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CORNACEAE

山茱萸科 shan zhu yu ke

Xiang Qiuyun (向秋云 Jenny Xiang)[1]; David E. Boufford[2]

Trees or shrubs, rarely rhizomatous herbs, mostly deciduous, sometimes evergreen, hermaphroditic [dioecious in African species]. Old branches terete, pith white or brown, lenticels and leaf scars often conspicuous; young branches rounded or slightly 4-ridged; nodes slightly swollen. Leaves opposite, rarely alternate or whorled, estipulate, petiolate, rarely sessile; leaf blade simple, entire, pinnately veined, rarely parallel veined, often pubescent, sometimes papillate; trichomes often 2-armed, arms equal or unequal, appressed and T-shaped, or raised and V- or Y-shaped, or pseudofiliform. Inflorescences cymose, paniculate, corymbose, umbellate, or capitulate, terminal, rarely lateral; bracts minute, not petaloid, early caducous, or 4(–6) and usually showy. Flowers 4-merous. Calyx tubular, fused to ovary, minutely 4-dentate or truncate. Petals 4, free, creamy white or yellow, rarely dark reddish purple or partially dark reddish purple, valvate. Stamens 4, surrounding a fleshy floral disk, alternate petals. Anthers longitudinally dehiscent. Ovary inferior; carpels 2, rarely 3 or 4; locules 2, rarely 3 or 4; ovules pendulous, 1 per locule; style 1, columnar or clavate; stigma capitate, disciform, punctate, or truncate, sometimes slightly 2-lobed. Fruit a drupaceous berry, white, blue, red, or black, berries distinct or fused into a fleshy syncarpous compound fruit; stone of fruit bony, 1- or 2(–4)-chambered, seeds 1 or 2(–4); endosperm oily; cotyledons 2, leaflike.

One genus and ca. 55 species: widespread in N temperate regions, extending to tropical and boreal areas, one species in tropical Africa and one or two species in South America; 25 species (14 endemic) in China.

The family is treated here in the strict sense, excluding *Alangium* (Alangiaceae), *Aucuba* (Aucubaceae), *Davidia* (Davidiaceae), *Helwingia* (Helwingiaceae), *Mastixia* (Mastixiaceae), *Nyssa* (Nyssaceae), and *Toricellia* (Toricelliaceae), all of which have sometimes been placed in the Cornaceae. The Cornaceae in the FRPS included *Mastixia, Cornus sensu lato, Aucuba, Helwingia,* and *Toricellia*. Given that the latter three genera are allied with higher asterids in broad phylogenetic analyses, they are, therefore, removed from the Cornaceae in this treatment. These genera are recognized in the present volume as three families following Takhtajan (Sist. Magnoliofit. 1987). Based on molecular data, *Mastixia* is a close relative, but not the sister of, *Cornus*. Its relationships to *Cornus* and close relatives remain unclear. Thus, we also treat *Mastixia* as a family separate from Cornaceae. Although molecular data have suggested that *Alangium* is a member of Cornaceae, the genus will be treated as a separate family in a different volume of the *Flora of China*. This treatment of Cornaceae therefore includes only *Cornus sensu lato*.

The circumscription of the Cornaceae and the relationships among the 17 genera often placed within it have been controversial. The family has been defined as consisting of a single genus, *Cornus,* or up to as many as 15 genera by various authors (e.g., Harms, Ber. Deutsch. Bot. Ges. 15: 19–29. 1898; Takhtajan, Sist. Magnoliofit. 1987; Cronquist, Integr. Syst. Classif. Fl. Pl. 1988; Angiosperm Phylogeny Group, Ann. Missouri Bot. Gard. 85: 531–553. 1998; see also Xiang et al., Ann. Missouri Bot. Gard. 80: 723–734. 1993; Xiang & Soltis in Boufford & Ohba, Sino-Jap. Fl. Charact. Diversif. 123. 1998). Recent phylogenetic analyses of the chloroplast gene *rbc*L sequences (Xiang et al., loc. cit. 1993; Xiang & Soltis, loc. cit. 1998; Xiang, Harvard Pap. Bot. 4: 527–542. 1999) suggested that nine genera (*Aralidium, Aucuba, Corokia, Garrya, Griselinia, Helwingia, Kaliphora, Melanophylla,* and *Toricellia*) were not closely related to Cornaceae. Evidence from other studies, including pollen morphology and wood anatomy (Li & Chao, Quart. J. Taiwan Mus. 7: 119–136. 1954; Ferguson & Hideux, Proc. IV Int. Palynol. Conf., Lucknow 1: 240. 1980; Noshiro & Baas, IAWA J. 19: 43–97. 1998; see also Eyde, Bot. Rev. 54: 233–351. 1988), support the removal of these genera from Cornaceae. Various phylogenetic analyses of the *rbc*L and other chloroplast gene sequences identified a strongly supported monophyletic Cornales consisting of *Alangium, Camptotheca, Cornus, Curtisia, Davidia, Diplopanax,* Hydrangeaceae, Hydrostachyaceae, Grubbiaceae, Loasaceae, *Mastixia,* and *Nyssa* (Chase et al., Ann. Missouri Bot. Gard. 80: 528–580. 1993; Xiang & Soltis, loc. cit. 1998; Xiang, loc. cit. 1999; Olmstead et al., Molec. Phylogen. Evol. 16: 96–112. 2000; Savolainen et al., Kew Bull. 55: 257–309. 2000; Savolainen et al., Syst. Biol. 49: 306–362. 2000; Soltis et al., Bot. J. Linn. Soc. 133: 381–461. 2000; Albach et al., Ann. Missouri Bot. Gard. 88: 163–210. 2001; Albach et al., Taxon 50: 781–805. 2001). Phylogenetic analyses of the *rbc*L and *mat*K sequences for the Cornales suggested a Cornaceae consisting of *Alangium* and *Cornus,* a Grubbiaceae consisting of *Curtisia* and *Grubbia* (Xiang et al., Amer. J. Bot. 85: 285–297. 1998; Xiang, loc. cit. 1999; Xiang et al., Molec. Phylogen. Evol. 24: 35–57. 2002; Fan & Xiang, Amer. J. Bot. 90: 1357–1372. 2003). The Cornaceae of Eyde (loc. cit. 1988), consisting of *Camptotheca, Cornus, Davidia, Diplopanax, Mastixia,* and *Nyssa,* were not supported by molecular data.

The hard wood of several species of *Cornus* is used for making farming tools. The fruit of some species is used for food or as a source of industrial oil. *Cornus mas* Linnaeus is cultivated in China for medicinal uses. Many species are widely cultivated as ornamentals, e.g., *C. alba, C. canadensis, C. controversa, C. florida* Linnaeus, *C. kousa, C. mas, C. nuttallii* Audubon, and *C. stolonifera* Michaux.

Hu Wenkuang. 1990. *Bothrocaryum, Swida, Cornus, Dendrobenthamia,* and *Chamaepericlymenum*. *In*: Fang Wenpei & Hu Wenkuang, eds., Fl. Reipubl. Popularis Sin. 56: 38–108.

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1. CORNUS Linnaeus, Sp. Pl. 1: 117. 1753.

山茱萸属 shan zhu yu shu

Shrubs, trees, or herblike shrubs, precocious, coetaneous, or serotinous. Young shoots pubescent, rarely glabrous; trichomes curly or straight, raised or appressed. Stem sympodial, rarely monopodial. Winter buds terminal or axillary, mixed or separate, covered or exposed. Petiole slightly furrowed adaxially; leaf blade narrowly elliptic, elliptic, oblong, or ovate, glabrous to densely pubescent, lateral veins actinodromous, often raised abaxially. Inflorescence formed in previous or current year; bracts covering inflorescence or not. Sepals 4, fused; teeth absent, minute, or variously triangular. Petals 4, free, spreading, oblong to orbicular, valvate. Filaments filiform or awn-shaped, longer than style, longer or shorter than petals; anthers whitish or yellow, rarely blue, red, or purplish, ellipsoid to narrowly ellipsoid or oblong, 2-loculed. Ovary obovoid, crowned by a disk. Fruit globose, ovoid, oblong, or ellipsoid, crowned by persistent calyx, disk, and style; stones globose, ovoid, ellipsoid, oblong, sometimes asymmetric, surface smooth or ribbed, apex rarely pitted.

Geographical distribution is the same as that of the family.

The classification of *Cornus* has long been debated. The ranks and circumscriptions of subgroups vary considerably among taxonomists. The current treatment retains *Cornus* in the broad sense as defined by Linnaeus and represents a synthesis of Ferguson (J. Arnold Arbor. 47: 100–105. 1966), Murrell (Syst. Bot. 18: 469–495. 1993), and Xiang (Acta Phytotax. Sin. 25: 125–131. 1987). This treatment agrees with recent molecular phylogenetic analyses of *Cornus*. The genus can be conveniently divided into distinct groups, all of which at one time or another have been recognized at full generic level. The keys below take advantage of those groupings.

The Co-chairs of the Editorial Committee call attention to the possibility of splitting *Cornus* into a number of distinct genera, namely: *Thelycrania* (or *Bothrocaryum*), which may have differentiated in E Asia and North America; *Cornus sensu stricto,* in Eurasia, with one (or two) species in North America, one or two in Asia, and one in Africa; *Dendrobenthamia,* which corresponds to the closely related North American *Benthamidia*; *Swida,* widespread in the N temperate region; and *Chamaepericlymenum,* which may have differentiated in later Cenozoic glacial periods. Alternatively, one genus could be recognized for each of the four strongly supported major lineages, corresponding to *Bothrocaryum* and *Swida, Cornus sensu stricto, Benthamidia* and *Dendrobenthamia,* and *Chamaepericlymenum*.

Cornus esquirolii H. Léveillé (Repert. Spec. Nov. Regni Veg. 13: 257. 1914) was identified as *Adina racemosa* (Siebold & Zuccarini) Miquel (Rubiaceae) by Lauener (Notes Roy. Bot. Gard. Edinburgh 32: 97. 1972).

1a. Herblike shrubs, perennial, rhizomatous; leaves appearing whorled at summit of stem; inflorescences corymbose cymes, subtended by 4 white petaloid bracts ..... 6. *C.* subg. *Arctocrania*
1b. Trees or shrubs; leaves opposite or alternate; inflorescences paniculate, corymbose, umbellate, or cymes, subtended by showy petaloid bracts or not.
2a. Inflorescence capitulate, subtended by 4 large showy petaloid bracts; fruit of each inflorescence fused, forming a compound drupaceous berry ..... 5. *C.* subg. *Syncarpea*
2b. Inflorescences umbellate or paniculate or corymbose cymes, bracts not showy; fruit of each inflorescence separate, distinct.
3a. Inflorescences umbellate, precocious; bracts subtending inflorescence orbicular, 3–4 mm; fruit oblong, red or blackish red ..... 4. *C.* subg. *Cornus*
3b. Inflorescences paniculate or corymbose cymes, coetaneous or serotinous; bracts along branches minute, linear or branched; fruit globose or ovoid, rarely ellipsoid, white, blue, or black.
4a. Leaves alternate; apex of fruit stone conspicuously pitted ..... 2. *C.* subg. *Mesomora*
4b. Leaves opposite, rarely subopposite; apex of fruit stone not pitted.
5a. Evergreen; leaves leathery; style cylindrical; stigma subcapitate or punctiform; locules of fruit stone (2 or)3 or 4; anthesis autumn and winter; bracts inserted at base of inflorescence branches, often persistent to anthesis ..... 1. *C.* subg. *Yinquania*
5b. Deciduous, rarely evergreen; leaves papery or rarely leathery; style cylindrical or clavate; stigma capitate or disciform, rarely punctiform; locules of fruit stone 2; anthesis spring and early summer, rarely autumn; bracts inserted distal and adnate to inflorescence branches, early caducous ..... 3. *C.* subg. *Kraniopsis*

1. Cornus subg. Yinquania (Z. Y. Zhu) Q. Y. Xiang & Boufford, comb. et stat. nov.

长圆叶梾木亚属 chang yuan ye lai mu ya shu

Basionym: *Yinquania* Z. Y. Zhu, Bull. Bot. Res., Harbin 4(4): 121. 1984.

Trees or shrubs, evergreen. Buds terminal or axillary, narrowly awn-shaped, pubescent, trichomes gray, short. Leaves opposite, rarely subopposite at some nodes; leaf blade narrowly elliptic to oblong-elliptic or oblong-lanceolate, leathery, abaxially glabrous or papillate and pubescent with appressed grayish shortly 2-armed trichomes, or densely pubescent with long dense soft trichomes. Paniculate cymes terminal; bracts green, small to minute or sometimes leaflike, at base of inflorescence branches, often persistent at least to anthesis. Calyx tube conspicuously 4-dentate; teeth ovate-triangular. Petals white, narrowly elliptic. Anthers purplish yellow, ellipsoid. Ovary (2- or)3- or 4-loculed; style cylindrical; stigma subcapitate to punctiform. Fruit purplish red, black at maturity, ellip-

soid, oblong, or globose, seeds 2–4; stones bony, not pitted, pointed at one or both ends. 2*n* = 22.

One species: Bhutan, China, India, Kashmir, Myanmar, Nepal, Pakistan, Sikkim, Sri Lanka, Thailand, Vietnam.

Cornus subg. *Yinquania* was previously published by Murrell (Syst. Bot. 18: 476. 1993), but the basionym was cited from the pagination of the whole paper in which it was published, not the pagination of the protologue, which is not coextensive. The combination was therefore not validly published under Art. 33.3 and Art. 33 Note 1 of the Saint Louis Code.

1. Cornus oblonga Wallich in Roxburgh, Fl. Ind. 1: 432. 1820.

长圆叶梾木 chang yuan ye lai mu

Trees evergreen, to 16 m tall. Bark grayish brown or blackish gray, smooth. Current year's branches ± 4-angled, glabrous to densely pubescent; old branches with sparse rounded lenticels and semicircular leaf scars. Leaf blade narrowly elliptic, oblong-elliptic, or lanceolate-elliptic, 6–13 × 1.6–4 cm, veins 4 or 5(or 6), raised abaxially, base cuneate, margin slightly revolute, apex acute or caudate. Paniculate cymes terminal, 6–6.5 × 6–8 cm, pubescent with white or brown trichomes or trichomes of both colors intermixed. Flowers ca. 8 mm in diam., pedicellate. Calyx teeth 2–3 mm, taller than disk. Petals oblong, ca. 4 × 1.3 mm. Stamens longer than or subequaling petals; filaments ca. 5 mm. Style 2.5–2.8 mm. Fruit black at maturity, ellipsoid, 4–6 × 6–7 mm; stones ca. 6 × 3.8 mm, inconspicuously ribbed. Fl. Sep–Jan, fr. Apr–Jun.

Broad-leaved evergreen and mixed broad-leaved evergreen-deciduous forests, thickets; 800–3700 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, Sikkim, Sri Lanka, Thailand, Vietnam].

The fruit is used as a source of industrial oil or medicinally as a replacement for "zao pi" (the flesh of the fruit of *Cornus officinalis* and *C. chinensis*). The bark contains essential oils and tannins and is used in folk remedies to treat arthritis and injuries.

1a. Both surfaces of leaves glabrous, smooth ..... 1c. var. *glabrescens*
1b. Abaxial surface of leaves pubescent, rough or soft to touch.
  2a. Abaxial surface of leaves pubescent with short grayish appressed trichomes, rough ..... 1a. var. *oblonga*
  2b. Abaxial surface of leaves densely pubescent with long and soft trichomes, soft to touch ..... 1b. var. *griffithii*

1a. Cornus oblonga var. **oblonga**

长圆叶梾木(原变种) chang yuan ye lai mu (yuan bian zhong)

Ardisia discolor H. Léveillé; *Cornus paniculata* Buchanan-Hamilton ex D. Don; *Swida muchuanensis* (Z. Y. Zhu) J. Holub; *S. oblonga* (Wallich) Soják; *Yinquania muchuanensis* Z. Y. Zhu; *Y. oblonga* (Wallich) Z. Y. Zhu.

Leaf blade elliptic to oblong, abaxially papillate. Inflorescence, abaxial surface of leaves, and petioles pubescent with short grayish appressed trichomes.

Broad-leaved evergreen and mixed broad-leaved evergreen-deciduous forests, thickets along streams; 800–3700 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, Sikkim, Sri Lanka, Thailand, Vietnam].

Yinquania muchuanesis is restricted to S Sichuan (Muchuan). It was recognized on the basis of its smaller size (2–4 m tall) and subglobose fruit; *C. oblonga* is typically a tree 2–16 m tall, with ellipsoid or subglobose fruit. Given that *Y. muchuanesis* falls within the size range of *C. oblonga* and subglobose fruit are also found in *C. oblonga, Y. muchuanesis* is tentatively treated here as a synonym of *C. oblonga*. Further evidence is needed to determine the status of this species.

1b. Cornus oblonga var. **griffithii** C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 745. 1879.

毛叶梾木 mao ye lai mu

Cornus oblonga f. *pilosula* H. L. Li; *Swida oblonga* var. *griffithii* (C. B. Clarke) W. K. Hu.

Leaf blade often narrowly elliptic, abaxially ± scurfy. Inflorescence, abaxial surface of leaves, and petioles densely pubescent with raised long and soft trichomes.

Evergreen forests, thickets on slopes; 800–3000 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, India].

1c. Cornus oblonga var. **glabrescens** W. P. Fang & W. K. Hu, J. Sichuan Univ., Nat. Sci. ed., 1980(3): 156. 1980.

无毛长圆叶梾木 wu mao chang yuan ye lai mu

Swida oblonga var. *glabrescens* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu.

Leaf blade narrowly elliptic, rarely lanceolate, abaxially glabrous.

● Mixed forests, thickets; 1500–3400 m. SE Xizang, N Yunnan.

2. Cornus subg. **Mesomora** Rafinesque, Alsogr. Amer. 58. 1838.

灯台树亚属 deng tai shu ya shu

Trees or shrubs, deciduous. Winter buds pseudoterminal or axillary, ovate or conical, glabrous or sparsely pubescent. Leaves alternate; leaf blade broadly ovate to elliptic-ovate, papery, abaxially pubescent with minute 2-armed appressed trichomes. Corymbose cymes terminal; bracts distal and adnate to branches, minute, early caducous. Calyx tube minutely 4-dentate; teeth triangular. Petals white. Anthers yellowish, ellipsoid. Ovary 2-loculed; style cylindrical; stigma capitate. Fruit dark purplish red, black at maturity, globose; seeds 2; stones bony, apex pitted, pits rectangular.

Two species: subtropical to temperate regions of E Asia and E North America; one species in China.

2. Cornus controversa Hemsley, Bot. Mag. 135: t. 8261. 1909.

灯台树 deng tai shu

Bothrocaryum controversum (Hemsley) Pojarkova; *Cornus brachypoda* Miquel (1865), not C. A. Meyer (1845); *C. controversa* var. *angustifolia* Wangerin; *C. obovata* Thunberg; *C. sanguinea* Thunberg (1784), not Linnaeus (1753); *Swida controversa* (Hemsley) Soják.

Trees 3–13(–20) m tall. Bark dark gray or yellowish gray, smooth; branches ± horizontal; branches of current year purplish, later greenish, glabrous or pubescent; older branches greenish, with conspicuous semicircular leaf scars and rounded lenticels; winter buds purplish, ovoid or conical, 3–8 mm, glabrous, with several alternate overlapping scales. Leaf blade broadly ovate or broadly elliptic-ovate, 5–13 × 3–9 cm, abaxially light or grayish green, sparsely pubescent with appressed trichomes, papillate, veins 6 or 7(–9), abaxially raised and slightly purplish, base subrounded, apex acute or acuminate. Corymbose cymes terminal, 5–14 cm in diam., pubescent with appressed trichomes. Flowers 8–9 mm in diam.; buds nearly orbicular, shortly pedicellate. Calyx teeth ca. 0.5 mm, taller than disk. Petals oblong-lanceolate, 3–4.5 × 1–1.6 mm. Stamens longer than petals; filaments whitish, 4–5 mm. Style 2–3 mm, glabrous. Fruit purplish red or bluish black, globose, 6–7 mm in diam.; stones globose, 5–6 mm in diam., inconspicuously 8-ribbed. Fl. May–Jun, fr. Jul–Sep. 2*n* = 20.

Broad-leaved or mixed broad-leaved and coniferous forests; 200–2600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Japan, Korea, Myanmar, Nepal, ?Sikkim].

An oil used in the lubricating and soap industry is extracted from the fruit. The large, conspicuous, white inflorescences, layered branching pattern, and pagodalike shape of the tree make it a good garden ornamental. The leaves are used in folk remedies to relieve pain and to reduce swelling.

3. Cornus subg. **Kraniopsis** Rafinesque, Alsogr. Amer. 58. 1838.

梾木亚属 lai mu ya shu

Trees or shrubs, deciduous, rarely evergreen. Buds terminal or axillary, ovate to awn-shaped, pubescent. Leaves opposite, rarely alternate at some nodes; leaf blade ovate to elliptic, papery, rarely leathery, abaxially pubescent with appressed or raised trichomes, veins 3–8(or 9). Inflorescences terminal, compact or loose corymbose or paniculate cymes; bracts linear, minute, rarely branched, caducous prior to anthesis. Flowers often fragrant. Calyx tubular, minutely 4-dentate; teeth inconspicuous to narrowly triangular. Petals white, rarely yellowish white, ovate or oblong. Anthers yellowish white or blue-gray, oblong or oblong-ovate. Ovary 2-loculed; style cylindrical or clavate; stigma capitate, disciform, or punctiform. Fruit bluish black or black at maturity, globose, broadly globose, oblong-globose, or subovoid, seeds 2; stones bony, apex not pitted (inconspicuously pitted in one species). 2*n* = 22.

About 30 species: mostly in N temperate regions, a few species in subtropical mountains, one or two species in South America; 15 species (11 endemic) in China.

Many species produce hard wood that is used for agricultural tools. Some species are valuable sources of industrial oils and garden ornamentals.

1a. Style conspicuously clavate.
  2a. Deciduous shrub; leaves lanceolate to elliptic, rarely narrowly elliptic, veins (2 or)3(or 4) ..... 13. *C. quinquenervis*
  2b. Deciduous tree; leaves elliptic or ovate-elliptic to broadly ovate, veins (3 or)4(or 5) or 5–8.
    3a. Leaf veins 5–8 ..... 9. *C. macrophylla*
    3b. Leaf veins (3 or)4(or 5).
      4a. Bark light brown; leaf base rounded, rarely oblique; flowers smaller, ca. 5.2 mm in diam. ..... 6. *C. coreana*
      4b. Bark dark gray or dark brown; leaf base cuneate to broadly cuneate, often oblique; flowers 7–9.5 mm in diam.
        5a. Abaxial surface of leaves grayish green, pubescent with fine, appressed trichomes, veins 4; petiole 1.2–2.2 cm; inflorescences loose, branches spreading, often arched toward center; calyx teeth longer than disk ..... 8. *C. koehneana*
        5b. Abaxial surface of leaves light green, pubescent with thick appressed trichomes, scabrous, veins

(3 or)4 or 5; petiole (0.8–)3.5 cm; inflorescences dense, compact, branches straight, rarely arched; calyx teeth equal to disk ..... 16. *C. walteri*

1b. Style cylindrical or slightly expanded at apex, not clavate.
6a. Shrub, spreading; fruit creamy white or light blue at maturity; stone of fruit laterally compressed ..... 3. *C. alba*
6b. Shrub or tree; fruit bluish black or black at maturity; stone of fruit not laterally compressed.
7a. Leaves leathery; stigma smaller than or subequaling style in diam.
8a. Leaves broadly elliptic, lateral veins 3(or 4), conspicuous, smaller veins conspicuous; flowers ca. 9 mm in diam. ..... 10. *C. oligophlebia*
8b. Leaves elliptic, lateral veins 4 or 5, inconspicuous, smaller veins obscure; flowers ca. 7 mm in diam. ..... 4. *C. austrosinensis*
7b. Leaves papery; stigma obviously larger than style, rarely smaller than style in diam.
9a. Leaf veins 3; flowers ca. 4.5 mm in diam.; stigma smaller than or equaling style in diam., punctiform ..... 12. *C. parviflora*
9b. Leaf veins (2 or)3–8(or 9); flowers 7–9 mm in diam.; stigma broader than style, not punctiform.
10a. Abaxial surface of leaves conspicuously pubescent with ± curly or non-curly soft, raised trichomes (trichomes Y-shaped, V-shaped, or pseudofiliform).
11a. Lateral veins thin, tertiary veins inconspicuous ..... 5. *C. bretschneideri*
11b. Lateral veins thick, tertiary veins conspicuous.
12a. Veins 5–7, with dense yellowish trichomes; inflorescences loose corymbose cymes, nearly glabrous at anthesis; branches of inflorescences arched inward; flowers sessile or shortly pedicellate, pedicel thick, to 2 mm ..... 15. *C. ulotricha*
12b. Veins 5–8(or 9); both veins and interveinal areas of abaxial surface with dense yellowish, grayish, or brown trichomes; inflorescences corymbose or paniculate cymes, densely pubescent at anthesis; branches of inflorescences straight; flowers pedicellate, pedicel slender, 0.5–6 mm ..... 14. *C. schindleri*
10b. Abaxial surface of leaves conspicuously pubescent with short, appressed trichomes, without raised trichomes except sometimes in axils of veins.
13a. Leaf veins 3 or 4(or 5) ..... 17. *C. wilsoniana*
13b. Leaf veins (5 or)6–8(or 9).
14a. Leaves 6–17 cm; inflorescences loose, paniculate or corymbose cymes; filaments thick, equaling or slightly exceeding petals; style slightly thickened at apex, appearing subclavate ..... 9. *C. macrophylla*
14b. Leaves 4.5–12 cm; inflorescences compact, convex corymbose cymes; filaments slender, longer than petals; style cylindrical, not subclavate.
15a. Old branches light yellow; abaxial surface of leaves grayish white, inconspicuously papillate; small veins inconspicuous ..... 5. *C. bretschneideri*
15b. Old branches red, reddish brown, purplish red, or brown; abaxial surface of leaves grayish green, conspicuously papillate; small veins conspicuous.
16a. Abaxial surface of leaves with blackish streaks; flowers white ..... 11. *C. papillosa*
16b. Abaxial surface of leaves without blackish streaks; flowers white or yellowish ..... 7. *C. hemsleyi*

3. Cornus alba Linnaeus, Mant. Pl. 1: 40. 1767.

红瑞木 hong rui mu

Swida alba (Linnaeus) Opiz.

Shrubs deciduous, spreading, to 3 m tall. Bark purplish red; young branches terete, pubescent with short whitish trichomes, later glabrous, glaucous; old branches reddish, with scattered grayish white rounded lenticels; leaf scars semicircular, conspicuous. Leaf blade abaxially glaucous green, elliptic or ovate-elliptic, 5–8.5 × 1.8–5.5 cm, papery, veins (4 or)5(or 6), pubescent with short white appressed trichomes, axils of veins sometimes with a cluster of long brown trichomes, small veins conspicuous, base cuneate or broadly cuneate, margin entire or slightly revolute, apex acute. Corymbose cymes dense, ca. 3 cm wide, pubescent with soft white trichomes. Pedicel 2–6.5 mm, slender. Flowers white or yellowish white, 6–8.2 mm in diam. Calyx lobes sharply triangular, 0.1–0.2 mm, shorter than disk. Petals 3–3.8 × 1.1–1.8 mm. Stamens longer than petals; anthers yellowish. Style cylindrical, 2.1–2.5 mm; stigma disciform, broader than style. Fruit creamy white or bluish white at maturity, oblong-globose, laterally slightly compressed, ca. 8 mm, 5.5–6 mm in diam.; stones ± diamond-shaped, laterally compressed, ca. 5 × 3 mm, 3-ribbed on each side. Fl. Jun–Jul, fr. Aug–Oct.

Mixed broad-leaved and coniferous forests, mixed thickets by streams; 600–1700(–2700 m). Gansu, Hainan, Hebei, Heilongjiang, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong [Korea, Mongolia, Russia; Europe].

The seeds contain 30% oil, which is used industrially. *Cornus alba* is commonly cultivated as an ornamental.

4. Cornus austrosinensis W. P. Fang & W. K. Hu, J. Sichuan Univ., Nat. Sci. Ed. 1980(3): 155. 1980.

华南梾木 hua nan lai mu

Swida austrosinensis (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu.

Shrubs or small trees, 3–6 m tall. Young branches terete, sparsely pubescent with fine white trichomes; old branches yellowish brown, with oblong lenticels. Leaves opposite, rarely alternate; leaf blade oblong-elliptic, 4–8 × 2–4 cm, thinly leathery, abaxially nearly glabrous and not papillate, veins 4 or 5, base broadly cuneate, margin slightly revolute, apex shortly acuminate. Corymbose cymes 5–6 cm wide, sparsely pubescent. Pedicel 3–4 mm, slender. Flowers white, ca. 7 mm in diam. Calyx teeth sharply triangular, ca. 0.3 mm, subequaling disk. Petals lanceolate, ca. 3.6 mm. Stamens slightly longer than petals; anthers linear-elliptic. Style cylindrical, ca. 3.3 mm, slender; stigma capitate, subequaling style in diam. Fruit black at maturity, globose, ca. 5 mm in diam.; stones vertically compressed globose, ca. 4 × 3 mm. Fl. Jun–Jul, fr. Dec.

● Thickets; ca. 2500 m. Guangdong, Guangxi, Guizhou, Hunan.

There are few herbarium specimens of this species. Fang and Hu described the leaves as thickly papery in the description of the species, but as thickly leathery in the key to species. In the specimens we examined (including the type), the leaves were thinly leathery. Living plants were not observed.

5. Cornus bretschneideri L. Henry, Jardin 13: 309. 1899.

沙梾 sha lai

Shrubs or small trees, 1–6 m tall. Bark purplish red. Young branches reddish, terete, sparsely pubescent with grayish white trichomes; old branches light yellow, glabrous, with or without whitish elliptic lenticels. Leaves opposite; leaf blade ovate, elliptic-ovate, or oblong, 5–8.5 × 2.5–6 cm, papery, abaxially grayish white or glaucous, densely papillose and pubescent with appressed white trichomes or occasionally with dense yellowish brown curly trichomes, lateral veins 5 or 6(or 7), with soft, long white trichomes in axils, smaller veins inconspicuous, base broadly cuneate to rounded, apex cuspidate to acuminate. Corymbose cymes 4.5–6 cm wide, pubescent with grayish white trichomes, deciduous short trichomes, or rarely with dense curly trichomes. Pedicels 1.5–6 mm. Flowers white, 5.5–7 mm in diam. Calyx teeth sharply triangular, 0.2–0.3 mm, equal to or slightly longer than disk. Petals ligulate to ovate, 3–4 × 1.4–1.8 mm. Stamens longer than petals; anthers yellowish white, ovate-oblong. Style cylindrical, 2.3–2.6 mm; stigma capitate, broader than style. Fruit bluish black or black, subglobose, 4–5 mm in diam.; stones ovoid-globose, ca. 3.5 mm in diam., inconspicuously ribbed. Fl. Jun–Jul, fr. Aug–Sep.

● Forests, thickets, slopes; 600–2300 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

1a. Abaxial surface of leaves and inflorescence with short non-curly trichomes ..... 5a. var. *bretschneideri*

1b. Abaxial surface of leaves and inflorescence with dense curly trichomes ..... 5b. var. *crispa*

5a. Cornus bretschneideri var. **bretschneideri**

沙梾(原变种) sha lai (yuan bian zhong)

Cornus aspera Wangerin; *C. bretschneideri* var. *gracilis* Wangerin; *Swida bretschneideri* (L. Henry) Soják; *S. bretschneideri* var. *gracilis* (Wangerin) W. K. Hu.

Abaxial surface of leaves pubescent with short appressed non-curly trichomes. Inflorescences pubescent with short appressed non-curly trichomes.

● Forests, thickets, slopes; 1100–2300 m. Gansu, Hebei, Henan, Hubei, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

5b. Cornus bretschneideri var. **crispa** W. P. Fang & W. K. Hu, J. Sichuan Univ., Nat. Sci. Ed. 1980(3): 157. 1980.

卷毛沙梾 juan mao sha lai

Swida bretschneideri var. *crispa* (W. P. Fang & W. K Hu) W. P. Fang & W. K. Hu.

Abaxial surface of leaves densely pubescent with long, curly, soft trichomes. Inflorescences densely pubescent with long, curly, soft trichomes.

● Sparse forests; 600–1800 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi.

6. Cornus coreana Wangerin, Repert. Spec. Nov. Regni Veg. 6: 99. 1908.

朝鲜梾木 chao xian lai mu

Swida coreana (Wangerin) Soják.

Trees deciduous, to 20 m tall. Bark light brown, rectangularly splitting; young branches ± 4-angled, pubescent with short brown trichomes; old branches brown, glabrous. Leaves opposite; petiole 1.2–2 cm; leaf blade light green abaxially, narrowly elliptic to broadly ovate, 6–8 × 1.7–2.5(–4) cm, papery, abaxially with brown and grayish white short appressed trichomes, scabrous, veins 4 or 5, small veins reticulate, base rounded or broadly cuneate, rarely oblique, margin sometimes revolute, apex shortly acuminate. Corymbose cymes 3.5–5 cm wide, with short white and brown trichomes. Pedicels 2–3.2 mm. Flowers white, ca. 5.2 mm in diam. Calyx lobes unequal, lanceolate, 0.5–1.1 mm, longer than disk. Petals ligulate-lanceolate, ca. 4.2 × 1.4 mm. Stamens ca. 4.2 mm, equal to petals; anthers oblong. Style clavate, ca. 3 mm; stigma subcapitate, not broader than style. Fruit black at maturity, globose, ca. 5 mm in diam.; stones not seen. Fl. May–Jun, fr. Sep–Oct.

Forests; sea level to 300 m. Liaoning [Korea].

The specimens cited by Wangerin are very similar to *Cornus walteri,* except that *C. walteri* has larger flowers and darker bark. The status of *C. coreana* requires further evaluation.

7. Cornus hemsleyi C. K. Schneider & Wangerin, Repert. Spec. Nov. Regni Veg. 7: 229. 1909.

红椋子 hong liang zi

Cornus alsophila W. W. Smith; *C. hemsleyi* var. *gracilipes* W. P. Fang & W. K. Hu; *C. hemsleyi* var. *longistyla* W. P. Fang & W. K. Hu; *C. polyantha* W. P. Fang & W. K. Hu; *Swida alsophila* (W. W. Smith) Holub; *S. hemsleyi* (C. K. Schneider & Wangerin) Soják; *S. hemsleyi* var. *gracilipes*

(Fang & W. K. Hu) Fang & W. K. Hu; *S. hemsleyi* var. *longistyla* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. polyantha* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu.

Shrubs or small trees, 2–5 m tall. Bark reddish brown, brown, or dark gray; young branches red or green, later red, slightly 4-angled or rounded, glabrous or with soft appressed trichomes; old branches purplish red or deep brown, glabrous, with yellowish brown elliptic lenticels. Leaves opposite; leaf blade elliptic to ovate-elliptic or broadly ovate, 4.5–9.3(–13) × 1.8–4.8(–6.2) cm, papery, abaxially ± scabrous, densely papillate, pubescent with dense to sparse appressed short white trichomes, axils of veins sometimes with grayish and/or light brown long trichomes, veins 6–8, small veins conspicuously reticulate, base rounded or broadly cuneate to nearly cordate, sometimes slightly oblique, apex acuminate or shortly acuminate. Corymbose cymes flat to convex, 5–9 cm wide, pubescent with light brown short trichomes or nearly glabrous after anthesis. Pedicels 1–5.5 mm. Flowers white or yellowish, 6–7 (–8.5) mm in diam. Calyx lobes triangular, 0.4–1 mm, equal to or longer than disk. Petals ovate to oblong-lanceolate, 2.5–5 × 1.1–1.6 mm. Stamens longer than or rarely equal to petals; anthers grayish blue or grayish white or yellowish, ovoid-oblong. Style cylindrical or slightly expanded at apex, but not clavate, 1.8–4 mm; stigma subcapitate, broader than style, not or slightly 1–4-lobed. Fruit purplish red or black, globose, 4–5 mm in diam.; stones globose, vertically compressed, 2.3–3.1 × 1.8–2.5 mm, inconspicuously 8-ribbed. Fl. Jun–Jul, fr. Aug–Sep.

● Mixed forests, thickets, streamsides; 1000–4000 m. Gansu, Guizhou, Hebei, Henan, Hubei, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan.

Oil from the seeds is used in making soap. The leaves and bark are used as a source of industrial tannin.

8. Cornus koehneana Wangerin, Repert. Spec. Nov. Regni Veg. 6: 99. 1908.

川陕梾木 chuan shan lai mu

Swida koehneana (Wangerin) Soják.

Trees 6–10 m tall. Bark dark brown; young branches purplish or reddish green, slender, ± 4-angled (or ridged), pubescent with grayish appressed trichomes; old branches yellowish brown or grayish brown, glabrous, with sparsely scattered yellowish white narrowly elliptic lenticels. Leaves opposite; petiole 1.2–2.2 cm; leaf blade narrowly elliptic to ovate-elliptic, 3.3–8 × 2.3–4.5 cm, thickly papery, abaxially grayish green, with appressed grayish white short thin trichomes, veins 4, small veins inconspicuously reticulate, base cuneate to broadly cuneate, slightly oblique, apex acuminate or extended acuminate. Corymbose cymes loose and spreading, ca. 6 cm wide, with branches slightly arched inward (bent toward center), pubescent with grayish appressed trichomes. Pedicels 0.5–3 mm. Flowers white, ca. 7 mm in diam. Calyx lobes triangular, ca. 0.4 mm, longer than disk. Petals ligulate-oblong, ca. 4.5 × 0.9 mm. Stamens ca. 4 mm, shorter than petals; anthers light yellow, oblong-ovate. Style clavate, ca. 3.8 mm; stigma capitate, not broader than style. Fruit ovoid-globose, ca. 5 × 6 mm; stones subovoid, ca. 4 × 5 mm. Fl. May–Jun, fr. Jul–Aug.

● Mixed forests in valleys and on slopes; 1700–2200 m. Gansu, Shaanxi, Shanxi, Sichuan.

Cornus koehneana is known from only a few specimens, which appear to be similar to *C. walteri*. Examination of more material, especially living plants, is needed to determine the relationship to *C. walteri*.

9. Cornus macrophylla Wallich in Roxburgh, Fl. Ind. 1: 433. 1820.

梾木 lai mu

Trees, rarely shrubs, 2–15(–25) m tall. Bark grayish brown or grayish black, smooth when young, scaly when old; young branches stout, ± 4-angled, sparsely pubescent with grayish short trichomes, later glabrous; old branches dark brown, with yellowish white or grayish white elliptic to rounded lenticels and semicircular leaf scars. Leaves opposite; petiole 1.5–3 cm; leaf blade light green to slightly white abaxially, broadly elliptic, broadly ovate, or ovate-oblong, rarely elliptic, 9–16(–18) × 3.5–8.8 cm, papery, abaxially papillate, with appressed grayish white or brown short deciduous trichomes, veins 5–8, small veins conspicuous, base rounded, broadly cuneate, rarely oblique, apex acute or shortly acuminate. Inflorescences paniculate or sometimes corymbose cymes, 8–12 cm wide, sparsely or rarely densely pubescent with raised trichomes; peduncle sometimes reddish. Pedicels 0.3–4.5 mm. Flowers fragrant, white, (7–)8–10 mm in diam. Calyx lobes triangular or broadly triangular, 0.4–0.5 mm, rarely to 1 mm, taller than disk. Petals ligulate-oblong to ovate-oblong, 3–4 × 0.9–1.8 mm. Stamens equal to or slightly longer than petals; anthers yellow or rarely blue, oblong or obovoid-oblong. Style cylindrical, slightly expanded at apex to apparently clavate, 2–4 mm; stigma subcapitate, broader than style, slightly lobed. Fruit purplish black or bluish black, subglobose, 4.5–6 mm in diam.; stones compressed globose, (2.6–)3–4 mm in diam., ribs 6 or 8. Fl. Jun–Jul(–Aug), fr. Aug–Sep(–Oct).

Dense forests, mixed woods, margins of woods, slopes, streamsides; sea level to 3600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Ningxia, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, ?Sikkim].

1a. Inflorescence sparsely pubescent with appressed trichomes; fl. Jun–Jul; flowers 8–10 mm in diam.; stone of fruit 3–4 mm in diam. ..... 9a. var. *macrophylla*

1b. Inflorescence densely pubescent with raised trichomes; fl. Jul–Aug; flowers 7–8 mm in diam.; stone of fruit ca. 2.6 mm in diam. ..... 9b. var. *stracheyi*

9a. Cornus macrophylla var. **macrophylla**

梾木(原变种) lai mu (yuan bian zhong)

Bothrocaryum longipetiolatum (Hayata) Pojarkova; *Cornus alpina* W. P. Fang & W. K. Hu; *C. brachypoda* C. A. Meyer (1845), not Miquel (1865); *C. corynostylis* Koehne; *C. crispula* Hance; *C. longipedunculata* W. P. Fang & W. K. Hu; *C. longipetiolata* Hayata; *C. taiwanensis* Kanehira; *Swida alpina* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. macrophylla* (Wallich) Soják; *S. macrophylla* var. *longipedunculata* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu.

Trees 3–15(–25) m tall. Old branches with grayish white

elliptic lenticels. Inflorescences sparsely pubescent with white or yellowish appressed trichomes. Flowers 8–10 mm in diam. Calyx lobes broadly triangular, 0.4–0.5 mm, slightly longer than disk. Style thickened at apex or sometimes typically clavate. Stone of fruit 3–4 mm in diam., 6-ribbed. Fl. Jun–Jul, fr. Aug–Sep.

Dense forests, slopes, streamsides; sea level to 3600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Ningxia, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Zhejiang [Afghanistan, Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, ?Sikkim].

9b. Cornus macrophylla var. **stracheyi** C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 744. 1879.

密毛梾木 mi mao lai mu

Cornus stracheyi (C. B. Clarke) Hemsley; *Swida stracheyi* (C. B. Clarke) Soják.

Trees or shrubs, 3–9 m tall. Old branches with yellowish white rounded lenticels. Inflorescences densely pubescent with brownish or intermixed brownish and white trichomes. Flowers 7–8 mm in diam. Calyx lobes triangular, 0.8–1 mm, longer than disk. Style slightly thickened at apex. Stone of fruit ca. 2.6 mm, 8-ribbed. Fl. Jul–Aug, fr. Sep–Oct.

Mixed woods, margins of woods; 1700–3400 m. Xizang, Yunnan [India, Nepal].

10. Cornus oligophlebia Merrill, J. Arnold Arbor. 23: 187. 1942.

樟叶梾木 zhang ye lai mu

Swida oligophlebia (Merrill) W. K. Hu.

Trees 6–10 m tall. Young branches green, ± pubescent with brown trichomes; old branches dark brown. Leaves opposite, rarely alternate; petiole 1.1–15 cm; leaf blade light green abaxially, broadly elliptic to ovate, 8–11 × 4–4.5 cm, leathery, abaxially not papillate, sparsely pubescent with white short trichomes or nearly glabrous, veins 3(or 4), small veins conspicuous, base broadly cuneate or rounded, sometimes oblique, margin slightly revolute, apex acuminate. Paniculate cymes 8.5–11 cm wide, branches spreading, glabrous or with gray appressed trichomes. Pedicels 1–2 mm. Flowers white, ca. 9 mm in diam. Calyx lobes broadly triangular, slightly longer than disk. Petals lanceolate or ligulate-oblong, ca. 4 × 1.1–1.3 mm. Stamens shorter or longer than petals; anthers narrowly obovoid. Style cylindrical, ca. 3 mm; stigma flat, punctiform. Fruit purplish black or bluish black, subglobose, 3–4 mm in diam.; stones compressed globose, (2.6–)3–4 mm in diam. Fl. Jul–Sep, fr. Jan–Mar.

Forests; 1200–1500 m. SE Yunnan [Bhutan, India, Myanmar, Thailand, Vietnam].

Cornus oligophlebia appears to be rare in China, with a restricted distribution in Yunnan and adjacent countries. The species is distinct from the rest of the subgenus by a combination of features including leathery leaves, large, short, spreading paniculate inflorescences, punctiform stigma, sometimes subopposite leaves, autumn flowering and winter fruiting. These features suggest an affinity to *C. oblonga*. The species thus may represent a relatively old lineage in *C.* subg. *Kraniopsis* or may actually be a member of *C.* subg. *Yinquania*. Both are restricted to SW China. Phylogenetic analyses will help test these hypotheses.

11. Cornus papillosa W. P. Fang & W. K. Hu, Fl. Sichuan. 1: 468. 1981.

乳突梾木 ru tu lai mu

Swida papillosa (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu.

Trees ca. 5 m tall. Young branches light green, with sparse yellowish white soft trichomes; old branches deep brown, glabrous, with rounded or elliptic lenticels. Leaves opposite; leaf blade abaxially gray, elliptic to oblong-elliptic, 8–12 × 4–7 cm, papery, abaxially with dense papillae, blackish streaks and appressed (or flat) trichomes, axils of veins often with clusters of light yellow long trichomes, veins 7–9, small veins conspicuous, base cuneate or broadly cuneate, apex ± cuspidate. Corymbs 5–9 cm wide, sparsely pubescent with light yellowish white short trichomes. Pedicels 1–5.5 mm. Flowers white, ca. 7 mm in diam. Calyx lobes ovate to linear-triangular, 0.6–0.8 mm, equal to or longer than disk. Petals oblong-lanceolate, 3–4.5 × 0.9–1.7 mm. Stamens longer than petals; anthers yellow, ovoid-oblong. Style cylindrical, slightly expanded at apex, ca. 3.4 mm; stigma compressed capitulate, broader than style, slightly 3- or 4-lobed. Fruit black, globose, ca. 3 mm in diam.; stones globose, vertically compressed, ca. 2.7 × 1.8 mm. Fl. Jun, fr. unknown.

● Forests; ca. 3000 m. Sichuan, Yunnan.

12. Cornus parviflora S. S. Chien, Sinensia 2: 99. 1932.

小花梾木 xiao hua lai mu

Swida parviflora (S. S. Chien) Holub.

Trees or shrubs, 3–8 m tall. Bark yellowish brown. Young branches slender, 4-angled, with sparse grayish trichomes; old branches grayish brown, with sparse yellowish brown lenticels. Leaves opposite; leaf blade abaxially light green, narrowly elliptic to elliptic-lanceolate, 4–6.5 × 1.6–3.3 cm, papery, abaxially not papillate, with sparse white, short appressed trichomes, veins 3 or 4, base cuneate or broadly cuneate, apex acuminate to ± caudate. Corymbose cymes 4–12 cm wide, pubescent with light yellowish white short trichomes, occasionally with a lanceolate or ovate-lanceolate, leaflike bract. Pedicels 0.3–2 mm. Flowers white, ca. 4.5 mm in diam. Calyx lobes broadly triangular, 0.3–0.4 mm, slightly longer than disk. Petals oblong-lanceolate or ligulate-oblong, ca. 2.5 × 1 mm. Stamens shorter than petals; anthers narrowly obovoid. Style cylindrical, ca. 2 mm; stigma punctiform. Fruit obovoid or nearly oblong, 5–6 mm, ca. 4 mm in diam. Fl. Jul, fr. Aug–Sep.

● Dense to sparse forests, open hillsides; 300–2500 m. Guangxi, Guizhou.

13. Cornus quinquenervis Franchet, J. Bot. (Morot) 10: 307. 1896.

小梾木 xiao lai mu

Cornus paucinervis Hance (1881), not Heer (1859, fossil); *Swida paucinervis* Soják.

Shrubs 1–3(–4) m tall. Bark blackish gray, smooth; young

branches green or purplish red, 4-angled, with grayish short trichomes; old branches brown, glabrous. Leaves opposite; leaf blade elliptic-lanceolate or lanceolate, rarely oblong-ovate, 4–9(–10) × 1–2.3(–3.8) cm, papery, abaxially light green, with sparse white appressed deciduous short trichomes, veins (2 or)3(or 4), nearly straight and ascending below, arched inward near leaf margin, base cuneate, apex acuminate to obtuse-acuminate. Corymbose cymes 3.5–8 cm wide, pubescent with white appressed short trichomes. Pedicels 2–9 mm. Flowers white or yellowish white, 9–10 mm in diam. Calyx lobes lanceolate-triangular to acutely triangular, ca. 1 mm, conspicuously longer than disk. Petals narrowly ovate to narrowly triangular or lanceolate, ca. 6 × 1.8 mm. Stamens shorter than petals; anthers yellowish white, oblong-ovate. Style conspicuously clavate, ca. 3.5 mm; stigma punctiform or truncate. Fruit black at maturity, globose, ca. 5 mm in diam.; stones subglobose, ca. 4 mm in diam., inconspicuously 6-ribbed. Fl. Jun–Jul, fr. Oct–Nov.

● Montane forests, thickets by streams, scrub, hillsides; sea level to 2500 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Yunnan.

14. Cornus schindleri Wangerin, Repert. Spec. Nov. Regni Veg. 4: 337. 1907.

康定梾木 kang ding lai mu

Trees or shrubs, 2–8(–10) m tall. Bark brown; young branches 4-angled, densely pubescent with brown or grayish trichomes, rarely glabrous; old branches reddish or grayish purplish brown, glabrous, with sparse whitish rounded or elliptic lenticels. Leaves opposite; leaf blade abaxially light green or grayish green, elliptic or ovate-elliptic to broadly ovate, rarely narrowly elliptic or rounded or elliptic-lanceolate, 4–11(–15) × 2.5–6.5(–8) cm, papery to thickly papery, often papillate and conspicuously pubescent with whitish to brownish curly spreading trichomes on veins or on entire surface, veins 6–8(or 9), base cuneate to rounded or cordate, rarely slightly oblique, apex acuminate or shortly acuminate. Corymbose cymes (5–)6–10 cm wide, densely pubescent with yellowish or brown, rarely rusty red, often deciduous curly trichomes. Pedicels 1–5(–6) mm. Flowers white, (6–)7–8 mm in diam. Calyx lobes triangular, rarely lanceolate, (0.2–)0.3–0.5 mm, longer, rarely shorter, than disk. Petals oblong, oblong-lanceolate, triangular-lanceolate, or triangular-ovate, 2.5–4 × 0.7–1.8 mm. Stamens equal to or longer than petals; anthers light blue, grayish, or yellow, oblong to narrowly oblong. Style cylindrical, 2–3(–4) mm; stigma capitate to disciform, broader than style, often slightly lobed. Fruit purplish or reddish black, black at maturity, subglobose, 4–6 mm in diam.; stones compressed globose or ovoid, 3–4 × 2.8–3.5 mm, conspicuously or inconspicuously 8-ribbed, rarely ripe fruits 10-ribbed. Fl. May–Jul, fr. Aug–Oct.

● Dense to sparse forests, mixed forest or thickets on slopes and in valleys, open hillsides; 1100–3200 m. SE Gansu, Guizhou, Henan, W Hubei, S Shaanxi, Sichuan, Xizang, N Yunnan.

This species is somewhat continuously variable morphologically across its range. In particular, the ratio of filament length to petal length shows an E-N-W-S pattern, with a higher ratio in the east and lower ratio in the west. Due to this association with geography, two subspecies are recognized (Xiang, Bull. Bot. Res., Harbin 9(1): 125–138. 1989).

1a. Abaxial midvein of leaf with curly (crisped) yellowish or yellow trichomes; mature flower buds conical; ratio of filament length to petal length less than 1.4; trichomes on surface of ovary usually spreading ..... 14a. subsp. *schindleri*

1b. Abaxial midvein of leaf with scattered appressed brown trichomes; mature flower buds subrounded; ratio of filament length to petal length equal to or greater than 1.4; trichomes on surface of ovary usually appressed ..... 14b. subsp. *poliophylla*

14a. Cornus schindleri subsp. **schindleri**

康定梾木(原亚种) kang ding lai mu (yuan ya zhong)

Cornus daijinensis W. P. Fang & W. K. Hu; *C. fulvescens* W. P. Fang & W. K. Hu; *C. lixianensis* W. P. Fang & W. K. Hu; *C. malifolia* W. P. Fang & W. K. Hu; *C. monbeigii* Hemsley; *C. monbeigii* subsp. *crassa* W. P. Fang & W. K. Hu; *C. monbeigii* subsp. *populifolia* W. P. Fang & W. K Hu; *C. poliophylla* var. *praelonga* W. P. Fang & W. K. Hu; *C. scabrida* Franchet; *C. xanthotricha* W. P. Fang & W. K. Hu; *Swida daijinensis* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. fulvescens* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. monbeigii* (Hemsley) Soják; *S. monbeigii* var. *crassa* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. monbeigii* var. *populifolia* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. monbeigii* var. *xanthotricha* (W. P. Fang & W. K Hu) W. P. Fang & W. K. Hu; *S. poliophylla* var. *malifolia* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. poliophylla* var. *praelonga* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. scabrida* (Franchet) Holub; *S. schindleri* (Wangerin) Soják; *S. schindleri* var. *lixianensis* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu.

Abaxial midvein of leaf pubescent with yellowish or yellow crisped trichomes. Flower buds conical at maturity. Filaments shorter than petals. Ovary pubescent with spreading trichomes.

● Dense to sparse forests, open hillsides; 1100–3200 m. Guizhou, S and W Sichuan, SE Xizang, N Yunnan.

14b. Cornus schindleri subsp. **poliophylla** (C. K. Schneider & Wangerin) Q. Y. Xiang, Bull. Bot. Res., Harbin 9(1): 135. 1989.

灰叶梾木 hui ye lai mu

Cornus poliophylla C. K. Schneider & Wangerin, Repert. Spec. Nov. Regni Veg. 7: 228. 1909; *C. poliophylla* var. *microphylla* L. C. Wang & X. G. Sun; *Swida poliophylla* (C. K. Schneider & Wangerin) Soják.

Abaxial midvein of leaf pubescent with brown appressed trichomes. Flower buds nearly rounded at maturity. Filaments ca. as long as or longer than petals. Ovary pubescent with appressed trichomes.

● Mixed forests or thickets on slopes and in valleys; 1300–3100 m. SE Gansu, Henan, W Hubei, S Shaanxi, NE Sichuan, Xizang.

15. Cornus ulotricha C. K. Schneider & Wangerin, Repert.

Spec. Nov. Regni Veg. 7: 228. 1909.

卷毛梾木 juan mao lai mu

Cornus ulotricha var. *leptophylla* W. K. Hu ex P. C. Li; *Swida ulotricha* (C. K. Schneider & Wangerin) Soják; *S. ulotricha* var. *leptophylla* W. K. Hu.

Trees, rarely shrubs, (1.5–)7–15(–20) m tall. Bark gray, smooth on younger stems, rough on older stems, rectangularly splitting. Young branches reddish brown, sparsely pubescent with short trichomes; old branches yellowish brown, glabrous. Leaves opposite; petiole 1.5–2.8 cm; leaf blade broadly ovate to broadly elliptic, 9–15 × 3–8.5 cm, papery, abaxially grayish, not papillate or only inconspicuously papillate, pubescent with both whitish appressed and brown raised (V-shaped) or curly trichomes, trichomes often deciduous, curly trichomes on veins dense, veins 6 or 7, sometimes slightly oblique, base rounded, apex shortly acuminate. Corymbose cymes 8–12 cm wide, pubescent with a mixture of grayish short appressed trichomes and slightly curly trichomes; lateral branches arched inward; smaller branches nearly all secund, toward center of inflorescence. Pedicels 0.2–2 mm, thick. Flowers white, 6–8 mm in diam. Calyx lobes broadly triangular, 0.3–0.4 mm, shorter than or equal to disk. Petals ligulate-oblong, ca. 4 × 1.1–1.8 mm. Stamens shorter than or equal to petals; anthers yellow, oblong-ovoid. Style cylindrical, ca. 3 mm; stigma subglobose to disciform, broader than style. Fruit bluish black, subglobose, 4.3–4.5 mm in diam.; stones subglobose, 3–4 mm in diam. Fl. May–Jun, fr. Jul–Aug.

● Mixed forests, by streams; 800–2700 m. Gansu, Guizhou, Henan, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

Cornus ulotricha var. *leptophylla* W. K. Hu ex P. C. Li (in C. Y. Wu, Fl. Xizang. 3: 528. 1986) was published independently from *Swida ulotricha* var. *leptophylla* W. K. Hu (Bull. Bot. Res., Harbin 4(3): 106. 1984). The protologues cite a type gathering made at the same locality on the same date, but with different collection numbers.

16. Cornus walteri Wangerin, Repert. Spec. Nov. Regni Veg. 6: 99. 1908.

毛梾 mao lai

Cornus henryi Hemsley ex Wangerin; *C. walteri* var. *confertiflora* W. P. Fang & W. K. Hu; *C. walteri* var. *insignis* W. P. Fang & W. K. Hu; *C. yunnanensis* H. L. Li; *Swida walteri* (Wangerin) Soják; *S. walteri* var. *confertiflora* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *S. walteri* var. *insignis* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu.

Trees 6–15 m tall. Bark dark gray, rectangularly splitting. Young branches green, ± 4-angled, densely pubescent with grayish white short trichomes; old branches yellow-green, glabrous. Leaves opposite; petiole (0.8–)3.5 cm; leaf blade light green abaxially, narrowly elliptic to broadly ovate, 4–12(–15) × 1.7–5.5(–8) cm, papery, abaxially with grayish white short appressed trichomes, scabrous, veins 4(or 5), small veins inconspicuously reticulate, base cuneate, rarely rounded or cordate, often oblique, apex shortly to long acuminate. Corymbose cymes dense, 7–9 cm wide, with short white trichomes. Pedicels 0.8–2.7 mm. Flowers fragrant, white, ca. 9.5 mm in diam. Calyx lobes triangular, ca. 0.4 mm, equal to disk. Petals oblong-lanceolate, 4.5–6 × 1.2–1.5 mm. Stamens 4.8–5 mm, equal to or longer than petals; anthers light yellow, rarely rosy red, oblong-ovoid. Style clavate, ca. 3.5 mm; stigma capitate, not broader than style. Fruit black, globose, 6–7(–8) mm in diam.; stones compressed globose, ca. 5 × 4 mm, inconspicuously ribbed. Fl. May–Jun, fr. Aug–Oct.

● Mixed sparse to dense forests; 300–2500(–3000) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.

The fruit is a source of oil, the hard wood is used for making tools, and the tree itself is planted as a street tree.

17. Cornus wilsoniana Wangerin, Repert. Spec. Nov. Regni Veg. 6: 97. 1908.

光皮梾木 guang pi lai mu

Cornus fordii Hemsley; *C. kweichowensis* H. L. Li; *Swida wilsoniana* (Wangerin) Soják.

Trees 5–18 m tall, rarely to 40 m tall. Bark gray or greenish gray, rectangularly splitting. Young branches grayish green, ± 4-angled, pubescent with grayish short appressed trichomes; old branches brown, glabrous, with brown, narrowly elliptic lenticels. Leaves opposite; petiole 0.8–2 cm; leaf blade abaxially grayish green, elliptic or ovate-elliptic, 6–12 × 2–5.5 cm, papery, abaxially densely pubescent with white short appressed trichomes and papillae, scabrous, veins 3 or 4, base cuneate to broadly cuneate, margin slightly revolute, apex shortly acuminate to acuminate. Paniculate to corymbose cymes 6–10 cm wide, with short white trichomes. Flowers white, ca. 7 mm in diam. Calyx lobes triangular, 0.4–0.5 mm, longer than disk. Petals narrowly lanceolate, 3.5–5 × 0.9–1.3 mm. Stamens 6–6.8 mm, equaling petals; anthers yellow, narrowly oblong. Style cylindrical, sometimes slightly expanded near apex, 3.5–4 mm; stigma disciform, not broader than style. Fruit purplish black or black, globose, 6–7 mm in diam.; stones globose, 4–4.5 mm in diam., ribs inconspicuous. Fl. May, fr. Sep–Nov.

● Forests; 100–1100 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Zhejiang.

The fruit is a source of oil (up to 30% oil), the leaves are used for livestock feed, and the dense wood is used for making farm tools and furniture. The attractively shaped crown makes *Cornus wilsoniana* a good candidate for a street tree.

4. Cornus subg. **Cornus**

山茱萸亚属 shan zhu yu ya shu

Shrubs or small trees, deciduous. Flower buds terminal or axillary, ovoid-globose, pubescent with gray or brown appressed trichomes. Leaves opposite, petiolate; leaf blade ovate, elliptic, or ovate-lanceolate, papery, abaxially pubescent with appressed trichomes or sometimes tomentose, adaxially glabrous or nearly so. Inflorescences umbellate cymes, terminal or axillary, subtended by

4 decussate, scalelike bracts; bracts caducous after anthesis; outer pair of bracts larger than inner pair. Flowers precocious (flowering before leaves). Calyx tube cuplike, 4-dentate. Petals yellow, ovate-lanceolate. Filaments awn-shaped; anthers oblong, 2-loculed. Ovary 1- or 2-loculed; style cylindrical; stigma truncate. Fruit red or black, narrowly ellipsoid to oblong; stones narrowly ellipsoid, seeds 1 or 2.

Four species: E Asia, Europe, W North America; two species in China.

1a. Branches monopodial; inflorescences lateral; peduncle 2–3 mm; fruit 1.2–1.8 cm; abaxial leaf surface with clusters of light brown trichomes in axils of lateral veins ..... 18. *C. officinalis*
1b. Branches sympodial; inflorescences terminal; peduncle 5–12 mm; fruit smaller, 6–8(–10) mm; abaxial leaf surface with clusters of grayish trichomes in axils of lateral veins ..... 19. *C. chinensis*

18. Cornus officinalis Siebold & Zuccarini, Fl. Jap. 1: 100. 1835.

山茱萸 shan zhu yu

Macrocarpium officinale (Siebold & Zuccarini) Nakai.

Trees or shrubs, 4–10 m tall; axis sympodial. Bark grayish brown; winter leaf buds terminal or axillary, solitary or associated with flower buds; flower buds terminal, pubescent with yellowish brown short trichomes. Leaf blade abaxially light green, ovate-lanceolate or ovate-elliptic, 5.5–10 × 2.5–4.5 cm, abaxially sparsely pubescent with short appressed trichomes, axils of lateral veins with dense light brown long soft trichomes, veins 6 or 7. Umbellate inflorescences terminal; bracts ovate, 5–8 mm, papery to leathery, pubescent; peduncle ca. 2 mm, thick, pubescent. Pedicels 0.5–1 cm, slender, densely pubescent with soft trichomes. Calyx teeth broadly triangular, ca. 0.6 mm. Petals reflexed, ligulate-lanceolate, 2.5–3.3 × 1–1.3 mm. Stamens ca. 1.8 mm; anthers ellipsoid. Ovary obovoid, ca. 1 mm, densely pubescent; style ca. 1.5 mm. Fruit red or purplish red, narrowly ellipsoid, 1.2–1.8 × 0.5–0.7 cm; stones narrowly ellipsoid, ca. 1.2 cm, with a few unequal ribs. Fl. Mar–Apr, fr. Sep–Oct.

Forests, forest margins, mountain slopes; 400–1500(–2100) m. Anhui, Gansu, Henan, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea].

The fruit, called “zhu yu” or “zao pi” in Chinese medicine, is prescribed as an astringent tonic for impotence, spermatorrhea, lumbago, vertigo, and night sweats.

19. Cornus chinensis Wangerin, Repert. Spec. Nov. Regni Veg. 6: 100. 1908.

川鄂山茱萸 chuan e shan zhu yu

Cornus chinensis f. *jinyangensis* (W. K. Hu) W. K. Hu; *C. chinensis* f. *longipedunculata* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *C. chinensis* f. *microcarpa* (W. K. Hu) W. K. Hu; *Macrocarpium chinense* (Wangerin) Hutchinson; *M. chinense* f. *jinyangense* W. K. Hu; *M. chinense* f. *longipedunculatum* W. P. Fang & W. K. Hu; *M. chinense* f. *microcarpum* W. K. Hu.

Trees 4–8 m tall; axis monopodial. Bark dark brown; winter buds of leaves terminal or axillary, narrowly conical. Flower buds in pairs, lateral, separated by terminal leaf bud, subglobose, pubescent with yellowish brown trichomes, apex acute. Leaf blade ovate-lanceolate to narrowly elliptic, 6–11 × 2.8–5.5 cm, abaxially sparsely pubescent with grayish white appressed trichomes and a cluster of conspicuous gray long trichomes in axils of veins, or sometimes tomentose, veins 5 or 6. Umbellate

inflorescences lateral; bracts broadly ovate to elliptic, 6.5–7 mm, papery to leathery, both surfaces pubescent with appressed trichomes; peduncle purplish brown, 5–12 mm, ± pubescent. Pedicels 8–9 mm, slender, pubescent with long, yellow trichomes. Calyx triangular-lanceolate, ca. 0.7 mm. Petals lanceolate, ca. 4 mm. Stamens ca. 1.6 mm; anthers subglobose. Ovary campanulate, ca. 1 mm, pubescent with short gray trichomes; style 1–1.4 mm, glabrous. Fruit red or black (when ripe), oblong, 6–8(–10) × 3.4–4 mm; stones narrowly ellipsoid, ca. 7.5 mm, with few ribs. Fl. Apr, fr. Sep.

● Dense forests, mixed forest margins, slopes; 700–2500(–3500) m. Gansu, Guangdong, Guizhou, Henan, Hubei, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [?Myanmar].

The fruit is used medicinally to treat the same ailments as is *Cornus officinalis*.

5. Cornus subg. **Syncarpea** (Nakai) Q. Y. Xiang, Acta Phytotax. Sin. 25: 128. 1987.

四照花亚属 si zhao hua ya shu

Benthamia subg. *Syncarpea* Nakai, Bot. Mag. (Tokyo) 23: 41. 1909.

Shrubs or small trees, evergreen or deciduous. Flower buds terminal, globose to ovoid, exposed or with scales; leaf buds axillary or terminal, with scales or exposed. Leaves opposite, petiolate; leaf blade ovate, elliptic, or oblong-lanceolate, leathery or subleathery to papery. Inflorescences cymes, terminal; bracts 4, white or light yellowish. Calyx tubular, slightly to conspicuously 4-lobed. Petals white or yellowish. Filaments slender; anthers yellow, brown, or bluish black, ellipsoid, rarely ovoid-ellipsoid. Ovary 2-loculed; style cylindrical, often ridged and pubescent; stigma truncate to capitate. Fruit of adjacent flowers fused into a compound, multiple stoned berry, reddish orange or red, globose or subglobose; stones asymmetric, seed 1.

Five species: from the Himalayas to E Asia; five species (two endemic) in China.

Species delimitation within this subgenus is controversial. Over 15 new taxa have been published since the 1950s. This treatment follows Xiang (Bull. Bot. Res., Harbin 7(2): 33–52. 1987), who recognized 13 subspecies among four species, i.e., *Cornus capitata, C. hongkongensis, C. kousa,* and *C. multinervosa*. However, a preliminary allozyme investigation by Dudley and Santamour (Phytologia 77: 425–430. 1995) suggested that *C. capitata* subsp. *capitata* is quite divergent from *C. capitata* subsp. *angustata*. Thus, in the present treatment, we recognize *C. elliptica* as a species separate from *C. capitata*. Further studies are needed to test the various species delimitations in the group.

The wood of members of this subgenus is hard and is used for making tools. The edible, sweet fruit is sold in village markets and is used for making wine. The trees are excellent garden ornamentals because of their showy bracts.

1a. Deciduous tree; leaves papery; inflorescence buds completely covered by two pairs of decussate, pubescent scales; buds mixed.
  2a. Leaf veins 3 or 4(or 5), curved inward, extending upward, lower ones not reaching apex; base of peduncle often conspicuously ringlike thickened; anthers light yellow or dark blue; stone of fruit light yellow, without red spots ..... 23. *C. kousa*
  2b. Leaf veins 5 or 6(or 7), curved inward, extending nearly to apex; base of peduncle not conspicuously thickened; anthers dark blue; stone of fruit with scattered red spots ..... 24. *C. multinervosa*
1b. Evergreen tree; leaves subleathery, leathery, or thickly leathery; inflorescence buds exposed in winter.
  3a. Leaves abaxially yellowish or pale green, glabrous or ± pubescent with brown trichomes, smooth to touch; trichomes fine, appressed, deciduous, leaving brown dots on leaf surface after falling ..... 22. *C. hongkongensis*
  3b. Mature leaves abaxially grayish, typically pubescent with short, light gray or white trichomes, rough to touch, rarely smooth or tomentose; trichomes appressed, persistent, rarely deciduous.
    4a. Peduncles thick, 2–3(–5) cm; infructescences compressed globose ..... 21. *C. capitata*
    4b. Peduncles slender, 5–8(–10) cm; infructescences globose ..... 20. *C. elliptica*

20. Cornus elliptica (Pojarkova) Q. Y. Xiang & Boufford, **comb. nov.**

尖叶四照花 jian ye si zhao hua

Basionym: *Cynoxylon ellipticum* Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 12: 188. 1950 [*"elliptica"*]; *Benthamidia capitata* (Wallich) H. Hara var. *mollis* (Rehder) H. Hara; *B. japonica* (Siebold & Zuccarini) H. Hara var. *angustata* (Chun) H. Hara; *Cornus angustata* (Chun) T. R. Dudley; *C. capitata* Wallich subsp. *angustata* (Chun) Q. Y. Xiang; *C. capitata* var. *angustata* (Chun) W. P. Fang; *C. capitata* var. *hypoleuca* H. Léveillé; *C. capitata* var. *mollis* Rehder; *C. kousa* F. Buerger ex Hance var. *angustata* Chun; *Dendrobenthamia angustata* (Chun) W. P. Fang; *D. angustata* var. *mollis* (Rehder) W. P. Fang; *D. angustata* var. *wuyishanensis* (W. P. Fang & Y. T. Hsieh) W. P. Fang & W. K. Hu; *D. hupehensis* W. P. Fang; *D. longipedunculata* S. S. Chang & X. Chen; *D. wuyishanica* W. P. Fang & Y. T. Hsieh.

Trees or shrubs, evergreen, 4–12 m tall. Bark gray or grayish brown; young branches grayish green, typically pubescent with white appressed trichomes, rarely tomentose; old branches grayish brown, nearly glabrous. Flower buds globose, exposed, subtended by 4 small green bracts. Leaf buds subtending flower buds, covered by small triangular to lanceolate scales. Leaf blade grayish green on both surfaces, oblong-elliptic or obovate-elliptic to lanceolate, 7–9(–12) × 2–4(–5) cm, thinly to thickly leathery, densely pubescent with white appressed trichomes, scabrous, rarely tomentose, axils of veins sometimes with aggregated white raised soft trichomes, veins 3 or 4, base cuneate to broadly cuneate, apex acuminate-caudate. Cymes globose, 0.8–1.2 cm in diam., 55–80(–95)-flowered;

bracts yellowish, turning white, narrowly ovate to obovate, 2.5–5 × 0.9–2.2 cm. Calyx tube 0.7–1 mm, truncate to slightly 4-lobed. Petals ovate, ca. 2.8 × 1.5 mm. Style cylindrical, ca. 1.5 mm, densely pubescent with white trichomes. Infructescence globose, 1.5–2.5 cm in diam., pubescent with white appressed trichomes, red at maturity; peduncle 5.5–10 cm, slender. Fl. Jun–Jul, fr. Oct–Nov.

● Forests, slopes, streamsides; 300–2200 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan.

The young branches, leaves abaxially, and bracts are all pubescent with white, appressed, fine trichomes. The sweet, ripe fruit is edible.

Cornus angustata (Chun) T. R. Dudley (Phytologia 77: 428. 1995) was based on *C. kousa* var. *angustata* Chun (Sunyatsenia 1: 285. 1934), not on the earliest available name at the rank of species, *Cynoxylon ellipticum* Pojarkova.

21. Cornus capitata Wallich in Roxburgh, Fl. Ind. 1: 434. 1820.

头状四照花 tou zhuang si zhao hua

Benthamia capitata (Wallich) Nakai; *B. fragifera* Lindley; *Benthamidia capitata* (Wallich) H. Hara; *Cornus capitata* subsp. *brevipedunculata* (W. P. Fang & Y. T. Hsieh) Q. Y. Xiang; *C. capitata* subsp. *emeiensis* (W. P. Fang & Y. T. Hsieh) Q. Y. Xiang; *Cynoxylon capitatum* (Wallich) Nakai; *C. glabriusculum* Pojarkova; *C. yunnanense* Pojarkova; *Dendrobenthamia capitata* (Wallich ex Roxburgh) Hutchinson; *D. capitata* var. *emeiensis* (W. P. Fang & Y. T. Hsieh) W. P. Fang & W. K. Hu; *D. emeiensis* W. P. Fang & Y. T. Hsieh; *D. tonkinensis* W. P. Fang var. *brevipedunculata* (W. P. Fang & Y. T. Hsieh) W. P. Fang & W. K. Hu.

Trees or shrubs, evergreen, 3–15(–20) m tall. Bark brown or blackish gray; young branches grayish green, pubescent with white appressed trichomes; old branches grayish brown, nearly glabrous. Flower buds globose, exposed, subtended by four small green, linear-lanceolate bracts; leaf buds exposed. Leaf blade grayish green on both surfaces, narrowly elliptic or oblong-lanceolate, 5–12 × 2–3.5(–4) cm, thinly leathery to leathery, abaxially densely pubescent with thick white appressed trichomes, scabrous, axils of veins often pitted or rarely with a cluster of trichomes, veins 3 or 4, base cuneate to broadly cuneate, apex acuminate to shortly caudate. Cymes globose, ca. 1.2 cm in diam., 50–100-flowered; bracts white, obovate or broadly obovate, rarely orbicular, 3.5–6.2 × 1.5–5 cm. Calyx tube ca. 1.2 mm, hardly lobed to conspicuously 4-lobed; lobes rounded. Petals oblong, 3–4 mm. Styles cylindrical, ca. 1.5 mm, densely pubescent with white trichomes. Infructescences compressed or subglobose, 1.5–2.5 cm in diam., pubescent with small white trichomes, purple red at maturity; peduncle (1.5–) 4–5(–8) cm, stout. Fl. May–Jul, fr. Sep–Nov.

Evergreen and mixed forests; 1000–3200 m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

The ripe, sweet fruit is edible, the bark is used medicinally, and the branches and leaves are used for tannin.

At the eastern edge of its range in W Guizhou, *Cornus capitata* comes into contact with *C. elliptica* and the distinction between the two is somewhat obscured. Intermediates with leaves like *C. elliptica* but infructescences like *C. capitata,* or *vice versa,* are found. Additionally, there are some sparsely pubescent individuals with fine, white trichomes and leaves smooth to the touch abaxially (unlike either *C. capitata* or *C. elliptica,* both of which are densely pubescent with coarse trichomes and scabrous) and compressed globose infructescences (like *C. capitata*) borne on slender peduncles (like *C. elliptica*). These plants may represent hybrids between the two species in their region of contact, or incomplete infraspecific differentiation. The two taxa are distinguished primarily by the peduncle (stout vs. slender) and shape of the infructescence (compressed globose vs. globose) and whether the axils of the veins are pitted or not. However, as discussed above, a comparison of allozymes from a few specimens of the two taxa showed significantly different profiles. Additional molecular analyses should help to clarify the origin of this variation.

22. Cornus hongkongensis Hemsley, J. Linn. Soc., Bot. 23: 345. 1888.

香港四照花 xiang gang si zhao hua

Trees or shrubs, evergreen, 3–15(–25) m tall. Bark gray, dark gray, or blackish brown, smooth; young branches green or purplish green, sparsely pubescent with brown appressed trichomes or rarely densely pubescent with brown trichomes or glabrous; old branches light gray, grayish green, or grayish brown, with lenticels or not. Winter flower buds globose to conical, exposed, subtended by four green bracts, bracts eventually expanded and petaloid; leaf buds subtending flower buds, with small triangular to lanceolate scales. Leaf blade elliptic, oblong-elliptic, or obovate-oblong, 6.2–13(–16) × 2.5–6.3(–7.5) cm, thinly to thickly leathery, abaxially light green or powder green, glabrous or sparsely pubescent with white or brown and white trichomes when young, often glabrous in age except sometimes pubescent in axils of veins, veins 3 or 4(or 5), base cuneate or broadly cuneate to rounded, apex shortly acuminate to caudate. Capitate cymes globose, 0.7–1.3(–2) cm in diam., 40–70-flowered; bracts yellowish or white, broadly elliptic, broadly ovate, or orbicular to obovate, 1.6–4 × 1.3–2(–4.2) cm, sparsely pubescent or glabrous. Calyx tube 0.7–1.3 mm, shallowly 4-lobed, rarely 5-lobed; lobes truncate to rounded. Petals elliptic, oblong-elliptic, ovate-elliptic, or ovate-lanceolate to ovate, 1.5–4.2 × 0.8–1.1 mm, sometimes slightly united at base. Style cylindrical, 0.5–1.5 mm, sparsely pubescent with white trichomes or glabrous. Compound fruit red or yellowish red at maturity, globose, 1.5–2.5 cm in diam., nearly glabrous or slightly pubescent with fine white trichomes; peduncle 4–8(–10) cm. Fl. Apr–Jun, fr. Oct–Dec.

Forests, valleys, slopes, streamsides, roadsides; 200–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Laos, Vietnam].

Cornus hongkongensis is highly variable in vegetative morphology and was divided into several species on the basis of minor differences, such as pubescence and the shape and size of various parts. The variation overlaps, but is also more or less associated with geographic distribution. To recognize this pattern, Xiang (Bull. Bot. Res., Harbin 7(2): 33–52. 1987) recognized six subspecies within *C. hongkongensis,* which we follow here. This treatment needs to be reevaluated with further data from both the field and laboratory.

1a. Leaf blade obovate, 8.5–16 × 3.8–7.5 cm, thickly leathery; inflorescences

(excluding bracts) 15–20 mm in diam.; bracts broadly obovate or orbicular, 4–5 × 3–4.2 cm ..... 22e. subsp. *gigantea*

1b. Leaf blade ovate to narrowly elliptic, 5.5–10(–13.5) × 2.7–5.8(–6.3) cm; inflorescences (excluding bracts) 7–13 mm in diam.; bracts smaller, variously shaped.
2a. Outer surface of petals glabrous or nearly so; style glabrous ..... 22b. subsp. *tonkinensis*
2b. Outer surface of petals pubescent with short appressed fine trichomes; style pubescent with white trichomes.
3a. Lateral leaf veins, particularly secondary lateral veins, inconspicuous .... 22d. subsp. *elegans*
3b. Lateral leaf veins conspicuous, secondary lateral veins conspicuous.
4a. Abaxial surface of leaves and veins densely pubescent with reddish brown, coarse trichomes ..... 22f. subsp. *ferruginea*
4b. Abaxial surface of leaves sparsely pubescent with brown or brown and white thin trichomes; veins glabrous or nearly so.
5a. Leaves subleathery, axils of abaxial leaf veins often with a cluster of Y-shaped soft trichomes, abaxial surface of leaves glabrous or rarely pubescent with brown trichomes ..... 22c. subsp. *melanotricha*
5b. Leaves leathery or thickly leathery, axils of abaxial leaf veins without Y-shaped trichomes, abaxial surface of leaves sparsely pubescent with brown and white appressed trichomes when young, often glabrous with conspicuous brown hair scars (brown spots) in age ..... 22a. subsp. *hongkongensis*

22a. Cornus hongkongensis subsp. **hongkongensis**

香港四照花(原亚种) xiang gang si zhao hua (yuan ya zhong)

Benthamia japonica Siebold & Zuccarini var. *sinensis* Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 165. 1852; *Benthamia hongkongensis* (Hemsley) Nakai; *Benthamidia hongkongensis* (Hemsley) H. Hara; *B. sinensis* (Nakai) T. Yamazaki; *Cynoxylon hongkongense* (Hemsley) Nakai; *Dendrobenthamia hongkongensis* (Hemsley) Hutchinson; *D. latibracteata* W. P. Fang & Y. T. Hsieh; *D. xanthocarpa* C. Y. Wu.

Trees or shrubs, evergreen, 5–15(–25) m tall. Bark deep gray or deep brown; old branches gray or brown, glabrous, with conspicuous lenticels. Leaf blade elliptic to narrowly elliptic, rarely obovate-elliptic, 6–13 × 2.8–6.3 cm, leathery, pubescent on both surfaces when young with white and brown soft appressed trichomes, gradually glabrous and with scattered brown spots (hair scars) in age, veins 2 or 3(or 4). Inflorescences ca. 1 cm in diam., 50–70-flowered; bracts white, broadly elliptic to broadly elliptic-obovate, 2.8–4.1 × 1.7–3.5 cm, both surfaces nearly glabrous; peduncle 3.5–10 cm, pubescent with brown appressed trichomes. Flowers fragrant. Calyx tubular, 0.7–0.9 mm, with brown trichomes at base, pubescent. Petals light yellow, oblong-elliptic, 2.2–2.4 × 1–1.2 mm. Filaments 1.9–2.1 mm, slightly pubescent; anthers dark brown, ellipsoid. Style ca. 1 mm, pubescent with white trichomes. Compound fruit yellow or red at maturity, ca. 2.5 cm in diam., with thin white trichomes, peduncle 3.5–10 cm. Fl. May–Jun, fr. Nov–Dec.

Evergreen broad-leaved forests; 600–1800 m. Guangdong, Guangxi, Guizhou, Hunan [Laos, Vietnam].

The wood is used for construction; the fruit is edible and used for making wine.

Dendrobenthamia xanthocarpa was based on a specimen from Yunnan with yellow infructescences. Other features are indistinguishable from *Cornus hongkongensis*. Red-fruited and yellow-fruited plants of *C. hongkongensis* grow side-by-side in Huping, Guangxi, with the red-fruited plants in more open areas and the yellow-fruited ones in shaded places. *Dendrobenthamia xanthocarpa* is likely another example of such variation in *C. hongkongensis* in Yunnan. The yellow-fruited plants are probably rare because the species often grows in open places in forests or at forest margins where there is abundant light.

22b. Cornus hongkongensis subsp. **tonkinensis** (W. P. Fang) Q. Y. Xiang, Bull. Bot. Res., Harbin 7(2): 42. 1987.

东京四照花 dong jing si zhao hua

Dendrobenthamia tonkinensis W. P. Fang, Acta Phytotax. Sin. 2: 103. 1953; *Cornus tonkinensis* (W. P. Fang) Tardieu; *D. brevipedunculata* W. P. Fang & Y. T. Hsieh; *D. qianxinanica* S. S. Chang & X. Chen.

Trees or shrubs, evergreen, 4–15 m tall. Bark dark gray; old branches gray, often with lenticels. Leaf blade oblong-ovate or narrowly elliptic, 4.5–11(–13) × 1.7–5.3(–6) cm, leathery, nearly glabrous, veins 3(or 4). Inflorescences ca. 8 mm in diam., 40–50-flowered; bracts white, broadly elliptic to broadly ovate, 1.6–1.8 × 1.3–1.5 cm, both surfaces slightly pubescent. Calyx nearly glabrous. Petals ca. 2.2 × 0.8–1 mm, glabrous; filaments glabrous; anthers broadly ellipsoid, ca. 0.7 mm. Style ca. 0.5 mm, thick, glabrous. Compound fruit red at maturity, 1.5–2 cm in diam., peduncle (2–)4–7.5 cm. Fl. Jun(–Oct), fr. Dec(–May).

Evergreen broad-leaved forests; 1100–2500 m. SW Guangxi, S Yunnan [N Vietnam].

Some specimens from SW Guizhou have very short (2–4 cm) peduncles that are conspicuously enlarged in the upper part. These specimens have been identified as *Dendrobenthamia brevipedunculata*. However, the type gathering of this name (collected from the same geographic region) does not show this enlargement of the peduncles. Some specimens from this region and adjacent areas of Guangxi were colected in October and May with both flowers and fruits.

22c. Cornus hongkongensis subsp. **melanotricha** (Pojarkova) Q. Y. Xiang, Bull. Bot. Res., Harbin 7(2): 42. 1987.

黑毛四照花 hei mao si zhao hua

Cynoxylon melanotrichum Pojarkova, Bot. Mater. Gerb.

Bot. Inst. Komarova Akad. Nauk SSSR 12: 191. 1950 [*"melanotricha"*]; *Cornus hongkongensis* var. *jinyunensis* (W. P. Fang & W. K. Hu) Q. Y. Xiang; *Dendrobenthamia ferruginea* (C. Y. Wu) W. P. Fang var. *jinyunensis* (W. P. Fang & W. K. Hu) W. P. Fang & W. K. Hu; *D. gigantea* (Handel-Mazzetti) W. P. Fang var. *caudata* W. P. Fang & W. K. Hu; *D. jinyunensis* W. P. Fang & W. K. Hu; *D. melanotricha* (Pojarkova) W. P. Fang.

Trees or shrubs, evergreen, 3–12 m tall. Bark dark gray or dark brown; old branches grayish brown, glabrous, often without lenticels. Leaf blade elliptic to narrowly elliptic, 6–10 × 2.7–5 cm, subleathery or leathery, abaxially when young sparsely pubescent with white or brown short appressed trichomes, often glabrous in age, axils of veins with clusters of dark brown Y-shaped long trichomes, veins 3(or 4), conspicuous. Inflorescences greenish yellow, ca. 1 cm in diam., ca. 40-flowered; bracts at first yellowish green, later creamy white, broadly elliptic or broadly obovate, 2–4 × 1–3.5 cm, glabrous. Calyx tube ca. 0.9 mm, with brown trichomes at base. Petals narrowly elliptic or narrowly ovate, 2.8–3 × ca. 1 mm, outside sparsely pubescent. Filaments ca. 2.2 mm, glabrous; anthers brown, ovoid-ellipsoid, ca. 1 mm. Style ca. 1.3 mm, pubescent with white trichomes. Compound fruit red at maturity, 2–2.5 cm in diam., peduncle 3.7–9.5 cm. Fl. May–Jun, fr. Oct–Nov.

● Evergreen broad-leaved forests; 400–1800 m. Guizhou, Hunan, Sichuan, Yunnan.

The hard wood is used for making farming tools.

22d. Cornus hongkongensis subsp. **elegans** (W. P. Fang & Y. T. Hsieh) Q. Y. Xiang, Bull. Bot. Res., Harbin 7(2): 43. 1987.

秀丽四照花 xiu li si zhao hua

Dendrobenthamia elegans W. P. Fang & Y. T. Hsieh, J. Sichuan Univ., Nat. Sci. Ed. 1980(3): 162. 1980; *D. elegans* var. *rotundifolia* (W. P. Fang & Y. T. Hsieh) W. P. Fang & W. K. Hu; *D. rotundifolia* W. P. Fang & Y. T. Hsieh.

Shrubs or small trees, evergreen, 3–8(–15) m tall. Bark grayish or grayish brown; old branches gray or grayish brown, glabrous. Leaf blade elliptic to oblong-elliptic, 5.5–8.2 × 2.5–3.5 cm, leathery, abaxially glabrous, sometimes pitted in axils of veins, veins 3 or 4, secondary lateral veins inconspicuous. Inflorescences ca. 8 mm in diam., 45–55-flowered; bracts obovate-elliptic, 3.5–4 × 1.8–2.5 cm, sparsely pubescent with brownish appressed fine trichomes. Calyx tube 0.7–0.9 mm, outside pubescent, with a whorl of reddish brown long trichomes at base. Petals ovate-elliptic, 2–2.5 × 0.8–1 mm, outside sparsely pubescent. Filaments 1.8–2 mm; anthers ellipsoid, ca. 0.6 mm. Style 0.7–0.9 mm, pubescent with short white trichomes. Compound fruit red at maturity, 1.5–2 cm in diam., peduncle 4.5–9 cm. Fl. May–Jun, fr. Nov.

● Forests, streamsides; 200–1200 m. Fujian, Jiangxi, Zhejiang.

22e. Cornus hongkongensis subsp. **gigantea** (Handel-Mazzetti) Q. Y. Xiang, Bull. Bot. Res., Harbin 7(2): 43. 1987.

大型四照花 da xing si zhao hua

Cornus hongkongensis var. *gigantea* Handel-Mazzetti, Symb. Sin. 7: 690. 1933; *Benthamidia hongkongensis* (Hemsley) H. Hara var. *gigantea* (Handel-Mazzetti) H. Hara; *C. gigantea* (Handel-Mazzetti) Tardieu; *Dendrobenthamia gigantea* (Handel-Mazzetti) W. P. Fang; *D. gigantea* var. *caudata* W. P. Fang & W. K. Hu; *D. pachyphylla* W. P. Fang & W. K. Hu.

Shrubs or small trees, evergreen, 2–6 m tall. Old branches gray or grayish green. Leaf blade obovate, rarely broadly elliptic, 8.5–16 × 3.8–7.5 cm, leathery to thickly leathery, abaxially sparsely pubescent with appressed short trichomes when young, glabrous in age, axils of veins without or rarely with clusters of dark brown trichomes, veins often 4, conspicuous, apex caudate-acuminate. Inflorescences 1.4–2 cm in diam., ca. 60-flowered; bracts yellowish or white, broadly obovate or nearly orbicular, ca. 4 × 3–4.2 cm, nearly glabrous. Calyx tube ca. 1.3 mm, often shallowly 4-lobed, rarely 5-lobed, outside pubescent. Petals ovate-lanceolate, ca. 4.2 × 1.1 mm, outside sparsely pubescent. Filaments ca. 4 mm; anthers ovoid-ellipsoid, ca. 1.2 mm. Style ca. 1.5 mm, pubescent with white trichomes. Compound fruit yellowish red at maturity, ca. 2.5 cm in diam.; peduncle 8–9.5 cm. Fl. Apr–May, fr. unknown.

Evergreen broad-leaved forests, sparse forests, valleys; 700–1700 m. W Guizhou, S Sichuan, NE Yunnan [N Vietnam].

22f. Cornus hongkongensis subsp. **ferruginea** (Y. C. Wu) Q. Y. Xiang, Bull. Bot. Res., Harbin 7(2): 44. 1987.

褐毛四照花 he mao si zhao hua

Cornus ferruginea Y. C. Wu, Bot. Jahrb. Syst. 71: 199. 1940; *Benthamidia ferruginea* (Y. C. Wu) H. Hara; *Cynoxylon ferrugineum* (Y. C. Wu) Pojarkova; *Dendrobenthamia ferruginea* (Y. C. Wu) W. P. Fang; *D. ferruginea* var. *jiangxiensis* W. P. Fang & Y. T. Hsieh.

Shrubs or small trees, evergreen, 5–12(–20) m tall. Bark gray, rough. Young branches densely pubescent with brown trichomes; old branches dark grayish green. Leaf blade narrowly elliptic to broadly elliptic, 8–14 × 3.5–6 cm, subleathery to papery, abaxially powder green (or pale green), pubescent with thick brown or reddish trichomes, later gradually glabrous, veins 4(or 5), conspicuous, with long brown trichomes. Inflorescences ca. 1.1 cm in diam., flowers 60–70; bracts yellowish white, broadly obovate-elliptic, 4–4.5 × 2.5–3 cm, sparsely pubescent with thin appressed trichomes. Calyx tube ca. 1.2 mm, often shallowly 4-lobed, outside pubescent with white and brown trichomes. Petals narrowly elliptic, ca. 2.5 mm, outside sparsely pubescent. Filaments ca. 1.7 mm; anthers yellow, ellipsoid, ca. 0.8 mm. Style ca. 1.5 mm, pubescent with white trichomes. Compound fruit red or greenish at maturity, 3–1.8 cm in diam.; peduncle 8–9.5 cm. Fl. Jun, fr. Oct–Dec.

● Forests, valleys, slopes, roadsides; 200–1100 m. Guangdong, Guangxi, Guizhou, ?Hunan, Jiangxi.

The fruit is edible and sweet.

23. Cornus kousa F. Buerger ex Hance subsp. **chinensis** (Osborn) Q. Y. Xiang, Bull. Bot. Res., Harbin 7(2): 46. 1987.

四照花 si zhao hua

Cornus kousa var. *chinensis* Osborn, Gard. Chron., ser. 3,

72: 310. 1922; *Benthamidia japonica* (Siebold & Zuccarini) H. Hara var. *chinensis* (Osborn) H. Hara; *B. sinensis* (Nakai) T. Yamazaki; *C. kousa* var. *leucotricha* (W. P. Fang & Y. T. Hsieh) Q. Y. Xiang; *Cynoxylon pseudokousa* Pojarkova; *C. sinense* Nakai; *Dendrobenthamia japonica* (Siebold & Zuccarini) W. P. Fang var. *chinensis* (Osborn) W. P. Fang; *D. japonica* var. *huaxiensis* W. P. Fang & W. K. Hu; *D. japonica* var. *leucotricha* W. P. Fang & Y. T. Hsieh.

Trees or shrubs, deciduous, 3–10 m tall. Bark grayish brown, smooth; current year's branches pubescent with soft white trichomes; second year branches reddish brown, glabrescent or subglabrous, with rounded lenticels. Winter buds mixed, globose, completely covered by 2 pairs of scales. Leaf blade adaxially green, abaxially powder green, narrowly to broadly elliptic, narrowly to broadly ovate, 4–11 × 3.6–5 cm, papery to thickly papery, abaxially often densely papillate and pubescent with appressed trichomes, rarely with long soft white trichomes, trichomes gradually deciduous, axils of veins often with a cluster of white or brown soft long trichomes, veins 4 or 5 pairs, base abruptly acute to rounded, apex abruptly acuminate. Bracts white or rarely pink, narrowly to broadly elliptic to narrowly to broadly ovate, 3–6 cm, glabrous or minutely pubescent, apex acuminate. Capitate cymes globose, 0.7–1 cm in diam., 20–40-flowered; peduncle 3.5–7.5 cm; often with a conspicuously thickened ring at base. Calyx with a ring of short brown or white trichomes; tube ca. 1 mm; lobes pubescent on both surfaces, apex truncate to rounded. Petals greenish or yellowish. Anthers yellow or sometimes dark blue or blackish. Style cylindrical, ca. 1.5 mm, densely pubescent with thick white trichomes. Compound fruit red at maturity, globose, 1–1.5 cm in diam., minutely white strigillose; peduncle 6–11 cm. Fl. May–Jul, fr. Sep–Oct.

● Mixed woods, valleys, shaded slopes, streamsides, roadsides; 400–2200 m. Anhui, Fujian, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Nei Mongol, Shaanxi, Shanxi, Sichuan, Taiwan, ?Yunnan, Zhejiang.

The edible, sweet fruit is sometimes used for making wine.

Cornus kousa subsp. *kousa,* from Japan and Korea, has thinly papery leaves with the abaxial surface light green, the base of the peduncle not conspicuously expanded, and smooth branches with lines (cracks) of elongate lenticels; in subsp. *chinensis* the leaves are thickly papery with the abaxial surface powder green and sometimes with curly white trichomes, the base of the peduncle is conspicuously expanded into a ring, and the branches often have dense, rounded lenticels.

24. Cornus multinervosa (Pojarkova) Q. Y. Xiang, Bull. Bot. Res., Harbin 7(2): 47. 1987.

多脉四照花 duo mai si zhao hua

Cynoxylon multinervosum Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 12: 194. 1950 [*"multinervosa"*]; *Dendrobenthamia multinervosa* (Pojarkova) W. P. Fang.

Trees deciduous, 4–8(–15) m tall. Bark blackish brown; young branches green or purplish green, sparsely pubescent with white appressed trichomes; old branches grayish purple or grayish brown, glabrous, with white elliptic lenticels; winter buds mixed, globose, completely covered by two pairs of scales. Leaf blade narrowly elliptic or ovate-elliptic, 6–13 × 3–6 cm, papery, abaxially light green, pubescent with white appressed trichomes, scabrous, trichomes later often deciduous, veins (5 or)6(or 7), nearly extending to apex, base cuneate, occasionally oblique, margin entire or rarely inconspicuously undulate, apex acuminate. Capitate cymes globose, ca. 1 cm in diam., 30–45-flowered; bracts white or yellow, ovate or elliptic. Calyx tube ca. 0.8 mm, 4-lobed; lobes toothlike or rounded, inside pubescent with white or brown appressed trichomes. Petals narrowly elliptic, ca. 2.5 × 1 mm. Anthers blackish brown, ellipsoid. Style cylindrical, proximally densely pubescent with white trichomes. Compound fruit red at maturity, globose, 1.2–1.6 cm in diam.; peduncle 7–10 cm, usually without a thickened ring at base. Fl. May–Jun, fr. Oct–Nov.

● Mixed woods; 900–2700 m. Sichuan, Yunnan.

6. Cornus subg. **Arctocrania** (Endlicher) Reichenbach, Deut. Bot. Herb.-Buch 143. 1841.

草茱萸亚属 cao zhu yu ya shu

Cornus [unranked] *Arctocrania* Endlicher, Gen. Pl. 798. 1839; *Arctocrania* (Endlicher) Nakai.

Herblike shrubs, perennial, with vertical stem and creeping rhizomes. Leaves in whorls of 6 near summit of stem (or opposite at all nodes), sessile or shortly petiolate, palmately or pinnately veined, entire. Inflorescence a terminal compound cyme subtended by 4 white or rarely pinkish petaloid bracts. Calyx tubular, 4-dentate. Petals white, dark purple, or purple adaxially, white abaxially, oblong-ovate to ovate, apex of 1 or 2 petals often with a soft awnlike appendage. Stamens 4; filaments short; anthers oblong or oblong-ovoid. Ovary 2-loculed, ovule 1 per locule, pendulous; style cylindrical; stigma capitate, small. Fruit red, globose; stones ellipsoid-ovoid to subglobose.

Three species: circumboreal, from Europe to NE Asia, N North America, also in the high mountains of Myanmar; one species in China.

25. Cornus canadensis Linnaeus, Sp. Pl. 1: 118. 1753.

草茱萸 cao zhu yu

Chamaepericlymenum canadense (Linnaeus) Ascherson & Graebner; *Cornella canadensis* (Linnaeus) Rydberg.

Herblike shrubs, perennial, rhizomatous, 10–20 cm tall. Rhizomes creeping, slender. Vertical stems slender, unbranched. Leaves opposite, often appearing as a whorl of 6 at terminal node due to compression of internodes, 2 larger and 4 smaller; smaller ones developing from axillary buds of larger leaves; leaves at lower nodes rudimentary; petiole 2–3 mm; leaf blade obovate to ± diamond-shaped, 3.5–4.8 × 1.5–2.5 cm, papery,

veins 2 or 3, base cuneate, margin entire, apex shortly acuminate. Inflorescences compound cymes, terminal; bracts white, broadly ovate, 0.8–1.2 × 0.5–1.1 cm, with 7 parallel veins. Flowers white, ca. 2 mm in diam. Calyx tube obovate, ca. 1 mm, densely pubescent with grayish white appressed trichomes; teeth higher than disk. Petals reflexed, creamy white, ovate-lanceolate, 1.5–2 mm. Stamens ca. 1 mm; anthers yellowish white, narrowly ovoid. Style ca. 1 mm, glabrous. Fruit red at maturity, globose, ca. 5 mm in diam.; stones ellipsoid-ovoid. Fl. Jul–Aug, fr. Aug–Sep.

Montane coniferous forests, margins of woods, old tree stumps, mossy areas, open and moist habitats; ca. 1200 m. S Jilin (Changbai Shan) [Japan, Korea, N Myanmar, Russia (Far East); North America].