cheliensis* (Hu) Bân; *Unona simiarum* (A. Hamilton ex J. D. Hooker & Thomson) Baillon ex Pierre.

Trees to 25 m tall. Bark grayish white. Branches puberulent when young, glabrous and sparsely lenticellate with age. Petiole 5–10 mm, robust; leaf blade ovate-oblong, oblong, lanceolate, or oblanceolate, 9–28 × 3.5–12.5 cm, membranous to papery, hyalopunctate, glabrous or puberulent only on midvein, secondary veins 13–20 on each side of midvein, oblique, close-set, parallel, and prominent on both surfaces, base rounded to broadly cuneate and sometimes oblique, apex acuminate, shortly acuminate, or obtuse. Inflorescences axillary or on older or short branches, 1- to several flowered; bracts ovate, tomentulose. Pedicel ochraceous, 2.5–4 cm, tomentulose, bracteolate near base to middle. Sepals ovate-triangular, ca. 5 × 5 mm, outside pubescent, inside glabrous. Petals yellowish green; outer petals ± longer than inner petals; inner petals linear-lanceolate to linear, 1.5–3.5 × 0.3–0.4 cm, outside puberulent, inside ± glabrous. Stamens oblong; connectives apically broadly truncate to convex. Carpels oblong, pubescent; ovule 1 per carpel, basal; stigmas capitate, puberulent. Fruiting pedicel 2–3 cm; monocarp stipes 3–3.5 cm, glabrous; monocarp ovoid to ovoid-ellipsoid, 2.5–3 × 1.2–1.7 cm, glabrous. Seed 1 per monocarp. Fl. Apr–Sep, fr. Jul–Dec. $2n = 14$.

Forested slopes; 500–1200 m. S and SW Yunnan [Bhutan, Cambodia, India, Laos, Myanmar, C and N Thailand, Vietnam].

The record of *Goniothalamus macrophyllus* (Blume) J. D. Hooker & Thomson from the Flora area (X. L. Hou, <http://www.abclunwen.com/lunwen-free-387606/>; accessed on 25 Nov 2010) was based on a misidentification of *Polyalthia simiarum*.

6. *Polyalthia viridis* Craib, Bull. Misc. Inform. Kew 1914: 4. 1914.

毛脉暗罗 mao mai an luo

Trees to 15 m tall. Branches tawny pubescent when young, gray lenticellate with age. Petiole ca. 1 cm, robust, transversely striate, tawny pubescent; leaf blade oblong to elliptic-oblong, 18–28 × 5–8.5 cm, thinly leathery, glabrous except for pubescent midvein and secondary veins, secondary veins 15–18 on each side of midvein, prominent on both surfaces and pubescent, base truncate, shallowly cordate, or sometimes rounded, apex acute. Inflorescences axillary, several flowered. Pedicel ca. 2.5 cm, pubescent. Sepals broadly ovate, 3.5–4 mm, outside pubescent, inside glabrous. Petals green, linear-oblong, ca. 3 cm × 4 mm, glabrous. Ovules 2 per carpel. Fruiting pedicel 2–7 cm, robust; monocarp stipes 3–5 cm, glabrous; monocarp oblong-ellipsoid, 2.5–4 × ca. 1.8 cm, glabrous. Seed 1 per monocarp. Fl. Apr–Jul, fr. Aug–Feb.

Densely forested slopes; 600–1100 m. S and SW Yunnan [Thailand].

7. *Polyalthia pingpienensis* P. T. Li, Acta Phytotax. Sin. 14(1): 110. 1976.

多脉暗罗 duo mai an luo

Trees to 10 m tall. Bark and branches grayish black, longitudinally striate. Branchlets glabrous. Petiole 1–1.5 cm, densely pubescent; leaf blade oblong to oblong-lanceolate, 7–18 × 2.5–5.5 cm, leathery, abaxially sparsely pubescent but denser along veins, adaxially glabrous except for pubescent midvein, midvein adaxially impressed, secondary veins 24–28 on each side

of midvein, closely parallel, and prominent on both surfaces, base attenuate to obtuse, apex shortly acuminate. Inflorescences axillary or terminal, 1- or 2-flowered. Flowers ca. 3 cm in diam. Pedicel ca. 2.5 cm, puberulent or glabrous. Sepals broadly ovate, ca. 1.3×1.5 cm, outside puberulent, inside glabrous. Petals elliptic to ovate, $2.5\text{--}3.5 \times$ ca. 1.6 cm, outside puberulent, inside glabrous; inner petals oblong, $2.2\text{--}2.7 \times$ ca. 0.9 cm. Stamens oblong-cuneate, ca. 4 mm; connectives apically rounded, pubescent. Carpels many, oblong, ca. 2.5 mm, villous; ovule 1 per carpel, basal; stigmas capitate. Fruiting pedicel ca. 4 cm; monocarp stipes 2–4 cm, glabrous; monocarps purple, ellipsoid, ca. 1.5×1 mm, apex mucronate. Fl. May, fr. Oct.

- Densely forested slopes; 1000–1500 m. S Yunnan.

Polyalthia pingpiensis is listed as Endangered (EN A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 7 Oct 2010). The epithet has been given incorrectly as “*pingpinensis*” in some standard indices.

8. *Polyalthia cerasoides* (Roxburgh) Benth & J. D. Hooker ex Beddome, Fl. Sylv. S. India, t. 1. 1869.

细基丸 xi ji wan

Uvaria cerasoides Roxburgh, Pl. Coromandel 1: 30. 1795; *Polyalthia crassipetala* Merrill.

Trees to 20 m tall. Bark grayish black. Branchlets densely pubescent, glabrescent, lenticellate with age. Petiole 2–3 mm, sparsely hispid; leaf blade oblong, oblong-lanceolate, or sometimes elliptic, $6\text{--}19 \times 2.5\text{--}6$ cm, abaxially yellowish and pubescent, adaxially often bluish green when dry and glabrous except for minutely hairy midvein, secondary veins 7 or 8 on each side of midvein, base broadly cuneate to rounded, apex obtuse. Inflorescences axillary, 1-flowered. Flowers 1–2 cm in diam. Pedicel 1–2 cm, puberulent, with 1 or 2 leafy bracteoles below middle. Sepals oblong-ovate, 8–9 mm, outside pilose, apex acuminate. Petals green but black when dry, subequal or inner petals shorter than outer petals, oblong-ovate, 8–9 mm, thickly leathery, puberulent. Stamens cuneate; connectives apically truncate. Carpels oblong, pubescent; ovule 1 per carpel; stigmas ovoid, apex entire. Monocarp stipes 1.5–2 cm, weak; monocarps red but black when dry, ovoid to subglobose, ca. 6 mm in diam., glabrous. Fl. Mar–May, fr. Apr–Nov. $2n = 18$.

Sparsely forested slopes; 100–1100 m. S Guangdong, S Guangxi, Hainan, S Yunnan [Cambodia, India, Laos, Myanmar, Thailand, Vietnam].

A fine strong bast fiber obtained from the inner bark of *Polyalthia cerasoides* is used to make rope and sacks. The wood is used for farming tools and structural timbers. The flowers are very fragrant and are sometimes collected as a perfume.

9. *Polyalthia littoralis* (Blume) Boerlage in Hasskarl, Cat. Hort. Bot. Bogor. 34. 1844.

陵水暗罗 ling shui an luo

Guatteria littoralis Blume, Fl. Javae, Annonaceae, 99. 1830; *Polyalthia zhui* X. L. Hou & S. J. Li.

Shrubs or small trees, to 5 m tall. Branchlets dark purple, striate, appressed grayish yellow pubescent, soon glabrous. Petiole yellowish, 3–5 mm, puberulent; leaf blade oblong to

oblong-lanceolate, $9\text{--}19 \times 2\text{--}6$ cm, leathery, glabrous, abaxially glossy pale green, adaxially dark green, often bluish green when dry, secondary veins 8–10 on each side of midvein, at $60^\circ\text{--}80^\circ$ to midrib, arcuately ascending, and anastomosing 3–5 mm from margin, base cuneate to rounded, apex acuminate to bluntly acute. Inflorescences leaf-opposed, 1- or 2-flowered; peduncle ca. 1 mm. Flowers 1–2 cm in diam. Pedicel to 3 mm, pubescent; bracteole 1, broadly ovate, $1\text{--}2 \times$ ca. 2 mm, apex acuminate. Sepals triangular, ca. 2 mm, outside pubescent, apex acute. Petals white, oblong-elliptic, 6–8 mm, spreading, subequal or inner petals slightly shorter than outer petals, slightly thick, outside pubescent, apex acute to obtuse. Stamens many; connectives apically truncate, puberulent. Carpels 7–11(–30), puberulent; ovule 1 per carpel, basal; stigmas obovate, shallowly 2-cleft. Monocarp stipes 2–5 mm, puberulent; monocarps 4–7(–11), red but purplish red when dried, ovoid-ellipsoid, $1\text{--}1.5 \times 0.8\text{--}1$ cm, glabrous, densely minutely dotted. Seed 1 per monocarp, red, ellipsoid, $10\text{--}12 \times 6\text{--}8$ mm. Fl. Apr–Jul, fr. Jul–Feb. $2n = 36$.

Forested slopes, margins of wet forests, along small streams; 100–800 m. Guangdong, Guangxi, Hainan, Yunnan [Indonesia, Thailand, Vietnam].

Molecular data (Mols et al., Amer. J. Bot. 91: 598. 2004) suggest that *Polyalthia littoralis* and related species are more closely related to the genus *Marsypopetalum* Scheffer rather than *Polyalthia* s.s. “*Polyalthia caloneura*,” proposed but not validly published by X. L. Hou (<http://www.abclunwen.com/lunwen-free-387606/>; accessed on 25 Nov 2010), belongs here. *Polyalthia zhui* was based on material with immature flowers.

10. *Polyalthia florulenta* C. Y. Wu ex P. T. Li, Acta Phytotax. Sin. 14(1): 107. 1976.

小花暗罗 xiao hua an luo

Shrubs ca. 2 m tall. Branchlets pubescent when young, glabrescent. Petiole 2–4 mm, pubescent; leaf blade oblong-lanceolate to oblanceolate, $5\text{--}14.5 \times 2.3\text{--}4$ cm, membranous, abaxially puberulent, adaxially glabrous except for minutely hairy midvein, secondary veins 10–13 on each side of midvein, obliquely ascending, and anastomosing near margin, base broadly cuneate, apex obtuse to acuminate. Inflorescences leaf-opposed, 1-flowered. Flowers ca. 0.4 cm in diam. Pedicel 1–10 mm, pubescent; bracteoles 2 at middle of pedicel, ovate-lanceolate, ca. 3.5×1 mm, abaxially pubescent, adaxially glabrous. Sepals ovate, ca. 2×2 mm, outside pubescent, inside glabrous. Petals yellowish green; outer petals ovate-lanceolate, ca. 2.5×1.5 mm, concave, outside pubescent, inside glabrous; inner petals ovate, ca. 3.5×2 mm, flat. Stamens cuneate, ca. 0.5 mm; connectives apically truncate, puberulent. Carpels ca. 7, oblong, ca. 0.8 mm, glabrous; ovule 1 per carpel, basal. Fruiting pedicel 1–1.5 cm; monocarp stipes 3–5 mm, pubescent; monocarps to 7, red, globose, ca. 8 mm in diam., glabrous. Fl. Dec–Feb, fr. Jun–Aug.

- Forested slopes; 1100–1400 m. S and W Yunnan.

11. *Polyalthia laui* Merrill, Lingnan Sci. J. 14: 5. 1935.

海南暗罗 hai nan an luo

Trees to 25 m tall, d.b.h. to 40 cm. Bark gray. Branches pubescent when young, glabrescent. Petiole 5–8 mm, trans-

versely rugosely striate, puberulent; leaf blade oblong to oblong-elliptic, 8–20 × 3.5–8 cm, thinly leathery to leathery, glabrous, adaxially shiny, secondary veins 14–18 on each side of midvein, parallel, ascending to margin, and adaxially conspicuous, base broadly cuneate to rounded, apex acuminate. Inflorescences axillary or on old branches, several flowered. Pedicel 1.5–3 cm, puberulent; bracteoles at base of pedicel, broadly ovate. Sepals broadly ovate, ca. 5 × 5 mm, outside puberulent, inside glabrous, apex obtuse to acute. Petals yellowish, oblong-ovate to ovate-lanceolate, 2–3.5 × 1–1.5 cm, outside puberulent or glabrous, inside glabrous; inner petals slightly longer than outer petals. Stamens cuneate; connectives apically obtuse. Carpels many, oblong, densely pubescent; ovule 1 per carpel, basal; stigmas capitate. Fruiting pedicel 3.5–4 cm; monocarp stipes 2.5–5 cm; monocarps red, ovoid-ellipsoid, 2.5–5 × 1–2 cm, glabrous, apex obtuse. Seed 1 per monocarp. Fl. Apr–Jul, fr. Oct–Dec.

Evergreen broad-leaved forests on slopes; 300–700 m. Hainan [Vietnam].

The wood of *Polyalthia laui* is used for making household implements and as structural timber.

12. *Polyalthia suberosa* (Roxburgh) Thwaites, Enum. Pl. Zeyl. 398. 1864.

暗罗 an lu

Uvaria suberosa Roxburgh, Pl. Coromandel 1: 31. 1795; *Gutteria suberosa* (Roxburgh) Dunal.

Shrubs or small trees, to 5 m tall. Bark corky, ridged. Branchlets dark red, rust-colored pubescent when young, glabrescent, with pink lenticels and corky ridges when older. Petiole 2–4 mm, puberulent; leaf blade oblong, elliptic-oblong, or narrowly obovate-oblong, 5–11 × 2–4 cm, membranous to papery, abaxially pale brown when dry and glabrescent, adaxially gray and glabrous except for sparse pubescence along midvein, secondary veins 8–10 on each side of midvein, spreading, and inconspicuous on both surfaces, reticulate veins lax and inconspicuous, base narrowed and slightly oblique, apex subobtuse to rounded and sometimes abruptly shortly acuminate. Inflorescences extra-axillary, leaf-opposed, or slightly below leaf, 1 (or 2)-flowered. Pedicel 0.7–2.5 cm, puberulent; bracteole near base of pedicel, minute, apex acute. Sepals ovate-triangular, 2–2.5 mm, outside pubescent, inside glabrous. Petals yellowish green; outer petals oblong-lanceolate, shorter than inner petals, leathery, flat and spreading, outside slightly pubescent, inside glabrous, apex acute; inner petals oblong, erect and curved, ca. 10 mm, apex obtuse. Stamens many, ca. 1 mm; connectives apically convex. Carpels many, ca. 2 mm, pubescent; ovules 1 or 2 per carpel; styles widening into a thickly triangular bladellike glabrous stigma. Monocarp stipes 8–10 mm, slender; monocarps to 18, red, almost spherical, ca. 5 mm in diam., sparsely appressed pubescent or glabrescent. Seeds 1 or 2 per monocarp, with a longitudinal circumferential band. Fl. almost year-round, fr. Jun–Dec. $2n = 18$.

Open forests at lower elevations. S Guangdong, S Guangxi, Hainan [India, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

13. *Polyalthia longifolia* (Sonnerat) Thwaites, Enum. Pl. Zeyl. 398. 1864.

长叶暗罗 chang ye an lu

Uvaria longifolia Sonnerat, Voy. Indes Orient. 2: 260. 1782; *Gutteria longifolia* (Sonnerat) Wallich; *Unona longifolia* (Sonnerat) Dunal.

Trees to 20 m tall; trunk straight. Branches finely striate, minutely puberulent when young, soon glabrous. Petiole 5–10 mm; leaf blade ovate-oblong to ovate-lanceolate, 11–31 × 2.5–8 cm, stiffly membranous to thinly leathery, glabrous, abaxially pale, adaxially dark glossy green, secondary veins 18–24 on each side of midvein, reticulate veins raised on both surfaces, base cuneate, obtuse, or rounded, margin undulate, apex acuminate. Inflorescences axillary, fasciculate and shortly pedunculate, racemose, or umbelliform and sessile, mostly many flowered; peduncle to 0.7–1.5 cm; rachis to 1 cm. Pedicel 2–4 cm; bracteole usually 1, at middle of petiole, to 1 mm, tomentulose. Sepals ovate-triangular, 1.5–3 × 1.5–1.8 mm, outside tomentulose, inside glabrous. Petals greenish yellow, narrowly triangular-lanceolate, 1.3–1.5 × 0.2–0.4 cm, subequal, spreading, inside puberulent except basally, base broad, apex acute. Stamens 8–10 cm; connectives apically convex. Carpels 20–25, ca. 1.5 mm, apex tomentulose; ovule 1 per carpel; stigmas sessile, rectangular to oblong, pubescent, with a groove on inner side and continuing down inner side of ovary. Monocarp stipes 1–2 cm; monocarps 4–8, purple, ovoid, 2–2.5 × ca. 1.5 cm, glabrous. Seed pale brown, ovoid, ca. 2 × 1.4 cm, usually with a longitudinal groove. Fl. May–Jun, fr. Jul–Sep. $2n = 18$.

Cultivated; 300–400 m. Hainan, Taiwan, Yunnan [native to India and Sri Lanka].

Polyalthia longifolia is grown for its wood and as an ornamental throughout SE Asia.

14. *Polyalthia obliqua* J. D. Hooker & Thomson, Fl. Ind. 1: 138. 1855.

沙煲暗罗 sha bao an lu

Polyalthia consanguinea Merrill.

Trees to 12 m tall. Bark dark gray. Branchlets reddish, minutely rust-colored pubescent, soon glabrous, with many lenticels when young. Petiole 3–5 mm, swollen, puberulent; leaf blade oblong-lanceolate to oblanceolate, 10–20 × 2.5–7 cm, thinly leathery to papery, abaxially dull, drying silvery green, and pubescent along midvein, adaxially glabrous and shiny, secondary veins 10–14 on each side of midvein, curving, forming a wide angle with midvein, anastomosing doubly, and adaxially flat, base narrowed and sometimes inequilateral, margin slightly revolute, apex bluntly acuminate. Inflorescences axillary, sometimes formed after leaf fall, 1–3-flowered. Pedicel 1–1.8 cm, pubescent; bracteoles 2 or 3, minute, 2 basal and other medial on pedicel. Sepals ovate-triangular, 2–3 mm, outside pubescent, inside glabrous, apex slightly obtuse. Petals white, oblong, 10–13 × 3–4.5 mm, subequal, outside pubescent, inside glabrous and rough, margins revolute, apex slightly obtuse. Stamens ca. 1 mm; connectives apically flat-topped to

convex, pubescent. Carpels ovate-oblong, ca. 1.5 mm, pubescent; ovules 2 per carpel; stigmas ovoid, pubescent. Monocarp stipes 0.7–2 cm; monocarps reddish brown, globose, 1–2 cm in diam., thinly walled, glabrous, densely minutely verrucate. Seeds 2 per monocarp, verrucose. Fl. Jan–Apr, fr. Jun–Dec.

Woodlands at middle elevations. Hainan [Malaysia].

15. *Polyalthia lancilimba* C. Y. Wu ex P. T. Li, *Acta Phytotax. Sin.* 14(1): 109. 1976.

剑叶暗罗 jian ye an luo

Trees. Bark gray. Branchlets puberulent, glabrescent. Petiole 2–3 mm, pubescent; leaf blade oblong-lanceolate to oblanceolate, 13.5–24 × 4–5 cm, papery, abaxially pubescent along midvein, adaxially glabrous, secondary veins 10–13 on each side of midvein, adaxially flat, base broadly cuneate, apex acuminate to shortly acuminate. Inflorescences axillary, 1- or 2-flowered; peduncle short. Pedicel 5–10 mm, pubescent, bracteolate at base. Sepals broadly ovate, ca. 2 × 3 mm, outside puberulent, inside glabrous. Petals oblong, 6–10 × 2.5–4 mm, all similar and almost equal in length, leathery, outside pubescent, inside glabrous, apex obtuse. Stamens ovate-cuneate; connectives apically broadly truncate, puberulent. Carpels many, ovate-oblong, villous; ovules 2 per carpel, sutural; stigmas sessile, capitate, villous. Fruit not seen. Fl. Apr–May, fr. Jun–Aug.

• Forested slopes; ca. 200 m. SE Yunnan (Hekou).

Polyalthia lancilimba is listed as Critically Endangered (CR B1ab(i,ii,v)) by the *IUCN Red List of Threatened Species* (Version 2010.3; <http://www.iucnredlist.org>; accessed on 7 Oct 2010).

16. *Polyalthia rumphii* (Blume ex Henschel) Merrill, *Enum. Philipp. Fl. Pl.* 2: 162. 1923.

香花暗罗 xiang hua an luo

Guatteria rumphii Blume ex Henschel, *Vita Rumphii*, 153. 1833; *G. jenkinsii* J. D. Hooker & Thomson; *Polyalthia jenkinsii* (J. D. Hooker & Thomson) J. D. Hooker & Thomson.

Trees to 15 m tall. Branches minutely rust-colored pubescent when young, soon glabrous. Petiole 5–12 mm, glabrous; leaf blade oblong-lanceolate, 10–17 × 3–7 cm, papery to leathery, glabrous, adaxially shiny dark green, secondary veins 7–10 on each side of midvein and prominent on both surfaces, base cuneate to rounded and sometimes oblique, apex acuminate. Inflorescences axillary, 1-flowered. Flowers 4–7 cm in diam. Pedicel 1–2 cm, appressed pubescent. Sepals subovate to triangular, 6–15 × 3–8 mm, outside puberulent, apex acute. Petals greenish to yellowish, elliptic, oblong-elliptic, or oblong, 3–5.5 × 1.5–3 cm, thin, puberulent or glabrous, apex obtuse; inner petals slightly shorter than outer petals. Stamens oblong; connectives apically broadly rounded, concealing anther cells. Carpels many, oblong, pubescent; ovule 1 per carpel, basal; stigmas clavate to capitate. Fruiting pedicel ca. 2 cm × 2 mm; monocarp stipes 5–10 × ca. 1 mm, glabrous; monocarps many, ellipsoid, ca. 10 × 5 mm, base rounded, apex acute. Fl. May–Oct, fr. Jul–Apr. $2n = 18$.

Forested slopes at lower to middle elevations. Hainan [Indonesia, Malaysia, Philippines, Thailand].

17. *Polyalthia liukuensis* Hatusima, *J. Geobot.* 26: 86. 1979.

琉球暗罗 liu qiu an luo

Trees to 12 m tall. Branches dark brown, longitudinally reticulately striate when dried, glabrous. Petiole dark; leaf blade oblong-elliptic, 14–17 × 7–9 cm, thinly leathery, glabrous, midvein abaxially raised and adaxially flat, secondary veins 8 or 9, at ca. 45° to midrib, and then arcuately ascending, reticulate veins elevated on both surfaces, base rounded, apex acuminate. Inflorescences axillary, 1–6-flowered; peduncle 1–1.5 cm. Pedicel 2–3 cm, glabrous or sparsely shortly hairy. Sepals rounded-triangular, 3–5 mm. Petals green to yellowish green, narrowly lanceolate, 6–7 cm, subequal. Fruiting peduncle ca. 2 × 0.5 cm; pedicel 2.5–3 cm; monocarps black when mature, ellipsoid, 1.7–2.5 × 1.5–2 cm, longitudinally 2-grooved. Fl. Aug. $2n = 18$.

Thickets on coral limestone at low elevations. Taiwan (Lan Yu [Japan (Ryukyu Islands)]).

15. TRIVALVARIA (Miquel) Miquel, *Ann. Mus. Bot. Lugduno-Batavi* 2: 19. 1865.

海島木属 hai dao mu shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Guatteria sect. *Trivalvaria* Miquel, *Fl. Ned. Ind., Eerste Bijv.* 381. 1861.

Shrubs or small trees, indument of simple hairs, sometimes absent. Inflorescences extra-axillary or sometimes leaf-opposed, sometimes fasciculate on woody axes; flowers solitary or paired. Flowers polygamous or bisexual. Flower buds very broadly ovoid to cylindrical. Sepals 3, small, imbricate, free or united at base. Petals 6, in 2 whorls, unequal, each whorl minutely imbricate or valvate, outer petals spreading, inner petals larger, spreading or connivent and concave. Male flowers: torus conical, broadly conical-ovoid, or cylindrical; stamens many; connective apex shieldlike to tongue-shaped, minutely pubescent or glabrous. “Female” flowers: stamens few; carpels many, densely hairy; ovule 1, basal. Styles absent; stigmas ± globose. Bisexual flowers: torus cylindrical; stamens and carpels many. Fruit apocarpous; monocarps 2 to > 20, shortly stipitate, ellipsoid to oblong or ovoid, thin walled, glabrous or pubescent. Seeds solitary, ellipsoid to oblong, smooth, shiny, with circumferential, longitudinal groove.

Four species: Bangladesh, China, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam; one species in China.

Trivalvaria has not been recognized for China in previous Flora accounts, but see Heusden (*Nordic J. Bot.* 17: 169–180. 1997).

1. *Trivalvaria costata* (J. D. Hooker & Thomson) I. M. Turner, *Kew Bull.* 64: 577. 2009.

海岛木 hai dao mu

Guatteria costata J. D. Hooker & Thomson, *Fl. Ind.* 1: 143. 1855; *Ellipeia costata* (J. D. Hooker & Thomson) King; *Polyalthia costata* (J. D. Hooker & Thomson) J. D. Hooker & Thomson; *P. nemoralis* Aug. Candolle; *P. oligogyne* Merrill & Chun.

Shrubs or small trees, to 5 m tall. Branches densely to very sparsely pubescent when young, glabrescent. Petiole 2–10 mm, densely pubescent to glabrous; leaf blade obovate to elliptic to (ovate-)oblong, 6–25 × 2–9 cm, membranous to thinly leathery, abaxially sparsely to densely pubescent, adaxially glabrous or rarely pubescent, base cuneate to ± rounded, apex acuminate to caudate, sometimes rounded, midvein adaxially impressed, lateral veins adaxially faint to indistinct. Inflorescences extra-axillary or sometimes ± leaf-opposed, rarely from old branches, often on woody axis with scars of previous flowers, 1- or 2-flowered; bracts 1 or 2, triangular to ovate, 1.5–3(–5) mm. Flowers polygamous (male and bisexual). Pedicel 2–5(–8) mm, pubescent. Buds 2.5–5(–8) mm. Sepals triangular to very broadly ovate, 2–3.5 × 1.5–4 mm, outside densely pubescent, apex acuminate to rounded. Petals white to dirty pale yellow, minute

ly imbricate, (ob)lanceolate, narrowly ovate to broadly triangular, 2–8(–12) × 1–4.5 mm, spreading outside pubescent, inside glabrous; inner petals obovate to lanceolate, 4–12 × 1–4 mm, apex rounded to bluntly acute. Male flowers: torus conical; stamens many, 1.3–2.6 mm; connective apex shieldlike, sometimes tongue-shaped on outer stamens, glabrous or densely puberulent. Bisexual flowers: torus cylindrical; stamens many; carpels 2–10, densely hairy; stigma pubescent. Fruiting pedicel 3–5(–8) mm; monocarp stipes 1–6 mm; monocarps to 5, sometimes glaucous, ripening red, ellipsoid to oblong, 10–28 × 5–11 mm, sparsely pubescent, verruculose, with circumferential longitudinal groove.

Hainan [India (Andaman Islands), Laos, Malaysia, Myanmar, Thailand, Vietnam].

The Chinese material of *Trivalvaria costata* was included within *Polyalthia nemoralis* (as the synonym *P. oligogyne*) in FRPS (30(2): 87. 1979). "*Polyalthia dubia*" (Kurz, *Rep. Veg. Andaman Isl.* 29. 1870) belongs here but is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)); as a result, "*P. dubia* var. *glabriuscula*" (Kurz, *J. Asiat. Soc. Bengal*, Pt. 2, *Nat. Hist.* 43(2): 53. 1874) was also not validly published (Art. 43.1). *Popowia kurzii* King (*J. Asiat. Soc. Bengal*, Pt. 2, *Nat. Hist.* 61(2): 96. 1892) was also applied to this species, but that name was nomenclaturally superfluous (and is therefore illegitimate: Art. 52.1), because the earlier name *Guatteria macrophylla* Blume was cited as a synonym in the protologue.

16. DISEPALUM J. D. Hooker, *Trans. Linn. Soc. London* 23: 156. 1860.

异萼花属 yi e hua shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Enicosanthellum Bân.

Trees or shrubs, indument of simple or stellate hairs. Petiole often short to absent. Inflorescences terminal or sometimes leaf-opposed, 1–3-flowered. Pedicel slender, pendent, without bracteoles. Sepals [2 or]3, relatively large, valvate, free, eventually ± reflexed. Petals [4–]6, in [1 or]2 whorls, ± equal, free [or united into cup, sometimes adnate to torus], sometimes imbricate at tips. Torus usually much wider than high, enlarged in fruit. Stamens many; connective depressed-globose, wider than anther locules. Carpels many; ovules (1 or)2(or 3), lateral. Styles oblong, often hairy at apex. Fruit apocarpous; monocarps usually many, each on long stipelike carpophore articulate at apex, usually ± ellipsoid, fleshy. Seeds usually 2, shiny chestnut-brown, ellipsoid or flattened-ellipsoid.

Nine species: China, Indonesia, Laos, Malaysia, Vietnam; two species in China.

The fruit of *Disepalum* are very distinct because of the different origin of the carpophores bearing the monocarps. In most members of the Annonaceae the monocarps are borne on stipes formed by extension of the monocarps themselves. In *Disepalum* the monocarps are borne on carpophores derived from the torus that differ in color and texture from the monocarps and are abruptly separated from them by an articulation at the apex. The Chinese species had previously been placed in *Polyalthia* or placed in their own genus *Enicosanthellum*. *Disepalum* s.s. has extremely distinctive flowers, but Johnson (*Brittonia* 41: 356–378. 1989) argues that the very unusual fruit make a good case for including *Enicosanthellum* within *Disepalum*.

- 1a. Leaf blade with translucent dots, membranous; petals oblong or oblanceolate, 1.3–2.6 × 0.6–1.2 cm; carpels 18–35; carpophores 0.7–1.3 cm 1. *D. petelotii*
 1b. Leaf blade without translucent dots, papery to thinly leathery; flowers 5–10 cm in diam.; petals broadly obovate, 2.2–3.4 × 1.2–3 cm; carpels 60–200; carpophores 3–4.7 cm 2. *D. plagioneurum*

1. *Disepalum petelotii* (Merrill) D. M. Johnson, *Brittonia* 41: 364. 1989.

窄叶异萼花 zhai ye yi e hua

Polyalthia petelotii Merrill, *Univ. Calif. Publ. Bot.* 13: 131. 1926; *Enicosanthellum petelotii* (Merrill) Bân; *E. plagioneurum* (Diels) Bân var. *oblanceolatum* (W. T. Wang) Bân; *Uvaria oblanceolata* W. T. Wang.

Shrubs or small trees, 2–7 m tall. Branches dark gray, longitudinally wrinkled, puberulent when young, glabrescent. Petiole 5–7 mm, appressed pubescent; leaf blade narrowly elliptic, oblong, oblong-lanceolate, or oblanceolate, 8–20 × 2–4.5 cm, membranous and translucent punctate when young, later papery, abaxially golden to rust-colored sericeous but glabrescent or with scattered appressed hairs with age, adaxially shiny green and glabrous, secondary veins 7–13 on each side of mid-

vein, arcuately ascending, and slightly prominent on both surfaces, base cuneate to cuneate and decurrent onto petiole, apex acuminate and sometimes with a 1–2 cm acumen. Inflorescences terminal or sometimes leaf-opposed, 1-flowered. Flowers ca. 3 cm in diam. Pedicel 1–1.7 cm, ferruginous pubescent. Sepals ovate-triangular to subcordate, 1–1.2 × 0.8–1.2 cm, outside appressed pubescent, inside glabrous. Petals greenish to yellow with a purple base, oblong to rarely oblanceolate, 2–2.5 × 0.6–1.2 cm, subequal, outside sparsely puberulent or glabrous, inside glabrous, apex obtuse to acute. Stamens oblong, 2.2–2.7 mm; connectives apically broadly truncate, puberulent. Carpels 18–35, villous; ovules 1 or 2 per carpel, basal. Fruiting pedicel 2–5 cm; carpophore ± as long as monocarp, slender; monocarp to 20, dark purple when ripe, ellipsoid to cylindrical-ellipsoid, 1.2–1.5 × 0.8–1 cm, ferruginous pubescent when young, glabrescent. Seeds 1 or 2, flat-ellipsoid, 10–13 × 6–8 mm. Fl. Mar–Nov, fr. Jul–Dec.

Forested slopes, often along moist valleys; 100–2000 m. Guangxi, S Guizhou, Hainan, SE Yunnan [N Vietnam].

2. *Disepalum plagioneurum* (Diels) D. M. Johnson, *Brittonia* 41: 366. 1989.

斜脉异萼花 *xie mai yi e hua*

Polyalthia plagioneura Diels, *Notizbl. Bot. Gart. Mus. Berlin-Dahlem* 10: 886. 1930; *Enicosanthellum plagioneurum* (Diels) Bán.

Trees to 15 m tall. Branches brown to dark gray, rust-colored sericeous, glabrescent. Petiole 5–10 mm, appressed sericeous, glabrescent; leaf blade narrowly elliptic, oblong, lanceolate, or oblanceolate, 8–22 × 3–7.5 cm, papery to thinly leathery, abaxially densely rust-colored sericeous but soon sparsely appressed pubescent to glabrescent, adaxially shiny and glabrous, secondary veins 8–12 on each side of midvein, arcuately ascending, and prominent on both surfaces, base broadly cuneate to decurrent, apex acute to shortly acuminate and sometimes with a 3–9 mm acumen. Inflorescences terminal or leaf-opposed, 1-flowered. Flowers 5–10 cm in diam. Pedicel 3–5 cm, rust-colored pubescent. Sepals broadly ovate, 1.5–2 × 1.3–1.7 cm, pubescent to sparsely pubescent, apex obtuse to apiculate. Petals yellowish green, broadly obovate, 2.2–4 × 1.2–3 cm, subequal, thickly papery when dry, appressed tomentulose, apex obtuse to rounded. Stamens oblong, base attenuate; connectives apically truncate, puberulent. Carpels linear, 1.5–2 mm, rust-colored appressed pubescent; ovules 1 or 2 per carpel, basal. Fruiting pedicel 4.5–10 cm × 2–5 mm; carpophores 2–7 cm, pinkish red, pubescent or glabrescent; monocarp to at least 20, ripening black but grayish black when dry, ellipsoid to ovoid, 1–1.6 × 0.8–1.1 cm, glabrescent, apex dilated. Seeds 1 or 2 per monocarp, ellipsoid, 11–12 × ca. 8 mm. Fl. Mar–Aug, fr. Sep–Dec.

Forested slopes, often in valleys; 500–1600 m. Guangdong, Guangxi, S Guizhou, Hainan [Vietnam].

17. **POPOWIA** Endlicher, *Gen. Pl.* 831. 1839.

嘉陵花属 *jia ling hua shu*

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Shrubs or small trees. Leaf blade granular or subgranular in texture, glabrous, pubescent, or tomentose. Inflorescences leaf-opposed or extra-axillary and 1-flowered or fasciculate and several flowered. Flowers small, bisexual. Sepals 3, slightly smaller than petals, valvate. Petals 6, in 2 whorls, thick, sometimes outer and inner petals united at base forming a sympetalous corolla; outer petals small, valvate, spreading; inner petals larger than outer, sometimes connivent and erect, inside concave, base shortly clawed, margin adhering but later free, apically often incurved and valvate but occasionally imbricate. Stamens many; anther locules cuneate, extrorse; connectives apically broadly flat-topped to slightly concave. Carpels few to many; ovules 1 or 2 per carpel; styles very short; stigmas subcapitate to cuneate, grooved on top and down inner side. Fruit apocarpous; monocarp subsessile to stipitate, globose [or ovoid]. Seed often 1 per monocarp, rugose or pitted and with a circumferential ridge.

About 50 species: tropical Africa, tropical Asia, Oceania; one species in China.

1. *Popowia pisocarpa* (Blume) Endlicher in Walpers, *Repert. Bot. Syst.* 1: 252. 1842.

嘉陵花 *jia ling hua*

Guatteria pisocarpa Blume, *Bijdr.* 21. 1825.

Shrubs or small trees, 3–7 m tall. Branches spreading, slender, pliant; branchlets dark colored, striate, rufous pubescent when young, glabrescent, with many leaf scars when old. Petiole 2–5 mm; leaf blade ovate, elliptic, lanceolate, or sometimes slightly obovate, 5.5–14 × 2.5–7 cm, membranous, minutely granular, abaxially appressed rufous pubescent on midvein and secondary veins, adaxially glabrous except for slightly pubescent midvein, secondary veins 6–10 pairs, curving then

becoming straight, ascending steeply, and running some distance close to margin before terminating, base acute to subrounded and oblique, apex acute to shortly acuminate. Inflorescences 1-flowered or 2- or 3-fasciculate. Pedicel white or yellowish, 2–6 mm, slender, pubescent. Sepals broadly ovate, ca. 1 × 1 mm, outside pubescent. Petals yellowish green; outer petals ovate-triangular, ca. 2.5 × 2.5 mm, pubescent; inner petals ca. 2 × 2 mm. Stamen connectives apically truncate, puberulent. Carpels 5 or 6, ca. 1.5 mm, puberulent. Monocarps globose, 6–8 mm in diam. Fl. Jan–Jul, fr. Sep–Nov. $2n = 18$.

Forested slopes; 200–300 m. Guangdong, Hainan [Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

The flowers of *Popowia pisocarpa* are fragrant and are used as a perfume.

18. ALPHONSEA J. D. Hooker & Thomson, Fl. Ind. 1: 152. 1855.藤春属 *teng chun shu*

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Trees or shrubs, glabrous or with simple hairs. Petiole short; leaf blade usually leathery to thinly leathery, shiny. Inflorescences internodal, leaf-opposed, rarely extra-axillary or axillary, 1-flowered or flowers to 12 forming clusters. Flowers bisexual. Torus cylindrical to hemispheric, hairy. Sepals 3, much smaller than petals, valvate in bud. Petals 6, in 2 whorls, basally saccate, apically recurved and valvate in bud; outer petals spreading, \pm as long as inner petals but slightly wider. Stamens many, in several series; connectives produced but not concealing dorsal anther locules, apex apiculate. Carpels 1–8(–15), free; ovules 4–24 per carpel, in 2 series; styles cylindrical, short; stigmas inconspicuously capitate, with a slit down inner side. Fruit apocarpous; monocarp stipes with thick walls or almost absent; monocarps few, globose or cylindrical, succulent or woody, glabrous, tomentose, or verrucose. Seeds several per monocarp, not separating from fruit wall.

About 23 species: S and SE Asia; six species (four endemic) in China.

- 1a. Young stems and abaxial leaf surfaces densely villous to tomentose 1. *A. mollis*
 1b. Stems and abaxial leaf surfaces glabrous or obscurely puberulent only along midvein.
 2a. Leaf blade apex caudate with a 1–1.7 cm acumen, secondary veins 15–19 on each side of midvein;
 flowers solitary; monocarps cylindrical 6. *A. tsangyuanensis*
 2b. Leaf blade apex acute to acuminate but without an acumen, secondary veins 9–13 on each side of
 midvein; flowers fascicled; monocarps ovoid, subglobose, ellipsoid, or obovoid.
 3a. Peduncle with 4–12 bracts, pedicel with up to 8 persistent bracteoles; monocarp verrucose.
 4a. Peduncle with 8–12 bracts; sepals longer than wide, apex acuminate or acute 2. *A. squamosa*
 4b. Peduncle with 4 or 5 bracts; sepals shorter than wide, apex rounded 3. *A. boniana*
 3b. Peduncle and fruiting pedicel with not more than 2 bracts and bracteoles; monocarp smooth.
 5a. Leaf blade adaxially not glossy, glaucous when dry; outer petals glabrous inside; carpel 1, with
 ca. 22 ovules 4. *A. monogyna*
 5b. Leaf blade adaxially glossy, yellowish green when dry; outer petals pubescent inside; carpels
 3–5, with 10–12 ovules per carpel 5. *A. hainanensis*

1. *Alphonsea mollis* Dunn, J. Linn. Soc., Bot. 35: 485. 1903.毛叶藤春 *mao ye teng chun*

Trees to 20 m tall, evergreen, d.b.h. to 40 cm. Bark grayish brown, bast reddish. Branches densely tomentose when young, glabrescent. Petiole 2–3 mm, pubescent; leaf blade elliptic to ovate-oblong, 6–12 \times 2.5–5.6 cm, papery, abaxially villous, adaxially glabrous except for puberulent area along midvein, secondary veins ca. 10 on each side of midvein and slender, reticulate veins conspicuous, base obtuse to rounded, apex shortly acuminate. Inflorescences 1- or 2-flowered. Pedicel 1–2 cm, pubescent, bracteolate. Sepals triangular, ca. 1 \times 1 mm. Petals yellowish white; outer petals ca. 11 \times 7 mm, outside tomentose, inside glabrescent, apex recurved; inner petals slightly shorter than outer petals. Stamens many; anthers ovoid; connectives apically acute. Carpels 3, tomentose. Monocarps 1 or 2, yellow when ripe, ovoid to ellipsoid, 2–4 \times 1.5–2.5 cm, fulvous tomentose. Seeds several per monocarp, grayish brown, orbicular and flat, 1–1.5 cm in diam. Fl. Mar–May, fr. Jun–Aug.

• Evergreen broad-leaved forests on slopes; 600–1000 m. Guangdong, SW Guangxi, Hainan, S Yunnan.

The fruit of *Alphonsea mollis* are edible when ripe. The wood is used for the construction of carts, agricultural implements, etc.

2. *Alphonsea squamosa* Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 161. 1906.多包藤春 *duo bao teng chun*

Trees to 5 m tall. Bark grayish white. Branches pubescent when young, glabrous and lenticellate with age. Petiole 3–4

mm, transversely striate, puberulent or glabrescent; leaf blade elliptic, ovate, or sometimes oblong-elliptic, 4.5–11.5 \times 2–4.5 cm, papery, puberulent or glabrous, midvein adaxially impressed, secondary veins 10–13 on each side of midvein and adaxially flat, base rounded, apex shortly acuminate to acute. Inflorescences superaxillary, 1- or 2-flowered; peduncle ca. 6 mm; bracts 11 or 12. Pedicel ca. 1 cm, with 7 or 8 persistent bracteoles. Sepals triangular, ca. 3 \times 2 mm, outside pubescent, inside glabrous, apex acuminate or acute. Outer petals ovate, ca. 7 \times 5 mm; inner petals slightly smaller than outer petals. Stamens ovoid; connectives apically acute. Carpels 1–5, ovoid-oblong, pubescent; ovules ca. 10 per carpel, in 2 series; stigmas subglobose, glabrous, apex 2-cleft. Fruiting pedicel ca. 1.3 cm, with 7 or 8 bracteoles; monocarps 1–5, ovoid to subglobose, 2–2.5 \times 1.2–2 cm, densely pubescent. Fl. Mar–Jun, fr. Jun–Sep.

Forested slopes, usually in ravines; 1500–2300 m. Guangxi, Yunnan [Vietnam].

Alphonsea squamosa was treated as a synonym of the following species, *A. boniana*, by Kessler (Bot. Jahrb. Syst. 118: 86–87. 1995).

3. *Alphonsea boniana* Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 162. 1906.金平藤春 *jin ping teng chun*

Shrubs to 3 m tall. Branches pubescent when young, glabrescent. Petiole ca. 3 mm, transversely striate, puberulent or glabrous; leaf blade elliptic to oblong-elliptic, 5–11 \times 1.4–3 cm, thinly leathery, abaxially greenish and glabrous except occasionally for puberulent midvein, adaxially shiny green and glabrous, secondary veins 10–13 on each side of midvein, slender,

abaxially slightly prominent, and adaxially flat, base broadly cuneate, apex acuminate to shortly acuminate. Inflorescences leaf-opposed or superaxillary, 1- or 2-flowered; peduncle 2–3 mm, glabrous, with 4 or 5 bracts. Pedicel 4–7 mm, puberulent, with several bracteoles from base to middle. Sepals broadly ovate-reniform, ca. 1 × 2 mm, outside puberulent, inside glabrous, apex rounded. Outer petals ovate-lanceolate, ca. 7 × 4 mm, incurved at base, outside densely pubescent, inside glabrous; inner petals lanceolate, ca. 6 × 3.5 mm, incurved at base. Stamens 3, whorled; anther locules ovoid; connectives apically acute. Carpel 1, oblong, ca. 4 mm, densely villous; ovules 6–12, in 1 or 2 series; stigmas subglobose, glabrous, apex 2-cleft. Fruit not seen. Fl. Apr, fr. May–Jun.

Sparsely forested slopes; 300–700 m. SE Yunnan [Thailand, Vietnam].

Chinese material identified as *Alphonsea tonquinensis* Aug. Candolle (C. Y. Wu & W. T. Wang, Acta Phytotax. Sin. 6: 210. 1957) belongs here.

4. *Alphonsea monogyna* Merrill & Chun, Sunyatsenia 2: 62. 1934.

藤春 teng chun

Trees to 12 m tall. Peduncles, pedicels, sepals, and petals outside pubescent. Petiole 5–7 mm; leaf blade elliptic to oblong, 7–14 × 3–6 cm, thinly leathery to papery, glaucous when dry, glabrous, secondary veins 9–11 on each side of midvein, slender, and slightly prominent, reticulate veins prominent on both surfaces, base broadly cuneate to slightly obtuse, apex acute to acuminate. Inflorescences leaf-opposed; bracts ovate, puberulent. Pedicel 5–10 mm, with 1 or 2 bracteoles at base. Sepals broadly ovate, ca. 2 mm. Outer petals oblong-ovate to ovate, ca. 1 cm, apex acute; inner petals smaller than outer petals. Stamens ca. 1 mm; connectives apically acute. Carpel 1, cylindrical, puberulent; ovules ca. 22, in 2 series. Fruiting carpel subglobose to ellipsoid, 2–4 × 1–3 cm, densely hispidulous when young, inconspicuously verruculose with age. Fl. Jan–Sep, fr. Sep–Dec.

- Forested slopes; 400–1200 m. Guangxi, Hainan, S Yunnan.

The flowers of *Alphonsea monogyna* are fragrant and are used for perfumes. Its wood is hard and used in construction as supporting timber.

Alphonsea monogyna is listed as Vulnerable (VU A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 8 Oct 2010).

5. *Alphonsea hainanensis* Merrill & Chun, Sunyatsenia 5: 62. 1940.

海南藤春 hai nan teng chun

Trees to 20 m tall, evergreen, d.b.h. to 30 cm. Bark grayish brown, smooth, 5–6 mm thick; inner bark reddish brown, fra-

grant. Branchlets appressed ferruginous puberulent when young, glabrescent. Petiole 3–5 mm, puberulent or glabrous; leaf blade broadly ovate to elliptic, 4–9 × 2–3.5 cm, thickly papery, glabrous, adaxially shiny and green, secondary veins 7–10 on each side of midvein, slender, and prominent on both surfaces, base broadly cuneate to rounded, apex acute to shortly acuminate. Inflorescences leaf-opposed or subopposite, 2- or 3-flowered; peduncle subsessile; bracts broadly ovate. Pedicel 5–13 mm, pubescent, bracteolate at base. Sepals reniform, ca. 1 mm, outside pubescent, inside glabrous. Outer petals ovate to oblong-ovate, ca. 9 mm, pubescent, apex obtuse; inner petals smaller than outer petals, outside puberulent, inside glabrous or glabrescent. Stamens in 3 whorls; anther locules ovoid, ca. 1 mm; connectives apically acute. Carpels 3–5, densely pubescent; ovules 10–12 per carpel, in 2 series. Fruiting carpels yellowish green, subglobose to obovate, ca. 4 × 3–4 cm, densely tomentose. Seeds flat, semiobovate. Fl. Oct–Mar, fr. Mar–Aug.

- Evergreen broad-leaved forests on slopes; 400–700 m. SW Guangxi, Hainan, Yunnan.

The fruit of *Alphonsea hainanensis* are edible when ripe. Its wood is hard and used for the construction of carts and agricultural implements, etc.

Alphonsea hainanensis is listed as Endangered (EN A2c) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 8 Oct 2010).

6. *Alphonsea tsangyuanensis* P. T. Li, Acta Phytotax. Sin. 14(1): 112. 1976 [“*tsangyanensis*”].

多脉藤春 duo mai teng chun

Trees to 12 m tall, glabrous except for flowers. Petiole 3–5 mm; leaf blade oblong, 6–16 × 2.5–4.5 cm, papery, midvein abaxially elevated and adaxially impressed, secondary veins 15–19 on each side of midvein, abaxially slightly prominent, and adaxially flat, base broadly cuneate to obtuse, apex caudate with a 1–1.7 cm tip. Inflorescences leaf-opposed, 1-flowered. Pedicel ca. 3 mm, puberulent. Flower buds conic, ca. 10 × 8 mm. Sepals triangular, outside tomentulose, inside glabrous. Outer petals ovate-triangular, ca. 10 × 6 mm, outside tomentulose, inside glabrous; inner petals ca. 9 × 5 mm. Stamens many, in 3 whorls, ca. 1.5 mm; connectives apically apiculate. Carpels 4 or 5, oblong, slightly flat, hirsute; ovules 5 per carpel, in 2 series; styles short; stigmas apically 2-cleft. Fruiting carpels oblong, ca. 4 × 2.5 cm, densely tomentose. Fl. Apr–Jun, fr. Aug–Oct.

- Forested slopes; 700–1500 m. S Yunnan.

Alphonsea tsangyuanensis is listed as Endangered (EN B2ab (i,ii,v)) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 8 Oct 2010). The type collection of this species (*Q. W. Wang 73312*) was originally identified as *A. lutea* J. D. Hooker & Thomson (C. Y. Wu & W. T. Wang, Acta Phytotax. Sin. 6: 210. 1957).

19. CANANGA (Candolle) J. D. Hooker & Thomson, Fl. Ind. 1: 129. 1855, nom. cons., not Aublet (1775).

依兰属 yi lan shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Unona subsect. *Cananga* Candolle, Syst. Nat. 1: 485. 1817.

Trees or shrubs. Petiole short; leaf blade large. Inflorescences axillary or extra-axillary, forming cymes, racemes, or with several flowers clustered on a peduncle. Flowers large. Sepals 3, valvate. Petals 6, in 2 whorls, subequal or inner petals slightly smaller, spreading, flat, valvate in bud. Stamens many; anther locules linear-lanceolate, lateral or subintrorse; connectives ca. 1/3 size of stamens, apex apiculate. Carpels many, oblong; ovules many per carpel, in 2 series; styles slender; stigmas sticking together at anthesis, clavate. Fruit apocarpous; monocarps several to many, long stipitate, ovoid to subglobose. Seeds several per monocarp, in 2 series, pitted, sending spinose processes into albumen.

Two species: tropical Asia and Australia; one species (introduced) in China.

1. *Cananga odorata* (Lamarck) J. D. Hooker & Thomson, Fl. Ind. 1: 130. 1855.

依兰 yi lan

Trees or shrubs. Bark pale gray. Branchlets dark colored, striate with age, minutely pubescent when young, glabrescent. Petiole 1–2 cm, narrowly grooved; leaf blade in 2 ranks, ovate, oblong, or broadly elliptic, 9–23 × 4–14 cm, membranous to thinly papery, often drying black, glabrous when mature except for mostly whitish pubescence along midvein and secondary veins, secondary veins 7–15 on each side of midvein, base rounded, obtuse, or truncate and often inequilateral, apex acute to acuminate. Inflorescences axillary or on short woody branches, racemose or cymose, 1- or several flowered; peduncle 2–5 mm; bracts minute, deciduous. Flowers pendulous. Pedicel 1–5 cm, pubescent, bracteolate. Sepals ovate, ca. 0.7 mm, pubescent, connate at base, apex acute and reflexed. Petals green, turning yellow and inside basally with a purplish brown blotch, linear to linear-lanceolate, 5–8 × 0.5–1.8 cm, tomentose and with several veins minutely pubescent, basal claw small. Stamens oblong-oblancoate, 0.7–1 mm; connectives apically acute, pubescent. Carpels 10–12, ca. 4 mm, puberulent when young, glabrescent; stigmas clavate, lamellate, fused, with a U-shaped groove on inner side running down to base of ovary to form a convex pileate disk. Monocarp stipes 1.2–1.8 cm; monocarps nearly black, ovoid, globose, or oblong, 1.5–2.3 × ca. 1 cm, pulpy, glabrous. Seeds 2–12 per monocarp, pale brown, in 2 series, surface pitted. Fl. Apr–Aug, fr. Oct–Mar.

Cultivated. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Tai-

wan, Yunnan [native to NE Australia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, and Thailand].

The flowers of *Cananga odorata* are the source of an essential oil used in perfumery, soaps, and cosmetics. The flowers are also laid between cloth to impart an agreeable scent.

- 1a. Tree 6–33 m tall 1a. var. *odorata*
1b. Shrubs 1–2 m tall 1b. var. *fruticosa*

1a. *Cananga odorata* var. *odorata*

依兰(原变种) yi lan (yuan bian zhong)

Uvaria odorata Lamarck, Encycl. 1: 595. 1785; *Canangium odoratum* (Lamarck) King.

Trees 6–33 m tall. Fl. Apr–Aug, fr. Nov–Mar. 2n = 16.

Cultivated; 100–200 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan [native to NE Australia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, and Thailand].

1b. *Cananga odorata* var. *fruticosa* (Craib) J. Sinclair, Sarawak Mus. J. 5: 599. 1951.

小依兰 xiao yi lan

Canangium fruticosum Craib, Bull. Misc. Inform. Kew 1922: 166. 1922; *C. odoratum* var. *fruticosum* (Craib) Corner.

Shrubs 1–2 m tall. Fl. Apr–Jun, fr. Oct–Mar.

Cultivated; 100–200 m. Guangdong, Yunnan [native to Indonesia, Malaysia, and Thailand].

20. ARTABOTRYS R. Brown, Bot. Reg. 5: t. 423. 1820.

鹰爪花属 ying zhua hua shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Climbing shrubs or woody lianas. Inflorescences 1- or few-flowered clusters; peduncle recurved, woody, persistent, forming a hook. Flowers bisexual, often fragrant. Torus flat or concave. Sepals 3, valvate, connate at base. Petals 6, in 2 whorls, pale yellowish, subequal, with each whorl valvate, base concave, apex connivent. Stamens many, outermost series sometimes forming staminodes; connectives apically dilated, apex truncate. Carpels 4 to many; ovules 2 per carpel, basal; stigmas ovoid, oblong, or clavate. Fruit apocarpous; monocarps fasciculate, sessile or shortly stipitate, ellipsoid-obovoid or globose, fleshy and berrylike. Seeds 1 or 2 per monocarp, without an aril.

About 100 species: Old World tropics and subtropics; eight species (four endemic, one introduced) in China.

Members of *Artabotrys* climb by means of the very distinctive, persistent, recurved, woody peduncles and pedicels, which hook onto the supporting vegetation.

- 1a. Monocarp apex long beaked; leaf blade base slightly oblique 1. *A. rhynchocarpus*
1b. Monocarp apex not beaked; leaf blade base symmetric.
2a. Flowers many per peduncle; stamen connectives apically truncate 2. *A. multiflorus*
2b. Flowers 1–3 per peduncle; stamen connectives apically triangular, semiorbicular, or subtruncate.
3a. Outer petals 1–1.8 cm.

- 4a. Leaf blade glabrous on both surfaces or only midrib abaxially puberulent; pedicel longer than peduncle 3. *A. hongkongensis*
- 4b. Leaf blade abaxially densely tomentose or pubescent; pedicel shorter than peduncle.
- 5a. Leaf blade adaxially shiny, secondary veins 10–12 on each side of midvein; outer petals ovate to broadly triangular 4. *A. fragrans*
- 5b. Leaf blade adaxially slightly glaucous, secondary veins 8 on each side of midvein; outer petals narrowly oblong 5. *A. pilosus*
- 3b. Outer petals 2–4.5 cm.
- 6a. Leaf blade adaxially minutely punctate; outer petals oblong-ovate 6. *A. punctulatus*
- 6b. Leaf blade adaxially not punctate; outer petals narrowly lanceolate or oblong-lanceolate.
- 7a. Leaf blade secondary veins 7–9 on each side of midvein; outer petals ca. 2 × 0.2 cm 7. *A. hainanensis*
- 7b. Leaf blade secondary veins 8–16 on each side of midvein; outer petals 3–4.5 × 0.9–1.6 cm 8. *A. hexapetalus*

1. *Artabotrys rhynchocarpus* C. Y. Wu ex S. H. Yuan, Acta Bot. Yunnan. 4: 261. 1982.

喙果鹰爪花 hui guo ying zhua hua

Shrubs to 10 m tall, climbing. Branchlets appressed pilose when young, glabrescent. Petiole 3–5 mm, appressed pilose; leaf blade oblong to oblong-lanceolate, 8–13 × 3–4 cm, papery, abaxially puberulent, adaxially glabrous, secondary veins 12–14 on each side of midvein and adaxially prominent, base cuneate, apex acuminate. Inflorescences leaf-opposed, 2–5-flowered; peduncle 0.8–1.5 cm, pilose. Pedicel 1.2–1.5 cm, pubescent. Sepals broadly ovate, 3–4 × 3–4 mm, both surfaces pilose. Petals ovate-oblong, ca. 1.5 × 0.6 cm, tawny pubescent. Stamens cuneate, ca. 1.5 mm; connectives apically subtruncate, glabrous. Monocarp stipes 5–7 mm; monocarps oblong, 4.5–5 × 1.5–1.7 cm, apex conspicuously beaked. Seeds 2 per monocarp, flat, ca. 3 × 1.2 cm. Fl. Aug–Sep, fr. Oct.

- Dense woodlands; ca. 1200 m. SE Yunnan.

2. *Artabotrys multiflorus* C. E. C. Fischer, Bull. Misc. Inform. Kew 1937: 437. 1937.

多花鹰爪花 duo hua ying zhua hua

Lianas. Branchlets dark brown, minutely puberulent when young, minutely lenticellate. Petiole 5–8 mm; leaf blade elliptic to elliptic-oblong, 10–16.5 × 4–6.5 cm, appressed pubescent when young especially abaxially on midvein, glabrescent, midvein abaxially prominent, secondary veins 9–12 on each side of midvein, base narrow, apex apiculate to bluntly acuminate. Inflorescences with 2 fascicles, one apical and another slightly below it on outer side, many flowered; peduncle 1.5–2 cm, stout, sharply curved, appressed bristly. Pedicel 0.8–1.5 cm, rufous hispid. Sepals ovate-triangular, 3–4 mm, outside rufous pubescent, inside glabrous. Petals green to yellow, oblong to oblong-lanceolate, 1.8–2.5 × 0.6–0.7 cm, subequal, base deeply convex; inner petals slightly narrower and more deeply concave than outer petals, connivent over stamens and carpels, outside thinly pubescent but densely gray pubescent on basal concave part, inside glabrous. Stamens oblong-cuneate, ca. 1.5 mm; connectives apically truncate. Carpels 12–21, narrowly oblong to lanceolate-oblong, 1.3–1.5 mm, glabrous; styles oblong to narrowly clavate, 1.3–1.5 mm. Fruit not seen. Fl. May–Aug, fr. Jul–Oct.

Thickets on limestone; 800–1000 m. Guangdong, Guangxi, Guizhou, Yunnan [Myanmar].

3. *Artabotrys hongkongensis* Hance, J. Bot. 8: 71. 1870.

香港鹰爪花 xiang gang ying zhua hua

Shrubs, to 8 m tall, climbing. Branchlets hispid. Petiole 2–5 mm, puberulent; leaf blade elliptic-oblong to oblong, 6–12 × 2.5–4 cm, leathery, glabrous or only midvein abaxially puberulent, adaxially lucid, secondary veins 8–10 on each side of midvein and adaxially prominent, base rounded and slightly oblique. Inflorescences 1-flowered. Pedicel slightly longer than hooked peduncle, puberulent. Sepals ovate-triangular, ca. 5 mm, glabrescent. Outer petals ovate-lanceolate, 1–1.8 cm, thickened, outside densely sericeous pubescent, base concave; inner petals basally concave. Stamens cuneate; connectives apically 3-angled, puberulent. Carpels ovate-oblong, glabrous; ovules 2 per carpel, basal; stigmas shortly clavate. Monocarps black when dry, ellipsoid, 2–4 × 1.5–3 cm, apex subrounded. Fl. Mar–May, fr. May–Aug.

Dense woodlands, thickets; 300–1500 m. Guangdong, Guangxi, Guizhou, Hainan, Hunan, Yunnan [Vietnam].

4. *Artabotrys fragrans* Jovet-Ast, Notul. Syst. (Paris) 9: 77. 1940.

香鹰爪花 xiang ying zhua hua

Lianas to 20 m. Branchlets pubescent, glabrescent. Petiole 5–8 mm, pubescent; leaf blade oblong to lanceolate-oblong, 13–17 × 5–6 cm, densely pubescent when young and sparsely puberulent with age, adaxially lucid and glabrous, secondary veins 10–12 on each side of midvein and adaxially prominent, base cuneate to obtuse, apex shortly acuminate to obtuse. Inflorescences 1–3-flowered; peduncle ca. 2 cm, glabrous. Pedicel 1–1.2 cm, pubescent. Sepals triangular, golden pubescent. Outer petals broadly ovate-triangular, ca. 1.4 × 0.9 cm, densely villous except for base, base concave; inner petals triangular, 1–1.2 cm, pubescent except for base, base concave. Stamen connectives apically semiorbicular. Carpels 4–7, ovoid, glabrous. Monocarps ellipsoid, ca. 4 × 2 cm, glabrous; epicarp smooth. Fl. Jul–Aug, fr. Sep–Oct.

Mixed woods; ca. 1000 m. Guangxi, Guizhou, S Yunnan [Vietnam].

The name *Artabotrys fragrans* was first published in 1938 (Fl. Indo-Chine Suppl. 1: 83) but not validly so.

5. *Artabotrys pilosus* Merrill & Chun, Sunyatsenia 2: 224. 1935.

毛叶鹰爪花 mao ye ying zhua hua

Shrubs to 5 m tall, climbing. Branches densely tomentose

when young. Petiole ca. 2 mm, densely tomentose; leaf blade oblong to oblong-elliptic, 5–17 × 2–7.5 cm, papery, abaxially densely tomentose, adaxially glabrous and slightly glaucous, secondary veins ca. 8 on each side of midvein and adaxially flat to slightly prominent, base rounded, apex acuminate to obtuse. Inflorescences leaf-opposed or extra-axillary, usually 1-flowered; peduncle longer than pedicel, flat, densely villous when young, glabrescent. Pedicel 6–12 mm, densely pubescent. Sepals ovate, ca. 4 mm, outside pubescent. Petals greenish to yellowish, narrowly oblong, 1.5–1.7 cm, pubescent. Stamens cuneate; connectives apically subtruncate. Carpels ca. 8, glabrous. Monocarps dark brown, oblong-ellipsoid, 1.5–2.2 × ca. 1.5 cm, glabrous. Fl. Apr–Jul, fr. May–Dec.

- Mixed woods; 200–500 m. Guangdong, Hainan.

The flowers of *Artabotrys pilosus* are fragrant and are used as perfume; its bast fiber is used to make ropes.

6. *Artabotrys punctulatus* C. Y. Wu ex S. H. Yuan, Acta Bot. Yunnan. 4: 260. 1982.

点叶鹰爪花 dian ye ying zhua hua

Shrubs to 4 m tall, climbing. Branchlets puberulent when young. Petiole 5–7 mm, puberulent; leaf blade oblong-elliptic, 7–13.5 × 3–5.5 cm, papery, glabrous except for abaxially puberulent midvein, adaxially minutely punctate, secondary veins 12–14 on each side of midvein and adaxially prominent, base cuneate to broadly cuneate and oblique, apex acuminate to obtuse. Peduncle puberulent. Flowers 3–4 cm in diam. Pedicel 1.5–2 cm. Sepals broadly ovate-triangular, 5–7 mm, puberulent, basally slightly attenuate. Petals brownish green; outer petals oblong-ovate, ca. 2.5 cm, base concave; inner petals ca. 2 cm, concave and connivent, horizontally spreading from apical 1/3, basally attenuate. Stamens many, cuneate, ca. 1.5 mm; connectives apically subtruncate, glabrous. Carpels ca. 20, oblong, glabrous; stigmas clavate, longer than ovaries, pubescent. Monocarps fusiform, slightly flattened, 3.5–4 × 1.5–1.7 cm. Fl. Apr–Jun, fr. Sep–Nov.

- Open woods; ca. 1500 m. S Yunnan.

7. *Artabotrys hainanensis* R. E. Fries, Ark. Bot., n.s., 3: 41. 1955.

海南鹰爪花 hai nan ying zhua hua

Based on *Artabotrys stenopetalus* Merrill & Chun, Sunyatsenia 2: 226. 1935, not Engler (1899).

Shrubs to 4 m tall, climbing. Branchlets glabrous. Petiole 4–8 mm, glabrous; leaf blade oblong to oblong-elliptic, 7–15 × 3–6 cm, papery, glabrous except for abaxially hairy main veins, secondary veins 7–9 on each side of midvein and adaxially prominent, base rounded to broadly cuneate, apex acuminate to acute. Inflorescences leaf-opposed, usually 1-flowered. Pedicel 1.2–1.5 cm. Sepals ovate, 4–5 mm, sparsely pubescent. Petals yellowish white, narrowly lanceolate, ca. 2 × 0.2 cm, subequal, base slightly broad and concave. Stamens oblong, ca. 14 × 2 mm; connectives apically rounded to subtruncate. Carpels 15, slightly longer than stamens; stigmas shortly clavate. Monocarps ellipsoid, ca. 2.5 × 1.2 cm. Fl. May–Jul, fr. Jul–Oct.

- Densely wooded slopes; 200–500 m. Guangdong, Guangxi, Hainan.

8. *Artabotrys hexapetalus* (Linnaeus f.) Bhandari, Bailey 12: 149. 1965.

鹰爪花 ying zhua hua

Annona hexapetala Linnaeus f., Suppl. Pl. 270. 1782; *A. uncinata* Lamarck; *Artabotrys odoratissimus* R. Brown, nom. illeg. superfl.; *A. uncatu*s (Loureiro) Bailion; *A. uncinatus* (Lamarck) Merrill; *Unona uncinata* (Lamarck) Dunal; *Uvaria esculenta* Roxburgh ex Rottler; *U. odoratissima* Roxburgh; *U. uncatu* Loureiro.

Shrubs to 10 m tall, climbing. Branchlets glabrous or glabrescent. Petiole 4–8 mm; leaf blade oblong to broadly lanceolate, 6–16(–25) × 2.5–6(–8) cm, papery, abaxially glabrous or only midvein puberulent, adaxially glabrous, secondary veins 8–16 on each side of midvein and adaxially prominent, base cuneate to acute, apex acuminate to acute. Inflorescences 1- or 2-flowered. Flowers 2.5–3 cm in diam., fragrant. Sepals green, ovate, 5–8 mm, sparsely puberulent. Petals greenish to yellowish, oblong-lanceolate, 3–4.5 × 0.9–1.6 cm, outside basally densely pubescent, contracted nearly to base but basally expanded. Stamens oblong; connectives apically 3-angular. Carpels oblong, glabrous. Monocarps ovoid, 2.5–4 × ca. 2.5 cm, glabrous, apex conspicuously apiculate. Seeds pale brown, 1.5–2 cm, smooth. Fl. May–Aug, fr. May–Dec. 2n = 16.

Widely cultivated, rarely naturalized; 100–300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Taiwan, Yunnan, Zhejiang [native to S India and Sri Lanka].

The flowers of *Artabotrys hexapetalus* are fragrant and are used as perfume and in tea; its fruit are used as medicine for scrofula.

21. FRIESODIELSIA Steenis, Bull. Jard. Bot. Buitenzorg, sér. 3, 17: 458. 1948.

尖花藤属 jian hua teng shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Polyalthia sect. *Oxymitra* Blume, Fl. Javae, Annonaceae, 71. 1830; *Oxymitra* (Blume) J. D. Hooker & Thomson (1855), not Bischoff ex Lindenbergh (1829).

Climbers [rarely trees], with simple hairs. Inflorescences leaf-opposed, extra-axillary, or superaxillary, 1-flowered, bracteate. Flowers (not known for only Chinese species) bisexual. Sepals 3, valvate, ± connate at base. Petals 6, in 2 whorls, free, valvate; outer petals flat or 3-ridged, long and narrow, leathery, basally broadened and concave; inner petals much shorter than outer, ovate, lanceolate, or oblong, narrowed at base and often with a gap between petals, cohering to cover stamens and carpels. Stamens many; connectives apically enlarged and concealing anther locules, apex truncate. Carpels many, oblong; ovules 1–5 per carpel, lateral;

styles clavate. Fruit apocarpous; monocarps stipitate, subglobose [or globose to ellipsoid-cylindric], moniliform when more than 1-seeded; epicarp thin to thick. Seed usually 1 per monocarp, subglobose.

About 50–60 species: Old World tropics; one species (endemic) in China.

There has been considerable confusion between *Friesodielsia* and the genus *Richella* A. Gray. Recent accounts (e.g. Kessler in Kubitzki, *Fam. Gen. Fl. Pl.* 2: 119. 1993) have restricted *Richella* to just 2 or 3 species, which molecular studies (Nakkuntod et al., *Taxon* 58: 127–132. 2009) show to be most closely related to *Goniothalamus*. Most species previously placed within *Richella* are now placed in *Friesodielsia*.

1. *Friesodielsia hainanensis* Tsiang & P. T. Li, *Acta Phytotax. Sin.* 9: 377. 1964.

尖花藤 jian hua teng

Richella hainanensis (Tsiang & P. T. Li) Tsiang & P. T. Li.

Climbers to 5 m tall, woody, glabrous except for slightly puberulent leaf blade midvein. Petiole 5–8 mm; leaf blade oblong to oblong-elliptic, 10–21.5 × 3.7–7.5 cm, papery, abaxially glaucous, secondary veins 13–15 on each side of midvein, base shallowly cordate, apex acute to shortly acuminate. Flow-

ers not seen. Monocarp stipes 5.3–7.5 cm, slender; monocarps subglobose, ca. 10 × 8 mm, apex apiculate. Seed 1 per monocarp, brown, subglobose, ca. 8 × 6 mm, testa thin. Fl. Aug–Sep, fr. Oct.

• Forested slopes; 300–500 m. Hainan (Baoting).

The generic placement of *Friesodielsia hainanensis* must remain in doubt without knowledge of the flowers. It is listed as Vulnerable (VU D2) by the *IUCN Red List of Threatened Species* (Version 2010.3; <http://www.iucnredlist.org>; accessed on 8 Oct 2010, as *Richella hainanensis*).

22. FISSISTIGMA Griffith, *Not. Pl. Asiat.* 4: 706. 1854.

瓜馥木属 gua fu mu shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Climbers, with simple hairs, usually pubescent to tomentose and sometimes copiously so. Leaf blade with many stout parallel secondary veins. Inflorescences mostly leaf-opposed or terminal, less often axillary or infra-axillary, 1- to many flowered and forming cymes, glomerules, or branched panicles. Pedicel often with several bracteoles from base to middle. Flower buds ovoid or oblong-conic. Sepals 3, small, valvate, connate at very base. Petals 6, in 2 whorls, valvate, leathery, margin thickened; outer petals slightly larger than inner petals, erect or spreading, inside flat to convex; inner petals 3-edged, base concave. Stamens many; connectives slightly enlarged, apically oblique, obtuse, or slightly apiculate. Carpels many, free, often pubescent, slightly curved, grooved on inner side; ovules 1–16 per carpel, in 1 or 2 sutural series; styles sometimes narrowly clavate but usually not enlarging; stigmas very short and not clearly differentiated from style, apex 2-cleft or entire. Fruit apocarpous; monocarps few to many, stipitate, spherical, ovoid, or oblong, thick walled, usually pubescent to tomentose. Seeds 1–10 per monocarp, in 1 or 2 series, smooth, shiny.

About 75 species: Old World tropics and subtropics; 23 species (eight endemic) in China.

1a. Inflorescence 1- or 2-flowered.

2a. Flowers leaf-opposed, ca. 1.2 cm in diam.; outer petals rounded, ca. 6 mm; inner petals ca. 4 mm 1. *F. cupreonitens*

2b. Flowers axillary or subaxillary, 3–4 cm in diam.; outer petals ovate-triangular or oblong, 14–24 mm; inner petals 10–14 mm.

3a. Leaf blade oblong; pedicel ca. 2 cm; stigmas apically entire; ripe carpels 4–5 × ca. 4 cm 2. *F. uonicum*

3b. Leaf blade lanceolate to elliptic-lanceolate; pedicel ca. 0.5 cm; stigmas apically 2-cleft; ripe carpels ca. 1.8 × 1.5 cm 3. *F. machurei*

1b. Inflorescence usually more than 2-flowered, often in cymes, glomerules, or panicles.

4a. Leaf blade abaxially glabrous or obscurely sparsely pubescent, glabrescent.

5a. Leaf blade abaxially grayish white or grayish green and glaucous when dry.

6a. Leaf blade 1.2–6 cm wide; inflorescences thyrses; petals 5–6 mm; ovaries 1-ovuled; stigmas apically 2-cleft 4. *F. glaucescens*

6b. Leaf blade 6–8 cm wide; inflorescences cymes; petals ca. 15 mm; ovaries ca. 30-ovuled; stigmas apically entire 5. *F. pallens*

5b. Leaf blade greenish or abaxially grayish green and not glaucous.

7a. Leaf blade base truncate to slightly cordate, secondary veins 18–20 on each side of midvein; stigmas apically entire; ripe monocarps 3.5–4 cm wide; ovules ca. 10 per carpel 6. *F. chloroneurum*

7b. Leaf blade base rounded, obtuse, or broadly cuneate, secondary veins 13–15 on each side of midvein; stigmas apically 2-cleft; ripe monocarps 2–3 cm wide; ovules 4 or ca. 22 per carpel.

8a. Young branchlets ferruginous pubescent; cymes usually leaf-opposed or alternate; ovules 4 per carpel; ripe monocarps glabrescent 7. *F. wallichii*

8b. Branchlets glabrous; panicles terminal or axillary; ovules ca. 22 per carpel; ripe monocarps densely fulvous tomentulose 8. *F. tonkinense*

- 4b. Leaf blade abaxially densely tomentose, densely pubescent, or hispid.
- 9a. Flowers in panicles or cymes.
- 10a. Inflorescence rachides 1–28 cm.
- 11a. Leaf blade apex acute; flower buds ovoid; petals ovate; stamen connectives ovoid, apex obtuse 9. *F. latifolium*
- 11b. Leaf blade apex rounded or retuse; flower buds conic or lanceolate; petals oblong-lanceolate or ovate-elliptic; stamen connectives conic or broadly ovoid, apex acuminate or truncate.
- 12a. Peduncle to 28 cm; pedicel 2–3 mm; petals ovate-elliptic to ovate-oblong; stamen connectives apically acuminate; stigma apex 2-cleft 10. *F. tungfangense*
- 12b. Peduncle ca. 1 cm; pedicel ca. 15 mm; petals oblong-lanceolate to narrowly lanceolate; stamen connectives apically truncate; stigma apex entire 11. *F. tientangense*
- 10b. Inflorescence rachides 0.1–0.5 cm.
- 13a. Leaf blade secondary veins adaxially flattened; stigma apex 2-cleft.
- 14a. Sepals connate at base, broadly triangular, ca. 3 × 3.5 mm; stamen connectives broadly triangular 12. *F. polyanthoides*
- 14b. Sepals free at base, ovate-triangular, ca. 2 × 2 mm; stamen connectives obliquely triangular 13. *F. poilanei*
- 13b. Leaf blade secondary veins adaxially concave; stigma apex entire.
- 15a. Leaf blade base cuneate to broadly cuneate; inner petals pubescent outside; ripe monocarps ca. 1.2 cm in diam. 14. *F. acuminatissimum*
- 15b. Leaf blade base shallowly cordate; inner petals glabrous outside; ripe monocarps 2–2.5 cm in diam. 15. *F. cavaleriei*
- 9b. Flowers in glomerules.
- 16a. Leaf blade secondary veins 25–35 on each side of midvein; ripe monocarps ca. 4 cm in diam. 16. *F. balansae*
- 16b. Leaf blade secondary veins 13–20 on each side of midvein; ripe monocarps 1.5–3 cm in diam.
- 17a. Leaf blade secondary veins adaxially flattened.
- 18a. Branches and abaxial leaf blade surfaces densely tomentose; outer petals with a prominent abaxial midrib; stamen connectives subrounded or truncate 17. *F. xylopetalum*
- 18b. Branches and abaxial leaf blade surfaces pubescent to glabrescent; outer petals without a prominent midrib; stamen connectives triangular or slightly obliquely triangular.
- 19a. Petals 2–2.1 cm; ovules 10 per carpel; stigmas apically 2-cleft 18. *F. oldhamii*
- 19b. Petals 0.9–1.2 cm; ovules 4–6 per carpel; stigmas apically entire 19. *F. polyanthum*
- 17b. Leaf blade secondary veins adaxially concave.
- 20a. Bracteoles many, longer than or as long as sepals; stigmas apically 2-cleft 20. *F. bracteolatum*
- 20b. Bracteoles few or absent, if present shorter than sepals; stigmas apically entire.
- 21a. Leaf blade oblong-lanceolate to narrowly oblong, apex slightly acute; stamen connectives long lanceolate 21. *F. kwangsiense*
- 21b. Leaf blade broadly ovate, obovate, or obovate-oblong, apex rounded or retuse; stamen connectives broadly or obliquely triangular.
- 22a. Leaf blade base rounded, truncate, or shallowly cordate; inflorescences leaf-opposed; sepals ovate-lanceolate, ca. 1 cm; outer petals ovate-oblong, ca. 1.5 cm; ovules 4 per carpel; ripe monocarps globose 22. *F. retusum*
- 22b. Leaf blade base broadly cuneate or rounded; inflorescences extra-axillary; sepals broadly triangular, ca. 5 mm; outer petals ovate, ca. 1 cm; ovules 10 per carpel; ripe monocarps oblong 23. *F. shangtzeense*

1. Fissistigma cupreonitens Merrill & Chun, Sunyatsenia 2: 8. 1934.

金果瓜馥木 jin guo gua fu mu

Climbers to 13 m tall. Branchlets, petioles, and flowers densely appressed reddish brown pubescent, glabrescent. Petiole 0.8–1.2 cm; leaf blade oblong to oblong-elliptic, 5–10 × 1.5–3 cm, leathery, abaxially densely appressed reddish brown pubescent, adaxially glabrous except for appressed pubescence on midvein, secondary veins 8–13 on each side of midvein, slender, and adaxially flat, base rounded, apex acute to shortly acuminate. Inflorescences leaf-opposed, 1-flowered; bracts tri-

angular. Flowers ca. 1.2 cm in diam. Pedicel ca. 1 cm. Sepals broadly triangular, ca. 6 mm, basally connate. Outer petals rounded, ca. 6 mm, incurved; inner petals ca. 4 mm, inside basally depressed. Stamens oblong, ca. 1 mm; connectives 3-angular. Carpels oblong, ca. 2 mm, sericeous pubescent; ovules ca. 14 per carpel, in 2 series; stigma apex entire. Fruiting pedicel ca. 2 mm, robust; monocarp stipes ca. 1.5 cm; monocarps globose, ovoid-ellipsoid, or ellipsoid, ca. 3 × 2 cm, densely reddish brown tomentose, apex rounded or mucronulate. Seeds ca. 14 per monocarp, brown, in 2 series, ovoid, subflattened, ca. 1.4 × 0.9 cm. Fl. Apr–Nov, fr. Jun–Dec.

• Densely forested slopes; 300–1000 m. SE Guangxi.

Fissistigma cupreonitens is listed as Endangered (EN B2ab(ii,iv)) by the IUCN Red List of Threatened Species (Version 2010.3; <http://www.iucnredlist.org>; accessed on 8 Oct 2010).

2. *Fissistigma uonicum* (Dunn) Merrill, Philipp. J. Sci. 15: 137. 1919.

香港瓜馥木 xiang gang gua fu mu

Melodorum uonicum Dunn, J. Bot. 48: 323. 1910; *Fissistigma clementis* Merrill.

Climbers to 5 m tall. Branches glabrous. Petiole 5–10 mm, blackish and minutely transversely wrinkled when dried; leaf blade oblong, 4–20 × 1–5 cm, papery, abaxially yellowish, very sparsely puberulent, and reddish yellow when dry, adaxially glabrous, secondary veins 8–12[–18] on each side of midvein and adaxially flat to slightly prominent, tertiary veins inconspicuously raised, base rounded to cuneate, apex acute. Inflorescences axillary or subaxillary, sometimes ± grouped into terminal thyrses, 1- or 2-flowered; peduncle 1–3 mm; bracts minute, scalelike. Flowers fragrant. Pedicel ca. 2 cm, minutely appressed pubescent, minutely bracteolate below middle. Sepals ovate-triangular, ca. 2 mm, outside pubescent, inside glabrous. Petals yellow; outer petals ovate-triangular, ca. 2.4 × 1.4 cm, thickened, outside fulvous pubescent, inside glabrous, apex obtuse; inner petals lanceolate, 1.2–1.4 × ca. 0.6 cm, inside basally concave and apically convex. Stamens oblong; connectives 3-angular. Carpels oblong, pubescent; ovules 9–16 per carpel, in 2 series; styles cylindrical, short, glabrous; stigmas apically entire. Monocarp stipes short, thick; monocarps globose to shortly cylindrical, 4–5 × ca. 4 cm, pubescent to glabrescent. Seeds 9–16 per monocarp, in 2 series. Fl. Mar–Jun, fr. Jun–Dec.

Forest margins, scrub; 100–800 m. Fujian, Guangdong, Guizhou, Hainan, Hunan [Indonesia].

The fruit of *Fissistigma uonicum* are edible; its leaves are used as yeast powder to start fermentation when making liquor in Guangxi and Hainan.

3. *Fissistigma maclurei* Merrill, Philipp. J. Sci. 21: 342. 1922.

毛瓜馥木 mao gua fu mu

Meiogyne maclurei (Merrill) Sinclair; *Melodorum maclurei* (Merrill) Jovet-Ast [“Ast”].

Climbers to 6 m tall, most parts fulvous to blackish brown tomentose. Petiole 5–8 mm, blackish brown tomentose; leaf blade lanceolate to elliptic-lanceolate, 7–12 × 2–3.5 cm, thinly leathery, abaxially fulvous to blackish brown tomentose, adaxially glabrous, secondary veins 13–17 on each side of midvein and adaxially flat, reticulate veins prominent, base obtuse, apex acute to acuminate. Inflorescences axillary, 1-flowered. Pedicel ca. 5 mm, robust. Sepals ovate-oblong, ca. 5 mm, blackish brown villous. Petals thickened; outer petals oblong, ca. 1.4 cm, villous; inner petals shorter than outer petals, pubescent. Stamens oblong, nearly as long as carpels; connectives 3-angular, apex acute. Carpels fulvous pubescent; ovules 10 per carpel, in 2 series; stigmas apically 2-cleft. Fruiting pedicel 2–2.5 cm, densely blackish brown tomentose; monocarps globose to subglobose, ca. 1.8 × 1.5 cm, densely blackish brown tomentose. Seeds 7–9 per monocarp, deep yellow, reniform, ca. 10 × 6 mm. Fl. Feb–Aug, fr. Apr–Oct.

Forested slopes, often in valleys or beside water; 200–1100 m. Guangxi, Hainan, S Yunnan [Vietnam].

4. *Fissistigma glaucescens* (Hance) Merrill, Philipp. J. Sci. 15: 132. 1919.

白叶瓜馥木 bai ye gua fu mu

Melodorum glaucescens Hance, J. Bot. 19: 112. 1881; *Fissistigma obtusifolium* Merrill.

Climbers to 6 m tall, most parts glabrous except for inflorescences. Petiole 4–12 mm, blackish and minutely transversely wrinkled when dried, pubescent when young, glabrescent; leaf blade oblong, oblong-elliptic, or sometimes obovate-oblong, 3–20 × 1.2–6 cm, thinly leathery, abaxially grayish green and glaucous when dry, secondary veins 10–15 on each side of midvein and adaxially very slightly prominent or flat, tertiary veins inconspicuously raised, base rounded, apex rounded to slightly retuse. Inflorescences terminal, thyrsoid, to 6 cm, sometimes continuing vegetatively and cymes apparently axillary, cymules 2- or 3-flowered, brownish tomentose; peduncle very short. Pedicel to 1.2 cm. Sepals broadly triangular, ca. 2 mm. Outer petals broadly ovate, ca. 6 mm, fulvous pubescent; inner petals ovate-oblong, ca. 5 mm, grayish white pubescent. Stamens oblong; connectives 3-angular. Carpels ca. 15, ellipsoid, fulvous pubescent; ovule 1 per carpel; styles elongate, glabrous; stigmas apically 2-cleft. Monocarp stipes ca. 3 mm; monocarps ca. 8 mm in diam., glabrous. Seed 1 per monocarp. Fl. Jan–Sep, fr. Mar–Dec.

Sparsely forested slopes, scrub, often in ravines; 100–1000 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan [Vietnam].

A fine strong bast fiber obtained from the inner bark of *Fissistigma glaucescens* is used to make rope, sacks, and paper; its roots are used as medicine for rheumatism and injury; and its leaves are used as yeast powder to start fermentation when making liquor in Guangdong and Hainan.

5. *Fissistigma pallens* (Finet & Gagnepain) Merrill, Philipp. J. Sci. 15: 134. 1919.

苍叶瓜馥木 cang ye gua fu mu

Melodorum pallens Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 137. 1906; *Fissistigma petelotii* Merrill.

Climbers to 12 m tall. Branches robust, grayish black, glabrous. Petiole ca. 2 cm, rugose, glabrous; leaf blade oblong, 15–20 × 6–8 cm, papery, abaxially grayish white and sparsely puberulent, adaxially glabrous, secondary veins 13–16 on each side of midvein, reticulate veins apparent, base obtuse to rounded, apex obtuse to acute. Inflorescences leaf-opposed or terminal, 1–3-flowered; peduncle ca. 1.5 cm; bracts triangular. Pedicel ca. 2 cm, puberulent, with triangular bract at base. Sepals triangular, outside puberulent. Petals ovate, ca. 1.5 × 1 cm, puberulent; inner petals slightly smaller than outer petals. Stamens oblong, ca. 2.5 mm; connectives broadly triangular, apex obtuse. Carpels many, cylindrical, ca. 5 mm, villous; ovules ca. 30 per carpel, in 2 series; styles oblique, glabrous; stigmas 3-angular, apex entire. Fruit not seen. Fl. Mar–May, fr. Jun–Aug.

Forested slopes; 600–800 m. W Guangxi [Vietnam].

6. *Fissistigma chloroneurum* (Handel-Mazzetti) Tsiang, J. Bot. Soc. China 2: 693. 1935.

阔叶瓜馥木 *kuo ye gua fu mu*

Melodorum chloroneurum Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 83. 1924.

Climbers to 12 m tall. Branches puberulent when young, glabrescent. Petiole 0.8–2 cm, abaxially grooved, glabrous; leaf blade oblong, 14–30 × 5.5–12 cm, papery, abaxially puberulent when young but glabrescent and greenish with age, adaxially dark green and glabrous, secondary veins 15–20 on each side of midvein and adaxially flat, reticulate veins conspicuous, base truncate to shallowly cordate, apex shortly acuminate. Inflorescences leaf-opposed or subopposed, cymose, 2–8-flowered; peduncle 1–2 mm; bracts ovate, pubescent. Pedicel 0.5–2.3 cm, fulvous pubescent, bracteolate at middle. Flower buds broadly ovoid. Sepals triangular, ca. 4 × 4 mm, outside pubescent. Petals yellowish white; outer petals ovate-oblong, ca. 12 × 5(–10) mm, outside fulvous pubescent, inside glabrous; inner petals ovate-triangular, ca. 8(–11) × 4(–7) mm, outside pubescent, inside glabrous. Stamens oblong, ca. 1.2 mm; connectives apically rounded. Carpels ca. 15, ovate-oblong, 2–3 mm, densely pubescent; ovules 10 per carpel, in 2 series; styles short; stigmas ellipsoid, apex entire. Fruiting monocarps globose, subglobose, ellipsoid, or obovoid, 3.5–6 × 3.5–4 cm, glabrous. Seeds 10–20 per monocarp, in 2 series. Fl. Mar–Nov, fr. Jul–Dec.

Open woodland slopes, moist disturbed scrub; 100–900 m. Guangxi, Guizhou, SW Hunan, Yunnan [Vietnam].

7. *Fissistigma wallichii* (J. D. Hooker & Thomson) Merrill, Philipp. J. Sci. 15: 137. 1919.

贵州瓜馥木 *gui zhou gua fu mu*

Melodorum wallichii J. D. Hooker & Thomson, Fl. Ind. 1: 118. 1855; *Fissistigma oligocarpum* W. T. Wang.

Climbers to 7 m tall. Branchlets ferruginous pubescent when young, glabrescent. Petiole 1–2.5 cm, blackish and minutely transversely wrinkled when dried, pubescent when young, glabrescent; leaf blade oblong-lanceolate, oblong-elliptic, or sometimes obovate-oblong, 7–24 × 2.4–6 cm, thinly leathery, abaxially ferruginous pubescent when young but glabrescent and grayish green with age, adaxially glabrous, secondary veins 10–14 on each side of midvein and adaxially flat, tertiary veins partly parallel and also often irregularly branched, reticulate veins inconspicuous, base rounded, obtuse, or sometimes broadly cuneate, apex obtuse to shortly acuminate. Inflorescences leaf-opposed or alternate, sometimes terminal, cymose, umbel-like, 3–7-flowered, ferruginous pubescent; peduncle short; bracts ovate, pubescent. Pedicel 0.3–2 cm, 1- or 2-bracteolate. Sepals ovate-triangular, ca. 3 × 2.3 mm, outside pubescent, inside glabrous. Petals leathery; outer petals ovate-oblong, 1.5–1.7 × ca. 0.7 cm, outside densely ferruginous pubescent, inside slightly puberulent; inner petals lanceolate, ca. 1.3 × 0.4 cm, inside basally glabrous and concave, apically puberulent. Stamens oblong; connectives ovoid. Carpels 2–6, densely pubescent; ovules 4 per carpel; styles cylindrical, incurved; stigmas apically slightly 2-cleft. Monocarps subglobose, ca. 2.8 cm in diam., glabrescent. Fl. Mar–Nov, fr. Jul–Dec.

Densely forested slopes, open forests in valleys; 400–1600 m. W Guangxi, S Guizhou, S Yunnan [NE India].

8. *Fissistigma tonkinense* (Finet & Gagnepain) Merrill, Philipp. J. Sci. 15: 136. 1919.

东京瓜馥木 *dong jing gua fu mu*

Melodorum tonkinense Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4): 135. 1906; *Fissistigma globosum* C. Y. Wu ex P. T. Li.

Climbers to 8 m tall. Branches grayish black to grayish brown, glabrous. Petiole 0.5–1.5 cm, grayish black, verrucate, abaxially grooved; leaf blade oblong to oblong-ovate, 16–20 × 4–6 cm, papery, abaxially sparsely pubescent when young but glabrescent, adaxially glabrous, secondary veins 10–14 on each side of midvein, obliquely ascending to margin, and adaxially flat, reticulate veins prominent, base rounded, apex shortly acuminate. Inflorescences terminal or axillary, paniculate, puberulent; peduncle 1–3.5 cm, with bracts at base; bracts triangular, margins ciliate. Pedicel 0.5–1.5 cm, bracteolate at base and middle. Sepals broadly triangular, ca. 4 × 5 mm, outside puberulent. Outer petals ovate, ca. 10 × 7.5 mm, margins thickened, puberulent, apex obtuse; inner petals oblong-ovate, ca. 10 × 5 mm, thickened at middle, outside and inside puberulent from middle to apex, inside concave from base to middle. Stamens oblong, ca. 3 mm; connectives ovoid, apex subrounded. Carpels subcylindric, villous; ovules ca. 22 per carpel, in 2 series; styles short; stigmas obliquely ovoid, glabrous, apex 2-cleft. Fruiting pedicel ca. 1.2 cm, fulvous tomentulose; monocarp stipes 1.5–2 cm; monocarps globose, 2–3 cm in diam., densely fulvous tomentulose. Seeds ca. 7 per monocarp, reddish brown, shiny, oblong, flat, ca. 1.5 × 0.9 cm. Fl. Nov–Jan, fr. Mar–May.

Forested slopes; 200–800 m. SE Yunnan [Vietnam].

9. *Fissistigma latifolium* (Dunal) Merrill, Philipp. J. Sci. 15: 132. 1919.

大叶瓜馥木 *da ye gua fu mu*

Unona latifolia Dunal, Monogr. Anonac. 115. 1817; *Melodorum latifolium* (Dunal) J. D. Hooker & Thomson.

Climbers to 5 m tall. Branches tawny pubescent when young, glabrescent. Petiole 1–1.5 cm, robust, abaxially grooved, tawny pubescent; leaf blade oblong, oblong-elliptic, or obovate, 13–35 × 5–15 cm, papery, abaxially tawny pubescent and more densely so on veins, adaxially puberulent, secondary veins 18–22 on each side of midvein, at ca. 45° to midvein, anastomosing before margin, and adaxially impressed, reticulate veins dense and nearly at 90° to secondary veins, base rounded, apex acute. Inflorescences leaf-opposed, panicles borne on apical branches, to 20 cm, densely tawny pubescent; peduncle 1.5–1.8 cm; bracts broadly ovate, 3–4 × 3–4 mm, abaxially densely tawny pubescent. Pedicel ca. 2 cm, bracteolate at middle. Flower buds ovoid, recurved. Sepals broadly ovate, 5–6 × 5–6 mm, outside densely tawny pubescent. Outer petals outside reddish and basally orange, inside orangish red, ovate, 1.6–2.2 × 1.1–1.5 cm, thickened, outside brown pubescent, inside glabrous; inner petals ovate, 1.2–1.5 × 0.6–0.8 cm, glabrous. Stamens oblong,

ca. 2.5 mm; connectives ovoid, apex obtuse. Carpels oblong, densely villous; ovules 8 per carpel; stigmas pubescent. Monocarp stipes ca. 3 cm, pubescent; monocarps globose, ca. 2 cm in diam., densely brown pubescent. Seeds 4–8 per monocarp. Fl. Mar–Nov, fr. Jun–Jan.

Forested slopes; 500–1200 m. S Yunnan [India, Indonesia, Malaysia, Philippines, Thailand, Vietnam].

10. Fissistigma tungfangense Tsiang & P. T. Li, *Acta Phytotax. Sin.* 9: 377. 1964.

东方瓜馥木 dong fang gua fu mu

Climbers to 6 m tall, most parts densely red tomentose, glabrescent. Petiole 1–1.5 cm; leaf blade spatulate to elliptic-oblong, 5–11 × 1.9–4.1 cm, leathery, abaxially yellowish brown pilose, adaxially glabrous, secondary veins 16–22 on each side of midvein and adaxially impressed, reticulate veins inconspicuous, base rounded to broadly cuneate, margin revolute, apex rounded to retuse. Inflorescences terminal or leaf-opposed, paniculate; peduncle to 28 cm; bracts broadly triangular, red tomentose. Pedicel 2–3 mm, 1- or 2-bracteolate. Flower buds conic, ca. 1.1 cm. Sepals broadly triangular, ca. 4 × 3 mm, glabrous. Outer petals ovate-elliptic, ca. 11 × 5 mm, inside glabrous; inner petals ovate-oblong, ca. 8 × 4 mm. Stamens oblong, ca. 1 mm; connectives conic. Carpels oblong, 1.5–2 mm, sericeous pubescent; ovules 10 per carpel, in 2 series; stigmas glabrous, apex 2-cleft. Fruit not seen. Fl. Oct, fr. Nov–Dec.

- Sparsely forested slopes; 400–600 m. W Hainan.

Fissistigma tungfangense is listed as Critically Endangered (CR B1ab(i,ii)) by the *IUCN Red List of Threatened Species* (Version 2010.3; <http://www.iucnredlist.org>; accessed on 8 Oct 2010).

11. Fissistigma tientangense Tsiang & P. T. Li, *Acta Phytotax. Sin.* 10: 326. 1965.

天堂瓜馥木 tian tang gua fu mu

Climbers to 9 m tall. Branchlets densely yellowish pubescent when young, glabrous and lenticellate with age. Petiole 3–5 mm; leaf blade oblong to elliptic-oblong, 8.5–17.5 × 3.2–6 cm, leathery, abaxially yellowish pubescent, adaxially glabrous except for sparsely pubescent midvein, secondary veins 16–18 on each side of midvein, obliquely ascending, anastomosing before margin, and adaxially impressed, base rounded, apex rounded to retuse. Inflorescences leaf-opposed, paniculate, 1–4-flowered, yellowish pubescent; peduncle ca. 1 cm. Pedicel ca. 1.5 cm, bracteolate above middle. Flower buds lanceolate in outline, ca. 2.8 × 0.8 cm. Sepals triangular, ca. 4 × 4 mm, outside pubescent, inside glabrous. Outer petals oblong-lanceolate, ca. 2.5 × 0.8 cm, outside glabrous, inside sparsely pubescent; inner petals narrowly lanceolate, ca. 2.3 × 0.6 cm, glabrous. Stamens oblong; connectives apically truncate. Carpels ovate-oblong, ca. 2.5 mm, densely sericeous pubescent; ovules 6–8 per carpel, in 2 series; stigma apex entire. Monocarp stipes ca. 3 cm, robust; monocarps globose, ca. 1.6 cm in diam., densely yellowish pubescent. Fl. Mar–Nov, fr. Jul–Dec.

- Forested valley slopes; 300–600 m. SW Guangdong, SE Guangxi, Hainan, Yunnan.

12. Fissistigma polyanthoides (Aug. Candolle) Merrill, *Philipp. J. Sci.* 15: 135. 1919.

小萼瓜馥木 xiao e gua fu mu

Melodorum polyanthoides Aug. Candolle, *Bull. Herb. Boissier*, sér. 2, 4: 1070. 1904; *Fissistigma minuticalyx* (R. W. MacGregor & W. W. Smith) Chatterjee; *M. minuticalyx* R. W. MacGregor & W. W. Smith.

Climbers to 10 m tall. Branches fulvous pubescent when young, glabrous and lenticellate with age. Petiole 1–1.3 cm, fulvous tomentose; leaf blade oblong, oblong-lanceolate, or sometimes obovate-oblong, 10–23 × 4–10 cm, leathery, abaxially fulvous tomentose, adaxially pubescent or glabrous, secondary veins 14–20 on each side of midvein, obliquely ascending to margin, and adaxially flat, base rounded, apex acute to shortly acuminate. Inflorescences leaf-opposed, subopposed, or sometimes terminal, pseudo-cymose, densely red fulvous tomentulose; peduncle ca. 3 mm; bracts ovate, ca. 1.5 mm, abaxially reddish fulvous tomentulose. Pedicel 1–1.5 cm, 1- or 2-bracteolate above middle. Flower buds conic. Sepals broadly triangular, ca. 3 × 3.5 mm, basally connate, outside tomentose, inside pubescent. Outer petals ovate-triangular, ca. 1.2 × 0.9 cm, outside red fulvous tomentose, inside apically puberulent; inner petals ovate-lanceolate, ca. 10 × 6 mm, outside pubescent, inside glabrous. Stamens oblong-cuneate, ca. 1.5 mm; connectives broadly 3-angular. Carpels ca. 10, sericeous pubescent; stigma apex 2-cleft. Fruiting pedicel ca. 2 cm; monocarp stipes to 4 cm; monocarps globose, ca. 2 cm in diam., densely red fulvous tomentose. Seeds reddish brown, oblong, ca. 1.5 × 0.6 cm. Fl. May–Nov, fr. Aug–Mar.

Densely forested slopes; 500–1600 m. Guizhou, C and S Yunnan [Laos, Myanmar, N Thailand, Vietnam].

13. Fissistigma poilanei (Jovet-Ast) Tsiang & P. T. Li, *Acta Phytotax. Sin.* 10: 316. 1965.

火绳藤 huo sheng teng

Melodorum poilanei Jovet-Ast, *Notul. Syst. (Paris)* 9: 82. 1940.

Climbers to 7 m tall. Branches sparsely puberulent when young, glabrous and lenticellate with age. Petiole 1–1.5 cm, pubescent; leaf blade oblong-lanceolate, 6.5–16 × 2–4.5 cm, leathery to thickly papery, abaxially densely grayish brown pubescent, adaxially glabrous except for sparsely puberulent midvein, secondary veins 14–20 on each side of midvein, obliquely ascending, and adaxially flat, base cuneate to broadly cuneate, apex acuminate. Inflorescences leaf-opposed or subopposed, cymose, 2–8-flowered; peduncle 1–3 mm. Pedicel 7–8 mm, ochraceous pubescent, 1- or 2-bracteolate at base to middle. Flower buds broadly ovoid, 4–5 × 4–5 mm. Sepals ovate-triangular, ca. 2 × 2 mm, outside puberulent, inside glabrous. Outer petals ovate-triangular, ca. 9 × 6 mm, outside ochraceous pubescent, inside apically puberulent; inner petals ovate-oblong, ca. 7 × 4 mm, outside pubescent, inside glabrous. Stamens oblong, ca. 1.5 mm; connectives obliquely 3-angular. Carpels oblong, ca. 3 mm, densely hispid; ovules ca. 8 per carpel, in 2 series; stigma apex 2-cleft. Fruiting monocarps globose, ca. 2 cm in diam. Fl. Mar–Dec, fr. Jun–Apr.

Sparsely forested slopes, usually in valleys; 700–1000 m. S and SE Yunnan [Vietnam].

The basionym, *Melodorum poilanei*, was first published in 1938 (Fl. Indo-Chine Suppl. 1: 109) but not validly so.

14. *Fissistigma acuminatissimum* Merrill, J. Arnold Arbor. 19: 29. 1938.

尖叶瓜馥木 jian ye gua fu mu

Climbers to 8 m tall. Branchlets pubescent when young, glabrescent. Petiole 5–12 mm, densely appressed ferruginous pubescent; leaf blade lanceolate to oblong-lanceolate, 7–17 × 2–4 cm, papery to thinly leathery, abaxially ferruginous pubescent but denser on veins, adaxially glabrous except for pubescent midvein and secondary veins, secondary veins 14–21 on each side of midvein, obliquely ascending to margin, and adaxially impressed, base cuneate to broadly cuneate, apex acuminate. Inflorescences terminal or leaf-opposed, cymose, 1–4-flowered; peduncle 3–4 mm, pubescent; bracts ovate-lanceolate. Pedicel 1–1.5 cm, ferruginous pubescent, bracteolate between base and middle. Sepals ovate-triangular, 6–8 × 3–3.5 mm, outside ferruginous pubescent, inside glabrous. Petals greenish white; outer petals oblong-lanceolate, ca. 20 × 8 mm, outside ferruginous pubescent, inside puberulent; inner petals orbicular, to 16 mm, outside pubescent, inside glabrous, apex rounded. Stamens oblong, ca. 2 mm; connectives 3-angular, apex obtuse. Carpels oblong, pubescent; ovules 6 per carpel, in 2 series; styles oblong, pubescent; stigma apex entire. Monocarp stipes ca. 1 cm; monocarps globose, ca. 1.2 cm in diam., densely golden tomentose. Fl. Mar–Nov, fr. Jun–Dec.

Forested slopes; 900–2000 m. Guangxi, SW Guizhou, S Yunnan [Vietnam].

A fine strong bast fiber obtained from the inner bark of *Fissistigma acuminatissimum* is used to make rope in Yunnan.

15. *Fissistigma cavaleriei* (H. Léveillé) Rehder, J. Arnold Arbor. 10: 192. 1929.

独山瓜馥木 du shan gua fu mu

Uvaria cavaleriei H. Léveillé, Fl. Kouy-Tchéou, 29. 1914–1915.

Climbers to 8 m tall, most parts reddish pubescent. Petiole 6–8 mm; leaf blade oblong-lanceolate to oblong-elliptic, 6.5–16 × 1.8–3.8 cm, thinly leathery to thickly papery, abaxially glabrous, adaxially sparsely pubescent, secondary veins 14–21 on each side of midvein and adaxially impressed, base shallowly cordate, apex acute. Inflorescences leaf-opposed or alternate, cymose, 1–5-flowered. Pedicel 1.5–2 cm, 2-bracteolate at base. Sepals ovate-oblong, ca. 6 mm, reddish tomentose. Petals yellowish; outer petals ovate-oblong, ca. 18 × 7 mm, outside densely reddish tomentose, inside glabrous; inner petals ovate-lanceolate, ca. 13 × 4 mm, glabrous, inside basally concave. Stamens oblong; connectives broadly 3-angular. Carpels densely villous; ovules ca. 7 per carpel, in 2 series; styles oblong, pubescent; stigma apex entire. Fruiting pedicel ca. 1.2 cm, reddish pubescent; monocarp stipes ca. 2.7 cm; monocarps globose, 2–2.5 cm in diam., densely villous. Fl. Mar–Nov, fr. Jun–Dec.

• Densely forested slopes; 500–1500 m. W Guangxi, S Guizhou, SE Yunnan.

16. *Fissistigma balansae* (Aug. Candolle) Merrill, Philipp. J. Sci. 15: 130. 1919.

多脉瓜馥木 duo mai gua fu mu

Melodorum balansae Aug. Candolle, Bull. Herb. Boissier, sér. 2, 4: 1070. 1904; *Fissistigma guinanense* Y. Wan.

Climbers to 6 m tall. Branchlets densely fulvous pubescent when young, glabrescent. Petiole 0.8–2 cm, robust, abaxially grooved, densely brown pubescent; leaf blade oblong, oblong-elliptic, or obovate-oblong, 14–23 × 5–10 cm, thinly leathery, abaxially brown pubescent, adaxially sparsely appressed puberulent or puberulent only on midvein and secondary veins, secondary veins 25–35 on each side of midvein and adaxially flat to impressed when dry, reticulate veins prominent and at ca. 90° to secondary veins, base rounded to broadly cuneate, margin revolute, apex acute, obtuse, or retuse. Inflorescences leaf-opposed, terminal, or extra-axillary, in glomerules, many flowered, fulvous tomentulose; peduncle to 1 cm; bracts ovate, 3.5–5 × 2–3 mm, adaxially tomentulose. Flowers fragrant. Stigma apex entire. Fruiting pedicel ca. 2.5 cm, pubescent; monocarp stipes 1.5–2 cm, densely fulvous tomentulose; monocarps sub-globose, ca. 4.4 × 4 cm, sparsely fulvous hispid and with slightly raised tubercles. Seeds brown, oblong, ca. 2.4 × 1.7 cm, with a winged margin. Fl. Mar–May, fr. May–Sep.

Forested slopes; 500–1200 m. SW Guangxi, SE Yunnan [Vietnam].

17. *Fissistigma xylopetalum* Tsiang & P. T. Li, Acta Phytotax. Sin. 10: 318. 1965.

木瓣瓜馥木 mu ban gua fu mu

Climbers to 8 m tall, most parts densely reddish brown to brown tomentose. Petiole ca. 1 cm; leaf blade ovate-oblong to ovate-elliptic, 7.5–17 × 3.5–6.5 cm, thickly papery, abaxially densely reddish brown to brown tomentose, adaxially glabrous except for pubescent midvein, secondary veins 14–18 on each side of midvein, ascending obliquely to margin, and adaxially flat, base rounded to broadly cuneate, apex acute to obtuse. Inflorescences axillary or leaf-opposed, in glomerules, 3–7-flowered; peduncle ca. 3 mm; bracts 1 or 2, lanceolate, 1.5–2 × ca. 0.3 cm, adaxially pubescent. Pedicel 2–2.5 cm. Sepals triangular, ca. 9 × 6 mm, inside glabrous. Petals yellow to grayish purple, thickened, woody when dry; outer petals ovate-lanceolate, ca. 19 × 7 mm, outside sparsely pubescent and prominently costate, inside glabrous. Stamens oblong, ca. 2 mm; connectives apically subrounded to truncate. Carpels oblong, ca. 4 mm, densely sericeous pubescent; ovules 6 per carpel, in 2 series; stigmas glabrous, apex 2-cleft. Fruiting pedicel ca. 2.5 cm; monocarp stipes ca. 3 mm; monocarps globose, 1.5–2 cm in diam. Seeds 6 per monocarp, in 2 series, reddish brown, ovoid to sometimes globose, flat, ca. 10 × 6–8 mm. Fl. Oct–Dec, fr. May–Jul.

Open woodlands, often on moist riverbanks; 300–500 m. S Guangxi, Hainan, S Yunnan [Vietnam].

18. *Fissistigma oldhamii* (Hemsley) Merrill, Philipp. J. Sci. 15: 134. 1919.

瓜馥木 gua fu mu

Melodorum oldhamii Hemsley, J. Linn. Soc., Bot. 23: 27. 1886; *Fissistigma oldhamii* var. *longistipitatum* Tsiang.

Climbers to 8 m tall. Branchlets fulvous pubescent. Petiole ca. 1 cm, pubescent; leaf blade obovate-elliptic to oblong, 6–13 × 2–5 cm, leathery, abaxially pubescent to glabrescent, adaxially glabrous, secondary veins 10–20 on each side of midvein and adaxially flat, base broadly cuneate to rounded, apex bluntly acute, rounded, or retuse. Inflorescences in glomerules, 1–8-flowered; peduncle ca. 2.5 cm. Flowers ca. 1.5 × 1–1.7 cm. Sepals broadly triangular, 3–5(–7) × 5–6 mm, brown tomentose, apex acute. Petals pale yellow to golden; outer petals ovate-elliptic, 21–24 × 11–12 mm, thicker, outside pubescent, inside glabrous; inner petals ovate-lanceolate, ca. 20 × 6 mm, outside puberulent, inside concave and puberulent, margin ciliate. Stamens oblong, ca. 2 cm; connectives slightly curved. Carpels 24–26, golden hairy; ovules 10 per carpel; styles white; stigma apex 2-cleft. Monocarp stipes 2.5–4 cm; monocarps globose, 1.5–1.8 cm in diam., densely fulvous tomentose. Seeds 4 per monocarp, orbicular. Fl. Apr–Sep, fr. Jul–Feb.

• On shrubs, often along ravines; 500–1500 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, SE Yunnan, S Zhejiang.

A fine strong bast fiber is obtained from the inner bark of *Fissistigma oldhamii* and is used to make rope, sacks, and paper; its flowers yield a perfumed oil; the seed oil is used in cosmetics and industry; and its roots are used as medicine for traumatic injury and arthritis.

19. *Fissistigma polyanthum* (J. D. Hooker & Thomson) Merrill, Philipp. J. Sci. 15: 135. 1919.

多花瓜馥木 duo hua gua fu mu

Melodorum polyanthum J. D. Hooker & Thomson, Fl. Ind. 1: 121. 1855.

Climbers to 8 m tall. Roots black, very aromatic. Branches dark gray to brown pubescent, glabrescent. Petiole 0.8–1.5 cm, blackish and transversely wrinkled when dried, pubescent; leaf blade oblong, obovate-oblong, or sometimes elliptic, 6–17.5 × 2–7.5 cm, thinly leathery, abaxially puberulent, adaxially glabrous, secondary veins 13–18 on each side of midvein and adaxially flat, base rounded to broadly cuneate, apex acute, rounded, or sometimes retuse. Inflorescences axillary, leaf-opposed, or extra-axillary, glomerulate, usually 3–7-flowered, yellowish pubescent; peduncle to 4 mm. Flowers small; pedicel to 1.5 cm, bracteolate between base and below middle. Flowers buds broadly 3-angular, apex acute. Sepals broadly triangular, outside pubescent. Outer petals ovate-elliptic, ca. 12 mm, outside densely fulvous pubescent, inside glabrous; inner petals oblong, ca. 9 mm, apex acuminate. Stamens oblong; connectives 3-angular, apex obtuse. Carpels oblong, villous; ovules 4–6 per carpel, in 2 series; stigma apex entire. Monocarp stipes to 2.5 cm, slender; monocarps globose, ca. 1.5 cm in diam., yellowish pubescent. Seeds reddish brown, ellipsoid, flat. Fl. Jan–Oct, fr. Mar–Dec.

Forested slopes, often in ravines; 100–1200 m. Guangdong, Guangxi, S Guizhou, Hainan, SE Xizang, S Yunnan [Bhutan, India, Myanmar, Vietnam].

The roots of *Fissistigma polyanthum* are used as medicine for rheumatism, traumatic injury, and scabies; its leaves are used for treating asthma and scabies; and the bast fibers are used to make rope. The taxon was first mentioned, but not validly published, as "*Uvaria polyantha*" by Wallich (Numer. List, no. 6467. 1832).

20. *Fissistigma bracteolatum* Chatterjee, Kew Bull. [3]: 58. 1948.

多苞瓜馥木 duo bao gua fu mu

Climbers to 10 m tall. Bark grayish black. Branches brown tomentose when young, glabrous and lenticellate with age. Petiole 1–1.5 cm, densely hispid to tomentose; leaf blade ovate-oblong, elliptic-oblong, or obovate-oblong, 9–18 × 3.2–8 cm, leathery, abaxially brown hispid, adaxially glabrous except for hispid midvein, secondary veins 16–20 on each side of midvein, obliquely ascending to margin, and adaxially impressed, main tertiary veins prominent and parallel, reticulate veins inconspicuous, base rounded to broadly cuneate, apex acute and apiculate. Inflorescences mostly leaf-opposed, in subumbellate glomerules, often 10-flowered or more; peduncle 3–10 mm; bracts oblong-ovate, 5–6 × 3–4 mm, abaxially brown tomentulose, adaxially glabrous. Pedicel 1–2 cm, fulvous tomentulose, 1- or 2-bracteolate below middle. Flower buds conic. Sepals ovate, 5–7 × 3–4 mm, outside tomentulose, inside glabrous. Outer petals ovate-triangular to ovate-lanceolate, 13–17 × 7–8 cm, outside fulvous tomentulose, inside glabrous; inner petals ovate-lanceolate, 10–11 × 4–5 mm, outside pubescent, inside glabrous. Stamens oblong; connectives ovoid-triangular. Carpels 4–6, ovate-oblong, ca. 3 mm, densely hispid; ovules 8–10 per carpel, in 2 series; styles elongate, inclining; stigma apex 2-cleft. Monocarp stipes ca. 3 cm; monocarps globose, ca. 1.5 cm in diam., tomentulose. Fl. Mar–Jun, fr. Aug–Nov.

Forested valley slopes, moist scrub; 800–1800 m. SE Yunnan [Myanmar].

21. *Fissistigma kwangsiense* Tsiang & P. T. Li, Acta Phytotax. Sin. 10: 323. 1965.

广西瓜馥木 guang xi gua fu mu

Climbers to 6 m tall. Branches densely ferruginous pubescent when young, glabrous and lenticellate with age. Petiole ca. 5 mm, ferruginous tomentose; leaf blade oblong-lanceolate to narrowly oblong, 7–18 × 1.7–3.8 cm, papery, abaxially ferruginous tomentose, adaxially sparsely pubescent but denser along midvein, secondary veins 13–19 on each side of midvein, obliquely ascending, and adaxially impressed, base rounded, apex slightly acute. Inflorescences usually leaf-opposed, sometimes pseudoterminal, in glomerules, several flowered, densely ferruginous tomentose; peduncle very short to almost absent. Pedicel 2-bracteolate. Flower buds ovoid, ca. 1 cm. Sepals ovate-oblong, ca. 6 mm. Outer petals ovate-elliptic, ca. 8 × 4 mm; inner petals oblong-elliptic, smaller than outer petals, margins connivent. Stamen connectives apically long acuminate. Carpels ovate-oblong, villous; ovules ca. 10 per carpel, in 2 series; styles filamentous; stigma apex entire. Fruit not seen. Fl. Feb–Sep, fr. Jun–Nov.

• Densely forested slopes, usually in valleys; 200–500 m. SW Guangxi, SE Yunnan.

22. *Fissistigma retusum* (H. Léveillé) Rehder, J. Arnold Arbor. 10: 191. 1929.

凹叶瓜馥木 ao ye gua fu mu

Melodorum retusum H. Léveillé, Repert. Spec. Nov. Regni Veg. 9: 458. 1911; *Fissistigma capitatum* Merrill ex H. L. Li.

Climbers to 10 m tall. Branches brown tomentose. Petiole 0.8–1.5 cm, abaxially grooved, densely tomentulose; leaf blade broadly ovate, obovate, or obovate-oblong, 9–26 × 4.5–13 cm, leathery to thinly leathery, abaxially brown tomentose, adaxially tomentulose only on midvein and secondary veins, secondary veins 15–22 on each side of midvein and adaxially ± impressed, tertiary veins prominently parallel, reticulate veins very dense, base rounded, truncate, or sometimes shallowly cordate, apex rounded to retuse and minutely apiculate. Inflorescences ± leaf-opposed, in umbel-like glomerules, 4–8-flowered or more; peduncle 5–10 mm; bracts caducous. Pedicel to 2 cm, bracteolate at middle. Sepals ovate-lanceolate, ca. 1 cm, as long as petals in bud, outside tomentulose, inside glabrous. Outer petals ovate-elliptic, ca. 15 mm, outside tomentulose, inside glabrous; inner petals ovate-lanceolate, shorter than outer petals, glabrous, slightly incurved at base. Stamens oblong; connectives broadly 3-angular. Carpels ca. 1.5 mm, densely sericeous pubescent; ovules ca. 4 per carpel, in 2 series; styles oblong, incurved, pubescent; stigma apex entire. Fruiting pedicel 1.5–2.2 cm, golden tomentulose; monocarp stipes very short; monocarp globose, ca. 3 cm in diam., golden tomentulose. Fl. May–Nov, fr. Jun–Dec.

• Densely forested slopes; 700–2000 m. S Guangdong, Guangxi, Guizhou, Hainan, SE Xizang, Yunnan.

23. *Fissistigma shangtzeense* Tsiang & P. T. Li, Acta Phytotax. Sin. 10: 324. 1965.

上思瓜馥木 shang si gua fu mu

Climbers to 8 m tall, most parts fulvous pubescent. Branches lenticellate and glabrous with age. Petiole ca. 1.5 cm; leaf blade obovate, obovate-oblong, or sometimes elliptic, 3–13(–25) × 2–5.5(–8) cm, papery, abaxially fulvous pubescent, adaxially glabrous except for fulvous pubescence on midvein, secondary veins 13–20 on each side of midvein and adaxially impressed, base broadly cuneate to sometimes rounded, apex rounded to retuse. Inflorescences extra-axillary, in glomerules, 2–5-flowered; peduncle to 6 mm; bracts ovate, ca. 1 × 1 mm. Pedicel bracteolate between base and middle. Sepals broadly triangular, ca. 5 × 3 mm. Outer petals ovate, ca. 10 × 6 mm, outside puberulent; inner petals oblong, ca. 6 × 2 mm, outside puberulent, inside glabrous. Stamens oblong; connectives obliquely 3-angular. Carpels oblong-lanceolate, densely sericeous-villous; ovules ca. 10 per carpel, in 2 series; stigmas apically entire. Fruiting pedicel ca. 2 cm; monocarp oblong, ca. 4 × 2 cm, densely brown tomentose. Seeds shiny black, oblong, ca. 5 mm in diam. Fl. Jul–Oct, fr. Oct–May.

• Forested slopes; 600–800 m. S Guangxi.

23. *ANNONA* Linnaeus, Sp. Pl. 1: 536. 1753.

番荔枝属 fan li zhi shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Guanabamus Miller.

Trees or shrubs, with an indument of simple or stellate hairs. Inflorescences terminal, leaf-opposed, extra-axillary, or sometimes cauliflorous, never axillary, 1-flowered or in few-flowered clusters. Pedicel usually short. Sepals 3, small, valvate. Petals 6, in 2 whorls or inner whorl rudimentary or absent, free or connate at base; outer petals valvate, fleshy but leathery when dry, connivent or somewhat spreading, inside basally concave, margin thick; inner petals imbricate or valvate. Stamens many; filament short; connectives apically convex or apiculate. Carpels many, often connate; ovule 1 per carpel, basal; styles clavate; stigmas muriculate. Fruit syncarpous, surface covered with knobs, bulges, spines, or less often smooth. Seeds many per syncarp, embedded in edible pulp.

About 100 species: mostly in tropical America, a few in tropical Africa; seven species (all introduced) in China.

Annona includes several trees that have become widely grown for their fruit.

- 1a. Inner petals present.
 - 2a. Carpels glabrous; ripe syncarp smooth 1. *A. glabra*
 - 2b. Carpels pubescent; ripe syncarp with soft prickles.
 - 3a. Leaf blade elliptic, 14–24 cm, secondary veins punctate at base; inner petals glabrous 2. *A. montana*
 - 3b. Leaf blade obovate-oblong to ovate-elliptic, 5–18 cm, secondary veins not punctate at base; inner petals pubescent 3. *A. muricata*
- 1b. Inner petals absent or reduced to minute scales.
 - 4a. Leaf blade abaxially tomentose.
 - 5a. Axillary vegetative buds glabrous; leaf blade adaxially pubescent; leaves associated with flowering branches not auriculate 4. *A. cherimolia*
 - 5b. Axillary vegetative buds pubescent; leaf blade adaxially glabrous; leaves associated with flowering branches auriculate 5. *A. diversifolia*
 - 4b. Leaf blade abaxially pubescent or puberulent when young, glabrescent.
 - 6a. Outer petals outside surface and carpels hairy; ripe syncarp not pruinose, areoles flattened and separated by ± raised ridges; fruit pulp yellowish 6. *A. reticulata*
 - 6b. Outer petals and carpels glabrous; ripe syncarp slightly pruinose, areoles convex and separated by deep grooves; fruit pulp whitish 7. *A. squamosa*

1. *Annona glabra* Linnaeus, Sp. Pl. 1: 537. 1753.

圆滑番荔枝 yuan hua fan li zhi

Trees to 12 m tall, evergreen. Branches glabrous, lenticellate. Axillary leaf buds ovoid, fulvous pubescent, apex obtuse. Petiole 0.8–2.5 cm; leaf blade ovate, elliptic-ovate, elliptic, or oblong, 6–20 × 3–8 cm, papery to thinly leathery, glabrous at maturity, secondary veins 7–12 on each side of midvein and forming a ca. 60° angle with midvein, secondary and reticulate veins prominent on both surfaces when dry, base obtuse to rounded and slightly decurrent onto petiole, apex acute to obtuse. Inflorescences internodal or terminal on a short branchlet, 1-flowered. Flower buds ovoid to subglobose. Pedicel 1.5–2 cm, glabrous. Sepals broadly ovate, 3–4 × 3–4 mm, free, glabrous. Outer petals greenish yellow to pale yellow and inside basally with a red spot, broadly ovate, 1.5–3 × 1.3–2.5 cm, outside glabrous, inside minutely puberulent, apex obtuse; inner petals outside yellow, inside carmine, 1.2–2.5 × 0.7–1.5 cm, minutely puberulent. Stamens oblong, 3–4 mm; connectives apically slightly convex. Carpels connate at anthesis, glabrous. Syncarp yellow to orange, ovoid, 5–12 × 5–8 cm, smooth, apex rounded. Seeds pale reddish brown, 1.3–1.5 cm. Fl. May–Jun, fr. Jul–Aug.

Cultivated; 100–200 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan, Zhejiang [native to tropical America].

The insipid fruit, pond apple, are mostly used for jellies or eaten raw. This tree is tolerant of saline soils and is considered a very troublesome invasive species in coastal areas of Australia.

2. *Annona montana* Macfadyen, Fl. Jamaica 1: 7. 1837.

山地番荔枝 shan di fan li zhi

Trees to 10 m tall, evergreen. Bark purplish brown. Branchlets green and smooth when young. Petiole 1.2–2 cm, adaxially grooved; leaf blade elliptic, papery, abaxially smooth and pale green, adaxially light to dark green, secondary veins 11–16 on each side of midvein, basally punctate, and adaxially slightly concave, base cuneate, apex shortly acuminate. Inflorescences terminal or axillary on apical branchlets, 1- or 2-flowered. Pedicel 2.5–4 cm, robust. Sepals ovate, ca. 6 mm. Outer petals yellowish brown, broadly ovate, apex acute; inner petals orange, shorter than outer petals, apex obtuse. Stamens many; filaments white, flat; anther locules brown; connectives apically dilated. Carpels oblong, 6–7 mm, free at anthesis; ovaries pubescent. Syncarp brownish yellow, ovoid, subglobose, or cordate-ovoid, slightly oblique, 9.5–14 × 9.5–12.5 cm, with dense soft prickles and dark brown hairs; pulp yellowish, aromatic. Fl. May–Jun, fr. Jul–Sep.

Cultivated; 100–200 m. Guangdong, Taiwan [native to W tropical America].

The fruit, mountain soursop, are of a good flavor.

3. *Annona muricata* Linnaeus, Sp. Pl. 1: 536. 1753.

刺果番荔枝 ci guo fan li zhi

Trees to 10 m tall, evergreen. Bark rugose. Petiole short; leaf blade obovate-oblong to ovate-elliptic, 5–18 × 2–7 cm, papery, abaxially greenish and glabrous, adaxially green and shiny, secondary veins 6–13 on each side of midvein and

slightly prominent on both surfaces, base broadly cuneate to rounded, apex acute to obtuse. Inflorescences axillary, 1- or 2-flowered. Flowers ca. 3.8 cm in diam. Pedicel 0.5–2.5 cm, pubescent. Sepals ovate-elliptic to ovate-triangular, 3–5 mm. Petals green, later yellowish, inside basally without a red spot; outer petals thick, broadly triangular, 2.5–5 × 2–4 cm, inside finely pubescent, apex acute to obtuse; inner petals ovate-elliptic, 2–4 × 1.5–3.5 cm, slightly thin, imbricate, pubescent, base clawed, apex obtuse. Stamens 4–5 mm; filaments fleshy; connectives apically dilated. Carpels ca. 5 mm, pubescent. Syncarp green, ovoid and often oblique or curved, 10–35 × 7–15 cm, covered with soft prickles, base impressed, apex rounded; pulp white. Seeds brownish yellow, reniform, ca. 2 × 1 cm. Fl. Apr–Jul, fr. Jul–Dec. $2n = 14, 16$.

Widely cultivated; 100–400 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [native to tropical America].

The fruit, soursop, is the largest among *Annona* species. It is eaten raw, used in sherbets, and used in drinks. The pulp is also consumed with wine or cognac.

4. *Annona cherimolia* Miller, Gard. Dict., ed. 8, *Annona* no. 5. 1768.

毛叶番荔枝 mao ye fan li zhi

Trees 3–7 m tall, deciduous. Branchlets tomentose, glabrescent. Axillary leaf buds ovoid, apex obtuse. Petiole 6–12 mm; leaf blade ovate, ovate-lanceolate, elliptic, obovate, or rarely orbicular, 5–25 × 2.5–10 cm, thinly papery, abaxially tomentose, adaxially pubescent, secondary veins 11–14 on each side of midvein and forming an angle from 60° to almost 90° with midvein, base rounded to obtuse and slightly decurrent onto petiole, apex obtuse to shortly acuminate. Inflorescences 1–3-flowered. Sepals ovate, 2–4 mm, outside tomentose, inside glabrous. Petals outside greenish yellow to reddish, inside yellowish to whitish and basally purple-spotted, linear-oblong, 1.5–3 cm, tomentose, apex obtuse; inner petals absent or reduced to minute scales. Stamens oblong, 1.2–1.7 mm. Syncarp mostly green, ovoid, cordate, conic, or rarely globose, to 20 × 15 cm, smooth or tuberculate but not furrowed between areoles; pulp white. Seeds blackish brown, turning paler when dry, obovoid, ca. 1 cm, slightly flattened, apex obliquely truncate. Fl. Mar–Jul, fr. Jun–Nov.

Widely cultivated; 100–300 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [native to tropical America].

The fruit, cherimoya, has good dessert qualities and is subacid and delicate. It is eaten raw, used in cooling drinks, and used in sherbets. It contains up to 18.4% sugar, 1.8% protein, and 0.4% fat.

5. *Annona diversifolia* Safford, Science, n.s., 33: 471. 1911.

异叶番荔枝 yi ye fan li zhi

Trees to 8 m tall, deciduous. Branchlets tomentose, glabrescent. Axillary leaf buds ovoid, brown tomentose, apex obtuse. Petiole ca. 1 cm; leaf blade broadly obovate to ovate-lanceolate, 7.5–20 × 3–10 cm, papery, abaxially gray pruinose and brown tomentose, adaxially smooth and glabrous, secondary veins 11–14 on each side of midvein and adaxially flat, base rounded to obtuse, apex rounded. Flowering branches associated with large auriculate leaves. Inflorescences 1–3-flowered.

Flowers ca. 3 cm. Sepals ovate, 2–4 mm, outside tomentose, inside glabrous. Petals reddish; outer petals linear-oblong, 1.5–3 cm, tomentose; inner petals absent. Stamens oblong, ca. 1.5 mm. Syncarp green to reddish, conic, ovoid, or spherical, ca. 20 × 15 cm, tuberculate; pulp white or brownish when ripe. Seeds blackish brown, ovoid to obovoid, ca. 1 cm. Fl. Apr–Aug, fr. Jun–Nov. $2n = 14$.

Cultivated; 100–200 m. Guangdong [native to Central America and S Mexico].

This species is cultivated for the fine fruit, ilama, which are eaten raw.

6. *Annona reticulata* Linnaeus, Sp. Pl. 1: 537. 1753.

牛心番荔枝 niu xin fan li zhi

Trees to 6 m tall, evergreen. Branchlets grayish sericeous, glabrescent. Axillary leaf buds ovoid, apex obtuse. Petiole 1–1.5 cm; leaf blade oblong-lanceolate, 9–30 × 2–7 cm, papery, pubescent when young but glabrescent, secondary veins 9–18 on each side of midvein, forming an angle of 30°–60° with midvein, and flat, base cuneate to obtuse and slightly decurrent onto petiole, apex acuminate. Inflorescences leaf-opposed or internodal, cymose, several flowered. Flower buds lanceolate, apex obtuse. Sepals ovate, 2–3 mm, outside pubescent, inside glabrous. Petals yellowish green; outer petals oblong-lanceolate, fleshy, outside puberulent, inside glabrous; inner petals absent. Stamens oblong, 1–1.3 mm; connectives apically subtruncate. Carpels oblong, villous; stigmas muriculate. Syncarp turning yellow to reddish, spherical to ovoid, 5–12.5 cm in diam.; areoles ± flat, separated by a reticulation of often raised ridges; pulp yellowish. Seeds blackish brown. Fl. Nov–Feb, fr. Mar–Jun. $2n = 14$.

Widely cultivated; 100–200 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [native to tropical America].

The fruit, bullock's-heart or custard-apple, are edible, containing nearly 17% sugar, 1.6% protein, and 0.26% fat.

7. *Annona squamosa* Linnaeus, Sp. Pl. 1: 537. 1753.

番荔枝 fan li zhi

Trees, deciduous, to 8 m tall. Bark thin. Branchlets pubescent, glabrescent. Petiole 4–15 mm; leaf blade elliptic-lanceolate, narrowly elliptic, or oblong, 5–17.5 × 2–7.5 cm, thinly papery to membranous, abaxially pale green and puberulent when young but glabrate in age, base obtuse to rounded and slightly decurrent, apex acute to obtuse, lateral veins 8–15 on each side of midvein, adaxially flat. Inflorescences 1-flowered or 2–4-fasciculate. Flowers 2–3 cm, puberulent. Sepals triangular. Outer petals basally green to purple, oblong-lanceolate, 1.5–3 × 0.5–0.8 cm, fleshy, thick, inside concave, keeled on apical half; inner petals absent or reduced to scales, as long as stamens. Stamens oblong, ca. 1 mm; connective broad, apex subtruncate. Carpels oblong, distinct at anthesis; stigmas ovate-lanceolate. Syncarp greenish yellow, slightly pruinose, spherical to ovoid, 5–10 cm in diam., areoles rounded, convex, separated by deep grooves; pulp white. Seeds black-brown, ca. 14 mm. Fl. May–Jul, fr. Jun–Nov.

Widely cultivated; near sea level to 200 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan, Zhejiang [native to tropical America].

The fruit, sugar-apple or sweetsop, is edible. It contains more than 20% sugar, 2.3% protein, and 0.3% fat. The bast fiber is used for paper making; the roots are used medicinally for dysentery; and the seeds yield up to 20% oil.

24. ROLLINIA A. Saint-Hilaire, Fl. Bras. Merid., ed folio, 1: 23; ed. quarto, 1: 28. 1824.

萎林果属 lou lin guo shu

Li Bingtao (李秉滔 Li Ping-tao); Michael G. Gilbert

Trees or shrubs, indument of simple or rarely stellate hairs. Inflorescences few flowered or rarely 1-flowered. Sepals 3, small, valvate, free or rarely connate at base into a cup. Petals 6, in 2 whorls, with each whorl valvate, connate at base; outer petals outside with a spur or wing; inner petals minute. Stamens many; connectives disklike, apex dilated. Carpels many; ovule 1 per carpel, basal. Fruit syncarpous, globose to ovoid. Seeds many per syncarp, usually dark brown to almost black, flat, embedded in edible pulp.

About 42 species: Central America, tropical South America; one species (introduced) in China.

Rainer (Ann. Naturhist. Mus. Wien, B, 108: 191–205. 2007) transferred all species of *Rollinia* to *Annona*, mainly on the basis of preliminary molecular data that nested the two species of *Rollinia* investigated within *Annona*.

1. *Rollinia mucosa* (Jacquin) Baillon, Adansonia 8: 268. 1868.

米糕萎林果 mi gao lou lin guo

Annona mucosa Jacquin, Observ. Bot. 1: 16. 1764; *Rollinia orthopetala* A. Candolle.

Trees to 10 m tall. Bark grayish brown, with rose-colored tissue below. Petiole 5–10 mm; leaf blade oblong-elliptic, 15–25 × 8–11 cm, leathery, abaxially pubescent, adaxially smooth and glossy, midvein prominent, secondary veins 11–16 on each side of midvein, base slightly cuneate, apex acuminate. Inflorescences 1-flowered. Flowers 2–3.5 cm in diam. Pedicel ca. 2 cm, thick and widening at apex. Sepals broadly triangular, 3–4

mm. Outer petals with conspicuous winglike dorsal appendage; inner petals small and scalelike. Stamens many, ca. 1 mm. Carpels many; styles terminal, short, densely hairy. Syncarp dark green at first, ripening yellow to pale yellow, spherical to oblong, 10–20 × 7–20 cm, with soft protuberances ending in a brown to black fleshy point at apex of each carpel; pulp white or cream, fleshy, with a soft fibrous and mucilaginous texture, juicy and with a pleasant aroma. Seeds dark brown to almost black, ca. 10 × 5 mm. Fl. May–Jun, fr. Jul–Nov.

Cultivated; 100–200 m. Guangdong [native to tropical South America].

This species is grown for the fine fruit, biriba. The abundant fleshy pulp surrounding the seeds is eaten.