OLACACEAE

铁青树科 tie qing shu ke

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Shrubs, scandent shrubs, trees, or lianas, sometimes hemiparasitic, often glabrous. Lateral shoots sometimes with bud scales at base. Stipules absent. Leaves alternate, rarely opposite; petiole well developed; leaf blade simple, margin entire; veins usually pinnate, sometimes palmate and 3–5-veined. Inflorescences axillary, rarely also terminal, cymose, fasciculate, racemelike, spikelike, or umbellate, mostly small; bracts small and inconspicuous. Flowers usually bisexual, actinomorphic, 3–7-merous, sometimes heterostylous. Calyx small at anthesis, cupular, discoid, or lobed, sometimes accrescent to partly or wholly covering fruit, sometimes fused to fruit (in *Schoepfia*). Petals free or basally connate, valvate. Disk cuplike or annular, rarely free glands, sometimes accrescent and covering fruit apex (in *Schoepfia*). Stamens 3–15, rarely in part staminodes, epipetalous; anthers basi- or medi-fixed, usually 2-loculed, longitudinally dehiscent. Ovary usually superior, rarely semisuperior but sometimes apparently inferior through fusion with calyx, 2–5-loculed or semiloculed with apex of ovary 1-loculed; ovules solitary in each locule or semilocule, pendent from apex of free central placenta, usually anatropous, integuments 1 or 2. Style terminal, simple; stigma 2–5-lobed. Fruit a drupe, sometimes with an accrescent calyx. Seed solitary; testa thin; endosperm abundant; embryo small; cotyledons 2–4.

Between 23 and 27 genera and 180-250 species: tropical and warm-temperate regions worldwide; five genera (one endemic) and ten species (three endemic) in China.

Ling Yeou-ruenn. 1988. Olacaceae. In: Kiu Hua-shing & Ling Yeou-ruenn, eds., Fl. Reipubl. Popularis Sin. 24: 30-46.

- 1a. Leaves palmately 3–5-veined, usually narrowly but distinctly peltate; liana, sometimes with axillary tendrils; inflorescences a dichotomous cyme, often very lax; fruiting pedicel accrescent to 1.5–2.5 cm; fruit dehiscent 4. *Erythropalum*
- 1b. Leaves pinnately veined, not peltate; tendrils absent; inflorescences fasciculate, racemelike, spikelike, or umbellate; fruiting pedicel to 1 cm, often ± absent; fruit indehiscent.

 - 2b. Inflorescences fasciculate, racemose, or spicate (sometimes in cymes in *Ximenia*); fruit ± globose, ellipsoid, or ovoid, 0.5–3 cm wide, longer than wide.
 - 3a. Staminodes present; petals glabrous on inside; calyx enlarged, free from and partly or entirely enveloping fruit

 3. Olax
 - 3b. Staminodes absent; petals hairy on inside; calyx not enlarged, not enclosing fruit or completely fused to fruit.

1. XIMENIA Linnaeus, Sp. Pl. 2: 1193. 1753.

海檀木属 hai tan mu shu

Shrubs or low trees. Branchlets often spine-tipped. Leaves alternate or fascicled on short shoots; veins pinnate. Inflorescences a fascicle or cyme. Calyx cupular, 4- or 5-dentate, persistent, not accrescent. Petals 4 or 5, free, densely villous on inside, apical 1/2 revolute. Stamens 8 or 10; filaments filiform; anthers linear. Disk absent. Ovary superior, (3 or)4-loculed, placenta axile; ovules 3 or 4. Style ± slender; stigma capitate. Drupe ovoid, 1-seeded.

Eight species: mostly in tropical America, one species restricted to Africa, one species ± pantropical; one species in China.

1. Ximenia americana Linnaeus, Sp. Pl. 2: 1193. 1753.

海檀木 hai tan mu

Shrub or tree, 2–4 m tall. Branchlets usually spiny. Petiole 3–5 mm; leaf blade ovate, elliptic, or obovate, $3-5\times2-3$ cm, \pm leathery, base obtuse, apex obtuse, apiculate, mucronulate, or sometimes emarginate; secondary veins 3–5 on each side of midvein. Cymes or racemes 1.5–2.5 cm, 3–6-flowered. Pedicel 2–3 mm. Calyx cupular, ca. 1 mm. Petals 4 or 5, white or greenish, oblong, 5–7 mm, inside white-barbate. Stamens 8 or

10. Ovary ovoid-conic. Drupe orange, ± globose to ovoid, 2–3 cm in diam. Fl. and fr. Mar–Jun.

Sandy areas behind beaches along seashores, rarely hills; near sea level to 100 m. S Hainan [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand; Africa, America, Australia, Pacific Islands].

The fruit are dispersed both by birds eating the succulent mesocarp and by water, as the endocarp contains air spaces and is able to float for a long time.

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2. MALANIA W. Y. Chun & S. K. Lee, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 67. 1980.

蒜头果属 suan tou guo shu

Trees. Branchlets unarmed. Leaves alternate; leaf blade pinnately veined. Inflorescences compound, a short raceme of umbellules. Calyx cupular, 4- or 5-dentate, not accrescent. Petals 4 or 5, basal 1/2 adaxially woolly. Stamens 8 or 10; filaments filiform; anthers linear. Ovary superior, imperfectly 2-loculed; placenta central, free; ovules 2. Style short; stigma minutely 2-lobed. Drupe oblately ± pear-shaped, 1-seeded.

• One species.

1. Malania oleifera Chun & S. K. Lee, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 68. 1980.

蒜头果 suan tou guo

Trees, 10–20 m tall. Branchlets brown, with scattered lenticels. Petiole 1–2 cm; leaf blade elliptic to elliptic-lanceolate, 7– 15×2.5 –6 cm, thickly papery to \pm leathery, minutely puberulous when young, glabrescent, base broadly cuneate to obtuse and sometimes slightly unequal, apex acute to acuminate; midvein adaxially impressed; secondary veins 3–5 on

each side of midvein, distant, abaxially prominent, adaxially flat or slightly impressed. Umbels 10–15-flowered; peduncle 1–2.5 cm. Pedicel 5–7 mm. Calyx 4(or 5)-dentate, ca. 1 mm, not accrescent. Petals greenish, broadly ovate, ca. 3 mm, puberulous, inside woolly. Stamens 8 or 10. Ovary ovoid-coniform, ca. 1 mm. Style ca. 0.5 mm; stigma minutely 2-lobed. Drupe oblate or pear-shaped, 3–4.5 cm in diam., glabrous. Seed ± globose. Fl. Apr–Sep, fr. May–Dec.

Forests, mountain slopes, limestone hills; 300–1700 m. W. Guangxi, SE Yunnan.

3. OLAX Linnaeus, Sp. Pl. 1: 34. 1753.

铁青树属 tie qing shu shu

Trees or shrubs, sometimes climbers. Branchlets unarmed. Leaves alternate; leaf blade pinnately veined. Inflorescences racemelike or spikelike, sometimes paniculate; rachis \pm zigzagged before anthesis. Calyx cupular, truncate or obscurely dentate, greatly accrescent in fruit. Petals 3, margin entire or deeply 2-lobed, free or connate at base. Stamens 3, basally adnate to petals; filaments flat; anthers oblong; staminodes 5, 2-cleft. Disk annular. Ovary superior, 3-loculed below, 1-loculed above, placenta central, free; ovules 3. Style short or elongate; stigma capitellate, minutely 3-lobed. Drupe ellipsoid to \pm globose, basal 1/2 to near apex covered by persistent calyx, 1-seeded; endosperm copious.

About 40 species: tropical Africa, Asia, and Australia; three species (one endemic) in China.

- 1a. Petals 3–4 mm, not 2-lobed; inflorescences 1–1.5 cm; leaf blade apex acuminate; fruiting calyx 0.8–0.9 cm 3. *O. acuminata* 1b. Petals 8–13 mm, 2 petals 2-lobed; inflorescences 1.5–5 cm; leaf blade apex acute; fruiting calyx 1.4–2 cm.
- 1. Olax imbricata Roxburgh, Fl. Ind. 1: 169. 1820.

铁青树 tie qing shu

Olax wightiana Wallich ex Wight & Arnott; Ximenia olacoides Wight & Arnott.

Shrubs, sometimes climbers, 2–6 m tall. Branchlets brown. Petiole 5–10 mm; leaf blade elliptic to ovate-oblong, 5– 10×2.5 –3.5 cm, \pm leathery, glabrous, base rounded, apex acute; secondary veins 6–9 on each side of midvein. Inflorescences usually unbranched, 1.5–2.5 cm; rachis zigzagged; peduncle 3–10 mm. Pedicel 1–3 mm. Calyx small, truncate. Petals white or yellowish, 8–10 mm, 1 entire and 2 2-lobed. Style to 1 cm. Drupe \pm globose or obovoid, nearly covered by accrescent orange calyx, 1.5–2 cm in diam. Fl. and fr. Apr–Oct.

Forests or secondary forests; below 200 m. Hainan, Taiwan [India, Indonesia, Myanmar, Sri Lanka, Malaysia, Philippines, Thailand].

2. Olax austrosinensis Y. R. Ling, Bull. Bot. Res., Harbin 2(4): 18. 1982.

疏花铁青树 shu hua tie qing shu

Olax laxiflora Merrill ex H. L. Li, J. Arnold Arbor. 26: 60. 1945, not Ridley (1931).

Shrubs, sometimes climbers, 1–4 m tall. Branchlets brown. Petiole 1–1.3 cm; leaf blade oblong-ovate to elliptic, 8– 18×4 –7 cm, \pm leathery, glabrous, base cuneate to rounded, apex acute to \pm acuminate; secondary veins 7–15 on each side of midvein. Inflorescences branched or unbranched, (1–)3.5–5 cm, 5- or 6-flowered; peduncle 2–8 mm. Pedicel 3–10 mm. Calyx small, obscurely dentate. Petals white, 1–1.3 cm, 2-lobed. Ovary conic. Style 7–8 mm. Drupe red, ellipsoid to obovoid, basal 1/2 covered by accrescent calyx, 2.8–3.8 \times 1.3–2 cm. Fl. Mar–May, fr. Apr–Sep.

- Forests, mountain valleys; 100–1600 m. Guangxi, Hainan.
- **3. Olax acuminata** Wallich ex Bentham, Proc. Linn. Soc. Lond. 1: 89. 1840.

尖叶铁青树 jian ye tie qing shu

Shrubs, to 5 m tall. Branchlets yellow. Petiole 3–7 mm; leaf blade oblong to ovate-lanceolate, $6-10 \times 2.5-3.5$ cm,

papery, glabrous, base cuneate to rounded, apex acuminate; secondary veins 9–11 on each side of midvein. Inflorescences unbranched, 1–1.5 cm, 3–8-flowered; peduncle 4–6 mm. Pedicel 2–3 mm. Calyx small, truncate, Petals yellowish, 3–4 mm, oblong-lanceolate. Drupe orange, ellipsoid to ovoid, basal 1/2

covered by accrescent calyx, 1.5–1.8 cm in diam. Fl. and fr. Mar–Sep.

Rain forests; below 500 m. Yunnan (Yingjiang) [Bhutan, E India, Myanmar].

4. ERYTHROPALUM Blume, Bijdr. Fl. Ned. Ind. 921. 1826.

赤苍藤属 chi cang teng shu

Scandent shrubs or lianas, with axillary tendrils. Branchlets unarmed. Leaves alternate; leaf blade slightly peltate, palmately 3–5-veined. Inflorescences a dichotomous cyme. Calyx cupular, 4- or 5-dentate, accrescent and covering fruit. Petals 5, ovate-triangular, bases coherent. Stamens 5, inserted at base of petals; filaments short; anthers ovoid. Disk cupular, 5-crenate. Ovary inferior, 1-loculed; placenta central, free; ovules 2 or 3. Style conic; stigma 3-lobed. Drupe ellipsoid, crowned by persistent calyx, splitting into 3–5 1-seeded segments when mature.

One species: S and SE Asia.

Erythropalum has sometimes been placed in a distinct family, the Erythropalaceae, because of its very distinctive tendrils, large and lax inflorescences, and dehiscent fruit, but it also has the free, central placentation characteristic of the Olacaceae, and molecular data do not seem to support such a separation.

1. Erythropalum scandens Blume, Bijdr. Fl. Ned. Ind. 922. 1826.

赤苍藤 chi cang teng

Dactylium vagum Griffith; Erythropalum populifolium Masters; E. vagum (Griffith) Masters.

Lianas, 5–10 m tall, glabrous. Branchlets with \pm persistent acute bud scales at base, with axillary tendrils. Petiole 3–10 cm; leaf blade ovate, oblong-ovate, or triangular-ovate, 8–20 \times 4–15 cm, papery to \pm leathery, base obtuse, truncate, or \pm cordate, and usually peltate, apex acuminate; basal veins 3 or 5, abaxi-

ally prominent, adaxially impressed. Cymes 6–18 cm, many-flowered; peduncle 4–10 cm. Pedicel filiform, 2–5 mm. Calyx cupular, 5-dentate, ca. 1 mm. Petals white, 1.5–2 mm. Stamens with tufts of hairs on either side. Disk elevated. Drupe ellipsoid to obovoid, $1.5-2.5\times0.8-1.2$ cm, crowned by persistent calyx; dehisced segments eventually recurving to display bright red inner surface. Seeds indigo blue, broadly ellipsoid. Fl. and fr. Mar–Sep.

Alluvial and riverine forests; 100–1500 m. Guangdong, Guangxi, S Guizhou, Hainan, SE Xizang, Yunnan [Bangladesh, Brunei, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

5. SCHOEPFIA Schreber, Gen. Pl. 129. 1789.

青皮木属 qing pi mu shu

Schoepfiopsis Miers.

Trees or shrubs. Branchlets unarmed, often caducous, produced successively from basal pulvinus. Leaves alternate; leaf blade pinnately veined. Inflorescences racemelike or spikelike; peduncle base sometimes with persistent bud scales; rachis usually slightly zigzagged. Flowers sometimes ± opposite, fragrant, often heterostylous. Bract and bracteoles or bract at calyx base forming epicalyx, persistent. Calyx adherent to ovary, truncate or 4- or 5(or 6)-denticulate, accrescent. Corolla tubular, campanulate, or urceolate; lobes 4–6, with a tuft of hairs behind each filament. Stamens 4 or 5(or 6), epipetalous, opposite petal lobes; filaments short; anther 2-loculed. Disk annular, fleshy. Ovary semisuperior, basally 3-loculed, apically 1-loculed; placenta central, free; ovules 3. Style slender, shorter than or as long as corolla tube; stigma 3-lobed. Drupe united with calyx and apparently inferior, tipped with disk and calyx teeth, often ± longitudinally striate when dried, 1-seeded; endosperm copious.

About 30 species: tropical and subtropical America and Asia; four species (one endemic) in China.

The stems are often clearly dimorphic. The older, pale-barked, perennial stems have groups of prominent scars left by the caducous branchlets, which bear the flowers and fruit; these are much more slender and often purplish with white lenticels. The caducous shoots have bud scales at the base, but these are lost soon after the branchlets develop.

Recent molecular data suggest that Schoepfia is not very closely related to other members of the Olacaceae.

Species 2-4 are very closely related to each other and are difficult to differentiate in the absence of flowers.

1a. Peduncle base with pale brown bud scales; pedicel 5–6 mm1. S. fragrans1b. Peduncle base without bud scales; pedicel ± absent.2a. Corolla tubular, throat slightly wider; drupe 1–2 × 0.5–1.4 cm2. S. jasminodora2b. Corolla urceolate, base slightly wider; drupe 0.8–1.5 × 0.5–0.7 cm.3a. Corolla 0.8–1 cm, white or pale yellow; drupe 8–10 × ca. 7 mm3. S. griffithii3b. Corolla 1–1.2 cm, pink; drupe 10–15 × 5–6 mm4. S. chinensis

 Schoepfia fragrans Wallich in Roxburgh, Fl. Ind. 2: 188. 1824.

香芙木 xiang fu mu

Olax evrardii Gagnepain; Schoepfia acuminata Wallich ex Candolle; S. miersii Pierre; Schoepfiopsis acuminata (Candolle) Miers; S. fragrans (Wallich) Miers.

Shrubs or trees, 2.5–10 m tall. Branchlets pale brown. Petiole 4–7 mm; leaf blade oblong-elliptic, oblong-ovate, or elliptic, 6– 11×3.5 –5 cm, \pm leathery, base cuneate and unequal, apex acuminate; secondary veins 3–8 on each side of midvein. Inflorescences 2–3.5 cm, 5–10-flowered; peduncle base with few persistent bud scales. Pedicel 5–6 mm; base of flower with a 3-lobed cupular epicalyx. Calyx cupular. Corolla whitish or pale yellow, tubular; tube 5–6 mm, throat broader; lobes 3-angular, 3–4 mm. Disk pulvinate. Style shorter than or as long as corolla tube. Drupe yellow, \pm globose, 7–9 mm in diam. Fl. Sep–Dec, fr. Oct–Mar.

Forests, scrub; 800–2100 m. SE Xizang, S Yunnan [Bangladesh, Bhutan, Cambodia, E India, Indonesia, Laos, Myanmar, Nepal, Sikkim, Thailand, Vietnam].

2. Schoepfia jasminodora Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 135. 1846.

青皮木 qing pi mu

Shrubs or trees, 3–15 m tall, glabrous. Older stems pale brown, slightly striate; branchlets often deciduous, produced in succession from short shoots, bark purplish brown with white lenticels, sometimes not sharply contrasting in color with older stems. Petiole 2–3 mm; leaf blade ovate, narrowly ovate, elliptic, or ovate-elliptic, 3.5– 11×2 –6 cm, papery or thickly papery, base broadly cuneate to obtuse, apex acuminate to caudate; secondary veins 3–5 on each side of midvein. Inflorescences 2–6(–9) cm, 2–9-flowered; peduncle base without bud scales. Pedicel absent; bracteole 1, at base of flower. Calyx cone shaped. Corolla white or pale yellow, tubular; tube 5–7 mm, throat broader; lobes ovate to \pm triangular, 3–4 mm, apex acute. Stamens (4 or)5. Disk pulvinate. Style 5–7 mm, shorter than or as long as corolla tube. Drupe ellipsoid, 1– 2×0.5 –1.4 cm. Fl. Mar–May, fr. Apr–Jun.

Forests, broad-leaved evergreen forests, mountain slopes, valleys; 500–2600 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Thailand, Vietnam].

2a. Schoepfia jasminodora var. jasminodora

青皮木(原变种) ging pi mu (yuan bian zhong)

Schoepfiopsis jasminodora (Siebold & Zuccarini) Miers; Vaccinium cavaleriei H. Léveillé & Vaniot.

Shrubs or trees, 3–15 m tall. Leaf blade ovate to narrowly ovate, $3.5-10 \times 2-5$ cm, papery; secondary veins 3 or 4 on each

side of midvein. Drupe red to purplish, $1-1.2 \times 0.5$ –0.8 cm. Fl. Mar–May, fr. Apr–Jun.

Forests, mountain slopes, valleys; 500–2600 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Thailand, ?Vietnam].

This variety is easily confused with *Schoepfia chinensis*; see the note after that species.

2b. Schoepfia jasminodora var. **malipoensis** Y. R. Ling, Acta Phytotax. Sin. 19: 388. 1981.

大果青皮木 da guo qing pi mu

Trees, 10–20 m tall. Leaf blade elliptic to ovate-elliptic, 8–11 \times 4–6 cm, thickly papery; secondary veins 4 or 5 on each side of midvein, abaxially slightly raised. Drupe red, 1.6–2 \times ca. 1.4 cm. Fr. May–Jun.

- Broad-leaved evergreen forests, mountain slopes, valleys; 700–1200 m. Guangxi, Hainan, Yunnan.
- **3. Schoepfia griffithii** Tieghem ex Steenis, Reinwardtia 1: 472. 1952.

小果青皮木 xiao guo qing pi mu

Trees, 5–15 m tall. Branchlets with white lenticels. Petiole 2–3 mm; leaf blade ovate to ovate-lanceolate, $3.5–7\times1.5–3.5$ cm, papery, base broadly cuneate to rounded, apex acuminate; secondary veins 3 or 4 on each side of midvein. Inflorescences 2–4 cm, 4- or 5-flowered; peduncle base without bud scales. Pedicel absent; bracteole 1, at base of flower. Calyx ellipsoid. Corolla white or pale yellow, urceolate; tube 6–7 mm, throat broader; lobes \pm triangular, ca. 3 mm. Stamens (4 or)5. Disk pulvinate. Style 4–6 mm, shorter than or as long as corolla tube. Drupe purplish red, ellipsoid, 8–10 × ca. 7 mm. Fl. Mar–May, fr. May.

Forests; 1800-2100 m. S Xizang, W Yunnan [Bhutan, E India].

4. Schoepfia chinensis Gardner & Champion, Hooker's J. Bot. Kew Gard. Misc. 1: 308. 1849.

华南青皮木 hua nan qing pi mu

Schoepfiopsis chinensis (Gardner & Champion) Miers.

Shrubs or trees, 1-6 m tall, glabrous. Older stems grayish brown, slightly striate; branchlets often deciduous, produced in succession from short shoots, bark purplish brown with white lenticels, contrasting sharply with much thicker older stems, with rounded deciduous bud scales at base. Petiole 3-6 mm; leaf blade oblong-lanceolate to elliptic, 5-10 × 1.5-4 cm, papery to \pm leathery, base cuneate and unequal, apex acuminate; veins 3-5 on each side of midvein. Inflorescences 0.5-1.5 cm, (1 or)2-4-flowered; peduncle base without bud scales. Pedicel absent; bracteole 1, at base of flower. Calyx obcampanulate. Corolla pink, urceolate; tube 6-10 mm, throat narrower; lobes ovate, 2-4 mm, apex acute. Stamens (4 or)5; filaments coherent to corolla tube; anthers free, slightly exserted from corolla throat. Disk epigynous, pulvinate. Style 5-9 mm, shorter than or as long as corolla tube. Drupe red to purple, blackish in age, ellipsoid, $1-1.5 \times 0.5-0.6$ cm. Fl. Feb-Apr, fr. Apr-Jul.

• Forests, mountain slopes, valleys; below 100 to 2000 m. Fujian, Guangdong, Guangxi, Guizhou, S Hunan, Jiangxi, Sichuan, Yunnan.

Fruiting material of *Schoepfia chinensis* cannot be reliably distinguished from that of *S. jasminodora*, although the often very short inflorescence is distinctive. Flowering material can usually be readily

distinguished by the distinctly urn-shaped, often pinkish corolla in contrast to the tubular to slightly funnel-shaped, often yellowish corolla of *S. jasminodora*. The much rarer *S. griffithii* is also very easily confused with *S. chinensis*, especially as it shares the same corolla form, but again the corolla is white or pale yellow rather than pink and the plants have rather smaller flowers and fruit.