

RHIZOPHORACEAE

红树科 hong shu ke

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Trees or shrubs, evergreen, without spines, often with aerial roots. Stem nodes swollen. Stipules interpetiolar, sheathing terminal bud, caducous. Leaves simple, opposite or distichous, petiolate; leaf blade leathery, usually glabrous, margin entire, serrulate near apex, or completely serrulate. Inflorescences axillary, dense cymes. Flowers bisexual, actinomorphic; hypanthium present [or absent]. Calyx lobes 4–16, inserted on rim of hypanthium, free or scarcely connate a base, valvate, persistent in fruit. Petals usually as many as sepals, free, usually caducous, margin entire, lacerate, or 2-cleft. Stamens twice as many as calyx lobes; anther locules 4 to many, dehiscing longitudinally or by an adaxial valve. Hypogynous disk present or absent. Ovary inferior or half-inferior; carpels 2–5(–20), 2–8-loculed; ovules usually 2 per locule, pendulous; style 1; stigma entire, capitate, or lobed. Fruit pulpy or leathery, indehiscent. Seeds 1 to few, viviparous; seedling (propagule) 7–80 cm when shed (except in *Carallia* and *Pellacalyx*).

About 17 genera and 120 species: tropics and subtropics; six genera and 13 species (three endemic) in China.

Ko Wan-cheung. 1983. Rhizophoraceae. *In*: Fang Wen-pei & Chang Che-yung, eds., *Fl. Reipubl. Popularis Sin.* 52(2): 125–143.

- 1a. Trees of inland ecosystems; seeds not germinating while attached to parent plant.
 - 2a. Stipules twisted, overlapping; free part of calyx divided to base; stamens attached to disk 5. *Carallia*
 - 2b. Stipules flat, free; free part of calyx tubular, lobed only apically; stamens attached to mouth of calyx tube 6. *Pellacalyx*
- 1b. Trees or shrubs of coastal mangrove ecosystems; seeds germinating and hypocotyls growing from fruit while attached to parent plant.
 - 3a. Calyx lobes 4; petals entire, lanceolate; anther locules many, opening by adaxial valve; trunk with stilt roots 1. *Rhizophora*
 - 3b. Calyx lobes 5–16; petals 2-lobed, many-cleft, or with apical appendages; anther locules 4, opening by lengthwise slits; trunk without stilt roots.
 - 4a. Calyx lobes 8–16; petals 2-lobed or emarginate 2. *Bruguiera*
 - 4b. Calyx lobes 5 or 6; petals fringed with apical appendages or many-cleft.
 - 5a. Calyx lobes ovate; petals spreading at anthesis; stamens 10–12; hypocotyl ridged 3. *Ceriops*
 - 5b. Calyx lobes linear-oblong; petals reflexed at anthesis; stamens indefinite; hypocotyl smooth 4. *Kandelia*

1. RHIZOPHORA Linnaeus, Sp. Pl. 1: 443. 1753.

红树属 hong shu shu

Trees or shrubs, with aerial roots. Stipules reddish, sessile, leaflike, lanceolate. Leaves opposite or distichous; leaf blade glabrous, midvein extended into a caducous point, margin entire or serrulate near apex. Inflorescences axillary, dense cymes. Bracteoles forming a cup just below flower. Calyx tube adnate to ovary, persistent; lobes 5–8. Petals 4, lanceolate. Stamens 8–12; filaments much shorter than anthers or absent; anthers introrse, locules many, dehiscing by an adaxial valve. Ovary inferior, 2-loculed, apically partly surrounded by a disk, free part elongating after anthesis; style 1, sometimes very short; stigmas 4. Fruit brown, ovoid, ovoid-conic, or pyriform. Fertile seed 1 per fruit; germination viviparous; hypocotyl protruding to 78 cm before propagule falls.

Eight or nine species: tropics and subtropics; three species in China.

- 1a. Peduncle shorter than petiole, thick, on leafless stems; flowers 2 per inflorescence; bracteoles united, cup-shaped; petals glabrous 1. *R. apiculata*
- 1b. Peduncle usually as long as petiole, slender, in leaf axil; flowers more than 2 per inflorescence; bracteoles united at base; petals pubescent.
 - 2a. Style 0.5–1.5 mm; anthers sessile 2. *R. mucronata*
 - 2b. Style 4–6 mm; anthers on a short but distinct filament 3. *R. stylosa*

1. *Rhizophora apiculata* Blume, Enum. Pl. Javae 1: 91. 1827.

红树 hong shu

Rhizophora candelaria Candolle.

Trees or shrubs, 3–6(–10) m tall. Bark gray, usually with vertical fissures. Stipules 4–8 cm. Petiole 1.5–3 cm, usually tinged reddish; leaf blade elliptic-oblong to sublanceolate, 7–16 × 3–6 cm, abaxial midvein reddish, base broadly cuneate, apex

acute to apiculate. Inflorescences 2-flowered cymes; peduncle 0.7–10 mm. Flowers sessile. Calyx lobes ovate, concave, 1–1.4 cm, apex acute. Petals lanceolate, flat, 6–8 mm, membranaceous, glabrous, white. Stamens mostly 12, 4 adnate to base of petals, 8 adnate to sepals, 6–7.5 mm; anthers nearly sessile, apex apiculate. Ovary largely enclosed by disk, free part 1.5–2.5 mm; style ca. 1 mm. Fruit ca. 2.5 × 1.5 cm, apical half narrower. Hypocotyl cylindrical-clavate, ca. 3.8 × 1.2 cm, ± blunt before falling. Fl. and fr. all year.

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Mangrove forests; sea level. S Guangxi, Hainan [Cambodia, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; E Africa, N Australia, New Guinea, Pacific islands].

2. *Rhizophora mucronata* Lamarck ex Poirlet, *Encycl.* 6: 189. 1804.

红茄冬 hong qie dong

Rhizophora longissima Blanco.

Trees, to 27(–30) m, d.b.h. to 70 cm. Stipules 5.5–8.5 cm. Petiole 2.5–4 cm; leaf blade broadly elliptic to oblong, 8.5–16 × 5–10 cm, base cuneate, apex ± blunt to ± acute. Inflorescences 2–4(–8)-flowered cymes; peduncle 2–5 cm. Flowers sessile. Calyx lobes ovate, 9–14 × 5–7 mm. Petals lanceolate, 7–9 mm, fleshy, partly embracing stamens, margins pilose. Stamens 8, 4 borne on base of petals, 4 borne on sepals, 6–8 mm; anthers sessile. Ovary emerging far beyond disk, free part elongate-conic, 2–3 mm; style 0.5–1.5 mm. Fruit dirty brownish green, elongate-ovoid, 5–7 × 2.5–3.5 cm, basally often tuberculate, apically slightly contracted. Hypocotyl cylindrical, 30–60 cm. $2n = 36$.

Mangrove forests; sea level. Taiwan [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Pakistan, Philippines,

Sri Lanka, Thailand, Vietnam; E Africa, SW Asia, N Australia, Indian Ocean islands, New Guinea, Madagascar, Pacific islands].

3. *Rhizophora stylosa* Griffith, *Not. Pl. Asiat.* 4: 665. 1854.

红海兰 hong hai lan

Rhizophora mucronata Lamarck var. *stylosa* (Griffith) Schimper.

Trees, often less than 8 m tall. Bark reddish or pale gray, rough. Petiole 2–3 cm; leaf blade obovate, 6.5–11 × 3–4(–5.5) cm, base broadly cuneate, apex mucronate. Inflorescences 2- to many flowered; peduncle 1–5 cm. Pedicel 5–10 mm, terete; bracteoles brown, connate. Calyx lobes lanceolate to oblong-lanceolate, 9–12 × 3–5 mm. Petals to 1.2 cm, involute, margin densely villous. Stamens usually 8; filaments short but distinct; anthers 5–6 mm. Ovary emerging beyond disk, free part shallowly conic and less than 1.5 mm; style 4–6 mm; stigma lobes 2. Fruit green, conic, 2.5–3 × ca. 2 cm. Hypocotyl cylindrical, 30–40 cm, apex acute. Fl. and fr. autumn–winter.

Mangrove forests; sea level. S Guangdong, S Guangxi, N Hainan [Cambodia, Indonesia, Japan (Ryukyu Islands), Malaysia, Philippines, Vietnam; N Australia, New Guinea, Pacific islands].

2. BRUGUIERA Savigny in Desrousseaux et al., *Encycl.* 4: 696. 1798.

木榄属 mu lan shu

Trees, producing kneelike pneumatophores. Trunk basally buttressed, often with a cone of stilt roots at base. Leaf scars showing evidence of 3 vascular bundles. Leaves entire. Inflorescences cymes, 1–5-flowered, pedunculate. Flowers generally nodding. Calyx accrescent, tube extending beyond ovary; lobes 8–14(–16), subulate-lanceolate. Petals as many as calyx lobes, usually 2-lobed, fringed with hairs and/or bristles. Stamens 2 × as many as petals, in unequal pairs opposite petals, each pair enclosed by inrolled petal margins; anthers introrse, dehiscing lengthwise. Ovary inferior, 2–4-loculed; ovules 2 per locule; style lobes 2–4. Fruit campanulate. Seed usually solitary, viviparous; hypocotyl terete or obscurely ribbed.

Six species: E Africa, SE Asia, N Australia, Indian Ocean islands, Pacific islands; three species in China.

1a. Flowers 2 or 3 in pedunculate cymes, ca. 2 cm; bristles in sinus between petal lobes far exceeding lobes 3. *B. cylindrica*

1b. Flowers solitary, 3–4 cm; bristles in sinus between petal lobes not exceeding lobes.

2a. Petal lobes acute, spreading to ascending; bristles 3 or 4 per petal lobe, 2–3 mm, distinctly exceeding petal lobes; mature calyx red or pinkish red, ribbed only apically 1. *B. gymnorhiza*

2b. Petal lobes obtuse, reflexed; bristles 1 or 2(or 3) per petal, 0.5–1.2 mm, not or barely exceeding petal lobes; mature calyx yellow, distinctly ribbed at base 2. *B. sexangula*

1. *Bruguiera gymnorhiza* (Linnaeus) Savigny in Desrousseaux et al., *Encycl.* 4: 696. 1798.

木榄 mu lan

Rhizophora gymnorhiza Linnaeus, *Sp. Pl.* 1: 443. 1753; *Bruguiera conjugata* (Linnaeus) Merrill; *R. conjugata* Linnaeus.

Trees 6–20 m tall, d.b.h. 30–60 cm. Bark gray, deeply fissured. Stipules often reddish, ca. 4 cm, interpetiolar, caducous. Petiole 2–4.5 cm; leaf blade elliptic-oblong, 8–21 × 4–7(–9) cm, leathery, glabrous, base cuneate to rarely obtuse, apex acute. Pedicel 1–2.5 cm. Flowers in axils of upper leaves, solitary, red or pinkish red, ca. 3 cm. Calyx lobes 10–14, linear, 1.5–2 cm, glabrous. Petals 12–14, 1.3–1.5 cm, outer margin fringed with white silky hairs; sinus bristles 3 or 4 per petal, 2–3 mm, distinctly exceeding petals. Stamens twice as many as petals, 8–11 mm; filaments filiform; anthers linear to lanceolate, 4–5 mm. Disk cup-shaped. Ovary inferior, 3-loculed; style filiform, ca.

1.5 cm; stigma lobes 3 or 4. Fruit adnate to calyx tube, ca. 2.5 mm; persistent calyx on fruit or hypocotyls ribbed only apically. Seed 1, viviparous. Hypocotyl cigar-shaped, slightly angular, 15–25 × 1.5–2 cm. Fl. May–Jun. $2n = 26$.

Mangrove forests; sea level. S Fujian, Guangdong, S Guangxi, Hainan, SW Taiwan (extinct) [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; E Africa, N Australia, Indian Ocean islands, Madagascar, New Guinea, Pacific islands].

Bruguiera gymnorhiza and *Ceriops tagal* were originally found among the mangroves of Gaoxiong (Kaohsiung) lagoon, Taiwan. Both species completely disappeared after 12 years (1956–1968) of expansion and second-stage construction of the harbor (1967–1977). The last gathering records indicate that in 1959 only 22 individuals of *B. gymnorhiza* and one individual of *C. tagal* remained in the lagoon (C. F. Hsieh, pers. comm.). According to C.-I Peng (pers. comm.), *B. gymnorhiza* disappeared from Taiwan in the 1960s.

2. *Bruguiera sexangula* (Loureiro) Poiret, *Encycl., Suppl.* 4: 262. 1816.

海莲 hai lian

Rhizophora sexangula Loureiro, *Fl. Cochinch.* 1: 297. 1790; *Bruguiera eriopetala* Wight & Arnott; *B. sexangula* var. *rhy-nchopetala* W. C. Ko.

Trees 6–8(–15) m tall, d.b.h. 15–35 cm. Bark gray to pale brown, smooth. Stipules green or yellowish, 3.5–4 cm. Petiole yellowish, 1.5–3.5 cm; leaf blade elliptic, elliptic-oblong, or rarely oblanceolate, 8–13(–16) × 3–6 cm, base cuneate to rarely obtuse, apex acute. Pedicel 6–12 mm. Flowers solitary, yellow, 2.7–4 cm. Calyx tube 1–1.5 cm; lobes 9–13, ca. 2 cm. Petals 1–1.5 cm, margin with a tuft of hairs, apex 2-lobed; lobes obtuse, with 1 or 2 short bristles less than 1.5 mm, bristles not exceeding lobes. Stamens 0.7–1.4 cm. Style 1.5–2.2 cm, apical branches to 0.5 mm. Fruit 1.5–1.8 cm. Fruiting calyx tube ± distinctly ribbed. Hypocotyl cigar-shaped, ± angular, 6–8 cm. Fl. autumn, fr. spring.

Mangrove forests; sea level. Hainan [Cambodia, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

3. *Bruguiera cylindrica* (Linnaeus) Blume, *Enum. Pl. Javæ* 1: 93. 1827.

柱果木榄 zhu guo mu lan

Rhizophora cylindrica Linnaeus, *Sp. Pl.* 1: 443. 1753; *Bruguiera caryophylloides* (N. L. Burman) Blume; *Rhizophora caryophylloides* N. L. Burman.

Trees 10–15 m tall, d.b.h. 15–25 cm. Bark gray, smooth, with few lenticels. Stipules 2.5–3.5 cm. Petiole 1–3.5 cm; leaf blade elliptic, 7–17 × 2–8 cm, thin, secondary veins abaxially remote and thin, reticulate veins mostly obscure, base cuneate, apex acute. Cymes pedunculate, 2- or 3-flowered. Pedicel 1–4 mm. Flowers greenish, less than 2 cm. Calyx tube 4–6 × ca. 2 mm, not ribbed, smooth; lobes 7 or 8, ± as long as tube. Petals white but soon turning brown, 3–4 mm, 2-lobed, outer margins usually basally fringed with white hairs. Stamens 1.5–2.5 mm. Disk in open flowers not entirely lining calyx tube. Style 3–4 mm. Fruiting calyx tube ca. 1 cm, slightly ribbed; lobes recurved. Hypocotyl cylindrical, often curved, 8–15 × ca. 0.5 cm. Fl. autumn, fr. winter–spring (and sporadically year-round).

Mangrove forests; sea level. Hainan [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, New Guinea, Pacific islands].

3. **CERIOPS** Arnott, *Ann. Nat. Hist.* 1: 363. 1838.

角果木属 jiao guo mu shu

Shrubs or small trees. Trunks often with stilt roots clustered around base. Stipules lanceolate. Leaves crowded near shoot apex; leaf blade veins obscure on both surfaces. Inflorescences condensed cymes, pedunculate, 2- to many flowered. Bracteoles 2, partly connate. Calyx deeply 5- or 6-lobed. Petals 5 or 6, white, each embracing 2 stamens, cohering at base, margin with uncinatate trichomes. Stamens twice as many as calyx lobes. Disk cupular, shallowly lobed. Ovary semi-inferior, 3-loculed; ovules 2 per locule; style short; stigma entire or shortly lobed. Fruit ovoid. Hypocotyl clavate, ridged and grooved, apically tapering.

Two species: E Africa, S and SE Asia, N Australia, Indian Ocean islands, Madagascar, New Guinea, Pacific islands; one species in China.

1. *Ceriops tagal* (Perrottet) C. B. Robinson, *Philipp. J. Sci.* 3: 306. 1908.

角果木 jiao guo mu

Rhizophora tagal Perrottet, *Mém. Soc. Linn. Paris* 3: 138. 1824; *Ceriops candolleana* Arnott, nom. illeg. superfl.; *C. candolleana* var. *sasakii* Hayata; *C. tagal* var. *australis* C. T. White; *C. timoriensis* (Candolle) Domin; *R. timoriensis* Candolle.

Shrubs or trees, 2–5 m tall. Trunks with buttresses or small stilt roots. Bark brownish. Stipules lanceolate, 1–2 cm. Petiole 1–3 cm; leaf blade obovate to obovate-oblong, 4–9 × 2–5 cm, base cuneate, apex obtuse to sometimes slightly emarginate.

Inflorescences 4–10-flowered; peduncle 1–2 cm. Pedicel to 2 mm. Calyx 6–7 mm, erect or slight spreading in flower, widely spreading or reflexed in fruit. Petals oblong, ca. 4 mm, margins fringed with trichomes and slightly cohering, apex with 3 club-shape terminal appendages. Stamen filaments 3–5 mm, shorter than calyx lobes; anthers less than 1 mm. Hypocotyl 15–30 cm, apex sharply pointed. Fl. autumn–winter, fr. winter.

Mangrove forests; sea level. S Guangdong, Hainan, SW Taiwan (extinct) [Cambodia, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; E Africa, N Australia, Indian Ocean islands, Madagascar, New Guinea].

Ceriops tagal became extinct in Taiwan in the 1950s (C.-I Peng, pers. comm.). See also comments under *Bruguiera gymnorhiza*.

4. **KANDELIA** (Candolle) Wight & Arnott, *Prodr. Fl. Ind. Orient.* 1: 310. 1834.

秋茄树属 qiu qie shu shu

Rhizophora sect. *Kandelia* Candolle, *Prodr.* 3: 32. 1828.

Trees. Branches terete. Leaf blade margin entire. Inflorescences axillary, cymes, 4–9-flowered, pedunculate. Calyx deeply 5-lobed, subtended by a cuplike involucre of bracteoles. Petals 5, with long setae in sinus between petals, 2-lobed; lobes apically fimbriate. Stamens numerous, on a disk; anthers 4-celled, cells longitudinally dehiscent. Ovary inferior, 1-loculed; ovules 6 per locule; style filiform; stigma 3-lobed. Fruit with persistent calyx, attached to plant until falling with viviparous seedling. Seed 1, germinating on plant. Hypocotyl cylindrical, spindle-shaped or clavate, apex pointed.

One species: E and SE Asia; one species in China.

1. *Kandelia obovata* Sheue et al., *Taxon* 52: 291. 2003.

秋茄树 *qiu qie shu*

Trees 1–3(–8) m tall. Bark grayish to brown, smooth. Stipules linear, 2–3 cm. Petiole 1–1.8 cm; leaf blade elliptic, oblong, or obovate-oblong, 4–12 × 2–5 cm, thick, base cuneate to attenuate, apex obtuse, rounded, or sometimes slightly emarginate. Inflorescence 2 or 3 times dichotomously branched; peduncle 1–3 cm. Pedicel 3–6 mm; bracteoles 2–4, connate. Calyx cream colored, glabrous; lobes 5 or 6, linear, 1.3–1.9 cm, reflexed after anthesis, apex acuminate. Petals inserted at base of disk, 5(or 6), white, 1–1.5 cm, 2-lobed, arista in sinuses 7–10

mm. Stamens numerous, 6–13 mm; filaments filiform; anthers lanceolate, ca. 1 mm, 2-loculed, dehiscing longitudinally. Disk cup-shaped. Ovary inferior, 1-loculed; ovules 6; style filiform, 1.4–1.6 mm; stigma lobes 3. Fruit ovoid, 1.5–2.5 × ca. 1 cm, indehiscent, calyx lobes persistent. Seed 1, viviparous. Hypocotyl clavate, 15–23 cm, terete. Fl. and fr. all year. $2n = 36$.

Margins of mangrove swamps and muddy or sandy tidal flats; sea level. E Fujian, S Guangdong, S Guangxi, Hainan, Taiwan [S Japan].

Until 2003, plants of *Kandelia* in E China and Japan were included within *K. candel* (Linnaeus) Druce, which is now recognized as an allopatric species ranging from E India to Borneo.

5. *CARALLIA* Roxburgh, *Pl. Coromandel* 3: 8. 1811, nom. cons.

竹节树属 *zhu jie shu shu*

Barraldeia Thouars; *Diatoma* Loureiro; *Karekandel* Wolf; *Petalotoma* Candolle.

Shrubs or trees. Stipules lanceolate. Leaf blade margin entire or serrate. Inflorescences dichasial cymes. Bracteoles present. Calyx lobes 5–8, deltoid. Petals 5–8, conspicuously clawed. Stamens twice as many as petals, free, persistent, of 2 lengths, shorter ones opposite petals. Disk annular, fleshy. Ovary inferior, 5–8-loculed; ovules 2 per locule; style filiform; stigma discoid, capitate, or obscurely lobed. Fruit pulpy, 1-loculed. Seeds 1(–5), arillate, not viviparous.

About ten species: S and SE Asia, N Australia, Madagascar, New Guinea, Pacific islands: four species (two endemic) in China.

1a. Leaf blade margin entire or denticulate to serrulate for 1/3–1/2 its length.

2a. Leaf blade obovate, obovate-oblong, or rarely suborbicular, 5–15 × 2–10 cm; peduncle and branches of inflorescence slender 1. *C. brachiata*

2b. Leaf blade elliptic to broadly elliptic, 10–17 × 5–9 cm; peduncle and branches of inflorescence thick 2. *C. garciniifolia*

1b. Leaf blade margin serrulate.

3a. Petals rose red, twice as many as calyx lobes, in 2 whorls, outer petals larger than inner ones 3. *C. diplopetala*

3b. Petals white, as many as calyx lobes, in 1 whorl, equal in size 4. *C. pectinifolia*

1. *Carallia brachiata* (Loureiro) Merrill, *Philipp. J. Sci.* 15: 249. 1920 [“1919”].

竹节树 *zhu jie shu*

Diatoma brachiata Loureiro, *Fl. Cochinch.* 1: 296. 1790; *Carallia integerrima* Candolle; *C. sinensis* Arnott; *Petalotoma brachiata* (Loureiro) Candolle.

Trees to 10 m tall. Branches brown, corky. Stipules 1–2.5 cm. Petiole ca. 1 cm; leaf blade elliptic, obovate, oblanceolate, or rarely suborbicular, 5–15 × 2–10 cm, papery to thinly leathery, base cuneate, margin entire, serrate, or denticulate, apex acute to shortly acuminate. Inflorescences 1–6 cm, often resinous, usually shining from secreted resin. Flowers shortly pedicellate or sessile; bracteoles 2 or 3, partially connate into a cup. Calyx lobes 6 or 7, deltoid, 3–4 mm. Petals white, suborbiculate, ca. 1.5 mm in diam., apically emarginate and unevenly lacerate. Stamens ca. 2 mm. Ovary bulbous, ca. 2 mm; style ca. 2 mm; stigma discoid, apically 4–8-lobed. Fruit pink to red globose, ca. 5 mm in diam., glossy. Seeds reniform. Fl. winter–spring, fr. spring–summer.

Evergreen forests, thickets, swamps; near sea level to 900 m. Fujian, Guangdong, S Guangxi, Hainan, Yunnan [S Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Madagascar, E Nepal, New Guinea, Pacific islands].

2. *Carallia garciniifolia* F. C. How & C. N. Ho, *Acta Phytotax. Sin.* 2: 142. 1953 [“*garciniaefolia*”].

大叶竹节树 *da ye zhu jie shu*

Trees to 14 m tall, resinous. Branches and branchlets grayish black when dried, thick; lenticels fusiform, conspicuous. Stipules 1.8–2.6 cm, caducous. Petiole 1–1.5 cm; leaf blade broadly elliptic, 10–17 × 5–9.5 cm, leathery, base broadly cuneate, margin entire or denticulate apically from middle, apex acute to shortly acuminate. Inflorescences dichasial or trichasial cymes, 3–6 cm. Flowers usually 3 or 4, sessile, crowded at apex of branchlets. Calyx campanulate, 4–5 mm; lobes 6 or 7, triangular, 1.2–1.5 × 1–1.2 mm. Petals white, orbiculate, 1.2–1.6 × 1.6–1.8 mm. Stamens 12–14, equal in length. Ovary 4- or 5-loculed; style longer than calyx, thick; stigma lobes shallow, 4 or 5. Fruit not seen. Fl. spring.

• Dense forests in valleys; 700–1900 m. Guangxi, Yunnan.

Carallia garciniifolia is almost certainly also present in Vietnam and should be sought there.

3. *Carallia diplopetala* Handel-Mazzetti, *Sinensia* 2: 5. 1931.

锯叶竹节树 *ju ye zhu jie shu*

Trees or shrubs 2–13 m tall. Bark gray; lenticels conspicuous on branches and branchlets. Petiole 3–4 mm; leaf blade

oblong, 8.5–11 × 2.5–3 cm, base cuneate, margin finely denticulate, apex acute to shortly acuminate. Inflorescences dichasial cymes; peduncle ca. 5 mm, thick; bracts brown, obovate, small. Calyx lobes 7, triangular-ovate. Petals rose red, ovate, in 2 whorls, inner ones smaller than outer ones, adnate to calyx. Stamens 7 or 14, adnate to petals; anthers oblong, both ends obtuse. Style shorter than calyx; stigma platelike, shallowly 4-lobed. Fruit red, purplish red, or black, globose to ellipsoid, 8–13 × 8–9 mm. Fl. autumn–winter, fr. spring.

Forests, thickets; 300–1000 m. S Guangdong, S Guangxi, S Yunnan [Vietnam].

This species was listed as endangered in China by Liang (in Fu & Jin, China Pl. Red Data Book 1: 540–541. 1992).

4. *Carallia pectinifolia* W. C. Ko, Acta Phytotax. Sin. 16(4): 130. 1978.

旁杞树 pang qi shu

Carallia longipes Chun ex W. C. Ko, Acta Phytotax. Sin. 16(2): 109. 1978, not Ding Hou (1960).

Shrubs or small trees. Branches and branchlets purplish brown when dried; lenticels fusiform, conspicuous. Petiole 5–6 mm; leaf blade oblong to rarely oblanceolate, 5–13 × 2.5–5.5 cm, papery, base broadly cuneate, margin serrate, apex acuminate. Inflorescences dichasial cymes, 1.5–2 cm. Flowers shortly pedicellate, 2 or 3 crowded at apex of branchlets. Bracteoles minute, membranaceous. Calyx deeply lobed, lobes 6 or 7, triangular. Petals white, ca. 2 × 2 mm, claw ca. 1 mm, margin not entire, apically 2-lobed. Fruit red, globose, ca. 7 mm in diam.; persistent calyx red. Seeds reniform. Fl. and fr. spring–summer.

• Mixed forests in valleys, along rivers. Guangdong, Guangxi, Yunnan.

Carallia pectinifolia is almost certainly also present in Vietnam and should be sought there. It is also possible that the same species occurs in Vietnam but is known there under a different, earlier name.

6. PELLACALYX Korthals, Tijdschr. Natuurl. Gesch. Physiol. 3: 20. 1836.

山红树属 shan hong shu shu

Trees. Branchlets hollow. Stipules stellate. Leaves opposite; leaf blade margin entire or minutely dentate. Flowers fascicled or in branched glomerules, bracteolate. Calyx lobes (3 or)4 or 5(or 6). Petals as many as calyx lobes, outside densely puberulous, apically dentate. Stamens attached to mouth of calyx tube, twice as many as petals, inflexed, unequal in length; anthers subglobose, 4-loculed, longitudinally dehiscent. Ovary inferior, 5–10-loculed; ovules 8–25; style puberulous; stigma platelike or capitate, inconspicuously lobed. Fruit berries, subglobose. Seeds numerous, germinating after leaving tree; endosperm present; embryo filiform.

Seven or eight species: SW China, Indonesia, Malaysia, Myanmar, Philippines, Thailand; one species (endemic) in China.

1. *Pellacalyx yunnanensis* H. H. Hu, Bull. Fan Mem. Inst. Biol., Bot. 10: 130. 1940.

山红树 shan hong shu

Trees to 15 m tall. Branchlets thick, with loose long hairs. Petiole 1–2 cm; leaf blade oblanceolate to lanceolate, 13–20 × 4.5–6.5 cm, abaxially pubescent, adaxially glabrous, secondary veins 8 or 9 on each side of midvein, base cuneate, margin serrulate and slightly reflexed when dried, apex shortly acuminate

Pedicel ca. 2 cm, slender, persistent. Flowers not seen. Fruit solitary, subglobose, ca. 1.5 cm in diam.; persistent calyx lobes 6 or 7, at fruit apex, lanceolate, ca. 1 cm, apex mucronate; persistent style thick, shorter than calyx lobes; persistent stigma capitate, deeply 6-lobed. Seeds numerous, brownish black, oblong. Fr. winter.

• Forests; 800–1200 m. S Yunnan.

This species was listed as rare in China by Tong (in Fu & Jin, China Pl. Red Data Book 1: 542–543. 1992).