

TILIACEAE

椴树科 duan shu ke

Tang Ya (唐亚)¹; Michael G. Gilbert²; Laurence J. Dorr³

Trees, shrubs, or herbs. Leaves simple, alternate or rarely opposite, basally veined, entire or serrate, sometimes lobed; stipule, when present, caducous or persistent. Inflorescences cymose or cymose-paniculate. Flowers bisexual or unisexual (plants dioecious), actinomorphic. Bracts caducous or sometimes large and persistent. Sepals (4 or)5, free or sometimes basally connate, valvate. Petals as many as sepals, sometimes absent, free, usually glandular on adaxial surface. Androgynophore present or absent. Stamens numerous, rarely 5, free or connate into fascicles at base; anthers 2-loculed, dehiscence longitudinal or apical; petaloid staminodes alternating with petals or absent. Ovary superior, 2–6-loculed, sometimes more; ovules 1 to many per locule; placentation axile; style simple, sometimes free; stigma acute or peltate, usually lobed. Fruit usually a drupe, capsule, or schizocarp, sometimes a berry or samara, 2–10-loculed. Seeds without aril; endosperm copious; embryo erect; cotyledons flat.

About 52 genera and ca. 500 species: primarily in tropical and subtropical areas; 11 genera and 70 species (32 endemic) in China.

Molecular data have shown that the members of the Tiliaceae as here defined fall clearly into four clades that can either be treated as subfamilies within an enlarged Malvaceae or as families in their own right. In this view the Tiliaceae/Tilioideae is restricted to *Tilia* and *Craigia*, along with the Central American *Mortoniodendron* Standley & Steyermark; *Colona*, *Corchorus*, *Grewia*, *Microcos*, and *Triumfetta* are placed in the Sparmanniaceae/Grewioideae; *Berrya* and *Diplodiscus* are placed in the Brownlowiaceae/Brownlowioideae; and *Burretiodendron* and *Excentrodendron* form a basal group of uncertain placement, possibly most closely allied to the Pentapetaceae/Dombeyoideae which includes mostly genera here placed in the Sterculiaceae.

Plagiopteron Griffith, included in the Tiliaceae in FRPS (49(1): 48–50. 1989), is now regarded as either a member of the Celastraceae or a separate family, Plagiopteraceae (see Fl. China 11).

Chang Hung-ta & Miau Ru-huai. 1989. Tiliaceae. In: Chang Hung-ta, ed., Fl. Reipubl. Popularis Sin. 49(1): 47–123.

1a. Herbs or subshrubs.

- 2a. Androgynophore absent; petals eglandular; fruit a smooth capsule 3. *Corchorus*
2b. Androgynophore present; petals glandular; fruit a spiny or bristly capsule 7. *Triumfetta*

1b. Trees or shrubs.

- 3a. Each inflorescence with a single large, persistent, band-shaped bract partially connate with peduncle 1. *Tilia*
3b. Inflorescence without such a bract.
4a. Fruit without wings, at the most ridged.
5a. Calyx campanulate; fruit a capsule; androgynophore absent 8. *Diplodiscus*
5b. Calyx with free sepals; fruit a drupe, often 2- or 4-lobed; short androgynophore present.
6a. Inflorescences paniculate, terminal; stigma subulate, not lobed 5. *Microcos*
6b. Inflorescences cymose, usually axillary; stigma swollen, lobed 6. *Grewia*
4b. Fruit with well-defined wings.
7a. Calyx campanulate; ovary 3-loculed; fruit with 3 pairs of long wings 9. *Berrya*
7b. Calyx divided to base or near to base; ovary 3–5-loculed; fruit with 3–5 wings.
8a. Flowers bisexual.
9a. Basal veins 3; inflorescences axillary, cymose; petals absent 2. *Craigia*
9b. Basal veins 5–7; inflorescences usually terminal, paniculate; petals 5 4. *Colona*
8b. Flowers unisexual or polygamous.
10a. Leaf blade leathery, glabrous, basal veins 3 10. *Excentrodendron*
10b. Leaf blade papery, stellate scaly or stellate pilose, basal veins 5–9 11. *Burretiodendron*

1. *TILIA* Linnaeus, Sp. Pl. 1: 514. 1753.

椴树属 duan shu shu

Trees deciduous. Leaves alternate; stipule caducous; leaf blade base usually slightly oblique, cordate, truncate, or rounded, margin usually serrate or sometimes entire, often with hairy domatia in axils of veins. Inflorescences axillary, cymose, 3- to many-flowered. Bracts adnate to inflorescence peduncle, band-shaped, large, persistent. Flowers bisexual. Sepals 5, with adaxial nectary at base. Petals 5, white or yellow, imbricate. Stamens many, free or connate into 5 fascicles; anthers 2-locular, dorsifixed; staminodes when present petaloid, tightly enclosing style and stigma, alternating with petals. Ovary 5-loculed, ovoid, usually hairy after anthesis;

¹ Department of Environmental Sciences, Sichuan University, Chengdu, Sichuan 610065, People's Republic of China.

² Missouri Botanical Garden c/o Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, United Kingdom.

³ United States National Herbarium, Department of Botany, National Museum of Natural History, MRC-166, Smithsonian Institution, P.O. Box 37012, Washington, DC 20013-7012, U.S.A.

ovules 2 per locule; style glabrous; stigma apparent, 5-lobed. Fruit a nut or capsule, globose, obovoid, ellipsoid, or ovoid, pericarp usually hairy, mostly woody or fragile and indehiscent, rarely leathery and dehiscent when dry. Seeds 1 or 2.

Between 23 and 40 species: primarily in temperate and subtropical regions; 19 species (15 endemic) in China.

Tilia is very distinct by its unique bracts adnate to the peduncle of the inflorescence. It is in the process of being monographed by C. D. Pigot, who has studied many populations in China, but this work is not yet available. An initial publication (Pigott, Edinburgh J. Bot. 59: 239–246. 2002) indicated that he intends to accept only 23 species in total, 13 of these occurring in China, and he intends to include many of the more recently described Chinese species within the very variable *Tilia tuan*. Chromosome numbers were given for all those taxa that he accepts. Tang and Zhuge (Acta Phytotax. Sin. 34: 254–264. 1996) recognized 14 “good” species in China, 17 in E Asia, and 25 in total, but Tang noted that more study for a taxonomic revision is needed.

Modern molecular analyses indicate that *Tilia* and *Craigia* form a very distinct lineage that could be treated as a distinct family or subfamily restricted to just these two genera plus the poorly known Central American genus *Mortonioidendron* Standley & Steyermark.

- 1a. Fruit exocarp leathery, dehiscent when dry 1. *T. endochrysea*
 1b. Fruit exocarp woody or thickly leathery, indehiscent.
 2a. Exocarp thickly leathery, fragile; bract with stalk.
 3a. Leaf blade 4–6 cm; fruit 5-angled.
 4a. Cymes 5–8 cm; leaf blade apex usually 3-lobed; petaloid staminodes present; fruit obovoid 15. *T. mongolica*
 4b. Cymes 3–5 cm; leaf blade apex usually not lobed; staminodes absent; fruit ovoid 16. *T. amurensis*
 3b. Leaf blade 5–10 cm; fruit not angled or only weakly so.
 5a. Ovary glabrous; cymes (20–)40–100-flowered, with bracteoles 19. *T. jiaodongensis*
 5b. Ovary hairy; cymes 3–16-flowered, without bracteoles.
 6a. Leaf blade orbicular, brown when dry; fruit ovoid; sepals abaxially sparsely stellate hairy; pedicel 5–8 mm; bracts 3.5–6 cm 17. *T. japonica*
 6b. Leaf blade ovate or ovate-triangular, greenish when dry; fruit obovoid; sepals abaxially glabrous; pedicel 10–15 mm; bracts 5–8.5 cm 18. *T. paucicostata*
 2b. Exocarp woody, hard; bract sessile or with short stalk, basal 1/3–1/2 adnate to peduncle.
 7a. Fruit not angled, apex rounded.
 8a. Leaf blade margin entire or with a few teeth near apex 10. *T. tuan*
 8b. Leaf blade prominently serrate.
 9a. Bracts with stalk 5–8 cm.
 10a. Leaf blade broadly ovate, abaxially hairy in vein axils only 13. *T. chingiana*
 10b. Leaf blade ovate, suborbicular, or ovate-oblong, abaxially uniformly tomentose or puberulent.
 11a. Branchlets hairy; bracts 12–16 cm 10. *T. tuan*
 11b. Branchlets glabrous; bracts 6–9 cm 7. *T. likiangensis*
 9b. Bracts usually sessile.
 12a. Leaf blade submembranous, abaxially glabrous or hairy in axils of veins only 11. *T. membranacea*
 12b. Leaf blade thicker, not membranous, abaxially uniformly hairy.
 13a. Leaf blade marginal teeth awnlike, 1.5–5 mm; bracts 3.5–9 cm 2. *T. mandshurica*
 13b. Leaf blade marginal teeth smaller, not awnlike; bracts 8–12 cm.
 14a. Cymes 3–22-flowered; leaf blade base usually oblique 10. *T. tuan*
 14b. Cymes 3–12-flowered; leaf blade base symmetrically cordate 12. *T. miqueliana*
 7b. Fruit prominently or weakly 5-angled, apex acute or obtuse.
 15a. Old leaves abaxially glabrous or hairy in axils of veins only; branchlets glabrous or rarely hairy when very young.
 16a. Cymes 50–200-flowered 14. *T. taishanensis*
 16b. Cymes 1–15-flowered.
 17a. Bract with stalk 0.4–2 cm.
 18a. Leaf blade suborbicular, marginal teeth 3–5 mm; bracts 7–10 × 1–1.3 cm 3. *T. henryana*
 18b. Leaf blade broadly ovate, marginal teeth small and dense; bracts 6–6.5 × 1.5–1.8 cm 8. *T. callidonta*
 17b. Bract sessile.
 19a. Leaf blade (5.5–)10–14(–17) cm; fruit weakly 5-angled 9. *T. nobilis*
 19b. Leaf blade 5–10 cm; fruit prominently 5-angled 4. *T. chinensis*
 15b. Old leaves abaxially uniformly densely hairy; branchlets hairy or not.
 20a. Branchlets hairy.
 21a. Leaf blade marginal teeth less than 1.5 mm, lateral veins 7–9 pairs; fruit ovoid-globose 4. *T. chinensis*

- 21b. Leaf blade marginal teeth 1.5–5 mm, lateral veins 5–7 pairs; fruit globose or obovoid.
 22a. Branchlets and leaves yellow stellate tomentose; leaf blade orbicular, marginal teeth with long mucros 3–5 mm 3. *T. henryana*
 22b. Branchlets and leaves gray stellate tomentose; leaf blade ovate-orbicular, marginal teeth triangular 2. *T. mandshurica*
 20b. Branchlets glabrous.
 23a. Leaf blade marginal teeth 3–5 mm; bract stalk 0.7–2 cm 3. *T. henryana*
 23b. Leaf blade marginal teeth less than 2 mm; bract stalk usually less than 5 mm.
 24a. Leaf blade broadly elliptic, abaxially tomentose; bracts sessile or subsessile.
 25a. Cymes 1–3-flowered; petals 8–9 mm 4. *T. chinensis*
 25b. Cymes 7–20-flowered; petals 6–7 mm 5. *T. oliveri*
 24b. Leaf blade ovate-oblong or obliquely ovate, abaxially puberulent or puberulent; bracts stalked.
 26a. Petiole glabrous, leaf margin deeply serrate, teeth extending into awns 6. *T. kweichouensis*
 26b. Petiole stellate pubescent, leaf margin serrulate 7. *T. likiangensis*

1. *Tilia endochrysea* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 9. 1926.

白毛榉 bai mao duan

Tilia begoniifolia Chun & H. D. Wong (1935), not Steven (1846); *T. croizatii* Chun & H. D. Wong; *T. hypoglauca* Rehder; *T. lepidota* Rehder; *T. leptocarya* Rehder; *T. leptocarya* var. *triloba* Rehder; *T. scalenophylla* Ling; *T. vitifolia* Hu & F. H. Chen (1951), not Host (1831).

Trees to 20 m tall. Bark gray with longitudinal dark gray fissures; branchlets bright green when young, glabrous or minutely hairy; buds 3–3.5 mm, glabrous. Stipules oblong, 7–10 mm; petiole 3–7 cm, nearly glabrous; leaf blade dark brown when dry, broadly to narrowly ovate or almost triangular, sometimes apically 3–5-lobed, 7–16 × 5–13 cm, abaxially gray-white stellate tomentose, sometimes glabrescent, adaxially glabrous, base obliquely cordate or truncate, margin sparsely denticulate, teeth 5–12 mm apart, apex acuminate or acute. Cymes 9–16 cm, 8–32-flowered; peduncle 3.5–9 cm, nearly glabrous. Bracts narrowly oblong, 6–13 × 1.5–3 cm, adnate to peduncle for 1–1.5 cm, abaxially gray-white stellate puberulent, adaxially glabrous or sparsely hairy, base cuneate to cordate, apex rounded; stalk 1–3 cm. Pedicel 2–15 mm, stellate pilose. Sepals narrowly ovate, 6–8 mm, gray-brown puberulent. Petals 0.9–1.2 cm. Stamens ca. 40, as long as sepals; staminodes slightly shorter than petals. Ovary hairy; style 4–5 mm, glabrous; stigma 5-lobed. Fruit globose, leathery, dehiscent into 5-valves. Fl. Jul–Aug. $2n = 82^*$.

• Species-rich mixed evergreen and deciduous woodlands, often on steep sides of narrow valleys and along rivers on well-drained brown soils; 600–1200 m. S Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang.

Pigott (Bot. Mag. 23: 56–61. 2006) gave a discussion of the taxonomy and ecology of *Tilia endochrysea*.

2. *Tilia mandshurica* Ruprecht & Maximowicz, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 15: 124. 1856.

糠榉 kang duan

Trees to 20 m tall, to 0.5(–0.7) m d.b.h. Bark dark gray, longitudinally fissured when old; branchlets gray-white stellate tomentose when young; buds tomentose. Petiole robust, 2–5

cm, stellate tomentose, glabrescent; leaf blade ovate-orbicular, 8–10 × 7–9 cm, abaxially densely gray stellate tomentose, adaxially glabrous, lateral veins 5–7 pairs, base obliquely cordate or truncate, margin dentate, teeth triangular, 1.5–5 mm, with or without awns, 4–7 mm apart, apex acute. Cymes 6–12(–20)-flowered, 6–9 cm; peduncle hairy. Bracts narrowly oblong or narrowly oblanceolate, 5–9 × 1–2.4 cm, adnate to peduncle for 1/3–1/2 of length, abaxially stellate puberulent, adaxially glabrous, base obtuse, apex rounded; stalk 4–5 mm. Pedicel 4–6 mm, hairy. Sepals ca. 5 mm, abaxially stellate puberulent, silky, adaxially villous. Petals 7–8 mm. Stamens as long as sepals; staminodes slightly smaller than petals. Ovary stellate tomentose; style 4–5 mm, glabrous. Fruit globose, ovoid or obovoid, weakly to prominently 5-angled, 7–9 mm, sometimes tuberculate; exocarp woody, indehiscent. Fr. Jul, fr. Sep. $2n = 82$.

Hebei, Heilongjiang, N Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong [Japan, Korea, Russia (Siberia)].

- 1a. Fruit obovoid or obovoid-cylindrical, prominently 5-angled 2d. var. *megaphylla*
 1b. Fruit globose or ovoid, rarely obscurely angled.
 2a. Fruit prominently tuberculate 2b. var. *tuberculata*
 2b. Fruit not tuberculate.
 3a. Fruit globose, weakly 5-angled 2a. var. *mandshurica*
 3b. Fruit ovoid, rarely obscurely angled 2c. var. *ovalis*

2a. *Tilia mandshurica* var. *mandshurica*

糠榉(原变种) kang duan (yuan bian zhong)

Tilia pekingensis Ruprecht ex Maximowicz.

Leaf blade marginal teeth with awns. Bracts 5–9 × 1–2.4 cm. Fruit globose, weakly 5-angled, not tuberculate.

Hebei, Heilongjiang, N Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong [Japan, Korea, Russia (Siberia)].

2b. *Tilia mandshurica* var. *tuberculata* Liou & Li, Ill. Man. Woody Pl. N.-E. Prov. 565. 1955.

瘤果糠榉 liu guo kang duan

Leaf blade marginal teeth with awns. Bracts 3.5–5.5 cm. Fruit globose, prominently tuberculate.

- Liaoning.

2c. *Tilia mandshurica* var. *ovalis* (Nakai) Liou & Li, Ill. Man. Woody Pl. N.-E. Prov. 565. 1955.

卵果糠椴 luan guo kang duan

Tilia ovalis Nakai, Bot. Mag. (Tokyo) 35: 15. 1921.

Leaf blade smaller, marginal teeth without awns. Bract 5–9 cm. Fruit ovoid, rarely obscurely 5-angled, not tuberculate.

Jilin [Japan].

2d. *Tilia mandshurica* var. *megaphylla* (Nakai) Liou & Li, Ill. Man. Woody Pl. N.-E. Prov. 418. 1955.

棱果辽椴 leng guo liao duan

Tilia megaphylla Nakai, Bot. Mag. (Tokyo) 27: 130. 1913.

Leaf blade larger, marginal teeth with awns. Bract 5–9 cm. Fruit obovoid or obovoid-cylindrical, prominently 5-angled, densely stellate hairy, not tuberculate.

Heilongjiang [Korea].

3. *Tilia henryana* Szyszłowicz, Hooker's Icon. Pl. 20: t. 1927. 1890.

毛糯米椴 mao nuo mi duan

Trees to 25 m. Bark pale gray, fissured; branchlets and buds yellow stellate tomentose or glabrous. Petiole 3–5 cm, yellow tomentose; leaf blade orbicular, 6–10 × 6–10 cm, abaxially densely yellow stellate tomentose or hairy only in vein axils, adaxially glabrous, lateral veins 5–6 pairs, extending into 3–5 mm awns, base cordate, sometimes oblique, margin serrate, apex broadly rounded, shortly caudate. Cymes 30–100-flowered, 10–12 cm; peduncle stellate puberulent. Bracts narrowly oblanceolate, 7–10 × 1–1.3 cm, adnate to peduncle for 3–5 cm, abaxially yellow stellate puberulent, adaxially sometimes glabrous, base narrow, apex obtuse; stalk 0.7–2 cm. Pedicel 7–9 mm, hairy. Sepals narrowly ovate, 4–5 mm, abaxially hairy. Petals 6–7 mm. Stamens as long as sepals; staminodes shorter than petals. Ovary hairy; style ca. 4 mm. Fruit obovoid, 5-angled, 7–9 mm, stellate hairy; exocarp woody, hard, indehiscent. Fl. Jun. $2n = 164^*$.

- Anhui, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Zhejiang.

- 1a. Branchlets yellow stellate tomentose; leaf blade abaxially densely yellow stellate tomentose 3a. var. *henryana*
- 1b. Branchlets glabrous or nearly so; leaf blade abaxially hairy in vein axils, otherwise glabrous 3b. var. *subglabra*

3a. *Tilia henryana* var. *henryana*

毛糯米椴(原变种) mao nuo mi duan (yuan bian zhong)

Branchlets yellow stellate tomentose. Leaf blade abaxially densely yellow stellate tomentose. Bracts adaxially yellow stellate puberulent.

• Anhui, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Zhejiang.

3b. *Tilia henryana* var. *subglabra* V. Engler, Monogr. *Tilia*, 125. 1909.

糯米椴 nuo mi duan

Branchlets and bud glabrous or nearly so. Leaf blade abaxially hairy in vein axils only, marginal teeth 3–5 mm. Bracts adaxially glabrous.

- Anhui, Jiangsu, Jiangxi, Zhejiang.

4. *Tilia chinensis* Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 83. 1890.

华椴 hua duan

Trees to 30 m tall. Branchlets usually brown when dry, glabrous, rarely sparsely pilose or densely tomentose; winter buds big, bud scale glabrous. Petiole 3–8 cm, usually sparsely pilose; leaf blade broadly elliptic or orbicular to ovate-orbicular, (5–)7–13 × (4.5–)6–9 cm, papery, abaxially densely stellate tomentose, adaxially glabrous, basal veins 5–7, lateral veins 7–9 pairs, base usually oblique, cordate, truncate, or rounded, margin serrate, apex acuminate or shortly acuminate. Cymes 1–3-flowered, usually not exceeding bract, shorter than leaves; peduncle hairy. Bracts long band-shaped, 4–9(–12) × 1–2 cm, adnate to peduncle for 2/5–1/2 of length, abaxially hairy, adaxially glabrous, sessile or with stalk to 0.5 cm. Sepals narrowly ovate, 6–7 mm, abaxially stellate hairy, adaxially stellate tomentose or glabrous at central part, margin densely hairy. Petals 8–9 mm, glabrous. Stamens 30–45, in 5 fascicles; staminodes 5, smaller than petals. Ovary 5-angled, gray-yellow tomentose; style glabrous; stigma peltate or capitate. Fruit ellipsoid or globose, prominently 5-angled, 10–14 × 8–9 mm, gray-yellow tomentose; exocarp woody, hard, indehiscent. Fl. Jun–Jul, fr. Aug–Oct. $2n = 164^*$.

- Forests; 1800–3100(–3900) m. Gansu, Henan, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

- 1a. Old leaves abaxially subglabrous and hairy in axils of veins only 4b. var. *investita*
- 1b. Old leaves abaxially densely hairy.
 - 2a. Branchlets glabrous 4a. var. *chinensis*
 - 2b. Branchlets hairy 4c. var. *intonsa*

4a. *Tilia chinensis* var. *chinensis*

华椴(原变种) hua duan (yuan bian zhong)

Tilia baroniana Diels; *T. laetevirens* Rehder & E. H. Wilson; *T. yunnanensis* Hu.

Branchlets glabrous or rarely hairy when very young. Leaf blade 7–13 × 6–9 cm, abaxially densely stellate tomentose when old, marginal awns 3–5 mm. Fruit ellipsoid or globose.

- Forests; 1800–3100(–3900) m. Gansu, Henan, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

4b. *Tilia chinensis* var. *investita* (V. Engler) Rehder, J. Arnold Arbor. 12: 75. 1931.

秃华椴 tu hua duan

Tilia baroniana var. *investita* V. Engler, Monogr. *Tilia*, 132. 1909.

Branchlets glabrous or very nearly so. Leaf blade 5–10 × 4.5–9 cm, abaxially subglabrous and hairy in vein axils only when old. Fruit ellipsoid or globose.

- Hubei, Shaanxi, Sichuan, ?Xizang, Yunnan.

4c. *Tilia chinensis* var. *intonsa* (E. H. Wilson) Y. C. Hsu & R. Zhuge, J. SouthW. Forest. Coll. 11(1): 3. 1991.

多毛椴 duo mao duan

Tilia intonsa E. H. Wilson in Sargent, Pl. Wilson. 2: 365. 1915; *T. fulvosa* Hung T. Chang.

Branchlets densely tomentose. Leaf blade marginal teeth shorter than 1.5 mm. Fruit ovoid-globose.

- Sichuan.

5. *Tilia oliveri* Szyszylowicz, Hooker's Icon. Pl. 20: sub t. 1927. 1890.

鄂椴 e duan

Trees 6–26 m tall. Bark dark gray, smooth with shallow furrows and rounded ridges; branchlets glabrous; winter buds big, glabrous or hairy. Petiole 1.5–5 cm, glabrous or rarely pilose; leaf blade broadly elliptic, ovate-orbicular, or triangular-ovate, 6–14 × 4.5–10 cm, abaxially densely gray-white stellate tomentose, adaxially glabrous, lateral veins 5–6 pairs, base shallowly cordate to obliquely truncate, margin serrate to serrulate, teeth often awned, apex shortly acuminate. Cymes 7–20-flowered, as long as or shorter than bracts. Bracts band-shaped, sometimes broader distally, 5–8 × 1–2.5 cm, adnate to peduncle for 2/5 of length, sessile. Sepals triangular-ovate, 5–6 mm, abaxially densely stellate puberulent, adaxially densely tomentose. Petals 5, 6–7 mm, glabrous. Stamens 45, in 5 fascicles, glabrous; staminodes smaller than petals, glabrous, stalked. Ovary densely stellate tomentose; style glabrous. Fruit obovoid, globose, or ellipsoid, 7–10 mm, gray-white tomentose and verrucose; exocarp woody, hard, indehiscent. Fl. Jun–Aug, fr. Aug–Sep. $2n = 82^*$.

- Evergreen or mixed evergreen and deciduous forests; 1300–2300 m. Gansu, Hubei, Hunan, Shaanxi, Sichuan.

- 1a. Leaf blade abaxially gray-white tomentose, marginal teeth often extending into distinct awn 5a. var. *oliveri*
- 1b. Leaf blade abaxially loosely yellow-brown or gray stellate tomentose to pubescent, marginal teeth short and broad 5b. var. *cinerascens*

5a. *Tilia oliveri* var. *oliveri*

鄂椴(原变种) e duan (yuan bian zhong)

Tilia pendula V. Engler ex C. K. Schneider.

Petiole 1.5–5 cm; leaf blade 6–10 cm, broadly elliptic, ovate-orbicular, or triangular-ovate, abaxially gray-white tomentose, adaxially glabrous, marginal teeth often prominently awned.

- Evergreen or mixed evergreen and deciduous forests; 1300–2300 m. Gansu, Hubei, Hunan, Shaanxi, Sichuan.

5b. *Tilia oliveri* var. *cinerascens* Rehder & E. H. Wilson in Sargent, Pl. Wilson. 2: 367. 1915.

灰背椴 hui bei duan

Tilia populifolia Hung T. Chang (1982), not Lesquereux [fossil].

Petiole 3–5 cm; leaf blade to 14 cm, abaxially loosely yellow-brown or gray stellate tomentose to pubescent, marginal teeth short and broad.

- Forests; 1600–2300 m. Hubei.

6. *Tilia kueichouensis* Hu, Acta Phytotax. Sin. 8: 198. 1963.

黔椴 qian duan

Tilia nanchuanensis Hung T. Chang.

Trees to 10 m tall. Branchlets and terminal bud glabrous. Petiole 2–3 cm, glabrous; leaf blade obliquely ovate, 9.5–13.5 × 5–7.5 cm, papery, abaxially sparsely stellate puberulent, adaxially glabrous, lateral veins 6 pairs, base cordate or truncate, margin deeply serrate, teeth extended into awns, apex acute. Bracts narrowly oblong, shorter than infructescence stalk, 6.5–8 × 1–1.2 cm, adnate to peduncle for 1/2 of length, base narrowed, apex obtuse; stalk short. Flowers unknown. Infructescence stalk and stipe terete, slender, glabrous. Fruit globose, obscurely ridged, ca. 8 mm in diam., densely appressed hairy, verruculose, apex acute; exocarp woody, hard, indehiscent. Fr. Aug–Sep.

- Chongqing, N Guizhou, ?Yunnan.

7. *Tilia likiangensis* Hung T. Chang, Acta Phytotax. Sin. 20: 171. 1982.

丽江椴 li jiang duan

Trees. Branchlets and terminal bud gray stellate or glabrescent. Petiole slender, 2–3.5 cm, stellate pubescent; leaf blade ovate-oblong, 9–12 × 4–6 cm, papery, abaxially gray appressed-pubescent, adaxially glabrous, lateral veins 6–7 pairs, base oblique, cordate or truncate, margin serrulate, apex acuminate. Cymes 6–16-flowered, 7–11 cm; peduncle glabrous. Bracts narrowly oblanceolate, 6–9 × 1–1.5 cm, abaxially gray stellate pilose, adaxially glabrous, basal 1/2 tapering, decurrent, apex obtuse; stalk 0.5–0.7 cm. Pedicel grooved, 7–9 mm, gray hairy. Sepals narrowly ovate, 4–5 mm, abaxially gray hairy. Petals ovate, 6–7 mm. Stamens 35, 3–4 mm; staminodes ca. 5 mm; stalk ca. 1.5 mm. Ovary tomentose; style 3–4 mm. Fruit with exocarp woody, hard, indehiscent.

- Forests; ca. 2300 m. NW Yunnan.

8. *Tilia callidonta* Hung T. Chang, Acta Phytotax. Sin. 20: 171. 1982.

美齿椴 mei chi duan

Trees to 10 m tall. Branchlets and terminal bud pilose. Petiole 3–4.5 cm, nearly glabrous; leaf blade broadly ovate, 6–9 × 5–7 cm, abaxially yellowish green, glabrescent, hairy only in

vein axils, adaxially glabrous, lateral veins 5–6 pairs, base symmetrical or oblique, cordate, sometimes truncate, margin regularly serrulate, apex acute. Cymes 9–12-flowered, 5–8 cm; peduncle slender, 5–7 cm, hairy. Bracts narrowly oblong, 6–6.5 × 1.5–1.8 cm, proximal 1.5–2.5 cm adnate to peduncle, luminous adaxially, stellate pilose abaxially, base cuneate, apex obtuse; stalk 1–1.5 cm. Flowers not seen. Fruiting pedicel 7–15 mm, hairy. Fruit narrowly obovoid, prominently 5-angled, 10–12 × ca. 5 mm, tomentose, apex pointed; exocarp woody, hard, indehiscent.

- NW Yunnan.

9. *Tilia nobilis* Rehder & E. H. Wilson in Sargent, Pl. Wilson. 2: 363. 1915.

大叶椴 da ye duan

Trees 4–12 m tall. Branchlets glabrous; terminal bud glabrous or sparsely pilose. Petiole 4–10 cm, glabrous; leaf blade nearly orbicular, (5.5–)10–14(–17) × (5–)7–8(–13) cm, papery, abaxially glabrous or fascicled hairy in vein axils only, adaxially glabrous, basal veins 5, lateral veins 6–8 pairs, minor veinlets prominently raised abaxially, base oblique, cordate, truncate, or rounded, margin serrate, apex acuminate or shortly caudate. Cymes 3–16-flowered, usually longer than or equaling bracts; peduncle adnate to bract for 2/5–1/2 length. Bracts broadly oblanceolate or narrowly oblong, 8–16 × 1.5–2.5 cm, abaxially nearly glabrous or sparsely pilose, adaxially glabrous; stalk to 0.5 cm. Sepals abaxially subglabrous or sparsely pilose, adaxially villous at base, margin densely hairy. Petals oblanceolate, glabrous, shortly stalked. Stamens 30–45; staminodes spatulate, long stalked. Ovary tomentose or nearly glabrous in bud; style glabrous; stigma prominently swollen, 2-lobed. Fruit nearly globose, sometimes prominently 5-angled, ca. 10 mm in diam., yellowish tomentose; exocarp woody, hard, indehiscent. Fl. Jun–Jul, fr. Aug–Oct. $2n = ca. 328^*$.

- Forests; 1800–2500 m. Henan, Sichuan, Yunnan.

10. *Tilia tuan* Szyszylowicz, Hooker's Icon. Pl. 20: t. 1926. 1890.

椴树 duan shu

Trees 10–20 m tall. Bark gray, longitudinally exfoliate; branchlets glabrous or tomentose; terminal bud glabrous or hairy. Petiole 1–6 cm, glabrous or tomentose; leaf blade narrowly ovate or ovate-oblong to ovate-orbicular, 6.5–17 × 3.5–11 cm, abaxially glabrous to densely shortly gray-white or brown tomentose, adaxially glabrous, lateral veins 3–11 pairs, base oblique, rounded, truncate, or cordate, margin entire or with a few minute teeth near apex or prominently dentate, apex acuminate or acute. Cymes 3–22-flowered, 5–14 cm, glabrous or hairy. Bracts band-shaped to oblanceolate, 6–16 × 1–3 cm, adnate to peduncle for ca. 1/2 of length, stellate pilose or tomentose to glabrous, base cuneate to rounded, apex obtuse to acuminate, sessile or stalk 0.5–0.8 cm. Pedicel 4–9 mm, glabrous or tomentose. Sepals ovate to ovate-lanceolate, 4–6 mm, abaxially puberulent, adaxially villous at base, margin densely hairy. Petals 6–8 mm, glabrous, shortly clawed. Stamens 35–50, in 5 fascicles, glabrous; staminodes 5, oblanceolate, prominently keeled. Ovary ovoid, densely gray-white stellate tomen-

tose; style 3–4 mm, glabrous. Fruit globose or obovoid-globose, not ridged, 7–11 × 7–9 mm, brown or gray hairy, verrucose; exocarp woody, hard, indehiscent. Fl. Jun–Jul, fr. Jul–Nov. $n = 82^*$.

- Forests; 1200–2400 m. Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang.

Tilia tuan has long been recognized as the most variable *Tilia* within China (e.g., by Rehder and Wilson in Sargent, Pl. Wilson. 2: 368. 1915). Pigott (Edinburgh J. Bot. 59: 239–246. 2002) indicated that he believes that a number of the more local species in China should be included within *T. tuan*, a view that has been at least partially followed in this account.

- 1a. Leaf blade entire or with a few teeth near apex 10a. var. *tuan*
- 1b. Leaf blade prominently dentate.
 - 2a. Cymes 16–22-flowered; bracts 8–12 cm, usually sessile 10b. var. *chinensis*
 - 2b. Cymes 3–6-flowered; bracts 12–16 cm, stalk 5–8 mm 10c. var. *chenmoui*

10a. *Tilia tuan* var. *tuan*

椴树(原变种) duan shu (yuan bian zhong)

Tilia angustibracteata Hung T. Chang; *T. gracilis* Hung T. Chang; *T. hupehensis* W. C. Cheng ex Hung T. Chang; *T. integrissima* Hung T. Chang; *T. mesembrinos* Merrill; *T. mofungensis* Chun & H. D. Wong; *T. oblongifolia* Rehder; *T. obscura* Handel-Mazzetti; *T. omeiensis* Fang; *T. tristis* Chun ex Hung T. Chang; *T. tuan* var. *cavaleriei* Engler & H. Léveillé; *T. tuan* f. *divaricata* V. Engler; *T. tuan* var. *pruinosa* V. Engler.

Branchlets glabrous or tomentose. Leaf blade narrowly ovate or ovate-oblong to ovate-orbicular, 6.5–17 × 3.5–11 cm, abaxially glabrous to densely shortly gray-white or brown tomentose, adaxially glabrous, lateral veins 3–11 pairs, base oblique, rounded, truncate, or cordate, margin entire or with a few minute teeth near apex. Cymes 3–22-flowered. Bracts 6–16 × 1–3 cm, sessile or stalk 0.5–0.8 cm.

- Forests; 1200–2000 m. Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang.

10b. *Tilia tuan* var. *chinensis* (Szyszylowicz) Rehder & E. H. Wilson in Sargent, Pl. Wilson. 2: 369. 1915.

毛芽椴 mao ya duan

Tilia miqueliana Maximowicz var. *chinensis* Szyszylowicz, Hooker's Icon. Pl. 20: sub t. 1927. 1890; *T. oblongifolia* var. *sangzhiensis* B. R. Liao & W. X. Wang.

Branchlets and terminal buds tomentose. Leaf blade broadly ovate, 10–12 × 7–10 cm, abaxially gray stellate tomentose, base usually oblique, margin prominently dentate. Cymes 16–22-flowered. Bracts 8–12 cm, sessile.

- Guizhou, Hubei, Hunan, Jiangsu, Sichuan, Zhejiang.

10c. *Tilia tuan* var. *chenmoui* (W. C. Cheng) Y. Tang, **comb. et stat. nov.**

长苞椴 chang bao duan

Basionym: *Tilia chenmoui* W. C. Cheng, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 10: 170. 1936.

Branchlets densely yellowish stellate tomentose. Leaf blade abaxially tomentose, margin prominently dentate. Cymes 3–6-flowered. Bracts 12–16 cm; stalk 5–8 mm.

- Forests on streamsides; 2100–2400 m. W Yunnan (Binchuan).

11. *Tilia membranacea* Hung T. Chang, Acta Phytotax. Sin. 20: 173. 1982.

膜叶椴 mo ye duan

Trees to 10 m tall. Bark smooth; branchlets glabrous. Petiole slender, 2–3.5 cm, glabrous; leaf blade ovate, 6–10 × 4–6 cm, nearly membranous, both surfaces glabrous or abaxially hairy on veins only, lateral veins 6–8 pairs, prominent on both surfaces, base cordate, margin serrulate, teeth 1–1.5 mm, apex acute. Bracts subsessile, 6–8 × 1.5–1.8 cm, adnate to peduncle for 2–2.5 cm, abaxially sparsely pilose, adaxially glabrous, base rounded, apex obtuse. Flowers unknown. Infructescences 6–7 cm, with 2–3 capsules, slightly shorter than bracts; peduncle 4–5 cm; stipe 0.8–1 cm. Fruit subglobose, not ridged, 6–7 mm, hairy; exocarp woody, hard, indehiscent.

- Hunan, Jiangxi.

12. *Tilia miqueliana* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 434. 1880.

南京椴 nan jing duan

Tilia franchetiana C. K. Schneider; *T. kinashii* H. Léveillé & Vaniot; *T. kwangtungensis* Chun & H. D. Wong; *T. miqueliana* var. *longipes* P. C. Chiu.

Trees to 10(–20) m tall. Bark gray-white; branchlets yellow-brown tomentose; terminal bud ovoid, yellow-brown tomentose. Petiole terete, 3–4 cm, stellate tomentose; leaf blade ovate-orbicular, (5–)9–12 × (4–)7–9.5 cm, abaxially gray or gray-yellow stellate tomentose, adaxially glabrous, lateral veins 6–8 pairs, base cordate, rarely oblique, margin serrate, apex acute. Cymes 3–12-flowered, 6–8 cm; peduncle gray tomentose. Bracts on 2–3 mm stalk, sometimes sessile, narrowly oblanceolate, 8–12 × 1.5–2.5 cm, adnate to peduncle for 4–6 cm, both surfaces stellate puberulent, base narrowly cuneate, apex obtuse. Pedicel 8–12 mm. Sepals 5–6 mm, gray hairy. Petals slightly longer than sepals. Stamens slightly shorter than sepals; staminodes 5, smaller. Ovary hairy; style as long as petals. Fruit globose, not angled, stellate puberulent, verrucose; exocarp woody, hard, indehiscent. Fl. Jul. $2n = 164$.

- Anhui, Guangdong, Jiangsu, Jiangxi, Zhejiang [Japan].

13. *Tilia chingiana* Hu & W. C. Cheng, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 10: 79. 1935.

短毛椴 duan mao duan

Tilia brevibradiata (Rehder) Hu & W. C. Cheng, nom. superfl.; *T. orocryptica* Croizat; *T. tuan* Szyszylowicz var. *brevibradiata* Rehder.

Trees to 15 m tall. Bark gray, smooth; branchlets glabrous or at first minutely hairy; terminal bud sparsely puberulent. Petiole 2.5–4 cm, hairy, glabrescent; leaf blade broadly ovate, 5–10 × 4–9 cm, abaxially usually glabrescent, hairy in vein axils, adaxially glabrous, lateral veins 6–7 pairs, base oblique, truncate or cordate, margin serrate, apex acuminate or acute.

Cymes 4–10-flowered, 5–8 cm; peduncle stellate puberulent. Bracts on 5–8 mm stalk, narrowly oblanceolate, 7–9 cm, adnate to peduncle for 1/2 of length, hairy, more densely so abaxially, base cuneate, apex obtuse. Pedicel 7–9 mm. Sepals lanceolate, ca. 5 mm, abaxially stellate puberulent. Petals ca. 7 × 3 mm. Stamens ca. 4 mm; staminodes 5, shorter than petals. Ovary hairy; style glabrous. Fruit globose, stellate puberulent, verrucose; exocarp woody, hard, indehiscent. Fl. Jun–Jul. $2n = 82^*$.

- Anhui, Jiangsu, Jiangxi, Zhejiang.

14. *Tilia taishanensis* S. B. Liang, Bull. Bot. Res., Harbin 5(1): 146. 1985.

泰山椴 tai shan duan

Trees. Branchlets and bud glabrous. Petiole 3–7 cm, glabrous; leaf blade suborbicular or broadly ovate, 5–8 × 5–7 cm, abaxially hairy only in axils of veins, glabrous adaxially, lateral veins 7–8 pairs, base shallowly cordate or obliquely truncate, margin serrulate, apex acute. Cymes 50–200-flowered, 8–13 cm. Bracts sessile, narrowly oblong, 5–8 × 1–1.2 cm, glabrous, base rounded, apex obtuse. Sepals narrowly ovate, 4–5 mm, both surfaces puberulent. Petals oblong, 7–8 mm. Stamines present. Ovary ovoid, densely gray tomentose. Fruit obovoid, prominently 5-angled, 5–8 × 3–5 mm, densely brown puberulent; exocarp woody, hard, indehiscent.

- About 600 m. Shandong.

The prominently 5-angled fruits and serrulate leaf margins of *Tilia taishanensis* suggest that this might be a form of *T. chinensis* with abnormally large inflorescences.

15. *Tilia mongolica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 433. 1880.

蒙椴 meng duan

Trees to 10 m. Bark grayish, exfoliating irregularly; branchlets glabrous; winter buds ovoid, glabrous. Petiole slender, 2–3.5 cm, glabrous; leaf blade broadly ovate or orbicular, 4–6 × 3.5–5.5 cm, abaxially hairy only in axils of veins, adaxially glabrous, lateral veins 4–5 pairs, base slightly cordate or obliquely truncate, margin coarsely serrate, apex acuminate, usually 3-lobed. Cymes 6–12-flowered, 5–8 cm; peduncle glabrous. Pedicel slender, 5–8 mm. Bracts on ca. 10 mm stalk, narrowly oblong, 3.5–6 × 0.6–1 cm, adnate to peduncle for 1/2 of length, both surfaces glabrous, base obtuse, apex obtuse. Sepals lanceolate, 4–5 mm, abaxially subglabrous. Petals 6–7 mm. Stamens as long as sepals; staminodes slightly smaller. Ovary hairy; style glabrous. Fruit obovoid, 5-angled or obscurely angled, 6–8 mm; exocarp thickly leathery, fragile, hairy, indehiscent. Fl. Jul. $2n = 164^*$.

- Hebei, Henan, W Liaoning, Nei Mongol, Shanxi.

16. *Tilia amurensis* Ruprecht, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 7, 15(2) [Fl. Caucasi]: 253. 1869–1870.

紫椴 zi duan

Trees to 25 m tall, 1 m d.b.h. Bark dark gray, exfoliating; branchlets white or reddish stellate pubescent, glabrescent; terminal bud glabrous, bud scales 3. Petiole slender, 2–3.5 cm, glabrous; leaf blade broadly ovate or ovate-orbicular, 4.5–6 × 4–5.5 cm, abaxially greenish, hairy only in vein axils, adaxially

glabrous, lateral veins 4–5 pairs, base cordate or rarely obliquely truncate, margin serrate, teeth ca. 1 mm, pointed, apex acute, acuminate, truncate or slightly emarginate or 3-lobed. Cymes 3–20-flowered, slender, 3–5 cm, glabrous. Bracts on 1–3.5 cm stalk, narrowly band-shaped, 3–7 × 0.5–0.8 cm, adnate to peduncle for 1/3–1/2 of length, both surfaces glabrous. Pedicel 7–10 mm. Sepals broadly lanceolate, 5–6 mm, abaxially stellate puberulent. Petals 6–7 mm. Stamens 20, 5–6 mm; staminodes absent. Ovary canescent-tomentose; style ca. 5 mm, glabrous. Fruit ovoid-globose, 5-angled or obscurely angled, 5–8 mm, stellate tomentose; exocarp thickly leathery, fragile, indehiscent. Fl. Jul. $2n = 82$.

Mixed *Abies* and *Picea* forests; 1300–1400 m. Heilongjiang, Jilin, Liaoning [Korea, Russia].

Tilia amurensis is similar to *T. japonica* but differs in having smaller leaves and bracts and a shorter cyme.

- 1a. Leaf base truncate or slightly cordate; branchlets reddish stellate pilose 16c. var. *taquetii*
- 1b. Leaf base cordate; branchlets white stellate pubescent.
 - 2a. Leaf blade 4.5–6 × 4–4.5 cm, hairy only in vein axils on abaxial surface 16a. var. *amurensis*
 - 2b. Leaf blade 3–4.5 × 2.5–4.5 cm, densely hairy on abaxial surface .. 16b. var. *araneosa*

16a. *Tilia amurensis* var. *amurensis*

紫椴(原变种) *zi duan* (yuan bian zhong)

Tilia amurensis var. *tricuspidata* Liou & Li.

Branchlets white stellate pubescent, glabrescent. Leaf blade 4.5–6 × 4–4.5 cm, hairy only in vein axils on abaxial surface, base cordate, apex acute or acuminate, sometimes 3-lobed. Bract stalk 1–3.5 cm. $2n = 82$.

Heilongjiang, Jilin, Liaoning [Korea, Russia].

Plants with 3-lobed leaf tips have been placed in var. *tricuspidata*.

16b. *Tilia amurensis* var. *araneosa* C. Wang & S. D. Zhao, Bull. Bot. Res., Harbin 1(4): 135. 1981.

毛紫椴 *mao zi duan*

Branchlets white stellate pubescent. Petiole ca. 1 cm, hairy; leaf blade 3–4.5 × 2.5–4.5 cm, abaxially greenish, densely hairy, base cordate, apex caudate.

• Mixed *Abies* and *Picea* forests; 1300–1400 m. Jilin.

16c. *Tilia amurensis* var. *taquetii* (C. K. Schneider) Liou & Li, Woody Fl. N.E. China, 420. 1955.

小叶紫椴 *xiao ye zi duan*

Tilia taquetii C. K. Schneider, Repert. Spec. Nov. Regni Veg. 7: 200. 1909; *T. amurensis* subsp. *taquetii* (C. K. Schneider) Pigott; *T. koreana* Nakai.

Branchlets and cymes reddish stellate pilose. Leaf blade base usually truncate or slightly cordate. Bract stalk 1–1.5 cm. $2n = 82$.

Heilongjiang, Jilin, Liaoning [Korea, Russia].

17. *Tilia japonica* (Miquel) Simonkai, Math. Term. Közlem. 22: 326. 1888.

华东椴 *hua dong duan*

Tilia cordata Miller var. *japonica* Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 18. 1867; *T. eurossinica* Croizat; *T. ulmifolia* Scopoli var. *japonica* (Miquel) O. H. Sargent ex Mayr.

Trees. Branchlets villous, soon glabrescent; terminal bud ovoid, glabrous. Petiole slender, 3–4.5 cm, glabrous; leaf blade brown when dry, orbicular or nearly so, 5–10 × 4–9 cm, leathery, abaxially hairy only in vein axils, adaxially glabrous, lateral veins 6–7 pairs, base cordate or rarely truncate, margin sharply serrulate, apex acute. Cymes 6–16-flowered, 5–7 cm; peduncle with proximal bract. Bracts on 1–1.5 cm stalk, narrowly oblanceolate or narrowly oblong, 3.5–6 × 1–1.5 cm, adnate to peduncle for 1/2 of length, glabrous. Pedicel 5–8 mm. Sepals narrowly oblong, 4–4.5 mm, sparsely stellate puberulent. Petals 6–7 mm. Stamens ca. 5 mm; staminodes slightly shorter than petals. Ovary hairy; style 3–4 mm. Fruit ovoid, not angled, stellate hairy; exocarp thickly leathery, fragile, indehiscent. $2n = 164$.

Anhui, Jiangsu, Shandong, Zhejiang [Japan].

18. *Tilia paucicostata* Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 82. 1890.

少脉椴 *shao mai duan*

Trees 10–15 m tall. Branchlets usually yellow-brown when dry, slender, glabrous; terminal buds minute, glabrous or slightly hairy at tip. Petiole slender, 2–5 cm, glabrous; leaf blade ovate-orbicular or ovate-triangular, (3–)6–10 × 2.5–6 cm, thinly leathery, both surfaces glabrous or abaxially sparsely tomentose in vein axils, lateral veins 5–6 pairs, basal pair usually 1/2 or more as long as blade, veinlets prominent, base truncate or obliquely cordate, rarely rounded, margin serrate or sparsely dentate, apex caudate-acuminate or acuminate. Cymes 3–10-flowered, usually shorter or rarely longer than bract; peduncle adnate with proximal 1/2 bract. Bracts on slender 0.5–2 cm stalk, oblanceolate, 4–6 cm, glabrous. Sepals 4–5 mm, abaxially glabrous, adaxially villous on proximal half. Petals ca. 4 mm, glabrous. Stamens 25–35, in 5 fascicles, glabrous; staminodes 5, linear-oblongate, distal 1/2 slightly wider, 1/2 as long as petals. Ovary ovoid, densely stellate puberulent; style glabrous. Fruit obovoid, 6–7 mm, apex usually beaked; exocarp thickly leathery, fragile, indehiscent. Fl. Jun–Aug, fr. Sep–Oct. $2n = 164^*$.

• Forests; 1300–2400 m. Gansu, Hebei, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

- 1a. Branchlets puberulent; leaf blade abaxially gray stellate puberulent ... 18b. var. *yunnanensis*
- 1b. Branchlets and leaf blade abaxially glabrous.
 - 2a. Leaf blade 6–10 × 3–6 cm, margin serrate 18a. var. *paucicostata*
 - 2b. Leaf blade 3.5–5.5 × 2.5–4 cm, margin sparsely dentate 18c. var. *dictyoneura*

18a. *Tilia paucicostata* var. *paucicostata*

少脉椴(原变种) shao mai duan (yuan bian zhong)

Tilia paucicostata var. *firma* V. Engler; *T. paucicostata* var. *temuis* V. Engler.

Branchlets glabrous. Leaf blade 6–10 × 3–6 cm, abaxially glabrous, margin serrate. Fruit obovoid, 6–7 mm.

• Forests; 1300–2400 m. Gansu, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

18b. *Tilia paucicostata* var. *yunnanensis* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 285. 1912.

毛少脉椴 mao shao mai duan

Tilia paucicostata var. *ningshanensis* P. H. Yang.

Branchlets and terminal buds puberulent. Leaf blade abaxially gray stellate puberulent, adaxially glabrous. Fruit unknown.

• Forests; 2000–2400 m. Gansu, Sichuan, Yunnan.

18c. *Tilia paucicostata* var. *dictyoneura* (V. Engler ex C. K. Schneider) Hung T. Chang & E. W. Miao, Fl. Reipubl. Popularis Sin. 49(1): 72. 1989.

红皮椴 hong pi duan

Tilia dictyoneura V. Engler ex C. K. Schneider, III. Handb. Laubholz. 2: 369. 1909.

Branchlets glabrous. Leaf blade triangular-ovate, 3.5–5.5

× 2.5–4 cm, abaxially glabrous, margin sparsely denticulate. Bracts with stalk. Fruit 5–6 mm, without ridges.

• Forests. Gansu, Hebei, Henan, Hunan, Shaanxi.

19. *Tilia jiaodongensis* S. B. Liang, Bull. Bot. Res., Harbin 5(1): 145. 1985.

胶东椴 jiao dong duan

Trees. Branchlets and buds glabrous. Petiole 3–5 cm, glabrous; leaf blade ovate-orbicular, 5–8 × 5–7 cm, abaxially hairy only in axils of veins, adaxially glabrous, lateral veins 6–7 pairs, base cordate or shallowly cordate, margin serrulate, teeth 2–3 mm, apex acute. Cymes (20–)40–100-flowered, 6–13 cm, glabrous. Bracts on 1–2 cm stalk, oblanceolate, 5–9 × 0.8–1.5 cm, glabrous, base obliquely cuneate, apex obtuse; bracteoles 3–4-verticillate at bases of pedicels, present at each branching of inflorescence, ovate-lanceolate or elliptic-lanceolate, 0.3–3 × 0.2–1 cm, densely brown stellate tomentose. Pedicel 3–7 mm. Sepals narrowly ovate, 4–5 mm, abaxially stellate hairy, adaxially sparsely stellate at apex and densely villous at base. Petals obovate, 4–5 mm, glabrous. Stamines shorter than petals. Ovary ovoid, prominently 5-angled; style short. Fruit subglobose, minutely 5-angled, ca. 5 mm in diam., thickly leathery, fragile, densely brown puberulent, indehiscent.

• Sunny slopes; ca. 600 m. Shandong.

The very large bracteolate inflorescence of *Tilia jiaodongensis* is unusual and is probably aberrant. The species was not accepted by Pigott. It was originally compared to *T. mongolica* from which it was distinguished by the acute leaf apex and glabrous ovary. The nature of the ovary requires clarification as the fruit is described as hairy.**2. CRAIGIA** W. W. Smith & W. E. Evans, Trans. & Proc. Bot. Soc. Edinburgh 28: 69. 1921.

滇桐属 dian tong shu

Trees deciduous; buds with scales. Leaves long petiolate; leaf blade elliptic or oblong, leathery or papery, basal veins 3, margin denticulate. Inflorescences axillary, cymose. Flowers bisexual. Pedicel articulate. Sepals 5, fleshy, valvate. Petals absent. Androgynophore absent. Stamens and stamenes many, in 2 or 3 series, outer series of 10 stamenes, in pairs, inner stamens 20, in 5 fascicles; filaments slightly connate; anthers 2-loculed. Ovary superior, 5-loculed, sessile; ovules 6 per locule; styles 5. Fruit a 5-winged capsule, ellipsoid, loculicidally dehiscent, wings veined, membranous. Seeds 1, 2, or 4 per locule, oblong.

Two species: China and adjacent Vietnam; two species (one endemic) in China.

The 5-winged capsules of *Craigia* superficially resemble the fruits of *Burretiodendron*, which has led to confusion. *Craigia* can be distinguished from *Burretiodendron* by its petaloid stamenes and the lack of petals. Both species of *Craigia* are included in the IUCN Red List; *C. kwangsiensis* is possibly extinct.1a. Leaf blade elliptic, base rounded; branchlets and leaves glabrous abaxially 1. *C. yunnanensis*
1b. Leaf blade oblong, base cuneate; branchlets and leaves hairy abaxially 2. *C. kwangsiensis***1. *Craigia yunnanensis*** W. W. Smith & W. E. Evans, Trans. & Proc. Bot. Soc. Edinburgh 28: 69. 1921.

滇桐 dian tong

Burretiodendron combretoides Chun & F. C. How; *B. yunnanense* Kostermans.

Trees 6–20 m tall. Branchlets glabrous; buds gray-white hairy. Petiole 1.5–5 cm; leaf blade dark greenish, elliptic, 10–20 × 5–11 cm, abaxially glabrous, 2 lateral veins 8–10 mm from margin, ascending less than 1/2 length of blade, lateral veins 5–7 pairs, base rounded, margin denticulate, apex acute. Cymes

2–5-flowered, ca. 3 cm. Sepals purplish pink, oblong, ca. 1 cm, hairy abaxially. Stamens of inner series shorter than sepals. Ovary glabrous. Capsule ca. 3.5 × 2.5–3 cm, wings 5-angled. Seeds ca. 1 cm.

Forests, open forests; 500–1600 m. W Guangxi (Jingxi, Napo), S Guizhou (Dushan), SE Xizang (Médog), SE and W Yunnan (Malipo, Ruili, Xichou) [N Vietnam].

Craigia yunnanensis is listed as “Endangered” in the IUCN Red List. The synonym *Burretiodendron yunnanense* is an independent name based on a different type.

2. *Craigia kwangsiensis* H. H. Hsue, Acta Phytotax. Sin. 13(1): 107. 1975.

桂滇桐 gui dian tong

Branchlets, buds, stalk, and stipe stellate pubescent. Petiole 1.8–2.5 cm; leaf blade oblong, 7–9 × 2.5–4 cm, dark greenish when dry, abaxially yellow-brown pubescent, 2 lateral veins close to margin, ascending to 1/3 length of blade, lateral veins 5–6 pairs, veinlets prominent, base cuneate, margin serrate,

apex acuminate. Infructescence cymelike; peduncle 1–1.5 cm. Stipe 1–1.2 cm. Capsule 2.5–3 × 2–2.4 cm, wings transversely veined. Seeds 4 per locule, ca. 8 mm. Fr. Nov.

• Evergreen broad-leaved forests on limestone; ca. 1400 m. NW Guangxi (Tianlin).

Craigia kwangsiensis is known only from the type. It has not been relocated and it is possibly extinct due to deforestation. It is listed as “Critically endangered” in the IUCN Red List.

3. CORCHORUS Linnaeus, Sp. Pl. 1: 529. 1753.

黄麻属 huang ma shu

Herbs or subshrubs. Leaves petiolate; stipules filiform; leaf blade papery, basal veins usually 3, usually with linear appendages at or near base, margin serrate, serrulate, or crenate. Flowers solitary or several arranged in cymes, axillary or extra-axillary, bisexual, yellow. Sepals 4 or 5. Petals 4 or 5; glands absent. Stamens 15 to many, on androgynophore, free; staminodes absent. Ovary 2–5-loculed; ovules many per locule; style short; stigma peltate or disk-shaped, entire or lobed. Fruit a capsule, cylindrical or globose, sometimes angled, 2–5-valved, loculicidally dehiscent. Seeds many.

Between 40 and 100 species: primarily in tropical regions; four species in China.

Corchorus oenotheroides H. Léveillé is the basionym of *Indigofera oenotheroides* (H. Léveillé) Lauener in the Fabaceae (see Fl. China 10). *Corchorus polygonatum* H. Léveillé is a synonym of *Tricyrtis pilosa* Wallich in the Liliaceae (see Fl. China 24: 152. 2000).

Several species have been grown as a fiber crop. *Corchorus capsularis* and *C. olitorius* are the source of the important fiber jute.

- 1a. Capsule globose, apex truncate or slightly emarginate; leaf blade glabrous 1. *C. capsularis*
 1b. Capsule cylindrical, apex angled or beaked; leaf blade hairy at least abaxially on veins.
 2a. Capsule apex 3–5-angled; leaf blade abaxially sparsely pilose, glabrescent 2. *C. aestuans*
 2b. Capsule apex beaked; leaf blade abaxially sparsely hairy only on veins.
 3a. Ovary 5-loculed; leaf blade margin serrulate, petiole 0.8–3.5 cm 3. *C. olitorius*
 3b. Ovary 3-loculed; leaf blade margin crenate, petiole 0.5–1 cm 4. *C. trilocularis*

1. *Corchorus capsularis* Linnaeus, Sp. Pl. 1: 529. 1753.

黄麻 huang ma

Herbs woody, erect, 1–2 m tall. Petiole ca. 2 cm, puberulent; leaf blade ovate-lanceolate or narrowly lanceolate, 5–12 × 2–5 cm, glabrous, basal veins ascending to mid leaf, lateral veins 8–10 pairs, base rounded, margin coarsely serrate, apex acuminate. Flowers solitary or several arranged in cymes, axillary; peduncle and pedicel short. Sepals 4 or 5, 3–4 mm. Petals obovate, ± as long as sepals, glabrous. Stamens 18–22; androgynophore short, glabrous. Ovary 5-loculed, glabrous; stigma lobed. Capsule globose, obtusely angled, 5-valved, ca. 1 cm in diam., verrucose, apex truncate or slightly emarginate. Fl. summer, fr. late autumn.

Widely cultivated. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bangladesh, India, Indonesia, Japan, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka].

2. *Corchorus aestuans* Linnaeus, Syst. Nat., ed. 10, 2: 1079. 1759.

甜麻 tian ma

Herbs annual, to 1 m tall. Stem red-brown, slightly yellowish puberulent; branches slender. Petiole 0.9–1.6 cm, with yellowish, long, rigid hairs; leaf blade ovate or broadly ovate, 4.5–6.5 × 3–4 cm, sparsely pilose on both surfaces, glabrescent, basal veins 5–7, lateral veins 3–6 pairs, base rounded, margin

serrate, basal pair of teeth usually elongating into filiform or caudate appendages, apex shortly acuminate or acute. Flowers solitary or several together in cymes, axillary or leaf-opposed; peduncle and pedicel very short or absent. Sepals 5, purple-red abaxially, narrowly oblong, ca. 5 mm, semi-foveolately boat-shaped distally, apex awned. Petals 5, yellow, nearly as long as sepals, obovate. Stamens many, yellow, ca. 3 mm. Ovary 3–5-loculed, long cylindrical, puberulent; style rodlike; stigma beak-like, 5-toothed. Capsule cylindrical, angled, 3–5-valved, 1.2–2.5 × ca. 0.5 cm, apex 3–5-angled, awns bifurcate. Seeds separated by transverse septum. Fl. summer–autumn.

Widely cultivated. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia, Central America, West Indies].

- 1a. Ovary puberulent, stigma 5-toothed; capsule 3–4-loculed 2a. var. *aestuans*
 1b. Ovary woolly, stigma entire; capsule usually 5-loculed 2b. var. *brevicaulis*

2a. *Corchorus aestuans* var. *aestuans*

甜麻(原变种) tian ma (yuan bian zhong)

Stems usually erect, internodes as long as or longer than leaf blade. Stamens many. Ovary puberulent; stigma 5-toothed. Capsule 3–4-loculed, 6–8-angled, ca. 2.5 cm. Fl. summer–autumn.

Widely cultivated. Anhui, Guangdong, Guangxi, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Vietnam; tropical Africa, Australia, Central America, West Indies].

2b. *Corchorus aestuans* var. *brevicaulis* (Hosokawa) T. S. Liu & H. C. Lo, Fl. Taiwan 3: 695. 1977.

短茎甜麻 duan jing tian ma

Corchorus brevicaulis Hosokawa, Trans. Nat. Hist. Soc. Taiwan 22: 226. 1932.

Stems almost procumbent, internode shorter than leaf blade. Leaf blade membranous, basal appendages subulate filiform. Stamens 16 to many. Ovary woolly; stigma entire. Capsule usually 5-loculed, 10-angled, ca. 1.2 cm (excluding awns). Fl. Aug.

• Taiwan.

3. *Corchorus olitorius* Linnaeus, Sp. Pl. 1: 529. 1753.

长蒴黄麻 chang shuo huang ma

Herbs woody, 1–3 m tall. Stipule ovate-lanceolate, ca. 1 cm; petiole 0.8–3.5 cm, puberulent; leaf blade oblong-lanceolate, 7–10 × 2–4.5 cm, glabrous, basal veins 5, lateral veins 7–10 pairs, base rounded, margin serrulate, apex acuminate. Flowers solitary or 1–3 arranged in cymes, axillary, opposite to leaves; peduncle and pedicel short. Sepals oblong, hairy at base,

apex long awned. Petals oblong, as long as or slightly shorter than sepals, stalked at base; stalk ciliate. Stamens on very short androgynophore, glabrous. Ovary 5-loculed, hairy; style glabrous; stigma disk-shaped, lobed. Capsule cylindrical, slightly curved, 10-angled, robust, 5–6-valved, 3–8 cm, apex beaked, with single awn. Seeds obconic, slightly angled, separated by septum. Fl. summer–autumn.

Cultivated, weed of disturbed areas. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Yunnan [widely distributed throughout tropics].

4. *Corchorus trilocularis* Linnaeus, Syst. Nat., ed. 12, 2: 369; Mant. Pl. 1: 77. 1767.

三室黄麻 san shi huang ma

Herbs annual or perennial, many branched, pilose. Stipule subulate; petiole 0.5–1 cm, pilose; leaf blade elliptic or ovate-oblong, 1.5–3 × 1–2 cm, hairy only on veins abaxially, glabrous adaxially, lateral basal veins 1/3 as long as leaf blade, base broadly rounded, margin crenate, apex obtuse. Cymes opposite to leaves, 1–3-flowered; peduncle very short. Sepals ca. 5 mm. Petals nearly spatulate, 5–6 mm. Stamens 15–20; filaments 5–6 mm. Ovary 3-loculed. Capsule 1–3-fascicled, long cylindrical, 5–7 × ca. 0.3 cm, apex beaked. Seeds separated by septum. Fl. Aug, fr. Sep.

Moist shady places, weed of cultivated fields. NW Yunnan [Afghanistan, Bhutan, India, Indonesia (Java), Pakistan, Sri Lanka; tropical and N Africa, S Asia, Australia].

4. COLONA Cavanilles, Icon. 4: 47. 1798.

一担柴属 yi dan chai shu

Columbia Persoon.

Trees or shrubs. Leaves long petiolate; leaf blade ovate, usually hairy abaxially, basal veins 5–7, margin entire or serrulate, apex acute, sometimes 3–5-lobed. Inflorescences usually terminal, cymose paniculate. Bracts small; bracteoles present. Flowers bisexual. Sepals 5, free. Petals 5, glandular at base. Stamens many, free or in 5 bundles, borne on short androgynophore. Ovary 3–5-loculed; ovules 2–4 per locule; stigma thin, lobed or entire. Fruit a capsule, subglobose, 3–5-winged, septicidally dehiscent.

About 20 species: tropical Asia; two species in China.

- 1a. Leaf blade broadly obovate-orbicular or nearly orbicular, 11–20 cm wide, abaxially and adaxially roughly hairy; petiole 1.5–5.5 cm 1. *C. floribunda*
 1b. Leaf blade oblong, 4–7 cm wide, abaxially stellate tomentose, adaxially glabrous; petiole 0.5–1 cm 2. *C. thorelii*

1. *Colona floribunda* (Wallich ex Kurz) Craib, Bull. Misc. Inform. Kew 1925: 21. 1925.

一担柴 yi dan chai

Columbia floribunda Wallich ex Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 63. 1873.

Trees 8–10 m tall. Branchlets gray-brown stellate puberulent. Petiole 1.5–5.5 cm; leaf blade broadly obovate-orbicular or nearly orbicular, 14–21 × 11–20 cm, with rough, gray-brown stellate hairs on both surfaces, more dense abaxially, basal veins 5–7, veinlets prominently raised abaxially, base slightly cordate, margin serrulate, apex acute or acuminate, sometimes 3–5-lobed. Inflorescences terminal, to 27 cm. Flowers ca. 8 mm in diam. Sepals lanceolate, ca. 4 mm, stellate tomentose abax-

ially. Petals yellow, spatulate, nearly as long as sepals. Stamens ca. 40, nearly as long as petals, in 5 bundles. Ovary stellate tomentose, 3–5-loculed; stigma hairy. Capsule 1–1.5 cm in diam., stellate hairy, 3–5-winged, wings ca. 5 mm. Fl. Jun, fr. Nov.

Secondary montane forests; 300–2000 m. S Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

The basionym is often given as “*Grewia floribunda* Wallich ex Voigt” (Hort. Suburb. Calcutt. 128. 1845) but that name, as a nomen nudum, was not validly published.

2. *Colona thorelii* (Gagnepain) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 9: 808. 1926.

狭叶一担柴 xia ye yi dan chai

Columbia thorelii Gagnepain, Notul. Syst. (Paris) 1: 132. 1910; *Colona sinica* Hu.

Trees 5–15 m tall, many branched. Branchlets gray-brown stellate tomentose. Stipule hastate; petiole 0.5–1 cm; leaf blade oblong, 8–15 × 4–7 cm, thinly leathery, densely gray stellate tomentose abaxially, adaxially glabrous, smooth or slightly rough, basal veins 5, lateral veins 2–3 pairs, base rounded, margin entire or slightly serrulate near apex, apex acute or acuminate. Inflorescences terminal or axillary at twig tips, 4–9 cm.

Bracts triangular, ovate, or lanceolate, 5–6 mm; bracteoles obovate. Pedicel 3–5 mm. Sepals narrowly lanceolate, 6–7 mm, abaxially gray hairy, adaxially glabrous. Petals 5–6 mm. Stamens as long as petals. Ovary 3-loculed, hairy; style ca. 5 mm; stigma 2-lobed. Capsule 2–2.5 cm in diam., gray tomentose, 3-winged, wing ca. 10 mm wide. Fl. Sep–Oct, fr. Nov–Dec.

Mountains; 200–800 m. S and SE Yunnan [Laos, Malaysia, Myanmar, Thailand].

5. MICROCOS Linnaeus, Sp. Pl. 1: 514. 1753.

破布叶属 po bu ye shu

Shrubs or small trees. Leaves alternate, shortly petiolate; leaf blade ovate, oblong, or lanceolate, leathery, basal veins 3, margin entire or lobed in distal 1/2. Inflorescences terminal or axillary, cymose paniculate. Flowers bisexual. Sepals 5, free. Petals 5 or rarely absent, glandular at base adaxially. Stamens many, free, borne distally on androgynophore. Ovary superior, usually 3-loculed; ovules 4–7 per locule; style simple; stigma subulate, usually not lobed. Fruit a drupe, globose, obovoid, or pyriform, not furrowed, without drupelets.

About 60 species; primarily in Africa, Asia; three species in China.

- 1a. Mature leaf blade tomentose abaxially, apex acute 3. *M. stauntoniana*
 1b. Mature leaf blade glabrescent or nearly so abaxially, apex acuminate.
 2a. Ovary glabrous; leaf blade ovate-oblong; sepals 5–7 mm 1. *M. paniculata*
 2b. Ovary densely villous; leaf blade oblong or lanceolate; sepals 8–10 mm 2. *M. chungii*

1. *Microcos paniculata* Linnaeus, Sp. Pl. 1: 514. 1753.

破布叶 po bu ye

Fallopia nervosa Loureiro; *Grewia microcos* Linnaeus, nom. illeg. superfl.; *G. nervosa* (Loureiro) Panigrahi; *Microcos nervosa* (Loureiro) S. Y. Hu.

Shrubs or small trees 3–12 m tall. Bark rough; branchlets hairy. Stipule filiform, lanceolate, 5–7 mm; petiole 1–1.5 cm, hairy; leaf blade ovate or oblong, 8–18 × 4–8 cm, thinly leathery, very sparsely stellate at first and glabrescent both abaxially and adaxially, basal veins 3, laterals more than 1/2 as long as leaf blade, base rounded, margin finely crenate, apex acuminate. Panicles terminal, 4–10 cm, stellate. Bracts lanceolate. Pedicel short. Sepals oblong, 5–7 mm, hairy abaxially. Petals oblong, 3–4 mm, hairy in proximal 1/2; glands ca. 2 mm. Stamens shorter than sepals. Ovary globose, glabrous. Drupe nearly globose or obovoid, ca. 1 cm; stipe short. Fl. Jun–Jul.

Guangdong, Guangxi, Hainan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam].

2. *Microcos chungii* (Merrill) Chun, Sunyatsenia 4: 196. 1940.

海南破布叶 hai nan po bu ye

Grewia chungii Merrill, Philipp. J. Sci. 23: 252. 1923.

Trees 5–15 m tall. Branchlets yellow-brown pubescent. Petiole 1–1.5 cm, stellate; leaf blade oblong or lanceolate, 11–20 × 3.5–6 cm, nearly leathery, very sparsely stellate and gla-

brerescent abaxially, glabrous adaxially, base rounded obtuse, margin entire or sparsely serrate distally, apex long acuminate. Panicles terminal or axillary. Bracts yellow-brown puberulent. Sepals 5, narrowly lanceolate, 8–10 mm, stellate puberulent on both surfaces, more densely abaxially. Petals yellow, narrowly oblong, 3–4 mm, sparsely pubescent abaxially, with hairy glands at base adaxially; glands ca. 1/3 as long as petals. Ovary broadly ovoid, densely villous. Drupe pyriform, 12–22 × 9–12 mm, densely gray-yellow stellate pubescent; stipe robust, hairy. Fl. summer–autumn, fr. winter.

Montane forests. Hainan, S Yunnan [Vietnam].

3. *Microcos stauntoniana* G. Don, Gen. Hist. 1: 551. 1831.

毛破布叶 mao po bu ye

Trees 2–5 m tall. Branchlets stellate tomentose. Petiole ca. 1 cm, tomentose; leaf blade ovate or long ovate, 9–16 × 4.5–9 cm, densely brown tomentose abaxially, glabrous adaxially, lateral pair of basal veins ascending to mid leaf blade, base rounded or slightly cordate, apex acute. Panicles 4–7 cm. Pedicel 2–4 mm. Sepals oblong, 5–6 mm, tomentose abaxially. Petals ca. 1/2 as long as sepals; glands 1–1.5 mm. Stamens as long as sepals. Ovary glabrous or hairy at base; style slightly longer than stamens, glabrous. Drupe obovoid. Fl. summer–autumn.

Hainan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

6. GREWIA Linnaeus, Sp. Pl. 2: 964. 1753.

扁担杆属 bian dan gan shu

Trees or shrubs. Branchlets usually stellate. Leaves alternate; stipule minute, caducous; petiole short; leaf blade basal veins 3–5, margin serrate or rarely lobed. Flowers bisexual, polygamous, or unisexual (plants monoecious), usually arranged in 3- to many-

flowered cymes, solitary or fascicled, axillary or opposite leaves, rarely terminal. Peduncle and pedicel usually hairy. Bracts caducous. Sepals 5, yellow, white, or lilac, rarely brown, free, valvate, abaxially hairy, adaxially usually glabrous, rarely hairy. Petals 5, mostly yellow or white in Flora area, shorter than sepals; glands usually scalelike, borne on base of petals, margin usually villous. Androgynophore short, usually glabrous. Stamens many, free, irregular in length; anthers globose, dorsifixed, dehiscence longitudinal. Ovary 2–4-loculed; ovules 2–8 per locule; style simple; stigma swollen, peltate, entire or 2–4-lobed. Drupe usually with 2 or 4 drupelets. Endosperm copious; cotyledons flat.

About 90 species: tropical regions of Old World; 27 species (13 endemic) in China.

Grewia nitida Jussieu (Ann. Mus. Natl. Hist. Nat. 4: 90. 1804) could not be treated here because no material was seen by the authors.

Grewia salviifolia Linnaeus f. is the basionym of *Alangium salviifolium* (Linnaeus f.) Wangerin in the Alangiaceae (see Fl. China 13: 307. 2007).

- 1a. Ovary and drupe globose, not lobed; drupelets 1 or 2 per fruit.
- 2a. Climbing lianas; leaf blade oblong or lanceolate, base cordate, abaxially subglabrous 5. *G. kwangtungensis*
- 2b. Erect shrubs or trees; leaf blade broadly ovate-orbicular to ovate-oblong, base oblique or symmetrically rounded, abaxially tomentose, rarely glabrous.
- 3a. Leaf blade base oblique.
- 4a. Leaf blade abaxially densely softly stellate tomentose; cymes in clusters of 1–3 1. *G. eriocarpa*
- 4b. Leaf blade abaxially sparsely pilose or subglabrous; cymes in clusters of 2–6 4. *G. tiliifolia*
- 3b. Leaf blade base symmetrical, rounded.
- 5a. Petiole 5–10 mm, leaf blade broadly ovate, 4.5–6 cm wide; drupe 6–8 mm in diam. 2. *G. celtidifolia*
- 5b. Petiole 3–4 mm, leaf blade nearly orbicular, 7.5–10 cm wide; drupe 4–5 mm in diam. 3. *G. yinkiangensis*
- 1b. Ovary and drupe obviously 2–4-lobed, lobes ± globose, each with 1 drupelet.
- 6a. Leaf blade ovate, rhomboid, suborbicular, or obovate-elliptic, base oblique or symmetrical, lateral basal veins ascending beyond middle of blade.
- 7a. Leaf blade abaxially glabrescent or sparsely pilose, never tomentose.
- 8a. Leaf blade margin serrulate, leaf blade elliptic to obovate-elliptic or suborbicular 7. *G. biloba*
- 8b. Leaf blade margin serrate or irregularly serrate, leaf blade rhomboid, ovate, or elliptic.
- 9a. Leaf blade 2–4.5 cm wide, rhomboid or ovate; branchlets rust-brown stellate tomentose 6. *G. rhombifolia*
- 9b. Leaf blade 1–2 cm wide, ovate or elliptic; branchlets sparsely stellate hairy 8. *G. piscatorum*
- 7b. Leaf blade abaxially tomentose, coarsely hairy or pilose.
- 10a. Leaf blade adaxially glabrous or softly hairy.
- 11a. Leaf blade elliptic or ovate-elliptic, margin crenate, branchlets softly yellow tomentose 9. *G. angustisepala*
- 11b. Leaf blade oblong-lanceolate, margin denticulate; branchlets glabrescent 27. *G. multiflora*
- 10b. Leaf blade adaxially coarsely hairy.
- 12a. Leaf blade longer than 10 cm, base regular.
- 13a. Erect shrubs or small trees; leaf blade 21–28 cm 10. *G. permagna*
- 13b. Climbing shrubs; leaf blade 8–13 cm 11. *G. acuminata*
- 12b. Leaf blade shorter than 10 cm, base regular or oblique.
- 14a. Leaf blade ovate-orbicular or elliptic, 2–3 cm wide 7. *G. biloba*
- 14b. Leaf orbicular or broadly ovate-orbicular, 4–9 cm wide.
- 15a. Cymes many per axil; peduncle 3–6 mm; stigma 2-lobed 12. *G. abutilifolia*
- 15b. Cymes 1 or 2 per axil; peduncle ca. 10 mm; stigma 5-lobed 13. *G. urenifolia*
- 6b. Leaf blade lanceolate or oblong, base always symmetrical, lateral basal veins reaching mid leaf only.
- 16a. Old leaves abaxially subglabrous or sparsely hairy on veins, adaxially hairy only in vein axils at most.
- 17a. Leaf blade leathery; peduncle robust, with long hairs; petals 2.5–3 mm 14. *G. concolor*
- 17b. Leaf blade thinly leathery; peduncle slender, with short hairs; petals 4–5 mm 15. *G. macropetala*
- 16b. Old leaves abaxially tomentose or rough-hairy, adaxially hairy.
- 18a. Leaf blade broadly oblong, base broadly cuneate or obtuse on one side; petiole 7–9 mm 25. *G. henryi*
- 18b. Leaf blade lanceolate, oblong-lanceolate, triangular-lanceolate, or band-shaped, base rounded or slightly cordate, rarely obtuse; petiole 1–8 mm.
- 19a. Leaf blade triangular-lanceolate, base wide 16. *G. sessiliflora*
- 19b. Leaf blade lanceolate, oblong-lanceolate, or band-shaped, base rounded and narrow.
- 20a. Teeth on leaf blade margin irregular in size, leaf blade leathery, densely tomentose 24. *G. cuspidatoserrata*
- 20b. Teeth on leaf blade margin regular and similar in size, leaf blade papery or leathery, glabrous or sparsely to densely hairy.
- 21a. Leaf blade band-shaped, 13–20 × 1–3 cm.
- 22a. Cymes 1–3 per axil; stamens 20–30; leaf veinlets adaxially obscure 23. *G. falcata*

- 22b. Cymes 2 to several per axil; stamens 10–20; leaf veinlets adaxially prominent 26. *G. lacei*
- 21b. Leaf blade lanceolate or oblong-lanceolate, 4–14 × 2–4 cm.
- 23a. Leaf blade abaxially gray-white appressed stellate pilose 22. *G. retusifolia*
- 23b. Leaf blade abaxially yellow-brown or gray-brown tomentose or coarsely hairy.
- 24a. Leaf blade abaxially stellate pilose.
- 25a. Leaf blade abaxially sparsely yellow stellate pilose 21. *G. brachypoda*
- 25b. Leaf blade abaxially densely white stellate pilose 20. *G. latiglandulosa*
- 24b. Leaf blade abaxially thickly and softly or coarsely tomentose.
- 26a. Leaf blade coarsely yellow-brown tomentose; petiole 2–3 mm .. 19. *G. hirsuta*
- 26b. Leaf blade softly gray-brown tomentose; petiole 3–8 mm.
- 27a. Leaf blade leathery; petiole 3–5 mm 17. *G. chuniana*
- 27b. Leaf blade papery; petiole 5–8 mm 18. *G. oligandra*

1. *Grewia eriocarpa* Jussieu, Ann. Mus. Natl. Hist. Nat. 4: 93. 1804.

毛果扁担杆 *mao guo bian dan gan*

Grewia boehmeriifolia Kanehira & Sasaki; *G. lantsangensis* Hu.

Shrubs or small trees to 8 m tall. Branchlets softly gray stellate tomentose. Stipule filiform, lanceolate, 5–10 mm; petiole 5–10 mm; leaf blade ovate or ovate-oblong, 6–13 × 3–6 cm, papery, black-brown when dry, softly gray stellate tomentose abaxially, sparsely stellate adaxially, lateral basal veins to 3/4 as long as leaf blade, lateral veins 3–4 pairs, base obliquely rounded or truncate, margin serrulate, apex acuminate or acute. Cymes 1–3, axillary, 1.5–3 cm; peduncle 3–8 mm. Pedicel 3–5 mm. Bracts lanceolate. Flowers bisexual. Sepals narrowly oblong, 6–8 mm, hairy on both surfaces. Petals ca. 3 mm, eglandular. Androgynophore absent. Stamens irregular in length, shorter than sepals. Ovary hairy; style puberulent. Drupe subglobose, furrowed, 6–8 mm in diam., stellate hairy; drupelets 1 or 2.

Guangdong, Guangxi, Guizhou, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

2. *Grewia celtidifolia* Jussieu, Ann. Mus. Natl. Hist. Nat. 4: 93. 1804.

朴叶扁担杆 *pu ye bian dan gan*

Grewia asiatica Linnaeus var. *celtidifolia* (Jussieu) L. F. Gagnepain; *G. simaensis* Y. Y. Qian; *G. yunnanensis* Hung T. Chang.

Shrubs. Branchlets softly gray-brown tomentose. Petiole 5–6 mm, softly tomentose; leaf blade broadly ovate, 8–10 × 4.5–6 cm, shortly yellow-brown stellate tomentose abaxially, glabrescent adaxially, lateral basal veins 3/4 as long as leaf blade, ca. 1 cm from margin, each with secondary veins 5–6, lateral veins 2–3 pairs distally, base rounded, margin serrate, apex shortly acute. Cymes 1–1.5 cm, yellow-brown stellate tomentose; peduncle to 1 cm. Pedicel 2–3 mm. Sepals lanceolate, 6–7 mm, tomentose abaxially, pubescent adaxially. Petals 3–4 mm, glandular at base. Stamens 3–4 mm. Androgynophore hairy. Ovary 2-loculed, tomentose; style ca. 2 mm. Drupe subglobose, shallowly furrowed, 6–8 mm in diam., stellate hairy; exocarp not separating from endocarp; drupelets 1 or 2.

Fl. Apr–Jun, fr. Jul–Aug.

Open forests, shrublands; 100–1800 m. Guangdong, Guangxi, Guizhou, Taiwan, Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

3. *Grewia yinkiangensis* Y. C. Hsu & R. Zhuge, Fl. Yunnan. 6: 412. 1995.

盈江扁担杆 *ying jiang bian dan gan*

Shrubs. Branchlets striate, gray-yellow stellate pilose. Petiole very short, 3–4 mm, gray-yellow pilose; leaf blade nearly orbicular, 8–12 × 7.5–10 cm, papery, densely stellate tomentose abaxially, sparsely minutely hairy adaxially, basal veins 5, lateral veins 2–3 pairs, ascending, base rounded, margin entire basally, glandular dentate distally, apex obtuse or acute. Cymes 2–4 per leaf axil, slender, 3-flowered. Infructescence stipe 1.8–2.5 cm; stipe 8–12 mm, densely pilose. Drupe subglobose, 4–5 mm in diam., sparsely stellate pilose; drupelets 1 or 2. Fl. Apr–May, fr. Jun–Jul.

• Open woodlands, scrub; ca. 1000 m. SW Yunnan.

4. *Grewia tiliifolia* Vahl, Symb. Bot. 1: 35. 1790 [*“tiliaefolia”*].

椴叶扁担杆 *duan ye bian dan gan*

Grewia rotunda C. Y. Wu ex Hung T. Chang.

Trees 5–8 m tall. Branchlets gray stellate tomentose. Petiole ca. 1 cm, softly tomentose; leaf blade nearly orbicular or broadly ovate-orbicular, (1.7–)8–13(–36) × (1–)6.5–9.5(–24) cm, papery, black-brown when dry, with sparse solitary hairs or glabrescent and hairy only on veins adaxially, lateral basal veins 2/3 as long as leaf blade, 1.5–2.7 cm from margin, each with 5 or 6 secondary veins, dark brown, abaxially sparsely hairy or glabrous, base obliquely cordate, margin serrulate, apex shortly acute. Cymes 2–6 per leaf axil, 3-flowered; peduncle 1–1.5 cm. Pedicel 6–7 mm, gray-brown tomentose. Sepals oblong lanceolate, 7–8 mm, softly gray-yellow tomentose on both surfaces. Petals yellow, shorter and narrower than sepals. Stamens many, in 5 fascicles, slightly connate at base, slightly shorter than sepals. Ovary 2-loculed, hairy; style slightly longer than stamens. Drupe subglobose, not divided; exocarp not separating from endocarp; drupelets 1 or 2. Fl. Apr–Jun, fr. Jul–Aug.

Open woodlands, shrublands, grasslands; 800–1600 m. Guangxi,

SW Yunnan [Cambodia, India, Laos, Malaysia, Myanmar, Thailand, Vietnam; E Africa].

5. *Grewia kwangtungensis* Hung T. Chang, Acta Phytotax. Sin. 20: 175. 1982.

广东扁担杆 *guang dong bian dan gan*

Shrubs, climbing. Branchlets brown, shortly tomentose. Petiole 5–6 mm; leaf blade oblong or lanceolate, 6–10 × 2–3 cm, membranous, abaxially puberulent only on veins, adaxially hairy, glabrescent, lateral basal veins 1/3 as long as leaf blade, 2–3 mm from margin, lateral veins 3–5 pairs, minor veins prominently raised abaxially, base cordate or slightly cordate, margin serrulate, apex acuminate or caudate-acuminate. Flowers unknown. Inflorescence in subterminal axils; peduncle 3–6 mm, shortly brown tomentose; fruiting pedicel 7–9 mm, shortly brown tomentose. Androgynophore short, glabrous, with hairs on apex. Drupe red, globose, 6–7 mm in diam., hairy, becoming glabrescent, glossy; drupelets 1 or 2.

• Evergreen forest; 800–900 m. Guangdong.

6. *Grewia rhombifolia* Kanehira & Sasaki, Trans. Nat. Hist. Soc. Taiwan 18: 335. 1928.

菱叶扁担杆 *ling ye bian dan gan*

Shrubs. Branchlets rust-brown stellate tomentose. Stipule subulate, 5–7 mm; petiole 5–7 mm; leaf blade rhomboid or ovate, rarely ovate-orbicular, 2.5–5.5 × 2–4.5 cm, sparsely stellate, abaxially hairy only on veins, adaxially glabrescent, lateral basal veins to 1/2 as long as leaf blade, lateral veins 4–5 pairs, base broadly cuneate to nearly rounded, margin irregularly serrate, apex slightly acute or obtuse. Cymes axillary; peduncle 5–8 mm. Pedicel 5–7 mm. Bracts subulate, ca. 4 mm. Sepals ca. 6 × 1.5–2 mm, glabrous abaxially, adaxially stellate tomentose. Petals oblong, ca. 1.5 mm; glands nearly round, hairy. Stamens many, with long silk hairs. Ovary hairy; style glabrous. Drupe 2–4-lobed; drupelets 1 per lobe. Fl. Jun.

• Taiwan.

7. *Grewia biloba* G. Don, Gen. Hist. 1: 549. 1831.

扁担杆 *bian dan gan*

Shrubs or small trees 0.5–1(–4) m tall, many branched. Branchlets pubescent or nearly glabrous. Stipule subulate, 3–4 mm; petiole 4–8 mm, densely puberulent; leaf blade ovate-orbicular or obovate-elliptic, sometimes shallowly 3-lobed, 4–9 × 2.5–4 cm, thinly leathery, abaxially sparsely stellate hairy to stellate tomentose, adaxially more sparsely stellate hairy, lateral basal veins more than 1/2 as long as leaf blade, lateral veins 3–5 pairs, base cuneate or obtuse, margin serrulate, apex acute. Cymes axillary, many flowered; peduncle less than 1 cm. Pedicel 3–6 mm. Bracts subulate, 3–5 mm. Sepals narrowly oblong, 4–7 mm, abaxially hairy, adaxially white and glabrous. Petals 1–1.5 mm. Androgynophore ca. 0.5 mm, hairy. Stamens ca. 2 mm. Ovary hairy; style as long as sepals. Drupe red, 2–4-lobed; drupelets 1 per lobe. Fl. May–Jul.

Anhui, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Korea].

- 1a. Leaf blade suborbicular, 1–1.5 × ca. 1 cm 7c. var. *microphylla*
 1b. Leaf blade elliptic or obovate-elliptic, 4–9 × 2.5–4 cm.
 2a. Leaf blade sparsely stellate hairy abaxially 7a. var. *biloba*
 2b. Leaf blade densely softly stellate tomentose abaxially 7b. var. *parviflora*

7a. *Grewia biloba* var. *biloba*

扁担杆(原变种) *bian dan gan* (yuan bian zhong)

Grewia biloba var. *glabrescens* (Benth) Rehder; *G. glabrescens* Benth; *G. parviflora* Bunge var. *glabrescens* (Benth) Rehder & E. H. Wilson; *G. tenuifolia* Kanehira & Sasaki.

Leaf blade elliptic or obovate-elliptic, 4–9 × 2.5–4 cm, abaxially sparsely stellate hairy.

Anhui, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Korea].

7b. *Grewia biloba* var. *parviflora* (Bunge) Handel-Mazzetti, Symb. Sin. 7: 612. 1933.

小花扁担杆 *xiao hua bian dan gan*

Grewia parviflora Bunge, Enum. Pl. China Bor. 9. 1833; *G. chanelii* H. Léveillé; *G. parviflora* var. *velutina* Pampanini.

Leaf blade elliptic or obovate-elliptic, 4–9 × 2.5–4 cm, abaxially densely softly stellate tomentose. Flowers smaller.

• Anhui, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.

7c. *Grewia biloba* var. *microphylla* (Maximowicz) Handel-Mazzetti, Symb. Sin. 7: 612. 1933.

小叶扁担杆 *xiao ye bian dan gan*

Grewia parviflora var. *microphylla* Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 81. 1890.

Leaf blade suborbicular, 1–1.5 cm, sparsely pilose abaxially. Flowers larger.

• Sichuan, Yunnan.

8. *Grewia piscatorum* Hance, Ann. Sci. Nat., Bot., sér. 5, 5: 208. 1866.

海岸扁担杆 *hai an bian dan gan*

Shrubs small, many branched, extending, slender. Branchlets sparsely stellate. Stipule filiform, ca. 2 mm; petiole 2–3 mm; leaf blade ovate or elliptic, 1–2.3 × 1–2 cm, nearly membranous, glabrous adaxially, greenish when dry, luminous, glabrous or sparsely pilose abaxially, lateral basal veins ca. 1/2 as long as leaf blade, lateral veins 2–3 pairs, base rounded or slightly cordate, margin serrate, apex obtuse or shortly acute. Cymes 1 or 2 in subterminal axils, usually 3-flowered; peduncle ca. 5 mm. Pedicel as long as peduncle or slightly shorter. Bracts subulate, 2–4 mm. Sepals narrowly oblong, 5–7 mm, abaxially

hairy, adaxially glabrous. Petals 1.5–2 mm. Androgynophore very short. Stamens many, 4–5 mm. Ovary hairy; style glabrous. Drupe 2- or 4-lobed, furrowed; drupelets 1 per lobe.

- Coastal areas. Fujian, Hainan, Taiwan.

This species is very similar to *Grewia biloba* var. *microphylla*. It differs in having leaves that are nearly membranous, not thinly leathery, and abaxially nearly glabrous, not stellate hairy.

9. *Grewia angustisepala* Hung T. Chang, Acta Phytotax. Sin. 20: 175. 1982.

狭萼扁担杆 xia e bian dan gan

Shrubs 1–2.5 m tall. Branchlets softly yellow-brown tomentose. Petiole 3–5 mm, softly yellow-brown tomentose; leaf blade ovate-elliptic, thinly leathery, 13–16 × 6–9 cm, densely softly yellow-brown tomentose abaxially, stellate but glabrescent and hairy only on veins adaxially, lateral basal veins to 2/3 as long as blade, 8–15 mm from margin, each with secondary veins 6–8, lateral veins 4–5 pairs in distal 1/2, base rounded or slightly cordate, slightly oblique, margin dentate (teeth alternately small and large, triangular, 1–2.5 mm), apex acuminate. Cymes 1 or 2 in axils of leaves, 2–3 cm; peduncle 1–1.7 cm. Pedicel 6–8 mm. Bracts lanceolate, 6–8 mm, hairy. Sepals narrowly lanceolate, 7–8 × 1–1.5 mm, abaxially tomentose, adaxially white and glabrous. Petals 3–4 mm. Stamens 5–6 mm. Ovary tomentose; style glabrous. Drupe 2-lobed, lobes globose.

- Open forests; 800–1200 m. Yunnan.

10. *Grewia permagna* C. Y. Wu ex Hung T. Chang, Acta Phytotax. Sin. 20: 176. 1982.

大叶扁担杆 da ye bian dan gan

Grewia rugulosa C. Y. Wu ex Hung T. Chang.

Shrubs or small trees. Bark gray-brown; branchlets coarsely yellow-brown tomentose. Petiole 1.7–2.5 cm, coarsely stellate; leaf blade nearly orbicular, 21–28 × 8–23 cm, leathery, softly yellow-brown tomentose abaxially, coarsely hairy adaxially, lateral basal veins ascending to near apex of leaf blade, 3.5–5 cm from margin, each with secondary veins 8–11, lateral veins 5–6 pairs, base rounded or slightly obliquely cordate, margin dentate, apex acute. Flowers not seen. Cymes axillary, ca. 1.5 cm; peduncle 7–11 mm, coarsely hairy. Drupe globose, 7–8 mm in diam., slightly hairy. Fr. winter.

- Scrub; ca. 1200 m. Yunnan.

11. *Grewia acuminata* Jussieu, Ann. Mus. Natl. Hist. Nat. 4: 91. 1804.

密齿扁担杆 mi chi bian dan gan

Grewia densiserrulata Hung T. Chang.

Shrubs climbing. Branchlets densely brown stellate, shortly coarsely hairy. Petiole 3–4 mm, densely yellow stellate; leaf blade ovate to ovate-oblong, 8–13 × 4–6 cm, leathery, stellate, shortly coarsely hairy adaxially, densely brown stellate abaxially, lateral basal veins to 1/2 as long as leaf blade, 6–8 mm from margin, each with 10 secondary veins, lateral veins 5–6 pairs distally, base rounded, margin densely serrulate, teeth

less than 0.4 mm, ca. 1 mm apart, apex acute. Cymes solitary in leaf axils, 2- or 3-flowered; peduncle 1–1.5 cm. Pedicel 12–18 mm. Sepals to 2 cm. Petals ca. 7 mm. Androgynophore 4–8 mm. Stamens many; filaments 8–12 mm. Ovary 2-loculed; style ca. 1 cm. Fruiting peduncle 1–2 cm, pedicels 1.5–2 cm, both coarsely stellate hairy. Drupe 4-lobed, ca. 2 cm in diam.; drupelets coarsely hairy; androgynophore 5–6 mm, stellate tomentose.

Scrub; 800–900 m. S Yunnan [Cambodia, India, Indonesia (Java), Laos, Malaysia, Myanmar, Thailand, Vietnam].

12. *Grewia abutilifolia* W. Vent ex Jussieu, Ann. Mus. Natl. Hist. Nat. 4: 92. 1804.

苘麻叶扁担杆 qing ma ye bian dan gan

Grewia hirsutovelutina Burret; *G. kainantensis* Masamune; *Sterculia tiliacea* H. Léveillé.

Shrubs or small trees 1–5 m tall; branchlets yellow-brown stellate, coarsely hairy. Petiole 1–2 cm, coarsely stellate tomentose; leaf blade broadly ovate to nearly orbicular, usually lobed distally, 7–11 × 5–9 cm, papery, densely yellow and brown, coarsely stellate tomentose abaxially, adaxially sparsely coarsely stellate hairy, lateral basal veins more than 1/2 as long as leaf blade, each with 7–9 secondary veins, lateral veins distal, 3–4 pairs, base rounded or slightly cordate, margin serrulate, apex acute. Cymes 3–7 per leaf axil; peduncle 3–6 mm. Pedicel 4–8 mm. Bracts filiform, caducous. Sepals white, narrowly oblong, 6–8 × ca. 2 mm, abaxially hairy, adaxially glabrous. Petals 2–3 mm. Androgynophore glabrous. Stamens 4–5 mm. Ovary villous; style as long as sepals; stigma 2-lobed. Drupe obscurely 2- or 4-lobed, tomentose; drupelets 1 per lobe.

Scrub, slopes on grasslands. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

13. *Grewia urenifolia* (Pierre) Gagnepain, Notul. Syst. (Paris) 1: 126. 1909 [*“urenaefolia”*].

稔叶扁担杆 ren ye bian dan gan

Grewia abutilifolia W. Vent ex Jussieu var. *urenifolia* Pierre, Fl. Forest. Cochinch. t. 164. 1888 [*“urenaefolia”*].

Shrubs 1–2 m tall. Branchlets coarsely stellate. Petiole 1–1.5 cm, coarsely hairy; leaf blade broadly ovate, 6–8 × 4–6.5 cm, coarsely stellate adaxially, densely coarsely stellate abaxially, base cordate. Cymes 1–2 in axils of leaves; peduncle ca. 1 cm. Pedicel 4–6 mm. Flower buds 6–7 mm. Sepals ca. 6 mm, hairy abaxially, adaxially glabrous. Petals minute, gland base hairy. Ovary hairy; stigma 5-lobed. Drupe 2–4-lobed; drupelets 1 per lobe.

Secondary scrub. Guangxi, Hainan, Yunnan [Cambodia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

This species is similar to *Grewia abutilifolia* but differs in having only 1 or 2 cymes per leaf axil, longer peduncles and pedicels, and a 5-lobed stigma.

14. *Grewia concolor* Merrill, Lingnan Sci. J. 14: 35. 1935.

同色扁担杆 tong se bian dan gan

Shrubs climbing. Branchlets rust-brown stellate tomentose. Stipules lanceolate, ca. 5 × 2 mm; petiole 5–7 mm, hairy; leaf blade oblong, 7–12 × 2.5–4 cm, leathery, sparsely stellate and villous with long solitary hairs at first on both surfaces, glabrescent or with sparsely solitary hairs only on veins on both surfaces, lateral basal veins less than 1/2 as long as leaf blade, lateral veins 5–6 pairs, base slightly oblique, nearly rounded to shallowly cordate, margin serrulate, apex shortly acute or obtuse. Cymes 1 or 2 per leaf axil, 2- or 3-flowered; peduncle ca. 1 cm, brown hairy. Flowers unisexual. Pedicel 5–9 mm, brown hairy. Bracts subulate, ca. 5 mm, hairy abaxially. Sepals narrowly lanceolate, 7–8 mm, adaxially hairy. Petals 2.5–3 mm; glands obovoid, hairy. Stamens many. Ovary villous; style glabrous; stigma 5-lobed. Drupe 2–4-lobed, lobes globose; drupelets 1 per lobe. Fl. Jul–Aug.

- Forests, open scrub. Fujian, Hainan.

15. *Grewia macropetala* Burret, Repert. Spec. Nov. Regni Veg. 33: 74. 1933.

长瓣扁担杆 chang ban bian dan gan

Shrubs 1–3 m tall. Branchlets coarsely brown stellate. Petiole 4–5 mm, stellate pubescent; leaf blade oblong-lanceolate, 4–7 × 1.5–2 cm, thinly leathery, sparsely coarsely stellate pubescent, glabrescent, lateral basal veins to 1/2 as long as leaf blade, lateral veins 3–4 pairs, veinlets prominent on both surfaces, base narrowly rounded, margin irregularly serrulate, apex acuminate. Cymes 1 or 2 per leaf axil, 3-flowered; peduncle slender, 4–14 mm. Pedicel 4–12 mm, stellate pubescent. Bracts filiform, 3–4 mm. Sepals ca. 6 mm, abaxially hairy, adaxially glabrous. Petals 4–5 mm. Androgynophore short, glabrous. Stamens 16–18, as long as or slightly longer than petals. Ovary hairy; style as long as stamens; stigma 2–4-lobed. Drupe 2–4-lobed, hairy, glabrescent; drupelets 1 per lobe. Fl. May–Jun.

- Secondary forests. Guangdong, Guangxi, Yunnan.

16. *Grewia sessiliflora* Gagnepain, Notul. Syst. (Paris) 1: 167. 1910.

无柄扁担杆 wu bing bian dan gan

Shrubs. Branches and branchlets softly yellow-brown tomentose. Petiole 1–3 mm; leaf blade triangular-lanceolate, 6–10 × 3–5 cm, abaxially densely softly yellow-brown tomentose, adaxially softly stellate tomentose, lateral basal veins to 1/2 as long as leaf blade, 7–13 mm from margin, lateral veins 3–4 pairs, base oblique, rounded or shallowly cordate, margin serrate, apex narrowly acuminate. Cymes 1 or 2 per leaf axil, 4–5 cm; peduncle 3–4 cm, tomentose. Bracts filiform, 7–8 mm, tomentose. Sepals lanceolate, 8–9 × ca. 1.5 mm, abaxially tomentose, adaxially glabrous. Petals 4–5 mm. Stamens slightly longer than petals. Ovary tomentose; style longer than stamens. Drupe 2-lobed, lobes globose, glossy, sparsely stellate hairy. Fl. Jun–Jul.

Secondary forests at low elevations. S Guangdong, Guangxi [Laos, N Thailand, N Vietnam].

The diagnostic features of this species include the triangular-lanceolate leaves covered with yellow-brown soft indumentum and the long cymes; at 4–5 cm, these are the longest cymes in the genus in China.

17. *Grewia chuniana* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 13: 488. 1936.

崖县扁担杆 ya xian bian dan gan

Shrubs. Old branches dark brown, glabrous; branchlets densely rust-brown tomentose. Stipules subulate, 5–6 mm; petiole 3–5 mm, densely tomentose; leaf blade oblong-lanceolate, 7–11 × 3–4 cm, leathery, abaxially densely gray-brown stellate tomentose, adaxially sparsely hairy, base rounded or obliquely shallowly cordate, margin serrulate, apex acuminate. Cymes 3-flowered; peduncle 1–1.2 cm, tomentose. Pedicel 5–7 mm, tomentose. Bracts subulate, ca. 5 mm. Sepals 5–6 mm, abaxially densely tomentose, adaxially glabrous. Petals ca. 2.5 mm; glands scalelike, enclosed by ring of long hairs. Stamens many, shorter than sepals, slightly longer than petals. Ovary hairy; style as long as sepals; stigma many-lobed. Drupe 2–4-lobed; drupelets 1 per lobe. Fl. Aug–Sep.

- Coastal scrub. Hainan.

This species is similar to *Grewia hirsuta* but differs in having leaf blades that are gray-brown, not yellowish brown, stellate tomentose, and not blackened when dried, and longer cymes: peduncle 10–12 mm, not 3–7 mm.

18. *Grewia oligandra* Pierre, Fl. Forest. Cochinch. t. 163. 1888.

寡蕊扁担杆 gua rui bian dan gan

Shrubs. Old branches dark brown; branchlets stellate tomentose. Stipules subulate, ca. 4 mm, caducous; petiole 5–8 mm; leaf blade lanceolate or oblong-lanceolate, 9–10.5 × 2–3.5 cm, papery, dark brown when dried, abaxially densely softly gray-brown tomentose, adaxially sparsely coarsely shortly stellate hairy, base rounded, margin serrulate, teeth alternately large and small. Cymes 3–5-flowered; peduncle 4–7 mm, tomentose. Pedicel 3–4 mm, tomentose. Bracts 3–4 mm. Sepals 5–6 mm, abaxially tomentose, adaxially glabrous. Petals oblong, 2–3 mm; glands scalelike, enclosed by ring of hairs. Stamens shorter than sepals. Ovary hairy; stigma many-lobed. Drupe 2–4-lobed, lobes globose, ca. 1 cm in diam., glossy. Fl. Aug.

Guangdong, Guangxi, Hainan [Cambodia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

This species is similar to *Grewia cuspidatoserrata* but differs by its soft gray-brown, not rust-brown, indumentum on the abaxial leaf blade surface and longer cymes: peduncle 4–7 mm, not less than 3 mm.

19. *Grewia hirsuta* Vahl, Symb. Bot. 1: 34. 1790.

粗毛扁担杆 cu mao bian dan gan

Shrubs or small trees. Branchlets coarsely gray-brown stellate hairy. Petiole 2–3 mm, tomentose; leaf blade lanceolate, 6–14 × 2–3.5 cm, leathery, black-brown when dried, abaxially yellow-brown stellate tomentose, adaxially sparsely coarsely stellate, lateral basal veins to 1/2 as long as leaf blade, lateral veins 4–5 pairs, base narrow, shallowly cordate, margin serrulate, apex acuminate or rarely obtuse. Cymes 1–5 per leaf axil, 3- or 4-flowered; peduncle 3–7 mm, tomentose. Pedicel 3–5 mm, tomentose. Bracts lanceolate, 3–4 mm. Sepals narrowly lanceolate, 6–7 × ca. 1.5 mm, abaxially tomentose, adaxially

glabrous. Petals narrowly ovate, ca. 3×1.5 mm. Stamens 4–5 mm. Ovary villous; style longer than stamens, glabrous; stigma 4-lobed. Drupe globose or 2-lobed, sparsely coarsely hairy; drupelets 2 per lobe. Fl. Jun–Jul.

Guangdong, S Guangxi [Bangladesh, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

20. *Grewia latiglandulosa* Z. Y. Huang & S. Y. Liu, J. Trop. Subtrop. Bot. 13: 367. 2005.

阔腺扁担杆 *kuo xian bian dan gan*

Shrubs 1–1.8 m tall. Stem and branches grayish brown; branchlets pale brown, densely white stellate pilose. Stipules linear-lanceolate, 3–5 mm; petiole 2–3 mm, stellate pilose; leaf blade elliptic or oblong, $2.2\text{--}10 \times 1.2\text{--}3.4$ cm, papery, abaxially densely stellate pilose, adaxially drying green, minutely stellate pilose, lateral basal veins to 1/2 as long as leaf blade, lateral veins 3–6 pairs, base rounded or nearly rounded, slightly oblique, margin serrulate, apex acuminate or long acuminate. Cymes 1 or 2 per leaf axil, 1–3-flowered; peduncle 8–15 mm, densely white stellate pilose. Pedicel 5–10 mm. Sepals 10–12 \times 2–3 mm, abaxially densely stellate pilose, adaxially white, glabrous, apex obtuse. Petals yellow, ovate-rotund, $2.5\text{--}3 \times 1.5\text{--}2$ mm; gland scalelike, ca. 2/3 as large as petal, margin pilose. Androgynophore ca. 1 mm, pilose. Stamens many; filaments white, unequal; anthers yellow. Ovary depressed-globose, densely white stellate pilose; style ca. 7 mm, stellate pilose below middle; stigma 4- or 5-lobed. Drupe yellow-green drying blackish, 2–4-lobed, sparsely white stellate pilose, glossy; drupelets ca. $5 \times 5\text{--}6$ mm.

• Guangxi (Tianyang).

21. *Grewia brachypoda* C. Y. Wu, J. W. China Border Res. Soc. 16: 162. 1946.

短柄扁担杆 *duan bing bian dan gan*

Shrubs 0.5–1.5 m tall. Branchlets densely yellow-brown tomentose, two-year-old branches slightly coarsely tomentose. Petiole 1–4 mm, densely tomentose; leaf blade oblong-lanceolate or oblong, $3\text{--}9 \times 2\text{--}3.5$ cm, leathery, abaxially densely yellow-brown to gray-brown stellate tomentose, adaxially coarsely stellate hairy, fallen hairs leaving verrucose prominence, lateral basal veins 1/2 as long as blade or longer, lateral veins 3–4 pairs, base rounded, margin serrate, apex acute. Cymes solitary in axils, 3-flowered; peduncle 0.7–1 cm, tomentose. Pedicel 4–6 mm, tomentose. Bracts subulate, hairy, caducous. Sepals 5–7 \times 2–2.5 mm, abaxially stellate hairy, adaxially glabrous. Petals 2–3 mm. Stamens 3–5 mm. Ovary villous; style 3–4 mm, glabrous; stigma swollen. Drupe 2-lobed, 1–1.2 cm, glossy, glabrous.

• Scrub, dry grassy slopes. SW Sichuan, N and SW Yunnan.

22. *Grewia retusifolia* Pierre, Fl. Forest. Cochinch. t. 168. 1888.

钝叶扁担杆 *dun ye bian dan gan*

Shrubs or small trees. Branchlets slender, appressed yellow stellate tomentose. Petiole 3–5 mm; leaf blade oblong-lanceolate, $6\text{--}8.5 \times 2.2\text{--}3.4$ cm, abaxially gray-white adnate stel-

late puberulent, adaxially coarsely shortly stellate hairy, glabrescent, lateral basal veins to 1/2 as long as leaf blade, 4–7 mm from margin, lateral veins 3–4 pairs, base rounded, margin irregularly denticulate, apex obtuse or slightly acute. Cymes 1 or 2 per leaf axil, 3–5-flowered; peduncle ca. 1 cm, slender, hairy. Pedicel ca. 3 mm. Bracts filiform, lanceolate, 3–5 mm. Sepals narrowly lanceolate, 5–6 mm, abaxially stellate tomentose, adaxially glabrous. Petals ca. 2.5 mm. Androgynophore slightly longer than petals. Ovary hairy; style longer than stamens; stigma 4-lobed. Drupe 4-lobed, lobes globose, glossy dark reddish brown.

Secondary forests. S Guangxi (Nanning) [Indonesia, Vietnam; N Australia].

23. *Grewia falcata* C. Y. Wu, J. W. China Border Res. Soc. 16: 161. 1946.

镰叶扁担杆 *lian ye bian dan gan*

Shrubs or small trees. Branchlets softly yellow-brown tomentose. Petiole 3–5 mm, tomentose; leaf blade band-shaped, slightly curved or straight, or falcate, $6\text{--}18 \times 1\text{--}3$ cm, leathery or papery, abaxially softly yellow-brown or rust-brown tomentose, adaxially sparsely stellate pilose and more densely on veins, lateral basal veins obscure, 1/4–1/3 as long as leaf blade, 1–3 mm from margin, lateral veins 4–8 pairs, veinlets prominent, base obtuse, margin serrulate, apex acuminate. Cymes 1–3 per leaf axil; peduncle 3–5 mm, yellow-brown tomentose. Pedicel 3–4 mm, yellow-brown tomentose. Sepals lanceolate, $8\text{--}9 \times 2\text{--}2.5$ mm, abaxially tomentose, adaxially glabrous. Petals oblong, 3–4 mm, glands on basal 1/2. Stamens 20–30, 5–6 mm. Ovary densely yellow-brown villous; style longer than stamens; stigma 4-lobed. Drupe 4-lobed, lobes globose, hairy, glossy.

Open forests; 800–1700 m. SW Guangxi, Yunnan [Cambodia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

This species is similar to *Grewia cuspidatoserrata* but differs in having the leaf margin with uniform teeth, not alternately small and large, the indumentum yellow-brown, not gray-brown, and the leaf blade narrowly band-shaped, not oblong-lanceolate or lanceolate.

24. *Grewia cuspidatoserrata* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 9: 718. 1926 [*“cuspidato-serrata”*].

尖齿扁担杆 *jian chi bian dan gan*

Shrubs. Old branches brown; branchlets rust-brown tomentose. Stipules lanceolate, ca. 7 mm, caducous; petiole 4–6 mm, tomentose; leaf blade oblong-lanceolate or lanceolate, $7\text{--}16 \times 2.5\text{--}4.5$ cm, papery or leathery, abaxially densely softly rust-brown tomentose, adaxially coarsely stellate, lateral basal veins 1/3 to more than 1/2 as long as leaf blade, lateral veins distal, 4–5 pairs, base nearly rounded, slightly oblique, margin double-serrate, teeth 1–2.5 mm, alternately small and large, narrow and acute, apex shortly acute or slightly obtuse. Cymes 1 to several per leaf axil; peduncle less than 3 mm. Pedicel 5–8 mm. Bracts lanceolate, ca. 3 mm. Sepals oblong, $6\text{--}7 \times$ ca. 2 mm, abaxially hairy, adaxially glabrous. Petals ca. 3 mm, abaxially hairy at base; glands obovoid, enclosed by ring of hairs. Stamens many, with long hairs in between. Ovary hairy. Fruit 2–4-lobed. Seeds 1 or 2 per drupelet. Fl. Apr–May.

- Open forests; 1200–1500 m. S Yunnan.

25. *Grewia henryi* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 9: 674. 1926.

黄麻叶扁担杆 *huang ma ye bian dan gan*

Shrubs or small trees 1–6 m tall. Branchlets yellow-brown coarsely stellate. Petiole 7–9 mm, coarsely stellate; leaf blade broadly oblong, 11–19 × 3–4.5 cm, thinly leathery, abaxially greenish or coarsely yellow-green stellate, glabrescent, adaxially yellow-green when dry, sparsely shortly stellate hairy, lateral basal veins 1/3–1/2 as long as blade, 3–8 mm from margin, lateral veins 4–6 pairs, base broadly cuneate, rarely unequally obtuse, margin serrulate, apex acuminate. Cymes 1 or 2 per leaf axil, 3–4-flowered; peduncle 1–2.5 cm. Pedicel 5–11 mm. Sepals lanceolate, 1–1.3 cm, abaxially tomentose, adaxially glabrous. Petals long ovate, 4–5 mm. Stamens 5–7 mm. Ovary 4-loculed, hairy; style 6–7 mm; stigma 4-lobed. Drupe 4-lobed.

- Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Yunnan.

26. *Grewia lacei* Drummond & Craib, Bull. Misc. Inform. Kew 1911: 21. 1911.

细齿扁担杆 *xi chi bian dan gan*

Trees to 5 m tall. Branchlets densely tomentose. Petiole ca. 5 mm, hairy; leaf blade narrowly lanceolate, 15–20 × 2–2.5 cm, papery, densely rust-brown tomentose abaxially, glabrous or sparsely hairy adaxially, lateral basal veins 1/4–1/3 as long as leaf blade, lateral veins 7–8 pairs, base slightly oblique, cuneate, margin obscurely serrulate, apex obtuse or acute. Cymes 2 to several per leaf axil, 1–3-flowered; peduncle ca. 2 mm. Flowers polygamo-monoecious. Pedicel 3–5 mm. Sepals linear, ca. 6 mm, margin involute, apex obtuse, densely coarsely yellow-brown hairy. Petals ca. 1.5 × 1 mm, abaxially minutely hairy, apex erose. Stamens 10–20; filaments ca. 2 mm. Ovary densely yellow-brown tomentose; style ca. 2 mm; stigma swollen, lobed. Drupe nearly square, 4-lobed, yellow villous. Fl. Aug–Sep, fr. Oct–Nov.

Open lowland forests; 500–700 m. S Yunnan [Laos, Myanmar, Thailand].

27. *Grewia multiflora* Jussieu, Ann. Mus. Natl. Hist. Nat. 4: 89. 1804.

光叶扁担杆 *guang ye bian dan gan*

Grewia didyma Roxburgh ex G. Don; *G. disperma* Rottler ex Sprengel; *G. glabra* Blume; *G. jinghongensis* Y. Y. Qian; *G. serrulata* Candolle.

Shrubs and small trees. Branchlets sparsely stellate, glabrescent. Stipule filiform, 1–1.5 × ca. 0.1 cm, caducous; petiole 6–8 mm, tomentose; leaf blade oblong-lanceolate, 7–17 × 2.5–4.5 cm, papery, glabrous or very sparsely hairy adaxially, hairs simple and stellate, in vein axils, lateral basal veins to 1/2 as long as leaf blade, lateral veins 5–6 pairs, base cuneate or broadly cuneate, margin serrulate, apex long acuminate. Cymes 2–3 in axils, 3-flowered; peduncle slender, 1.2–2.5 cm. Pedicel 1–1.2 cm, sparsely stellate. Bracts subulate, ca. 4 mm. Sepals ca. 1.3 × 0.3–0.5 cm, densely yellow-brown pubescent abaxially. Petals ca. 3 mm. Androgynophore 2–4 mm. Drupe 4-lobed, glabrous; exocarp not separating. Fl. Jul–Sep, fr. Oct.

S Yunnan [India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan; Australia].

This species has been confused with *Grewia laevigata* Vahl (see Chung, Edinburgh J. Bot. 62: 1–27. 2005).

7. TRIUMFETTA Linnaeus, Sp. Pl. 1: 444. 1753.

刺蒴麻属 *ci shuo ma shu*

Bartramia Linnaeus.

Herbs, rarely subshrubs, annual or perennial, erect or procumbent, hairs with swollen base, stellate or with 1 ray and apparently simple. Leaves alternate, simple or palmately 3–5-lobed, palmately veined, margin serrate. Flowers solitary or arranged in small cymes or fascicles, axillary, opposite to leaves, bisexual; peduncle very short. Sepals 5, free, valvate, usually with hooked appendages at tip. Petals as many as sepals, free, thickened glands on base of adaxial surface. Stamens 5 to numerous; filaments free; anthers dorsifixed, subglobose, dehiscence longitudinal, borne on androgynophore; androgynophore fleshy, segmented, short, with 5 glands opposite to petals. Ovary 2–5-loculed; ovules 2 per locule; style simple; stigma 2–5-lobed. Fruit a capsule nearly globose, 3–6-valved, spiny or strigose, loculicidally dehiscent or indehiscent, spine tips pointed, straight or hooked. Seeds with endosperm; cotyledons fleshy, epigeous.

Between 100 to 160 species: primarily in tropical and subtropical areas, several species are widespread weeds; seven species in China.

- 1a. Capsule dehiscent, spines 3–10 mm; leaf blade not lobed.
 - 2a. Capsule spines glabrous or hairy at base only; leaf blade hairs mostly unbranched, occasionally few-rayed on main veins; flower bud nearly glabrous 3. *T. annua*
 - 2b. Capsule spines uniformly hairy; leaf blade hairs mostly obviously stellate, abaxially tomentose; flower bud obviously hairy.
 - 3a. Capsule spines with straight or gently curved apex; pedicel ca. 1.5 mm 1. *T. cana*
 - 3b. Capsule spines with strongly hooked apex; pedicel 3–5 mm 2. *T. pilosa*
- 1b. Capsule indehiscent, spines 1.5–4 mm; blade of lower leaves often 3–5-lobed or coarsely dentate.
 - 4a. Blade of upper leaves 0.7–1.5 cm wide, abaxial hairs apparently simple 4. *T. grandidens*
 - 4b. Blade of upper leaves 1.5–6 cm wide, abaxial hairs stellate.

- 5a. Leaf blade base cordate, abaxial surface densely yellow-brown tomentose, apex obtuse; stamens 20–35 7. *T. procumbens*
 5b. Leaf blade base broadly cuneate or rounded, abaxial surface pilose or pubescent, apex acute or acuminate; stamens 10 or 15–20.
 6a. Pedicels less than 1 mm; stamens 10 5. *T. rhomboidea*
 6b. Pedicels 2–3 mm; stamens 15 or more 6. *T. semitriloba*

1. *Triumfetta cana* Blume, Bijdr. 126. 1825.

毛刺蒴麻 mao ci shuo ma

Triumfetta tomentosa Bojer; *T. tomentosa* var. *calvescens* Franchet.

Herbs woody or subshrubs to 2 m tall. Branchlets yellow-brown tomentose, hairs stellate. Petiole 1–3 cm; leaf blade ovate or ovate-lanceolate, 4–8 × ca. 2.4 cm, abaxially densely stellate tomentose, adaxially sparsely stellate hairy, basal veins 3–5, 2 lateral ones ascending beyond 1/2 blade, base rounded, margin irregularly serrate, apex acuminate. Cymes 1 to several per axil; peduncle ca. 3 mm. Flower buds densely appressed gray-white puberulent. Pedicel ca. 1.5 mm. Sepals narrowly oblong, ca. 7 mm, tomentose. Petals oblong, slightly shorter than sepals, base shortly stalked, stalk ciliate. Stamens 8–10 or rarely more. Ovary 4-loculed, spiny; stigma 3–5-lobed. Capsule globose, ca. 4 mm in diam., spiny, dehiscent into 4 valves; spines slender, 5–7 mm, puberulent, curved, tip straight. Seeds 2 per cell. Fl. summer–autumn.

Secondary forests, scrub. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

2. *Triumfetta pilosa* Roth, Nov. Pl. Sp. 223. 1821.

长勾刺蒴麻 chang gou ci shuo ma

Herbs woody at base, or subshrubs to 1(–1.5) m tall. Branchlets yellow-brown stellate tomentose, simple hairs also present. Petiole 1–5 cm; leaf blade ovate or narrowly ovate, 3–14 × 1.3–4.5 cm, thickly papery, abaxially densely yellow-brown stellate tomentose, adaxially sparsely stellate, basal veins 3, lateral 2 ascending beyond 1/2 blade, base rounded or subcordate, margin irregularly serrate, apex acuminate or acute. Cymes 1 to several per node; peduncle 5–8 mm. Flower buds pilose. Pedicel 3–5 mm. Bracts lanceolate, ca. 1 mm. Sepals narrowly lanceolate, 6–10(–12) × 1–1.5 mm, hairy, apex cucullate, apical appendage 0.5–1 mm. Petals as long as sepals. Stamens 10(–30). Ovary hairy. Capsule globose, body 3–5 mm in diam., spiny, overall 1.1–1.3 × 1.2–1.4 cm, 4-loculed, dehiscent; spines 6–8 mm, hairy, tip hooked. Fl. summer–autumn.

Dry scrub. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [Bhutan, ?Cambodia, India, ?Laos, Malaysia, Nepal, New Guinea, Sri Lanka, Thailand, ?Vietnam; tropical Africa, Australia].

3. *Triumfetta annua* Linnaeus, Syst. Nat., ed. 12, 2: 327; Mant. Pl. 1: 73. 1767.

单毛刺蒴麻 dan mao ci shuo ma

Herbs annual, or subshrubs. Branchlets yellow-brown tomentose. Stipule narrowly triangular; petiole 1–7.5 cm, sparsely simple-pilose; leaf blade ovate or ovate-lanceolate, 5–13 × 3–7 cm, papery, sparsely pilose, both surfaces simple-pilose, basal

veins 3–5, 2 lateral ones ascending beyond 1/2 blade, base rounded or subcordate, margin serrate, apex caudate or acuminate. Peduncle very short. Pedicel 3–6 mm, villous. Bracts 2–3 mm, villous. Flower bud nearly glabrous. Sepals ca. 5 mm, tips appendaged. Petals oblanceolate, slightly shorter than sepals. Stamens 10. Ovary 3- or 4-loculed, spiny; style very short; stigma 2–3-lobed. Capsule impressed globose, ca. 6 mm in diam., spiny, dehiscent, 3- or 4-valved; spines 3–7 mm, glabrous or hairy at base, tip hooked. Fl. autumn.

Open areas, roadsides. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Bhutan, India, Malaysia, Nepal, Pakistan; Africa].

Triumfetta annua was incorrectly named as *T. suffruticosa* Blume by some authors, including Merrill; it has also been confused with *T. japonica* Makino, which is restricted to Japan, Korea, and the Philippines.

4. *Triumfetta grandidens* Hance, J. Bot. 15: 329. 1877.

粗齿刺蒴麻 cu chi ci shuo ma

Herbs woody, creeping or not, many branched; stems pubescent, hairs simple, or glabrous. Petiole 5–10 mm, hairy; lower leaf blades rhomboid, 3–5-lobed; upper ones oblong, 1–2.5 × 0.7–1.5 cm, both surfaces glabrous or abaxially hairy on veins, basal veins not strongly ascending, base cuneate, margin serrate, apex obtuse. Cymes 10–20 mm; peduncle 5–7 mm. Pedicel 2–3 mm. Sepals filiform, ca. 6 mm, abaxially puberulent. Petals broadly ovate, slightly shorter than sepals, shortly stalked. Stamens 8–10. Ovary 2- or 3-loculed. Capsule globose, spiny, indehiscent; spines 2–4 mm, puberulent or glabrous, tip shortly hooked. Fl. winter–spring.

Sandy coasts, coastal wastelands. Guangdong, Hainan [Cambodia, Malaysia, Thailand, Vietnam].

Triumfetta grandidens has been included within *T. repens* (Blume) Merrill & Rolfe, but the combination of small leaves with relatively very large triangular marginal teeth is very distinctive.

- 1a. Stems and capsule pubescent or puberulent 4a. var. *grandidens*
 1b. Stems and capsule glabrous 4b. var. *glabra*

4a. *Triumfetta grandidens* var. *grandidens*

粗齿刺蒴麻(原变种) cu chi ci shuo ma (yuan bian zhong)

Triumfetta dunalis O. Kuntze.

Branchlets and leaves hairy. Stems and capsule pubescent or puberulent.

Guangdong, Hainan [Malaysia, Vietnam].

4b. *Triumfetta grandidens* var. *glabra* R. H. Miao ex Hung T. Chang, Acta Phytotax. Sin. 20: 178. 1982.

秃刺蒴麻 tu ci shuo ma

Stems, branchlets, leaves, and capsule glabrous.

- Coastal wastelands. Hainan.

5. *Triumfetta rhomboidea* Jacquin, Enum. Syst. Pl. 22. 1760.

刺蒴麻 ci shuo ma

Bartramia indica Linnaeus; *Triumfetta angulata* Lamarck; *T. bartramii* Linnaeus, nom. illeg. superfl.; *T. indica* Lamarck; *T. trilocularis* Roxburgh; *T. velutina* Vahl.

Subshrubs or herbs. Branchlets gray-brown tomentose. Petiole 1–5 cm; lower leaf blades broadly ovate-orbicular, rhomboid, or broadly ovate, 3-lobed, 3–9.5 × 2–8.5 cm, abaxially stellate pilose, adaxially sparsely hairy, basal veins 3–5, 2 lateral ones reaching tip of lobes, base broadly cuneate or rounded, margin irregularly bluntly serrate, apex acute; upper leaf blades oblong-lanceolate, not lobed. Cymes 3–5 per axil; peduncle to 2 mm. Flower buds cylindrical, apex slightly wider, ca. 4 mm. Pedicel less than 1 mm. Sepals narrowly oblong, 4.5–5.5 mm, villous, appendaged at tip. Petals yellow, slightly shorter than sepals, hairy along margins. Stamens 10. Ovary spiny. Capsule globose, ca. 3 mm in diam., spiny, indehiscent; spines ca. 2 mm, gray-yellow puberulent, tip hooked. Seeds 2–6. Fl. summer–autumn. $2n = 32$.

Forest margins, open areas, wastelands; 100–1500 m. Fujian, Guangdong, Guangxi, Taiwan, Yunnan [throughout tropics; type from West Indies].

Triumfetta indica Lamarck (Encycl. 3: 420. 1792) is not based on *Bartramia indica* Linnaeus (Sp. Pl. 1: 389. 1753) and therefore blocks the transfer of *B. indica* to *Triumfetta*; hence the correct name for this species is *T. rhomboidea*.

The whole plant is used medicinally.

6. *Triumfetta semitriloba* Jacquin, Enum. Syst. Pl. 22. 1760.

菲岛刺蒴麻 fei dao ci shuo ma

Shrubs or perennial herbs, to 1 m or more tall. Branchlets pubescent, hairs simple and stellate. Petiole 0.5–6 cm; leaf blade broadly ovate, sometimes obscurely 3-lobed, 4–8 × 3–6 cm, membranous, abaxially grayish green, stellate pubescent,

adaxially pubescent, hairs simple, basal veins 3, base rounded, rarely shallowly cordate, margin irregularly serrate-dentate, apex acuminate; upper leaves usually oblong. Cymes 2 or 3 per axil; peduncle 1–2(–3) mm. Flower buds cylindrical, ca. 4 mm, pubescent. Pedicel 2–3 mm. Sepals linear, ca. 6 mm, abaxially stellate pubescent, appendage subapical, ca. 0.5 mm, pubescent. Petals narrowly elliptic-obovate, ca. as long as sepals, Stamens 15 or more, filaments glabrous. Ovary 3-loculed, spiny; style 3–5 mm; stigma ± 3-lobed. Capsule globose, body 3–5 mm in diam., 3-loculed, indehiscent, glabrescent; spines 1.5–2 mm, retrorsely pilosulose at base, conical at base, tip hooked. Seeds 1 or 2 per cell. Fl. Oct–Jan.

Fields, wastelands. S Taiwan [Philippines; tropical America].

Triumfetta semitriloba is very easily confused with *T. rhomboidea*.

7. *Triumfetta procumbens* G. Forster, Fl. Ins. Austr. 35. 1786.

铺地刺蒴麻 pu di ci shuo ma

Shrubs, stems procumbent, to 3 m. Branchlets yellow-brown, shortly stellate hairy. Petiole 2–3 mm; leaf blade ovate-orbicular, sometimes 3-lobed, 2–4.5 × 1.5–4.5 cm, thickly papery to slightly fleshy, abaxially densely yellow-brown tomentose, adaxially more sparsely shortly stellate tomentose, basal veins 5–7, base cordate, margin crenate, apex obtuse. Cymes solitary, 2–5-flowered; peduncle 5–10(–35) mm. Pedicel 2–3(–10) mm. Sepals 9–13 × 2–2.5 mm, abaxially moderately densely stellate hairy, adaxially densely stellate tomentose near base, tips with subapical appendage terete, 1–2 mm, glabrous. Petals linear-obovate, 7.5–9 × ca. 4 mm, claw tomentose. Androgynophore ca. 0.5 mm. Stamens 20–35; filaments 5–8 mm, glabrous. Capsule globose, 4-loculed, 1.5–2 cm in diam., spiny, indehiscent, glabrous or with sparse simple and stellate hairs; spines robust, 3–5 mm, puberulent, curved at tip. Seeds 1 or 2 per cell. Fr. May–Sep.

Coastal strands near sea level. South China Sea [Japan, Malaysia; Australia, Indian Ocean islands (Diego Garcia, Seychelles), SW Pacific islands].

8. DIPLODISCUS Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 31: 235. Jun–Jul 1858.

海南椴属 hai nan duan shu

Hainania Merrill; *Pityranthe* Thwaites (Nov–Dec 1858).

Trees or shrubs. Leaves simple, entire, long or shortly petiolate; stipules minute, caducous; leaf blade ovate-orbicular, base asymmetrical, usually cordate, basal veins 5–7, margin entire, slightly sinuate, or minutely denticulate distally; foliar nectaries absent. Inflorescences terminal, paniculate. Flowers bisexual. Bracts minute, caducous. Involucral bracts absent. Calyx campanulate, 2–5-lobed, lobes unequal in length. Petals 5, oblanceolate. Stamens 20–30, free or slightly connate in 5 fascicles; filaments long; anthers minute, 2-thecate, anther cells not connate; staminodes 5, opposite to petals, lanceolate. Ovary syncarpous, superior, 5-loculed; ovules up to 5 per locule; style slender; stigma pointed. Fruit a capsule, obovoid, 4–5-angled, loculicidally dehiscent [?sometimes indehiscent]. Seeds 1–3 per cell, sometimes reduced to 1 per fruit, glabrous, scaly, or hairy.

Nine or ten species: China, Borneo, Malaysia, Philippines, Sri Lanka; one species (endemic) in China.

A close morphological relationship between *Diplodiscus*, *Hainania*, and *Pityranthe* has long been recognized, and various pairs of these three genera have been synonymized. Merrill distinguished *Hainania* from *Pityranthe*, represented by a single species endemic to Sri Lanka, on the basis of *Hainania* having more numerous ovules and hairy seeds. *Diplodiscus* was separated from *Hainania* and *Pityranthe* by the fruit, which contains only one (rarely two) glabrous seeds. Kostermans (Reinwardtia 5: 372. 1961), followed by Meijer and Robyns (Rev. Handbook Fl. Ceylon 7: 428–430.

1991), reduced *Pityranthe* to synonymy under *Diplodiscus*, which has priority by about five months. Bayer and Kubitzki (Fam. Gen. Vasc. Pl. 5: 258. 2003) made *Hainania* a synonym of *Pityranthe* and thus also of *Diplodiscus*.

1. *Diplodiscus trichospermus* (Merrill) Y. Tang, M. G. Gilbert & Dorr, **comb. nov.**

海南椴 hai nan duan

Basionym: *Hainania trichosperma* Merrill, Lingnan Sci. J. 14: 36. 1935; *Pityranthe trichosperma* (Merrill) Kubitzki.

Trees to 15 m tall, to 45 cm d.b.h. Bark gray-white, old branches dark brown, glabrous; branchlets densely gray-brown tomentose. Petiole 2.5–5.5 cm, hairy; leaf blade 6–14 × 4–10 cm, abaxially densely appressed gray-yellow stellate puberulent, adaxially glabrous or nearly so, base subcordate or trun-

cate, apex acuminate or acute. Panicles to 26 cm; peduncle densely gray-yellow stellate puberulent. Pedicel 5–7 mm, hairy. Calyx 3–4 mm, abaxially densely yellowish stellate puberulent. Petals yellow or white, 6–7 mm, oblanceolate, glabrous. Stamens glabrous; staminodes ca. 2.5 mm, apex pointed. Ovary ovoid, densely stellate puberulent; style simple. Capsule 2–2.5 cm, valves densely yellowish stellate puberulent abaxially, deeply furrowed and glabrous adaxially. Seeds ellipsoid, ca. 4 mm, densely yellow-brown villous. Fl. autumn, fr. winter.

• Open forests; 200–300 m. Guangxi, Hainan.

9. *BERRYA* Roxburgh, Pl. Coromandel 3: 60. 1820 [“*Berria*,” “1819”], nom. cons.

六翅木属 liu chi mu shu

Espera Willdenow.

Trees. Leaves alternate; leaf blade basal veins 5–7, base cordate, margin entire. Inflorescences terminal or axillary, paniculate. Flowers many, minute. Calyx campanulate, 3–5-divided. Petals 5, white or pink, spatulate or filiform. Stamens many, free; staminodes absent. Ovary 3(or 4)-loculed; stigma 3-lobed. Fruit a capsule, globose, 3(or 4)-valved, loculicidally dehiscent, each valve with 2 erect wings. Seeds 1 or 2(–4) per cell, villous; endosperm fleshy; cotyledons fallacious.

Six species: primarily in tropical Asia and Polynesia; one species in China.

1. *Berrya cordifolia* (Willdenow) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 9: 606. 1926.

六翅木 liu chi mu

Espera cordifolia Willdenow, Ges. Naturf. Freunde Berlin Neue Schriften 3: 450. 1801; *Berrya ammonilla* Roxburgh.

Trees 4–6(–35) m tall, 10–20 cm d.b.h. Stipules filiform, 1–2 cm, glabrous; petiole 3.5–10 cm; leaf blade ovate to ovate-oblong, 10–20(–25) × 6–8(–14) cm, thinly leathery, very sparsely stellate pubescent, soon glabrous, lateral veins 4 or 5 pairs, base cordate, apex acuminate. Panicles to ca. 20 cm,

hairy. Pedicel ca. 10 mm. Calyx 3–5-lobed, 3–5 mm, lobes triangular-ovate, hairy. Petals white or pink, filiform, 6–8 mm, becoming reflexed. Stamens 5–6 mm. Ovary hairy; style short. Capsule with persistent calyx, globose, 1–1.3 cm wide, pubescent, with 6(or 8) horizontally spreading thin wings, wings 2.5–3 × 0.7–1 cm. Seeds ca. 6 × 3 mm, with brown or yellow, caducous bristles.

Taiwan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

Berrya cordifolia is a valued timber tree in some parts of its range.

10. *EXCENTRODENDRON* Hung T. Chang & R. H. Miao, Acta Sci. Nat. Sunyatseni 17(3): 21. 1978.

蚬木属 xian mu shu

Trees, evergreen. Branchlets and buds glabrous. Leaves alternate, petiolate; leaf blade ovate or oblong, leathery, glabrous, basal veins 3, with glands in axils of veins, base cuneate or rounded, margin entire. Inflorescences paniculate. Flowers unisexual (plants monoecious or dioecious). Bracts caducous. Male flowers (4 or)5-merous, rarely more. Sepals (4 or)5, oblong, valvate, free or slightly connate at base, abaxially pilose, adaxially glabrous, glandular at base. Petals (4 or)5, obovate or oblanceolate, slightly shorter than sepals, shortly clawed. Stamens 25–35; filaments filiform, slightly connate at base, in 5 fascicles; anthers 2-loculed, basifixed. Ovary 5-loculed; ovules 2 per locule; style 5, very short. Fruit a capsule, ellipsoid or obconic, 5-loculed, loculicidally dehiscent, wings 5, thin. Seeds 1 per cell.

Two species: China, Vietnam; two species (one endemic) in China.

Many authors follow Zhuge (J. Arnold Arbor. 71: 371. 1990) and do not accept the segregation of *Excentrodendron* from *Burretiodendron* (but see Gao et al., Acta Phytotax. Sin. 44: 538–550. 2006).

- 1a. Capsule 2–3 cm, ellipsoid; leaf blade orbicular-ovate or elliptic-ovate 1. *E. tonkinense*
1b. Capsule 5–5.5 cm, obconic; leaf blade oblong 2. *E. obconicum*

1. *Excentrodendron tonkinense* (A. Chevalier) Hung T. Chang & R. H. Miao, *Acta Sci. Nat. Univ. Sunyatseni* 17(3): 23. 1978.

蚬木 xian mu

Pentace tonkinensis A. Chevalier, *Bull. Écon. Indochine*, n.s., 20: 803. 1918; *Burretiodendron hsienmu* Chun & F. C. How; *B. tonkinense* (A. Chevalier) Kostermans; *Excentrodendron hsienmu* (Chun & F. C. How) Hung T. Chang & R. H. Miao; *E. rhombifolium* Hung T. Chang & R. H. Miao.

Trees to 40 m. Petiole 3.5–6.5(–10) cm; leaf blade green, orbicular-ovate or elliptic-ovate, 8–14(–18) × 5–8(–12) cm, leathery, glossy, abaxially yellow-brown fascicled hairy in vein axils, lateral basal veins to 1/2 as long as blade, 10–15 mm from margin, each with 4 or 5 secondary veins, base rounded, apex acuminate or caudate-acuminate. Male inflorescences paniculate, 7–13-flowered, 5–9 cm; female inflorescences racemelike, 1–3-flowered. Flowers unisexual. Pedicel not articulate. Sepals oblong-lanceolate, 1–1.5 cm, abaxially brown stellate puberulent, adaxially glabrous, without glands or a few inner petals with 2 globose glands. Petals broadly obovate to spatulate, 8–9 × 5–6 mm, base obviously clawed. Stamens 25–35; filaments 4–6 mm; anthers ca. 3 mm. Female flowers unknown. Capsule

ellipsoid, 2–3 cm.

Evergreen forests on limestone. Guangxi, SE Yunnan [Vietnam].

Excentrodendron tonkinense (as *Burretiodendron hsienmu*) is included in the IUCN Red List as “Vulnerable (B1+2c).” The wood is very hard and is prized for making chopping boards.

2. *Excentrodendron obconicum* (Chun & F. C. How) Hung T. Chang & R. H. Miao, *Acta Sci. Nat. Univ. Sunyatseni* 17(3): 24. 1978.

长蒴蚬木 chang shuo xian mu

Burretiodendron obconicum Chun & F. C. How, *Acta Phytotax. Sin.* 5: 11. 1956.

Trees, to 20 m. Petiole 5–6(–8) cm; leaf blade oblong, (7–)11–15 × (4–)5–6(–10) cm, leathery, abaxially hairy in vein axils, lateral basal veins 1/2 as long as leaf blade, 7–10 mm from margin, each with 4 or 5 secondary veins, without obvious lateral veins at base, lateral veins 3–4 pairs, base cuneate, apex acuminate. Flowers unknown. Infructescences with 1–4 capsules, 10–11 cm; fruiting pedicel articulate. Capsule narrowly obconic, 5–5.5 cm, proximal 1/2 narrow. Seed ca. 1 cm.

• Evergreen forests on limestone. Guangxi.

11. *BURRETIODENDRON* Rehder, *J. Arnold Arbor.* 17: 47. 1936.

柄翅果属 bing chi guo shu

Trees deciduous or semi-evergreen. Buds with scales. Leaves petiolate; stipules caducous; leaf blade cordate, papery or leathery, basal veins 5–9, margin minutely denticulate or nearly entire. Flowers unisexual or bisexual (plants polygamo-dioecious or dioecious). Male flowers in cymes. Bracts 2–3, caducous. Pedicel articulate. Sepals 5, valvate, free or shortly connate at base, abaxially stellate puberulent, adaxially sometimes glandular at base. Petals 5, free, imbricate, slightly longer than sepals, clawed. Androgynophore absent. Stamens 25–30; filaments connate at base, in 5 fascicles; anthers oblong, 2-loculed, basifixed, dehiscence longitudinal. Rudimentary ovary enclosed in stamens; style short. Female flowers solitary. Fruit a winged capsule, oblong, loculicidally dehiscent, base shortly stalked, wings 5, thin. Seed 1 per cell, narrowly obovoid.

Four species: China, Myanmar, Thailand; two species (one endemic) in China.

1a. Mature leaves densely stellate puberulent abaxially; sepals glandular at base; staminodes absent 1. *B. esquirolii*
1b. Mature leaves glabrous; sepals not glandular; staminodes 5 2. *B. kydiifolium*

1. *Burretiodendron esquirolii* (H. Léveillé) Rehder, *J. Arnold Arbor.* 17: 48. 1936.

柄翅果 bing chi guo

Pentace esquirolii H. Léveillé, *Repert. Spec. Nov. Regni Veg.* 10: 147. 1911; *Burretiodendron longistipitatum* R. H. Miao; *Eriolaena esquirolii* H. Léveillé.

Trees deciduous, to 20 m tall. Branchlets gray-brown, stellate pubescent. Petiole 2–4 cm; leaf blade elliptic, broadly elliptic, or broadly obovate, 9–14 × 6–9 cm, papery, stellate puberulent abaxially, stellate puberulent adaxially, densely gray-brown, basal veins 5–7, 4 lateral veins with 4–5 secondary veins, base obliquely cordate, margin denticulate, apex acute. Cymes 3-flowered, as long as petiole. Bracts 2, ovate, ca. 7 mm, hairy. Male flowers pedicellate, ca. 2 cm in diam. Sepals oblong, ca. 1 × 0.4 cm, stellate tomentose abaxially, glandular at base adaxially, glands as long as 1/3 sepals. Petals broadly obovate, ca. 11 × 7 mm, base with 3–4 mm claw, apex nearly trun-

cate. Stamens ca. 30, ca. 7 mm; anthers ca. 2 mm; staminodes absent. Infructescence with 1–4 fruits, infructescence stalk ca. 1 cm, stellate. Stipe slightly shorter than infructescence stalk, not articulate, stellate. Capsule ellipsoid, 3.5–4 cm, base rounded; stalk 3–4 mm. Seeds obovate, ca. 1 cm.

Evergreen forests; 100–700 m. Guangxi, SW Guizhou, S and SE Yunnan [Myanmar, W Thailand].

Burretiodendron esquirolii is included in the IUCN Red List as “Vulnerable (B1+2c).” It is relatively common in Guizhou and Yunnan.

2. *Burretiodendron kydiifolium* Y. C. Hsu & R. Zhuge, *J. Arnold Arbor.* 71: 378. 1990.

元江柄翅果 yuan jiang bing chi guo

Trees deciduous or semi-evergreen, to 15 m tall. Branchlets densely brown stellate scaly. Petiole 3.5–10 cm; leaf blade suborbicular, sometimes 3-lobed, 7–15 × 7–13 cm, papery, glabrous, basal veins 7–9, lateral veins 3 or 4 pairs, base cor-

date, margin entire, apex acute. Flowers unisexual. Male flowers in 3–7-flowered cymes. Female flowers solitary or rarely in 2- or 3-flowered cymes. Bracteoles 3, large, enveloping flower bud. Sepals eglandular. Petals flabelliform, apex praemorse, not glandular adaxially. Stamens 25–30, without pollen in ap-

parently bisexual flowers; staminodes 5, longer than stamens. Ovary 5-loculed, 5-angled; styles 5, clavate. Capsule ellipsoid, 3–4 cm. Fl. Apr–May, fr. Jun–Jul.

- Sparse forests in dry valleys; 400–900 m. S Yunnan.