COMBRETACEAE

使君子科 shi jun zi ke

Chen Jie (陈介 Chen Cheih)[1]; Nicholas J. Turland[2]

Trees, shrubs, or woody lianas, evergreen or deciduous, rarely subherbaceous. Indumentum of simple hairs, glandular hairs, or multicellular hairs secreting calcium oxalate and forming scales or present beneath cuticle and making leaf blade surface verruculose and sometimes translucent dotted. Leaves opposite, subopposite, whorled, spiraled, or alternate, usually petiolate, estipulate; petiole sometimes persistent and thornlike; leaf blade simple, margin entire or subentire, sometimes toothed, glands often present between crenations of proximal margin and at base or on petiole. Inflorescences terminal, axillary, or extra-axillary, spikes, branched spikes, racemes, panicles, or sometimes capitula, bracteate. Flowers usually regular, rarely slightly zygomorphic, usually bisexual, sometimes bisexual and male flowers present in same inflorescence. Receptacle surrounding and adnate to ovary and extended into a short or long calyx tube dilated distally (together termed "calyx tube" in this treatment); lobes 4 or 5(–8), valvate in bud, persistent or deciduous, sometimes almost absent. Petals 4 or 5, inserted near mouth of calyx tube, imbricate or valvate in bud, conspicuous or not, or absent. Stamens usually 2 × as many as calyx lobes in 2 series, inserted inside distal part of calyx tube, included in or exserted from calyx tube; filaments incurved in bud; anthers dorsifixed, usually versatile, dehiscing longitudinally. Disk usually present, intrastaminal, hairy or glabrous. Ovary inferior, 1-loculed; ovules 2(–6), pendulous, anatropous, usually only 1 developing; style 1, simple, usually free from distal part of calyx tube, subulate to filiform; stigma capitate or inconspicuous. Fruit a pseudocarp, very variable in shape and size, fleshy or dry, 1-seeded, usually indehiscent, often longitudinally 2–5-winged, -ridged, or -angled; endocarp not or at least partly sclerenchymatous. Cotyledons convolute, folded, or twisted. Endosperm absent.

About 20 genera and ca. 500 species: widespread in tropics and subtropics; six genera and 20 species (one endemic) in China.

Tan et al. (J. Plant. Res. 115: 475–481. 2002) inferred a phylogeny of the Chinese genera from nuclear, plastid, and spacer sequences based on 16 species in 19 samples. The mangrove genera *Lumnitzera* and *Laguncularia* Gaertner were placed as sister taxa in a clade sister to the other genera in China plus *Conocarpus* Linnaeus. The latter group comprised two clades: one with *Conocarpus* sister to an unresolved grouping of *Terminalia* and *Anogeissus*; the other with *Getonia* sister to *Quisqualis* and *Combretum*.

In this treatment, measurements of calyx tube length include the stipe (if any), the part surrounding the ovary, the tube above the ovary, and the lobes. Measurements of fruit include any ridges or wings.

Hsu Ting-zhi. 1984. Combretaceae. *In:* Chen Cheih, ed., Fl. Reipubl. Popularis Sin. 53(1): 1–28.

1a. Trees or non-climbing shrubs.
  2a. Petals present; calyx tube bearing 2 bracteoles; leaf blade cuneate, somewhat fleshy ..... 1. *Lumnitzera*
  2b. Petals absent; calyx tube without bracteoles; leaf blade oblong, elliptic, obovate, or orbicular, not fleshy.
    3a. Inflorescences spikes or racemes, sometimes panicles; middle part of calyx tube not persistent ..... 2. *Terminalia*
    3b. Inflorescences pedunculate capitula; middle part of calyx tube persistent and beaklike at apex of fruit ..... 3. *Anogeissus*
1b. Woody lianas, or if non-climbing shrubs then leaf blade not cuneate and petals present although sometimes inconspicuous.
  4a. Calyx lobes persistent, expanded, and winglike in fruit; petals absent ..... 4. *Getonia*
  4b. Calyx lobes not persistent; petals present although sometimes inconspicuous.
    5a. Calyx tube (1.7–)5–9 cm; stamens not or scarcely exserted from calyx tube; style partly adnate to inside of calyx tube ..... 5. *Quisqualis*
    5b. Calyx tube usually shorter than 2 cm; stamens usually exserted from calyx tube; style not adnate to inside of calyx tube ..... 6. *Combretum*

1. LUMNITZERA Willdenow, Ges. Naturf. Freunde Berlin Neue Schriften 4: 186. 1803.

榄李属 lan li shu

Funckia Dennstedt (1818), not Willdenow (1808); *Pokornya* Montrouzier; *Problastes* Reinwardt; *Pyrrhanthus* Jack.

Trees small or shrubs, evergreen. Leaves spiraled, densely crowded at apices of branchlets; leaf blade spatulate to narrowly oblanceolate, gradually narrowed into a short petiole, somewhat fleshy, glossy and glabrous when mature; lateral veins inconspicuous or obscure. Inflorescences axillary or terminal, short, several-flowered spikes or racemes. Calyx tube cylindric or cylindric-ellipsoid, not differentiated into proximal and distal parts, bearing 2 deltoid bracteoles minutely glandular pilose at margin; lobes 5, persistent, deltoid or broadly triangular, margin minutely glandular pilose. Petals 5, red or white, rarely pink [or yellow]. Stamens 5–10. Style persistent. Fruit fusiform or ellipsoid, obtusely angled, dry, ± woody, nearly smooth or longitudinally wrinkled, apex bearing persistent calyx lobes and style.

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Two species: Bangladesh, Cambodia, China, India, Indonesia, Japan (Ryukyu Islands), S Korea, Malaysia, New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; E Africa (including Madagascar), N Australia, Pacific islands; two species in China.

The species of this genus are trees of mangrove forests, banks of tidal creeks, and borders of coastal fishponds.

1a. Petals bright red; inflorescences terminal; stamens ca. 2 × as long as petals; fruit fusiform, stipe ca. 5 mm ..... 1. *L. littorea*
1b. Petals white; inflorescences axillary; stamens shorter than or equaling petals; fruit ellipsoid or ovoid, stipe ca. 1 mm ..... 2. *L. racemosa*

1. Lumnitzera littorea (Jack) Voigt, Hort. Suburb. Calcutt. 39. 1845.

红榄李 hong lan li

Pyrrhanthus littoreus Jack, Malayan Misc. 2(7): 57. 1822; *Bruguiera littorea* (Jack) Steudel; *Laguncularia coccinea* Gaudichaud-Beaupré; *L. purpurea* Gaudichaud-Beaupré; *Lumnitzera coccinea* (Gaudichaud-Beaupré) Wight & Arnott, nom. superfl.; *L. purpurea* (Gaudichaud-Beaupré) C. Presl; *Petaloma coccinea* (Gaudichaud-Beaupré) Blanco.

Trees to 7(–25) m tall; trunk to 0.5 m d.b.h. Bark dark blackish brown, deeply longitudinally fissured. Branchlets reddish or green when young, glabrous. Leaf blade dark green adaxially, oblanceolate or narrowly oblong-oblanceolate, (2–)4–8 × 1–3 cm, apex retuse or rounded; lateral veins in 4 or 5 pairs. Inflorescences terminal, 3–4.5 cm. Calyx tube 12–18 mm; bracteoles 1.5–2 mm; lobes broadly triangular, 1–1.5 mm, apex obtuse. Petals bright red, oblong-elliptic, 5–6 mm, apex obtuse or acuminate. Stamens 5–10 (usually 7), ca. 10 mm, ca. 2 × as long as petals. Style ca. 10 mm. Fruit blackish brown when ripe, fusiform, 1.6–2 cm × 4–5 mm excluding stipe, longitudinally striate; stipe ca. 5 mm. Fl. Nov–Dec, May, fr. Jun–Aug.

Open remnant mangrove forests along sea shores. S Hainan (Lingshui, Yaxian) [Cambodia, India, Indonesia, Malaysia, New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; N Australia, Pacific islands].

This species was listed as endangered in China by Ko (in Fu & Jin, China Pl. Red Data Book 1: 224–225. 1992).

2. Lumnitzera racemosa Willdenow, Ges. Naturf. Freunde Berlin Neue Schriften 4: 187. 1803.

榄李 lan li

Bruguiera madagascariensis Candolle; *Funckia karakandel* Dennstedt; *Laguncularia rosea* Gaudichaud-Beaupré; *Lumnitzera racemosa* var. *pubescens* Koorders & Valeton; *L. rosea* (Gaudichaud-Beaupré) C. Presl; *Petaloma alba* Blanco; *P. albiflora* Zippelius ex Spanoghe; *P. alternifolia* Roxburgh; *Pokornya ettingshausenii* Montrouzier; *Problastes cuneifolia* Reinwardt.

Shrubs or small trees, to 8 m tall; trunk to 0.3 m d.b.h. Bark brown or grayish black, coarse. Branchlets red or grayish black. Leaf blade pale green adaxially, spatulate to oblanceolate or obovate, 3.5–7 × 1–2.5 cm, apex retuse or rounded; lateral veins usually in 3 or 4 pairs. Inflorescences axillary, 2–6 cm. Flowers fragrant. Calyx tube ca. 9 mm; bracteoles ca. 1 mm; lobes deltoid, 1–2 mm, apex obtuse or shortly mucronate. Petals white, elliptic, 4.5–5 mm, apex obtuse. Stamens 5 or 10, 4–5 mm, shorter than or equaling petals. Style ca. 4 mm. Fruit blackish brown when ripe, ellipsoid or ovoid, slightly compressed on one side, 1–2 cm × 5–8 mm excluding stipe, 2- or 3-ridged, smooth proximally, longitudinally striate distally; stipe ca. 1 mm. Fl. Nov–Aug, fr. Aug–Apr.

Open remnant mangrove forests along sea shores, estuaries, lagoon sides, saltwater swamps, swamps, swampy meadows on sandy soils. Guangdong, Guangxi (Fangcheng, Hepu), Hainan, Taiwan [Bangladesh, Cambodia, India, Indonesia, Japan (Ryukyu Islands), S Korea, Malaysia, New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; E Africa (including Madagascar), N Australia, Pacific islands].

Chinese plants belong to *Lumnitzera racemosa* var. *racemosa*, which occurs throughout the range of the species; *L. racemosa* var. *lutea* (Gaudichaud-Beaupré) Exell (*Laguncularia lutea* Gaudichaud-Beaupré; *Lumnitzera lutea* (Gaudichaud-Beaupré) C. Presl), which has yellow petals, is confined to Timor.

2. TERMINALIA Linnaeus, Syst. Nat., ed. 12, 2: 665, 674 ["638"]; Mant. Pl. 1: 21, 128. 1767, nom. cons.

诃子属 he zi shu

Adamaram Adanson; *Badamia* Gaertner; *Buceras* P. Browne; *Bucida* Linnaeus, nom. cons.; *Myrobalanus* Gaertner; *Pentaptera* Roxburgh.

Trees, often very large and buttressed, rarely shrubs. Branches often in tiers. Leaves spiraled, alternate, subopposite, or opposite, often crowded into pseudowhorls at apices of branchlets; leaf blade oblong, elliptic, obovate, or orbicular, hairy or glabrous, often minutely verruculose and translucent dotted (from calcium oxalate crystals), often with domatia, often with 2 or more glands at or above leaf blade base or on petiole. Inflorescences axillary or terminal spikes or racemes, sometimes panicles, with bisexual flowers toward base of inflorescence and male flowers toward apex. Calyx tube proximally broadly cylindric to ellipsoid or ovoid, distally cupular or sometimes scarcely developed; lobes 4 or 5, deltoid or ovate. Petals absent. Stamens 8 or 10. Fruit variable in size and shape, often fleshy and drupelike, sometimes dry and leathery or corky, often longitudinally 2–5-winged, or -ridged, sometimes weakly so; endocarp usually at least partly sclerenchymatous.

About 150 species: tropics of Africa, America, and Asia, extending to S Africa, Australia, and Pacific islands; six species in China.

The following species have been recorded as cultivated in China. Two species have fruit with 5 broad wings: *Terminalia alata* Heyne ex Roth

(*T. tomentosa* (Roxburgh) Wight & Arnott; *Pentaptera tomentosa* Roxburgh), from India to Vietnam, has been recorded from Guangdong (Guangzhou); *T. arjuna* (Roxburgh ex Candolle) Wight & Arnott (*P. arjuna* Roxburgh ex Candolle), from India, has been recorded from Fujian (Xiamen), Guangdong (Dinghu Shan, Guangzhou, Hong Kong), and Guangxi. These two species may be distinguished by their fruit: *T. alata* has fruit ovoid, ca. 3 cm, with wings not or scarcely extending beyond the apex, whereas *T. arjuna* has fruit obovoid, ca. 5 cm, with wings obviously extending beyond the apex. *Terminalia muelleri* Bentham (*Myrobalanus muelleri* (Bentham) Kuntze), from Australia, is similar to *T. catappa* but with fruit only ca. 1.6 cm; it has been recorded from Guangdong (Guangzhou). In addition, *T. mantaly* H. Perrier, from Madagascar, with small, cuneate-oblanceolate leaves 5–7 cm and short spikes 4–5 cm, has been recorded as a street tree in Taiwan (Taizhong).

1a. Fruit 2- or 3-winged (or plants cultivated; fruit 5-winged: see *T. alata* and *T. arjuna* above).
  2a. Fruit 3-winged, (1.5–)2–3.5 × (1–)1.5–2 cm, glabrous; glands absent at petiole apex or leaf blade base .... 1. *T. nigrovenulosa*
  2b. Fruit 2- or 3-winged, 0.3–1 cm, sparsely pubescent to densely villous; 2 glands present at petiole apex or leaf blade base.
    3a. Trees evergreen, to 35 m tall, often buttressed, to 2.8 m d.b.h.; leaf blade 10–25(–30) cm, 2–4 × as long as wide; fruit wider than long, 2-winged, sometimes also with 1 rudimentary wing between wings ..... 2. *T. myriocarpa*
    3b. Shrubs or trees deciduous, 0.6–10 m tall; leaf blade 1.5–6.5(–11) cm, 1–2 × as long as wide; fruit longer than wide, 3-winged ..... 3. *T. franchetii*
1b. Fruit 2- or 5-ridged, sometimes weakly so, sometimes narrowly 2-winged (and then fruit 3–5.5 cm: *T. catappa*).
  4a. Leaves spaced along branchlets, leaf blade elliptic; fruit obtusely 5-ridged, glabrous ..... 4. *T. chebula*
  4b. Leaves crowded into pseudowhorls at apices of branchlets, leaf blade obovate to oblanceolate; fruit 5-ridged and then velutinous or sericeous, or 2-ridged or -winged and then glabrous.
    5a. Fruit subglobose to broadly ellipsoid or ovoid, weakly to strongly 5-ridged, 2–3 cm, densely and finely velutinous or sericeous; leaf blade obovate, base obtuse-rounded or attenuate, lateral veins in 5–8 pairs; petiole 3–9 cm ..... 5. *T. bellirica*
    5b. Fruit ellipsoid, slightly to strongly compressed, strongly 2-ridged to narrowly 2-winged, 3–5.5 cm, glabrous; leaf blade obovate to oblanceolate, narrowed in proximal half toward a narrow, cordate or truncate base, lateral veins in 10–12 pairs; petiole 0.5–2 cm (or plants cultivated; fruit ca. 1.6 cm: see *T. muelleri* above) ..... 6. *T. catappa*

1. Terminalia nigrovenulosa Pierre in Lanessan, Pl. Util. Col. Franç. 315. 1886 [*"inguovenulosa"*].

海南榄仁 hai nan lan ren

Terminalia hainanensis Exell; *T. obliqua* Craib; *T. triptera* Stapf (1895), not Franchet (1896); *T. tripteroides* Craib.

Trees or shrubs to 15 m tall; trunk to 0.5 m d.b.h. Bark gray-white, gray, yellowish brown, gray-brown, or brown, spotted. Branchlets gray or brown, slender, longitudinally corrugated, yellow orbicular lenticellate, glabrous. Leaves alternate or subopposite, grouped at apices of branchlets; petiole 1–2.4 cm, apex (or leaf blade base) without glands; leaf blade green abaxially, deep green adaxially, oblong-elliptic to broadly elliptic, ovate, obovate, or sometimes suborbicular, 4–11 × 2.5–5.5 cm, with glands near margin, glabrous, puberulous on midvein, or abaxially thinly pilose when young, base truncate, rounded, or obtuse, apex mucronate or acuminate, rarely retuse; lateral veins in (6–)8–10 pairs. Inflorescences terminal and axillary spikes, many grouped at branchlet apex and forming a panicle 4–8 cm; axes densely deep yellow and red tomentose. Flowers fragrant. Calyx tube distally cupular, ca. 1.5 mm, abaxially usually glabrous, rarely minutely tomentose, adaxially densely white long hairy; lobes 4 or 5. Stamens 8–10, exserted, 3–4.5 mm. Fruit not or scarcely stipitate, green tinged with red, scarlet, deep brown, black and purple, or green-purple when ripe, ellipsoid or obovoid, 3-winged, (1.5–)2–3.5 × (1–)1.5–2 cm, glabrous, base broadly obtuse to oblique and rounded; wings subleathery, transversely striate, margin shallowly undulate, apical part obtusely deltoid, extending 5–8 mm beyond seed-bearing part of fruit. Fl. May–Sep, fr. Jul–Feb.

Forests, mixed forests, woods, sparse woods, thickets, mountains, seashores, dry sandy seashores; sea level to 500 m. Hainan [Cambodia, Laos, Malaysia (NW Peninsular Malaysia and Lankawi Islands), ?Myanmar, Thailand, Vietnam].

Terminalia hainanensis, described from Hainan, and *T. nigrovenulosa* (S Vietnam), *T. obliqua* (Thailand), *T. triptera* Stapf (Malaysia: Lankawi Islands), and *T. tripteroides* (Thailand) are all clearly the same species. This was already realized by Lecompte (in Aubréville, Fl. Cambodge Laos Vietnam 10: 92. 1969). The name *T. nigrovenulosa* has priority.

2. Terminalia myriocarpa Van Heurck & Müller Argoviensis in Van Heurck, Observ. Bot. 215. 1871.

千果榄仁 qian guo lan ren

Trees evergreen, to 35 m tall; trunk to 2.8 m d.b.h., with large buttresses. Branchlets cylindric, together with petioles glabrous, minutely brownish hirsute when young, or rarely densely brownish long stiff hirsute. Leaves opposite; petiole 0.5–1.5 cm, stout, with 2 stalked glands at apex; leaf blade oblong-elliptic or oblong-lanceolate, 10–25(–30) × 4–10(–15) cm, 2–4 × as long as wide, thickly papery, sparsely brownish hirsute abaxially and on veins adaxially when young, glabrescent or later glabrous, or rarely appressed yellowish brown sericeous when young, later sparsely (except on veins) hairy abaxially and subglabrous adaxially, base obtuse, margin entire or slightly undulate, rarely conspicuously toothed, apex with short, oblique tip; midvein yellow adaxially; lateral veins in 15–35 pairs. Inflorescences terminal or axillary, simple or compound, long, slender spikes, many grouped at branchlet apex and forming a large panicle 18–30(–50) cm; axes densely yellow tomentose. Calyx tube distally cupular, 2.5–3 mm, abaxially tomentose on ovary, gla-

brous on cupular part, adaxially tomentose; lobes 5. Stamens 10, exserted, 2–3 mm. Fruit not stipitate, yellowish when dry, 2-winged, 0.3–0.6 × 0.8–1.2 cm (broader than long); wings opposite, oblong, equal, membranous, sparsely pubescent, glabrescent, sometimes with 1 rudimentary wing seated between them. Fl. Aug–Sep, fr. Oct–Jan.

Forests, streamsides in mountain valleys, one of the upper-layer canopy trees in primary forests; 600–2100(–2500) m. Guangdong (probably planted), SW Guangxi, SE Xizang, Yunnan [Bangladesh, Bhutan, NE India, Indonesia (N Sumatra), Laos, Malaysia, N Myanmar, Nepal, Thailand, N Vietnam].

This species was listed as vulnerable in China by Liu (in Fu & Jin, China Pl. Red Data Book 1: 226–227. 1992).

1a. Margin of leaf blade entire or slightly undulate; branchlets and petioles glabrous, or minutely brownish hirsute when young; leaf blade sparsely brownish hirsute abaxially and on veins adaxially when young, glabrescent or later glabrous ..... 2a. var. *myriocarpa*
1b. Margin of leaf blade conspicuously toothed; branchlets and petioles densely brownish long stiff hirsute; leaf blade appressed yellowish brown sericeous when young, later sparsely (except on veins) hairy abaxially and subglabrous adaxially ..... 2b. var. *hirsuta*

2a. Terminalia myriocarpa var. **myriocarpa**

千果榄仁(原变种) qian guo lan ren (yuan bian zhong)

Myrobalanus myriocarpa (Van Heurck & Müller Argoviensis) Kuntze.

Branchlets and petioles glabrous, or minutely brownish hirsute when young. Leaf blade sparsely brownish hirsute abaxially and on veins adaxially when young, glabrescent or later glabrous, margin entire or slightly undulate.

Forests, one of the upper-layer canopy trees in primary forests; 600–1500(–2500) m. Guangdong (Zhongshan, probably planted), SW Guangxi (Longzhou), SE Xizang (Mêdog), C and S Yunnan [Bangladesh, Bhutan, NE India, Indonesia (N Sumatra), Laos, Malaysia, N Myanmar, Nepal, Thailand, N Vietnam].

The name *"Terminalia saja"* (Steudel, Nomencl. Bot., ed. 2, 2: 669. 1841) is a nomen nudum. Steudel cited the synonym *"Pentaptera saja"* (Wallich, Numer. List no. 3983. 1831), but that name also is a nomen nudum.

2b. Terminalia myriocarpa var. **hirsuta** Craib, Fl. Siam. 1: 606. 1931.

硬毛千果榄仁 ying mao qian guo lan ren

Branchlets and petioles densely brownish long stiff hirsute. Leaf blade appressed yellowish brown sericeous when young, later sparsely (except on veins) hairy abaxially and subglabrous adaxially, margin conspicuously toothed. Fr. Oct.

Forests, streamsides in mountain valleys; 1000–2100 m. W Yunnan (Lushui) [N Thailand].

This variety is maintained here as separate from typical *Terminalia myriocarpa* not merely as a hairy variant, but also because of the conspicuously toothed leaf blade margin.

3. Terminalia franchetii Gagnepain, Notul. Syst. (Paris) 3: 287. 1917.

滇榄仁 dian lan ren

Shrubs or trees deciduous, 0.6–10 m tall. Bark longitudinally striate when old. Branches slender, golden velvety, or with pilose hairs gradually deciduous when old. Leaves alternate; petiole 0.4–1.5 cm, densely or sparsely brownish yellow tomentose or glabrous, with 2 glands at apex; leaf blade oblong to elliptic, ovate or broadly so, or obovate, 1.5–6.5(–11) × 1.2–4.5(–6.5) cm, 1–2 × as long as wide, papery, abaxially densely yellow or brown appressed sericeous, glabrescent, glabrous except hairy on veins and margin, or if sparsely hairy then not appressed sericeous, adaxially tomentose to ± glabrous, or both surfaces glabrous, base cordate, truncate, rounded, obtuse, or cuneate, apex retuse, rounded, or obtuse, mucronate; lateral veins in 5–15 pairs. Inflorescences axillary or terminal, simple spikes, 2.5–10(–12) cm; axis hairy. Calyx tube distally cupular or salverform, 4–5 mm, abaxially villous, or densely yellowish long hairy on ovary and with fewer hairs on cupular part, adaxially long hairy or yellow pappose; lobes 5. Stamens 10, exserted, 4–5 mm. Fruit usually not stipitate, obovoid or broadly cylindric, deltoid in transverse section, 3-winged, 0.5–1 × 0.3–0.7 cm, yellowish brown (rarely white) tomentose or villous, usually densely so, or shortly and rather sparsely whitish pubescent, base obtuse, apex acute or acuminate; stipe rarely present (?in Thailand only) and then to 6 mm. Fl. Apr–Jul, fr. May–Dec.

Mixed forests, scattered forests, dry scrub forests, thickets, open thickets, thicket margins, scrub, open stony hills, slopes, dry river valleys, stony river deposits, cliff ledges, open dry places; (1000–)1100–3700 m. NW Guangxi, SW Sichuan, SE Xizang, Yunnan [N Thailand].

1a. Leaf blade 5–6.5(–11) × 2.5–4.5(–6.5) cm, usually hairy, at least abaxially, often densely so; spikes 4–10(–12) cm; trees or shrubs 1.5–10 m tall ..... 3a. var. *franchetii*
1b. Leaf blade 1.5–4 × 1.2–2.5 cm, both surfaces glabrous; spikes 2.5–5 cm; shrubs 0.6–5 m tall ..... 3b. var. *intricata*

3a. Terminalia franchetii var. **franchetii**

滇榄仁(原变种) dian lan ren (yuan bian zhong)

Terminalia triptera Franchet, J. Bot. (Morot) 10: 291. 1896, not Stapf (1895); *T. dukouensis* W. P. Fang & P. C. Kao; *T. franchetii* var. *glabra* Exell; *T. franchetii* var. *membranifolia* A. C. Chao; *T. franchetii* var. *tomentosa* Nanakorn; *T. micans* Handel-Mazzetti, nom. illeg. superfl.

Trees or shrubs 1.5–10 m tall. Leaf blade 5–6.5(–11) × 2.5–4.5(–6.5) cm, abaxially densely yellow or brown appressed sericeous, glabrescent, glabrous except hairy on veins and margin, or if sparsely hairy then not appressed sericeous, adaxially tomentose to ± glabrous. Spikes 4–10(–12) cm. Fl. Apr–Jul, fr. May–Dec.

Mixed forests, scattered forests, thickets, thicket margins, dry scrub, open scrub, open stony hills, slopes, dry river valleys, open dry places; (1000–)1100–3700 m. NW Guangxi (Longlin), SW Sichuan, Yunnan [N Thailand].

As circumscribed here, *Terminalia franchetii* var. *franchetii* displays considerable variation in the size of the leaf blades and the density and distribution of their indumentum. For example, plants from S Yunnan with larger, less hairy leaf blades have been called *T. franchetii* var. *membranifolia*, and plants from the Jinsha Jiang in SW Sichuan and NW Yunnan with glabrous to sparsely hairy leaf blades have been called *T. franchetii* var. *glabra*. Plants from Dukou in S Sichuan with hairy leaves at the large end of the size range were named *T. dukouensis*, and plants from N Thailand with hairy leaf blades and shortly stalked flowers and fruit were named *T. franchetii* var. *tomentosa*. However, apart from the minor detail of stalked flowers and fruit in the entity from Thailand, there seem to be no clear-cut discontinuities between typical *T. franchetii* and these variants, so they are not recognized as distinct taxa here. On the other hand, plants named *T. intricata* from the dry valley region where Sichuan, Xizang, and Yunnan meet appear to represent a distinct, xerophytic, local variant of *T. franchetii* and are accordingly recognized here at varietal rank.

3b. Terminalia franchetii var. **intricata** (Handel-Mazzetti) Turland & C. Chen, **comb. et stat. nov.**

错枝榄仁 cuo zhi lan ren

Basionym: *Terminalia intricata* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 97. 1924.

Shrubs 0.6–5 m tall. Leaf blade 1.5–4 × 1.2–2.5 cm, both surfaces glabrous. Spikes 2.5–5 cm. Fl. May–Jun, fr. Jun–Nov.

● Dry scrub forests, thickets, open thickets, scrub on open rocky slopes, stony river deposits, cliff ledges, open dry places; 1900–3400 m. SW Sichuan (Dêrong, Xiangcheng), SE Xizang (Markam), NW Yunnan.

4. Terminalia chebula Retzius, Observ. Bot. 5: 31. 1788.

诃子 he zi

Trees to 30 m tall; trunk to 1 m d.b.h. Bark grayish black to gray, coarsely split and thick. Branchlets conspicuously white or yellowish long lenticellate, glabrous, or tomentose or appressed villous at least when young, hairs tawny, rarely silvery. Leaves alternate or subopposite, spaced along branchlets; petiole 1–3 cm, moderately stout, with 2(–4) glands 1–5 mm below apex; leaf blade elliptic, 7–18 × 4.5–10 cm, both surfaces glabrous, or appressed (and rarely silvery) villous at least when young, base obtuse-rounded or cuneate, oblique, apex mucronate; lateral veins in 6–12 pairs. Inflorescences axillary or terminal, simple spikes, 5–10 cm, numerous flowered, sometimes grouped at branchlet apex and forming a panicle; axis glabrous or sparsely hairy, with denser hairs near base of flowers. Flowers slightly fragrant, bisexual. Calyx tube distally cupular, 2.5–3.5 mm, abaxially glabrous, adaxially tawny tomentose; lobes 5, apex mucronate to aristate. Stamens 10, exserted, 3–4 mm. Fruit not stipitate, blackish brown when ripe, ovoid or broadly so, ellipsoid, or cylindric-ovoid, obtusely 5-ridged, 2–4.5 × 1.2–2.5 cm, rigid, becoming deeply wrinkled when dry, glabrous. Fl. May–Jun, Sep, fr. Jul–Dec. $2n = 24, 48, 72$.

Sparse forests, secondary bamboo forests, sunny forest margins, thickets, also cultivated on village commons; below 500 to 1800 m. Native in W Yunnan; cultivated in Fujian, Guangdong, Guangxi (Nanning), and Taiwan (Nantou) [Bangladesh, Bhutan, Cambodia, India, Laos, Malaysia (introduced), Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

The fruit yields a black dye used to dye cloth, at least in Guangdong.

1a. Branchlets and both surfaces of leaf blade glabrous, or tawny tomentose only when young ..... 4a. var. *chebula*

1b. Branchlets and both surfaces of leaf blade appressed tawny villous or densely appressed silvery tomentose at least when young ..... 4b. var. *tomentella*

4a. Terminalia chebula var. **chebula**

诃子(原变种) he zi (yuan bian zhong)

Embryogonia arborea Teijsmann & Binnendijk; *Myrobalanus chebula* (Retzius) Gaertner; *M. gangetica* (Roxburgh) Kosteletzky; *Terminalia acuta* Walpers; *T. gangetica* Roxburgh; *T. parviflora* Thwaites (1859), not C. Presl (1851); *T. reticulata* Roth; *T. zeylanica* Van Heurck & Müller Argoviensis.

Branchlets and both surfaces of leaf blade glabrous, or tawny tomentose only when young.

Sparse forests, thickets, also cultivated on village commons; 800–1800 m. Native in W Yunnan; cultivated in Fujian, Guangdong, Guangxi (Nanning), and Taiwan (Nantou) [Bangladesh, Bhutan, Cambodia, India, Laos, Malaysia (introduced), Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

4b. Terminalia chebula var. **tomentella** (Kurz) C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 446. 1878.

微毛诃子 wei mao he zi

Terminalia tomentella Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42(2): 80. 1873; *Myrobalanus tomentella* (Kurz) Kuntze; *T. argyrophylla* King & Prain.

Branchlets and both surfaces of leaf blade appressed tawny villous or densely appressed silvery tomentose at least when young.

Secondary bamboo forests, sunny forest margins; below 500 to 1100 m. W Yunnan [Myanmar].

This variety is tentatively maintained, with *Terminalia argyrophylla* included, on account of its persistently hairy branchlets and leaf blades.

5. Terminalia bellirica (Gaertner) Roxburgh, Pl. Coromandel 2: 54. 1805 [*"bellerica"*].

毗黎勒 pi li le

Myrobalanus bellirica Gaertner, Fruct. Sem. Pl. 2: 90. 1790 [*"bellirina"*]; *M. laurinoides* (Teijsmann & Binnendijk) Kuntze; *Terminalia attenuata* Edgeworth; *T. bellirica* var. *laurinoides* (Teijsmann & Binnendijk) C. B. Clarke; *T. eglandulosa* Roxburgh ex C. B. Clarke; *T. gella* Dalzell; *T. laurinoides* Teijsmann & Binnendijk; *T. punctata* Roth.

Trees deciduous, to 35 m tall; trunk to 1 m d.b.h., with large buttresses. Bark gray, longitudinally ridged. Branchlets with conspicuous, spirally ascending leaf scars. Leaves spiraled, crowded into pseudowhorls at apices of branchlets; petiole 3–9 cm, glabrous but ferruginous tomentose when young, especially at base, with 2 glands above middle; leaf blade glossy, obovate, 18–26 × 6–12 cm, both surfaces glabrous except ferruginous tomentose when young, base obtuse-rounded or attenuate, apex obtuse or mucronate; lateral veins in 5–8 pairs. Inflorescences axillary, simple spikes, 5–18 cm, often grouped at

branchlet apex and forming a panicle; axis densely ferruginous tomentose. Calyx tube distally shallowly cupular, 4–5 mm, abaxially tomentose, adaxially long villous; lobes 5. Stamens 10, exserted, 4–5 mm. Fruit shortly stipitate, subglobose to broadly ellipsoid or ovoid, weakly to strongly 5-ridged, 2–3 × 1.8–2.5 cm, densely and finely velutinous or sericeous; stipe ca. 2 mm. Fl. Mar–Apr, fr. May–Jul. 2*n* = 48.

Scattered forests, sunny mountain slopes, one of the upper layer trees of stream valleys and lower seasonal rain forests; 500–1400 m. S Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; N Australia; introduced in E Africa].

6. Terminalia catappa Linnaeus, Syst. Nat., ed. 12, 2: 674 [“638”]; Mant. Pl. 1: 128. 1767.

榄仁树 lan ren shu

Badamia commersonii Gaertner; *Juglans catappa* (Linnaeus) Loureiro; *Myrobalanus catappa* (Linnaeus) Kuntze; *Terminalia catappa* var. *chlorocarpa* Hasskarl; *T. catappa* var. *macrocarpa* Hasskarl; *T. catappa* var. *rhodocarpa* Hasskarl; *T. catappa* var. *subcordata* (Humboldt & Bonpland ex Willdenow) Candolle; *T. intermedia* Bertero ex Sprengel; *T. latifolia* Blanco (1837), not Swartz (1788); *T. moluccana* Lamarck; *T. myrobalana* Roth; *T. ovatifolia* Noronha; *T. paraensis* Martius; *T. procera* Roxburgh; *T. rubrigemmis* Tulasne; *T. subcordata* Humboldt & Bonpland ex Willdenow.

Trees to 20 m tall; trunk to 2 m d.b.h. Bark brownish black, longitudinally peeling. Branches spreading, forming tiers. Branchlets densely brownish yellow tomentose near apex, densely covered with conspicuous leaf scars. Leaves alternate, crowded into pseudowhorls at apices of branchlets; petiole 0.5–2 cm, stout, tomentose; leaf blade obovate to oblanceolate, narrowed in proximal half, 12–30 × 8–15 cm, both surfaces glabrous or abaxially sparsely softly hairy when young, base narrow, cordate or truncate, apex obtuse or mucronate; lateral veins in 10–12 pairs. Inflorescences axillary, simple, long, slender spikes, 15–20 cm, numerous flowered; axis shortly white tomentose. Flowers fragrant. Calyx tube distally cupular, 7–8 mm, abaxially white tomentose, densely so on ovary, sparsely so on cupular part, adaxially glabrous; lobes 5. Stamens 10, exserted, 2–3 mm. Fruit not stipitate, red or blackish green when ripe, ellipsoid, slightly to strongly compressed, strongly 2-ridged to narrowly 2-winged (wings to 3 mm wide), 3–5.5 × 2–3.5 cm, glabrous; pericarp woody, rigid. Fl. Mar–Jun, Oct, fr. May, Jul–Sep.

Sandy seashores, beaches with humid climate, villages, grassy village commons, also cultivated as a roadside tree. Guangdong, Hainan, Taiwan (including Lan Yu), SE Yunnan [Bangladesh, Cambodia, India (including Andaman and Nicobar Islands), Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam; N Australia, Indian Ocean islands, Madagascar, Pacific islands; planted throughout the tropics as a shade tree].

The fruit is edible.

3. ANOGEISSUS (Candolle) Wallich ex Guillemin et al., Fl. Seneg. Tent. 1: 279. 1832.

榆绿木属 yu lü mu shu

Conocarpus sect. *Anogeissus* Candolle, Prodr. 3: 16. 1828; *Finetia* Gagnepain.

Trees or shrubs. Leaves opposite, subopposite, or alternate; leaf blade ± elliptic. Inflorescences axillary or terminal, pedunculate, globose capitula. Calyx tube proximally ridged or winged, narrowly tubular in middle part, distally cupular; lobes 5, deltoid. Petals absent. Stamens 10. Fruit dry, ridged or winged, apically with middle part of calyx tube persistent and beaklike.

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

In addition to the species described below, *Anogeissus leiocarpa* Guillemin & Perrottet, from tropical Africa, has been recorded as cultivated in Guangdong (Guangzhou).

1. Anogeissus acuminata (Roxburgh ex Candolle) Guillemin et al., Fl. Seneg. Tent. 1: 280. 1832.

榆绿木 yu lü mu

Conocarpus acuminatus Roxburgh ex Candolle, Prodr. 3: 16. 1828 [*“acuminata”*]; *Anogeissus acuminata* var. *lanceolata* Wallich ex C. B. Clarke; *A. harmandii* Pierre; *A. lanceolata* (Wallich ex C. B. Clarke) Wallich ex Prain; *A. pierrei* Gagnepain; *A. tonkinensis* Gagnepain.

Trees to 20 m tall; trunk to 1 m d.b.h. Branchlets slightly pendent, slender, together with petioles and leaf blades golden villous when young. Petiole cylindric, 2–6 mm; leaf blade lanceolate to narrowly so, 4–8 × 1–3 cm, abaxially gray-green and pilose mostly in axils of lateral veins, adaxially green and glabrous to glabrescent, base narrowed or obtuse, apex acuminate; lateral veins in 5–7 pairs, inconspicuous. Capitula 9–13 mm in diam., numerous flowered; bracts easily deciduous, linear, 4–5 mm. Flowers sessile. Calyx tube ca. 5 mm, abaxially yellow pubescent, densely so on ovary and tubular part, more sparsely so on cupular part. Filaments 3–4 mm. Fruit ca. 6 × 5 mm including beak, ferruginous pubescent distally and on beak. Fl. Feb–Mar (Bangladesh, Thailand).

Rocky limestone areas, one of the dominant species of deciduous forests; near sea level to 700 m. Yunnan [Bangladesh, Cambodia, India, Laos, Myanmar, Thailand, Vietnam].

In FRPS (53(1): 2. 1984), Chinese plants were treated as *Anogeissus acuminata* var. *lanceolata*. However, that entity does not seem sufficiently distinct from typical *A. acuminata* to justify formal taxonomic recognition. Scott (Kew Bull. 33: 563–565. 1979) recognized two varieties within *A. acuminata*: var. *acuminata* (including var. *lanceolata*), occurring from India to Vietnam, and var. *phillyreifolia* (Van Heurck & Müller Argoviensis) Kurz, apparently restricted to Myanmar. The species was listed as endangered in China by Shun (in Fu & Jin, China Pl. Red Data Book 1: 220–221. 1992).

4. GETONIA Roxburgh, Pl. Coromandel 1: 61. 1798.

萼翅藤属 e chi teng shu

Calycopteris Poiret, nom. illeg. superfl.

Lianas woody. Leaves opposite or subopposite; leaf blade elliptic or lanceolate to ovate. Inflorescences axillary, simple or branched spikes crowded toward branchlet apex and forming a large, often dense, bracteate panicle. Calyx tube proximally ellipsoid, 5-ridged, distally campanulate; lobes 5, triangular-lanceolate at anthesis, persistent and much enlarged in fruit. Petals absent. Stamens 10. Fruit narrowly ovoid, dry, longitudinally 5-ridged; persistent calyx lobes spreading, winglike, elliptic to oblanceolate or narrowly so.

One species: Bangladesh, Cambodia, China, India, Laos, Malaysia, Myanmar, Singapore, Thailand, Vietnam.

The correct name for this genus is *Getonia*, not *Calycopteris* as given in FRPS (53(1): 3. 1984). Lamarck (Tabl. Encycl. 1: t. 357. 1793) published a plate captioned *"Calycopteris"* comprising an illustration with analysis. Under Art. 42.1 of the *Vienna Code* a name of a genus and its single species may be simultaneously validly published with a descriptio generico-specifica, in place of which, before 1908, an illustration with analysis is acceptable (Art. 42.3 and 42.4). However, Art. 42 does not apply to the publication of a genus name alone, so Lamarck did not validly publish any names. The text corresponding to the plate was published later (Poiret, Tabl. Encycl. 2: 485. 1819), but, before that, Poiret (Encycl., Suppl. 2: 41. 1811) published a description of the genus and recombined *Getonia floribunda* Roxburgh (1798) as its only species, *C. floribunda*. In citing *G. floribunda*, Poiret included the type of the then unispecific *Getonia*, so that *Calycopteris* was nomenclaturally superfluous when published and is therefore illegitimate (Art. 52.1).

1. Getonia floribunda Roxburgh, Pl. Coromandel 1: 61. 1798.

萼翅藤 e chi teng

Calycopteris floribunda (Roxburgh) Lamarck ex Poiret; *C. nutans* (Roxburgh) Kurz; *C. nutans* var. *glabriuscula* Kurz; *C. nutans* var. *roxburghii* Kurz; *Combretum sericeum* (Walpers) Wallich ex C. B. Clarke (1878), not G. Don (1824); *Getonia nitida* Roth; *G. nutans* Roxburgh; *Poivrea sericea* Walpers.

Lianas to 10 m or more tall. Branchlets densely pilose. Petiole 8–12 mm, densely pilose; leaf blade green adaxially, 5–15 × 3–7 cm, leathery, abaxially densely dark scaly and pilose, adaxially glabrescent but persistently pilose on midvein and lateral veins; lateral veins in 5–8(–10) pairs. Panicles to 30 cm or more; peduncle and rachis densely pilose; bracts 2–3 mm, densely pilose. Calyx tube 7–10 mm at anthesis, abaxially densely pilose; lobes 2–3.5 mm at anthesis, both surfaces densely pilose. Filaments 2–3 mm. Fruit 18–23 mm including calyx lobes, densely pilose; persistent calyx lobes 10–14 mm, longitudinally 3-veined with reticulate veins between, both surfaces pilose, especially on veins, or glabrescent, abaxially sparsely dark scaly. Fl. Mar–Apr, fr. May–Jun. $2n = 26$.

Monsoon forests, forest margins; 300–600 m. W Yunnan (Yingjiang) [Bangladesh, Cambodia, India, Laos, Malaysia, Myanmar, Singapore, Thailand, Vietnam].

This species was listed as endangered in China by Xu (in Fu & Jin, China Pl. Red Data Book 1: 222–223. 1992).

5. QUISQUALIS Linnaeus, Sp. Pl., ed. 2, 1: 556. 1762.

使君子属 shi jun zi shu

Kleinia Crantz (1766), not Miller (1754); *Mekistus* Loureiro ex B. A. Gomes; *Sphalanthus* Jack.

Lianas woody. Leaves opposite or subopposite; petiole persistent and thornlike; leaf blade ± elliptic, glabrous or hairy. Inflorescences terminal or axillary, simple or sometimes compound spikes. Calyx tube (1.7–)5–9 cm, ± uniformly narrowly tubular except funnelform at apex, deciduous above ovary, hairy or subglabrous; lobes 5, deltoid or triangular-lanceolate, small, apex sometimes cuspidate. Petals 5, white or red, larger (often much more so) than calyx lobes. Stamens 10, not or scarcely exserted from calyx tube. Style partly adnate to inside of calyx tube (in Chinese species). Fruit fusiform to subglobose or ovoid, longitudinally 5-ridged or -winged, dry, leathery.

About 17 species: tropical Africa, tropical Asia; two species in China.

Jongkind (Bull. Mus. Natl. Hist. Nat., B, Adansonia 12: 275–280. 1991) proposed uniting *Quisqualis* with *Combretum* on the grounds that the two genera cannot be separated morphologically in a consistent manner. Tan et al. (loc. cit., see note under family heading) found *Quisqualis* and *Combretum* to be monophyletic sister taxa, but noted that their sampling (two species of each genus in five samples) was insufficient to examine problems of generic circumscription.

1a. Calyx tube 5–9 cm; petals 10–24 mm, opening white, later turning yellowish abaxially and reddish adaxially; inflorescence lax; petiole without an inflated joint near base ..... 1. *Q. indica*
1b. Calyx tube 1.7–2.4 cm; petals ca. 3.5 mm, opening dark red or reddish; inflorescence dense; petiole with an inflated joint near base ..... 2. *Q. conferta*

1. Quisqualis indica Linnaeus, Sp. Pl., ed. 2, 1: 556. 1762.

使君子 shi jun zi

Combretum indicum (Linnaeus) Jongkind; *Kleinia quadricolor* Crantz; *Mekistus sinensis* Loureiro ex B. A. Gomes; *Ourouparia enormis* Yamamoto; *Quisqualis glabra* N. L. Burman; *Q. grandiflora* Miquel; *Q. indica* var. *oxypetala* Kurz; *Q. indica* var. *villosa* (Roxburgh) C. B. Clarke; *Q. longiflora* C.

Presl; *Q. loureiroi* G. Don; *Q. obovata* Schumacher & Thonning; *Q. pubescens* N. L. Burman; *Q. sinensis* Lindley; *Q. spinosa* Blanco; *Q. villosa* Roxburgh.

Lianas to 8 m tall. Branchlets brownish yellow pubescent. Petiole 5–9 mm, without an inflated joint near base, densely brown pilose when young; leaf blade mostly oblong-elliptic or elliptic, 5–18 × 2.5–7 cm, abaxially sometimes brown pilose, adaxially glabrous except slightly brown pilose on midvein, finely white verruculose, rarely tomentose on both surfaces, base obtuse, apex acuminate to shortly caudate; lateral veins in 7 or 8 pairs. Inflorescences lax; bracts deciduous, filiform-linear to ovate, 3–12 mm, brown pilose. Flowers fragrant. Calyx tube 5–9 cm, yellow pilose; lobes deltoid, 2–3 mm, apex acute or shortly acuminate but not cuspidate. Petals opening white, later turning yellowish abaxially and reddish adaxially, obovate to oblanceolate, 10–24 × 4–10 mm, apex rounded to obtuse. Fruit red when young, greenish black or brown when ripe, fusiform or narrowly ovoid, sharply 5-ridged, 2.7–4 × 1.2–2.3 cm, glabrous, apex mucronate. Fl. Mar–Nov, fr. Jun–Nov.

Rain forests, low woods, thickets, hedges, mountains, dry hillsides, riversides, roadsides, wasteland, also cultivated; below 1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, S Jiangxi, Sichuan, Taiwan, Yunnan; cultivated in Zhejiang [Bangladesh, Cambodia, India (including Andaman Islands), Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; coastal E Africa, Indian Ocean islands, Pacific islands; introduced to other parts of tropical Africa and Central and South America; widely cultivated and often naturalized in the tropics].

This species is cultivated in China as an ornamental. The seeds are used medicinally to kill intestinal parasites.

Quisqualis indica is variable in its indumentum and in the shape and size of its bracts. Most Chinese specimens with bracts still attached have linear-lanceolate to filiform-linear bracts. In this respect, these plants correspond with *Q. indica* var. *villosa*, as defined by Lecompte (in Aubréville, Fl. Cambodge Laos Vietnam 10: 22–31. 1969), who described var. *indica* as having ovate to lanceolate bracts. In FRPS (53(1): 17. 1984), var. *villosa* was said to have ovate leaf blades, tomentose on both surfaces (vs. elliptic or ovate, abaxially sometimes brown pilose, and adaxially glabrous in var. *indica*).

Four specimens from Guangdong (Deqing, Guangzhou, Nanhai, and Xingning), at least three of which are from cultivated plants, have a shorter calyx tube, 3–5 cm, and smaller petals, 8–9 × 3–4.5 mm, than is normal for *Quisqualis indica*. It is possible that these belong to *Q. indica* var. *pierrei* (Gagnepain) O. Lecompte (*Q. pierrei* Gagnepain), described from S Vietnam, which differs from var. *indica* in having smaller flowers of about these dimensions and, strikingly, in having fruit with 5 broad, papery wings 1–1.5 cm wide. However, because the specimens lack fruit, this determination is only tentative.

2. Quisqualis conferta (Jack) Exell, J. Bot. 69: 122. 1931.

小花使君子 xiao hua shi jun zi

Sphalanthus confertus Jack, Malayan Misc. 2(7): 55. 1822; *Quisqualis densiflora* Wallich ex Miquel.

Branchlets brown pilose. Petiole 3–7 mm, with an inflated joint near base, brown pilose; leaf blade oblong, 5–13 × 2–5.5 cm, abaxially glabrous except sparsely pilose on midvein and with denser hairs in axils of lateral veins, adaxially glabrous and finely white verruculose, base rounded, apex acuminate. Inflorescences dense; bracts leaflike, lanceolate, 5–12 × 2–4 mm, brown pilose, becoming sparsely so. Calyx tube 1.7–2.4 cm, brown pilose; lobes triangular-lanceolate, ca. 2 mm, apex cuspidate, cusp filiform, 1–3 mm, often recurved. Petals opening dark red or reddish, oblong-elliptic, ca. 3.5 × 2 mm. Fruit glossy black when ripe, ovoid, conspicuously 5-ridged, ca. 2.5 cm, glabrous. Fl. Jan.

Dense forests, wetlands; 400–1100 m. Yunnan [Cambodia, Indonesia (Sumatra), Malaysia, Thailand, S Vietnam].

Records of *Quisqualis caudata* Craib from Yunnan (e.g., in FRPS 53(1): 17. 1984) are based on misidentifications of *Q. conferta*. *Quisqualis caudata* is endemic to Thailand and differs in having calyx lobes with an apical cusp not more than 1 mm and not recurved.

6. COMBRETUM Loefling, Iter Hispan. 308. 1758, nom. cons.

风车子属 feng che zi shu

Cacoucia Aublet; *Embryogonia* Blume; *Grislea* Linnaeus; *Poivrea* Commerson ex Candolle.

Lianas woody, or shrubs when lacking climbing support, rarely non-climbing shrubs, trees, or subherbaceous. Leaves opposite, whorled, or rarely alternate; petiole sometimes persistent and thornlike; leaf blade variable in shape, generally elliptic or oblong-elliptic to broadly ovate, hairy or glabrous, often conspicuously scaly, often with domatia. Inflorescences terminal, axillary, or extra-axillary, simple or branched spikes, racemes, or panicles. Calyx tube usually shorter than 2 cm, proximally ellipsoid or fusiform, slightly contracted above ovary, distally narrowly funnelform to saucer-shaped; lobes 4 or 5, rarely more, deltoid to subulate, sometimes almost absent. Petals 4 or 5, white, yellow, orange, red, or purple, small and inconspicuous or showy and exceeding calyx lobes. Stamens usually 8 or 10, usually exserted from calyx tube. Style not adnate to inside of calyx tube (in Chinese species). Fruit often shortly stipitate, dry, rarely fleshy, longitudinally 4- or 5-winged, -ridged, or -angled, broadly winged in Chinese species with wings equal, papery, transversely striate; endocarp not sclerenchymatous.

About 250 species: mostly in tropical and S Africa, also in tropics of America and Asia, and Madagascar; eight species (one endemic) in China.

Cacoucia chinensis A. Jussieu ex Candolle (Prodr. 3: 22. 1828) was said to have originated in China. The application of this name is unclear. The fruit was described as 5-angled.

Combretum chinense Roxburgh ex G. Don (Trans. Linn. Soc. London 15: 432. 1827) was said by its author to have originated from China. It was treated by Exell (in Steenis, Fl. Males., ser. 1, 4: 540. 1954), who apparently did not see the type, as a name of uncertain application. Nanakorn

(Thai Forest Bull. 16: 171–175. 1986) designated *Roxburgh s.n.* in Herb. Lambert (G) as the lectotype and, having examined that specimen, accepted the name *C. chinense* for a species distributed from India to Indochina and Indonesia (but not in China) and similar morphologically to *C. yunnanense* (*C. griffithii* var. *yunnanense* in the present treatment).

1a. Flowers 5-merous; fruit 5-winged; calyx tube tomentose and/or villous, if scaly then hairs obscuring scales.
2a. Calyx tube distally funnelform, 7–8 mm; stamens 7–8 mm, obviously exceeding petals; fruit densely villosulous (when young) and sparsely red scaly; leaf blade abaxially without tufts of hairs in axils of lateral veins; inflorescences densely compound spikes usually crowded at branchlet apex and forming a dense, leafy panicle ..... 1. *C. pilosum*
2b. Calyx tube distally cupular, 3–5 mm; stamens ca. 2 mm, not exceeding petals; fruit glossy, glabrous; leaf blade abaxially sometimes with tufts of hairs in axils of lateral veins; inflorescences laxly compound spikes usually grouped at branchlet apex and forming a ± lax, leafy panicle ..... 2. *C. roxburghii*
1b. Flowers 4-merous; fruit 4-winged; calyx tube pubescent to glabrous, often scaly.
3a. Branchlets, both surfaces of leaf blade, inflorescence axes, calyx tube, and fruit sparsely to densely covered with obvious, white to ferruginous, peltate scales ca. 0.2 mm in diam.; leaf blade apex abruptly caudate, cauda with rounded or obtuse tip ..... 3. *C. punctatum*
3b. Branchlets, leaf blade, inflorescence axes, and calyx tube without obvious, peltate scales, although often with minute scales or verrucae much less than 0.2 mm in diam.; leaf blade apex not caudate but often acuminate and then acumen with acute tip.
4a. Inflorescences compound spikes, flower-bearing part of spikes very condensed and forming obconic to hemispheric capitula ..... 4. *C. sundaicum*
4b. Inflorescences simple or compound spikes, flower-bearing part of spikes broadly cylindric to long and slender.
5a. Inflorescence of at least some branched spikes; fruit obovoid, globose, or oblate.
6a. Inflorescences broadly cylindric spikes; calyx tube 12–15 mm, lobes reflexed, 2–3 mm; fruit ± obovoid, 2.5–4.5 cm, sparsely minutely tomentose when young, glabrous when mature, not scaly ..... 5. *C. latifolium*
6b. Inflorescences narrowly cylindric spikes; calyx tube 5–7 mm, lobes erect, 1–1.5 mm; fruit globose or oblate, 1.5–2.5 cm, glabrous, scaly ..... 6. *C. alfredii*
5b. Inflorescence of simple spikes only (even when grouped at branchlet apex and forming a panicle); fruit globose or ± so.
7a. Both surfaces of leaf blade usually not ferruginous minutely scaly but often densely green or white verruculose, glabrous at maturity except abaxially often with tufts of hairs in axils of lateral veins (rarely abaxially persistently sparsely pilose, densely so on veins) ..... 7. *C. wallichii*
7b. Both surfaces of leaf blade ferruginous minutely scaly (more densely so abaxially), not verruculose, glabrous, or pilose and glabrescent with age but remaining pilose on veins ..... 8. *C. griffithii*

1. Combretum pilosum Roxburgh, Fl. Ind., ed. 1832, 2: 231. 1832.

长毛风车子 chang mao feng che zi

Combretum insigne Van Heurck & Müller Argoviensis; *Poivrea pilosa* (Roxburgh) Wight & Arnott.

Lianas to 20 m tall. Bark grayish brown. Branchlets, petioles, and inflorescence rachis densely ferruginous tomentose and white villous. Leaves opposite or subopposite; petiole 2–7 mm; leaf blade abaxially pale green, adaxially deep green, ovate-oblong, elliptic, or narrowly elliptic, 5–15 × 2–7 cm, abaxially glabrous or villosulous on midvein, adaxially sparsely white verruculose, tomentose when young, glabrous or villosulous on midvein and lateral veins when mature, without tufts of hairs in axils of lateral veins, base obtuse, truncate, or shallowly cordate, apex mucronate or acuminate; lateral veins in 5–8(–10) pairs. Inflorescences terminal and axillary, densely compound spikes 3–10 cm, usually crowded at branchlet apex and forming a dense, leafy panicle; bracts persistent at anthesis, oblong-ovate to lanceolate, ca. 5 mm, ferruginous tomentose. Calyx tube pale green, distally funnelform, 7–8 mm, abaxially ferruginous tomentose and villous; lobes 5, erect, deltoid, 1–2 mm, apex acute. Petals 5, reddish, pink, or yellowish, rarely white, oblong or oblong-oblanceolate, 4–5 mm, villosulous. Stamens 10, exserted, 7–8 mm, obviously exceeding petals. Fruit pink or vivid pink, glossy, ellipsoid or obovoid, 5-winged, 2.5–3.5 × 2–2.5 cm, densely villosulous when young, glabrescent when old, sparsely red scaly. Fl. Dec–Apr, fr. Feb–Mar.

Forests, sparse forests, thickets, sparse dry scrub, among shrubs on stream banks, ravines; 100–800 m. Hainan, S Yunnan [Bangladesh, Cambodia, India, Laos, Myanmar, Thailand, Vietnam].

2. Combretum roxburghii Sprengel, Syst. Veg. 2: 331. 1825.

十蕊风车子 shi rui feng che zi

Combretum decandrum Roxburgh, Pl. Coromandel 1: 43. 1796, not Jacquin (1760); *Pentaptera roxburghii* Tulasne, nom. illeg. superfl.; *Poivrea roxburghii* Candolle, nom. illeg. superfl.

Lianas. Branchlets reddish villosulous when young. Leaves opposite; petiole 5–7 mm, with a tuft of hairs distally; leaf blade oblong-elliptic to obovate-oblong, 6–13(–15) × 3–6(–7) cm, both surfaces glabrous except abaxially very sparsely hairy, less sparsely so on veins, with or without tufts of hairs in axils of lateral veins, neither surface white verruculose, base obtuse or obtuse-rounded, apex obtuse, caudate; lateral veins in 6 or 7

pairs. Inflorescences terminal and axillary, laxly compound spikes 5–15 cm, usually grouped at branchlet apex and forming a ± lax, leafy panicle; bracts persistent at anthesis, lanceolate, 4–6 mm, tomentose. Calyx tube distally cupular, 3–5 mm, abaxially golden tomentose; lobes 5, broadly triangular, ca. 1 mm, apex aristate. Petals 5, obovate-oblong, ca. 2 mm, both surfaces yellow villous. Stamens 10, only slightly exserted, ca. 2 mm, not exceeding petals. Fruit glossy, cylindric, 5-winged, 2–3 × 0.8–1 cm, glabrous, apex acuminate.

Habitat and elevation not recorded. S Guangxi, SW Yunnan [Bangladesh, India, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

In botanical literature, this species has variously been called *Combretum decandrum*, by those presumably unaware of Jacquin's earlier homonym for a New World species, or *C. roxburghii*, which was published by Sprengel (Syst. Veg. 2: 331. 1825) as a nomen novum for Roxburgh's name.

3. Combretum punctatum Blume, Bijdr. 640. 1826.

盾鳞风车子 dun lin feng che zi

Lianas to 8 m tall; stems to 3 cm in diam. Surface scales obvious, white to ferruginous, peltate, ca. 0.2 mm in diam. Branchlets together with petioles glabrous and sparsely to densely scaly. Leaves opposite; petiole 5–12 mm; leaf blade lanceolate, ovate-lanceolate, or narrowly elliptic, 5–10 × 3–6(–7) cm, both surfaces glabrous, sparsely to densely scaly, abaxially more densely so, base obtuse-rounded, apex abruptly caudate, cauda with rounded or obtuse tip; lateral veins in 4–6 pairs. Inflorescences terminal and axillary, compound, spikes 4–12 cm, usually grouped at branchlet apex and forming a panicle; axes glabrous, densely scaly; distal, flower-bearing part of spikes very condensed, capitate, not longer than 0.5 cm, or broadly cylindric or cylindric, 1–5 cm; bracts caducous, linear, very small. Flowers fragrant. Calyx tube distally funnelform-cupular, 5–7 mm, abaxially glabrous, densely scaly, adaxially with a ring of dense, coarse hairs not or only slightly exserted; lobes 4, broadly triangular, 0.5–1 mm, apex obtuse. Petals 4, white, 1.5–2 mm, clawed; limb obovate, narrowly elliptic, or oblanceolate. Stamens 8, exserted, ca. 4 mm. Fruit mid-brown, variable in shape and size, oblate, suborbicular, broadly ovoid, obovoid, or pyriform, 4-winged, 1.3–4 × 1.3–3.5 cm, glabrous, sparsely to densely scaly. Fl. Mar–Apr, fr. Apr–Jul.

Forests, thickets, scrub; 500–1500 m. SW Guangdong, S Guangxi, Hainan, S Yunnan [Bangladesh, Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam].

Exell (in Steenis, Fl. Males., ser. 1, 4: 539. 1954) recognized *Combretum punctatum* and *C. squamosum* as subspecies, with *C. punctatum* subsp. *punctatum* in montane regions and subsp. *squamosum* in the lowlands. The present authors follow Exell, but prefer the rank of variety, for consistency within this treatment.

1a. Flower-bearing part of spikes very condensed, capitate, not longer than 0.5 cm; calyx tube ca. 7 mm; petal limb obovate ..... 3a. var. *punctatum*
1b. Flower-bearing part of spikes broadly cylindric or cylindric, 1–5 cm; calyx tube ca. 5 mm; petal limb narrowly elliptic or oblanceolate ..... 3b. var. *squamosum*

3a. Combretum punctatum var. **punctatum**

盾鳞风车子(原变种) dun lin feng che zi (yuan bian zhong)

Flower-bearing part of spikes very condensed, capitate, not longer than 0.5 cm. Calyx tube ca. 7 mm. Petal limb obovate. Fl. Apr.

Thickets, scrub; 1100–1500 m. SW Yunnan [Indonesia, Malaysia, Philippines, Thailand, Vietnam].

3b. Combretum punctatum var. **squamosum** (Roxburgh ex G. Don) M. G. Gangopadhyay & Chakrabarty, J. Econ. Taxon. Bot. 17: 680. 1993.

水密花 shui mi hua

Combretum squamosum Roxburgh ex G. Don, Trans. Linn. Soc. London 15: 438. 1827; *C. distillatorium* Blanco; *C. lepidotum* C. Presl; *C. punctatum* subsp. *squamosum* (Roxburgh ex G. Don) Exell; *C. squamosum* var. *dissitum* Craib; *C. squamosum* var. *luzonicum* C. Presl; *Poivrea squamosa* (Roxburgh ex G. Don) Walpers.

Flower-bearing part of spikes broadly cylindric or cylindric, 1–5 cm. Calyx tube ca. 5 mm. Petal limb narrowly elliptic or oblanceolate. Fl. Mar–Apr, fr. Apr–Jul.

Forests, thickets; 500–1500 m. SW Guangdong (Xuwen), S Guangxi (Shiwan Dashan), Hainan, S Yunnan [Bangladesh, Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam].

4. Combretum sundaicum Miquel, Fl. Ned. Ind., Eerste Bijv. 327. 1861.

榄形风车子 lan xing feng che zi

Combretum oliviforme A. C. Chao; *C. oliviforme* var. *yaxianense* Y. R. Ling.

Lianas to 2.5 m tall. Branchlets together with petioles glabrous and densely scaly. Leaves opposite; petiole 10–17 mm; leaf blade broadly elliptic, 7–13 × 5–8.5 cm, both surfaces glabrous, abaxially densely yellowish or brownish minutely scaly, adaxially white scaly and densely verruculose, base obtuse or subacute, apex obtuse and mucronate or shortly acuminate; lateral veins in 7 or 8 pairs. Inflorescences terminal and axillary, dichasially compound spikes 5–13 cm, usually grouped at branchlet apex and forming a panicle; axes densely villosulous, inconspicuously scaly; distal, flower-bearing part of spikes very condensed and forming obconic to hemispheric capitula; bracts caducous, linear, very small. Calyx tube distally narrowly funnelform, 11–13 mm, abaxially glabrous but yellow scaly at first, becoming smooth after anthesis, adaxially with a ring of dense, coarse hairs not exserted; lobes 4, reflexed, ± deltoid, ca. 2 mm, apex acute or shortly acuminate. Petals 4, white, oblong-elliptic or obovate, ca. 1.5 mm, apex obtuse-rounded or retuse. Stamens 8, exserted, 5–6 mm. Fruit subglobose, 4-winged, 2–3.5 × 2–2.5 cm, yellow or red scaly. Fl. Jul–Aug, fr. Aug.

Dense woods, dry thickets on sandy soil; 300–600 m. SW Guangxi (Longzhou), Hainan, Yunnan [Indonesia, Malaysia, Singapore, Thailand, Vietnam].

Combretum oliviforme was said to differ from *C. sundaicum* in having a distally cylindric-funnelform calyx tube and fusiform (vs. sub-

globose) fruit. These features of *C. oliviforme* are visible on the fruiting holotype (Hainan: *S. K. Lau 27571*, IBSC) and a flowering isotype (A). However, the calyx tube of *C. sundaicum* is likewise distally narrowly funnelform (e.g., drawing in Fl. Males., ser. 1, 4: 543. 1954) and the holotype of *C. oliviforme* has only immature fruit, which in *Combretum* tend to be narrower than the mature fruit. *Combretum oliviforme* var. *yaxianense* was said to differ from *C. oliviforme* in its subglobose fruit. The holotype of var. *yaxianense* (Hainan: *C. Wang 33616*, IBSC) is a branch with mature fruit. There therefore seems no justification to separate any of the Chinese plants from *C. sundaicum*.

5. Combretum latifolium Blume, Bijdr. 641. 1826.

阔叶风车子 kuo ye feng che zi

Combretum cyclophyllum Steudel; *C. extensum* Roxburgh ex G. Don; *C. formosum* Griffith (1854), not G. Don (1827); *C. horsfieldii* Miquel; *C. leucanthum* Van Heurck & Müller Argoviensis; *C. macrophyllum* Roxburgh; *C. micropetalum* Llanos (1856), not Candolle (1828); *C. platyphyllum* Van Heurck & Müller Argoviensis; *C. rotundifolium* Roxburgh (1832), not Richard (1792); *C. wightianum* Wallich ex Wight & Arnott; *Embryogonia latifolia* (Blume) Blume.

Lianas large, to 30 m tall. Branchlets together with petioles usually glabrous, scaly. Leaves opposite; petiole 10–25 mm; leaf blade broadly elliptic or ovate-elliptic, 7–20 × 5–10(–13) cm, both surfaces glabrous, sparsely or not scaly, not white verruculose, base obtuse-rounded, apex obtuse or attenuate; lateral veins in 6–8 pairs, axils with small, rounded pits abaxially. Inflorescences axillary, compound, broadly cylindric, densely flowered spikes 6–10 cm, sometimes grouped at branchlet apex and forming a panicle; axes densely minutely tomentose; bracts weakly persistent at anthesis, filiform-linear, very small. Flowers very fragrant. Calyx tube in middle part funnelform or narrowly so, distally salverform, 12–15 mm, abaxially densely minutely tomentose and yellow minutely scaly, adaxially with a ring of dense, coarse hairs not or only slightly exserted; lobes 4, reflexed, deltoid to somewhat narrowly triangular, 2–3 mm, apex acuminate. Petals 4, greenish white to yellowish green or yellow, 1–1.5 mm, clawed; limb oblong-obovate, apex retuse. Stamens 8, exserted, 5–7 mm. Fruit yellowish to brownish, glossy, ± obovoid, 4-winged, 2.5–4.5 × 2.2–4 cm, sparsely minutely tomentose when young, glabrous when mature, not scaly. Fl. Jan–Apr, fr. Jun–Oct.

Forests; 500–1000 m. S Yunnan [Bangladesh, Cambodia, India (including Andaman Islands), Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

Nanakorn (Thai Forest Bull. 16: 178. 1986) included “China (Yunnan, Kwangtung)” in the distribution of *Combretum latifolium*, but we have seen no specimens of this species from Guangdong.

6. Combretum alfredii Hance, J. Bot. 9: 131. 1871 [*“alfredi”*].

风车子 feng che zi

Combretum kwangsiense H. L. Li.

Lianas to 6 m tall. Bark grayish, young parts with scales. Branchlets together with petioles densely brownish yellow tomentose and orange-yellow scaly, glabrous when old. Leaves opposite or subopposite; petiole 7–15 mm; leaf blade usually elliptic or oblong-elliptic, 10–20(–25) × 4–11 cm, abaxially glabrous except for tufts of coarse hairs in axils of lateral veins, sometimes also coarsely hairy on veins, yellow-brown or orange-yellow scaly and green verruculose, adaxially glabrous and densely white verruculose, base cuneate, rarely obtuse-rounded, apex acuminate; lateral veins in 6–10 pairs. Inflorescences terminal and axillary, simple and compound, narrowly cylindric spikes 5–15 cm, often grouped at branchlet apex and forming a large panicle; axes brownish yellow tomentose and orange-yellow scaly; bracts persistent at anthesis, linear, ca. 1 mm. Flowers fragrant. Calyx tube in middle part funnelform, distally cupular, 5–7 mm, abaxially coarsely hairy and glossy yellow scaly, adaxially with a ring of dense, coarse hairs not or only slightly exserted; lobes 4, erect, deltoid or broadly triangular, 1–1.5 mm, apex acuminate. Petals 4, white or yellowish white, 1.5–2 mm, clawed; limb oblong-obovate, apex obtuse-rounded or slightly mucronate. Stamens 8, exserted, 4–4.5 mm. Fruit red or purple-red when mature, globose or oblate, 4-winged, 1.5–2.5 × 1.5–2.7 cm, glabrous, yellow or orange-yellow scaly. Fl. May–Sep, fr. Aug–Dec.

● Forests, woodlands, open thickets, valleys, river- and streamsides, swamps, plains; near sea level to 800 m. Guangdong, Guangxi, S Hunan (Yizhang), S Jiangxi (Longnan).

Plants of *Combretum alfredii* with simple spikes in the leaf axils may be difficult to separate from *C. wallichii*. The name *C. kwangsiense* was given to plants from Guangxi with fruit at the small end of the range of variation.

The fruit is edible.

7. Combretum wallichii Candolle, Prodr. 3: 21. 1828.

石风车子 shi feng che zi

Combretum auriculatum C. Y. Wu & T. Z. Hsu (1977), not Engler & Diels (1899); *C. incertum* Handel-Mazzetti; *C. linyenense* Handel-Mazzetti; *C. purpurascens* Handel-Mazzetti; *C. wallichii* var. *pubinerve* C. Y. Wu; *Terminalia mairei* H. Léveillé.

Lianas to 6 m tall. Bark longitudinally fibrous peeling, sparsely black lenticellate. Branchlets together with petioles puberulous and densely brown scaly, glabrescent. Leaves opposite or subopposite; petiole 4–10 mm; leaf blade variable in shape, oblong-elliptic, elliptic, broadly elliptic, ovate, obovate, or suborbicular, 4–15 × 2–7 cm, both surfaces glabrous at maturity except abaxially often with tufts of brown to white hairs in axils of lateral veins, or rarely abaxially persistently sparsely ferruginous pilose and densely so on veins, both surfaces usually not scaly but often densely green or white verruculose, base attenuate or obtuse-rounded, apex acuminate, or rounded or obtuse-rounded and mucronate; lateral veins in 5–9 pairs. Inflorescences terminal and axillary, simple, narrowly cylindric spikes 3–9 cm, sometimes grouped at branchlet apex and forming a panicle; axes puberulous, brown scaly; bracts caducous, linear or linear-lanceolate, 2.5–4 mm. Flowers strongly scented. Calyx tube in middle part broadly funnelform, distally broadly campanulate to salverform, 3.5–5 mm, abaxially glabrous and brown scaly, adaxially with a ring of exserted, dense, coarse hairs; lobes 4, erect, deltoid or broadly triangular, 1–1.5 mm, apex acuminate or shortly so. Petals 4, yellow to green, ca. 1.5 mm, clawed; limb oblanceolate. Stamens 8, exserted, ca. 5 mm. Fruit

purple or red, glossy, ± globose, 4-winged, 1.7–3.3 × 1.8–3 cm, glabrous, white or golden scaly. Fl. Mar–Aug, fr. Jul–Nov.

Mixed forests, woods, thickets, scrub, mountain slopes and valleys, shaded limestone ravines, streamsides, roadsides; (500–)800–2200(–3200) m. Guangxi, Guizhou, Sichuan, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, N Vietnam].

The record from N Vietnam (Cao Bang, in 1999) is apparently new and is based on *P. K. Loc et al. CBL 1351* (MO).

Combretum wallichii var. *pubinerve* C. Y. Wu (Fl. Yunnan. 1: 90. 1977), described from W Yunnan (Lushui), differs from typical *C. wallichii* in having a suborbicular leaf blade, abaxially sparsely ferruginous pilose at maturity, densely so on veins. Because the species is so variable in leaf blade shape, only the hairiness would reliably separate var. *pubinerve*, and that character does not seem sufficient to justify formal recognition of a variety.

Combretum auriculatum C. Y. Wu & T. Z. Hsu (in C. Y. Wu, Fl. Yunnan. 1: 90. 1977), described from SW Yunnan (Cangyuan), appears to be a form of *C. wallichii* with a ± oblanceolate leaf blade slightly auriculate-cordate at the base. The name is illegitimate because it is a later homonym of *C. auriculatum* Engler & Diels (in Engler, Monogr. Afric. Pflanzen-Fam. 3: 79. 1899), described from tropical Africa.

Gangopadhyay & Chakrabarty (J. Econ. Taxon. Bot. 17: 679–682. 1993) recognized six varieties within *Combretum wallichii*: the typical variety, three varieties from outside China, and two varieties based on *C. griffithii* and *C. yunnanense*. The last two taxa are indeed similar to *C. wallichii* but, in the present treatment, we prefer to maintain *C. griffithii* separately, including *C. yunnanense* within it as *C. griffithii* var. *yunnanense*.

8. Combretum griffithii Van Heurck & Müller Argoviensis in Van Heurck, Observ. Bot. 231. 1871.

西南风车子 xi nan feng che zi

Lianas woody, to 10 m tall. Branchlets glabrous or pilose, ferruginous scaly. Leaves opposite, subopposite, or alternate, rarely 3-whorled; petiole 6–13 mm, pilose and ferruginous scaly; leaf blade usually elliptic or oblong-elliptic, 6–15(–18) × 3–7(–9) cm, both surfaces glabrous, or pilose and glabrescent with age but remaining pilose on veins, ferruginous minutely scaly, more densely so abaxially, not verruculose, base obtuse-rounded or attenuate, apex acute or cuspidate to caudate-acuminate; lateral veins in 6–12 pairs. Inflorescences terminal and axillary, simple, narrowly cylindric spikes 4–10 cm, sometimes grouped at branchlet apex and forming a panicle; axes pilose and ferruginous scaly; bracts persistent at anthesis, filiform-linear, 3–7 mm, pilose. Calyx tube in middle part narrowly funnelform, distally cupular, 5.5–7 mm, abaxially glabrous, densely ferruginous scaly, adaxially with a ring of dense, coarse hairs not or only slightly exserted; lobes 4, erect, deltoid, ca. 1 mm, apex acute or subacute. Petals 4, white to yellow or yellowish green, 2–2.5 mm, clawed; limb obovate or oblanceolate. Stamens 8, exserted, 3–5 mm. Fruit brown, globose, 4-winged, 2–3.5 × 2–4 cm, glabrous, densely white and/or brown minutely scaly. Fl. Apr–Jun, fr. Jul–Dec.

Forests, sparse forests, woods, thickets by streams, mountain slopes and valleys, ravines, riversides; 500–1600(–2000) m. S and W Yunnan [Bangladesh, Bhutan, India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

1a. Both surfaces of leaf blade glabrous ..... 8a. var. *griffithii*
1b. Both surfaces of leaf blade pilose, glabrescent with age but remaining pilose on veins ..... 8b. var. *yunnanense*

8a. Combretum griffithii var. **griffithii**

西南风车子(原变种) xi nan feng che zi (yuan bian zhong)

Combretum dasystachyum Kurz; *C. wallichii* Candolle var. *griffithii* (Van Heurck & Müller Argoviensis) M. G. Gangopadhyay & Chakrabarty; *C. yuankiangense* C. C. Huang & S. C. Huang ex T. Z. Hsu.

Leaf blade glabrous on both surfaces. Fl. Apr–May, fr. Sep–Dec.

Forests, sparse forests, mountain slopes and valleys; (600–)1100–1600 m. S Yunnan [Bangladesh, Bhutan, India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

Combretum yuankiangense C. C. Huang & S. C. Huang ex T. Z. Hsu (in C. Y. Wu, Fl. Yunnan. 1: 93. 1977), described from S Yunnan (Yuanjiang) appears to be a form of *C. griffithii* var. *griffithii*. It has an abaxially sparsely scaly leaf blade (vs. densely so in typical *C. griffithii* var. *griffithii*), obtuse-rounded or retuse at the apex (vs. cuspidate or acuminate), and an ellipsoid fruit, 2–2.6 × 1.2–1.6 cm. The narrowness of the fruit may be a result of its having been immature when collected (cf. comments on *C. oliviforme* under *C. sundaicum* above).

8a. Combretum griffithii var. **yunnanense** (Exell) Turland & C. Chen, **comb. nov.**

云南风车子 yun nan feng che zi

Basionym: *Combretum yunnanense* Exell, Sunyatsenia 1: 88. 1933; *C. wallichii* var. *yunnanense* (Exell) M. G. Gangopadhyay & Chakrabarty.

Leaf blade pilose on both surfaces, glabrescent with age but remaining pilose on veins. Fl. Apr–Jun, fr. Jul–Dec.

Forests, sparse forests, woods, thickets by streams, mountain valleys, ravines, riversides; 500–1600(–2000) m. S and W Yunnan [Myanmar, Thailand].

Exell described *Combretum yunnanense* from Yunnan, based on *A. Henry 11891A* (BM, holotype; E, K, MO, isotypes), mentioning that the species also grows in “Burma and the Malay Peninsula.” Several additional gatherings from Yunnan were cited in the protologue, including *A. Henry 12509* (A, K) and *A. Henry 12546A* (A, BM, E, K, MO), which, with leaf blades glabrous on both surfaces, correspond with *C. griffithii*. Clearly *C. yunnanense* is very close morphologically to *C. griffithii* and occurs within the E part of the distribution of the latter species. It seems more appropriate, therefore, to treat *C. yunnanense* at varietal rank under *C. griffithii*.

When Exell (in Steenis, Fl. Males., ser. 1, 4: 540. 1954) gave a much broader distribution for *Combretum yunnanense*, as “Bengal?, Assam?, Yunnan, ... Sumatra, Malay Peninsula, and NW. Borneo,” his circumscription included the taxon later separated as *C. chinense* (see note under genus heading).