

RHAMNACEAE

鼠李科 shu li ke

Chen Yilin (陈艺林 Chen Yi-ling)¹; Carsten Schirarend²

Deciduous or evergreen, often thorny trees, shrubs, woody climbers, or lianas, rarely herbs. Leaves simple, petiolate, alternate or opposite, pinnately veined or 3–5-veined, entire to serrate, sometimes much reduced; stipules small, caducous or persistent, sometimes transformed into spines. Flowers yellowish to greenish, rarely brightly colored, small, bisexual or unisexual, rarely polygamous, (4 or)5-merous, hypogynous to epigynous, in mostly axillary, sessile or pedunculate cymes, or reduced to few in fascicles. Calyx tube patelliform or hemispherical to tubular, sometimes absent, at rim with calyx, corolla, and stamens; sepals 4 or 5, valvate in bud, triangular, erect or ± recurved during anthesis, adaxially often distinctly keeled, alternate with petals. Petals 4 or 5, rarely absent, usually smaller than sepals, concave or hooded, rarely nearly flat, often shortly clawed. Stamens 4 or 5, antepetalous and often ± enclosed by petals; filaments thin, adnate to bases of petals; anthers minute, versatile or not, 2(or 4)-celled, dehiscent by longitudinal slits, usually introrse. Disk intrastaminal, nectariferous, thin to ± fleshy, entire or lobed, glabrous or rarely pubescent, free from ovary or tightly surrounding it, or adnate to calyx tube. Ovary superior to inferior, (1 or)2–4-loculed, with 1(or 2) ovules per locule; ovules anatropous, basal and erect; styles simple or ± deeply 3-lobed or 3-cleft. Fruit either an indehiscent, rarely explosively dehiscent, sometimes winged, schizocarpic capsule, or a ± fleshy drupe with 1–4 indehiscent, rarely dehiscent, pyrenes (stones). Seeds with thin, oily albumen, sometimes exalbuminous; embryo large, oily, straight or rarely bent.

About 50 genera and more than 900 species: almost cosmopolitan, mainly in subtropical to tropical areas; 13 genera and 137 species (82 endemic, one introduced) in China.

Former classifications usually placed Rhamnaceae in the Rhamnales, together with Vitaceae and Leeaceae (Suessenguth in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 20d. 1953), or together with Elaeagnaceae (Thorne, Bot. Rev. 58: 225–348. 1992). Orders such as Celastrales, Urticales, and Euphorbiales have often been considered as closely related groups. Recent analyses of DNA sequences strongly supported including the family in the Rosales, beside the closest relatives Barbeyaceae and Dirachmaceae (see Angiosperm Phylogeny Group II, Bot. J. Linn. Soc. 141: 399–436. 2003). Suessenguth (loc. cit.) grouped the family into five tribes, mainly characterized by fruit characters. Richardson et al. (Kew Bull. 55: 311–340. 2000; Amer. J. Bot. 87: 1309–1324. 2000) revised this tribal classification on the basis of a phylogenetic analysis using *rbcL* and *trnL-F* sequences of the plastid genome. Now 11 tribes are recognized, of which four are represented in the Flora area.

Microrhamnus bodinieri H. Léveillé (Fl. Kouy-Tchéou, 341. 1914–1915) is a synonym of *Nyssa sinensis* Oliver in the Nyssaceae (see Fl. China 13: 302. 2007).

The bark, leaves, and fruit of several species of *Rhamnus* have been used as laxatives, notably *R. cathartica* and *R. frangula*. Diverse Old World species of *Rhamnus* provide yellow and green dyes as well as drugs. Timber of *Alphitonia*, *Colubrina*, *Hovenia*, and *Ziziphus* species is used for construction, fine furniture, carving, lathework, and musical instruments. Many *Ziziphus* species yield edible fruit; among them, *Z. jujuba* (Chinese jujube) and *Z. mauritiana* (Indian jujube) are cultivated on a commercial scale. *Hovenia dulcis* is also grown for its edible, fleshy inflorescence stalks. Species of *Hovenia*, *Paliurus*, and *Rhamnus* are cultivated as ornamentals.

Chen Yi-ling & Chou Pan-kai. 1982. Rhamnaceae. In: Chen Yi-ling, ed., Fl. Reipubl. Popularis Sin. 48(1): i–vi, 1–169.

- 1a. Fruit with apical appendages, longitudinal wings, or a transverse, membranous ring.
 - 2a. Shrubs or small trees, never climbing; fruit with a transverse, membranous ring (Paliureae p.p.) 1. *Paliurus*
 - 2b. Climbers; fruit not as above.
 - 3a. Ovary 3-loculed; fruit a capsule with longitudinal wings; tendrils present; endosperm present (Gouanieae) 10. *Gouania*
 - 3b. Ovary 2-loculed; fruit a samara with apical appendages; tendrils absent; endosperm absent (Ventilagineae) 11. *Ventilago*
- 1b. Fruit not as above.
 - 4a. Infructescence axis succulent; disk usually hairy (Paliureae p.p.) 2. *Hovenia*
 - 4b. Infructescence axis not succulent; disk glabrous.
 - 5a. Fruit dry, dehiscent.
 - 6a. Fruit a 2- or 3-seeded, indehiscent capsule; seeds arillate and often persistent on receptacle 12. *Alphitonia*
 - 6b. Fruit a 3-seeded, explosively or slowly dehiscent capsule; seeds never arillate 13. *Colubrina*
 - 5b. Fruit fleshy.
 - 7a. Fruit with 2–4 free pyrenes (Rhamneae p.p.).
 - 8a. Flowers and fruits nearly sessile, flowers spike- or paniclelike 7. *Sageretia*
 - 8b. Flowers and fruits distinctly pedicellate, flowers in axillary cymes.
 - 9a. Petals emarginate or notched; flowers often unisexual; if plants armed, seeds furrowed 8. *Rhamnus*

¹ Institute of Botany, Chinese Academy of Sciences, 20 Nanxincun, Xiangshan, Beijing 100093, People's Republic of China.

² Biozentrum Klein-Flottbek und Botanischer Garten, University of Hamburg, Ohnhorststraße 18, D-22609 Hamburg, Germany.

- 9b. Petals deeply obcordate or bilobed; flowers always bisexual; plants mostly armed, but seeds never furrowed 9. *Scutia*
- 7b. Fruit a fleshy, 1-stoned drupe.
- 10a. Leaves distinctly triplinerved, stipules often spinose (Paliureae p.p.) 3. *Ziziphus*
- 10b. Leaves pinnately veined, stipules never spinose (Rhamneae p.p.).
- 11a. Ovary superior 4. *Berchemia*
- 11b. Ovary semi-inferior.
- 12a. Leaves leathery, margin entire 5. *Berchemiella*
- 12b. Leaves papery, margin serrate 6. *Rhamnella*

1. PALIURUS Miller, Gard. Dict. Abr., ed. 4. 1754.

马甲子属 ma jia zi shu

Trees or shrubs, small to medium-sized, evergreen or deciduous. Leaves alternate, 3-veined from base, margin subentire to serrate; stipules usually changed into 1 or 2 lignified, erect or recurved spines. Flowers bisexual, 5-merous, perigynous, few to many in axillary, pedunculate cymes. Pedicel short, often elongated in fruit. Calyx tube hemispheric to dish-shaped; sepals free, deltoid, 1.5–2.5 × 1.5–2.5 mm, abaxially ± pubescent to glabrous, adaxially keeled, apex acute to weakly acuminate. Petals spatulate or unguiculate, 1–2 mm, often enfolding stamens. Stamens free, 1.5–2 mm; filaments subulate, thin; anthers ovoid, latrorse. Disk adnate with calyx tube, pentagonal or rounded, thick, fleshy, glabrous. Ovary semi-inferior, 2- or 3-loculed, with 1 ovule per locule, slightly immersed in disk; style cylindrical or flattened, with 2 or 3 ± diverging stylar branches. Fruit a dry, indehiscent, disk- to cup-shaped or hemispheric, winged drupe, base ± distinctly conical, often with remains of calyx tube, apex rounded to ± flattened; mesocarp leathery to corky; endocarp lignified. Seeds brownish, shiny, obovoid to ovoid; endosperm scanty, cotyledons flat.

Five species: E Asia, Europe; five species (three endemic, one introduced) in China.

- 1a. Drupes with a narrow, apically inserted wing; stipular spines 1 or 2 per node.
- 2a. Fruit glabrous, wing entire; branches with 1 recurved spine per node 2. *P. hirsutus*
- 2b. Fruit densely pubescent, wing ± distinctly 3-partite; branches with 2 erect spines per node 1. *P. ramosissimus*
- 1b. Drupes with a broad, papery, medially inserted wing; stipular spines 2 per node.
- 3a. Branches with 1 erect and 1 recurved spine per node 5. *P. spina-christi*
- 3b. Branches with exclusively erect, never hooklike recurved spines.
- 4a. Fruit 1.4–2(–2.6) cm in diam.; petiole 3–5(–8) mm, pubescent 4. *P. orientalis*
- 4b. Fruit 2–3.5 cm in diam.; petiole (6–)8–20 mm, glabrous or subglabrous 3. *P. hemsleyanus*

1. *Paliurus ramosissimus* (Loureiro) Poiret, Encycl., Suppl. 4: 262. 1816.

马甲子 ma jia zi

Aubletia ramosissima Loureiro, Fl. Cochinch. 1: 283. 1790; *Paliurus aubletia* Roemer & Schultes; *Ziziphus ramosissima* (Loureiro) Sprengel.

Shrubs or small trees, deciduous, to 6 m tall. Branchlets brown or deep brown, pubescent, rarely glabrous. Stipular spines erect, 4–17 mm, 2 per node; petiole 5–9 mm, pubescent; leaf blade broadly ovate or ovate-elliptic, 3–5.5(–7) × 2.2–5 cm, papery, abaxially yellowish to brownish pubescent on major veins, adaxially mostly glabrous, distinctly 3-veined from base, base broadly cuneate, cuneate, or subrounded, symmetric to slightly oblique, margin obtusely serrate or serrulate, rarely subentire, apex obtuse, rounded, or slightly retuse. Flowers in axillary cymes. Calyx tube shallowly cup-shaped; sepals broadly ovate, ca. 2 × 1.6–1.8 mm. Petals spatulate, shorter than sepals, 1.5–1.6 × ca. 1 mm. Stamens ca. as long as petals or slightly longer. Disk orbicular, margin 5- or 10-lobed. Ovary 3-loculed; style 3-fid. Drupe cup-shaped, 1.1–1.5 cm in diam., densely yellow-brown pubescent, base conical, apex flat to slightly mucronate; wing apically inserted, 7–8 mm, comparatively thick, margin distinctly 3-partite; fruiting pedicel brownish pubescent.

Seeds purple-red or red-brown, shiny, oblate. Fl. May–Aug, fr. Sep–Oct.

Mountains and plains, wild or cultivated; below 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

The hard wood is used for producing farm tools. The roots, branches, leaves, flowers, and fruit are used medicinally. Oil extracted from the seeds is used for making candles.

2. *Paliurus hirsutus* Hemsley, Bull. Misc. Inform. Kew 1894: 388. 1894.

硬毛马甲子 ying mao ma jia zi

Paliurus hirsutus var. *trichocarpus* C. Z. Gao; *P. tonkinensis* Pitard.

Evergreen, erect to climbing shrubs or medium-sized trees, to 20 m tall. Young branchlets, axillary buds, petioles, major leaf venation, pedicels, receptacles, and sepals ± densely brownish pubescent, mature branches glabrescent. Stipular spine 1, hooklike, recurved; petiole to 1.5 cm; leaf blade broadly ovate, ovate-elliptic, or suborbicular, 4.5–10.5 × 4–7 cm, papery or thickly papery, 3-veined from base, base obtuse to rounded or rarely cordate, often slightly oblique, margin serrulate or subentire, apex acute to acuminate. Flowers densely pubescent, in axillary cymes or cymose panicles. Calyx tube cup-shaped;

lobes broadly deltoid, 1.5–1.6 × 1.4–1.5 mm. Petals spatulate, 1–5 × 1.4–1.5 mm. Stamens ca. as long as petals. Disk pentagonous, 5- or 10-lobed. Ovary 3-loculed; style deeply 3(or 4)-cleft. Drupe red or purple-red, cup-shaped, surrounded by an apically inserted, narrow, corky wing, 1–1.3 cm in diam., glabrous; fruiting pedicel 6–10 mm. Fl. Jun–Aug, fr. Aug–Oct.

• Slopes, plains; below 1000 m. Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangsu.

3. *Paliurus hemsleyanus* Rehder ex Schirarend & Olabi, Bot. Jahrb. Syst. 116: 341. 1994.

铜钱树 tong qian shu

Evergreen shrubs to medium-sized trees, to 20 m tall. Young branchlets, axillary buds, petioles, and major leaf venation ± densely brownish pubescent, flowers and fruit glabrous. Leaves alternate; petiole (6–)8–20 mm, glabrous or subglabrous, with 2 erect, stipular spines restricted to vegetative shoots; leaf blade broadly ovate to broadly elliptic, 4–12 × 3–9 cm, papery or thickly papery, both surfaces glabrous, 3-veined from base, base obtuse to rounded, often ± oblique, margin crenate or obtusely serrulate, apex acuminate to acute. Flowers glabrous, in cymes or cymose panicles, terminal or axillary together. Sepals triangular or broadly ovate, ca. 2 × 1.8 mm. Petals spatulate, ca. 1.8 × 1.2 mm. Stamens longer than petals. Disk pentagonous, 5-lobed. Ovary 3-loculed; style deeply 3-cleft. Drupe disk-shaped, comparatively large, 2–3.5 cm in diam., base conical, apex flattened; wing thinly papery to leathery; fruiting pedicel 1.2–1.5 cm. Fl. Apr–Jun, fr. Jul–Sep.

• Mountain forests, often cultivated in gardens; below 1600 m. Anhui, Chongqing, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

4. *Paliurus orientalis* (Franchet) Hemsley, Bull. Misc. Inform. Kew 1894: 387. 1894.

短柄铜钱树 duan bing tong qian shu

Paliurus australis Gaertner var. *orientalis* Franchet, Pl. Delavay. 132. 1889; *P. sinicus* C. K. Schneider.

Shrubs to small trees, evergreen to 12 m tall. Young branches puberulent to pubescent; mature branches soon glabrescent. Stipular spines 2, erect, often restricted to vegetative

shoots; petiole 3–5(–8) mm, pubescent; leaf blade broadly elliptic, ovate, or ovate-elliptic, 4.5–10(–14) × 2.5–5(–7) cm, papery, abaxially glabrous to ± densely pubescent, adaxially glabrous, 3-veined from base, base slightly oblique, subrounded, or broadly cuneate, margin obtusely serrulate, apex acuminate, rarely rounded-obtuse. Flowers 4–6 mm in diam., glabrous, in axillary cymes; peduncles pubescent. Calyx tube disk-shaped; lobes triangular, ca. 1.8 × 1.6 mm. Petals elliptic-spatulate, ca. 1.5 × 0.8 mm. Stamens slightly shorter than petals. Disk pentagonous, 5-dentate. Ovary 2- or 3-loculed; style flattened or terete, 2-cleft. Drupe disk-shaped, 1.4–2(–2.6) cm in diam., glabrous; wing thin, 5–8 mm wide, papery, margin ± undulate; mesocarp thin; endocarp globose, 3–5 mm in diam. Seeds compressed, obovoid; testa brownish, shiny. Fl. Apr–Jun, fr. Jul–Oct.

• Mountain forests; 900–2000 m. SW Sichuan, Yunnan.

5. *Paliurus spina-christi* Miller, Gard. Dict., ed. 8, *Paliurus*. 1768.

滨枣 bin zao

Rhamnus paliurus Linnaeus, Sp. Pl. 1: 194. 1753; *Paliurus australis* Gaertner, nom. illeg. superfl.

Shrubs or rarely small trees, deciduous, to 5 m tall. Young branches ± densely brownish pubescent, mature branches soon glabrescent. Stipular spines 2 per node; longer one erect, to 2 cm; shorter one hooklike, recurved; petiole 3–13 mm, pubescent; leaf blade ovate to elliptic, symmetric to ± asymmetric, 2–4 × 1.5–3.5 cm, papery, 3- to pinnately veined, with 3–6 pairs of secondary veins, base obtuse to cordate, margin inconspicuously serrate, apex obtuse. Flowers 3–6 mm in diam., glabrous, in axillary cymes. Pedicel 4–8 mm, pubescent. Calyx tube disk-shaped; lobes deltoid, adaxially slightly keeled. Petals cucullate, ± distinctly recurved during anthesis. Stamens slightly shorter than petals. Disk thin, nectariferous. Ovary 2- or 3-loculed; style 2- or 3-fid. Drupe disk-shaped, 1.5–3.5 cm in diam., glabrous, base conical, often with persistent sepals, apex rounded; wing broad and thin, 5–12 mm, papery, margin entire, ± undulate; mesocarp thin; endocarp obovoid. Seeds obovoid; testa brownish, shiny. $2n = 24$.

Cultivated in Shandong (Qingdao) [native to SW Asia and S Europe].

2. HOVENIA Thunberg, Nov. Gen. Pl. 7. 1781.

枳椇属 zhi ju shu

Deciduous trees or rarely shrubs, to 25 m tall. Young branches often pilose or tomentose. Leaves alternate, long petiolate, 3-veined from base, primary vein with 4–8 pairs of secondary veins, leaf base ± oblique, margin serrate. Flowers white or yellow-green, bisexual, 5-merous, in terminal or axillary, cymose panicles. Calyx tube hemispherical; lobes triangular, adaxially ± distinctly keeled. Petals elliptic to ovate, shortly clawed at base, rarely slightly emarginate apically, often ± completely enfolding stamens, ± widely reflexed during anthesis. Stamens enfolded by petals; filaments lanceolate-linear; anthers dorsifixed. Disk subrounded, thick, fleshy, often ± densely pubescent, rarely glabrous, filling calyx tube. Ovary semi-inferior, nearly completely immersed in disk, 3-loculed, with 1 ovule per locule; style 2- or 3-fid, ± deeply branched. Drupe subglobose, glabrous to densely hairy, base with persistent calyx tube, apex with rudimentary style; mesocarp leathery, often separating from membranous endocarp; peduncles and pedicels of infructescence becoming distinctly fleshy and juicy at fruit maturity. Seeds 3, brownish to blackish, shiny, obovate to orbicular, often spotted with minute pits.

Three species: Bhutan, China, India, Japan, Korea, Myanmar, Nepal; three species in China.

The hard timber with fine-grained wood is good for making furniture. The dilating peduncles of the infructescence are sweet and edible. The seeds are used medicinally.

- 1a. Sepals and fruit densely ferruginous tomentose 3. *H. trichocarpa*
 1b. Sepals and fruit glabrous, rarely pilose.
 2a. Flowers in terminal, or rarely axillary, asymmetrical cymose panicles; style undivided to shortly branched; fruit black at maturity, 6.5–7.5 mm in diam.; leaf margin irregularly or coarsely serrate 1. *H. dulcis*
 2b. Flowers in terminal or axillary, symmetrical, dichasial cymose panicles; style deeply branched to at least half of its length; fruit yellow at maturity, 5–6.5 mm in diam.; leaf margin shallowly obtusely serrulate 2. *H. acerba*

1. *Hovenia dulcis* Thunberg, Nov. Gen. Pl. 8. 1781.

北枳椇 bei zhi ju

Hovenia dulcis var. *glabra* Makino; *H. dulcis* var. *latifolia* Nakai ex Y. Kimura.

Trees, rarely shrubs, deciduous, to 10 m tall. Branchlets brown or black-purple, glabrous, with inconspicuous lenticels. Petiole 2–4.5 cm, glabrous; leaf blade ovate, broadly oblong, or elliptic-ovate, 7–17 × 4–11 cm, papery or thickly membranous, both surfaces glabrous or abaxially pilose on major veins, base truncate, rarely cordate or subrounded, margin irregularly serrate or coarsely serrate, rarely shallowly serrate, apex shortly acuminate or acuminate. Flowers yellow-green, 6–8 mm in diam., in terminal, or rarely axillary, asymmetrical cymose panicles; rachis and pedicels glabrous. Sepals ovate-triangular, 2.2–2.5 × 1.6–2 mm, glabrous. Petals clawed, obovate-spatulate, 2.4–2.6 × 1.8–2.1 mm. Disk sparsely pilose. Ovary globose; style shortly 3-fid, 2–2.2 mm, glabrous. Fruit a 3-seeded nut, black at maturity, subglobose, 6.5–7.5 mm in diam., glabrous; peduncles and pedicels becoming fleshy and juicy at fruit maturity. Seeds deep brown or black-purple, 5–5.5 mm in diam. Fl. May–Jul, fr. Aug–Oct.

Secondary forests, also cultivated in gardens; 200–1400 m. Anhui, Gansu, Hebei, Henan, NW Hubei, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, N Sichuan [Japan, Korea, Thailand].

The fleshy rachis of the infructescence is sweet and edible and is used for making wine and candy. The timber is fine and hard and is used for building construction and fine furniture.

2. *Hovenia acerba* Lindley, Bot. Reg. 6: t. 501. 1820.

枳椇 zhi ju

Trees large, 10–25 m tall. Branchlets brown or black-purple, brownish pilose or glabrous, with conspicuous white lenticels. Petiole 2–5 cm, glabrous; leaf blade broadly ovate, elliptic-ovate, or cordate, 8–17 × 6–12 cm, thickly papery to papery, abaxially glabrous or pilose on veins or in vein axils, adaxially glabrous, base truncate or cordate, rarely subrounded or broadly cuneate, margin finely serrulate, in upper or nearly terminal leaves ± conspicuously dentate, rarely subentire, apex acuminate. Inflorescences brownish pilose. Flowers 5–6.5 mm in diam., in terminal or axillary, symmetrical, dichasial cymose panicles. Sepals 1.9–2.2 × 1.3–2 mm, glabrous. Petals clawed, elliptic-spatulate, 2–2.2 × 1.6–2 mm. Disk pubescent. Style 1.7–2.1 mm, ± deeply branched, glabrous or pilose. Fruit yellow-brown or brown at maturity, subglobose, 5–6.5 mm in diam., glabrous or pilose; fruiting peduncles and pedicels dilated and ± fleshy. Seeds dark brown or blackish purple, 3.2–4.5 mm in diam. Fl. May–Jul, fr. Aug–Oct.

Forests, forest margins, slopes, open places, also often cultivated in gardens or by houses; below 2100 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, SE Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

The fine, hard timber is good for building construction and making fine wood furniture. The fruiting rachis is thick, rich in sugar, and edible; it is used medicinally and for making wine and sugar.

- 1a. Fruit and style glabrous 2a. var. *acerba*
 1b. Fruit and style pilose 2b. var. *kiukiangensis*

2a. *Hovenia acerba* var. *acerba*

枳椇(原变种) zhi ju (yuan bian zhong)

Hovenia dulcis Thunberg var. *acerba* (Lindley) Sengupta & Safui; *H. inaequalis* Candolle; *H. parviflora* Nakai & Y. Kimura; *Ziziphus esquirolii* H. Léveillé.

Fruit and style glabrous.

Sparse forests, forest margins, slopes, open places, also often cultivated in gardens or by houses; below 2100 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan [Bhutan, India, Myanmar, Nepal].

2b. *Hovenia acerba* var. *kiukiangensis* (Hu & Cheng) C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 87. 1979.

倅江枳椇 qiu jiang zhi ju

Hovenia kiukiangensis Hu & W. C. Cheng, Bull. Fan Mem. Inst. Biol., n.s., 1: 195. 1948.

Lower part of style and fruit pilose. Fl. Jun–Jul, fr. Sep–Oct. $2n = 24^*$.

• Evergreen forests, mixed forests; 600–1800 m. SE Xizang, NW and S Yunnan.

3. *Hovenia trichocarpa* Chun & Tsang, Sunyatsenia 4: 16. 1939.

毛果枳椇 mao guo zhi ju

Trees, medium-sized to large, deciduous, to 18 m tall. Branchlets brownish or blackish purple, glabrous, with conspicuous lenticels. Petiole 2–4 cm, glabrous or pilose; leaf blade oblong-ovate, broadly elliptic-ovate, or oblong, rarely subrounded, 12–18 × 7–15 cm, papery, abaxially densely tomentose to pilose on major veins, adaxially glabrous, base truncate and subrounded, or cordate, margin crenate-serrate or obtusely serrate, rarely subentire, apex acuminate. Inflorescence densely ferruginous or yellow-brownish tomentose. Flowers yellow-green, 7.5–8.5 mm in diam., ferruginous pilose, in terminal or

axillary dichasial cymes. Sepals 2.8–3 × 2.1–2.6 mm, conspicuously ferruginous pilose. Petals ovate-spatulate, 2.8–3 × 1.8–2 mm, clawed at base, claw 0.8–1.1 mm. Disk densely ferruginous villous. Styles 1–1.8 mm, villous basally, deeply divided up to base. Fruiting peduncles and pedicels dilating, ferruginous tomentose. Fruit yellow-brown or brown at maturity, subglobose. Seeds black, blackish purple, or brown, subglobose, 4–5.5 mm in diam. Fl. May–Jun, fr. Aug–Oct.

Mountain forests, dense forests on slopes; 600–1300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Zhejiang [Japan].

- 1a. Leaves densely yellow-brown or yellow-gray tomentose adaxially 3a. var. *trichocarpa*
 1b. Leaves glabrous on both surfaces or pilose on veins adaxially 3b. var. *robusta*

3a. *Hovenia trichocarpa* var. *trichocarpa*

毛果枳椇(原变种) mao guo zhi ju (yuan bian zhong)

Hovenia fulvotomentosa Hu & F. H. Chen; *H. trichocarpa* var. *fulvotomentosa* (Hu & Cheng) Y. L. Chen & P. K. Chou.

Leaves densely yellow-brown or yellow-gray tomentose adaxially.

• Mountain forests; 600–1300 m. N Guangdong, Guizhou, Hubei, Hunan, Jiangxi.

3b. *Hovenia trichocarpa* var. *robusta* (Nakai & Y. Kimura) Y. L. Chen & P. K. Chou in Y. L. Chen, Fl. Reipubl. Popularis Sin. 48(1): 93. 1982.

光叶毛果枳椇 guang ye mao guo zhi ju

Hovenia robusta Nakai & Y. Kimura, Bot. Mag. (Tokyo) 53: 479. 1939.

Leaves glabrous on both surfaces or pilose on veins adaxially.

Dense forests on slopes; 600–1100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Zhejiang [Japan].

3. ZIZIPHUS Miller, Gard. Dict. Abr., ed. 4. 1754.

枣属 zao shu

Shrubs or small to medium-sized trees, erect or straggling, often climbing, evergreen or deciduous, often spinose. Leaves alternate, petiolate, distinctly triplinerved or rarely pinnately veined; stipules usually transformed into 1 or 2, erect or ± recurved spines. Flowers yellow-green, small, bisexual, in axillary corymblike cymes, or axillary or terminal thyrses. Calyx tube shallow, patelliform to hemispherical. Sepals ovate-triangular or triangular, adaxially ± distinctly keeled. Petals clawed, obovate or spatulate, rarely absent. Disk shallow, fleshy, 5–10-lobed. Ovary superior, globose, 2- or 3(or 4)-loculed; style ± deeply branched, 2(–4)-fid. Fruit a single-stoned, (1 or)2- or 3-loculed, globose or oblong drupe, base with persistent calyx tube, apex mucronulate; mesocarp fleshy or soft corky; endocarp cartilaginous or woody, locules 1-seeded. Seeds without endosperm or rarely with endosperm; cotyledon thickening.

About 100 species: mainly in tropical and subtropical areas of Asia and the Americas, a few species in Africa and temperate regions; 12 species (six endemic) in China.

- 1a. Cymose racemes or terminal cymose panicles formed by cymes; drupe hairy, endocarp thin, early broken.
 2a. Shrubs or small trees; leaf blade broadly ovate or broadly elliptic, broad at middle, adaxially densely ferruginous or yellow-brown tomentose 12. *Z. rugosa*
 2b. Scandent shrubs; leaf blade ovate-elliptic or ovate-oblong, broad at lower part, adaxially veins pubescent or glabrous.
 3a. Leaves adaxially on veins densely ferruginous hairy or sparsely pubescent; flowers without petals; drupe subglobose, not more than 1.5 cm, densely pubescent at first, ± glabrescent 10. *Z. funghii*
 3b. Leaves adaxially only clustered hairy in vein axils; flowers with petals; drupe compressed-elliptic, ca. 2 cm, densely orange pilose 11. *Z. attopensis*
 1b. Axillary cymes; drupe glabrous, endocarp thick, stiffly cartilaginous, difficult to break.
 4a. Peduncles conspicuous, 2–16 mm.
 5a. Scandent or erect shrubs, with hooked-recurved spines or one erect spine and another recurved; leaf blade 3–5 × 2–4 cm; peduncles 2–5 mm; drupe 4–5 mm in diam., fruiting pedicels 2–3 mm 8. *Z. laui*
 5b. Spinescent trees; leaf blade 5–14 × 3–6 cm; drupe ca. 10 mm in diam., fruiting pedicels 4–11 mm 9. *Z. incurva*
 4b. Peduncles very short, not longer than 2 mm, or sessile.
 6a. Leaves adaxially hairy at least on veins; branches with short spines less than 6 mm; drupe not more than 1.2 cm.
 7a. Branchlets, petioles, pedicels, and calyx sparsely pubescent or rarely glabrous; leaves adaxially sparsely pubescent on veins; flowers solitary or 2–4 in axillary cymes 5. *Z. pubinervis*
 7b. Branchlets, petioles, pedicels, and calyx densely pubescent; flowers numerous in dichotomous cymes.
 8a. Scandent or erect shrubs; leaf blade ovate-oblong or ovate-lanceolate, broadest at lower part, apex acute or acuminate, adaxially ferruginous; drupe 5–6 mm in diam. 6. *Z. oenopolia*
 8b. Trees or shrubs; leaf blade oblong or elliptic, rarely suborbicular, broadest at middle, apex rounded, rarely acute, adaxially densely yellow or gray-white tomentose; drupe ca. 10 mm in diam. 7. *Z. mauritiana*

- 6b. Leaves adaxially glabrous or subglabrous, or only at base of vein axils hairy, with 2 spines, long spine often more than 1 cm, rarely to 3 cm; drupe 1.2–3 cm in diam. (excluding *Z. jujuba* var. *spinosa* and *Z. jujuba* f. *tortuosa*).
- 9a. Annual branches usually 2–7-fascicled on oblong reduced branches; pedicels and calyx glabrous; drupe oblong or narrowly ovoid, mesocarp thick, fleshy 1. *Z. jujuba*
- 9b. Plant without reduced branches; pedicels and calyx hairy; drupe globose or obovoid-globose, mesocarp thin, not fleshy.
- 10a. Leaves solitary or 2 or 3 in fascicles, leaf blade 2–4 × 1.5–3 cm, apex obtuse or rounded; drupe 1.2–1.5 cm in diam. 2. *Z. xiangchengensis*
- 10b. Leaves solitary, leaf blade 5–12.5 × 3–5.5 cm, apex acuminate to obtuse; drupe ca. 1.8 cm in diam.
- 11a. Young branches glabrous; leaf blade ovate-lanceolate, apex acuminate; drupe endocarp thicker than mesocarp, basal margin thickening 3. *Z. mairei*
- 11b. Young branches and annual branches tomentose; leaf blade elliptic or ovate-elliptic, apex obtuse or subrounded; drupe mesocarp thicker than endocarp, basal margin not thickening 4. *Z. montana*

1. *Ziziphus jujuba* Miller, Gard. Dict., ed. 8, *Ziziphus* no. 1. 1768, nom. cons. prop.

枣 zao

Trees small, rarely shrubs, deciduous, to 10 m tall, spinose or unarmed. Bark brown or gray-brown, with long reduced branches, without buds; branchlets (new branches) purple-red or gray-brown, flexuose, smooth, with 2 stipular spines or not; long spines erect, to 3 cm, stout; short spines recurved, developed from old branches; annual branchlets pendulous, green, solitary or 2–7-fascicled on short shoots. Stipular spines slender, caducous; petiole 1–6 mm, or to 1 cm on long shoots, glabrous or sparsely puberulent; leaf blade abaxially pale green, adaxially dark green, ovate, ovate-elliptic, or elliptic-oblong, 3–7 × 1.5–4 cm, papery, abaxially ± puberulent on major veins or glabrous, adaxially glabrous, 3-veined from base, base slightly asymmetric, subrounded, margin crenate-serrate, apex obtuse or rounded, rarely acute, mucronulate. Flowers yellow-green, bisexual, 5-merous, glabrous, solitary or 2–8 crowded in axillary cymes, shortly pedunculate. Pedicel 2–3 mm. Sepals ovate-triangular, adaxially distinctly keeled. Petals obovate, ca. as long as stamens, clawed at base. Disk orbicular, thick, fleshy, 5-lobed. Ovary basally slightly immersed in disk; style 2-cleft to half. Drupe red at maturity, turning red-purple, oblong or narrowly ovoid, 2–3.5 cm, (0.5–)1.5–2 cm in diam.; mesocarp fleshy, thick, sweet- or sour-tasting; stone acute or obtuse at both ends, 2-loculed, 1- or 2-seeded; fruiting pedicel 2–5 mm or longer. Seeds compressed-orbicular, ca. 1 × 0.8 cm, Fl. May–Jul, fr. Aug–Oct. $2n = 24^*$, 36^* , 48^* .

• Mountains, hills, sunny dry slopes, plains, also widely cultivated; below 1700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang [cultivated in Africa, Asia, Europe, and North and South America].

Kirkbride et al. (Taxon 55: 1049–1050. 2007 [“2006”]) proposed the name *Ziziphus jujuba* for conservation against the paratautonym *Z. zizyphus*.

Ziziphus jujuba f. *tortuosa* C. Y. Cheng & M. J. Liu (J. Hebei Agric. Univ. 17(4): 7. 1994) is cultivated in gardens in Hebei, Henan, Jiangsu, S Shaanxi (Qin Ling), and Shandong. The plants are small trees with ascending, often tortuous branchlets without spines, long fruiting

pedicels, and small drupes ca. 5 mm in diam. that resemble cucurbit fruits.

Ziziphus jujuba f. *lageniformis* (Nakai) Kitagawa (Lin. Fl. Manshur. 313. 1939; *Z. sativa* Gaertner var. *lageniformis* Nakai, Rep. Exped. Manchoukuo, Sect. IV, 1: 8. 1934) was recorded in FRPS (48(1): 136. 1982) from Hebei and (as cultivated) Beijing. However, it could not be treated here because no material was seen by the authors.

- 1a. Drupe 1.5–2 cm in diam., mesocarp sweet-tasting, stone acute at both ends.
- 2a. Branches with spines 1a. var. *jujuba*
- 2b. Branches without spines 1b. var. *inermis*
- 1b. Drupe less than 1.2 cm in diam., mesocarp sour-tasting, stone obtuse at both ends.
- 3a. Branches erect, not tortuous, with spines 1c. var. *spinosa*
- 3b. Branches ascending, tortuous, without spines f. *tortuosa* (see note above)

1a. *Ziziphus jujuba* var. *jujuba*

枣(原变种) zao (yuan bian zhong)

Rhamnus zizyphus Linnaeus, Sp. Pl. 1: 194. 1753; *Ziziphus sativa* Gaertner; *Z. sinensis* Lamarck; *Z. vulgaris* Lamarck; *Z. zizyphus* (Linnaeus) H. Karsten, nom. rej. prop.

Branches with stipular spines. Drupe large, 1.5–2 cm in diam.; mesocarp sweet-tasting; stone acute at both ends. Fr. Aug–Oct.

• Mountains, hills, plains, also widely cultivated; below 1700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang [cultivated in Africa, Asia, Europe, and North and South America].

This taxon is an important honey plant. The fruit is edible, rich in vitamin C, and often preserved or candied. The fresh fruit is used medicinally.

1b. *Ziziphus jujuba* var. *inermis* (Bunge) Rehder, J. Arnold Arbor. 3: 220. 1922.

无刺枣 wu ci zao

Ziziphus vulgaris var. *inermis* Bunge, Enum. Pl. China Bor. 14: 1833; *Z. sativa* var. *inermis* (Bunge) C. K. Schneider.

Branches long, without stipular spines. Drupe 1.5–2 cm in diam.; mesocarp sweet-tasting; stone acute at both ends. Fr. Aug–Oct.

- Widely cultivated, mainly in S and SW China; below 1600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang.

1c. *Ziziphus jujuba* var. *spinosa* (Bunge) Hu ex H. F. Chow, Familiar Trees Hopei, 307. 1934.

酸枣 suan zao

Ziziphus vulgaris var. *spinosa* Bunge, Enum. Pl. China Bor. 14. 1833 [“*spinosus*”]; *Z. sativa* var. *spinosa* (Bunge) C. K. Schneider; *Z. spinosa* (Bunge) Hu ex F. H. Chen (1937), not Saint-Lager (1880).

Plants often shrubs. Branches erect, not tortuous, with spines. Leaves small. Drupe subglobose or broadly oblong, small, 0.7–1.2 cm in diam.; mesocarp sour-tasting, thin; stone obtuse at both ends. Fl. Jun–Jul, fr. Aug–Sep. $2n = 24^*$.

- Hills, sunny dry slopes, plains. Anhui, Gansu, Hebei, Henan, Jiangsu, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang.

The seeds are used medicinally for relieving muscle spasms, as a tranquilizer, or to treat insomnia. The fruit is thin, but rich in vitamins, and is eaten fresh or used for making jam. The flowers are fragrant and rich in nectar, so the variety is considered an important honey plant in N China. Because of the spiny branches, it is often planted to form hedges.

2. *Ziziphus xiangchengensis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 88. 1979.

蜀枣 shu zao

Small trees or shrubs, 2–3 m tall, spinose. Young branches red-brown, densely pilose; old branches gray-brown, flexuose, glabrous. Leaves alternate, or 2 or 3 in fascicles; stipular spines 2, both erect or one recurved, 1–1.6 cm, slender; petiole 5–8 mm, sparsely pilose; leaf blade abaxially pale green, adaxially dark green, ovate or ovate-oblong, $2-4 \times 1.5-3$ cm, papery, abaxially glabrous to clustered hairy in vein axils, adaxially glabrous, 3-veined from base, veins prominent on both surfaces, midvein without conspicuous secondary veins, base asymmetric, subrounded, margin crenate-serrate, apex obtuse or rounded. Flowers yellow-green, few- to 10-fascicled in axils of leaves, without peduncles. Pedicel 4–5 mm, ferruginous pilose. Sepals ovate-triangular, densely ferruginous pubescent, apex acute. Petals spatulate. Stamens shorter than petals. Ovary globose, glabrous; style 2-fid. Drupe yellow-green, globose, 1.2–1.5 cm in diam., apex mucronulate, with persistent calyx tube at base; fruiting pedicel 5–7 mm, sparsely pilose; mesocarp thin, corky; endocarp cartilaginous; stone ca. 4 mm, 2-loculed, with 2 seeds. Seeds compressed, convex on one face, obovoid, ca. $8 \times 8-9$ mm. Fl. unknown, fr. Jul–Aug.

- Riverbanks; ca. 2800 m. W Sichuan (Xiangcheng).

3. *Ziziphus mairei* Dode, Bull. Soc. Bot. France 55: 649. 1909.

大果枣 da guo zao

Trees, to 15 m tall, spinose. Young branches yellow-green, glabrous; branchlets purple-red, longitudinally striate. Stipular

spines 2, both erect, or one erect and one recurved, yellow or turning purple-red, 8–25 mm; petiole 6–9 mm, glabrous; leaf blade abaxially pale green, adaxially dark green, ovate-lanceolate, $7.5-15 \times 3.5-7$ cm, papery, both surfaces glabrous, 3- or 5-veined from base, veins prominent abaxially, impressed adaxially, base oblique, asymmetric, subrounded, margin crenate-serrate, apex acuminate. Flowers yellow-green, small, usually few or 10 crowded in axillary dichasia; peduncles short, not longer than 2 mm, ferruginous tomentose. Pedicel 3–4 mm. Sepals ovate-triangular, sparsely hairy, apex acute or acuminate. Petals obovoid-orbicular, shortly clawed, apex emarginate. Stamens ca. as long as petals. Disk 5-lobed, centrally concave. Ovary slightly immersed in disk; style deeply 2-branched. Drupe yellow-brown, often spotted, globose or sub-obovoid-globose, large, $2.4-3.5$ cm, $1.8-3$ cm in diam., \pm rugose when dry, base concave, apex with persistent style; fruiting pedicel 5–7 mm, glabrous; fleshy mesocarp soon becoming corky; endocarp thick, cartilaginous; stone ca. 6 mm in diam., 2-loculed, with 1 or 2 seeds. Seeds compressed, ca. 1.2×1 cm. Fl. Apr–Jun, fr. Jun–Aug.

- Thickets and forest margins along riverbanks; 1900–2000 m. Yunnan.

4. *Ziziphus montana* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 78. 1917.

山枣 shan zao

Trees or shrubs, to 14 m tall, spinose. Young and annual branches red-brown tomentose; branchlets brown or purple black, with conspicuous lenticels. Stipular spines 2, both erect, red-purple, 1–1.8 cm; petiole 7–15 mm, \pm pilose at first, glabrescent; leaf blade abaxially pale green, adaxially green, elliptic, ovate-elliptic, or ovate, $5-8 \times 3-4.5$ cm, papery, abaxially ferruginous pubescent on major veins, adaxially glabrous, 3 (or 5)-veined from base, veins prominent on both surfaces, midvein without conspicuous secondary veins, base asymmetric, subrounded, margin crenulate, apex obtuse or subrounded, rarely shortly acute. Flowers greenish, few to 10 crowded in axillary dichotomous cymes; peduncles 1–2 mm, densely pilose. Sepals triangular, ca. 2 mm, abaxially brownish pilose, apex acute. Petals obovate, subequal to sepals, clawed. Disk thick, fleshy, 5-lobed. Ovary globose, deeply immersed in disk; styles long, 2-branched. Drupe yellow-brown, globose or subglobose, $2.5-3$ cm, $2-2.5$ cm in diam., glabrous, concave at base; fruiting pedicel often curved, 6–12 mm, sparsely pilose; mesocarp 6–7 mm, thick, spongy; endocarp woody, wall 3–4 mm, 2-loculed, with 2 seeds. Seeds compressed, obovoid, 9–10 mm. Fl. Apr–Jun, fr. May–Aug.

- Sparse forests in valleys, dry stony places; 1400–2600 m. SW and W Sichuan, E Xizang, NW Yunnan.

This species differs from *Ziziphus mairei* in having tomentose annual branches, leaf blade elliptic or ovate-elliptic, with an obtuse or subrounded apex, and mesocarp spongy and thicker than endocarp, not thickening at basal margin.

5. *Ziziphus pubinervis* Rehder, J. Arnold Arbor. 18: 218. 1937.

毛脉枣 mao mai zao

Strychnos esquirolii H. Léveillé.

Trees or shrubs, unarmed. Branchlets slender, glabrous. Petiole 4–6 mm, sparsely pilose or glabrous; leaf blade abaxially pale green, adaxially green, oblong-lanceolate or ovate-elliptic, 5–11 × 3–5 cm, papery, abaxially glabrous or pilose on major veins, adaxially glabrous, 3-veined from base, veins prominent abaxially, impressed adaxially, base subrounded or broadly cuneate, asymmetric, margin serrulate, apex caudate-acuminate or long acuminate. Flowers green, solitary or 2–4 in shortly pedunculate or subsessile cymes. Pedicel 3–4 mm, sparsely pilose. Drupe solitary in axils of leaves, subovoid-globose, 1–1.5 cm, 9–12 mm in diam., base with persistent calyx tube, apex mucronulate; exocarp rugose when dry; fruiting pedicel 4–5 mm, sparsely pilose, 2-loculed, with 1 or 2 seeds. Fl. unknown, fr. Aug–Sep.

• Forests on mountain slopes. W Guangxi, Guizhou.

6. *Ziziphus oenopolia* (Linnaeus) Miller, Gard. Dict., ed. 8, *Ziziphus* no. 3. 1768 [*“oenoplia”*].

小果枣 xiao guo zao

Rhamnus oenopolia Linnaeus, Sp. Pl. 1: 194. 1753.

Shrubs erect or scandent, spinose. Young branches densely ferruginous or yellow-brown pubescent; bark gray or gray-brown. Stipular spines 1, sometimes 2, one recurved and one erect, 3–4 mm; petiole 5–7 mm, densely yellow-brown pubescent; leaf blade ovate-oblong or ovate-lanceolate, 3–8 × 2–4 cm, papery, abaxially appressed pubescent to nearly villous, adaxially veins sparsely pubescent or glabrescent, 3-veined at base, veins prominent abaxially, conspicuously impressed adaxially, base usually ± asymmetric, subrounded, margin inconspicuously crenate, apex acute or acuminate. Flowers greenish yellow, few to 10 in axillary shortly pedunculate cymes. Pedicel ca. 2 mm, pilose. Sepals ovate-triangular, abaxially sparsely pilose to pubescent, adaxially glabrous, apex acute. Petals spatulate, clawed, enfolding stamens. Stamens slightly shorter than petals. Disk pentagonal, thick, fleshy, often 5-lobed. Ovary globose, glabrous, immersed in disk; style 2-branched. Drupe black, shiny, globose or obovoid-globose, small, 5–7 × 5–6 mm, base with persistent calyx tube, apex mucronulate; fruiting pedicel 3–4 mm, pilose; endocarp cartilaginous, ca. 2 mm; stone 1- or 2-seeded. Seeds shiny, globose. Fl. Aug–Sep, fr. Oct. $2n = 24$.

Forests, thickets; 500–1100 m. Guangxi, S Yunnan [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand; Australia].

7. *Ziziphus mauritiana* Lamarck, Encycl. 3: 319. 1789.

滇刺枣 dian ci zao

Paliurus mairei H. Léveillé; *Rhamnus jujuba* Linnaeus; *Ziziphus jujuba* (Linnaeus) Lamarck (1789), not Miller (1768); *Z. mairei* (H. Léveillé) Browicz & Lauener (1967), not Dode (1909).

Trees or shrubs, evergreen, to 15 m tall. Young branches densely yellow-gray tomentose; branchlets pilose; old branches purple-red. Stipular spines 2, one oblique and hooklike recurved; petiole 5–13 mm, densely gray-yellow tomentose; leaf blade adaxially dark green, shiny, ovate or oblong-elliptic, rarely subrounded, 2.5–6 × 1.5–4.5 cm, papery to thickly pa-

pery, abaxially yellow or gray-white tomentose, adaxially glabrous, 3-veined from base, veins conspicuously reticulate abaxially, impressed or ± prominent adaxially, base subrounded, slightly oblique, margin serrulate, apex rounded, rarely acute. Flowers green-yellow, few to 10 in subsessile or shortly pedunculate, axillary dichotomous cymes. Pedicel 2–4 mm, gray-yellow tomentose. Sepals ovate-triangular, abaxially hairy, apex acute. Petals oblong-spatulate, clawed at base. Stamens subequaling petals. Disk thick, fleshy, 10-lobed, concave at middle. Ovary globose, glabrous; style 2-fid or branched to half. Drupe orange or red, turning black at maturity, oblong or globose, 1–1.2 cm, ca. 1 cm in diam., with persistent tube at base; fruiting pedicel 5–8 mm, pilose, 2-loculed, 1- or 2-seeded; mesocarp corky; endocarp thick, thickly leathery. Seeds red-brown, broad and compressed, 6–7 × 5–6 mm, shiny. Fl. Aug–Nov, fr. Sep–Dec. $2n = 24$.

Humid forests, thickets along riverbanks, hills, slopes; below 1800 m. Native in Guangdong, Guangxi, Sichuan, and Yunnan; cultivated in Fujian and Taiwan [Afghanistan, Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa, Australia].

The hard, fine wood is used in making furniture; the bark is used medicinally. The leaves contain tannin used for producing tannin extract. This is an important host tree for the parasitic scale insect, *Laccifer lacca* (lac insect).

8. *Ziziphus laui* Merrill, Lingnan Sci. J. 14: 32. 1935.

球枣 qiu zao

Shrubs scandent or erect, rarely trees. Young branches purple-red, ferruginous or yellow-brown pubescent; mature branches blackish purple. Stipular spines either 1, recurved, 3–4 mm, or 2, one erect and one recurved; petiole 4–7 mm, densely ferruginous pilose; leaf blade ovate, rarely ovate-elliptic or ovate-oblong, 3–5 × 2–4 cm, thinly papery or submembranous, both surfaces glabrous, or abaxially sparsely pilose on veins in juvenile leaves, 3(or 5)-veined from base, veins abaxially prominent, base oblique, subrounded, margin sparsely serrulate or entire, apex obtuse or subrounded. Flowers small, several to 10 in axillary dichotomous cymes; peduncles 2–5 mm, pilose. Sepals ovate-triangular, ca. 1.3 mm, abaxially sparsely hairy, apex acute or acuminate. Petals oblong-obovate, shorter than sepals, clawed, apex rounded or emarginate. Stamens ca. as long as petals. Disk thick, fleshy, 5-lobed, centrally concave. Ovary subglobose, glabrous, 1-loculed; style 2-cleft to half, glabrous. Drupe subglobose, small, 4–5 mm in diam., with persistent styles at apex, glabrous; fruiting pedicel 2–3 mm, pilose, 1-seeded. Fl. Jun–Aug, fr. Aug–Nov.

Sparse forests, thickets, sandy beaches; sea level. Hainan [Vietnam].

9. *Ziziphus incurva* Roxburgh, Fl. Ind. 2: 364. 1824.

印度枣 yin du zao

Ziziphus yunnanensis C. K. Schneider.

Trees to 15 m tall or large shrubs, spinose. Young branches brownish pilose; old branches black-brown or purple-black, stiff, stout. Stipular spines 1 or 2, erect, 4–6 mm, caducous; petiole 5–11 mm, brownish pilose; leaf blade abaxially pale green, adaxially dark green, ovate to elliptic, rarely ovate-ob-

long, 5–14 × 3–6 cm, papery, abaxially with pubescent or sparsely hairy veins, glabrescent, adaxially glabrous or sparsely pubescent on primary vein, 3(or 5)-veined from base, base rounded to slightly cordate, often slightly asymmetric, margin crenate-serrate, apex acuminate or shortly acuminate, obtusely mucronulate, rarely subrounded. Flowers greenish, several to 10 in axillary dichotomous cymes; peduncles 7–16 mm, brownish pilose. Sepals ovate-triangular, abaxially pilose, adaxially glabrous, distinctly keeled up to middle, apex acute. Petals spatulate, subequal to stamens, clawed. Disk thick, fleshy, 5-lobed, distinctly emarginate in front of stamens, outer margin prominent. Ovary globose, apex puberulent; styles 2-branched, divided to half. Drupe red-brown at maturity, subglobose or globose-ellipsoid, 1–1.2 × 0.8–1.1 cm, glabrous, with persistent calyx tube and disk at base; fruiting pedicel 4–11 mm, pilose; mesocarp thin; endocarp ca. 3 mm, thickly cartilaginous, (1 or)2-loculed, with 1 or 2 seeds. Seeds black-brown, shiny, smooth. Fl. Apr–May, fr. Jun–Oct. $2n = 24$.

Mixed forests; 1000–2500 m. Guangxi, S Guizhou, SW Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

10. *Ziziphus fungii* Merrill, Lingnan Sci. J. 13: 61. 1934.

褐果枣 he guo zao

Shrubs scandent, to 5 m tall. Young branches ferruginous pilose; older branches black-purple or purple-red, sparsely pilose, with conspicuous lenticels. Stipular spine 1, hooklike recurved, 3–5 mm, ferruginous pilose, base broad and compressed; petiole 5–7 mm, sparsely or densely ferruginous pubescent; leaf blade adaxially green, turning brown when dry, ovate-elliptic, ovate, or ovate-oblong, 6–13 × 3–5.5 cm, papery, abaxially densely ferruginous pubescent or sparsely pubescent on major veins, adaxially with pilose midvein at first, glabrescent, 3-veined from base, midvein with 2 or 3 conspicuous pairs of secondary veins, prominent abaxially, impressed adaxially, base subrounded, asymmetric, margin inconspicuously serrulate, apex acuminate or shortly acuminate. Flowers yellow-green, in axillary dichotomous cymes or terminal cymose panicles; rachis, pedicels, and calyx densely ferruginous pubescent; peduncles 6–10 mm. Sepals triangular, abaxially densely pubescent. Petals absent. Disk thick, fleshy, 5-lobed. Drupe globose, to 1.5 cm, ferruginous pubescent, gradually glabrescent, with persistent calyx tube at base; endocarp ca. 1 mm thick; stone 1- or 2-loculed, with 1 or 2 seeds; fruiting pedicel 4–5 mm, pilose. Seeds reddish brown, reniform, 8–9 mm. Fl. Feb–Apr, fr. Apr–May.

- Sparse forests; below 1600 m. Hainan, S Yunnan.

11. *Ziziphus attopensis* Pierre, Fl. Forest. Cochinch. t. 316a. 1894.

毛果枣 mao guo zao

Ziziphus trichocarpa Hung T. Chang.

Shrubs scandent. Young branches purple-black, subcylindric, glabrous; old branches red-brown, with conspicuous lenticels. Stipular spine 1, recurved, ca. 1 mm, 3–5 mm wide basally; petiole 5–9 mm, subglabrous or sparsely pilose; leaf blade adaxially dark green, oblong or ovate-elliptic, 7–13 × 3.5–7 cm, papery or subleathery, adaxially glabrous, veins distinctly

prominent abaxially, impressed adaxially, base asymmetric, subrounded, rarely cordate, margin crenulate or inconspicuously denticulate, apex long acuminate, with slightly curved obtuse mucro 5–10 mm. Inflorescences to 25 cm; branches 2–11 cm, densely yellow-brown pubescent, with numerous flowers. Flowers yellow, in terminal cymose racemes or large cymose panicles. Sepals ovate-triangular, ca. 1.5 mm, abaxially densely yellow-brown pilose. Petals obovate, shorter than sepals, clawed at base. Stamens slightly shorter than petals. Disk pentagonous, thick, fleshy, 5-lobed. Ovary globose, densely pubescent; styles 2-cleft to half. Drupe compressed-ellipsoid or compressed-globose, 1.9–2.2 × 1.3–1.8 cm, yellow-brown or orange pilose, base with persistent tube, apex mucronulate; fruiting pedicel 4–7 mm, yellow-brown pilose; mesocarp thin, fleshy; endocarp weak, ca. 1 mm thick, fragile-crustaceous; stone 1-loculed, 1-seeded; fruiting rachis to 30 cm, stout; branches 5–15 cm, densely yellow-brown pilose. Seeds red-brown, compressed, oblong-ellipsoid, ca. 1.3 × 1.1 mm; cotyledon large. Fl. Feb–May, fr. Apr–Jun.

Sparse forests, thickets; below 1500 m. W Guangxi, S Yunnan [Laos, Thailand].

This species is closely related to *Ziziphus fungii* but differs in having slightly thinner leaves, with barbate vein axils and without secondary lateral veins, and fruit larger, yellow-brown pilose.

12. *Ziziphus rugosa* Lamarck, Encycl. 3: 319. 1789.

皱枣 zhou zao

Shrubs or small trees, evergreen, to 9 m tall, spinose. Young branches densely ferruginous or yellow-brown tomentose; old branches red-brown, scabrous, striate, with conspicuous lenticels. Stipular spines 1(or 2), recurved, purple-red, 3–6 mm; petiole short, 5–9 mm, stout, densely yellow-brown tomentose; leaf blade broadly ovate or broadly elliptic, 8–11 × 4.5–9.5 cm, papery or subleathery, abaxially densely ferruginous or yellow-brown tomentose, adaxially at first villous, gradually glabrescent or later sparsely pubescent in vein axils, 3–5-veined from base, midvein with 2–5 pairs of secondary veins, veins prominent abaxially, impressed adaxially, base subcordate or rounded, oblique, margin serrulate, apex rounded. Inflorescences to 20 cm. Flowers green, densely pubescent, few to 10 in terminal or axillary large cymose panicles or cymose racemes; peduncles 5–12 mm. Pedicel ca. 2 mm, densely ferruginous tomentose. Sepals triangular, subequal to calyx tube, abaxially ferruginous tomentose, adaxially slightly keeled, apex acute. Petals absent. Disk orbicular, rather thick, 5-lobed, outer rim inconspicuous. Ovary globose, densely tomentose, to ca. 1/3 immersed in disk; styles deeply 2-cleft or 2-cleft to half. Drupe orange, turning black at maturity, obovoid-globose or subglobose, 9–12 mm, 8–10 mm in diam., hairy, gradually glabrescent, with persistent tube at base; fruiting pedicel 7–10 mm, tomentose; endocarp fragile-crustaceous; stone 1-loculed, 1-seeded. Seeds red-brown, globose, 6–7 × 6–7 mm. Fl. Mar–May, fr. Apr–Jun. $2n = 24$.

Sparse forests and thickets on hills, sunny places on mountains; below 1400 m. Hainan, S and SW Yunnan [India, Laos, Myanmar, Sri Lanka, Thailand, Vietnam].

This species is an important host for the parasitic scale insect, *Laccifer lacca* (lac insect).

4. **BERCHEMIA** Necker ex Candolle, Prodr. 2: 22. 1825, nom. cons.

勾儿茶属 *gou er cha shu*

Oenoplea Michaux ex R. Hedwig.

Shrubs climbing or erect, evergreen to deciduous, rarely small trees, unarmed. Leaves alternate; stipules connate at base, persistent, rarely caducous; leaf blade mostly papery, margin entire, venation pinnate, with 4–18 pairs of strongly parallel secondary and mostly strongly parallel tertiary veins. Flowers bisexual, pedicellate, 5-merous, glabrous, in thyrses composed of mainly few flowered, terminal or axillary, pedunculate to sessile, corymblike cymes. Calyx tube disk- to cup-shaped or hemispherical. Sepals triangular, rarely linear or narrowly lanceolate, adaxially ± distinctly keeled. Petals spatulate to lanceolate, shorter than or ca. as long as sepals, shortly clawed. Stamens dorsifixed, equaling petals or slightly shorter. Disk mainly fleshy, filling calyx tube, with 10 irregular lobes, free at margin. Ovary superior, ± deeply immersed in disk, 2-loculed, with 1 ovule per locule; styles cylindrical, short, undivided; stigma large, entire, emarginate, or 2-fid. Drupe single-stoned, purple-red or purple-black, often turning black at maturity, mostly cylindrical, rarely obovate, base with persistent calyx tube and disk remnants, apex often with rudimentary style; mesocarp fleshy, thin, sometimes sweet-tasting; endocarp stiffly cartilaginous, 2-loculed, locules 1-seeded.

About 32 species: mainly in temperate and tropical areas of E to SE Asia; 19 species (12 endemic) in China.

Berchemia alnifolia H. Léveillé (Repert. Spec. Nov. Regni Veg. 10: 433. 1912) is the basionym of *Corylopsis alnifolia* (H. Léveillé) C. K. Schneider in the Hamamelidaceae (see Fl. China 9: 37. 2003).

Berchemia sessiliflora Benth (Fl. Hongk. 68. 1861), described from Hong Kong, could not be treated here because no material was seen by the authors.

The roots, stems, and leaves in some species are used medicinally. The young leaves are used as a substitute for tea.

- 1a. Flowers few, solitary or 2- or 3-fascicled in leaf axils; leaves relatively small, not more than 2 × 1.3 cm, lateral veins 4–6 pairs; low shrubs (*B. sect. Axilliflorae* Y. L. Chen & P. K. Chou).
 - 2a. Leaves uniform, papery, 4–10 × 3–6 mm, petioles 1–2 mm; pedicels to 4 mm; petals oblong-spatulate, apex obtuse 1. *B. edgeworthii*
 - 2b. Leaves dimorphic, thinly papery, 12–20 × 8–13 mm, petioles 3–7 mm; pedicels to 9 mm; petals triangular-ovate, apex acute 2. *B. longipedicellata*
- 1b. Flowers numerous, usually in terminal or axillary, cymose racemes or cymose panicles; leaves relatively large, lateral veins 8–18 pairs (except *B. lineata*); scandent shrubs (*B. sect. Berchemia*).
 - 3a. Flowers usually in simple, cymose racemes.
 - 4a. Flowers 3–12 in terminal or axillary, cymose racemes 8. *B. longipes*
 - 4b. Flowers few in pedunculate cymes.
 - 5a. Rachis, branchlets, and petioles pubescent.
 - 6a. Leaves 0.5–2 × 0.4–1.2 cm, lateral veins 4 or 5 (or 6) pairs, petioles to 2 mm; flowers usually few to 10 in terminal, cymose racemes; sepals linear or narrowly lanceolate-linear 3. *B. lineata*
 - 6b. Leaves to 5.5 × 3 cm, lateral veins 7–9 pairs, petioles 3–6 mm; flowers more numerous, in terminal or axillary, cymose racemes; sepals ovate-triangular 4. *B. polyphylla*
 - 5b. Rachis and branchlets glabrous; petioles glabrous or pubescent.
 - 7a. Petioles abaxially pubescent 4. *B. polyphylla*
 - 7b. Petioles glabrous.
 - 8a. Leaves to 3 × 1.5 cm 5. *B. formosana*
 - 8b. Leaves to 6.5 × 3 cm.
 - 9a. Leaves apically rounded-obtuse, rarely acute, abaxially grayish white when dry; drupe basally with cup-shaped remnants of disk 6. *B. kulingensis*
 - 9b. Leaves apically acute to obtuse, finely mucronate, abaxially turning yellow when dry; drupe basally with shallow dish-shaped remnants of calyx tube and disk 7. *B. yunnanensis*
 - 3b. Flowers in racemose or cymose panicles.
 - 10a. Rachis usually densely pubescent, rarely glabrous.
 - 11a. Drupe obovoid-globose; leaf blade to 20 cm, both surfaces glabrous, abaxially pubescent on veins 9. *B. annamensis*
 - 11b. Drupe cylindrical; leaf blade distinctly smaller, to 10 cm, adaxially pubescent.
 - 12a. Drupe 1.1–1.4 cm; leaves apically acuminate or shortly acuminate; young branches and petioles ± densely pubescent 10. *B. hirtella*
 - 12b. Drupe to 1 cm; leaves apically obtuse or rounded, rarely acute; young branches and petioles glabrous.
 - 13a. Leaves thinly papery to papery, lateral veins 10–14 pairs, petioles to 2.5 cm 11. *B. huana*
 - 13b. Leaves papery to subleathery, lateral veins 12–17 pairs, petioles to 4 cm 12. *B. hispida*
 - 10b. Rachis glabrous, rarely sparsely puberulent.

- 14a. Leaves abaxially pubescent in vein axils, grayish white when dry, lateral veins 7–13 pairs.
 15a. Flowers in racemose, broadly cymose panicles; leaves subleathery, apex shortly acuminate; drupe 10–13 mm 15. *B. omeiensis*
 15b. Flowers in racemose, narrowly cymose panicles; leaves papery, apex obtuse or rounded; drupe 5–9 mm.
 16a. Stem without short shoots; leaves exclusively alternate, thinly papery, abaxially densely pubescent in vein axils 13. *B. barbiger*
 16b. Stem with long and short shoots; leaves alternate or fascicled on short shoots, thickly papery, abaxially sparsely pubescent in vein axils 14. *B. sinica*
 14b. Leaves glabrous or abaxially sparsely pubescent on veins, not grayish white when dry, lateral veins (9–)12–18 pairs.
 17a. Leaves glabrous or abaxially sparsely pubescent on veins, lateral veins 9–12 pairs; flowers in elongated racemose or broadly cymose panicles 19. *B. floribunda*
 17b. Leaves glabrous, lateral veins 12–18 pairs; flowers in short racemose, narrowly cymose panicles.
 18a. Leaves abaxially turning golden-yellow when dry; drupe ripening in May–Jun of following year 18. *B. flavescens*
 18b. Leaves abaxially not turning yellow when dry; drupe ripening in Sep–Dec of current year.
 19a. Leaf blade thickly papery or subleathery, abaxially reddish when dry, both surfaces glabrous; drupe 6–7 mm, ripening in Sep–Oct of current year 16. *B. brachycarpa*
 19b. Leaf blade papery, abaxially gray-green, puberulous; drupe 7–12 mm, ripening in Nov–Dec of current year 17. *B. medogensis*

1. *Berchemia edgeworthii* M. A. Lawson in J. D. Hooker, Fl. Brit. India 1: 638. 1875.

腋花勾儿茶 ye hua gou er cha

Berchemia axilliflora W. C. Cheng; *B. nana* W. W. Smith.

Shrubs erect, ca. 2 m tall, branched. Branchlets smooth, glabrous. Stipules narrowly lanceolate, ca. as long as petioles or slightly longer, persistent; petiole 1–2 mm, glabrous; leaf blade abaxially greenish, adaxially green, ovate, oblong, or suborbicular, very small, 4–10 × 3–6 mm, thinly papery, adaxially glabrous, lateral veins 4 or 5 pairs, base rounded, apex obtuse, mucronulate. Flowers white, 2.5–3 mm in diam., glabrous, solitary or 2- or 3-fascicled in axils of leaves. Pedicel 2–4 mm. Sepals ovate-triangular. Petals oblong-spatulate, ca. as long as stamens, apically obtuse or acute. Drupe orange or purple at maturity, cylindrical, 7–9 mm, 3–4 mm in diam., with inconspicuous remnants of disk and calyx tube at base; mesocarp sweet; fruiting pedicel 2–4 mm, glabrous. Fl. Jul–Oct, fr. Apr–Jul of following year.

Subalpine thickets, cliffs; 2100–4500 m. SW and W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal].

2. *Berchemia longipedicellata* Y. L. Chen & P. K. Chou, Acta Phytotax. Sin. 18: 249. 1980.

细梗勾儿茶 xi geng gou er cha

Shrubs erect, low, ca. 1 m tall. Branchlets yellow-green, smooth, glabrous. Leaves dimorphic; stipules lanceolate, ca. 4 mm, membranous, persistent; petiole 3–7 mm, slender, glabrous; leaf blade abaxially greenish, adaxially green, oblong-elliptic or ovate-oblong, larger ones 12–20 × 8–13 mm, smaller ones 6–10 × 4–6 mm, thinly papery, both surfaces glabrous, lateral veins 5 or 6 (or 7) pairs, base rounded or subrounded, apex obtuse, mucronulate. Flowers yellow-green, glabrous, solitary

or 2- or 3-fascicled in axils of leaves. Pedicel 4–9 mm, slender. Sepals triangular, ca. 2 mm, apex acuminate. Petals white, subovate, very small, apex acuminate, rarely 2-fid. Stamens slightly shorter than petals. Drupe subcylindric, 5–6 mm, ca. 3 mm in diam., with persistent disk and calyx tube at base; fruiting pedicel 7–11 mm. Fl. Jun, fr. Jul–Oct.

- Sparse forests on slopes; 2100–3100 m. S and SE Xizang.

3. *Berchemia lineata* (Linnaeus) Candolle, Prodr. 2: 23. 1825.

铁包金 tie bao jin

Rhamnus lineata Linnaeus, Cent. Pl. 2: 11. 1756.

Shrubs, prostrate or procumbent, rarely to 2 m tall. Branchlets yellow-green, densely pubescent; older branches glabrescent. Stipules remarkable, reddish, lanceolate, 3–5 mm, persistent; petiole 1–3 mm, pubescent; leaf blade abaxially greenish and with minute dark pits, adaxially dark green, broadly elliptic or oblong-ovate, 5–20 × 4–12 mm, papery, both surfaces glabrous, lateral veins 4–6 pairs, base rounded, apex rounded or obtuse, with a mucro 1–2 mm, often slightly emarginate. Flowers white, very small, 4–5 mm in diam., in terminal cymose racemes or in fascicles of few to 10 in leaf axils. Pedicel 2.5–4 mm, glabrous. Calyx tube campanulate; lobes triangular-lanceolate, ca. 1.5 mm. Petals lanceolate, ca. 2.5 mm. Stamens slightly longer than petals, with very thin, flat filaments. Drupe yellowish green when young, dark blue and waxy at maturity, globose to ovoid to ellipsoid, 5–6 mm, to 3 mm in diam., with persistent disk and calyx tube at base; fruiting pedicel 4.5–5 mm, pilose. Fl. Jul–Oct, fr. Nov.

Hills, open places, roadsides; low elevations. Fujian, Guangdong, Guangxi, Hainan, Taiwan [India, Japan, Vietnam].

The roots and leaves are used medicinally for relieving coughs and reducing sputum and for treating injuries, trauma, and snakebites.

4. *Berchemia polyphylla* Wallich ex M. A. Lawson in J. D. Hooker, Fl. Brit. India 1: 638. 1875.

多叶勾儿茶 duo ye gou er cha

Shrubs scandent, 3–4 m tall. Branchlets yellow-brown, pubescent or glabrous. Stipules lanceolate-subulate, minute, basally connate, persistent; petiole 3–6 mm, pubescent or sparsely so; leaf blade abaxially greenish, often turning yellow when dry, adaxially deep green, ovate-elliptic, ovate-oblong, or elliptic, 1.5–4.5(–5.5) × 0.8–2(–3) cm, papery, both surfaces glabrous or at least abaxially pubescent on veins, lateral veins 7–9 pairs, conspicuously prominent abaxially, slightly prominent adaxially, base rounded, rarely broadly cuneate, apex rounded or obtuse, rarely acute, often mucronulate. Flowers greenish or white, glabrous, usually 2–10-fascicled in pedunculate cymose racemes or rarely in shortly branched narrow cymose panicles at lower part of terminal inflorescences, ca. 7 cm; rachis sparsely or densely pubescent. Pedicel 2–5 mm. Sepals ovate-triangular or triangular, apex acute. Petals suborbicular. Drupe red at maturity, turning black, cylindrical, 7–9 mm, 3–3.5 mm in diam., base with persistent disk and tube, apex acute; fruiting pedicel 3–6 mm. Fl. May–Sep, fr. Jul–Nov.

Mountain forests, forests in valleys, forest margins, thickets, slopes; 100–2100 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [India, Myanmar].

- 1a. Branchlets glabrous 4b. var. *leioclada*
 1b. Branchlets pubescent.
 2a. Leaves glabrous on both surfaces
 4a. var. *polyphylla*
 2b. Leaves abaxially or along veins
 pubescent 4c. var. *trichophylla*

4a. *Berchemia polyphylla* var. *polyphylla*

多叶勾儿茶(原变种) duo ye gou er cha (yuan bian zhong)

Berchemia trichoclada (Rehder & E. H. Wilson) Handel-Mazzetti; *B. yunnanensis* Franchet var. *trichoclada* Rehder & E. H. Wilson.

Branchlets pubescent. Leaves glabrous on both surfaces.

Mountain forests and thickets; 300–900 m. Gansu, Guangxi, Guizhou, Shaanxi, Sichuan, Yunnan [India, Myanmar].

4b. *Berchemia polyphylla* var. *leioclada* (Handel-Mazzetti) Handel-Mazzetti, Symb. Sin. 7: 672. 1933.

光枝勾儿茶 guang zhi gou er cha

Berchemia trichoclada var. *leioclada* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 58: 149. 1921.

Branchlets, rachis, and fruiting pedicels glabrous. Petiole only sparsely pubescent.

• Forest margins, thickets, slopes; 100–2100 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

The roots and leaves are used medicinally. The young leaves are used as a substitute for tea.

4c. *Berchemia polyphylla* var. *trichophylla* Handel-Mazzetti, Symb. Sin. 7: 672. 1933.

毛叶勾儿茶 mao ye gou er cha

Branchlets, petioles, and rachis densely golden-yellow pubescent. Leaves sparsely or densely pubescent abaxially or along veins.

• Forests in valleys, thickets; 1500–1600 m. Guizhou, Yunnan.

5. *Berchemia formosana* C. K. Schneider in Sargent, Pl. Wilson. 2: 220. 1914.

台湾勾儿茶 tai wan gou er cha

Berchemia ohwii Kanehira & Hatusima ex Kanehira; *B. racemosa* Siebold & Zuccarini var. *formosana* (C. K. Schneider) Kitamura.

Shrubs scandent. Branchlets purple-black, glabrous. Petiole 4–8 mm, glabrous; leaf blade abaxially turning white, adaxially turning black when dry, ovate or broadly ovate-oblong, (1.5–)2–3 × 1–1.5 cm, papery, both surfaces glabrous, lateral veins 6–8 pairs, primary and lateral veins prominent on both surfaces, base rounded, apex subrounded, or slightly acute, mucronulate. Inflorescences 2–5 cm. Flowers yellow-green, usually 2- or 3-fascicled, in cymose racemes at apices of lateral branches. Pedicel 2–3 mm. Sepals ovate, apically shortly acute. Petals obovate, shorter than sepals. Drupe cylindrical to ellipsoid, 7–10 mm, 2–3 mm in diam., with persistent disk at base; fruiting pedicel 2–4 mm. Fl. autumn, fr. Apr–May of following year.

Thickets on slopes; ca. 900 m. Taiwan [Japan (Ryukyu Islands)].

6. *Berchemia kulingensis* C. K. Schneider in Sargent, Pl. Wilson. 2: 216. 1914.

牯岭勾儿茶 gu ling gou er cha

Shrubs scandent or climbing, to 3 m tall. Branchlets spreading, yellow, turning pale brown, glabrous. Stipules lanceolate, ca. 3 mm, basally connate; petiole 6–10 mm, glabrous; leaf blade abaxially grayish green when dry, adaxially green, ovate-elliptic or ovate-oblong, 2–6.5 × 1.5–3.5 cm, papery, both surfaces glabrous, lateral veins 7–9(or 10) pairs, veins slightly prominent on both surfaces, base rounded or subcordate, apex obtuse-rounded or acute, mucronulate. Inflorescences 3–5 cm, glabrous. Flowers green, glabrous, usually 2- or 3-fascicled in subsessile or shortly pedunculate lax cymose racemes, rarely narrowly cymose panicles. Pedicels 2–3 mm, glabrous. Sepals triangular, margin ciliate, apex acuminate. Petals obovate. Drupe red when young, black-purple at maturity, narrowly cylindrical, 7–9 mm, 3.5–4 mm in diam., with persistent cup-shaped disk at base; fruiting pedicel 2–3 mm, glabrous. Fl. Jun–Jul, fr. Apr–Jun of following year.

• Forests in valleys, forest margins, thickets; 300–2200 m. Anhui, Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Zhejiang.

The roots are used medicinally.

This species is quite similar to *Berchemia polyphylla* var. *leioclada*, but the latter differs in having shorter, pubescent petioles and fruit that matures within the same year.

7. *Berchemia yunnanensis* Franchet, Bull. Soc. Bot. France 33: 456. 1886.

云南勾儿茶 yun nan gou er cha

Berchemia pycnantha C. K. Schneider; *Microrhamnuss mairei* H. Léveillé.

Shrubs scandent, 2.5–5 m tall. Branchlets spreading, light to yellow-green; old branches yellow-brown, glabrous. Petioles to 1.5(–2) cm, stout, glabrous; leaf blade abaxially pale green, turning yellow when dry, adaxially green, ovate-elliptic, oblong-elliptic, or ovate, 2.5–6 × 1.5–3 cm, papery, both surfaces glabrous, lateral veins 8–12 pairs, prominent on both surfaces, base broadly cuneate, apex acute to obtuse, finely mucronate. Flowers yellow, 2- or 3-fascicled in long pedunculate, terminal racemes 2–5 cm. Pedicel 3–4 mm, glabrous. Calyx tube shallowly dish-shaped, glabrous; sepals narrowly triangular, apex acute or shortly acuminate. Petals obovate, apex obtuse. Stamens slightly shorter than petals. Disk thick, fleshy, centrally distinctly convex. Ovary nearly completely immersed in but not fused with disk; style cylindrical, stout, undivided; stigma capitate, 2- or 3-lobed. Drupe red when young, turning black at maturity, cylindrical, 6–9 mm, 4–5 mm in diam., base with persistent remnants of calyx tube and cup-shaped disk, apex obtuse, never mucronulate; mesocarp thin, sweet; fruiting pedicel 4–5 mm. Fl. Jun–Aug, fr. Apr–May of following year.

• Forests, thickets, slopes, riverbanks; 1500–3900 m. Gansu, Guizhou, Shaanxi, Sichuan, E Xizang, Yunnan.

8. *Berchemia longipes* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 12. 1979.

长梗勾儿茶 *chang geng gou er cha*

Shrubs scandent, glabrous. Branchlets red-brown, smooth. Stipules ovate-triangular, ca. 2 mm, caducous; petiole remarkably long, 1.2–2.7 cm, glabrous; leaf blade abaxially grayish white, adaxially green, oblong or ovate-oblong, 4.5–6.5 × 2.5–4 cm, papery, lateral veins 10–12 pairs, slightly prominent on both surfaces, base rounded, apex shortly acuminate, rarely acute. Inflorescences to 6 cm, glabrous. Flowers white, 3–3.5 mm in diam., usually 3–12-fascicled in terminal or axillary, cymose racemes; peduncles 5–10 mm, rarely to 1.5 cm. Pedicel 4–6 mm. Sepals ovate-triangular, ca. 2 mm, apex slightly obtuse. Petals spatulate, apex obtuse. Stamens longer than petals. Fruit not seen. Fl. summer, fr. unknown.

• Forests; middle elevations. SE Yunnan (Xichou).

This species is characterized by its long petioles and up to 1.5 cm long peduncles.

9. *Berchemia annamensis* Pitard in Lecomte, Fl. Indo-Chine 1: 925. 1912.

越南勾儿茶 *yue nan gou er cha*

Shrubs climbing. Young branches grayish or gray-brown, glabrous. Petiole 1–1.5 cm, glabrous; leaf blade abaxially pale green, adaxially green, ovate or ovate-elliptic, 6.5–20 × 3.5–6 cm, papery, both surfaces glabrous or abaxially sparsely pubescent on veins, glabrescent, lateral veins 8–12 pairs, prominent on both surfaces, base rounded or cordate, apex acuminate or mucronate, mucro to 5 mm. Inflorescences 5–10 cm, pubescent. Flowers yellow-green, glabrous, usually few in fascicles, in terminal, pedunculate, broad cymose panicles. Pedicel 1–2

mm, glabrous. Drupe obovoid or obovoid-elliptic, 5–7 mm, 4–5 mm in diam., apex mucronulate, with persistent cup-shaped remnants of disk at base; fruiting pedicel 2–3 mm, glabrous. Fl. Jul–Aug, fr. Apr–May of following year.

Forests, mountain thickets; middle elevations. Guangdong (Longmen), Guangxi [Vietnam].

This species is distinct in having an obovoid drupe.

10. *Berchemia hirtella* H. T. Tsai & K. M. Feng, Acta Phytotax. Sin. 1: 190. 1951.

大果勾儿茶 *da guo gou er cha*

Shrubs scandent. Branchlets spreading, yellow-green, sparsely pubescent; old branches turning brown, glabrescent. Stipules ovate, ciliate, caducous; petiole 1.5–2 cm; leaf blade abaxially gray-yellow, adaxially dark brown when dry, ovate-elliptic or oblong, 6.5–10 × 4–6 cm, papery, adaxially glabrous or white powdery, densely pubescent or glabrous, or sparsely pubescent on veins, or clustered hairy in vein axils, lateral veins 11–13 pairs, prominent on both surfaces, base cordate or subrounded, apex shortly acuminate. Inflorescences rather large, to 20 × 7 cm; rachis pubescent. Flowers usually in broad cymose panicles at ends of lateral branches. Pedicel 1–1.5 cm, glabrous or subglabrous. Drupe purple-red at maturity, cylindrical-ellipsoid, 1.1–1.4 cm, 5–6 mm in diam., with persistent cup-shaped disk at base; fruiting pedicel 1.2–2 cm. Fl. May–Jun, fr. Feb–May of following year.

• Forests and thickets in valleys; 400–1500 m. Guizhou, Yunnan.

- 1a. Young branches and petioles pubescent; leaf blade abaxially densely pubescent 10a. var. *hirtella*
- 1b. Young branches and petioles glabrous; leaf blade abaxially glabrous or sparsely pubescent on veins and in vein axils 10b. var. *glabrescens*

10a. *Berchemia hirtella* var. *hirtella*

大果勾儿茶(原变种) *da guo gou er cha (yuan bian zhong)*

Young branches and petioles pubescent. Leaf blade abaxially densely pubescent.

• Forests and thickets in valleys; 400–1500 m. Yunnan.

10b. *Berchemia hirtella* var. *glabrescens* C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 13. 1979.

大老鼠耳 *da lao shu er*

Young branches and petioles glabrous. Leaf blade abaxially glabrous or sparsely pubescent on veins or clustered hairy in vein axils.

• Forests; ca. 1300 m. Guizhou (Anlong), Yunnan.

11. *Berchemia huana* Rehder, J. Arnold Arbor. 8: 166. 1927.

大叶勾儿茶 *da ye gou er cha*

Shrubs scandent, ca. 10 m tall. Branchlets green-brown, smooth, glabrous. Petiole 1.4–2.5 cm, glabrous; leaf blade abax-

ially yellow-green, dark brown when dry, adaxially green, ovate or ovate-oblong, 6–10 × 3–6 cm, upper leaves gradually smaller, papery or thinly papery, abaxially densely yellowish pubescent or sparsely pubescent on veins or in vein axils, adaxially glabrous, lateral veins 10–14 pairs, slightly prominent on both surfaces, base rounded or subcordate, apex rounded or slightly obtuse, rarely acute. Inflorescences comparatively large; rachis to 20 cm; branches to 8 cm, pubescent. Flowers yellowish green, glabrous, usually in terminal, broad cymose panicles, rarely in axillary, narrow cymose racemes or cymose panicles. Pedicel 1–2 mm, glabrous. Drupe purple-red or purple-black at maturity, cylindric-elliptic, 7–9 mm, ca. 4 mm in diam., with persistent, cup-shaped disk at base; fruiting pedicel ca. 2 mm. Fl. Jul–Sep, fr. May–Jun of following year.

• Forests on slopes, thickets; below 1000 m. Anhui, Fujian, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang.

1a. Leaves abaxially densely pubescent 11a. var. *huana*

1b. Leaves abaxially sparsely pubescent on major veins or in vein axils 11b. var. *glabrescens*

11a. *Berchemia huana* var. *huana*

大叶勾儿茶(原变种) da ye gou er cha (yuan bian zhong)

Leaves densely pubescent abaxially.

• Forests on slopes, thickets; below 1000 m. Anhui, Fujian, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang.

11b. *Berchemia huana* var. *glabrescens* Cheng ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 14. 1979.

脱毛大叶勾儿茶 tuo mao da ye gou er cha

Leaves sparsely pubescent on major veins or in vein axils abaxially.

• Forests on slopes. Anhui, Zhejiang.

12. *Berchemia hispida* (H. T. Tsai & K. M. Feng) Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 14. 1979.

毛背勾儿茶 mao bei gou er cha

Shrubs climbing. Young branches yellow-green, smooth, glabrous. Petiole 1.5–4 cm, glabrous; leaf blade adaxially green, turning dark brown when dry, ovate to elliptic, 6–10 × 3.5–6.5 cm, papery to subleathery, abaxially densely pubescent or pubescent on veins or in vein axils, adaxially glabrous, lateral veins 12–17 pairs, conspicuously prominent abaxially, impressed adaxially, base rounded, rarely truncate, apex acute and minutely mucronate. Inflorescences to 18 cm; rachis hispid or glabrous; branches ca. 7 cm. Flowers yellow-green, glabrous, in terminal, broad cymose panicles. Pedicel 2–3 mm, glabrous. Drupe purple-red at maturity, small, 6–8 mm, 3–4 mm in diam., apex mucronulate, base with persistent cup-shaped disk; fruiting pedicel 2–3 mm. Fl. Jul–Sep, fr. May–Jun of following year.

• Mountain forests and thickets; 1000–2000 m. Guizhou, Sichuan, Yunnan.

1a. Leaves abaxially densely pubescent 12a. var. *hispida*

1b. Leaves abaxially sparsely pubescent on veins or in vein axils 12b. var. *glabrata*

12a. *Berchemia hispida* var. *hispida*

毛背勾儿茶(原变种) mao bei gou er cha (yuan bian zhong)

Berchemia hypochrysa C. K. Schneider var. *hispida* H. T. Tsai & K. M. Feng, Acta Phytotax. Sin. 1: 191. 1951.

Leaves densely pubescent abaxially.

• Mountain forests and thickets; 1000–2000 m. Sichuan, S Yunnan.

12b. *Berchemia hispida* var. *glabrata* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 15. 1979.

光轴勾儿茶 guang zhou gou er cha

Leaves sparsely pubescent on veins or in vein axils abaxially. Inflorescence rachis glabrous.

• Mountain forests and thickets; 1400–1900 m. Guizhou, Sichuan (Emei Shan), Yunnan.

13. *Berchemia barbiger* C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 15. 1979.

腋毛勾儿茶 ye mao gou er cha

Shrubs scandent. Branchlets red-brown, smooth, glabrous. Petiole 1–2.5 cm, glabrous; leaf blade abaxially grayish green, adaxially green, ovate-elliptic or ovate-oblong, 5–9 × 3–5.5 cm, thinly papery, abaxially grayish white puberulent on vein axils, lateral veins 8–13 pairs, base rounded, apex obtuse or rounded. Flowers yellow-green, glabrous, in terminal, narrow, cymose panicles; rachis glabrous. Pedicel 2–3 mm. Drupe red when young, turning black at maturity, cylindrical, 5–7 mm, ca. 3 mm in diam., basally with persistent disk-shaped remnants of calyx tube and disk; fruiting pedicel ca. 3 mm, glabrous. Fl. Jun–Aug, fr. May–Jun.

• Mixed mountain forests; middle elevations. S Anhui (Huang Shan), N Zhejiang (Tianmu Shan).

14. *Berchemia sinica* C. K. Schneider in Sargent, Pl. Wilson. 2: 215. 1914.

勾儿茶 gou er cha

Shrubs scandent or climbing, to 5 m tall. Young branches glabrous; old branches yellow-brown, smooth, glabrous. Leaves alternate or fascicled on short shoots; petiole reddish, 1.2–2.6 cm, slender, glabrous; leaf blade grayish white abaxially, green adaxially, ovate-elliptic or ovate-oblong, 3–6 × 1.6–3.5 cm, thickly papery, abaxially sparsely puberulent in vein axils, adaxially glabrous, lateral veins 8–10 pairs, base rounded or subcordate, apex rounded or obtuse, often mucronulate. Flowers yellow or greenish, solitary or few in fascicles, sessile or shortly pedunculate, in short, branched, narrow cymose panicles at ends of lateral branches; rachis to 10 cm, glabrous; branches ca. 5 cm, sometimes in axillary, short racemes. Pedicel ca. 2 mm, glabrous. Calyx tube shallowly cup-shaped, glabrous; sepals broadly triangular, abaxially glabrous, adaxially slightly keeled. Petals hooded. Disk thick, fleshy, centrally distinctly convex. Ovary deeply immersed in disk but not fused to it; style cylindric, short; stigma 2- or 3-lobed. Drupe purple-red, turning black at maturity, cylindrical, 5–9 mm, 2.5–3 mm in diam., basally with persistent remnants of calyx tube and disk;

fruiting pedicel ca. 3 mm. Fl. Jun–Aug, fr. May–Jun of following year.

• Mixed forests and thickets on slopes and in valleys; 1000–2500 m. Gansu, Guizhou, Henan, Hubei, Shaanxi, Shanxi, Sichuan, Yunnan.

15. *Berchemia omeiensis* Feng ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 16. 1979.

峨眉勾儿茶 e mei gou er cha

Shrubs scandent or climbing. Young branches glabrous; branchlets yellow-green, smooth. Leaves usually 2–5-fasciated on short shoots; stipules broadly ovate-lanceolate, basally connate; petiole 2–4 cm; leaf blade abaxially pale green, slightly gray or reddish when dry, adaxially deep green, ovate-elliptic or ovate-oblong, 6–12 × 3–6 cm, leathery or subleathery, abaxially pubescent on vein axils, adaxially glabrous, lateral veins (7–)9 or 10(–13) pairs, prominent on both surfaces, base cordate or rounded, slightly oblique, apex shortly acuminate or acute, often mucronulate. Inflorescences to 16 cm; branches ca. 8 cm, glabrous. Flowers yellow or greenish, glabrous, usually 2–5 in fascicles, in shortly pedunculate, terminal, broad cymose panicles. Pedicels ca. 3 mm. Drupe red, turning purple-black at maturity, cylindrical-ellipsoid, 1–1.3 cm, ca. 4 mm in diam., base with persistent cup-shaped disk; fruiting pedicel 3–4 mm. Fl. Jul–Aug, fr. May–Jun of following year.

• Mountain forests; 400–1700 m. N Guizhou, W Hubei, Sichuan.

16. *Berchemia brachycarpa* C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 17. 1979.

短果勾儿茶 duan guo gou er cha

Shrubs climbing. Young branches reddish brown, smooth, glabrous. Petiole 1–1.5 cm, stout, glabrous; leaf blade abaxially reddish when dry, adaxially green, oblong or ovate-oblong, 5–8 × 2.5–4.5 cm, thickly papery or subleathery, both surfaces glabrous, lateral veins 12–16 pairs, prominent abaxially, ± impressed adaxially, base rounded or truncate, apex shortly acute. Flowers yellow-green, glabrous, solitary or 2 or 3 in fascicles, in shortly pedunculate, narrow cymose panicles or cymose racemes at ends of lateral branches; rachis 5–6 cm, glabrous. Pedicel ca. 2 mm, glabrous. Drupe cylindrical, 6–7 mm, 4–5 mm in diam., base with persistent sepals and cup-shaped disk, apex mucronulate; fruiting pedicel 2–3 mm, glabrous. Fl. May, fr. Sep–Oct.

• Forests; 1400–2800 m. S Yunnan.

17. *Berchemia medogensis* Y. L. Chen & Y. F. Du, Acta Phytotax. Sin. 39: 73. 2001.

墨脱勾儿茶 mo tuo gou er cha

Shrubs scandent. Branchlets spreading, green or yellow-green, brown puberulous. Stipules minute, triangular, persistent; petiole 1.5–2 cm, puberulous; leaf blade ovate or ovate-elliptic, 4.5–8 × 3–5.5 cm, papery, abaxially gray-green, white puberulous, adaxially dark green, glabrous, lateral veins 10–13 pairs, abaxially prominent, densely puberulous on veins, base rounded or subcordate, apex obtuse, mucronulate. Flowers not seen. Fruiting inflorescence in broad cymose panicles up to 18 cm;

lateral branches to 10 cm; rachis of inflorescence puberulous. Drupe cylindrical-ellipsoid, 7–12 mm, 4–6 mm in diam., base with persistent disk-shaped disk, apex mucronulate, deciduous; fruiting pedicel red at maturity, turning purple-black later, 2–4 mm, puberulous. Fl. unknown, fr. Dec.

• Margins of evergreen forests; 1200–1500 m. SE Xizang (Médog).

This species is somewhat similar to *Berchemia flavescens*, from which it differs by having branchlets, abaxial leaf surface, and inflorescence rachis puberulous.

18. *Berchemia flavescens* (Wallich) Brongniart, Mém. Fam. Rhamnées, 50. 1826.

黄背勾儿茶 huang bei gou er cha

Ziziphus flavescens Wallich in Roxburgh, Fl. Ind. 2: 367. 1824; *Berchemia hypochrysa* C. K. Schneider.

Shrubs scandent, 7–8 m tall, glabrous. Branchlets spreading, yellow or turning brown. Stipules caducous; petiole 1.3–2.5 cm, glabrous; leaf blade adaxially green, turning yellow when dry, ovate, ovate-elliptic, or oblong, 7–15 × 3–7 cm, papery or subleathery, adaxially glabrous, lateral veins 12–18 pairs, prominent on both surfaces, base rounded, apex obtuse to acute, mucronulate. Flowers yellow-green, very small, ca. 1.5 mm, glabrous, usually 1 to few in fascicles, in narrow cymose panicles, rarely cymose racemes at ends of lateral branches. Pedicel 2–3 mm. Calyx tube shallowly dish-shaped; lobes narrowly triangular. Petals obovate, distinctly hooded. Stamens nearly completely enfolded by petals. Disk thick, fleshy. Ovary deeply immersed in disk; style cylindrical, short, stout; stigma 2- or 3-lobed. Drupe purple-red or purple-black at maturity, subcylindrical, 7–11 mm, 4–5 mm in diam., base with persistent cup-shaped disk, apex mucronulate; mesocarp thin, sour-sweet-tasting; fruiting pedicel 3–5 mm, glabrous. Fl. Jun–Aug, fr. May–Jul of following year.

Forests and thickets on slopes; 1200–4000 m. E Gansu, W Hubei, S Shaanxi, Sichuan, S and SE Xizang, NW Yunnan [Bhutan, India, Nepal].

19. *Berchemia floribunda* (Wallich) Brongniart, Mém. Fam. Rhamnées, 50. 1826.

多花勾儿茶 duo hua gou er cha

Shrubs scandent or erect. Young branches yellow-green, smooth, glabrous. Stipules narrowly lanceolate, 1–2 mm, persistent; petiole 1–2 cm, rarely to 5 cm, glabrous; leaf blade abaxially dark brown when dry, adaxially green, ovate or ovate-elliptic to elliptic, 4–9(–11) × 2–5(–6.5) cm, papery, abaxially glabrous, or sparsely pubescent on veins, adaxially glabrous, lateral veins 9–12 pairs, prominent on both surfaces, base rounded to cordate, margin entire, apex obtuse to rounded, or acute to acuminate. Inflorescences to 15 cm; lateral branches less than 5 cm; rachis glabrous or sparsely puberulent. Flowers numerous, glabrous, few in fascicles, in terminal cymose panicles or axillary cymose racemes. Pedicel 1–2 mm. Calyx tube shallowly patelliform, glabrous; lobes narrowly triangular, adaxially distinctly keeled up to middle. Petals spatulate, en-

folding stamens. Disk thick, fleshy, centrally distinctly convex. Ovary nearly completely immersed in disk; style cylindrical, undivided; stigma 2- or 3-lobed. Drupe red, bluish black at maturity, cylindrical-elliptic to ovoid-oblong, 7–10 × 4–5 mm, with persistent cup-shaped disk; stone 2-loculed; fruiting pedicel 2–3 mm, glabrous. Fl. Jul–Oct, fr. Apr–Jul of following year.

Mountain forests, understories of forests and thickets on slopes, forest margins, valleys; below 2600 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Nepal, Thailand, Vietnam].

The roots are used medicinally to alleviate pain. The young leaves are used as a substitute for tea.

- 1a. Leaf blade ovate or ovate-elliptic, apex acute 19a. var. *floribunda*
 1b. Leaf blade oblong or narrowly oblong, apex obtuse 19b. var. *oblongifolia*

19a. Berchemia floribunda var. *floribunda*

5. BERCHEMIELLA Nakai, Bot. Mag. (Tokyo) 37: 30. 1923.

小勾儿茶属 *xiao gou er cha shu*

Trees or shrubs, subglabrous. Leaves alternate, pinnately veined, with strongly parallel secondary veins, base often asymmetrical, margin entire. Flowers bisexual, 5-merous, pedicellate, in lax terminal cymose racemes or axillary fascicles; flower buds globose; bracts small, caducous. Calyx tube cup-shaped; lobes triangular, valvate, adaxially medially keeled, with a basally inserted beaklike protrusion. Petals obovate-cucullate, ca. as long as sepals, base shortly clawed, apex rounded or emarginate. Stamens dorsifixed, enfolded by petals. Disk pentagonous, thick, not persisting at fruit. Ovary superior, almost up to half immersed in disk, 2-loculed, each locule with 1 lateral ovule near base; styles short, stout, deciduous after flowering; stigma emarginate or 2-fid. Drupe 1-loculed, 1-seeded, with persistent calyx tube at base.

Three species: China, Japan; two species (both endemic) in China.

This genus is closely related to *Berchemia* but differs in having sepals with beaklike protrusions at the keeled adaxial midvein; disk pentagonous, not persisting in fruit; drupe 1-loculed, 1-seeded; and leaves often asymmetrical.

- 1a. Shrubs; leaf blade 7–10 × 3–5 cm, lateral veins 8–10 pairs 1. *B. wilsonii*
 1b. Small trees; leaf blade 4–8 × 2–3 cm, lateral veins 6 or 7 pairs 2. *B. yunnanensis*

1. Berchemiella wilsonii (C. K. Schneider) Nakai, Bot. Mag. (Tokyo) 37: 31. 1923.

小勾儿茶 *xiao gou er cha*

Shrubs deciduous, 3–6 m tall. Branchlets brown, glabrous, with dense, conspicuous lenticels and longitudinal slits; old branches gray. Stipules broadly triangular, abaxially connate, surrounding buds; petiole 4–5 mm, glabrous or pilose; leaf blade adaxially gray-white, elliptic, 7–10 × 3–5 cm, papery, abaxially densely pubescent or with barbate vein axils, adaxially glabrous, lateral veins 8–10 pairs, base rounded, asymmetrical, apex obtuse, mucronulate. Inflorescences ca. 3.5 cm, glabrous. Flowers greenish, glabrous, in terminal cymose racemes or few in axillary cymes; flower buds globose, ca. 1.5 mm in diam., shorter than pedicels. Calyx tube cup-shaped; lobes triangular, adaxially slightly keeled and with minute basal beak. Petals broadly obovate, very short, ca. 1 mm, apex emarginate, hooded. Disk thin, lining calyx tube, marginally slightly thickened and prominent. Ovary globose, basally surrounded but not immersed into disk; style cylindrical, short, undivided; stigma capitate, distinctly 2- or 3-lobed. Fruit red when young,

多花勾儿茶(原变种) *duo hua gou er cha* (yuan bian zhong)

Ziziphus floribunda Wallich in Roxburgh, Fl. Ind. 2: 368. 1824; *Berchemia floribunda* var. *megalophylla* C. K. Schneider; *B. giraldiana* C. K. Schneider; *B. racemosa* Siebold & Zuccarini.

Leaf blade ovate or ovate-elliptic, apex acute.

Understories of forests and thickets on slopes, forest margins, valleys; below 2600 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Nepal, Vietnam].

19b. Berchemia floribunda var. *oblongifolia* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 19. 1979.

矩叶勾儿茶 *ju ye gou er cha*

Leaf blade oblong or narrowly oblong, apex obtuse. Inflorescence rachis sparsely puberulent, rarely glabrous.

• Mountain forests; ca. 1000 m. Fujian, Jiangxi, Zhejiang.

nearly black at maturity, cylindrical to slightly obovoid. Fl. Jul, fr. Aug–Sept.

• Forests, valley forests; 500–1500 m. Anhui, W Hubei, Zhejiang.

- 1a. Petiole glabrous; leaf blade abaxially with barbate vein axils 1a. var. *wilsonii*
 1b. Petiole pilose; leaf blade abaxially densely pubescent 1b. var. *pubipetiolata*

1a. Berchemiella wilsonii var. *wilsonii*

小勾儿茶(原变种) *xiao gou er cha* (yuan bian zhong)

Chaydaia wilsonii C. K. Schneider in Sargent, Pl. Wilson. 2: 221. 1914; *Berchemia wilsonii* (C. K. Schneider) Koidzumi.

Petiole glabrous; leaf blade with barbate vein axils abaxially.

• Forests, valley forests; ca. 1300 m. W Hubei (Xingshan).

1b. Berchemiella wilsonii var. *pubipetiolata* H. Qian, var. nov.

毛柄小勾儿茶 *mao bing xiao gou er cha*

Type: China. Anhui: Huoshan, *L. M. Chen 099* (fl.) (holotype, AAUF).

Validating Latin diagnosis: that of "*Berchemiella wilsonii* var. *pubipetiolata*" (H. Qian, Bull. Bot. Res., Harbin 8(4): 124. 1988).

Petiole pilose; leaf blade densely pubescent abaxially.

- Valley forests; 500–1500 m. Anhui, Zhejiang.

When *Berchemiella wilsonii* var. *pubipetiolata* was originally described by Qian (loc. cit.), two gatherings were indicated as types, one flowering and one fruiting, with the result that the name was not validly published (*Vienna Code*, Art. 37.2).

2. *Berchemiella yunnanensis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 20. 1979.

滇小勾儿茶 *dian xiao gou er cha*

Trees to 5 m tall, subglabrous. Branchlets dark brown, asperous, with longitudinal slits. Stipules ovate-lanceolate, short, caducous; petiole 4–5 mm; leaf blade abaxially greenish, adaxially dark green, elliptic, rarely oblong, 4–8 × 2–3 cm, papery, abaxially often with barbate vein axils, lateral veins 6 or 7 pairs, base subrounded, often asymmetrical, margin entire, apex obtuse or shortly acuminate, rarely acute or subrounded. Flowers 3–9 in terminal lax cymose racemes, 2–3 cm; peduncles 1–5 mm; flower buds green, globose. Pedicel 1–2 mm. Sepals triangular, adaxially medially keeled and with minute basal beak. Petals obovate. Disk pentagonal, thick. Ovary up to half immersed in disk, 1- or 2-loculed, 2-ovuled; styles short, emarginate. Fruit not seen. Fl. and fr. unknown.

- Slopes, stony crevices; ca. 1000 m. SE Yunnan (Funing).

6. RHAMNELLA Miquel, Prolus. Fl. Jap. 218; Ann. Mus. Bot. Lugduno-Batavi 3: 30. 1867.

猫乳属 *mao ru shu*

Chaydaia Pitard.

Shrubs or small trees, rarely scandent, evergreen to mostly deciduous. Leaves alternate, shortly petiolate; stipules narrowly triangular or lanceolate, often persistent; leaf blade papery or submembranous, pinnately veined, margin serrulate. Flowers yellow-green, small, bisexual, 5-merous, pedicellate, in shortly pedunculate axillary cymes, or fascicled in axils of leaves. Calyx tube cup-shaped; lobes triangular, midvein adaxially keeled and with centrally inserted beaklike protrusion. Petals ovate-spatulate or orbicular-spatulate, ± distinctly cucullate, enfolding stamens. Stamens dorsifixed; filaments free from claw at base, lanceolate-linear. Disk pentagonal, thin, lining calyx tube, nectariferous. Ovary superior, base slightly immersed in disk, 1- or 2-loculed or imperfectly 1-loculed, with 2 ovules per locule; styles terminally 2-fid. Drupe yellowish to orange, turning black or purple-black when ripe, cylindrical-ellipsoidal base with persistent remnants of calyx tube, with rudimentary style at apex, 1- or 2-loculed, with 1 or 2 seeds.

Eight species: China, Japan, Korea; eight species (five endemic) in China.

- 1a. Evergreen shrubs or small trees, rarely scandent..... 1. *R. rubrinervis*
- 1b. Deciduous shrubs or small trees, never scandent.
 - 2a. Young branches, petioles, and abaxial leaf surface pubescent.
 - 3a. Leaf blade obovate-oblong or obovate-elliptic, rarely obovate, apex caudate-acuminate or long acuminate, abaxially pubescent or only on veins, lateral veins 5–11(–13) pairs 2. *R. franguloides*
 - 3b. Leaf blade subelliptic or oblong, apex shortly acuminate or acuminate, abaxially tomentose or pubescent, lateral veins 5–8 pairs 3. *R. julianae*
 - 2b. Young branches, petioles, and abaxial leaf surface glabrous or subglabrous.
 - 4a. Leaf blade 7–15 cm, obovate-elliptic or obovate-oblong, apex caudate-acuminate, glabrous or abaxially pilose on veins, lateral veins 7–10 pairs 4. *R. caudata*
 - 4b. Leaf blade usually shorter than 7 cm, ovate, ovate-elliptic, or lanceolate-elliptic, apex acute or acuminate, lateral veins 4–8 pairs.
 - 5a. Leaf lateral veins 4 or 5 pairs, margin subentire or inconspicuously serrulate.
 - 6a. Leaf blade ovate or ovate-elliptic, apex shortly acuminate, rarely acute, margin entire at lower half, inconspicuously serrulate at upper half 5. *R. wilsonii*
 - 6b. Leaf blade elliptic or lanceolate-elliptic, broadest at middle, apex acute, margin inconspicuously serrulate 6. *R. gilgitica*
 - 5b. Leaf lateral veins 5–8 pairs, margin conspicuously serrulate.
 - 7a. Leaf blade oblong, both surfaces glabrous, margin entire at lower 1/3, lateral veins 5–7 per side 7. *R. forrestii*
 - 7b. Leaf blade narrowly elliptic, adaxially pilose on veins, margin serrulate, lateral veins 6–8 pairs 8. *R. martini*

1. *Rhamnella rubrinervis* (H. Léveillé) Rehder, J. Arnold Arb. 15: 12. 1934.

苞叶木 *bao ye mu*

Embelia rubrinervis H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 374. 1912; *Berchemiella crenulata* (Handel-Mazzetti)

Hu; *Chaydaia crenulata* Handel-Mazzetti; *C. rubrinervis* (H. Léveillé) C. Y. Wu ex Y. L. Chen & P. K. Chou; *Rhamnella crenulata* (Handel-Mazzetti) T. Yamazaki; *R. hainanensis* Merrill; *R. longifolia* H. T. Tsai & K. M. Feng.

Shrubs or small trees, rarely scandent shrubs, evergreen. Young branches pilose; older branches reddish brown or gray-

brown, glabrous. Leaves alternate; stipules lanceolate, persistent; petiole 4–10 mm, pilose or subglabrous; leaf blade abaxially dark green, shiny, adaxially pale green, oblong or ovate-oblong, 6–13(–17) × 2–5 cm, leathery or thinly so, abaxially glabrous, adaxially glabrous, or puberulent on veins, lateral veins 5–7 pairs, slightly impressed abaxially, prominent adaxially, sometimes turning pink when dry, base rounded, margin inconspicuously remotely serrate or subentire, apex acuminate to long acuminate. Flowering branches axillary, 6–15 cm, sparsely puberulent. Flowers bisexual, 5-merous, few to 10 in axillary cymes, or sessile or shortly pedunculate at bracteole leaf of flowering branches; bracteole leaf similar to leaves in vegetative branches, but smaller. Pedicel 2–4 mm, sparsely puberulent. Sepals triangular, adaxially midvein raised, rostellate at lower middle. Petals obovate, shortly clawed. Stamens involute by petals, ca. as long as petals. Disk rounded, thick. Ovary globose, not immersed in disk; styles 2-fid. Drupe purple-red or orange at maturity, ovoid-cylindric, 8–10 mm, 5–6 mm in diam., base with persistent calyx tube; fruiting pedicel 4–5 mm, puberulent or subglabrous, 1-loculed, 1-seeded, developmentally 2-loculed, with developed and undeveloped seeds. Fl. Jul–Sep, fr. Aug–Nov.

Mountain forests and thickets; below 1500 m. Guangdong, Guangxi, Guizhou, Yunnan [Vietnam].

2. *Rhamnella franguloides* (Maximowicz) Weberbauer in Engler & Prantl, Nat. Pflanzenfam. III(5): 406. 1895.

猫乳 mao ru

Microrhamnula franguloides Maximowicz, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 10(11): 4. 1866; *Berchemia congesta* S. Moore; *M. taquetii* H. Léveillé; *Rhamnella japonica* Miquel; *R. obovalis* C. K. Schneider.

Shrubs or small trees, deciduous, 2–9 m tall. Young branches greenish, pilose or densely pubescent. Stipules lanceolate, 3–4 mm, persistent; petiole 2–6 mm, densely pubescent; leaf blade abaxially yellow-green, adaxially green, obovate-oblong, obovate-elliptic, oblong, or narrowly elliptic, rarely obovate, 4–12 × 2–5 cm, abaxially pubescent at least on veins, adaxially glabrous, lateral veins 5–11(–13) pairs, base rounded, rarely cuneate, slightly oblique, margin serrulate, apex caudate-acuminate, acuminate, or shortly acuminate. Flowers yellow-green, bisexual, 6–18 in axillary cymes; peduncles 1–4 mm, pilose or glabrous. Sepals triangular-ovate, sparsely pilose at margin. Petals broadly obovate, apex emarginate. Pedicel 1.5–4 mm, sparsely pilose or glabrous. Drupe red or orange at maturity, turning black or purple-black when dry, cylindric, 7–9 mm, 3–4.5 mm in diam.; fruiting pedicel 3–5 mm, pilose or glabrous. Fl. May–Jul, fr. Jul–Oct. $2n = 24^*$.

• Forests, slopes, roadsides; below 1100 m. Anhui, Hebei, Henan, W Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, S Shanxi, Shandong, Zhejiang.

3. *Rhamnella julianae* C. K. Schneider in Sargent, Pl. Wilson. 2: 223. 1914.

毛背猫乳 mao bei mao ru

Shrubs 2–3 m tall, deciduous. Young branches green, tomentose or pilose; branchlets black-brown, with few inconspic-

uous lenticels. Petiole 2–5 mm, tomentose or pilose; leaf blade abaxially gray-green, adaxially dark green, subelliptic or ovate-oblong, 4–8 × 2–4 cm, papery, abaxially tomentose or densely pubescent, or only pilose, adaxially subglabrous, lateral veins 5–8 pairs, base rounded or subcordate, slightly oblique, margin serrulate, apex shortly acuminate or long acuminate. Flowers yellow-green, 2–4 in axillary cymes. Sepals broadly ovate, apex acute. Petals obovate, slightly longer than stamens, apex emarginate. Drupe purple-red at maturity, subcylindric, ca. 7 mm; fruiting pedicel 3.5–4.5 mm. Fl. May, fr. Jul–Aug.

• Forest understories on slopes; 1000–1600 m. Hubei, Sichuan, Yunnan.

This species differs from other species in the genus in having tomentose or densely pilose young branches, abaxial leaf surfaces, and petioles.

4. *Rhamnella caudata* Merrill, Sunyatsenia 2: 11. 1934.

尾叶猫乳 wei ye mao ru

Shrubs or small trees, deciduous, to 4 m tall. Young branches glabrous or subglabrous. Petiole 4–6 mm, glabrous or pilose; leaf blade subelliptic, rarely obovate-elliptic or obovate-oblong, 7–15 × 3–5.5 cm, both surfaces glabrous or abaxially pilose on veins, lateral veins 7–10 pairs, base subrounded, slightly oblique, margin shallowly serrate, apex caudate-acuminate. Flowers yellow-green, 6–10 cm, glabrous, in axillary or terminal cymes; peduncles 3–5 mm. Pedicel 2–3 mm. Drupe yellow-green, turning black or purple-black at maturity, subcylindric, 8–9 mm, 4–5 mm in diam.; fruiting pedicel ca. 4 mm. Fl. May–Jun, fr. Jul–Aug.

• Mixed forests on slopes, field margins, roadsides. NE Guangdong.

5. *Rhamnella wilsonii* C. K. Schneider in Sargent, Pl. Wilson. 2: 222. 1914.

卵叶猫乳 luan ye mao ru

Shrubs, rarely small trees, deciduous, to 8 m tall. Young branches greenish, glabrous; old branches brown. Stipules subulate, partly caducous; petiole 3–7 mm, glabrous or pilose; leaf blade adaxially grayish white when dry, ovate or ovate-elliptic, 1.5–6 × 0.8–2.8 cm, papery, both surfaces glabrous, lateral veins (3–)5 pairs, base rounded or broadly cuneate, slightly oblique, margin subentire or conspicuously serrulate on apical half, apex shortly acuminate, rarely acute. Flowers yellow-green, glabrous, 2–6-fascicled or in axillary, nearly sessile cymes. Pedicel 1.3–3.5 mm. Drupe purple-black or black at maturity, cylindric, 6–8 mm, 3–3.5 mm in diam.; fruiting pedicel 3–4 mm, glabrous. Fl. May–Jul, fr. Jul–Oct.

• Forest margins on slopes and in valleys, thickets; 2000–3000 m. W Sichuan, E Xizang.

6. *Rhamnella gilgitica* Mansfeld & Melch, Notizbl. Bot. Gart. Berlin-Dahlem 15: 112. 1940.

西藏猫乳 xi zang mao ru

Shrubs deciduous, to 2 m tall. Young branches glabrous or pilose; old branches dark brown. Stipules narrowly lanceolate, caducous; petiole 2–4 mm, glabrous; leaf blade abaxially gray, adaxially dark green, elliptic or lanceolate-elliptic, 2–5 × 1–2

cm, papery, both surfaces glabrous, lateral veins 4 or 5 (or 6) pairs, base subrounded or broadly cuneate, broadest at middle, margin inconspicuously serrulate or entire at basal half and serrulate at upper half, apex acute. Flowers yellow-green, glabrous, solitary or 2–5-fascicled in axils of leaf, or in pedunculate cymes. Drupe orange at maturity, subglobose, 6–8 mm, 3–4 mm in diam., with rudimentary styles at apex; fruiting pedicel (immature) 2–3 mm. Fl. May–Jul, fr. Sep.

Subalpine forests and thickets; 2600–2900 m. SW Sichuan, SE Xizang, NW Yunnan [Kashmir].

This species is quite similar to *Rhamnella wilsonii*, but the latter differs in having leaves ovate or ovate-elliptic, usually broadest at base.

7. *Rhamnella forrestii* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 62. 1917.

川滇猫乳 chuan dian mao ru

Shrubs deciduous, 2–4 m tall. Young branches green, slender, glabrous. Stipules subulate, basally persistent; petiole 2–6 mm, puberulent or glabrous; leaf blade abaxially pale green, adaxially dark green, oblong or lanceolate-oblong, 3–9 × 2–3.5 cm, papery or thinly papery, both surfaces glabrous, lateral veins 5–7 pairs, base rounded or broadly cuneate, margin subentire at basal part, serrulate at upper half, apex acuminate or acute. Flowers yellow-green, glabrous, 2–8-fascicled in leaf axils, or in axillary cymes; peduncles 1–2 mm or shorter. Pedicel 2–3 mm, glabrous. Drupe orange to red when young, black at maturity, cylindrical, 8–9 mm, ca. 3.5 mm in diam.; fruiting pedicel 3–6 mm, glabrous. Fl. May–Jul, fr. Jul–Sep.

• Subalpine forests and thickets; 2000–3000 m. SW and W Sichuan, E and SE Xizang, NW Yunnan.

8. *Rhamnella martini* (H. Léveillé) C. K. Schneider in Sargent, Pl. Wilson. 2: 225. 1914 [*“martinii”*].

多脉猫乳 duo mai mao ru

Rhamnus martini H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 473. 1912; *Microrhamnus cavaleriei* H. Léveillé; *Rhamnella mairei* C. K. Schneider; *Rhamnus yunnanensis* Heppler.

Shrubs or small trees, deciduous, to 8 m tall. Young branches yellow-green, slender, glabrous; old branches dark-brown, with numerous yellow lenticels. Stipules subulate, basally persistent; petiole 2–4 mm, glabrous or pilose; leaf blade narrowly elliptic, lanceolate-elliptic, or oblong-elliptic, 4–11 × 1.5–4.2 cm, papery, both surfaces glabrous, rarely abaxially slightly pilose on veins, lateral veins 6–8 pairs, base rounded, or subrounded, slightly oblique, margin serrulate, apex acute or acuminate. Flowers yellow-green, glabrous, in axillary cymes; peduncles very short, to 2 mm. Sepals ovate-triangular, apex acute. Petals obovate, apex emarginate. Pedicel 2–3 mm. Drupe purple-black at maturity, subcylindric, ca. 8 mm, 3–3.5 mm in diam.; fruiting pedicel 3–4 mm. Fl. Apr–Jun, fr. Jul–Sep.

Mixed forests, thickets on mountains; 800–2800 m. N Guangdong, Guizhou, W Hubei, Sichuan, SE Xizang, Yunnan [Nepal].

The leaves differ from those of *Rhamnus forrestii* in being narrowly elliptic or lanceolate-elliptic with 6–8 pairs of lateral veins.

7. SAGERETIA Brongniart, Mém. Fam. Rhamnées, 52. 1826.

雀梅藤属 que mei teng shu

Ampelopsis Rafinesque.

Shrubs scandent or erect, rarely small trees, unarmed or spinescent. Branchlets alternate or subopposite, often terminating in a woody spine. Leaves alternate or subopposite; stipules small, caducous; leaf blade papery to leathery, pinnately veined, margin serrate, rarely entire. Flowers mostly very small, 1–2 mm in diam., bisexual, 5-merous, usually sessile or subsessile, rarely pedicellate, in spikes or spicate panicles, rarely in racemes. Calyx tube shallowly cup-shaped to hemispherical; sepals triangular, ± fleshy, adaxially medially keeled and hooded. Petals spatulate, apex 2-lobed to ± deeply emarginate. Stamens equaling petals or slightly longer; anthers dorsifixed. Disk cup-shaped, thick, fleshy, outer margin free from calyx tube, ± distinctly erect, entire or 5-lobed. Ovary superior, 2- or 3-loculed, with 1 ovule per locule; style short, stout, undivided, apically ± distinctly 2- or 3-lobed. Drupe obovoid-globose, with 2 or 3 one-seeded stones, base with remnants of persistent calyx tube. Seeds compressed, slightly asymmetrical, concave at both ends.

About 35 species: mainly in SE Asia, a few species in Africa and North America; 19 species (15 endemic) in China.

Sageretia gongshanensis G. S. Fan & L. L. Deng (Sida 17: 677. 1997) and *S. latifolia* Handel-Mazzetti (Symb. Sin. 7: 673. 1933), both described from Yunnan, and *S. yunlongensis* G. S. Fan & L. L. Deng (Sida 16: 477. 1995), described from Xizang and Yunnan, could not be treated here because no material was seen by the authors.

The fruit of some species is edible. The leaves are used as a substitute for tea. Several species are very popular in Bonsai gardening.

- 1a. Flowers distinctly pedicellate, in racemes or panicles; fruit maturity delayed to following year.
- 2a. Leaves 5–12 × 2.5–5 cm, with 5 or 6 (or 7) pairs of lateral veins 18. *S. henryi*
- 2b. Leaves distinctly smaller, 0.8–2 × 0.7–1.2 cm, with 3 or 4 pairs of lateral veins 19. *S. pedicellata*
- 1b. Flowers sessile or subsessile, in spikes or spicate panicles; fruit maturity in current year.
- 3a. Rachis of inflorescence glabrous, rarely sparsely pubescent.
- 4a. Leaf blade 0.5–2(–2.5) cm × less than 1.4 cm, petiole 1–3 mm, lateral veins 3–5 pairs.
- 5a. Leaves papery, often fascicled, leaf blade obovate or oblong, apex emarginate or rounded, margin entire or crenate; inflorescences usually inserted at middle of branches 1. *S. horrida*

- 5b. Leaves leathery, not fascicled, but often distichous, leaf blade oblong or ovate-elliptic, apex obtuse or acute, not emarginate, margin minutely serrulate; inflorescences at ends of branchlets 2. *S. pycnophylla*
- 4b. Leaf blade larger than 2.5 × 1.4 cm, petiole longer than 4 mm, lateral veins 2–8 pairs.
- 6a. Leaves adaxially smooth; lateral veins few, 2 or 3 (or 4) pairs 3. *S. paucicostata*
- 6b. Leaves adaxially shiny; lateral veins 5–8 pairs.
- 7a. Leaves abaxially barbate at vein axils, leaf bases asymmetric 4. *S. lucida*
- 7b. Leaves abaxially glabrous, leaf bases symmetric.
- 8a. Leaves papery or subleathery, apex acuminate or acute, margin not revolute; flowers usually in terminal spicate-paniculate inflorescences; fruit maturity in following year 5. *S. gracilis*
- 8b. Leaves leathery or thickly so, apex obtuse or rounded, margin often revolute; flowers in axillary or terminal lax spikes; fruit maturity within current year 6. *S. camelliifolia*
- 3b. Rachis of inflorescence tomentose or densely pubescent.
- 9a. Leaf blade abaxially glabrous or pubescent on veins, or barbate at vein axils.
- 10a. Leaves up to 4.5 × 2.5 cm, lateral veins 3–5(–7) pairs, adaxially not impressed 13. *S. thea*
- 10b. Leaves 4–15 cm × more than 3.5 cm, lateral veins 5–10 pairs, adaxially distinctly impressed.
- 11a. Branchlets often with hooked, incurved long spines; leaf blade usually oblong, abaxially barbate at axils of veins, petioles glabrous; fruit ripe in current year.
- 12a. Leaves leathery, major veins adaxially distinctly impressed 14. *S. hamosa*
- 12b. Leaves papery, major veins adaxially inconspicuously impressed 15. *S. randaiensis*
- 11b. Branchlets with erect spines or without spines; leaf blade usually ovate-elliptic, glabrous or abaxially pubescent on veins, petioles pubescent or sparsely pubescent; fruit ripe in following year.
- 13a. Leaf blade leathery, abaxially glabrous, lateral veins 5–7 pairs, apex acuminate, rarely acute, base subrounded, slightly asymmetric 16. *S. melliana*
- 13b. Leaf blade papery or thinly leathery, abaxially on veins pubescent, lateral veins 7–10 pairs, apex caudate-acuminate or long acuminate, base cordate or subrounded, never asymmetric 17. *S. subcaudata*
- 9b. Leaf blade abaxially tomentose, hairs persistent or ± deciduous.
- 14a. Leaf blade 1–2.5 × 0.3–1.5 cm, abaxially persistently densely tomentose.
- 15a. Leaf blade papery, margin explanate, lateral veins 4–6 pairs 7. *S. brandrethiana*
- 15b. Leaf blade leathery, margin revolute or not, lateral veins 3 or 4 pairs.
- 16a. Leaf blade dimorphic, large one 1.5–2.5 × 0.8–1.5 cm, small one 1–1.5 × 0.3–0.6 cm, all thickly leathery, margin revolute; calyx and ovary tomentose 8. *S. lijiangensis*
- 16b. Leaf blade uniform, 1–1.5 × 0.7–1 cm, thinly leathery, margin explanate; calyx puberulous; ovary glabrous 9. *S. yilini*
- 14b. Leaf blade larger than 3 × 1 cm, often ferruginous or canescent tomentose, hairs deciduous or not.
- 17a. Leaf blade oblong, ovate-oblong, or ovate, apex acute, adaxially distinctly rugose 10. *S. rugosa*
- 17b. Leaf blade lanceolate, lanceolate-oblong, or lanceolate-elliptic, apex acuminate or long acuminate, adaxially not rugose.
- 18a. Leaves abaxially incanous or ferruginous tomentose, lateral veins 7–9 pairs; branchlets and petioles incanous or ferruginous tomentose 11. *S. omeiensis*
- 18b. Leaves abaxially ferruginous tomentose, hairs later partly or wholly deciduous, lateral veins 5 or 6 pairs; branchlets and petioles ferruginous pubescent 12. *S. laxiflora*

1. *Sageretia horrida* Pax & K. Hoffmann, Repert. Spec. Nov. Regni Veg. Beih. 12: 436. 1922.

凹叶雀梅藤 ao ye que mei teng

Shrubs erect, ca. 3 m tall. Branchlets short, with red-brown spines, sparsely pubescent when young, glabrous when old. Leaves alternate or subopposite, or fascicled at base of inflorescence; petiole 1–2 mm, sparsely puberulent; leaf blade obovate or oblong, 0.5–2(–2.5) × 0.4–1.4 cm, papery, both surfaces glabrous or sparsely pubescent when young, adaxially shiny, lateral veins 3 or 4 pairs, prominent abaxially, base rounded, rarely cuneate, margin entire or serrulate, apex rounded, often emarginate. Flowers sessile, yellow-green, in spikes, or rarely in spicate panicles; rachis sparsely puberulent, inserted at middle or lower part of spinescent branches or at leaf axil on

short shoots. Calyx glabrous; sepals triangular-ovate, apex acute. Petals shorter than or equaling stamens, apically 2-lobed or entire. Ovary globose, 3-loculed, with 1 ovule per locule; style stout; stigma capitate, 3-fid or cleft. Drupe black-purple when mature, subglobose. Fl. Jun–Sep, fr. Apr–Jun of following year.

• Forest margins on mountains and stony slopes; 1900–3600 m. W Sichuan, E Xizang, NW Yunnan.

This species is quite similar to *Sageretia pycnophylla*, but the latter has leaves leathery, often distichously arranged, with apex acute or obtuse, and inflorescences inserted at the ends of branchlets, ca. 9 cm. It is also distinguished from *S. paucicostata*, which has leaves larger than 2.5 cm, margins hooked serrulate, lateral veins 2 or 3 pairs, and petioles more than 4 mm.

2. *Sageretia pycnophylla* C. K. Schneider in Sargent, Pl. Wilson. 2: 226. 1914.

对节刺 dui jie ci

Sageretia perpusilla C. K. Schneider.

Shrubs evergreen, erect, ca. 2 m tall, spinescent. Branchlets opposite or subopposite, red-brown or black-brown, puberulent. Leaves alternate or subopposite, often distichously arranged; stipules lanceolate-subulate, minute, caducous; petiole 1–2 mm, puberulent; leaf blade adaxially yellow-green when dry, oblong or ovate-elliptic, 5–20 × 3–11 mm, leathery, both surfaces glabrous, lateral veins 4 or 5 pairs, reticulate veins inconspicuous, base subrounded, margin serrulate or entire, apex rounded, rarely acute, often mucronate. Flowers white, small, sessile, glabrous, in terminal spikes or spicate panicles; rachis ± densely puberulent, ca. 9 cm. Sepals triangular-ovate, adaxially medially keeled and hooded, apex acute. Petals spatulate or obovate-lanceolate, shorter than sepals, apex deeply emarginate. Stamens slightly longer than or equaling petals. Ovary glabrous, 3-loculed, with 1 ovule per locule; styles short, thick; stigma capitate, 3-divided. Drupe black-purple at maturity, nearly globose, 4–5.5 mm in diam., with 2 or 3 indehiscent pyrenes. Seeds yellowish, apically slightly emarginate. Fl. Jul–Oct, fr. May–Jun of following year.

• Sparse forests, thickets, open slopes; 700–2800 m. S Gansu, Shaanxi, SW and W Sichuan.

Schneider published the name *Sageretia perpusilla* based on a gathering from the Mao District in Sichuan with very small leaves (5–8 mm) compared to *S. pycnophylla*. We checked the type specimen of *S. perpusilla* and found obvious variation in the shape and size of the leaves. We therefore reduce it to synonymy under *S. pycnophylla*.

3. *Sageretia paucicostata* Maximowicz, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 101. 1890.

少脉雀梅藤 shao mai que mei teng

Sageretia tibetica Pax & K. Hoffmann.

Shrubs or rarely small trees, erect, to 6 m tall. Young branches yellow tomentose, glabrescent; branchlets opposite or subopposite, spinescent. Leaves alternate or subopposite; petiole 4–6 mm, rarely longer, puberulent; leaf blade abaxially yellow-green, adaxially deep green, elliptic or obovate-elliptic, 2.5–4.5 × 1.4–2.5 cm, papery, both surfaces glabrous, lateral veins 2 or 3(or 4) pairs, major veins ± prominent abaxially, impressed adaxially, base cuneate or subrounded, margin serrulate, with hooklike recurved teeth, apex obtuse or rounded, rarely acute, slightly emarginate. Flowers sessile or subsessile, glabrous, solitary or 2- or 3-fascicled in lax spikes or spicate panicles, often inserted at ends of lateral branches or in axils of upper leaves; rachis glabrous. Sepals triangular, fleshy, apex acute. Petals spatulate, shorter than sepals, apex slightly emarginate. Stamens longer than petals; anthers globose. Ovary compressed-globose, immersed in disk, 3-loculed, with 1 ovule per locule; style short, thick; stigma large, 3-fid. Drupe black or black-purple when mature, obovoid-globose or globose, 5–8 mm in diam., with 3 pyrenes. Seeds compressed, emarginate at both ends. Fl. May–Sep, fr. Jul–Oct.

• Sparse forests on slopes or in valleys, thickets. Gansu, Hebei, Henan, Shaanxi, Shanxi, Sichuan, E Xizang, Yunnan.

Previous authors identified this as *Sageretia pycnophylla* in error; this species has large, not shiny leaves, 2 or 3 pairs of lateral veins, and longer petioles.

4. *Sageretia lucida* Merrill, Lingnan Sci. J. 7: 314. 1931.

亮叶雀梅藤 liang ye que mei teng

Shrubs scandent, unarmed or with spines. Leaves alternate or subopposite; petiole 8–12 mm, glabrous; leaf blade adaxially shiny, ovate-oblong or elliptic, 6–12 × 2.5–4 cm, thinly leathery, or leaves on flowering branches smaller, 3.5–5 × 1.8–2.5 cm, abaxially barbate at vein axils, adaxially glabrous, lateral veins 5 or 6(or 7) pairs, prominent abaxially, inconspicuous adaxially, base rounded, often asymmetrical, margin crenate, shallowly serrate, apex obtuse, acuminate, or shortly acuminate, rarely acute. Flowers sessile or subsessile, glabrous, usually in short axillary spikes, or rarely in spicate panicles on lower branches; rachis 2–3 cm, glabrous, often with brownish, ovate-triangular bracteoles. Sepals triangular-ovate, 1.3–1.5 mm, adaxially slightly keeled, apex acute. Petals clawed, shorter than sepals. Stamens ca. as long as petals. Drupe red when mature, elliptic-ovoid, large, 1–1.2 cm, 5–7 mm in diam., apex obtuse or mucronulate. Fl. Apr–Jul, fr. Nov–Dec.

Sparse forests in valleys; 300–800 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Yunnan, Zhejiang [India, Indonesia, Nepal, Sri Lanka, Vietnam].

This species is very similar to, and often confused with, *Sageretia hamosa*. The latter species differs in having larger leaves, with 7–10 pairs of lateral veins, and large inflorescences, with hairy rachises to 15 cm.

Sageretia lucida has been included by some authors in the synonymy of *S. henryi*. However, we found that specimens of *S. lucida* differ from *S. henryi* in having sessile flowers, barbate vein axils on the abaxial leaf surface, and drupes maturing within the current year.

5. *Sageretia gracilis* J. R. Drummond & Sprague, Bull. Misc. Inform. Kew 1908: 15. 1908.

纤细雀梅藤 xian xi que mei teng

Sageretia apiculata C. K. Schneider; *S. compacta* J. R. Drummond & Sprague.

Shrubs, erect or scandent, spinescent. Leaves alternate or subopposite; stipules subulate, 1–2 mm; petiole 5–14 mm, glabrous or sparsely puberulent; leaf blade abaxially pale green, adaxially slightly shiny and dark green or pale brown when dry, ovate, ovate-elliptic, or lanceolate, 4–11 × 1.5–4 cm, papery or nearly leathery, both surfaces glabrous, or young leaves sparsely tomentose, lateral veins 5–7 pairs, ± prominent abaxially, slightly impressed adaxially, base subrounded or cuneate, margin serrulate, apex acuminate or acute, rarely obtuse, often mucronulate. Flowers yellow-green, sessile, glabrous, usually 1–5-fascicled, lax or crowded, in more than 20 cm terminal or axillary spicate panicles; rachis glabrous or sparsely puberulent. Sepals triangular or triangular-ovate, 1.3–1.5 mm, adaxially keeled and hooded. Petals white, spatulate, ca. 0.8 mm, shorter than stamens, apex emarginate. Stamens shorter than sepals;

anthers acute, mucronulate. Disk thick, fleshy, surrounding ovary. Ovary 2- or 3-loculed, with 1 ovule per locule; style short, stout; stigma entire. Drupe red when mature, obovoid-globose, 6–7 mm in diam. Seeds obliquely cordate, 5–6 mm. Fl. Jul–Oct, fr. Feb–May of following year.

• Forests or thickets in valleys and on mountains; 1200–3400 m. W Guangxi, E and SE Xizang, Yunnan.

Together with *Sageretia gracilis*, *S. compacta* was described by Drummond and Sprague (Bull. Misc. Inform. Kew 1908: 15. 1908), based on specimens from Kunming, Yunnan, and was said to differ in having narrowly lanceolate leaves; inflorescences short, densely paniculate, with flowers crowded at the ends; and stamens equaling the petals. We checked specimens from this area, and except for the flowers being sometimes crowded at the ends, there were no other distinct differences.

6. *Sageretia camelliifolia* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 73. 1979 [*“camelliifolia”*].

茶叶雀梅藤 cha ye que mei teng

Shrubs erect, ca. 4 m tall, unarmed. Branchlets gray-brown, glabrous, longitudinally striate. Stipules subulate, caducous; petiole 5–7 mm, glabrous; leaf blade abaxially yellow-green, adaxially shiny, green, brown when dry, oblong or ovate-elliptic, rarely oblong-lanceolate, 5–7 × 2.5–3 cm, leathery, adaxially glabrous, lateral veins 6–8 pairs, midvein and lateral veins prominent abaxially, impressed adaxially, base subrounded, margin often revolute, serrulate, apex obtuse or rounded, rarely acute, emarginate. Flowers sessile, glabrous, usually 1–4-fascicled in axillary or terminal lax spikes, or lower part branched spicate-paniculate; rachis 4–9 cm, glabrous. Sepals ovate-triangular, ca. 1.3 mm, adaxially keeled and hooded, apex slightly acute. Petals spatulate, shorter than sepals, apex emarginate. Stamens slightly longer than petals; anthers acute. Style short, thick; stigma short, entire. Drupe obovoid-globose, 5–6 mm, ca. 4 mm in diam., with 3 pyrenes. Seeds brown, flat. Fl. Aug, fr. Oct–Nov.

• Sparse forests or thickets on top of limestone hills. W Guangxi.

7. *Sageretia brandrethiana* Aitchison, J. Linn. Soc., Bot. 8: 62. 1865.

窄叶雀梅藤 zhai ye que mei teng

Shrubs, spinescent. Branchlets opposite or subopposite, gray-brown, glabrous or sparsely pubescent, often terminating in a spine. Leaves alternate; petiole 1.5–2.5 mm, densely white tomentose; leaf blade adaxially light green, elliptic, lanceolate, or ovate-oblong, small, narrow, 1–2 cm × 5–8 mm, stiffly papery, abaxially densely and persistently gray-white tomentose, adaxially glabrous or sparsely white pubescent, lateral veins 4–6 pairs, midvein prominent abaxially, inconspicuous adaxially, base obtuse, margin serrulate, apex obtuse or acute, rarely rounded, often long mucronulate. Flowers yellow-green, sessile, gray-white pubescent, usually in terminal and axillary spicate panicles; rachis 1–2 cm, densely gray-white pubescent. Sepals triangular, without apical rostellum. Petals white, spatulate, shorter than sepals. Drupe black when mature, obovoid-globose, small, 3-lobed; mesocarp fleshy and sweet. Fl. Nov, fr. May of following year.

Along rivers; low elevations. NW Yunnan [Afghanistan, NW India, Pakistan; SW Asia (Iran)].

The fleshy, sweet-tasting fruits are eaten in Afghanistan.

8. *Sageretia lijiangensis* G. S. Fan & S. K. Chen, Acta Bot. Yunnan. 19: 38. 1997.

丽江雀梅藤 li jiang que mei teng

Shrubs spinescent. Branchlets opposite or subopposite, brownish, densely tomentose, apex spinescent. Leaves alternate or subopposite, dimorphic; petiole 2–3 mm, whitish tomentose; leaf blade thickly leathery, lateral veins 3 or 4 pairs, slightly impressed adaxially, margin slightly revolute; large leaves elliptic, 1.5–2.5 × 0.8–1.5 cm, abaxially tomentose, adaxially glabrous, margin sparsely dentate, apex rounded-obtuse or shortly acuminate; small leaves 1–1.5 cm × 3–6 mm, abaxially persistently densely tomentose, adaxially shiny, base cuneate, apex obtuse or acuminate. Flowers sessile, in spikes; rachis 2–7 cm. Calyx tomentose. Ovary tomentose. Fruit unknown. Fl. Jun, fr. unknown.

• Forests; 2000–3000 m. NW Yunnan (Lijiang).

Material of this species was not seen by the second author.

9. *Sageretia yilini* G. S. Fan & S. K. Chen, Acta Bot. Yunnan. 19: 38. 1997.

脱毛雀梅藤 tuo mao que mei teng

Shrubs unarmed. Branchlets subopposite or alternate, densely whitish tomentose. Petiole 2–3 mm, whitish tomentose; leaf blade elliptic, 1–1.5 × 0.7–1 cm, thinly leathery, abaxially densely whitish tomentose, glabrescent when old, adaxially sparsely tomentose, glabrescent, lateral veins 3 or 4 pairs, prominent abaxially, slightly impressed adaxially, base rounded, margin densely crenulate explanate (not revolute), apex shortly acuminate. Flowers sessile, in spikes or 2- or 3-fascicled at leaf axils; rachis 1–3 cm, densely whitish tomentose. Calyx sparsely puberulent. Stamens ca. as long as petals. Ovary glabrous. Fruit unknown. Fl. Jun, fr. unknown.

• Forests; 2000–3000 m. NW Yunnan.

Material of this species was not seen by the second author.

10. *Sageretia rugosa* Hance, J. Bot. 16: 9. 1878.

皱叶雀梅藤 zhou ye que mei teng

Quercus dunniana H. Léveillé; *Sageretia ferruginea* Oliver.

Shrubs unarmed, scandent or erect, ca. 4 m tall. Juvenile branches and branchlets ferruginous tomentose or densely puberulent; lateral branches sometimes becoming hooklike. Leaves alternate or subopposite; petiole 3–8 mm, densely puberulent; leaf blade ovate-oblong or ovate, rarely obovate-oblong, 3–8(–11) × 2–5 cm, papery or thickly papery, often rugose when dry, abaxially persistently ferruginous or castaneous-tomentose, rarely glabrescent, adaxially whitish tomentose, glabrescent, lateral veins 6–8 pairs, lateral veins and higher vein orders prominent abaxially, distinctly impressed adaxially, base subrounded, rarely subcordate, margin serrulate,

apex acute or shortly acuminate, rarely rounded. Flowers sessile, fragrant, 2-bracteate with lanceolate bracts, usually in terminal or axillary spikes or spicate panicles; rachis densely puberulent or tomentose. Calyx pubescent; sepals triangular, hooded, apex acute. Petals spatulate, shorter than sepals, apex 2-lobed, involute. Stamens equaling or longer than petals. Ovary immersed in disk, 2-loculed, with 1 ovule per locule; style short; stigma capitate, entire. Drupe red or purple-red at maturity, globose, with 2 pyrenes. Seeds flat, both ends emarginate, slightly asymmetrical. Fl. Jul–Dec, fr. Mar–Apr of following year.

• Forests and thickets on slopes; ca. 1600 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

This species is very similar to and easily confused with *Sageretia omeiensis*. The latter differs in having longer, lanceolate or ovate-elliptic leaves, with apex long acuminate, petioles longer, inconspicuously rugose, and a large spicate-paniculate inflorescence.

11. *Sageretia omeiensis* C. K. Schneider, Pl. Wilson. 2: 230. 1914.

峨眉雀梅藤 e mei que mei teng

Shrubs scandent, unarmed. Branchlets gray-brown, canescent or ferruginous tomentose. Leaves subopposite or alternate; petiole 7–11 mm, canescent or ferruginous tomentose; leaf blade adaxially green, ovate-oblong or ovate-elliptic, rarely lanceolate-oblong, 7.5–11 × 3–5 cm, papery, abaxially canescent or ferruginous tomentose, adaxially glabrous, lateral veins 7–9 pairs, prominent abaxially, impressed adaxially, base rounded, margin serrulate, apex long acuminate or acuminate. Flowers sessile, fetid, glabrous or sparsely pubescent, 1- to few fascicled in terminal paniculate spikes; rachis canescent or ferruginous tomentose, ca. 16 cm, 2-bracteate. Sepals triangular, sparsely puberulent or glabrous. Petals spatulate, shorter than sepals, apex emarginate. Ovary immersed in disk, 2-loculed, with 1 ovule per locule; style short; stigma capitate, undivided. Drupe black-purple when mature, obovoid-oblong, with 2 pyrenes. Seeds flat, ca. 5 mm, both ends emarginate, slightly asymmetric. Fl. Jul–Sep, fr. Apr–May.

• Mountain forests. Chongqing (Nanchuan), Sichuan (Emei Shan).

12. *Sageretia laxiflora* Handel-Mazzetti, Sinensia 3: 191. 1933.

疏花雀梅藤 shu hua que mei teng

Shrubs scandent or erect, to 10 m tall, armed. Branchlets white or yellow tomentose, or puberulent; old branches glabrescent, conspicuously longitudinally striate, with stout spines. Leaves subopposite or alternate; stipules subulate, small, caducous; petiole 6–10 mm, adaxially canaliculate, puberulent or glabrescent; leaf blade adaxially shiny, green, brown when dry, lanceolate, ovate-lanceolate, or ovate-elliptic, 5–8 × 2–3 cm, abaxially ferruginous tomentose, hairs partly or completely deciduous later, adaxially glabrous or arachnoid-lanate, lateral veins 5 or 6(–8) pairs, conspicuously prominent abaxially, impressed adaxially, base subcordate, margin serrulate or subentire, apex obtuse or shortly acuminate. Flowers sessile, glabrous, 1- to few fascicled in lax paniculate spikes; rachis 8–15 cm, yellow-white or ferruginous puberulent; bracts triangular or fibrous. Sepals triangular. Petals obovate, shorter than sepals.

Ovary 3-loculed, with 1 ovule per locule. Drupe red when mature, obovoid-globose, with 2 or 3 pyrenes. Seeds flat. Fl. Sep–Dec, fr. Mar–Apr of following year.

• Thickets on slopes, grasslands; below 700 m. W Guangxi, S Guizhou.

This species differs from *Sageretia gracilis* in having leaves leathery, abaxially ferruginous tomentose with base subcordate, and rachis yellow-white puberulent.

13. *Sageretia thea* (Osbeck) M. C. Johnston, J. Arnold Arbor. 49: 378. 1968.

雀梅藤 que mei teng

Shrubs scandent or erect, to 3 m tall, armed. Branchlets slender, alternate or subopposite, brownish, terminating in a spine, finely tomentose when young. Leaves opposite at basal nodes to alternate; petiole 2–7 mm, puberulent; leaf blade abaxially pale green, adaxially green, usually elliptic, oblong, or ovate-elliptic, rarely ovate or nearly orbicular, 2–4.5 × 0.7–2.5 cm, papery, abaxially glabrous or pubescent on veins, sometimes tomentose and glabrescent, adaxially glabrous, lateral veins 3–5(–7) pairs, conspicuously prominent abaxially, base rounded or subcordate, margin serrulate, apex acute, obtuse, or rounded. Flowers yellow, sessile, fragrant, usually 2- to few fascicled in terminal or axillary lax spikes or paniculate spikes; rachis 2–5 cm, sparsely puberulent. Calyx tube sparsely pubescent, shallowly cup-shaped; sepals triangular, ca. 1 mm. Petals spatulate, shorter than sepals, apex 2-fid, often reflexed. Disk fleshy, glabrous, distinctly thickened around ovary. Ovary 3-loculed, with 1 ovule per locule; style very short; stigma 3-fid. Drupe black or purple-black at maturity, subglobose to obovoid, ca. 5 mm in diam., with 1–3 pyrenes; mesocarp fleshy, sour-tasting. Seeds flat, emarginate at both ends. Fl. Jul–Sep, fr. Mar–May of following year.

Mountain forests, thickets, hills; below 2100 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Thailand, Vietnam].

- 1a. Petiole 1–2 mm, leaf blade cordate or ovate-orbicular 13b. var. *cordiformis*
 1b. Petiole 2–7 mm, leaf blade elliptic or ovate-elliptic to oblong or ovate.
 2a. Leaf blade abaxially glabrous or pubescent on veins 13a. var. *thea*
 2b. Leaf blade abaxially tomentose, glabrescent 13c. var. *tomentosa*

13a. *Sageretia thea* var. *thea*

雀梅藤(原变种) que mei teng (yuan bian zhong)

Rhamnus thea Osbeck, Dagb. Ostind. Resa, 232. 1757; *Ampelopsis chinensis* Rafinesque, nom. illeg. superfl.; *Berchemia chanetii* H. Léveillé; *R. theezans* Linnaeus, nom. illeg. superfl.; *Sageretia chanetii* (H. Léveillé) C. K. Schneider; *S. taiwaniana* Hosokawa ex Masamune; *S. thea* var. *bilocularis* S. Y. Liu; *S. theezans* Brongniart, nom. illeg. superfl.

Petiole 2–7 mm; leaf blade usually elliptic, oblong, or ovate-elliptic, abaxially glabrous or pubescent on veins, base rounded or subcordate.

Mountain forests, thickets, hills; below 2100 m. Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Vietnam].

13b. *Sageretia thea* var. *cordiformis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 74. 1979.

心叶雀梅藤 xin ye que mei teng

Petiole 1–2 mm; leaf blade cordate or ovate-orbicular, 1–3 × 1–2 cm, base cordate or subcordate.

Thickets on slopes; ca. 700 m. S Yunnan (Mengla) [Thailand].

13c. *Sageretia thea* var. *tomentosa* (C. K. Schneider) Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 75. 1979.

毛叶雀梅藤 mao ye que mei teng

Sageretia theezans var. *tomentosa* C. K. Schneider in Sargent, Pl. Wilson. 2: 228. 1914.

Leaf blade usually ovate, oblong, or ovate-elliptic, abaxially tomentose, glabrescent.

Anhui, Fujian, Gansu, Guangdong, Guangxi, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan [Korea, Thailand].

14. *Sageretia hamosa* (Wallich) Brongniart, Mém. Fam. Rhamnées, 53. 1826.

钩枝雀梅藤 gou zhi que mei teng

Shrubs evergreen, scandent, armed. Branchlets grayish brown or dark brown, with incurved, hooklike stout spines, glabrous or puberulent at base only, sometimes yellow-brown pubescent. Leaves alternate or subopposite; petiole 8–15(–17) mm, glabrous, sometimes yellow-brown pubescent; leaf blade adaxially shiny, oblong or narrowly elliptic, rarely ovate-elliptic, 9–15(–20) × 4–6(–7) cm, leathery, abaxially barbate at vein axils or sparsely pubescent, glabrescent, adaxially glabrous, lateral veins 7–10 pairs, prominent abaxially, impressed adaxially, base rounded or subrounded, margin serrulate, apex caudate-acuminate, acuminate, or shortly acuminate. Flowers sessile, glabrous, usually 2- or 3-fascicled in lax terminal or axillary spicate panicles; rachis ca. 15 cm, brown or canescent tomentose or densely puberulent; bracts ovate, small, sparsely puberulent. Ovary 2-loculed, with 1 ovule per locule; style short; stigma capitate. Drupe subsessile, deep red or purple-black at maturity, subglobose, 7–10 × 5–7 mm, with 2 pyrenes, often white powdery. Seeds brown, flat, ca. 6 mm, emarginate at both ends, asymmetrical. Fl. Jul–Aug, fr. Aug–Oct.

Forests or thickets on slopes, dense forests along canals; below 1600 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, SE Xizang, S Yunnan, Zhejiang [India, Nepal, Philippines, Sri Lanka, Vietnam].

Because this species is quite similar to *Sageretia lucida*, previous authors have misidentified it as the latter; however, the latter differs in having smaller leaves, with lateral veins 5 or 6 pairs, adaxially not impressed, and rachis glabrous.

- 1a. Branchlets glabrous or puberulent at base only; leaf petioles glabrous 14a. var. *hamosa*
 1b. Branchlets and leaf petioles yellow-brown pubescent 14b. var. *trichoclada*

14a. *Sageretia hamosa* var. *hamosa*

钩枝雀梅藤(原变种) gou zhi que mei teng (yuan bian zhong)

Ziziphus hamosa Wallich in Roxburgh, Fl. Ind. 2: 369. 1824; *Rhamnus affinis* Blume; *Sageretia affinis* (Blume) G. Don; *S. costata* Miquel, nom. illeg. superfl.

Branchlets glabrous or puberulent at base only. Leaf petioles glabrous.

Forests or thickets on slopes; below 1600 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, SE Xizang (Zayü), Zhejiang [India, Indonesia, Nepal, Philippines, Sri Lanka, Vietnam].

14b. *Sageretia hamosa* var. *trichoclada* C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 75. 1979.

毛枝雀梅藤 mao zhi que mei teng

Branchlets, petioles, and inflorescence rachises yellow-brown pubescent. Inflorescences paniculate-spicate, ca. 23 cm.

- Dense forests along canals. S Yunnan (Malipo, Mengla).

15. *Sageretia randaiensis* Hayata, Icon. Pl. Formosan. 5: 29. 1915.

峦大雀梅藤 luan da que mei teng

Shrubs small. Branchlets dark brown, slender, sparsely yellow brown hairy or subglabrous; old branches often opposite to branchlets, with hooklike, deflexed spines. Leaves alternate; stipules lanceolate, caducous; petiole 5–13 mm, strongly canaliculate, sparsely puberulent; leaf blade abaxially dark green, adaxially pale green, oblong or ovate-oblong, 8–13 × 3.5–6 cm, papery, abaxially glabrous, adaxially barbellate at vein axils or pubescent on veins when young, gradually glabrescent, lateral veins 8–10 pairs, raised abaxially, slightly impressed adaxially, base rounded, margin minutely serrulate, apex acuminate or long acuminate. Flowers sessile, glabrous, solitary or 2- or 3-fascicled in terminal or axillary, spicate panicles; rachis ca. 10 cm, brownish tomentose; bracts ovate-triangular, puberulent or glabrous. Sepals triangular, ca. 1.5 mm. Petals spatulate, small, ca. 0.7 mm. Stamens longer than petals; anthers ovoid-oblong, apex acute. Ovary 2-loculed, with 1 ovule per locule; style short, 2-lobed. Fruit unknown. Fl. Aug.

- Mountains. C and N Taiwan.

This is a rare species.

16. *Sageretia melliana* Handel-Mazzetti, Beih. Bot. Centralbl. 52, Abt. B [Pl. Melliana Sin. 2]: 168. 1934.

刺藤子 ci teng zi

Shrubs evergreen, scandent, spinescent. Branchlets terete, brown-yellow puberulent. Leaves generally opposite; petiole 4–8 mm, strongly canaliculate, puberulent or glabrous; leaf blade abaxially shiny, green, brown when dry, ovate-elliptic, rarely ovate, 5–10 × 2–3.5 cm, leathery, both surfaces glabrous, lateral veins 5–7(or 8) pairs, curved near margins, conspicuously impressed abaxially, raised adaxially, base subrounded, slightly asymmetrical, margin minutely serrulate, apex acuminate, rarely acute. Flowers white, sessile, glabrous, solitary or few fascicled in terminal or rarely axillary spikes or paniculate spikes;

rachis 4–17 cm, yellow or yellow-white puberulent or tomentulose; bracts lanceolate or fibrous, 2–4 mm. Sepals triangular, cuspidate. Petals narrowly obovate, ca. 1/2 as long as sepals. Anthers acute. Ovary 2- or 3-loculed, with 1 ovule per locule; style short, 2- or 3-lobed. Drupe reddish. Fl. Nov–Sep, fr. Apr–May of following year.

• Forests, forest margins; below 1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, SE Yunnan (Xichou), Zhejiang.

17. *Sageretia subcaudata* C. K. Schneider in Sargent, Pl. Wilson. 2: 228. 1914.

尾叶雀梅藤 wei ye que mei teng

Shrubs scandent or erect, ca. 1.5 m tall. Branchlets dark brown, glabrous or sparsely puberulent. Leaves subopposite or alternate; stipules fibrous, ca. 6 mm; petiole 5–11 mm, canaliculate, densely or sparsely pubescent; leaf blade abaxially green, ovate, ovate-elliptic, or oblong, 4–10(–13) × 2–4.5 cm, papery or thinly leathery, abaxially glabrous, adaxially pubescent at first, gradually glabrescent or veins sparsely pubescent, lateral veins (6 or) 7–10 pairs, veins conspicuously impressed abaxially, raised adaxially, conspicuously reticulate, base cordate or subrounded, margin shallowly serrate, apex caudate-acuminate or long acuminate, rarely acute. Flower yellow-white or white, sessile, usually 2- or 3-fascicled in terminal or axillary spicate panicles; rachis 3–6 mm, yellow tomentulose; bracts triangular-subulate, ca. 1 mm, glabrous. Calyx sparsely puberulent; sepals triangular, apex acute. Petals obovate, shorter than sepals, apex emarginate. Stamens equaling petals. Ovary 2-loculed, with 1 ovule per locule; style short, 2-lobed. Drupe black at maturity, globose, 2-loculed. Seeds yellow, broadly obovoid, flat. Fl. Jul–Nov, fr. Apr–May of following year.

• Mountain forests, thickets; 200–2000 m. N Guangdong, Guizhou, W Henan, Hubei, Hunan, Jiangxi, S Shaanxi, E Sichuan, Xizang, Yunnan.

18. *Sageretia henryi* J. R. Drummond & Sprague, Bull. Misc. Inform. Kew 1908: 14. 1908.

梗花雀梅藤 geng hua que mei teng

Berchemia cavaleriei H. Léveillé; *Sageretia cavaleriei* (H. Léveillé) C. K. Schneider.

Shrubs scandent, rarely small trees, ca. 2.5 m tall, unarmed or spinose; branchlets red-brown, glabrous; old branches gray-black. Leaves alternate or subopposite; stipules subulate, 1–1.5 mm; petiole 5–13 mm, glabrous; leaf blade brownish on both sides when dry, oblong, narrowly elliptic, or ovate-elliptic, 5–12 × 2.5–5 cm, papery, both surfaces glabrous, lateral veins 5 or 6(or 7) pairs, prominent abaxially, slightly impressed adaxially, base rounded or broadly cuneate, margin minutely serrulate, apex caudate-acuminate, rarely acute. Flowers white or yellow, solitary or few fascicled in axillary or terminal lax racemes; rachis to 15 cm, glabrous. Pedicels 1–3 mm. Calyx tube shallowly cup-shaped; lobes triangular, adaxially distinctly keeled and with minute apical beak, apex acute. Petals spatulate, slightly shorter than stamens, apex emarginate. Ovary 3-loculed, with 1 ovule per locule. Drupe purple-red at maturity, elliptic or obovoid-globose, 5–6 mm, 4–5 mm in diam., 2- or 3-loculed; fruiting pedicel 1–4 mm. Seeds 2, flat, both ends emarginate. Fl. Jul–Nov, fr. Mar–Jun of following year.

• Dense forests, mountain thickets; 400–2500 m. Gansu, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, S Zhejiang.

The fruit is used medicinally for heart and stomach diseases.

19. *Sageretia pedicellata* C. Z. Gao, Guihaia 3: 313. 1983.

南丹雀梅藤 nan dan que mei teng

Shrubs scandent, spinose. Branchlets gray, longitudinally striate; branches subopposite, densely brownish puberulent. Leaves alternate or subopposite; petiole 2–3 mm, brownish puberulent; leaf blade adaxially shiny, brown when dry, obovate or oblong, rarely subrounded, 0.8–2 × 0.7–1.2 cm, thickly leathery, midvein puberulent adaxially, lateral veins usually 4 pairs, slightly impressed abaxially, raised adaxially, base broadly cuneate or rounded, rarely slightly cordate, margin reflexed, minutely serrulate, apex acute, obtuse, or rounded. Flowers yellow-white, small, solitary or 2(or 3)-fascicled in terminal or axillary racemes; rachis 2–5.5 cm, gray puberulent; bracteoles ovate. Pedicels 1–1.5 mm. Sepals triangular or ovate-triangular, ca. 1 mm, apex acute. Petals spatulate, shorter than sepals, apex emarginate. Stamens slightly longer than petals. Ovary globose, 3-loculed, with 1 ovule per locule; style short, stout; stigma capitate, inconspicuously 3-fid. Fl. Sep, fr. unknown.

• NW Guangxi (Nandan).

8. RHAMNUS Linnaeus, Sp. Pl. 1: 193. 1753.

鼠李属 shu li shu

Shrubs or small to medium-sized trees, deciduous or rarely evergreen, often spinose. Branches opposite or alternate, unarmed or terminating in a woody spine; winter buds naked (*R.* subg. *Frangula*) or with scales (*R.* subg. *Rhamnus*). Leaves opposite or alternate, rarely fasciculate on short shoots; stipules mainly subulate, caducous, rarely persistent; leaf blade always undivided, pinnately veined, margin serrate or rarely entire. Flowers mostly yellowish green, small, bisexual or unisexual, rarely polygamous, solitary or few fascicled in axillary cymes, cymose racemes, or cymose panicles. Calyx tube campanulate to cup-shaped; sepals 4 or 5, ovate-triangular, adaxially ± distinctly keeled. Petals 4 or 5, rarely absent, shorter than sepals, cucullate to hooded, often enfolding stamens, base shortly clawed, apex often 2-fid. Stamens 4 or 5, surrounded by and equaling petals or shorter; anthers dorsifixed. Disk thin, adnate and lining calyx tube. Ovary superior, globose, free, 2–4-loculed; styles ± deeply 2–4-cleft. Fruit a 2–4-stoned, berrylike drupe, obovoid-globose or globose; stones indehiscent or ventrally dehiscent. Seeds obovoid or oblong-obovoid, unfurrowed or abaxially or laterally with a ± long, narrow to gaping, often distinctly margined furrow; endosperm fleshy.

About 150 species: temperate to tropical regions, mainly in E Asia and North America, a few species in Europe and Africa; 57 species (37 endemic) in China.

The fruit of most species contain yellow dye; the seeds contain rich protein and oils and are used for making lubricating oil, printing ink, and soap. The roots and leaves of a few species are used medicinally.

Rhamnus coriaceifolia H. Léveillé (Repert. Spec. Nov. Regni Veg. 12: 535. 1913, "*coriaceifolius*") was referred by Lauener (Notes Roy. Bot. Gard. Edinburgh 27: 279. 1967) to *Sideroxylon wightianum* Hooker & Arnott, the basionym of *Sinosideroxylon wightianum* (Hooker & Arnott) Aubréville in the Sapotaceae (see Fl. China 15: 212. 1996).

Rhamnus myrtillos H. Léveillé (Repert. Spec. Nov. Regni Veg. 12: 535. 1913) is a synonym of *Myrsine africana* Linnaeus in the Myrsinaceae (see Fl. China 15: 36. 1996).

Rhamnus pasteurii H. Léveillé (Monde Pl. 18: 31. 1916, "*pasteuri*") is a synonym of *Gardneria multiflora* Makino in the Loganiaceae (see Fl. China 15: 328. 1996).

The following species were described from China but could not be treated here because no material was seen by the authors:

Rhamnus calcicola Q. H. Chen (Acta Bot. Yunnan. 7: 413. 1985, "*calcicolus*"), described from Guizhou.

Rhamnus dalianensis S. Y. Li & Z. H. Ning (Bull. Bot. Res., Harbin 8(2): 95. 1988), described from Liaoning.

Rhamnus daliensis G. S. Fan & L. L. Deng (Sida 17: 680. 1997), described from Yunnan.

Rhamnus laoshanensis D. K. Zang (Bull. Bot. Res., Harbin 19: 371. 1999), described from Shandong.

Rhamnus mongolica Y. Z. Zhao & L. Q. Zhao (Novon 16: 158. 2006), described from Nei Mongol.

Rhamnus qianweiensis Z. Y. Zhu (Acta Bot. Boreal.-Occid. Sin. 6(2): 135. 1986), described from Sichuan.

Rhamnus serpyllifolia H. Léveillé (Repert. Spec. Nov. Regni Veg. 12: 282. 1913), described from Yunnan (not treated as a synonym by Lauener, Notes Roy. Bot. Gard. Edinburgh 27: 280. 1967).

Rhamnus viridifolia Liou (Ill. Fl. Lign. Pl. N.-E. China, 565. 1955), described from Liaoning.

- 1a. Winter buds naked, without scales, ferruginous or brown tomentulose; flowers always bisexual, 5-merous; seeds abaxially not furrowed 1. *R.* subg. *Frangula*
 1b. Winter buds with few scales; flowers unisexual and plants dioecious, rarely polygamous, 4-merous, rarely 5-merous; seeds with distinct abaxial or lateral furrow 2. *R.* subg. *Rhamnus*

1. *Rhamnus* subg. *Frangula* (Miller) S. F. Gray, Nat. Arr. Brit. Pl. 2: 621. 1821.

裸芽亚属 luoya ya shu

Frangula Miller, Gard. Dict. Abr., ed. 4. 1754.

Trees or shrubs, unarmed. Young branches hairy, glabrescent. Winter buds naked, without scales. Leaves alternate, entire or dentate. Flowers bisexual, 5-merous. Calyx tube cup-shaped; sepals 5, adaxially \pm distinctly keeled. Petals broadly obovate to obovate, base shortly clawed, apex \pm deeply emarginate. Stamens equaling petals or slightly longer. Disk thin, lining calyx tube. Ovary superior, globose, 2- or 3-loculed; style simple, with 2- or 3-lobed stigma. Berrylike drupe with 3 loosely adhering, ventrally dehiscent stones. Seeds lenticular, with cartilaginous beak, never furrowed abaxially.

About 50 species: mainly in North America, a few species in N Africa, E Asia, and Europe; five species (three endemic) in China.

- 1a. Leaves entire, broadly elliptic or oblong; flowers usually 2- to few fascicled at leaf axils, rarely solitary, peduncles absent; style simple 1. *R. frangula*
 1b. Leaves dentate or subentire; flowers few to 10 in cymes or subumbels on peduncles, often hairy; style lobed, rarely simple.
 2a. Leaves subentire or inconspicuously denticulate, abaxially incanous or yellow tomentose; style deeply 3-lobed to base 5. *R. henryi*
 2b. Leaves dentate, abaxially pubescent to glabrous; style 2- or 3-semilobed or simple.
 3a. Leaf blade obovate-elliptic or obovate, abaxially pubescent or tomentulose or at least densely pubescent on veins, petiole densely pubescent; style and stigma undivided 2. *R. crenata*
 3b. Leaf blade elliptic or oblong, abaxially glabrous or hirsute on veins, petiole glabrous or puberulent; style undivided, stigma 2- or 3-lobed.
 4a. Leaf blade 6–11 \times 2–4 cm, lateral veins 7–10 pairs, petiole 1.2–2.2 cm; peduncles 1.5–4 cm; stigma 2- or 3-lobed 3. *R. longipes*
 4b. Leaf blade 3–5 \times 1–1.8 cm, lateral veins 5 or 6 pairs, petiole 0.5–1.2 cm; peduncles 0.2–1 cm; stigma 2-lobed 4. *R. rhododendriphylla*

1. *Rhamnus frangula* Linnaeus, Sp. Pl. 1: 193. 1753.

Frangula alnus Miller.

欧鼠李 ou shu li

Shrubs or small trees, rarely to 7 m tall. Young branches

greenish, sparsely puberulent; older branches brownish, with distinct transversely oriented lenticels. Petiole 1–1.9 cm, puberulent, ± glabrescent; leaf blade abaxially pale green, adaxially green, broadly elliptic or oblong, rarely obovate, 4–11 × 2.5–6 cm, papery, abaxially sparsely puberulent on midvein, adaxially glabrous, lateral veins 6–10 pairs, prominent on both surfaces, base broadly cuneate or subrounded, margin entire, apex shortly acuminate or rounded, rarely acute. Flowers solitary or 2–4-fascicled at leaf axils, glabrous. Pedicels 5–10 mm. Sepals keeled and slightly rostrate adaxially. Petals orbicular, apex slightly emarginate. Disk thin, lining calyx tube. Ovary globose, 2- or 3-loculed; style undivided; stigma slightly 2- or 3-lobed. Drupe red, turning purple-black at maturity, 6–8 mm in diam., with 2 or 3 lenticular stones; fruiting pedicel 7–10 mm. Fl. Apr–Jul, fr. Jun–Sep. $2n = 20$.

Forest margins, riverbanks, lakesides. N Xinjiang (Manas) [Russia; N Africa, SW Asia, Europe].

The bark is used medicinally for stomach pain. The bark and young fruit contain dye. The timber is used for making charcoal and gunpowder.

2. *Rhamnus crenata* Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 146. 1845.

长叶冻绿 chang ye dong lü

Shrubs or small trees, deciduous, to 4 m tall. Young branchlets ferruginous tomentose; old branches reddish, glabrescent. Petiole 4–10(–12) mm, densely pubescent; leaf blade obovate-elliptic, elliptic, or obovate, rarely oblanceolate-elliptic or oblong, 4–14 × 2–5 cm, papery, abaxially pubescent or at least ± pubescent on veins, adaxially glabrous, lateral veins 7–12 pairs, base cuneate or obtuse, margin finely crenate, apex acuminate to caudate-acuminate, or shortly acute. Flowers bisexual, (4 or) 5-merous, few or up to 10 crowded in axillary cymes; peduncles 4–10(–15) mm, pubescent. Pedicels 2–4 mm, puberulent. Sepals triangular, equaling calyx tube, fleshy, abaxially sparsely puberulent. Petals obcordate, distinctly shorter than sepals, apex 2-lobed. Stamens equaling petals. Disk thin, outer margin inconspicuous. Ovary globose, glabrous, 3-loculed; style cylindrical, undivided; stigma 3-capitate. Drupe red, black, or purple-black at maturity, globose or obovoid-globose, 5.6–6 mm, 6–7 mm in diam.; fruiting pedicel 3–6 mm, glabrous or sparsely puberulent, with 3 one-seeded stones. Fl. May–Aug, fr. Aug–Oct.

Mountain forests or thickets; below 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, SW Zhejiang [Cambodia, Japan, Korea, Laos, Thailand, Vietnam].

The leaves of *Rhamnus crenata*, especially prior to fruiting, are quite similar to and often confused with those of *Rhamnella franguloides*, but the latter species differs in having stem and branches without tomentulose terminal buds, stipules persistent, peduncles glabrous, ovary 2-loculed, and style 2-fid.

The roots are poisonous. The roots and bark are often used as an insecticide. The roots and fruit contain yellow dye.

- 1a. Leaf blade abaxially pubescent or at least
veins densely pubescent 2a. var. *crenata*
1b. Leaf blade abaxially gray-white
tomentose 2b. var. *discolor*

2a. *Rhamnus crenata* var. *crenata*

长叶冻绿(原变种) chang ye dong lü (yuan bian zhong)

Celastrus esquirolianus H. Léveillé; *C. kouytchensis* H. Léveillé; *Frangula crenata* (Siebold & Zuccarini) Miquel; *F. crenata* var. *acuminatifolia* (Hayata) Hatusima; *Rhamnus acuminatifolia* Hayata; *R. cambodiana* Pierre ex Pitard; *R. crenata* var. *cambodiana* (Pierre ex Pitard) Tardieu; *R. crenata* var. *oreigenes* (Hance) Tardieu; *R. oreigenes* Hance; *R. pseudo-frangula* H. Léveillé.

Leaf blade abaxially pubescent or at least veins densely pubescent.

Mountain forests or thickets; below 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan [Cambodia, Japan, Korea, Laos, Thailand, Vietnam].

2b. *Rhamnus crenata* var. *discolor* Rehder, J. Arnold Arbor. 14: 347. 1933.

两色冻绿 liang se dong lü

Leaf blade elliptic or oblong, rarely ovate-elliptic, 6–12 × 2.5–4.5 cm, abaxially gray-white tomentose, lateral veins 8–12 pairs, margin crenate or obscurely serrate, apex acuminate or long acuminate.

• Mountain forests; 900–1200 m. SW Zhejiang (Longquan, Qingyuan).

3. *Rhamnus longipes* Merrill & Chun, Sunyatsenia 2: 272. 1935.

长柄鼠李 chang bing shu li

Frangula longipes (Merrill & Chun) Grubov.

Shrubs or small trees, erect, to 8 m tall. Young branches and branchlets purple-brown, glabrous or sparsely puberulent. Stipules linear-lanceolate, 4–5 mm, caducous; petiole 1.2–2.2 cm, hairy, glabrescent; leaf blade shiny, yellow-green when dry, elliptic or oblong-lanceolate, 6–11 × 2–4 cm, subleathery, both surfaces glabrous, rarely sparsely hirsute on veins, midvein stout, prominent abaxially, impressed adaxially, lateral veins 7–10 pairs, base cuneate or subrounded, margin revolute, remotely obtusely crenulate, apex acuminate. Flowers 2 to few, crowded on 1.5–4 cm peduncles in axillary cymes, glabrous or sparsely pubescent. Pedicels 3–4 mm, puberulent. Sepals triangular, ca. equal to calyx tube, apex slightly acute. Petals obcordate, ca. 1.5 mm, apex rounded. Stamens longer than petals. Ovary globose, 2- or 3-loculed; style ca. 1.2 mm, 2- or 3-semilobed. Drupe red-purple or black at maturity, globose or obovoid-globose, 6–8 mm in diam., with 2 or 3 one-seeded stones; fruiting pedicel 6–8 mm, sparsely pubescent. Seeds 2(or 3), ca. 4 mm. Fl. Jun–Aug, fr. Aug–Nov.

• Dense mountain forests; 500–1700 m. Guangdong, Guangxi, Hainan, SE Yunnan.

This species differs from *Rhamnus crenata* in having subleathery leaves, longer petioles, 1.5–4 cm peduncles, and a larger drupe.

The seeds are used for making soap.

4. *Rhamnus rhododendriphylla* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 75. 1979.

杜鹃叶鼠李 du juan ye shu li

Shrubs to 4 m tall. Branchlets purple-brown, longitudinally striate, sparsely puberulent, glabrescent; old branches black-brown, irregularly fissured, glabrous. Stipules linear-lanceolate, caducous; petiole 5–12 mm, stout, slightly puberulent; leaf blade oblong or oblong-elliptic, 3–5 × 1–1.8 cm, subleathery, both surfaces glabrous, or abaxially barbellate at vein axils, lateral veins 5 or 6 pairs, midvein and lateral veins prominent abaxially, ± impressed adaxially, base broadly cuneate or subrounded, margin often revolute, shallowly serrulate, apex obtuse, shortly acute, or acuminate. Flowers yellow-green, campanulate, usually 3–5, rarely to 8, in axillary cymes; peduncles short, 2–5(–10) mm, sparsely yellow-brown puberulent. Pedicels 3–4 mm; bracts linear-lanceolate. Sepals triangular, ca. 1.5 mm, puberulent, inconspicuously 3-veined. Petals elliptic-spatulate, ca. 1 mm, apex emarginate. Ovary subglobose, glabrous; styles shortly 2-lobed. Drupe (immature) subglobose, ca. 3 mm in diam., base with shallow dish-shaped calyx tube, with 2 one-seeded stones; fruiting pedicel 4–5 mm, puberulent. Fl. Jun., fr. unknown.

• Summits of limestone mountains. W Guangdong (Yangchun), Guangxi (Xiangxian).

Material of this species was not seen by the second author.

5. *Rhamnus henryi* C. K. Schneider in Sargent, Pl. Wilson. 2: 244. 1914.

毛叶鼠李 mao ye shu li

Frangula henryi (C. K. Schneider) Grubov.

Trees 3–10 m tall. Young branches puberulent, glabrescent; older branchlets sparsely pubescent, apex with ferruginous or brownish tomentose naked buds. Petiole 1.2–3.5 cm, puberulent; leaf blade adaxially dark green, shiny, narrowly elliptic or oblong-elliptic, 7–19 × 2.5–8 cm, papery, abaxially ± densely grayish to yellowish tomentose, adaxially glabrous or sparsely puberulent on midvein, lateral veins 9–13 pairs, prominent abaxially, slightly impressed adaxially, base cuneate, margin slightly revolute, subentire, or inconspicuously remotely denticulate, apex acuminate. Flowers few, in axillary cymes or cymose racemes, nearly sessile or with peduncles 2–12 mm, sparsely puberulent. Pedicels 3–6 mm, hairy. Sepals triangular, adaxially pubescent on midvein. Petals obcordate, apex deeply emarginate. Stamens longer than petals. Ovary globose, glabrous, rarely hairy, 3-loculed; style undivided, stigma 3-lobed. Drupe purple-black at maturity, obovoid-globose, ca. 5 mm, 5–7 mm in diam., apex emarginate, with 3 one-seeded stones; fruiting pedicel 7–11 mm, sparsely puberulent. Seeds brown, shiny, obovoid, ca. 3 mm. Fl. May–Aug, fr. Jul–Oct.

• Mixed forests, thickets; 1200–2800 m. Guangxi, Sichuan, Xizang, Yunnan.

This species is easy to distinguish by its large, abaxially gray-white or yellowish tomentose leaves, with usually entire margin and 9–13 pairs of lateral veins.

2. *Rhamnus* subg. *Rhamnus*

鼠李亚属 shu li ya shu

Shrubs or trees, usually spinescent, rarely unarmed, with terminal scaly buds and axillary buds. Leaves alternate, subopposite to opposite, or fascicled at short shoots. Flowers unisexual and plants dioecious, rarely polygamous, usually 4(or 5)-merous. Sepals adaxially with conspicuous or inconspicuous midvein. Petals spatulate, base shortly clawed, apex entire or 2-fid. Male flower with developed stamens; female flowers with rudimentary stamens. Disk thin, lining calyx tube. Ovary superior, globose, not immersed in disk, 2–4-loculed; style 2–4-cleft. Berrylike drupe subglobose or obovoid-globose, base with persistent calyx tube, with 2–4 one-seeded stones. Seeds with a ± long, narrow to gaping, often distinctly margined abaxial or lateral furrow.

About 150 species: mainly in E Asia, a few species in tropical Africa, Europe, and North America; 52 species (34 endemic) in China.

The Chinese species of *Rhamnus* subg. *Rhamnus* belong to *R.* sect. *Tetrarhamnus* Grubov, *R.* sect. *Pseudoceanothus* Grubov, and *R.* sect. *Rhamnus*.

- 1a. Plants only with long shoots, without short shoots, unarmed; leaves alternate; flowers 4- or 5-merous; petals present or absent.
- 2a. Flowers polygamous, 4-merous; petals absent; ovary 4-loculed, rarely 3-loculed; flowers usually fascicled in axils of leaves; inflorescences never with leaflike bracts (*R.* sect. *Tetrarhamnus*).
- 3a. Leaf blade 2–4.5 cm, apex obtuse or rounded, margin entire, both surfaces yellow tomentulose, velutinous, lateral veins 5 or 6(–8) pairs 8. *R. ninglangensis*
- 3b. Leaf blade 5–20 cm, apex acuminate or long acuminate, margin serrate, abaxially puberulent on veins or barbate in axils of veins, lateral veins 9–17 pairs.
- 4a. Deciduous trees or shrubs; young branches puberulent; leaves papery, abaxially sparsely pubescent on veins 7. *R. sargentiana*
- 4b. Evergreen trees or shrubs; young branches glabrous; leaves leathery, abaxially glabrous or barbellate in axils of leaves 6. *R. hemsleyana*
- 2b. Flowers unisexual and plants dioecious, rarely polygamous, 5-merous; petals usually present; ovary 3-loculed; flowers solitary or few fascicled in axillary cymose racemes or cymose panicles; inflorescences with small, leaflike bracts (*R.* sect. *Pseudoceanothus*).
- 5a. Flowers few, solitary or 2–6-fascicled in axils of leaves.

- 6a. Leaf blade to 4 cm, lateral veins 2–4 pairs.
- 7a. Leaves papery, petioles 2–7 mm; flowers solitary, unisexual and plants dioecious; petals present; pedicels 1–2 mm 9. *R. heterophylla*
- 7b. Leaves thinly leathery, petioles shorter than 2 mm; flowers polygamous; petals absent; pedicels 5–6(–10) mm 10. *R. procumbens*
- 6b. Leaf blade usually longer than 4 cm, lateral veins 4–6 pairs.
- 8a. Leaves leathery, lateral and reticulate veins abaxially conspicuously impressed; seeds broad at both ends, abaxially narrowly furrowed at middle part 11. *R. bodinieri*
- 8b. Leaves papery to thickly papery, lateral veins prominent on both surfaces; seeds with base broader than middle, abaxially longitudinally furrowed in upper part 12. *R. xizangensis*
- 5b. Flowers numerous, in cymose racemes or cymose panicles.
- 9a. Flowers polygamous or unisexual; inflorescences often with many persistent leaflike bracts; seeds shortly furrowed for 1/2 length.
- 10a. Drupe 3–4 mm in diam., base with persistent sepals and calyx tube 13. *R. formosana*
- 10b. Drupe 5–6 mm in diam., sepals caducous, base with persistent calyx tube only 14. *R. hainanensis*
- 9b. Flowers unisexual and plants dioecious; inflorescences without leaflike bracts or with few caducous leaflike bractlets; seeds abaxially longitudinally furrowed for 3/5 length.
- 11a. Leaves abaxially hairy or only hairy on veins and petioles; petals present.
- 12a. Leaves thickly leathery, abaxially densely tomentulose; seeds with equally broad, longitudinal furrow for 4/5 length 15. *R. kwangsiensis*
- 12b. Leaves papery or thickly papery, abaxially puberulent or only on veins; seeds abaxially furrowed for 3/4 length or for nearly entire length.
- 13a. Leaf blade narrowly elliptic or oblanceolate-elliptic; petiole shorter than 1 cm; flowers often in short cymose racemes; pedicel and calyx puberulent; seeds abaxially with furrow extending over nearly entire length 16. *R. esquirolii*
- 13b. Leaf blade elliptic to broadly elliptic; petiole 1.2–2 cm; flowers usually in large panicles; pedicel and calyx glabrous; seeds abaxially furrowed for 3/4 length 17. *R. nigricans*
- 11b. Leaves and petioles glabrous or leaves abaxially clustered hairy in vein axils; petals present or absent.
- 14a. Leaf blade usually broadly elliptic or broadly oblong; young branches and inflorescence rachises puberulent; inflorescences to 12 cm; petals present 18. *R. napalensis*
- 14b. Leaf blade elliptic or oblong-elliptic; young branches and inflorescence rachises glabrous; inflorescences shorter than 5 cm; petals absent.
- 15a. Leaf blade papery or thinly leathery, apex caudate-acuminate, abaxially pale purple when dry, petiole to 18 mm 19. *R. subapetala*
- 15b. Leaf blade leathery, apex shortly acuminate or acuminate, abaxially not drying purple, petiole to 7 mm 20. *R. coriophylla*
- 1b. Plants with both long and short shoots, apices of short shoots often terminating in a woody spine; leaves opposite or alternate on long shoots, clustered or fascicled on short shoots; flowers unisexual and plants dioecious, 4-merous; petals present (*R. sect. Rhammus*).
- 16a. Leaves opposite or subopposite, rarely alternate.
- 17a. Leaves not longer than 3 cm, narrow, usually less than 1 cm wide, lateral veins in 2 or 3, rarely 4, pairs.
- 18a. Leaves subleathery, both surfaces glabrous, petioles 5–20 mm, glabrous; seeds abaxially shortly furrowed for 1/2 length, obcordate 21. *R. maximovicziana*
- 18b. Leaves papery or thickly papery, both surfaces and petioles sparsely puberulent; seeds abaxially or laterally furrowed for ca. 4/5 of length.
- 19a. Leaf blade oblong or elliptic, petiole 1–3 mm.
- 20a. Branchlets dark brown; bark scabrous, longitudinally fissured; leaf blade usually elliptic, abaxially black when dry, clustered hairy at vein axils or glabrous, reticulate veins inconspicuous; seeds abaxially deeply furrowed for 4/5 length 22. *R. gilgiana*
- 20b. Branchlets silvery-gray or gray-brown, slightly glabrous; leaf blade usually oblong or ovate-elliptic, abaxially golden-yellow or yellowish when dry, reticulate veins conspicuous, both surfaces puberulent, rarely subglabrous; seeds abaxially shallowly furrowed for nearly entire length 23. *R. flavescens*
- 19b. Leaf blade ovate, rhombic-obovate, or rhombic-elliptic, petiole 4–15 mm.
- 21a. Leaf blade papery, ovate or ovate-lanceolate, abaxially yellow when dry, veins or vein axils white puberulent; seeds abaxially with broad furrow 24. *R. bungeana*
- 21b. Leaf blade thickly papery, rhombic-obovate or rhombic-elliptic, abaxially gray-white when dry, areole of vein axils puberulent; seeds abaxially with narrow furrow 25. *R. parvifolia*

- 17b. Leaves longer than 3 cm, ca. 1.5 cm wide, lateral veins (3 or)4–7 pairs.
- 22a. Leaf blade ovate-cordate or ovate-orbicular, base cordate or rounded, margin densely sharply serrate; fruiting pedicel 1.3–2.3 cm; seeds abaxially furrowed for 4/5 length 26. *R. arguta*
- 22b. Leaf blade not ovate-cordate, base cuneate or subrounded, margin obtusely serrate or crenate-serrate; fruiting pedicel not longer than 1.2 cm.
- 23a. Petioles usually longer than 1–1.5 cm; seeds with short abaxial furrow restricted to 1/3 of length.
- 24a. Branchlets hairy or glabrous; leaves abaxially often turning yellow or golden-yellow when dry, veins and vein axils golden-yellow pubescent, petioles 5–15 mm 37. *R. utilis*
- 24b. Branchlets glabrous; leaves abaxially greenish when dry, glabrous, or abaxially midvein sparsely white hairy, petioles 1.5–3 cm.
- 25a. Leaf blade glabrous, margin densely crenate, elliptic or broadly elliptic, lateral veins 3 or 4 pairs 33. *R. cathartica*
- 25b. Leaf blade and petiole subglabrous, margin sparsely obtusely serrate, or crenate, orbicular, narrowly to broadly elliptic, or oblong, lateral veins 4–6 pairs.
- 26a. Leaf blade suborbicular, ovate-rhombic, or elliptic; axillary buds small; seeds easily separated from endocarp, exposing a nearly circular, distinctly margined furrow 34. *R. diamantiaca*
- 26b. Leaf blade narrowly to broadly elliptic or oblong; axillary buds 4–8 mm; seeds exposing a short, never circular furrow.
- 27a. Branches terminating in a spine or large bud; leaf blade narrowly elliptic or narrowly oblong 35. *R. ussuriensis*
- 27b. Branches terminating in a large bud, rarely spinescent; leaf blade broadly elliptic or ovate-oblong 36. *R. davurica*
- 23b. Petioles shorter than 1 cm; seeds abaxially or laterally longitudinally furrowed for more than 1/2 length (except in *R. dumetorum*).
- 28a. Young branches, annual branches, both surfaces of leaves, or veins and petioles puberulent; flowers and pedicels sparsely puberulent; leaf blade obovate-orbicular, ovate-orbicular, or suborbicular 27. *R. globosa*
- 28b. Young branches, annual branches, and petioles glabrous or nearly so; flowers and pedicels glabrous; leaf blade not obovate-orbicular or suborbicular.
- 29a. Leaves adaxially glabrous, abaxially vein axils clustered hairy.
- 30a. Leaf blade narrowly elliptic or oblanceolate-elliptic, 1–2.2 cm wide, apex caudate-acuminate or long acuminate, lateral veins (4 or)5 or 6(or 7) pairs, petiole 2–6 mm 28. *R. iteinophylla*
- 30b. Leaf blade obovate or obovate-elliptic, 2–5 cm wide, apex shortly acuminate or acute, lateral veins 3–5 pairs, petiole 7–20 mm 29. *R. leptophylla*
- 29b. Leaves adaxially sparsely pubescent at least on veins, abaxially areoles of veins clustered hairy or rarely glabrous.
- 31a. Branchlets pale gray or gray-brown; bark scabrous, not nitid; seeds black, abaxially at base with short furrow 30. *R. dumetorum*
- 31b. Branchlets red-brown, purple-red, or dark brown; bark laevigate, shiny; seeds red-brown or brown, abaxially with longitudinal furrow extending over 2/3 of length.
- 32a. Leaf blade rhombic-obovate or rhombic-elliptic, both surfaces glabrous or abaxially areoles of vein axils sparsely puberulent, lateral veins 2–4 pairs 25. *R. parvifolia*
- 32b. Leaf blade elliptic, obovate-elliptic, or obovate-lanceolate, adaxially sparsely hirsutulous, abaxially glabrous or areoles of vein axils sparsely pilose, lateral veins 4 or 5 pairs.
- 33a. Leaf blade usually elliptic or obovate-elliptic, abaxially yellowish or gray when dry, reticulate veins inconspicuous, vein axils often with areole, papery to thickly papery; young branches glabrous 31. *R. tangutica*
- 33b. Leaf blade usually obovate-lanceolate, abaxially often reddish when dry, reticulate veins conspicuous, vein axils without areoles, rarely with areoles, thinly papery or papery; young branches slightly pubescent or glabrous 32. *R. virgata*

- 16b. Leaves and branches alternate, rarely subopposite.
- 34a. Leaves usually shorter than 1.2 cm, narrow; seeds abaxially or laterally with over 2/3 entire length longitudinal furrow.
- 35a. Leaf blade linear, oblanceolate, or narrowly oblanceolate, both surfaces glabrous; seeds abaxially with narrow furrow for 4/5 entire length.
- 36a. Leaf blade narrowly lanceolate to narrowly obovate, 3–5 cm, apex acute or obtuse, petiole 3–15 mm; branches terminating in a spine; erect shrubs or small trees 38. *R. erythroxyllum*
- 36b. Leaf blade oblanceolate or narrowly oblanceolate, 1–2.5 cm, apex obtuse or emarginate, petiole 2–3 mm; branches terminating in a small bud, not spinescent; procumbent small shrubs 39. *R. tzeckweiensis*
- 35b. Leaf blade elliptic, obovate-elliptic, or spatulate, both surfaces puberulent, or abaxially puberulent on veins, rarely glabrous; seeds with broad or narrow furrow.
- 37a. Leaves at both surfaces, or at least major veins, yellowish verrucose-pilosulose; flowers and pedicels sparsely pilose 40. *R. aurea*
- 37b. Leaves glabrous or puberulent or abaxially vein axils clustered hairy; flowers and pedicels glabrous.
- 38a. Leaves leathery or nearly so; seeds abaxially or laterally with deep furrow.
- 39a. Branchlets spreading, often virgate, purple-red or dark purple, smooth, shiny; leaf blade subleathery, oblanceolate or obovate-elliptic, apex obtuse or emarginate, glabrous or subglabrous; seeds abaxially with broad furrow 41. *R. leptacantha*
- 39b. Branchlets not virgate, gray-brown or dark brown, scabrous, with longitudinally arranged slits, not shiny; leaf blade leathery, spatulate or rhombic-elliptic, apex truncate or acute, adaxially glabrous or midvein sparsely puberulent, abaxially with ± distinct bearded domatia in axils of primary and lateral veins; seeds abaxially with narrower furrow 42. *R. rosthornii*
- 38b. Leaves papery; seeds abaxially with broad, shallow furrow.
- 40a. Leaf blade elliptic or oblong, margin entire or abaxially inconspicuously serrulate above middle, glabrous, lateral veins 3 or 4 pairs; flowers 10–20-clustered at leaf axils 43. *R. songorica*
- 40b. Leaf blade obovate or obovate-elliptic, rarely elliptic, both surfaces sparsely puberulent, margin sparsely serrulate, lateral veins 2 or 3 pairs; flowers 2–5-clustered at leaf axils or terminal on short shoots.
- 41a. Leaves 5–10 mm, obovate; profusely shortly branched, pulvinate compact shrubs, 10–25 cm tall 44. *R. minuta*
- 41b. Leaves ca. 2.2 mm, elliptic or ovate-elliptic; prostrate, small shrubs, to 200 cm tall 45. *R. prostrata*
- 34b. Leaves usually more than 3 × 2 cm; seeds abaxially or laterally with long or short furrow.
- 42a. Young branches, leaves, petioles, flowers, and pedicels glabrous.
- 43a. Leaf blade membranous, oblong-ovate or ovate-orbicular, margin crenate to serrate; terminal bud not spinescent 46. *R. nakaharae*
- 43b. Leaf blade papery, elliptic, oblong-elliptic, or broadly elliptic, margin hooklike crenate; terminal bud spinescent.
- 44a. Leaf blade apically shortly acuminate, petiole 1–1.5 cm; seeds abaxially with margined furrow for 5/7 of length 49. *R. hupehensis*
- 44b. Leaf blade apically caudate-acuminate or long acuminate, petiole not longer than 1 cm; seeds with margined furrow for 1/2 of length.
- 45a. Petioles 2–4 mm; seeds abaxially with margined furrow for 2/5–1/2 of length, apex without fissured line 47. *R. wilsonii*
- 45b. Petioles 5–10 mm; seeds abaxially with margined furrow for 1/4–1/3 of length, apex with fissured line 48. *R. lamprophylla*
- 42b. Young branches, both surfaces of leaves, leaf veins, or vein axils hairy; flowers and pedicels puberulent or glabrous.
- 46a. Calyx and pedicel sparsely puberulent; annual branches, both leaf surfaces, or at least leaf veins pubescent.
- 47a. Leaf blade thickly papery, obovate-elliptic or obovate-orbicular, adaxially veins conspicuously impressed, distinctly rugose when dry; seeds abaxially with margined furrow nearly as long as entire length, above furrow without fissured line 50. *R. rugulosa*
- 47b. Leaf blade papery or thinly papery, veins adaxially not rugose when dry; seeds abaxially with fissured furrow for 1/4–2/5 of length, above furrow with fissured line.

- 48a. Leaf blade broadly elliptic, obovate-elliptic, or ovate-orbicular, apex shortly acuminate or acuminate, petiole 7–25 mm; fruiting pedicel 7–14 mm 51. *R. koraiensis*
- 48b. Leaf blade oblanceolate-oblong or elliptic, apex long acuminate or caudate-acuminate, petiole 3–8 mm; fruiting pedicel 4–7 mm 52. *R. grandiflora*
- 46b. Calyx and pedicel glabrous; leaves subglabrous or ± hairy.
- 49a. Leaf blade membranous, ovate or elliptic-ovate, glabrous, or midvein adaxially and veins abaxially sparsely pilose 53. *R. liukuensis*
- 49b. Leaf blade papery; seeds abaxially with, long or short furrow.
- 50a. Seeds abaxially with margined furrow for nearly entire length; leaves abaxially sparsely clustered hairy in vein axils.
- 51a. Leaf blade oblong or ovate-oblong 54. *R. wumingensis*
- 51b. Leaf blade ovate-elliptic, obovate-elliptic, or obovate 50. *R. rugulosa*
- 50b. Seeds abaxially with margined furrow for 1/3–1/2 of length; leaves adaxially glabrous, or pubescent on veins.
- 52a. Seeds abaxially with margined furrow for nearly 1/2 of length, above furrow without fissured line.
- 53a. Leaf blade usually broadly elliptic, abaxially pubescent especially on veins, petiole 2–4 mm 47. *R. wilsonii*
- 53b. Leaf blade oblong or ovate-oblong, abaxially often turning reddish when dry, glabrous, petiole 4–9 mm 55. *R. brachypoda*
- 52b. Seeds abaxially with basal rim shortly furrowed for less than 1/3 of length, above furrow with fissured line.
- 54a. Branchlets gray-brown, not shiny, terminating in an obtuse spine; leaves often reflexed when dry, adaxially glabrous, abaxially veins or veins axils pilose, petioles 3–6 mm, glabrous or puberulent 56. *R. fulvotincta*
- 54b. Branchlets yellow-brown, shiny, terminating in a sharp spine; leaves not reflexed when dry, adaxially white adpressed hairy or pilose, abaxially veins or vein axils pilose or glabrous, petioles 6–25 mm, sparsely or densely pubescent 57. *R. schneideri*

6. *Rhamnus hemsleyana* C. K. Schneider, Notizbl. Königl. Bot. Gart. Berlin 5: 78. 1908.

亮叶鼠李 *liang ye shu li*

Trees, rarely shrubs, evergreen, unarmed, to 8 m tall. Young branches grayish to brownish, glabrous. Stipules linear, 8–12 mm, caducous; petiole short, 3–8(–15) mm, stout, adaxially canaliculate, often sparsely puberulent; leaf blade shiny, abaxially greenish or yellowish, adaxially green or dark green, narrowly elliptic, rarely narrowly oblong or oblanceolate, (4.5–)6–12 × 2.5–6 cm, leathery, abaxially often with bearded vein axils, adaxially glabrous, lateral veins 9–12(–15) pairs, ± prominent abaxially, slightly impressed adaxially, base cuneate or rounded, margin serrate-crenate, often slightly revolute, apex acuminate to long acuminate, rarely obtuse-rounded. Flowers polygamous, 4-merous, glabrous, 2–8 clustered at leaf axils. Sepals triangular, 3-veined, adaxially medially keeled. Petals absent. Stamens shorter than sepals. Ovary in bisexual flowers globose, 3- or 4-loculed; style 3- or 4-cleft to half. Female flower with rudimentary stamens; ovary globose, abortive, without ovules; stigma short, undivided; disk slightly thick, dish-shaped, margin free. Drupe green, red at maturity, then turning black, globose, 4–5 mm in diam., with 3 or 4 stones. Seeds purple-black, obconical, ca. 2 mm, abaxially with furrow for entire length. Fl. Apr–May, fr. Jun–Oct.

• Subalpine mixed forests, forests in valleys, forest margins; 700–2800 m. W Guizhou, SW Shaanxi, Sichuan, N Yunnan.

1a. Leaf blade 6–12 cm, abaxially glabrous

or barbate in vein axils, petiole 3–8 mm 6a. var. *hemsleyana*

1b. Leaf blade 4.5–13.5 cm, abaxially glabrous, petiole 8–15 mm 6b. var. *yunnanensis*

6a. *Rhamnus hemsleyana* var. *hemsleyana*

亮叶鼠李(原变种) *liang ye shu li* (*yuan bian zhong*)

Maesa blinii H. Léveillé; *Rhamnus blinii* (H. Léveillé) Rehder.

Petiole 3–8 mm; leaf blade 6–12 cm, abaxially glabrous or barbate in vein axils.

• Forests in valleys, forest margins; 700–2300 m. W Guizhou, SW Shaanxi, Sichuan, NE Yunnan.

6b. *Rhamnus hemsleyana* var. *yunnanensis* C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 77. 1979.

高山亮叶鼠李 *gao shan liang ye shu li*

Rhamnus hemsleyana var. *paucinervata* G. S. Fan & L. L. Deng.

Young branches glabrous. Petiole 8–15 mm, glabrous; leaf blade elliptic or oblong, 4.5–13.5 cm, both surfaces glabrous, lateral veins 8–14 pairs, margin inconspicuously sparsely serrate, apex acuminate to caudate-acuminate, rarely rounded. Fl. Apr–May, fr. Jun–Nov.

• Subalpine mixed forests, forest margins; 2200–2800 m. SW Sichuan, NW Yunnan.

7. *Rhamnus sargentiana* C. K. Schneider in Sargent, Pl. Wilson. 2: 235. 1914.

多脉鼠李 duo mai shu li

Rhamnus blinii (H. Léveillé) Rehder var. *sargentiana* (C. K. Schneider) Rehder.

Shrubs deciduous, dioecious, to 6 m tall, unarmed. Branches alternate; young branches puberulent; older branches glabrous. Stipules subulate; petiole 5–10 mm; leaf blade lanceolate-elliptic, 6–12 × 2–4.5 cm, papery, abaxially sparsely pubescent on veins and slightly barbate vein axils, adaxially glabrous, lateral veins 12–15(–18) pairs, prominent abaxially, slightly impressed adaxially, base cuneate, often slightly asymmetric, margin finely serrate, slightly revolute, apex acute. Flowers 4-merous, few-clustered in leaf axils. Pedicels to 5 mm, slender. Calyx tube shallowly cup-shaped; lobes triangular, 1–1.5 mm, puberulent. Petals absent. Stamens shorter than sepals. Ovary 3- or 4-loculed. Drupe dark brown, blackish at maturity, globose, ca. 4 mm in diam., with 3 or 4 stones, with persistent calyx tube at base; fruiting pedicel 4–6 mm. Seeds not seen. Fl. Jul–Aug, fr. May–Jun of following year.

• Woods on mountain slopes; 1700–3800 m. Gansu, Hubei, Sichuan, Xizang, Yunnan.

8. *Rhamnus ninglangensis* Y. L. Chen, *nom. nov.*

宁蒭鼠李 ning lang shu li

Replaced synonym: *Rhamnus velutina* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 15: 244. 1927 [*“velutinus”*], not *Rhamnus velutina* Boissier, Elench. Pl. Nov. 29. 1838 [*“velutinus”*].

Shrubs erect, to 1 m tall, unarmed. Young branches densely brownish puberulent; old branches slightly glabrescent. Petiole 8–10 mm, puberulent; leaf blade abaxially yellow, adaxially yellow-green when dry, broadly elliptic to ovate-orbicular, 2–4.5 × 1.5–3 cm, leathery or nearly leathery, both surfaces yellow velutinous-puberulent, lateral veins 5 or 6(–8) pairs, inconspicuously prominent on both surfaces, base rounded, margin entire, apex obtuse or rounded, slightly emarginate. Flowers bisexual, 2- or 3-clustered in leaf axils. Pedicels slender, slightly puberulent. Calyx tube puberulent; lobes 4 or 5, triangular, ca. 1.5 mm, puberulent. Petals absent. Stamens shorter than sepals. Ovary 4-loculed. Drupe black at maturity, obovoid-globose, ca. 4 mm in diam., with 3 or 4 stones, with persistent calyx tube at base; fruiting pedicel 6–8 mm, sparsely puberulent. Fl. unknown, fr. Jul–Aug.

• Stony slopes, steep alpine slopes; below 3000 m. SW Sichuan (Muli), NW Yunnan.

9. *Rhamnus heterophylla* Oliver, Hooker’s Icon. Pl. 18: t. 1759. 1888 [*“heterophyllus”*].

异叶鼠李 yi ye shu li

Rhamnus cavaleriei H. Léveillé (10 May 1911), not H. Léveillé (5 Dec 1911); *R. heterophylla* var. *oblongifolia* E. Pritzl.

Shrubs low, climbing, dioecious, to 2 m tall, unarmed. Young branches and branchlets slender, densely pubescent.

Stipules subulate or linear-lanceolate, shorter than petioles, persistent; petiole 2–7 mm, densely pubescent; leaf blade abaxially pale green, adaxially vivid green, oblong, ovate-elliptic, or ovate-oblong, 1.5–4.5 × 1–2.2 cm, papery to subleathery, abaxially pubescent in vein axils and on major veins, adaxially glabrous, lateral veins 2–4 pairs, slightly prominent abaxially, inconspicuous adaxially, base cuneate or rounded, margin serrulate or crenulate, ± revolute when dry, apex acute, often mucronulate. Flowers unisexual, 5-merous, solitary or 2- or 3-clustered in axils of small leaflike bracts. Pedicels 1–2 mm, sparsely puberulent. Sepals puberulent, adaxially 3-veined. Male flowers: petals spatulate, apex emarginate, with rudimentary pistil; ovary abortive. Female flowers: petals 2-fid, caducous, with very small rudimentary stamens; ovary globose, 3-loculed; style short, 3-cleft to half. Drupe black at maturity, globose, with persistent calyx tube at base, with 3 stones; fruiting pedicel 1–2 mm. Seeds abaxially with margined furrow extending over 4/5 of length. Fl. May–Aug, fr. Nov–Dec.

• Forest margins, thickets on mountain slopes; 300–1500 m. SE Gansu, Guizhou, W Hubei, S Shaanxi, Sichuan, Yunnan.

The fruit contains yellow dye, and the young leaves are used as a substitute for tea.

This species is variable. Pritzl (Bot. Jahrb. Syst. 29: 459. 1900) published *Rhamnus heterophylla* var. *oblongifolia* as different from var. *heterophylla* based on “leaves larger, narrowly lanceolate”; however, we reduced it here in synonymy.

10. *Rhamnus procumbens* Edgeworth, Trans. Linn. Soc. London 20. 43. 1846.

蔓生鼠李 man sheng shu li

Shrubs small, climbing, with prostrate branches, unarmed. Branchlets slender, with numerous tuberculate lenticels; annual branches puberulent. Stipules needle-shaped, 3–4 mm, persistent; petioles very short, 1–2 mm, puberulent; leaf blade abaxially yellow-green, adaxially deep green, shiny, lanceolate, 1.5–2.5 × 0.8–1.5 cm, thinly leathery, abaxially puberulent on veins, adaxially glabrous, lateral veins 3 or 4 pairs, prominent abaxially, conspicuously impressed adaxially, base broadly cuneate, margin slightly revolute, serrulate, apex acute. Flowers polygamous, 5-merous, 1–3-clustered in axils of small leaflike bracts, bracts narrowly elliptic, to 1 cm. Pedicels 5–6(–10) mm, puberulent. Bisexual flowers broadly campanulate. Sepals broadly ovate-triangular, ca. 2 mm, sparsely puberulent, adaxially with distinct midvein, apex acute. Petals absent. Stamens ca. 1 mm. Disk disk-shaped, thin. Ovary 3-loculed; style 3-fid or cleft to half. Drupe black at maturity, ca. 5 mm in diam., with persistent calyx tube at base, with 3 or sometimes 2 stones; fruiting pedicel 7–8 mm. Fl. Jun–Jul, fr. Aug–Sep. *2n* = 24.

Subalpine slopes; 2400–3000 m. S Xizang (Gyirong) [Bhutan, NW India, Nepal].

This species is very similar to *Rhamnus heterophylla*, but the latter differs in having flowers unisexual and plants dioecious, petals present, pedicels very short, 1–2 mm, seeds abaxially with furrow for ca. 4/5 of length, leaves papery, and petioles 2–7 mm.

11. *Rhamnus bodinieri* H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 473. 1912.

陷脉鼠李 xian mai shu li

Rhamnus bodinieri f. *silvicola* C. K. Schneider.

Shrubs evergreen, dioecious, ca. 3 m tall, unarmed. Annual branches puberulent. Stipules needle-shaped, caducous; petiole 3–9(–12) mm, puberulent; leaf blade abaxially pale yellow-green, adaxially dark green, elliptic or oblong, 2.5–10 × 1.2–3.5 cm, leathery, abaxially glabrous, or clustered hairy in vein axils, adaxially sparsely pubescent on midvein, lateral veins 5 or 6 pairs, distinctly prominent abaxially, impressed adaxially, base cuneate or subrounded, margin distinctly revolute, sparsely acutely hooked-serrate, apex acute, rarely obtuse or rounded, midvein often elongated into mucro. Flowers unisexual, 5-merous, broadly campanulate, sparsely puberulent, solitary or 2- or 3(–7)-clustered in axils of small leaflike bracts; bracts narrowly elliptic, to 2 cm. Sepals 2–2.5 mm, adaxially with conspicuous midvein, apex acute. Petals absent. Pedicels 3–6 mm, sparsely puberulent. Male flowers with rudimentary pistil; ovary abortive; style short, 3-fid or 3-cleft to half. Female flowers small, with rudimentary stamens; ovary globose, 3-loculed; style longer and stout, deeply 3-cleft; disk disk-shaped, thin. Drupe purple-red, blackish at maturity, globose or obovoid, ca. 5 mm, ca. 4 mm in diam., with persistent calyx tube at base, with 3 stones; fruiting pedicel 4–10 mm. Seeds abaxially with margined furrow extending over 4/5 of length. Fl. May–Jul, fr. Jul–Oct.

• Dense mountain forests, thickets; 1000–2000 m. NW Guangxi, W Guizhou, S and SE Yunnan [?Nepal].

This species differs from *Rhamnus xizangensis* in having leathery leaves, with margins revolute when dry, acutely hooked-serrate, and lateral veins 5 or 6 pairs, adaxially conspicuously impressed.

12. *Rhamnus xizangensis* Y. L. Chen & P. K. Chou, Acta Phytotax. Sin. 18: 248. 1980.

西藏鼠李 xi zang shu li

Shrubs or small trees, evergreen, dioecious, to 2 m tall, unarmed. Young branches slender, puberulent; branchlets red-brown, with numerous tuberculate lenticels or laevigate. Stipules linear-lanceolate, persistent; petiole 4–8 mm, slightly puberulent; leaf blade abaxially pale green, adaxially dark green, elliptic or elliptic-lanceolate, 4–10 × 1.5–2.4 cm, papery to thickly papery, abaxially clustered hairy in vein axils, rarely slightly pubescent on veins, adaxially sparsely puberulent on veins or only on midvein, lateral veins 4 or 5 pairs, inconspicuously reticulate, prominent on both surfaces, base cuneate, margin slightly revolute when dry, serrulate, apex acuminate or shortly acuminate, rarely acute, often mucronulate. Flowers green, unisexual, 5-merous, broadly campanulate, usually 2–6-clustered in axils of small leaflike bracts; bracts elliptic-orbicular, to 2.5 cm. Sepals ovate-triangular, adaxially distinctly keeled and hooded apically. Pedicels 3–6 mm, sparsely puberulent. Male flowers with rudimentary pistil; style short, 3-fid. Female flowers solitary or 2- or 3-clustered, with very small rudimentary stamens; ovary globose, 3-loculed; style 3-cleft to half. Disk shallowly cup-shaped or disk-shaped, thin. Drupe purple-red at maturity, subglobose or obovoid-globose, ca. 5 mm in diam., with persistent calyx tube at base, with 3 stones; fruiting pedicel 6–10 mm, puberulent. Seeds abaxially with margined furrow for 4/5 of length. Fl. May–Jul, fr. Jun–Nov.

• Forests, thickets; 1600–3200 m. SE Xizang, NW Yunnan.

Material of this species was not seen by the second author.

13. *Rhamnus formosana* Matsumura, Bot. Mag. (Tokyo) 12: 22. 1898.

台湾鼠李 tai wan shu li

Shrubs ± scandent, dioecious, to 10 m tall, unarmed. Branchlets brown, with numerous tuberculate lenticels, puberulent. Petiole 0.8–2 mm, densely yellow-brown puberulent; leaf blade abaxially pale green, adaxially yellow-green, shiny, oblong or oblong-elliptic, 5–13 × 2–6 cm, papery, abaxially sparsely puberulent on veins and vein axils, adaxially glabrous, lateral veins 5–8 pairs, prominent abaxially, slightly impressed adaxially, base subrounded, margin obtusely serrate, apex acuminate. Flowers unisexual, 5-merous, 2–6 in axillary, bracteate, cymose racemes; bracts leaflike, ovate, to 5 cm. Pedicels 1–2 mm, puberulent. Sepals lanceolate, ca. 2 mm, adaxially medially keeled, apex acute. Petals spatulate-emarginate, ca. 1 mm. Disk thin, lining calyx tube. Male flowers with very small stamens. Female flowers: ovary globose, 3-loculed; style ca. 1.5 × as long as ovary, 3-fid or cleft to half. Drupe dark red, turning black at maturity, globose or obovoid-globose, 3–4 mm in diam., with persistent calyx tube at base, with 3 stones; fruiting pedicel 3–4 mm. Seeds oblong-ovoid, abaxially with margined furrow extending over 1/2 of length. Fl. Oct, fr. Nov–Dec.

• Broad-leaved forests, thickets; below 1000 m. Taiwan (Taibei, Taizhong).

14. *Rhamnus hainanensis* Merrill & Chun, Sunyatsenia 2: 273. 1935.

海南鼠李 hai nan shu li

Shrubs scandent, rarely erect, dioecious, unarmed. Young branches with numerous tuberculate lenticels, sparsely puberulent when young; old branches glabrescent. Petiole 7–15 mm, puberulent; leaf blade shiny on both sides, green-yellow when dry, elliptic or oblong-ovate, 5–11 × 2.5–4.5 cm, papery, abaxially golden-yellow puberulent on veins, rarely subglabrous, adaxially glabrous, lateral veins 5–7 pairs, distinctly prominent abaxially, slightly impressed or not adaxially, base rounded, margin serrulate or obtusely serrate, apex acuminate or acute. Flowers unisexual, 5-merous, solitary or 2–4 in axillary, cymose racemes; bracts very small, to 4 mm. Pedicels 2–3 mm, sparsely puberulent. Sepals caducous, oblong-lanceolate, adaxially with inconspicuous midvein, apex acute. Petals broadly elliptic, apex nearly truncate. Stamens equalling petals, slightly shorter than sepals. Ovary globose, 3-loculed; style (2 or)3-fid, ca. 1.5 × as long as ovary. Drupe deep red or purple-red at maturity, obovoid-globose or globose, 6–7 mm, 5–6 mm in diam., with persistent calyx tube at base, with 3 stones; fruiting pedicel 5–7 mm. Seeds abaxially with margined furrow for 1/2 of length. Fl. Aug–Nov, fr. Mar of following year.

• Dense forests in valleys; 600–900 m. Hainan.

This species is very similar to *Rhamnus formosana*, but the latter differs in having smaller drupes and fruit with persistent sepals.

The seeds are used for making oils, printing ink, and dyes.

15. *Rhamnus kwangsiensis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 77. 1979.

广西鼠李 *guang xi shu li*

Shrubs erect or scandent, dioecious, unarmed. Branchlets deep brown, with numerous tuberculate lenticels, puberulent. Stipules linear, needlelike, caducous; leaf blade abaxially pale green, adaxially deep green, lanceolate-oblong or oblong, 6–14 × 2.5–6 cm, thickly leathery, abaxially gray-green tomentose, adaxially glabrous, lateral veins 8–10 pairs, base rounded or subrounded, margin often revolute when dry, sparsely hooked serrulate, apex acuminate or caudate-acuminate, rarely acute. Flowers unisexual, 5-merous, few in 2–4 cm, cymose racemes; rachis, pedicel, and calyx puberulent. Sepals triangular, adaxially with conspicuous midvein, apex acute. Petals obovoid, shorter than sepals. Pedicels 1–2 mm. Female flowers with minute rudimentary stamens; ovary 3-loculed; style 3-cleft to half. Drupe red, turning black at maturity, subglobose, ca. 4 mm in diam., with persistent calyx tube at base, with 2 or 3 stones; fruiting pedicel ca. 2 mm, puberulent. Seeds 2 or 3, obovoid-globose, abaxially with margined furrow for 4/5 of length. Fl. Jul–Oct, fr. Aug–Nov.

- Limestone slopes. NE Guangxi (Guilin).

This species is very similar to *Rhamnus esquirolii* but differs in having branchlets with numerous tuberculate lenticels; leaves thickly leathery, lanceolate-oblong, abaxially gray-green tomentose, with margins often revolute when dry, sparsely hooked serrulate; and seeds abaxially with margined furrow for 4/5 of their length.

Material of this species was not seen by the second author.

16. *Rhamnus esquirolii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 473. 1912.

贵州鼠李 *gui zhou shu li*

Shrubs, often scandent, dioecious, 3–5 m tall, unarmed. Branchlets brown, with inconspicuous tuberculate lenticels, puberulent. Stipules subulate, persistent; petiole 3–11 mm, rarely to 15 mm, densely or sparsely puberulent; leaf blade abaxially pale green, adaxially deep green, shiny, narrowly elliptic, oblanceolate-elliptic, or narrowly oblong, 5–19 × 1.7–6 cm, papery, abaxially glabrous or scattered grayish puberulent on veins, or barbate in vein axils, adaxially glabrous, lateral veins 6–8 pairs, prominent abaxially, impressed adaxially, base rounded or cuneate, margin flat or ± revolute, serrulate or inconspicuously so, apex acuminate to long acuminate, rarely acute. Flowers unisexual, 5-merous, usually few in 1–3 cm axillary, cymose racemes; bracts leaflike, to 4 cm; rachis, pedicels, and flowers puberulent. Pedicels 1–3 mm. Sepals triangular, apex acute. Petals small, caducous. Male flower with rudimentary pistil. Female flowers with minute, rudimentary stamens; ovary globose, 3-loculed; style 3-fid or cleft to half. Drupe purple-red, turning black at maturity, obovoid-globose, 4–5 mm in diam., with persistent calyx tube at base, with 3 stones. Seeds obovoid-oblong, abaxially with a margined furrow extending over nearly entire length. Fl. May–Jul, fr. Aug–Nov.

- Dense forests, forest margins, understories of forests and thickets, thickets in valleys; 400–1800 m. Guangxi, Guizhou, W Hubei, NW Sichuan, S Yunnan.

- 1a. Leaves abaxially puberulent at least on veins 16a. var. *esquirolii*
 1b. Leaves abaxially glabrous or barbate in vein axils 16b. var. *glabrata*

16a. *Rhamnus esquirolii* var. *esquirolii*

贵州鼠李(原变种) *gui zhou shu li* (yuan bian zhong)

Celastrus lyi H. Léveillé; *Sageretia bodinieri* H. Léveillé.

Leaves abaxially puberulent at least on veins.

- Dense forests, forest margins, thickets in valleys; 400–1800 m. Guangxi, Guizhou, W Hubei, NW Sichuan, S Yunnan.

16b. *Rhamnus esquirolii* var. *glabrata* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 78. 1979.

木子花 *mu zi hua*

Leaves abaxially glabrous or barbate in vein axils.

- Mountain forest margins, understories of forests and thickets; 500–1800 m. Guizhou, Sichuan (Emei Shan).

17. *Rhamnus nigricans* Handel-Mazzetti, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 62: 234. 1880.

黑背鼠李 *hei bei shu li*

Shrubs or small trees, dioecious, to 5 m tall, unarmed. Young branches pubescent; branchlets slender, with numerous tuberculate lenticels. Leaves alternate; stipules caducous; petiole 1.2–2 cm, sparsely puberulent; leaf blade turning black when dry, adaxially ± shiny, papery or thickly papery; lower leaf blades smaller, elliptic, oblong, or broadly elliptic, 7–16 × 3.5–7 cm, abaxially puberulent or only on veins, adaxially with small granules, glabrous or subglabrous, lateral veins 6 or 7 pairs, prominent abaxially, impressed adaxially, base rounded, margin slightly revolute, densely cartilaginous serrulate, apex shortly acuminate or caudate. Flowers unisexual, 5-merous, puberulent, in axillary, bracteate, rather short cymose racemes or branched cymose panicles, with minute bracteoles; bracts small, leaflike. Pedicels ca. 1.5 mm, stout, glabrous. Sepals triangular, glabrous. Petals oblong, less than 1/2 as long as sepals. Style of female flowers 3-cleft. Drupe purple-black at maturity, obovoid-globose or globose, with persistent calyx tube at base, with 3 stones. Seeds abaxially with a margined furrow extending over 3/4 of length. Fl. May–Jul, fr. after Jul.

- Mountain slopes with open vegetation; 1500–2800 m. Yunnan.

This species is very similar to *Rhamnus napalensis* in leaf shape; however, the latter differs in having leaves abaxially usually glabrous, rarely veins and petioles sparsely hairy, inflorescences to 12 cm, and flowers and pedicels glabrous.

18. *Rhamnus napalensis* (Wallich) M. A. Lawson in J. D. Hooker, Fl. Brit. India 1: 640. 1875 [“*nipalensis*”].

尼泊尔鼠李 *ni bo er shu li*

Ceanothus napalensis Wallich in Roxburgh, Fl. Ind. 2: 375. 1824 [“*napalensis*”]; *Celastrus tristis* H. Léveillé; *Rhamnus paniculiflora* C. K. Schneider.

Shrubs erect or scandent, rarely trees, deciduous, dioecious, unarmed. Young branches puberulent, glabrescent; older branches with numerous conspicuous lenticels. Leaves alternate; petiole 1.3–2 cm, glabrous; leaf blade adaxially deep green, broadly elliptic or elliptic-oblong, 6–17(–20) × 3–8.5 cm, papery or subleathery, abaxially with clustered hairy vein axils, adaxially glabrous, lateral veins 5–9 pairs, major veins ± prominent abaxially, impressed adaxially, base rounded, margin crenate or obtusely serrate, slightly revolute, apex rounded, shortly acuminate, or acuminate. Flowers unisexual, 5-merous, in axillary cymose racemes or branched cymose panicles to 12 cm; rachis puberulent; bracts leaflike, to 5 cm. Sepals triangular, ca. 1.5 mm, puberulent, apex acute. Petals deeply cucullate, equaling stamens or slightly shorter, base clawed, apex obtuse or emarginate. Disk circular, thin, glabrous. Female flowers with caducous petals; stamens rudimentary; ovary globose, 3-loculed; style 3-fid or cleft to half. Drupe reddish purple when young, purplish black at maturity, obovoid-globose, 5–6 mm in diam., with persistent calyx tube at base, with 3 stones. Seeds abaxially with margined furrow extending over nearly whole length. Fl. May–Sep, fr. Aug–Nov.

Sparse or dense forests, thickets; below 1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Xizang, Yunnan, Zhejiang [Bhutan, India, Malaysia, Myanmar, Nepal, Thailand].

The leaves of this species often turn gray-black when dry. In Zhejiang and Fujian, the leaves are often used for dyeing tissues; in Jiangxi, the plant is used for making paper. The fruit and leaves are used medicinally.

19. *Rhamnus subapetala* Merrill, J. Arnold Arbor. 23: 179. 1942.

紫背鼠李 *zi bei shu li*

Shrubs scandent, rarely small trees, dioecious, 3–9 m tall, unarmed. Branchlets brown, with numerous tuberculate lenticels. Leaves alternate; stipules lanceolate, 1–1.5 mm, caducous; petiole 5–18(–25) mm, glabrous; leaf blade adaxially yellow-purple or pale purple when dry, stiffly papery or subleathery; small leaf blades 2–6 cm; large leaf blades oblong-elliptic or oblong, 7.5–15 × 2–6.5 cm, abaxially glabrous or clustered hairy in vein axils, adaxially glabrous, lateral veins 5–8 pairs, midvein prominent abaxially, impressed adaxially, with ± conspicuous reticulate veins, base cuneate or rounded, margin slightly revolute when dry, shallowly or inconspicuously serrate, apex caudate-acuminate or acuminate, rarely rounded, erect or curved mucronate, mucro 1–2 mm. Flowers green, unisexual, 5-merous, solitary or 2- or 3-fascicled in axillary, lax cymose racemes or cymose panicles; bracts leaflike, to 6 cm. Pedicels ca. 1 mm, puberulent. Sepals triangular, ca. 1.5 mm, apex acute or slightly acuminate. Petals absent. Female flowers with minute, rudimentary stamens; ovary 3-loculed; style short, deeply 3-cleft, caducous. Drupe (immature) globose-obovoid, ca. 5 mm, with 2 or 3 stones. Seeds abaxially with a margined furrow extending over ca. 2/3 of length. Fl. Jun–Jul, fr. Aug–Nov.

Sparse or dense forests in valleys; 700–2000 m. W Guangxi, S Yunnan [Vietnam].

This species is similar to *Rhamnus coriophylla*, but the latter

differs in having leathery leaves that do not turn purple when dry, apex acuminate, and short petioles.

20. *Rhamnus coriophylla* Handel-Mazzetti, Sinensia 3: 192. 1933.

革叶鼠李 *ge ye shu li*

Shrubs or small trees, dioecious, 3–4 m tall, unarmed. Young branches glabrous; branchlets purple-brown, with numerous tuberculate lenticels. Leaves alternate; petiole red when dry, 3–7 mm, glabrous; leaf blade abaxially pale green, adaxially deep green, shiny, elliptic or oblong-elliptic, 3–10(–14) × 1.5–4.5(–5.5) cm, leathery, abaxially barbellate in axils of veins only, adaxially glabrous, lateral veins 5–8 pairs, prominent on both surfaces except midvein, base subrounded or broadly cuneate, margin often revolute when dry, inconspicuously serrulate or conspicuously sharply serrate, apex shortly acuminate or acuminate, rarely obtuse or rounded, emarginate. Inflorescences 1–3 cm, glabrous or sparsely puberulent. Flowers green, unisexual, 5-merous, in rather small, axillary cymose racemes. Sepals narrowly triangular, thick, abaxially sparsely puberulent, adaxially thickened at apex. Petals absent. Pedicels ca. 1 mm. Female flowers with rudimentary stamens; ovary obovate, 3-loculed; style short, 3-lobed, free. Drupe purple-red at maturity, obovoid-globose, 3–5 mm in diam., with persistent calyx tube at base, with 3 stones; fruiting pedicel ca. 2 mm. Seeds 3. Fl. Jun–Aug, fr. Aug–Dec.

• Forests and thickets on limestone slopes, roadsides; ca. 800 m. Guangdong, Guangxi, Guizhou, Yunnan.

- 1a. Leaf margin obscurely serrulate, blade to 10 cm 20a. var. *coriophylla*
- 1b. Leaf margin conspicuously sharply serrulate, blade to 14 cm 20b. var. *acutidens*

20a. *Rhamnus coriophylla* var. *coriophylla*

革叶鼠李(原变种) *ge ye shu li* (yuan bian zhong)

Leaf blade to 10 cm, margin obscurely serrulate.

• Forests and thickets on limestone slopes; ca. 800 m. Guangdong, Guangxi, Yunnan.

20b. *Rhamnus coriophylla* var. *acutidens* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 79. 1979.

锐齿革叶鼠李 *rui chi ge ye shu li*

Leaf blade to 14 × 5.5 cm, margin conspicuously sharply serrulate, apex long acuminate or caudate-acuminate.

• Roadsides; ca. 800 m. Guizhou (Dushan).

21. *Rhamnus maximovicziana* J. J. Vassiljev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 126. 1940.

黑桦树 *hei hua shu*

Shrubs much branched, dioecious, to 2.5 m tall, spinose. Branches opposite or subopposite, terminating in a spine, puberulent or glabrous, shiny or slightly scabrous. Leaves opposite or subopposite on long shoots, fascicled at ends of short shoots; stipules narrowly lanceolate, ca. 4 mm; petiole 5–20 mm, glabrous or subglabrous; leaf blade abaxially pale green,

adaxially green, elliptic, ovate-elliptic, or broadly ovate, rarely spatulate, 1–3.5 × 0.6–1.2 cm, leathery, both surfaces glabrous, lateral veins 2 or 3 pairs, prominent abaxially, slightly impressed adaxially, base cuneate or subrounded, margin entire or inconspicuously serrulate, apex rounded-obtuse, rarely emarginate. Flowers unisexual, 4-merous, usually few- to 10-clustered at ends of short shoots. Pedicels 4–5 mm. Drupe red, turning black at maturity, obovoid-globose or subglobose, ca. 4 mm, 4–6 mm in diam., with persistent calyx tube at base, mostly with 2(or 3) stones; fruiting pedicel 4–6 mm, glabrous. Seeds brownish, obcordate, abaxially with a dark margined, broad furrow extending over 1/2–3/5 of length. Fl. May–Jun, fr. Jun–Sep.

Thickets on mountain slopes; 900–2700 m. Gansu, N Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi, NW Sichuan [Mongolia].

- 1a. Leaf blade elliptic or ovate-elliptic, rarely spatulate, 10–35 × 6–12 mm 21a. var. *maximovicziana*
 1b. Leaf blade oblong, 25–35 × 6–9 mm 21b. var. *oblongifolia*

21a. *Rhamnus maximovicziana* var. *maximovicziana*

黑桦树(原变种) *hei hua shu* (yuan bian zhong)

Rhamnus virgata Roxburgh var. *aprica* Maximowicz; *R. virgata* var. *mongolica* Maximowicz.

Leaf blade elliptic or ovate-elliptic, rarely spatulate, 10–35 × 6–12 mm.

Thickets on mountain slopes; 900–2700 m. Gansu, N Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi, NW Sichuan [Mongolia].

21b. *Rhamnus maximovicziana* var. *oblongifolia* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 79. 1979.

矩叶黑桦树 *ju ye hei hua shu*

Leaf blade narrowly oblong, 25–35 × 6–9 mm.

- Nei Mongol.

22. *Rhamnus gilgiana* Heppeler, Notizbl. Bot. Gart. Berlin-Dahlem 10: 343. 1928.

川滇鼠李 *chuan dian shu li*

Shrubs 1–2 m tall, much spinescent. Branchlets spreading, opposite, subopposite, or alternate, black-brown, gray when young, puberulent, terminating in a spine; old branches gray-brown or brown, glabrous, irregularly fissured. Leaves opposite or subopposite, rarely alternate, or fascicled at short shoots; stipules linear-subulate, shorter than petioles, caducous; petiole 1–3 mm, puberulent; leaf blade abaxially pale green, turning black when dry, adaxially dark green, elliptic or ovate-elliptic, rarely lanceolate or lanceolate-oblong, 1.5–3 cm × 5–10 mm, papery to thickly papery, abaxially clustered hairy in vein axils or subglabrous, lateral veins 3 or 4 pairs, nearly inconspicuous, base cuneate, margin often revolute, inconspicuously crenulate or subentire, apex obtuse or rounded, sometimes emarginate, rarely slightly acute. Flowers yellow-green, turning black when dry, unisexual, 4-merous, usually 3–5-fascicled in leaf axils of short shoots. Male flowers campanulate, 3.5–4 mm, sparsely

puberulent; sepals ovate-triangular, 2–2.5 mm, apex acuminate; petals oblong-lanceolate, small, ca. 1 mm; stamens nearly equaling petals; rudimentary ovary minute; style 2-fid; pedicels 1–3 mm, puberulent. Drupe brown, subglobose, 4–5 mm in diam., with shallow, cup-shaped, persistent calyx tube at base, with 2 or 3 stones; fruiting pedicel 2–3 mm, glabrous. Seeds pale brown, elliptic, 4–4.5 mm, abaxially with a margined furrow extending over 4/5 of length. Fl. Apr–May, fr. Jun–Aug.

- Understories of mixed forests and thickets; 2200–2700 m. SW Sichuan, NW Yunnan.

This species is very similar to *Rhamnus leptacantha*, but the latter differs in having branchlets glabrous and leaves subleathery, spatulate, and glabrous on both surfaces.

23. *Rhamnus flavescens* Y. L. Chen & P. K. Chou, Acta Phytotax. Sin. 18: 249. 1980.

淡黄鼠李 *dan huang shu li*

Shrubs dioecious, 1–2 m tall, spinose. Branchlets opposite or subopposite, rarely alternate, silvery-gray or gray-brown, puberulent, glabrescent, terminating in a spine; old branches gray-brown, ± longitudinally fissured, glabrous. Leaves opposite or subopposite on long shoots, fascicled on short shoots; stipules linear-subulate, ca. equal to petioles, puberulent, persistent; petiole 1–3 mm, puberulent; leaf blade abaxially pale yellow or golden-yellow when dry, adaxially gray-green, oblong or ovate-elliptic, rarely ovate, small, (0.7–)1–2.5 × 0.4–1(–1.3) cm, papery, both surfaces puberulent or subglabrous, lateral veins 3 or 4 pairs, slightly prominent abaxially, slightly impressed adaxially, conspicuously reticulate abaxially, base broadly cuneate or subrounded, rarely inequilateral, margin inconspicuously crenulate, often black mucronulate, rarely subentire, apex obtuse or rounded, emarginate, rarely acute. Flowers unisexual, 4-merous. Female flowers solitary in leaf axils of short shoots, yellow-green, campanulate; sepals ovate-triangular, 1–1.5 mm, abaxially puberulent, 3-veined, apex acute; petals minute, caducous; stamens very short; ovary globose, 2- or 3-loculed; style 4-cleft. Drupe red-brown, subglobose, 3–4 mm in diam., with shallowly cup-shaped, persistent calyx tube at base, with 2(or 3) stones; fruiting pedicel 2–3 mm, puberulent. Seeds yellowish, oblong-obovoid, 3–3.5 mm, abaxially with a margined, broad, shallow furrow extending over nearly whole length. Fl. Jun–Jul, fr. Jul–Sep.

- Thickets on subalpine slopes; 2500–3400 m. SW and W Sichuan, E Xizang.

This species is similar to *Rhamnus prostrata* but differs in having branchlets opposite or subopposite, silvery-gray or gray-brown; leaves opposite or subopposite, ovate or ovate-elliptic, puberulent; flowers solitary in leaf axils of short shoots; and seeds abaxially with margined, broad, shallow furrow for almost entire length.

Material of this species was not seen by the second author.

24. *Rhamnus bungeana* J. J. Vassiljev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 123. 1940.

卵叶鼠李 *luan ye shu li*

Shrubs dioecious, to 2 m tall, spinose. Branchlets opposite or subopposite, rarely alternate, gray-brown puberulent, termi-

nating in a purple-red spine; axillary buds minute. Leaves opposite or subopposite, rarely alternate, or fascicled on short shoots; stipules subulate, persistent; petiole 5–12 mm, puberulent; leaf blade abaxially often turning yellow, adaxially green, ovate, ovate-lanceolate, or ovate-elliptic, 1–4 × 0.5–2 cm, papery to subleathery, abaxially white pubescent on veins or vein axils, adaxially glabrous, lateral veins 2 or 3 pairs, prominent on both surfaces, base rounded or cuneate, margin crenulate, apex obtuse or shortly acute. Flowers yellow-green, small, unisexual, 4-merous, usually 2- or 3-fascicled on short shoots or solitary in leaf axils. Sepals broadly triangular, abaxially puberulent, apex acute. Petals minute. Pedicels 2–3 mm, puberulent. Female flowers with rudimentary stamens; ovary globose, 2-loculed; style 2-fid or cleft to half. Drupe purple or black-purple at maturity, obovoid-globose or globose, 5–6 mm in diam., with 2 stones, with persistent calyx tube at base; fruiting pedicel 2–4 mm, puberulent. Seeds ovoid-globose, ca. 5 mm, abaxially with margined furrow extending over 4/5 of length. Fl. Apr–May, fr. Jun–Sep. $2n = 24^*$.

• Thickets, open slopes; ca. 1800 m. Hebei, Henan, W Hubei, Jilin, Shandong, Shanxi.

This species is quite similar to *Rhamnus parvifolia*, but the latter differs in having leaves rhombic-obovate or rhombic-elliptic, abaxially with clustered hairs in vein axils; branchlets purple or dark brown, shiny; and seeds abaxially with margined, narrow furrows.

The leaves and bark contain dye used for dyeing tissues.

25. *Rhamnus parvifolia* Bunge, Enum. Pl. China Bor. 14. 1833 [*“parvifolius”*].

小叶鼠李 xiao ye shu li

Rhamnus globosa Bunge var. *ziziphifolia* Tang; *R. oiwakensis* Hayata; *R. parvifolia* var. *tumetica* (Grubov) N. W. Ma; *R. pianensis* Kanehira; *R. polymorpha* Turczaninow; *R. tumetica* Grubov.

Shrubs dioecious, 1.5–2 m tall, spinose, much branched. Branchlets opposite or subopposite, purple-brown, puberulent when young, later glabrescent, slightly shiny, silvery-gray, terminating in a spine; buds ovoid, ca. 2 mm, scales few, yellow-brown. Leaves opposite or subopposite, rarely alternate, or fascicled on short shoots; stipules subulate, puberulent; petiole 4–15 mm, adaxially puberulent; leaf blade abaxially greenish, gray-white when dry, adaxially dark green, rhombic-obovate or rhombic-elliptic, rarely obovate-orbicular or suborbicular, 1.2–4 × 0.8–2(–3) cm, papery, abaxially glabrous or sparsely puberulent in areoles of vein axils, adaxially glabrous or sparsely pubescent, lateral veins 2–4 pairs, prominent on both surfaces, base cuneate or subrounded, margin crenate-dentate, apex obtuse or subrounded, rarely acute. Flowers yellow-green, unisexual, 4-merous, usually few clustered on short shoots. Pedicels 4–6 mm, glabrous. Female flowers: style 2-cleft to half. Drupe nearly dry, black at maturity, obovoid-globose, 4–5 mm in diam., with 2 stones, with persistent calyx tube at base. Seeds brown, oblong-obovoid, abaxially with a yellow margined lateral furrow extending over 4/5 of length. Fl. Apr–May, fr. Jun–Sep.

Thickets, grasslands, stony slopes, on open shiny rocks; 400–2300 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Shandong, Taiwan [Korea, Mongolia, Russia (E Siberia)].

This species is variable in leaf shape and closely related to *Rhamnus tangutica*, but the latter differs in having leaves usually elliptic or obovate-elliptic, abaxially turning yellow when dry, and branchlets glabrous, shiny.

26. *Rhamnus arguta* Maximowicz, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 10(11): 6. 1866.

锐齿鼠李 rui chi shu li

Shrubs or small trees, dioecious, 2–3 m tall, spinose or unarmed. Bark gray-brown; branchlets opposite or subopposite, rarely alternate, dark purple or purple-red, smooth, glabrous, sometimes terminating in a spine; terminal buds purple-black, narrowly ovoid, large, with few scales, scale margin ciliate. Leaves subopposite to opposite, or alternate, fascicled on short shoots; petiole red or red-purple, 1–3(–4) cm, adaxially canaliculate, ± puberulent; leaf blade ovate-cordate or ovate-orbicular, rarely suborbicular or elliptic, 1.5–6(–8) × 1.5–4.5(–6) cm, thinly papery or papery, glabrous or leaves abaxially or veins and petioles puberulent, lateral veins 4 or 5 pairs, slightly prominent on both surfaces, base cordate or rounded, margin densely sharply serrate, apex obtuse-rounded or acute. Flowers unisexual, 4-merous. Male flowers 1–20-fascicled at ends of short shoots or in leaf axils of lower part of long shoots; pedicels 8–12 mm. Female flowers few fascicled in leaf axils; pedicels ca. 2 cm; ovary globose, 3- or 4-loculed; style 3- or 4-cleft. Drupe black at maturity, globose or obovoid-globose, 6–7 mm in diam., with persistent calyx tube at base, with 3 or 4 stones; fruiting pedicel 1.3–2.3 cm, glabrous. Seeds oblong-ovoid, abaxially with margined furrow extending over 4/5 of length. Fl. May–Jun, fr. Jun–Sep. $2n = 24^*$.

• Forests and thickets on slopes; below 2000 m. Hebei, Heilongjiang, Liaoning, Shaanxi, Shandong, Shanxi.

- 1a. Both surfaces of leaves and petioles glabrous 26a. var. *arguta*
1b. Leaves abaxially or at least veins and petioles puberulent 26b. var. *velutina*

26a. *Rhamnus arguta* var. *arguta*

锐齿鼠李(原变种) rui chi shu li (yuan bian zhong)

Rhamnus arguta var. *betulifolia* Liou & Li; *R. arguta* var. *cuneatifolia* Wang & Li; *R. arguta* var. *rotundifolia* Wang & Li.

Both surfaces of leaves and petioles glabrous.

• Thickets on slopes; below 2000 m. Hebei, Heilongjiang, Liaoning, Shaanxi, Shandong, Shanxi.

The seeds are used for extracting oil. The stems, leaves, and seeds are used for making insecticide.

26b. *Rhamnus arguta* var. *velutina* Handel-Mazzetti, Oesterr. Bot. Z. 82: 251. 1933.

毛背锐齿鼠李 mao bei rui chi shu li

Leaves abaxially or at least veins and petioles puberulent.

• Forests and thickets on slopes; 900–1600 m. Hebei, Shanxi.

27. *Rhamnus globosa* Bunge, Enum. Pl. China Bor. 14. 1833 [*“globosus”*].

圆叶鼠李 yuan ye shu li

Rhamnus chlorophora Decaisne; *R. globosa* var. *meyeri* (C. K. Schneider) S. Y. Li & Z. H. Ning; *R. meyeri* C. K. Schneider.

Shrubs, rarely small trees, dioecious, 2–4 m tall, spinose, divaricate. Branchlets opposite or subopposite, gray-brown, terminating in a spine; young branches puberulent, glabrescent. Leaves opposite or subopposite, rarely alternate, or fascicled on short shoots; stipules persistent, linear-lanceolate, puberulent; petiole 6–10 mm, densely pubescent; leaf blade abaxially pale green, adaxially green, suborbicular, obovate-orbicular, or ovate-orbicular, rarely orbicular-elliptic, 1–6 × 1.2–4 cm, papery or thinly papery, abaxially throughout or on veins pubescent, adaxially initially densely pubescent, glabrescent, or only veins and margin becoming sparsely pubescent, lateral veins (2 or)3 or 4 pairs, prominent abaxially, impressed adaxially, base broadly cuneate or subrounded, margin irregularly crenate-serrate, apex acute or shortly acuminate, rarely rounded-obtuse. Flowers unisexual, 4-merous, usually few- to 20-fascicled on terminal branches or in leaf axils of lower parts of long shoots, rarely 2- or 3-fascicled in leaf axils of annual branches; petals, calyx, and pedicels sparsely puberulent. Pedicels 4–8(–10) mm. Style 2- or 3-fid or cleft to half. Drupe black at maturity, globose or obovoid-globose, often slightly asymmetric, 4–6 mm in diam., with persistent calyx tube at base, with 2(or 3) stones; fruiting pedicel 5–8 mm, sparsely pubescent. Seeds black-brown, shiny, abaxially or laterally with margined furrow extending over 3/5 of length. Fl. Apr–May, fr. Jun–Oct.

• Understories of forests and thickets, slopes; below 1600 m. Anhui, Gansu, Hebei, S and W Henan, Hunan, Jiangsu, Jiangxi, Liaoning, SW Shaanxi, Shandong, Shanxi.

Oil extracted from the seeds is used for making lubricating oil. The bark, fruit, and roots are used for making a green dye.

28. *Rhamnus iteinophylla* C. K. Schneider, Notizbl. Königl. Bot. Gart. Berlin 5: 76. 1908.

桃叶鼠李 tao ye shu li

Shrubs dioecious, to 1.5 m tall, spinose or unarmed. Young branches glabrous or subglabrous; branchlets opposite or subopposite, rarely alternate, gray-brown or purple-black, sometimes terminating in a spine; terminal buds small with few scales; axillary buds inconspicuous. Leaves opposite or subopposite, rarely alternate, fascicled on short shoots; stipules lanceolate, longer than petioles, sparsely ciliate, persistent; petiole 2–6 mm, puberulent; leaf blade abaxially pale green, adaxially green, narrowly elliptic or narrowly oblanceolate-elliptic, 4–10 × 1–2.2 cm, papery, abaxially clustered hairy only in vein axils, adaxially puberulent initially on veins, glabrescent, lateral veins (4 or)5 or 6(or 7) pairs, prominent abaxially, conspicuously impressed adaxially, base cuneate, margin crenate-dentate, apex caudate-acuminate or acuminate, mucronulate; mucro ca. 2 mm, erect or curved. Flowers unisexual, 4-merous. Pedicels ca. 5 mm. Petals present. Male flowers few- to 10-fascicled on short shoots, with rudimentary pistil. Female flowers 1- to few fascicled in leaf axils on short shoots; rudimentary stamens minute; ovary 3-loculed; style 3-fid or cleft to half. Drupe purple-black, obovoid-globose, often slightly asymmetric, 3.5–4 mm in diam., with persistent style at apex, persistent calyx tube at

base, and 2 or 3 stones; fruiting pedicel 5–7 mm, glabrous. Seeds abaxially with margined furrow extending over 2/3 of length.

• Forests, thickets, slopes; 1000–2000 m. W Hubei, E Sichuan, SE Yunnan (Guangnan).

29. *Rhamnus leptophylla* C. K. Schneider, Notizbl. Königl. Bot. Gart. Berlin 5: 77. 1908.

薄叶鼠李 bao ye shu li

Rhamnus inconspicua Grubov.

Shrubs, rarely small trees, dioecious, to 5 m tall, spinose, divaricate. Branchlets opposite or subopposite, shiny, brown or yellow-brown, rarely purple-red, smooth, glabrous, terminating in a spine; buds small, glabrous. Leaves opposite or subopposite, or fascicled on short shoots; stipules linear, caducous; petioles 0.7–2 cm, adaxially canaliculate, glabrous or sparsely puberulent; leaf blade abaxially pale green, adaxially dark green, obovate to obovate-elliptic, rarely elliptic or oblong, 3–8 × 2–5 cm, papery, abaxially distinctly bearded at vein axils, adaxially glabrous or sparsely hairy on midvein, lateral veins 3–5 pairs, prominent abaxially, impressed adaxially, base cuneate, margin crenate to serrate, apex shortly cuspidate to acuminate. Flowers unisexual, 4-merous. Pedicels 4–5 mm, glabrous. Petals present. Male flowers 10–20-fascicled on short shoots. Female flowers few- to 10-fascicled at apices of short shoots or in leaf axils of lower part of long shoots; rudimentary stamens minute; style 2-cleft to half. Drupe black at maturity, globose, 4–6 mm in diam., with persistent calyx tube at base and minute apical mucro, with 2 or 3 stones; fruiting pedicel 6–8(–10) mm. Seeds dark brownish, broadly obovoid, abaxially with margined furrow extending over 2/3–3/4 of length. Fl. Mar–May, fr. May–Oct.

• Thickets, forest margins, valleys, slopes, roadsides; 1700–2600 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang.

The entire plant is used medicinally.

30. *Rhamnus dumetorum* C. K. Schneider in Sargent, Pl. Wilson. 2: 237. 1914.

刺鼠李 ci shu li

Shrubs dioecious, 3–5 m tall, unarmed. Branchlets pale gray-brown, scabrous or shiny. Leaves opposite or subopposite, or fascicled on short shoots; stipules lanceolate, shorter than or nearly equaling petiole; petiole 2–7 mm, puberulent; leaf blade abaxially pale green, adaxially green, elliptic, rarely obovate, oblanceolate-elliptic, or oblong, 2.5–9 × 1–3.5 cm, abaxially sparsely or clustered hairy on veins and vein axils, rarely glabrous, or densely pubescent on veins, adaxially sparsely puberulent, lateral veins 4 or 5(or 6) pairs, prominent abaxially, slightly impressed adaxially, abaxially often with shallow areola in vein axils, base cuneate, margin inconspicuously undulate or crenulate, or crenate-serrate, apex acute or acuminate, rarely subrounded. Flowers unisexual, 4-merous. Pedicels 2–4 mm. Petals present. Male flowers few. Female flowers few- to 10-fascicled at apices of short shoots, puberulent; style 2-fid or cleft to half. Drupe globose, ca. 5 mm in diam., with persistent

calyx tube at base, with 1 or 2 stones; fruiting pedicel 3–6 mm, sparsely puberulent. Seeds black or purple-black, abaxially with short furrow at base, upper part fissured. Fl. Apr–May, fr. Jun–Oct.

• Understories of forests and thickets, thickets on slopes; 900–3300 m. Anhui, SE Gansu, Guizhou, W Hubei, Jiangxi, S Shanxi, Sichuan, Xizang, NW Yunnan, Zhejiang.

- 1a. Leaf margin serrulate or inconspicuously undulate, petiole and veins on abaxial leaf surface sparsely puberulent 30a. var. *dumetorum*
 1b. Leaf margin crenate-serrate, petiole and veins on abaxial leaf surface densely pubescent 30b. var. *crenoserrata*

30a. *Rhamnus dumetorum* var. *dumetorum*

刺鼠李(原变种) ci shu li (yuan bian zhong)

Petiole sparsely puberulent; leaf blade abaxial surface sparsely puberulent on veins, margin serrulate or inconspicuously undulate.

• Forest understories, thickets on slopes; 900–3300 m. Anhui, SE Gansu, Guizhou, W Hubei, Jiangxi, S Shanxi, Sichuan, Xizang, NW Yunnan, Zhejiang.

This species differs from *Rhamnus tangutica* and *R. virgata* in having branchlets pale gray-brown; bark scabrous, not shiny; petioles shorter; and seeds black, abaxially with short furrow at base only.

30b. *Rhamnus dumetorum* var. *crenoserrata* Rehder & E. H. Wilson in Sargent, Pl. Wilson. 2: 238. 1914.

圆齿刺鼠李 yuan chi ci shu li

Petiole densely pubescent; leaf blade abaxial surface densely pubescent on veins, margin crenate-serrate.

• Understories of forests and thickets; 2000–2200 m. W Sichuan, E Xizang, NW Yunnan.

31. *Rhamnus tangutica* J. J. Vassiljev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 127. 1940.

甘青鼠李 gan qing shu li

Rhamnus leptophylla C. K. Schneider var. *scabrella* Rehder; *R. potaninii* J. J. Vassiljev; *R. virgata* Roxburgh var. *parvifolia* Maximowicz.

Shrubs, rarely trees, dioecious, 2–6 m tall, spinose. Branchlets opposite or subopposite; young branches green, glabrous or subglabrous; older branches red-brown or black-brown, smooth, shiny, terminating in a spine. Leaves opposite or subopposite, or fascicled on short shoots; stipules linear, often persistent; petiole to 1.3 cm; leaf blade abaxially pale green, turning yellow when dry, adaxially dark green, elliptic, obovate-elliptic, or obovate, 2.5–6 × 1–3.5 cm, papery or thickly papery, abaxially sparsely puberulent on veins and vein axils, adaxially sparsely shortly hairy or subglabrous, lateral veins 4 or 5 pairs, base cuneate, margin obtuse or crenulate, apex shortly acuminate or acute, rarely subrounded. Flowers unisexual, 4-merous. Pedicels 4–6 mm, glabrous or subglabrous. Petals present. Male flowers few to 10. Female flowers

3–9-fascicled on short shoots; style 2-fid. Drupe black at maturity, obovoid-globose, 4–6 mm in diam., with persistent calyx tube at base, with 2 stones; fruiting pedicel 6–8 mm, glabrous. Seeds red-brown, abaxially-laterally with margined furrow extending over 3/4–4/5 of length. Fl. May–Jun, fr. Jun–Sep.

• Forests and thickets in valleys; 1200–3700 m. S Gansu, W Henan, Qinghai, C Shaanxi, W Sichuan, E Xizang.

The fruit is used for making dye.

This species is quite similar to *Rhamnus virgata*, but the latter differs in having young branches hairy and leaves thin, concolorous on both surfaces, turning red when dry, with conspicuous reticulate veins.

32. *Rhamnus virgata* Roxburgh, Fl. Ind. 2: 351. 1824.

帚枝鼠李 zhou zhi shu li

Shrubs or trees, dioecious, to 6 m tall, spinose. Branchlets opposite or subopposite; young branches densely hirsute; older branches virgate, shiny, red-brown or purple-red, smooth, glabrous, terminating in a spine. Leaves opposite or subopposite, or fascicled on short shoots; stipules lanceolate, often persistent; petiole 4–10(–15) mm, adaxially canaliculate and puberulent or densely hirsute; leaf blade vivid greenish, turning red when dry, obovate-lanceolate, obovate-elliptic, or elliptic, 2.5–8 × 1.5–3 cm, papery or thinly papery, abaxially pilose on veins or only in vein axils, or subglabrous or densely hirsute, adaxially pilose or subglabrous or pilose only on veins, lateral veins 4 or 5 pairs, reticulate veins conspicuous, base cuneate, margin crenate-serrulate, apex acuminate or shortly acuminate, rarely acute. Flowers unisexual, 4-merous. Petals present, 3–4 mm, sparsely puberulent or glabrous. Female flowers few, fascicled on short shoots, with rudimentary stamens; style 2-cleft. Drupe bluish black, subglobose, with persistent calyx tube at base, 4–5 mm in diam., with 2 stones; fruiting pedicel 2–5 mm. Seeds red-brown, abaxially with margined furrow extending over 2/3–3/4 of length. Fl. Apr–May, fr. Jun–Oct.

Forests, thickets on mountains and slopes; 1200–3800 m. Guizhou, SW Sichuan, E and SE Xizang, Yunnan [Bhutan, India, Nepal, Thailand].

- 1a. Annual branches glabrous; abaxial leaf surface subglabrous or sparsely pubescent on veins or vein axils, petioles adaxially puberulent 32a. var. *virgata*
 1b. Annual branches, petioles, and both surfaces of leaves or veins abaxially densely hirsute 32b. var. *hirsuta*

32a. *Rhamnus virgata* var. *virgata*

帚枝鼠李(原变种) zhou zhi shu li (yuan bian zhong)

Rhamnus leptophylla C. K. Schneider var. *milensis* C. K. Schneider.

Annual branches glabrous. Petiole adaxially puberulent only; leaf blade abaxially sparsely pubescent or subglabrous on veins or vein axils.

Forests, thickets on slopes; 1200–3800 m. Guizhou, SW Sichuan, E and SE Xizang, Yunnan [Bhutan, India, Nepal, Thailand].

32b. *Rhamnus virgata* var. *hirsuta* (Wight & Arnott) Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 80. 1979.

糙毛帚枝鼠李 cao mao zhou zhi shu li

Rhamnus hirsuta Wight & Arnott, Prodr. Fl. Ind. Orient. 1: 165. 1834; *R. davurica* Pallas var. *hirsuta* (Wight & Arnott) M. A. Lawson.

Annual branches, petioles, and both surfaces of leaves or veins abaxially densely hirsute.

Mountain thickets; 2000–2900 m. SW Sichuan, E Xizang, NW Yunnan [India].

33. *Rhamnus cathartica* Linnaeus, Sp. Pl. 1: 193. 1753.

药鼠李 yao shu li

Shrubs or trees, dioecious, 5–8 m tall, spinose. Young branches glabrous; branchlets opposite or subopposite, purple-red or silvery-gray, terminating in a spine; terminal buds elliptic, with few scales, margin ciliate. Leaves subopposite or alternate, or fascicled on short shoots; petiole 1–2.7 cm, adaxially canaliculate, sparsely hairy or subglabrous; leaf blade elliptic, ovate-elliptic, or ovate, 3–6.5 × 1.5–3 cm, papery, both surfaces glabrous, lateral veins 3 or 4 pairs, proximal pair often slightly stronger than others, base rounded or broadly cuneate, margin densely crenate-serrate, apex shortly acuminate, acute, or rounded-obtuse. Flowers unisexual, 4-merous, usually 10-fascicled on short shoots or in leaf axils of lower part on long shoots. Pedicels 2–4 mm. Male flowers with petals; ovary rudimentary. Female flowers apetalous, with minute rudimentary stamens; ovary 3-loculed; style long, 3-fid. Drupe black, globose, to 1 cm in diam., with 3 stones, with persistent calyx tube at base. Seeds yellow, abaxially with margined furrow extending over 3/4 of length. Fl. May–Jun, fr. Jul–Sep. $2n = 24$.

Thickets, valleys, slopes; 1200–1400 m. N Xinjiang [Russia (W Siberia)]; NW Africa, C and SW Asia, Europe].

The fruit is used medicinally for treating constipation.

34. *Rhamnus diamantiaca* Nakai, Bot. Mag. (Tokyo) 31: 98. 1917.

金刚鼠李 jin gang shu li

Rhamnus virgata Roxburgh var. *sylvestris* Maximowicz.

Shrubs dioecious, to 2 m tall, spinose. Branchlets opposite or subopposite, dark purple, smooth, glabrous, terminating in a spine; axillary buds small, scales glabrous. Leaves opposite or subopposite, rarely alternate; stipules linear-lanceolate, margin ciliate, caducous; petiole 1–2(–3) cm; leaf blade suborbicular, ovate-rhombic, or elliptic, 3–7 × 1.5–3.5(–4.5) cm, papery or thinly so, both surfaces glabrous, rarely abaxially pilose in vein axils and adaxially pilose on midvein, lateral veins 4 or 5 pairs, base cuneate or subrounded, margin crenate-serrate, apex acute or acuminate. Flowers unisexual, 4-merous, usually few fascicled on short shoots or in lower leaf axils of long shoots. Pedicels 3–4 mm. Petals present. Drupe black or purple-black, subglobose or obovoid-globose, 4–6 mm in diam., with (1 or) 2 stones, with persistent calyx tube at base; fruiting pedicel 7–8

mm. Seeds black-brown, with short abaxial furrow extending over 1/3 of length. Fl. May–Jun, fr. Jul–Sep.

Mixed forests, riverbanks. Heilongjiang, Jilin, Liaoning [Japan, N Korea, Russia (Far East)].

35. *Rhamnus ussuriensis* J. J. Vassiljev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 115. 1940.

乌苏里鼠李 wu su li shu li

Rhamnus cathartica Linnaeus var. *dahurica* Maximowicz; *R. cathartica* var. *intermedia* Maximowicz.

Shrubs spinose, dioecious, to 5 m tall, glabrous or subglabrous. Branchlets opposite or subopposite, slightly virgate, gray-brown, smooth, often terminating in a spine; axillary and terminal buds ovoid, with few scales, 3–4 mm. Leaves opposite or subopposite, or fascicled on short shoots; stipules lanceolate, caducous; petiole 1–2.5 cm; leaf blade shiny, narrowly elliptic or narrowly oblong, rarely lanceolate-elliptic or elliptic, 3–10.5 × 1.5–3.5 cm, papery, both surfaces glabrous or hairy only on midvein, lateral veins 4 or 5(or 6) pairs, prominent on both surfaces, base cuneate or rounded, slightly oblique, margin obtusely serrate or crenate-serrate, with glandular teeth, apex acute or shortly acuminate. Flowers unisexual, 4-merous. Pedicels 6–10 mm. Petals present. Female flowers few- to 20-fascicled in leaf axils of long shoots or on short shoots; sepals ovate-lanceolate, 3–4 × as long as calyx tube, with rudimentary stamens; style 2-fid or cleft to half. Drupe black, globose or obovoid-globose, 5–6 mm in diam., with 2 stones, with persistent calyx tube at base; fruiting pedicel 6–10 mm. Seeds black-brown, ovoid, abaxially-laterally with short margined furrow slit at upper part. Fl. Apr–Jun, fr. Jun–Oct.

Mountain forests, thickets on slopes, riverbanks; below 1600 m. Heilongjiang, N Hubei, Jilin, Liaoning, Nei Mongol, E Shandong (Kun-yu Shan) [Japan, N Korea, Mongolia, Russia (Far East, W Siberia)].

This species is quite similar to *Rhamnus davurica*, but the latter differs in having broader elliptic or ovate leaves and terminal buds not changed into a spine.

36. *Rhamnus davurica* Pallas, Reise Russ. Reich. 3: 721. 1776 [“*dauurica*”].

鼠李 shu li

Shrubs or small trees, dioecious, to 10 m tall, unarmed, much branched. Branchlets opposite to subopposite, or fascicled on short shoots, brown or red-brown, glabrous or slightly smooth, often terminating in a large bud; terminal and axillary buds ovoid, large, 5–8 mm; scales pale brown, conspicuously white ciliate. Leaves opposite or fascicled on short shoots; petiole 1.5–4 cm, glabrous or pilose; leaf blade broadly elliptic or ovate, rarely oblanceolate-elliptic, 4–13 × 2–6 cm, papery, abaxially sparsely pilose on veins, adaxially glabrous or sparsely pilose on veins, lateral veins 4 or 5(or 6) pairs, prominent on both surfaces, base cuneate or subrounded, sometimes slightly oblique, margin finely crenate, with glandular teeth, apex acute or shortly acuminate to acuminate, rarely obtuse or rounded. Flowers yellowish green, unisexual, 4-merous. Sepals very thin, translucent, 3-veined. Petals present. Male flowers 7–8 mm, very narrow; calyx tube narrowly funnel-shaped, ovary rudi-

mentary. Female flowers 1–3 in leaf axils or few- to 20-fascicled on short shoots, with rudimentary stamens; style 2- or 3-fid or cleft to half, 7–8 mm. Drupe black, globose, 5–6 mm in diam., with 2 stones, with persistent calyx tube at base; fruiting pedicel 1–1.2 cm. Seeds yellow-brown, ovoid-globose, abaxially-laterally narrowly furrowed for entire length. Fl. May–Jun, fr. Jul–Oct. $2n = 24^*$.

Forests on slopes, forest margins, thickets, wet places along canals; below 1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Shanxi [N Korea, Mongolia, Russia (Far East, Siberia)].

The bark and fruit are used for making a yellow dye, the hard wood for making furniture, and oil extracted from the seeds for making lubricating oil. The fleshy fruit is used medicinally.

37. *Rhamnus utilis* Decaisne, Compt. Rend. Hebd. Seances Acad. Sci. 44: 1141. 1857.

冻绿 dong lü

Shrubs or small trees, dioecious, to 4 m tall, mainly spinose, rarely unarmed. Branches opposite to subopposite; young branches whitish to grayish pubescent, glabrescent, terminating in a bud or spine; old branches brown or purple-red, smooth. Leaves opposite to subopposite or fascicled on short shoots; stipules lanceolate, often pilose, persistent; petiole 0.5–1.5 cm, adaxially canaliculate; leaf blade abaxially yellow-green, adaxially dark green, shiny, elliptic, oblong, or obovate-elliptic, 4–15 × 2–6.5 cm, papery to subleathery, abaxially golden-yellow pubescent on veins, adaxially mostly glabrous, lateral veins 5 or 6(–8) pairs, prominent on both surfaces, base cuneate or rarely rounded, sometimes slightly asymmetric, margin finely serrate, apex acute. Flowers unisexual, 4-merous. Pedicels 5–7 mm, glabrous, white pilose, or gray pubescent. Calyx puberulent or glabrous. Petals present. Male flowers few fascicled in leaf axils or 10–30-fascicled at lower part of branchlets, with rudimentary pistil. Female flowers 2–6-fascicled in leaf axils or at lower part of branchlets; rudimentary stamens small; style long, 2-fid or cleft to half. Drupe black at maturity, globose or subglobose, with 2 stones, with persistent calyx tube at base; fruiting pedicel 5–12 mm, glabrous. Seeds abaxially-laterally with margined short furrow at base. Fl. Apr–Jun, fr. May–Aug.

Forests, thickets, mountains, hills, grassy slopes; below 3300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Zhejiang [Japan, Korea].

Oil extracted from the seeds is used for making lubricating oil. The fruit, bark, and leaves contain yellow dye.

- 1a. Young branches, annual branches, and petioles sparsely or densely grayish pubescent; pedicels sparsely puberulent 37b. var. *hypochrysa*
- 1b. Young branches and annual branches glabrous; petiole glabrous or subglabrous; pedicels glabrous.
- 2a. Branches terminating in a spine; leaf margin serrulate or crenate-serrate, leaf blade adaxially glabrous or subglabrous, abaxially pubescent on veins 37a. var. *utilis*

- 2b. Branches terminating in a bud, but without spine; leaf margin conspicuously deeply serrate or double serrate, leaf blade abaxially white hirsute, adaxially pubescent on veins 37c. var. *szechuanensis*

37a. *Rhamnus utilis* var. *utilis*

冻绿(原变种) dong lü (yuan bian zhong)

Rhamnus utilis f. *glabra* Rehder; *R. utilis* var. *multinervis* Y. Q. Zhu & D. K. Zang.

Branches terminating in a spine; young branches and annual branches glabrous. Petiole glabrous or subglabrous; leaf blade abaxially pubescent on veins, adaxially glabrous or subglabrous, margin serrulate or crenate-serrate. Pedicels glabrous.

Sparse forests, thickets, mountains, hills, grassy slopes; below 1500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Zhejiang [Japan, Korea].

37b. *Rhamnus utilis* var. *hypochrysa* (C. K. Schneider) Rehder, J. Arnold Arbor. 14: 349. 1933.

毛冻绿 mao dong lü

Rhamnus hypochrysa C. K. Schneider, Notizbl. Königl. Bot. Gart. Berlin 5: 76. 1908.

Young branches, annual branches, and petioles sparsely or densely grayish pubescent. Leaves smaller, both surfaces golden-yellow pubescent especially abaxially. Pedicels sparsely puberulent.

• Thickets on slopes, forest understories. Gansu, Guangxi, Guizhou, Henan, Hubei, Shanxi, Sichuan.

37c. *Rhamnus utilis* var. *szechuanensis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 80. 1979.

高山冻绿 gao shan dong lü

Branches terminating in a bud, but without spine. Leaf blade abaxially white hirsute, adaxially pubescent on veins, base inequilateral, margin conspicuously deeply serrate or double serrate.

• Forests in valleys; 2600–3300 m. S Gansu, N Sichuan.

38. *Rhamnus erythroxylum* Pallas, Reise Russ. Reich. 3: 722. 1776.

柳叶鼠李 liu ye shu li

Shrubs, rarely trees, dioecious, to 2 m tall, very spinose. Young branches brown or purple-brown, smooth, glabrous; branchlets alternate, terminating in a spine. Leaves alternate or fascicled on short shoots; stipules subulate, caducous; petiole 3–15 mm, glabrous or puberulent; leaf blade abaxially brownish, narrowly lanceolate to narrowly obovate, 3–5 cm × 3–10 mm, papery, both surfaces glabrous, lateral veins 4 or 5 pairs, venation abaxially distinctly prominent, adaxially inconspicuous, base cuneate, margin remotely serrulate, apex acute or obtuse. Flowers yellow-green, unisexual, 4-merous. Pedicels ca. 5 mm, glabrous. Petals present. Male flowers few- to 20-fascicled on short shoots, broadly campanulate; sepals subequal to

calyx tube. Female flowers: sepals narrowly lanceolate, ca. 2 × as long as calyx tube, with rudimentary stamens; ovary 2- or 3-loculed; styles 2(or 3)-fid or cleft to half. Drupe black at maturity, globose, 5–6 mm in diam., usually 2(or 3) stones, with persistent calyx tube at base; fruiting pedicel 6–8 mm. Seeds pale brown, obovoid, 3–4 mm, abaxially with narrow margined furrow extending over 4/5 of length. Fl. May, fr. Jun–Jul.

Thickets, hills, open slopes, stony and rocky slopes, dry sands; 1000–2100 m. Gansu, Hebei, Nei Mongol, Qinghai, W Shaanxi, Shanxi [Mongolia, Russia (Siberia); SW Asia (Caucasus)].

The leaves are strongly fragrant and are used as a substitute for tea in Shaanxi.

39. *Rhamnus tzechweiensis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 81. 1979.

鄂西鼠李 e xi shu li

Shrubs prostrate, 8–20 cm tall. Spines not seen; annual branches pale yellow, slender, glabrous, terminal buds not becoming spinose; old branches often tortuous, striate or irregularly fissured. Leaves alternate or subopposite or fascicled on short shoots; stipules subulate, nearly equaling petioles or shorter, persistent; petiole 2–3 mm, adaxially canaliculate, glabrous; leaf blade abaxially golden-yellow when dry, adaxially green, narrowly oblanceolate or oblanceolate, small, 1–2.5 × 0.3–0.6 cm, papery or thinly leathery, both surfaces glabrous, lateral veins 3–5 pairs, curved, midvein and lateral veins slightly prominent abaxially, impressed adaxially, conspicuously reticulate, base narrowly cuneate, margin sparsely crenulate or entire or subentire at lower part, slightly revolute, apex rounded-obtuse or emarginate. Flowers not seen. Drupes 1 or 2 at lower part of branchlets or in leaf axils of short shoots, obovoid-globose, 4–5 mm in diam., with shallow cup-shaped persistent calyx tube at base; fruiting pedicel 5–8 mm, glabrous, with 2(or 3) stones. Seeds pale brown, shiny, obovoid-oblong, 4–5 mm, abaxially with margined furrow for 4/5 of length. Fl. unknown, fr. Jul–Aug.

- Rock crevices, stony sands. W Hubei (Zigui).

This species is closely related to *Rhamnus erythroxylum* but differs from the latter in having a prostrate, low habit; terminal buds small, never spinose; leaves small, oblanceolate or narrowly oblanceolate, with margin sparsely crenulate and apex rounded-obtuse; and stipules subulate, persistent.

Material of this species was not seen by the second author.

40. *Rhamnus aurea* Heppeler, Notizbl. Bot. Gart. Berlin-Dahlem 10: 343. 1928.

铁马鞭 tie ma bian

Shrubs small, dioecious, to 1 m tall, spinose. Young and annual branches puberulent; branchlets alternate or subopposite, gray-brown or black-brown, scabrous, terminating in a spine. Leaves alternate or fascicled on short shoots; petiole 1.5–3 mm, densely pilose; leaf blade golden-yellow when dry, elliptic, obovate-elliptic, or obovate, rarely oblong, 1–2 cm × 5–10 mm, papery or subleathery, abaxially densely pilose especially on veins, adaxially pilose, lateral veins 3 or 4 pairs, prominent abaxially, ± impressed adaxially, base cuneate, margin often

revolute, serrulate, apex obtuse or rounded, rarely emarginate. Flowers unisexual, 4-merous, usually 3–6-fascicled on short shoots. Pedicels 2–3 mm, pilose. Petals lanceolate, subequaling stamens. Styles in female flowers 2-fid or cleft to half. Drupe black at maturity, subglobose, 3–4 mm in diam., with 2 stones, with persistent calyx tube at base; fruiting pedicel 2–3 mm, pilose. Seeds brown, smooth, abaxially with margined furrow for 3/4–4/5 of length. Fl. Apr, fr. May–Aug.

- Forests on mountain slopes; 1800–2400 m. Yunnan.

This species is quite similar to *Rhamnus rosthornii*, but the latter differs in having leaves larger, leathery, glabrous on both surfaces, or pilose on midvein abaxially and clustered hairy in vein axils adaxially; also, the flowers and fruiting pedicels are glabrous.

41. *Rhamnus leptacantha* C. K. Schneider in Sargent, Pl. Wilson. 2: 236. 1914.

纤花鼠李 xian hua shu li

Shrubs spreading, dioecious, to 3 m tall, much spinose. Branches alternate or subopposite, often terminating in a woody spine; young branches yellow-green, pilose; older branches purple-red or dark purple, shiny, smooth, glabrous, with longitudinally fissured outer bark. Leaves alternate to subopposite, or fascicled on short shoots; stipules linear, ca. 1/2 as long as petiole; petiole 1–2 mm, puberulent; leaf blade abaxially pale green, adaxially grayish green, oblanceolate, obovate-elliptic, or oblong, small, narrow, 6–18 × 3–6 mm, subleathery, both surfaces glabrous or puberulent only at base, lateral veins 2–4 pairs, base cuneate, margin sparsely serrate, apex obtuse or emarginate. Flowers yellow-green, unisexual, 4-merous, glabrous. Pedicels 2–4 mm, slender. Male flowers 2–5-fascicled on short shoots, ca. 2.5 mm; sepals ovate-lanceolate, apex acute, ca. 2 × as long as petals; rudimentary ovary very small, narrow. Female flowers 2- or 3-fascicled at apices of branches or in leaf axils of lower part of annual branches; styles 2-fid. Drupe brown, subglobose, 3–4 mm in diam., with 2 or 3 stones, with persistent calyx tube at base; fruiting pedicel 4–5 mm, glabrous. Seeds yellow-brown, oblong-ovoid, abaxially-laterally with margined, broadly gaping furrow extending over 4/5 of length. Fl. Apr–Jun, fr. Jun–Sep.

- Forests and thickets on slopes; 700–1200 m. NW Hubei, E Sichuan.

42. *Rhamnus rosthornii* E. Pritzel, Bot. Jahrb. Syst. 29: 459. 1900.

小冻绿树 xiao dong lü shu

Rhamnus cavaleriei H. Léveillé (5 Dec 1911), not H. Léveillé (10 May 1911); *R. leveilleana* Fedde.

Shrubs or small trees, dioecious, to 3 m tall, spinose. Branches alternate or subopposite, terminating in a spine; young branches greenish pilose; old branches gray-brown or black-brown, glabrous, longitudinally fissured. Leaves alternate or fascicled on short shoots; stipules linear-lanceolate, puberulent, equaling petiole or slightly longer, persistent; petiole 2–4 mm, pilose; leaf blade abaxially pale green, adaxially dark green, shiny, spatulate, rhombic-elliptic, or obovate-elliptic, 1–2.5 × 0.5–1.2 cm, leathery or thinly leathery, abaxially often with bearded domatia in axils of primary and lateral veins,

adaxially glabrous, lateral veins 2–4 pairs, rather inconspicuous on both sides, base cuneate, rarely subrounded, margin crenate or obtusely serrate, slightly revolute, apex truncate or rounded, rarely acute. Flowers unisexual, 4-merous, glabrous. Pedicels 2–3 mm. Petals present. Female flowers few fascicled on short shoots or in leaf axils of annual branches; rudimentary stamens quite small; styles apically 2-cleft. Drupe black at maturity, globose, 3–5 mm in diam., with 2 stones, with persistent calyx tube at base; fruiting pedicel 2–4 mm, glabrous. Seeds red-brown, shiny, obovoid-globose, abaxially with margined furrow for 4/5 of length. Fl. Apr–May, fr. Jun–Sep.

• Forests at riversides, thickets, sunny slopes; 600–2600 m. Gansu, Guangxi, Guizhou, W Hubei, Shaanxi, Sichuan, Yunnan.

43. *Rhamnus songorica* Gontscharow, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 2: 243. 1936.

新疆鼠李 xin jiang shu li

Shrubs knotty branched (crooked), dioecious, to 1 m tall, spinose. Branchlets alternate, red-brown, puberulent or subglabrous, terminating in an obtuse spine. Leaves alternate or fascicled on short shoots; stipules subulate, persistent; petiole 2–3 mm; leaf blade abaxially yellow-green, adaxially gray-green, elliptic or oblong, rarely lanceolate-elliptic, 1–2.2 × 0.3–1.2 cm, papery, abaxially finely pubescent at base, adaxially glabrous, with stout primary vein and 3 or 4 pairs of lateral veins, primary vein prominent on both sides, lateral veins inconspicuous, base cuneate, margin entire or above middle inconspicuously serrulate, apex obtuse. Flowers unisexual. Male flowers few fascicled on short shoots, 4-merous. Pedicels 2–3 mm. Petals present. Female flowers yellow-green; sepals ovate, 3-veined; petals oblong-ovate; rudimentary stamens present; ovary globose, 3-loculed; styles cleft to half. Drupe black at maturity, globose, ca. 6 mm in diam., with 2 or 3 stones, with persistent calyx tube at base; fruiting pedicel ca. 3 mm. Seeds brown, shiny, oblong-ovoid, abaxially with cartilaginous margined, shallow furrow for 4/5 of length. Fl. Apr–May, fr. Jun–Aug.

Forests, thickets, dry pebbly and stony mountain slopes; 1000–2000 m. W Xinjiang [Russia].

According to the original description, the leaves are entire, but plants from Xinjiang differ in having sparsely crenulate leaves of slightly thin texture.

44. *Rhamnus minuta* Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 12: 131. 1950 [*“minutus”*].

矮小鼠李 ai xiao shu li

Shrubs creeping or pulvinate, dioecious, small, 10–25 cm tall, spinose, profusely shortly branched. Branchlets strict, alternate, dark gray or gray-brown, smooth or longitudinally fissured, terminating in a spine. Leaves very small, alternate or fascicled on short shoots; stipules linear-lanceolate, subequaling petiole; petiole 1–2 mm, puberulent; leaf blade bright green, unicolored on both surfaces, obovate, obovate-elliptic, or oblong, very small, 5–10 × 2.5–6 mm, papery, glabrous or puberulent, lateral veins 2 or 3 pairs, inconspicuous, base broadly cuneate, margin sparsely acutely denticulate, apex obtuse or rounded, rarely acuminate. Flowers unisexual, broadly campanulate, 1.5–2 mm, glabrous, usually 2- or 3-fascicled in leaf axils

of short shoots, shortly pedicellate. Drupe yellow or dark brown at maturity, obovoid-globose, 3–4.5 mm in diam., with 2 or 3 stones, base with cup-shaped persistent calyx tube. Seeds brown, shiny, oblong-ovoid, oblique, ca. 3 mm, abaxially with margined, narrow furrow extending over nearly whole length.

Rock crevices in subalpine and alpine zones; 2800–4000 m. SW Xinjiang [Russia].

45. *Rhamnus prostrata* R. N. Parker, Bull. Misc. Inform. Kew 1921: 217. 1921.

平卧鼠李 ping wo shu li

Shrubs low, prostrate, deciduous, dioecious, 1–2 m tall, spinescent. Branches alternate, short; young branches spreading, red-brown, puberulent or glabrous; flowering branches often crooked, gray-brown or red-brown, slightly scaly, terminating in a spine. Leaves alternate or fascicled on short shoots; stipules red-brown, subulate-lanceolate, shorter than petiole or slightly longer, puberulent, persistent; petiole 1–3 mm, puberulent; leaf blade abaxially yellow-green, turning yellow when dry, adaxially green, elliptic or ovate-elliptic, rarely oblong, small, 0.2–2.2 cm × 4–10 mm, papery, both surfaces puberulent or subglabrous, lateral veins 2–4 pairs, abaxially slightly conspicuous, often connected near margin, base broadly cuneate, margin inconspicuously denticulate or subentire, apex obtuse or rounded, sometimes emarginate. Flowers yellow-green, unisexual, usually 3- or 4-fascicled on short shoots. Pedicels short, puberulent. Calyx cup-shaped; sepals ovate-triangular. Petals narrowly obovate, cucullate, very small. Disk glabrous. Style 3- or 4-fid. Drupe purple-red, turning black at maturity, obovoid-globose, ca. 5 mm in diam., with 3 or 4 stones, with cup-shaped persistent calyx tube at base; fruiting pedicel 3–4 mm, subglabrous. Seeds yellow-brown, with brownish dots, ovoid-oblong, ca. 3 mm, abaxially with shallow margined furrow extending over 4/5 of length. Fl. May–Jun, fr. Jun–Aug.

Rock crevices in subalpine and alpine zones, stony slopes; 2800–3900 m. W Xizang [Afghanistan, E and W India, Kashmir, Pakistan].

This species is quite similar to *Rhamnus minuta*, but the latter is shorter (not more than 25 cm tall), with obovate or obovate-elliptic leaves not more than 1 cm.

46. *Rhamnus nakaharae* (Hayata) Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 61. 1911 [*“nakaharai”*].

台中鼠李 tai zhong shu li

Rhamnus arguta Maximowicz var. *nakaharae* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 70. 1908 [*“nakaharai”*].

Shrubs dioecious, unarmed, glabrous. Branches alternate, spreading; young branches grayish, longitudinally fissured; older branches dark brown, scabrous, terminal buds with distinctly elongated, reddish, glabrous scales, to 2 cm. Stipules reddish, subulate-lanceolate, caducous; petiole ca. 1 cm, glabrous; leaf blade abaxially pale green, adaxially green, oblong-ovate or ovate-orbicular, (5–)7–10 × 3–5 cm, membranous or thinly papery, both surfaces glabrous, lateral veins 4–6 pairs, curved, slightly prominent abaxially, inconspicuous adaxially, base subrounded, rarely cuneate, margin crenate-serrate, apex acuminate to caudate-acuminate, rarely acute. Flowers yellow-

green, unisexual, 4-merous, usually 5- or 6-fascicled in leaf axils, campanulate or narrowly campanulate, glabrous. Pedicels ca. 1 cm, slender. Sepals lanceolate, ca. 3 mm, with 3 veins. Male flowers: petals spatulate-oblongate, 1.5–2 mm; rudimentary ovary minute. Female flowers: petals rudimentary; stamens minute, ca. 0.5 mm; ovary globose; styles ca. 2 mm, 3- or 4-fid; stigma spreading, incurved. Drupe ellipsoid-globose, ca. 4 mm in diam., with 3 or 4 stones. Seeds brownish, obovoid, abaxially with whitish margined, narrow furrow extending over ca. 1/2 of seed length. Fl. Feb, fr. Feb–Nov.

- Forests on slopes; ca. 1300 m. Taiwan.

47. *Rhamnus wilsonii* C. K. Schneider in Sargent, Pl. Wilson. 2: 240. 1914.

山鼠李 shan shu li

Shrubs dioecious, 1–3 m tall, armed or unarmed. Branchlets alternate to subopposite, silvery-gray or gray-brown, sometimes terminating in an obtuse spine; terminal buds with few scales; scales pale green, ciliate. Leaves alternate to rarely subopposite, or fascicled at base of annual branches or on short shoots; petiole 2–4 mm, glabrous; leaf blade elliptic or broadly elliptic, rarely obovate-lanceolate or obovate-elliptic, 5–15 × 2–6 cm, papery or thinly papery, both surfaces glabrous or abaxially pubescent especially on veins, lateral veins 5–7 pairs, prominent abaxially, slightly impressed adaxially, reticulate veins conspicuous, base cuneate, margin hooked-crenate, apex acuminate or long acuminate. Flowers yellow-green, unisexual, 4-merous, few- to 20-fascicled at base of annual branches or 1 to few in axils. Pedicels 6–10 mm. Male flowers with petals present. Female flowers with rudimentary stamens; ovary globose, 3-loculed; styles longer than ovary, (2 or)3-fid or nearly cleft to half. Drupe purple-black or black at maturity, obovoid-globose, ca. 9 mm, 6–7 mm in diam., with 2 or 3 stones, with persistent calyx tube at base; fruiting pedicel 6–15 mm, glabrous. Seeds dark brown, obovoid-oblong, ca. 6.5 mm, abaxially with margined furrow extending over 2/5–1/2 of length, without fissured line. Fl. Apr–May, fr. Jun–Oct.

- Forests, forests margins, thickets, slopes, roadsides; 300–1600 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Zhejiang.

- 1a. Young branches, petioles, and leaves glabrous; leaf blade elliptic or broadly elliptic, 2–6 cm wide 47a. var. *wilsonii*
 1b. Young branches, petioles, and abaxial leaf surface especially along veins pubescent; leaf blade usually broadly elliptic, to 7.5 cm wide 47b. var. *pilosa*

47a. *Rhamnus wilsonii* var. *wilsonii*

山鼠李(原变种) shan shu li (yuan bian zhong)

Young branches, petioles, and leaves glabrous. Leaf blade elliptic or broadly elliptic, rarely obovate-lanceolate or obovate-elliptic, 2–6 cm wide.

- Forests and thickets along canals, slopes, roadsides; 300–1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Zhejiang.

47b. *Rhamnus wilsonii* var. *pilosa* Rehder, J. Arnold Arbor. 7: 167. 1927.

毛山鼠李 mao shan shu li

Young branches, petioles, and abaxial leaf surface especially along veins pubescent. Leaf blade usually broadly elliptic, to 7.5 cm wide.

- Forest margins, thickets, slopes; 400–1600 m. Anhui, Fujian, Jiangxi, Zhejiang.

48. *Rhamnus lamprophylla* C. K. Schneider, Notizbl. Königl. Bot. Gart. Berlin 5: 78. 1908.

钩齿鼠李 gou chi shu li

Rhamnus hamatidens H. Léveillé.

Shrubs or small trees, dioecious, to 6 m tall, spinescent. Branchlets alternate, rarely subopposite, gray-brown or yellow-brown, terminating in a spine; buds small, with few scales, glabrous. Leaves alternate or fascicled on short shoots; stipules caducous; petiole 5–10 mm; leaf blade narrowly elliptic or elliptic, rarely lanceolate or oblanceolate-elliptic, 5–12 × 2–5.5 cm, papery or thinly papery, both surfaces glabrous, lateral veins 4–6 pairs, base cuneate, margin hooked incurved-crenate, apex caudate-acuminate, rarely acute. Flowers yellow-green, unisexual, 4-merous. Pedicels 5–9 mm. Male flowers 2 to few in leaf axils or on short shoots or fascicled in lower parts of annual branches; petals present. Female flowers few to 10 in fascicles; styles 2- or 3-fid or nearly cleft to half. Drupe black at maturity, obovoid-globose, 6–7 mm, ca. 5 mm in diam., with 2(or 3) stones, with persistent calyx tube at base; fruiting pedicel 6–10 mm. Seeds dark brown, oblong-obovoid, abaxially with short margined furrow extending over 1/4 of length, fissured at upper part. Fl. Apr–May, fr. Jun–Sep.

- Forests, mountain thickets, shaded places; 400–1600 m. Fujian, Guangxi, Guizhou, W Hubei, Hunan, Jiangxi, E Sichuan, SE Yunnan.

49. *Rhamnus hupehensis* C. K. Schneider in Sargent, Pl. Wilson. 2: 236. 1914.

湖北鼠李 hu bei shu li

Shrubs 1.5–2 m tall, unarmed. Young branches alternate, yellow-green, glabrous, longitudinally striate when dry, ± with lenticels; old branches fissured, gray-brown, terminating in a large, ovoid bud 3–6 mm; scales few, pale yellow, black-brown at base, ciliate. Leaves alternate or fascicled at short shoots; stipules caducous; petiole 1–1.5 cm, adaxially canaliculate, glabrous; leaf blade abaxially pale green, adaxially dark green, elliptic or oblong-ovate, rarely lanceolate-elliptic, 5–11 × 2.5–5 cm, papery or thinly papery, both surfaces glabrous, lateral veins 5–7 pairs, prominent abaxially, impressed adaxially, base cuneate, margin sparsely serrate, apex shortly acuminate or acuminate. Flowers unisexual, few fascicled at short shoots. Drupes usually 1 or 2 on short shoots, black at maturity, obovoid-globose, 5–7 mm in diam., with 2 or 3 stones, with persistent calyx tube at base; fruiting pedicel 7–8 mm. Seeds purple-black, shiny, oblong-obovoid, 5–7 mm, abaxially with margined furrow extending over 5/7 of length. Fl. unknown, fr. Jun–Oct.

- Forests, thickets, slopes; 1700–2300 m. W Hubei.

50. *Rhamnus rugulosa* Hemsley, J. Linn. Soc., Bot. 23: 129. 1886 [“*rugulosus*”].

皱叶鼠李 *zhou ye shu li*

Shrubs dioecious, more than 1 m tall, spinescent. Young branches gray-green, turning red-purple, puberulent or glabrous; old branches alternate, dark red or purple-black, shiny, smooth, glabrous, terminating in a spine; axillary buds ovoid, small, with few scales, sparsely hairy. Leaves alternate on long shoots, or 2–5-fascicled on short shoots; stipules linear, caducous; petiole 5–16 mm, white pilose; leaf blade abaxially gray-green or gray-white, adaxially dark green, obovate-elliptic, obovate, or ovate-elliptic, rarely ovate or broadly elliptic, 3–10 × 2–6 cm, thickly papery, both surfaces densely whitish pubescent, lateral veins 5–7(–8) pairs, prominent abaxially, impressed adaxially, base rounded or cuneate, margin obtusely serrulate or shallowly denticulate, or inconspicuously denticulate at lower margin, apex acute or shortly acuminate, rarely subrounded. Flowers yellow-green, unisexual, 4-merous, sparsely pilose. Pedicels ca. 5 mm, sparsely hairy. Male flowers few to 20; calyx tube narrowly campanulate; sepals narrowly triangular; petals present. Female flowers 1–10-fascicled on lower part of annual branches or on short shoots; calyx tube hemispherical; sepals narrowly triangular; petals absent; stamens rudimentary; ovary globose; style long, shortly 2- or 3-cleft apically. Drupe purple-black or black at maturity, obovoid-globose or globose, 6–8 mm, ca. 4 mm in diam., with 2 or 3 stones, with persistent calyx tube at base; fruiting pedicel 5–16 mm, sparsely hairy. Seeds brown, shiny, oblong-obovoid, ca. 7 mm, abaxially with margined furrow ca. as long as seeds. Fl. Apr–May, fr. Jun–Sep.

- Mountain forests and thickets, thickets on slopes, thicket margins, slopes, along canals, roadsides; 500–2300 m. Anhui, S Gansu, Guangdong, Henan, Hubei, Hunan, Jiangxi, S Shaanxi, S Shanxi, E Sichuan, Zhejiang.

- 1a. Young branches glabrous 50c. var. *glabrata*
 1b. Young branches puberulent.
 2a. Leaf blade to 10 × 6 cm, margin
 obtusely serrulate 50a. var. *rugulosa*
 2b. Leaf blade to 4 × 2 cm, margin
 entire or slightly undulate 50b. var. *chekiangensis*

50a. *Rhamnus rugulosa* var. *rugulosa*

皱叶鼠李(原变种) *zhou ye shu li* (*yuan bian zhong*)

Rhamnus obovatilimba Merrill & F. P. Metcalf.

Young branches puberulent. Leaf blade 3–10 × 2–6 cm, margin obtusely serrulate.

- Thicket margins, slopes, along canals, roadsides; 500–2300 m. Anhui, S Gansu, Guangdong, Henan, Hubei, Hunan, Jiangxi, S Shaanxi, S Shanxi, E Sichuan.

50b. *Rhamnus rugulosa* var. *chekiangensis* (Cheng) Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 82. 1979.

浙江鼠李 *zhe jiang shu li*

Rhamnus chekiangensis W. C. Cheng, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 9: 200. 1934.

Young branches puberulent. Leaf blade to 4 × 2 cm, abaxially densely pilose, margin entire or slightly undulate, apex obtuse or rounded.

- Thickets on slopes. Zhejiang.

50c. *Rhamnus rugulosa* var. *glabrata* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 82. 1979.

脱毛皱叶鼠李 *tuo mao zhou ye shu li*

Young branches glabrous. Leaf blade obovate-elliptic or obovate-lanceolate, abaxially sparsely pilose only on vein axils or veins, adaxially glabrous or subglabrous. Flowers and pedicels glabrous.

- Mountain forests and thickets; 600–1500 m. W Hubei, E Sichuan.

51. *Rhamnus koraiensis* C. K. Schneider, Notizbl. Königl. Bot. Gart. Berlin 5: 77. 1908.

朝鲜鼠李 *chao xian shu li*

Shrubs dioecious, to 2 m tall, spinescent. Branches alternate; young branches slightly virgate, grayish, longitudinally fissured, sparsely hairy; older branches grayish brown, slightly shiny, smooth, with conspicuous transversally elongated lentils, glabrescent, terminating in a spine. Leaves alternate or fascicled on short shoots; stipules linear, caducous; petiole 7–25 mm, densely pilose; leaf blade broadly elliptic, obovate-elliptic, or ovate, 4–8 × 2.5–4.5 cm, papery or thinly so, both surfaces densely pilose, lateral veins 4–6 pairs, prominent on both surfaces, with inconspicuous reticulate veins, base broadly cuneate or subrounded, margin densely crenate-serrate, apex shortly acuminate or subrounded. Flowers unisexual, 4-merous. Pedicels 5–6(–10) mm, puberulent. Petals present, yellow-green, puberulent. Male flowers few- to 10-fascicled on short shoots, or 1–3 in leaf axils of lower part of branches. Female flowers few- to 10-fascicled on short shoots or lower parts of annual branches; styles deeply 2-cleft. Drupe purple-black, obovoid-globose, 5–6 mm in diam., with 2 stones, rarely with 1 stone, with persistent calyx tube at base; fruiting pedicel 7–14 mm, sparsely pilose. Seeds dark brown, abaxially with basally margined short furrow extending over 1/4–2/5 of length. Fl. Apr–May, fr. Jun–Sep.

- Mixed forests, thickets; low elevations. Jilin, Liaoning, E Shandong (Kunyu Shan, Laoshan) [N Korea].

52. *Rhamnus grandiflora* C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 82. 1979.

大花鼠李 *da hua shu li*

Shrubs 2–3 m tall, spinescent. Young branches alternate, rarely subopposite, black-brown or red-brown, often brownish pilose, terminating in an obtuse spine; old branches glabrous, with irregular slits. Leaves alternate or fascicled on short shoots; stipules subulate-linear, longer than petioles, caducous; petiole 3–8 mm, adaxially canaliculate, pilose; leaf blade abaxially pale gray, adaxially dark green, oblanceolate-oblong or

elliptic, 3.5–7.5 × 2–4 cm, thinly papery or papery, abaxially pilose, adaxially with adpressed, short hairs, lateral veins 4–6 pairs, prominent abaxially and slightly red, impressed adaxially, base cuneate or broadly cuneate, lower margin subentire or inconspicuously denticulate, upper margin hooked incurved-serrate, apex long acuminate or caudate-acuminate. Flowers yellow-green, large, 4-merous, usually 3–5-fascicled in leaf axils of lower part at branchlets. Pedicels 3–5 mm, puberulent. Male flowers campanulate, 5–6 mm, puberulent or glabrous; sepals ovate-lanceolate, 3–3.5 mm, 3-veined, apex acuminate; petals oblong, ca. equal to stamens, 2–2.5 mm, apex obtuse or mucronulate; rudimentary ovary minute; styles 2-fid. Female flowers: petals very short, fibrous; ovary subglobose; styles 3-cleft to half; stigma incurved. Drupe globose, 3–5 mm in diam., with 2 or 3 stones, with persistent, shallow, cup-shaped calyx tube at base; fruiting pedicel 4–7 mm, puberulent. Seeds dark brown, abaxially with margined short furrow for 1/4 of length. Fl. May–Jun, fr. Jul–Oct.

• Understories of forests on slopes, thickets; 1000–1800 m. Guizhou, Sichuan.

This species is very similar to *Rhamnus lamprophylla* but differs in having branchlets, leaves, and petioles initially pilose and flowers larger (5–6 mm), puberulent.

Material of this species was not seen by the second author.

53. *Rhamnus liukiensis* (E. H. Wilson) Koidzumi, Acta Phytotax. Geobot. 4: 118. 1935.

琉球鼠李 liu qiu shu li

Rhamnus davurica Pallas var. *liukiensis* E. H. Wilson, J. Arnold Arbor. 1: 181. 1920.

Shrubs dioecious, to 4 m tall, unarmed. Young branches glabrous, alternate, purplish to grayish brown, without spines. Leaves alternate or fascicled on short shoots; stipules linear, 3–5 mm; petiole 8–15(–20) mm, adaxially canaliculate, sparsely puberulent; leaf blade pale green abaxially, deep green adaxially, ovate or broadly elliptic-ovate, 4–8(–10) × 3–6 cm, membranous or thinly papery, abaxially sparsely pilose on major veins or in vein axils, adaxially glabrous, lateral veins 4 or 5 pairs, prominent abaxially, impressed adaxially, base obtuse to acute, margin serrate, apex acute or acuminate. Flowers unisexual, glabrous, usually fascicled on short shoots or in leaf axils of lower parts of branches. Calyx tube campanulate; sepals triangular-lanceolate, apex acute. Petals much shorter than sepals, lanceolate, caducous. Stamens equaling petals. Ovary slightly inferior, 2- or 3-loculed; style 2- or 3-branched. Drupe reddish when mature, globose, 2- or 3-grooved longitudinally, glabrous, with 2 or 3 stones, with persistent calyx tube at base; fruiting pedicel 6–7 mm, glabrous. Seeds unknown. Fl. Feb–Mar, fr. Jun–Aug.

Sparse forests; high elevations. C Taiwan [Japan (including Ryukyu Islands)].

54. *Rhamnus wumingensis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 84. 1979.

武鸣鼠李 wu ming shu li

Shrubs 3–4 m tall, spinescent. Young branches alternate,

spreading, yellow-green or gray-green, smooth, glabrous, terminating in a spine; old branches red-brown, glabrous, with irregular scaly slits. Leaves alternate or 2–4-fascicled on short shoots; stipules caducous; petiole 6–25 mm, adaxially canaliculate, pilose; leaf blade abaxially pale green, adaxially gray-green, oblong or ovate-oblong, 3–6 × 2–3 cm, papery, abaxially glabrous, or sparsely barbate only in vein axils, adaxially glabrous, lateral veins 4–6 pairs, midvein and lateral veins prominent abaxially, impressed adaxially, conspicuously reticulate, base subrounded or broadly cuneate, margin crenate-serrulate, apex shortly acuminate or obtusely acute, rarely subrounded. Flowers not seen. Drupes 1–3 in leaf axils of lower part or on short shoots, red-brown, obovoid-globose, 5–6 mm in diam., with 2 or 3 stones, with shallow, cup-shaped, persistent calyx tube at base; fruiting pedicel 6–12 mm, glabrous. Seeds yellow-brown, oblong-obovoid, ca. 5 mm, abaxially with margined furrow nearly equal to length of seeds. Fl. unknown, fr. Jun–Aug.

• Dense forests, thickets, slopes; low elevations. Guangxi.

Material of this species was not seen by the second author.

55. *Rhamnus brachypoda* C. Y. Wu ex Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 85. 1979 [“*brachypoda*”].

山绿柴 shan lü chai

Shrubs dioecious, 1.5–3 m tall, spinescent. Young branches alternate, red-brown or gray-brown, slightly smooth, black-brown or brown pilose, hairs ± deciduous, terminating in a spine; old branches red-brown, glabrous, often with irregular slits. Leaves alternate or fascicled on short shoots; stipules linear-lanceolate, ca. 1/2 as long as petiole, caducous; petiole 4–9 mm, adaxially canaliculate, pilose; leaf blade abaxially often turning reddish or yellow-green when dry, adaxially green or yellow-green, oblong, ovate-oblong, or obovate, rarely elliptic or suborbicular, 3–10 × 1.5–4.5 cm, papery or thickly papery, abaxially glabrous, often with verrucose process, adaxially sparsely puberulent at least on major veins, rarely subglabrous, lateral veins 3–5 pairs, prominent abaxially, base broadly cuneate or subrounded, margin hooked incurved-serrate, apex acuminate or acute, rarely obtuse or subrounded. Flowers yellow-green, unisexual, 4-merous, 1–3 in leaf axils of lower part of branchlets or on short shoots. Female flowers: calyx tube campanulate; sepals lanceolate, 2–2.5 mm, inconspicuously 3-veined, puberulent; ovary subglobose; styles 3-cleft to half; stigma recurved. Pedicels 2–3 mm, sparsely puberulent. Drupe black at maturity, obovoid-globose, 6–7 mm in diam., with (2 or)3 stones, with shallow, cup-shaped calyx tube at base; fruiting pedicel 2–4 mm, puberulent. Seeds brown, oblong-obovoid, ca. 6 mm, abaxially with margined furrow for 1/2 of length. Fl. May–Jun, fr. Jul–Nov.

• Sparse forests in valleys, thickets on slopes, roadsides; 500–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Zhejiang.

This species is similar to *Rhamnus fulvotincta* but differs in having branchlets, leaves, and petioles brown or black-brown pilose, flowers and pedicels puberulent, and seeds abaxially with margined furrow to 1/2 as long as whole length.

56. *Rhamnus fulvotincta* F. P. Metcalf, Lingnan Sci. J. 18: 615. 1938 [*"fulvo-tincta"*].

黄鼠李 huang shu li

Shrubs 1–2 m tall, spinescent. Annual branches puberulent or subglabrous; branchlets usually alternate, rarely opposite or subopposite, gray-brown, terminating in an obtuse spine; axillary buds small. Leaves alternate, rarely subopposite; stipules subulate, ca. 1/2 as long as petiole, caducous; petiole 3–6 mm, puberulent or subglabrous; leaf blade abaxially pale green, turning yellow when dry, adaxially green, elliptic or ovate-elliptic, rarely lanceolate-elliptic, 3–6.5 × 1.5–2.5 cm, papery or thickly papery, abaxially pilose on veins or in vein axils, adaxially glabrous, lateral veins 3–5 pairs, slightly prominent abaxially, ± impressed adaxially, inconspicuously reticulate, base cuneate, margin ± revolute when dry, serrulate, apex acuminate. Flowers not seen. Drupe solitary or 2–4-fascicled in leaf axils at base of branchlets, black, obovoid-globose, ca. 5 mm in diam., with 2 stones, with persistent calyx tube at base; fruiting pedicel 6–8 mm. Seeds brown, oblong-obovoid, abaxially with margined short furrow for 1/4–1/3 of length. Fl. unknown, fr. Jul–Oct.

• Forest margins and thickets on limestone slopes; ca. 400 m. Guangdong, Guangxi, Guizhou.

Material of this species was not seen by the second author.

57. *Rhamnus schneideri* H. Léveillé & Vaniot, Repert. Spec. Nov. Regni Veg. 6: 265. 1909.

长梗鼠李 chang geng shu li

Shrubs spreading, dioecious, 2–3 m tall, spinescent. Branches alternate; young branches green, glabrous or pilose at base; older branches yellow-brown or dark purple, smooth, glabrous, terminating in a spine; buds ovoid-orbicular, with few scales, margin ciliate. Leaves alternate or fascicled on short shoots; stipules linear, caducous; petiole 6–15(–25) mm, adaxially canaliculate, pilose; leaf blade abaxially pale green, adaxially green, elliptic, obovate, or ovate-elliptic, 2.5–8 × 2–4 cm, papery or submembranous, abaxially veins or vein axils pilose or glabrous, adaxially white adpressed hairy or pilose, lateral

veins (3–)5 or 6 pairs, prominent on both surfaces, base cuneate or subrounded, margin crenate-serrate, apex acute or acuminate. Flowers yellow-green, unisexual, 4-merous, usually few- to 11-fascicled on short shoots. Petals present. Female flowers: pedicels 9–13 mm, glabrous; sepals reflexed, lanceolate, ca. 3 mm; ovary obovoid; styles 2-fid or cleft to half. Drupe black, obovoid-globose or globose, 4–5 mm in diam., with 2 stones, with persistent calyx tube at base; fruiting pedicel (6–)10–18 mm, glabrous. Seeds dark brown, abaxially from base with margined furrow for 1/5 of length. Fl. May–Jun, fr. Jul–Oct.

Thickets, mountain forest and thicket margins, open sunny slopes; 400–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, Shandong, Shanxi [N Korea].

- 1a. Leaf lateral veins 5 or 6 pairs; fruiting pedicel 10–16 mm 57a. var. *schneideri*
 1b. Leaf lateral veins 3 or 4 pairs; fruiting pedicel 6–8 mm 57b. var. *manshurica*

57a. *Rhamnus schneideri* var. *schneideri*

长梗鼠李(原变种) chang geng shu li (yuan bian zhong)

Rhamnus glabra (Nakai) Nakai; *R. globosa* Bunge var. *glabra* Nakai.

Leaf lateral veins 5 or 6 pairs. Fruiting pedicel 10–16 mm.

• Mountain forest and thicket margins; 800–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, Shanxi.

57b. *Rhamnus schneideri* var. *manshurica* (Nakai) Nakai, Bot. Mag. (Tokyo) 31: 274. 1917.

东北鼠李 dong bei shu li

Rhamnus glabra var. *manshurica* Nakai, Bot. Mag. (Tokyo) 31: 99. 1917.

Leaf blade small, lateral veins 3 or 4(or 5) pairs, abaxially glabrous, adaxially pilose. Fruiting pedicel 6–8 mm.

Thickets, open sunny slopes; 400–2200 m. Hebei, Jilin, Liaoning, E Shandong (Kunyu Shan, Laoshan), Shanxi [N Korea].

9. SCUTIA (Commerson ex Candolle) Brongniart, Mém. Fam. Rhamnées, 55. 1826, nom. cons.

对刺藤属 dui ci teng shu

Ceanothus sect. *Scutia* Commerson ex Candolle, Prodr. 2: 29. 1825; *Adolia* Lamarck; *Blepetalon* Rafinesque.

Shrubs scandent or erect, spinose or unarmed. Leaves opposite or subopposite, leathery, margin entire or inconspicuously serrulate. Flowers hermaphroditic, 5-merous, few fascicled in leaf axils or in shortly pedunculate axillary cymes, shortly pedicellate. Calyx tube hemispherical or turbinate; sepals 5, triangular. Petals deeply obcordate or bilobed, base clawed, shorter than sepals. Stamens equaling petals. Disk thin, lining calyx tube, slightly fleshy, at margin free. Ovary globose, immersed in disk, 2–5-loculed, with 1 ovule per locule; style short, undivided or 2–4-fid. Drupe obovoid-globose or subglobose, apex often with rudimentary style, base surrounded by persistent calyx tube, with 2–4 one-seeded stones, embedded in a thin, fleshy pulp at maturity. Seeds not furrowed, seed coat thin to nearly leathery.

Five species: Old World tropics and South America; one species in China.

1. *Scutia myrtina* (N. L. Burman) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 44: 168. 1875.

对刺藤 dui ci teng

Rhamnus myrtina N. L. Burman, Fl. Indica, 60. 1768 [*"myrtinus"*]; *Blepetalon aculeatum* Rafinesque, nom. illeg. superfl.; *Ceanothus circumscissus* (Linnaeus f.) Gaertner; *R. circumscissa* Linnaeus f.; *Scutia circumscissa* (Linnaeus f.) W.

Theobald; *S. commersonii* Brongniart; *S. eberhardtii* Tardieu; *S. indica* Brongniart, nom. illeg. superfl.

Shrubs evergreen, scandent, straggling, or erect, to 5 m tall, spinescent. Branches opposite to subopposite; young branches puberulent; older branches brown or red-brown, striate, glabrous. Spines mostly 2 per node, axillary, 2–7 mm, recurved. Leaves opposite or subopposite; stipules lanceolate, 2–3 mm, early deciduous; petiole 3–5 mm, glabrous or puberulent; leaf blade abaxially pale green, adaxially shiny, deep green, brown when dry, elliptic, 3.5–6 × 1.8–3 cm, leathery, both surfaces glabrous, lateral veins 5–8 pairs, conspicuously raised abaxially, impressed adaxially, base broadly cuneate, margin inconspicuously remotely minutely serrulate, apex shortly acuminate or acute. Flowers yellow-green, few in axillary fascicles or shortly pedunculate in axillary condensed cymes, glabrous. Pedicels 1–2 mm. Sepals (4 or)5, narrowly triangular, ca. 2 mm, midvein distinctly keeled, apex acute and thickened. Petals (4 or)5, deeply emarginate to deeply bilobed,

unguiculate, ca. 1 mm, both sides slightly inflexed, base shortly clawed. Stamens (4 or)5, surrounded by and equaling petals. Disk glabrous, rather thin and inconspicuous. Ovary globose, base filling calyx tube, but not immersed in disk, 2-loculed; style short, ca. 1 mm, stout; stigma undivided or inconspicuously 2- or 3-lobed. Drupe obovoid-globose, 4–5 mm in diam., often with rudimentary style at apex, base with persistent calyx tube, with 2 one-seeded stones; fruiting pedicel 3–4 mm, glabrous. Seeds brown, flat, obcordate, not furrowed. Fl. Mar–May, fr. Jul–Nov.

Forest understories, open places; low elevations. SW Guangxi, S Yunnan [India, Thailand, Vietnam; Africa, Madagascar].

This species is very diverse in size, shape, and denticulation of the leaves, but Johnston (Bull. Torrey Bot. Club 101: 64–71. 1974) refused to base separate taxa on these characters.

In India, *Scutia myrtina* is grown as a hedge plant, and the edible fruit is used as an astringent.

10. GOUANIA Jacquin, Select. Stirp. Amer. Hist. 263. 1763.

咀签属 ju qian shu

Shrubs climbing, usually with tendrils, unarmed. Leaves alternate, with caducous stipules, petiolate, pinnateveined or 3-veined from base, margin entire or dentate. Flowers polygamous, in terminal or axillary, cymose racemes or cymose panicles, often with tendrils at lower part of rachis or base. Calyx tube short, coadnate with ovary; sepals 5, ovate-triangular, adaxially medially keeled, dehiscent with longitudinal slits. Petals 5, spatulate. Stamens 5, dorsifixed, enfolded by petals. Disk thick, pentagonous or 5-lobed, glabrous or hairy. Ovary inferior, ± deeply immersed in disk, 3-loculed, with 1 ovule per locule; styles cleft to half or deeply cleft. Capsule subglobose, impressed on both ends, crowned by persistent limb of calyx, 3-winged, with 3 rounded locules split from axil at maturity; locules indehiscent or along inner rib narrowly fissured. Seeds 3, red-brown, shiny, obovoid; endosperm thin.

Twenty species: tropical and subtropical areas; two species in China.

- 1a. Leaves abaxially ferruginous tomentose or densely pubescent on veins 1. *G. javanica*
 1b. Leaves abaxially glabrous or veins sparsely pubescent 2. *G. leptostachya*

1. *Gouania javanica* Miquel, Fl. Ned. Ind. 1(1): 649. 1856.

毛咀签 mao ju qian

Clematoclethra racemosa H. Léveillé.

Shrubs climbing. Branchlets, petioles, rachis, pedicels, and calyx densely brownish pilose. Leaves alternate; petiole 0.8–1.7 cm, densely or sparsely pubescent; leaf blade ovate or broadly ovate, 4–11 × 2–6 cm, papery, abaxially ferruginous tomentose or at least ± densely pubescent on major veins, adaxially soon glabrescent, lateral veins 5–7 pairs, prominent abaxially, flat adaxially, basal veins with 3–6 outer secondary veins, base cordate or rounded, margin entire or obtusely serrulate, apex shortly acuminate or acuminate, rarely acute. Flowers polygamous, 5-merous, solitary or few fascicled in shortly pedunculate cymes, axillary or terminal cymose racemes, or cymose panicles to 30 cm. Pedicel ca. 1 mm. Sepals triangular, adaxially rostellate on midvein. Petals obovate, ca. as long as stamens, shortly clawed at base. Disk pentagonous, surrounding ovary, each angle elongated into a liguliform appendage. Style long, 3-fid or cleft to half. Capsule yellow at maturity, 8–9 mm, 9–10 mm in diam., 3-winged, both ends concave, apex with persistent calyx, with 3 rounded, winged locules, along axil dehiscent. Seeds 3, red-brown, shiny, obovoid, ca. 3 × 2.5 mm, raised on back. Fl. Jul–Sep, fr. Nov–Mar of following year.

Sparse forests, often climbing on trees, riverbanks; low to middle elevations. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Cambodia, Laos, Philippines, Thailand, Vietnam].

2. *Gouania leptostachya* Candolle, Prodr. 2: 40. 1825.

咀签 ju qian

Shrubs climbing. Young branches glabrous or sparsely pilose. Leaves alternate; stipules lanceolate and caducous, or persistent and becoming a rounded, dentate bract; petiole 1–2.5 cm, sparsely or densely pilose; leaf blade abaxially pale green, adaxially dark green, ovate or ovate-oblong, 5–9 × 2.5–5 cm, papery, abaxially glabrous or sparsely hairy on veins, lateral veins 5 or 6 pairs, prominent abaxially, lower lateral veins with 3–5 secondary lateral veins, base cordate, margin crenate-serrate, apex acuminate. Flowers polygamous, 5-merous, solitary or few in fascicles and shortly pedunculate cymes, axillary cymose racemes, and terminal cymose panicles to 30 cm, pilose. Pedicel short, ca. 1 mm, glabrous or sparsely hairy. Sepals ovate-triangular, apex acuminate. Petals white, obovate, hooded, ca. as long as stamens, clawed at base. Disk distinctly pentagonous, antisepalous angles elongated into liguliform appendages. Ovary nearly completely immersed in but not fused with disk; styles short, 3-fid. Capsule 9–10(–13) mm, 1–1.2(–1.8) cm in diam., crowned by remnants of persistent calyx

tube, 3-winged, dehiscing into 3 subrounded winged mericarps, wing sometimes thickened at maturity; fruiting pedicel 1–3 mm, glabrous or sparsely pilose. Seeds brownish, shiny, obovoid, ca. 1 × 3 mm. Fl. Aug–Sep, fr. Oct–Dec.

Forests, often climbing on trees, thickets; low to middle elevations. W Guangxi (Napo), Yunnan [Bhutan, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Singapore, Thailand, Vietnam].

- 1a. Fruit 12–13 × 13–18 mm 2c. var. *macrocarpa*
 1b. Fruit 9–10 × 10–12 mm.
 2a. Stipules lanceolate, caducous,
 not becoming a bract 2a. var. *leptostachya*
 2b. Stipules persistent, often becoming
 a rounded, dentate bract 2b. var. *tonkinensis*

2a. *Gouania leptostachya* var. *leptostachya*

咀签(原变种) ju qian (yuan bian zhong)

Stipules lanceolate, caducous, not becoming a bract. Fruit 9–10 × 10–12 mm.

Sparse forests, often climbing on trees; middle elevations. W Guangxi (Napo), Yunnan [Bhutan, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Singapore, Thailand, Vietnam].

2b. *Gouania leptostachya* var. *tonkinensis* Pitard in Lecomte, Fl. Indo-Chine 1: 934. 1912.

越南咀签 yue nan ju qian

Stipules persistent, often becoming a rounded, dentate bract, base amplexicaul, margin sharply denticulate.

Forests, thickets; low to middle elevations. S Yunnan [Laos, Vietnam].

2c. *Gouania leptostachya* var. *macrocarpa* Pitard in Lecomte, Fl. Indo-Chine 1: 934. 1912.

大果咀签 da guo ju qian

Fruit 12–13 × 13–18 mm, with thickened wing.

Forests; below 2000 m. S and SE Yunnan [Thailand, Vietnam].

11. VENTILAGO Gaertner, Fruct. Sem. Pl. 1: 223. 1788.

翼核果属 yi he guo shu

Climbing shrubs or lianas, rarely small trees. Leaves alternate, leathery or nearly so, rarely papery, conspicuously reticulate, base asymmetric, margin entire or toothed. Flowers small, bisexual, 5-merous, few in fascicles or in shortly pedunculate cymes, or in terminal or axillary, cymose panicles. Sepals 5, triangular, adaxially medially keeled. Petals obovate-orbicular, apex emarginate, rarely absent. Disk thick, fleshy, pentagonous. Ovary globose, immersed in disk, 2-loculed, with 1 ovule per locule; styles 2-fid. Fruit a 1-seeded, indehiscent samara, 1/3–1/2 of base surrounded by persistent calyx tube, apex with longitudinally elongating oblong wing, with relict styles; endocarp globose, thin, woody, 1-loculed, 1-seeded. Seeds without endosperm; cotyledon thick.

About 40 species: Old World tropics; six species (two endemic) in China.

Ventilago zhengdeii G. S. Fan (J. Nanjing Forest. Univ. 28(1): 107. 2004), described from Yunnan, could not be treated here because no material was seen by the authors.

- 1a. Ovary and fruit densely pilose.
 2a. Leaf blade leathery, both surfaces glabrous or abaxially pubescent on major veins, apex acute, shortly acuminate, or acuminate 5. *V. calyculata*
 2b. Leaf blade papery, adaxially glabrous, abaxially with barbate axils on major veins, apex long acuminate or caudate-acuminate 6. *V. oblongifolia*
 1b. Ovary glabrous or sparsely pubescent; fruit glabrous.
 3a. Flowers few fascicled in leaf axils or in axillary shortly pedunculate cymes; lateral veins 4–6(or 7) pairs.
 4a. Leaf blade ovate-oblong or ovate-elliptic, 4–8 × 1.5–3.2 cm, apex acuminate or caudate-acuminate, petiole 3–5 mm; winged fruit 3–6 cm 1. *V. leiocarpa*
 4b. Leaf blade oblong, 1.2–3 × 1–1.5 cm, apex acute, petiole 1–2 mm; winged fruit 1.5–2 cm 2. *V. elegans*
 3b. Flowers in terminal cymose panicles or axillary cymose racemes; lateral veins 8–16 pairs.
 5a. Leaf blade leathery, oblong or elliptic, apex obtuse or rounded, margin entire or upper margin inconspicuously remotely dentate, lateral veins 8–16 pairs 3. *V. inaequilateralis*
 5b. Leaf blade papery, ovate-oblong or ovate-elliptic, apex long acuminate, margin obtusely dentate, lateral veins 4–8(–10) pairs 4. *V. maderaspatana*

1. *Ventilago leiocarpa* Bentham, J. Proc. Linn. Soc., Bot. 5: 77. 1861.

翼核果 yi he guo

Shrubs scandent. Young branches pilose; branchlets brown, striate, glabrous or pubescent. Petiole 3–5 mm, adaxially sparsely pilose; leaf blade ovate-oblong or ovate-elliptic, 4–8 × 1.5–3.2 cm, thinly leathery, abaxially ± densely pubescent or pilose on major veins, adaxially glabrous except for midvein,

lateral veins 4–6(or 7) pairs, prominent abaxially, impressed adaxially, base rounded or subrounded, margin subentire, only inconspicuously serrulate, apex acuminate, or shortly acuminate, rarely acute. Flowers small, bisexual, 5-merous, solitary or 2- to few fascicled in axils of leaves, rarely in terminal cymose racemes or cymose panicles, glabrous or sparsely pilose. Pedicel 1–2 mm. Sepals triangular. Petals obovate, apex emarginate. Stamens slightly shorter than petals. Disk pentagonous. Ovary immersed in disk; styles 2-fid or cleft to half. Drupe depressed-

globose, 3–5(–6) cm; stone 4–5 mm in diam., glabrous, wing 7–9 mm wide, apex obtuse-rounded, mucronulate, surrounded by persistent calyx tube at base for 1/4–1/3, 1- or 2-loculed, 1-seeded. Fl. Mar–May, fr. Apr–Jul.

Sparse forests, thickets; below 1500 m. Fujian, Guangdong, Guangxi, S Guizhou, Hunan, Taiwan, Yunnan [India, Myanmar, Thailand, Vietnam].

The roots are used medicinally for improving the circulatory system and tendons and for treating numbness in limbs, injuries, and trauma.

- 1a. Branchlets, fruiting pedicel, and persistent calyx tube glabrous; leaf blade abaxially glabrous or sparsely hairy on veins or vein axils 1a. var. *leiocarpa*
 1b. Branchlets, fruiting pedicel, and persistent calyx tube pubescent; leaf blade abaxially densely pubescent at least on veins 1b. var. *pubescens*

1a. *Ventilago leiocarpa* var. *leiocarpa*

翼核果(原变种) yi he guo (yuan bian zhong)

Smythea nitida Merrill.

Branchlets, fruiting pedicel, and persistent calyx tube glabrous. Leaf blade abaxially glabrous or veins or vein axils sparsely hairy.

Sparse forests, thickets; below 1500 m. Fujian, Guangdong, Guangxi, Hunan, Taiwan, Yunnan [India, Myanmar, Thailand, Vietnam].

1b. *Ventilago leiocarpa* var. *pubescens* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 89. 1979.

毛叶翼核果 mao ye yi he guo

Branchlets, fruiting pedicel, and persistent calyx tube pubescent. Leaf blade abaxially densely pubescent at least on veins.

• Sparse forests in valleys; 600–1000 m. W Guangxi, S Guizhou, SE Yunnan.

2. *Ventilago elegans* Hemsley, Ann. Bot. (Oxford) 9: 151. 1895.

台湾翼核果 tai wan yi he guo

Shrubs scandent, many branched. Annual branches often curved, pilose, glabrescent. Stipules minute, caducous; petiole 1–2 mm, pilose; leaf blade abaxially pale green, adaxially dark green, shiny, elliptic or obovate-elliptic, 1.2–3 × 1–1.5 cm, subleathery, abaxially glabrous, lateral veins 4 or 5 pairs, prominent on both surfaces, conspicuously reticulate, base cuneate, margin inconspicuously serrulate, apex acute or slightly obtuse, mucronulate. Flowers small, 2.5–3 mm in diam., bisexual, glabrous, solitary or few fascicled in axils of leaves. Pedicels 1–1.5 mm. Sepals triangular, adaxially medially keeled. Petals obovate, shorter than stamens, apex emarginate. Disk thick, pentagonous. Ovary immersed in disk; styles stout, 2-fid or cleft to half. Drupe winged, 1.5–2 cm, glabrous; stone 1-loculed, 1-seeded.

• Forests. Taiwan.

3. *Ventilago inaequilateralis* Merrill & Chun, Sunyatsenia 2: 38. 1934.

海南翼核果 hai nan yi he guo

Shrubs scandent. Young branches glabrous or pilose; branchlets gray-brown. Stipules lanceolate, caducous; petiole short, 1–5 mm, glabrous or subglabrous; leaf blade oblong or elliptic, 6–17 × 2–5 cm, leathery, both surfaces glabrous or abaxially sparsely pubescent on veins when young, lateral veins 8–14(–16) pairs, slightly prominent on both surfaces, conspicuously reticulate, base cuneate or subrounded, asymmetric or slightly so, margin entire or inconspicuously serrulate, apex obtuse or rounded, rarely acute. Inflorescences 3–7 cm, slender, pilose. Flowers yellow, 5-merous, solitary or few fascicled, and in pedunculate cymes, terminal or axillary, cymose panicles, or cymose racemes. Pedicel 1–2 mm, pilose. Calyx sparsely pilose; sepals adaxially medially keeled. Petals obovate, slightly longer than stamens, clawed at base, apex emarginate. Disk thick, fleshy, subpentagonous. Ovary globose, ± completely immersed in disk, glabrous or sparsely pilose; styles cleft to half. Drupe 3.5–4.5 cm, 4–5 mm in diam., wings 7–9 mm wide, apex obtuse or subrounded, surrounded by calyx tube at base for 1/3–1/2; stone 1-loculed, 1-seeded; fruiting pedicel 2–3 mm, sparsely pilose or subglabrous. Seeds without endosperm; cotyledons thick. Fl. Feb–May, fr. Mar–Jun.

• Forests in valleys; low elevations. W Guangxi, SW Guizhou, Hainan, S Yunnan.

4. *Ventilago maderaspatana* Gaertner, Fruct. Sem. Pl. 1: 223. 1788.

印度翼核果 yin du yi he guo

Shrubs scandent. Branchlets brownish, pubescent. Stipules caducous; petiole 4–7 mm; leaf blade abaxially pale green, adaxially dark green, shiny, ovate-oblong to ovate-elliptic, 7–15 × 2.5–5 cm, papery or subleathery, abaxially puberulent to glabrous, adaxially glabrous, lateral veins 4–8(–10) pairs, base subrounded, symmetric or ± asymmetric, margin obtusely dentate, rarely entire, apex long acuminate. Flowers in terminal or axillary, cymose racemes or cymose panicles, 5–15 cm. Calyx tube pubescent; sepals spreading, triangular, adaxially medially keeled. Petals obovate, equaling stamens, clawed at base, apex emarginate and minutely mucronulate. Disk fleshy, densely hairy. Ovary globose, ± completely immersed in disk, ± densely tomentose; styles cleft to half. Drupe 5–6 cm, densely pubescent; stone 6–8 mm in diam., wing oblong, 0.9–1.1 cm wide, surrounded by calyx tube at base for 2/5–1/2, apex rounded, 1-loculed, 1-seeded; fruiting pedicel ca. 3 mm. Fl. unknown, fr. Dec–Apr of following year.

Forests; low elevations. S Yunnan [India, Indonesia (Java), Myanmar, Sri Lanka].

The bark of *Ventilago maderaspatana* is used medicinally in India.

5. *Ventilago calyculata* Tulasne, Ann. Sci. Nat., Bot., sér. 4, 8: 124. 1857.

毛果翼核果 mao guo yi he guo

Shrubs scandent. Young branches glabrous or sparsely

pilose, glabrescent, or yellow-brown pubescent; old branches brown, angular. Petiole 5–8 mm, glabrous, sparsely pilose adaxially, or yellow-brown pubescent; leaf blade ovate to elliptic, 5–13 × 3–6 cm, abaxially ± densely pilose when young, glabrescent and finally only pubescent on major veins, adaxially nearly glabrous, lateral veins 5 or 6(–8) pairs, prominent abaxially, rather inconspicuous adaxially, base broadly cuneate or subrounded, lower margin entire, upper margin conspicuously remotely serrate, apex shortly acuminate or acuminate. Flowers numerous, in cymes, terminal or axillary, together in cymose panicles, 10–30 cm; rachis, calyx, and pedicels yellow-brown pilose. Pedicel very short, ca. 1 mm. Sepals ovate-triangular, adaxially medially keeled. Petals spatulate, ca. as long as stamens, apically minutely mucronate. Disk thick, fleshy, 5-lobed, densely ferruginous. Ovary globose, densely pilose, nearly completely immersed in disk; styles deeply 2-cleft. Drupe yellow-green, 4.5–6 cm, 5–6 mm in diam., puberulent, surrounded by persistent calyx tube at base for 1/3–2/5, wing oblong, 1–1.4 cm wide, both surfaces striate, ± puberulent, apex obtuse-rounded; stone 1-loculed, 1-seeded. Fl. Oct–Dec, fr. Dec–Apr of following year.

Forests; middle elevations. W Guangxi, SW Guizhou, S Yunnan [Bhutan, India, Nepal, Thailand, Vietnam].

- 1a. Leaf blade oblong or ovate, upper margin irregularly remotely dentate, middle and lower margins entire; young branches, petioles, and abaxial leaf surface glabrous or sparsely pubescent 5a. var. *calyculata*
 1b. Leaf blade ovate-elliptic, margin sparsely serrulate; young branches, petioles, and veins on abaxial leaf surface densely yellow-brown pubescent 5b. var. *trichoclada*

5a. *Ventilago calyculata* var. *calyculata*

毛果翼核果(原变种) mao guo yi he guo (yuan bian zhong)

Young branches, petioles, and abaxial leaf surface gla-

brous or sparsely pubescent. Leaf blade oblong or ovate, lower and middle margins entire, upper margin irregularly remotely dentate.

Forests; middle elevations. W Guangxi, SW Guizhou, S Yunnan [Bhutan, India, Nepal, Thailand, Vietnam].

5b. *Ventilago calyculata* var. *trichoclada* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 90. 1979.

毛枝翼核果 mao zhi yi he guo

Young branches, petioles, and veins on abaxial leaf surface densely yellow-brown pubescent. Leaf blade ovate-elliptic, margin sparsely serrulate.

• Forests; ca. 600 m. NW Guangxi (Tianlin).

6. *Ventilago oblongifolia* Blume, Bijdr. 1144. 1826–1827.

矩叶翼核果 ju ye yi he guo

Shrubs scandent. Annual branches pilose, glabrescent. Petiole 2–3 mm, glabrous or sparsely pilose adaxially; leaf blade narrowly elliptic to oblong, 6–12 × 2–4 cm, papery, both surfaces glabrous except for clustered hairy vein axils abaxially, lateral veins 4–6 pairs, prominent abaxially, slightly impressed adaxially, base rounded to broadly cuneate, often slightly asymmetric, margin crenulate, apex long acuminate or caudate-acuminate. Flowers very small, 1–1.5 mm in diam., numerous in terminal cymose racemes or cymose panicles, ca. 20 cm; peduncles, pedicels, and flowers densely pilose. Calyx tube shallowly cup-shaped; sepals triangular, ca. 1 mm, adaxially distinctly keeled. Petals obovate, ca. 1 mm. Ovary hairy; styles 2-cleft to half. Drupe 5.5–7 cm, wings 1–1.2 cm wide, densely puberulent, surrounded by persistent calyx tube at base; fruiting pedicel 2–3 mm, puberulent; stone 1-loculed, 1-seeded. Fl. Jun, fr. Dec.

Forests, often climbing on trees. Guangxi, Yunnan [Indonesia, Malaysia, Philippines, Thailand].

12. ALPHITONIA Reissek ex Endlicher, Gen. Pl. 1098. 1840.

麦珠子属 mai zhu zi shu

Trees or shrubs, evergreen. Buds and young branches often ± densely brownish pubescent. Leaves alternate, with small, caducous stipules; leaf blade ovate to obovate or elliptic to lanceolate, rarely nearly cordate, papery to leathery, pinnately veined, abaxially usually glabrous, adaxially whitish to rusty pubescent, margin entire. Flowers bisexual, 5-merous, many in di- or trichotomous, axillary or rarely terminal cymes. Calyx tube patelliform to hemispherical; sepals 5, triangular, adaxially keeled. Petals 5, clawed, cucullate. Stamens 5, enfolded by petals. Disk mainly thick, nectariferous. Ovary inferior, immersed in disk, 2- or 3-loculed, with 1 ovule per locule; style short, often divided into 2 to 3 slightly capitate styler branches, basally often densely whitish to yellowish pubescent or glabrous. Fruits drupaceous, globose or broadly ovoid, at base surrounded by persistent calyx tube; mesocarp thick, initially fleshy, later dry and mealy; endocarp splitting longitudinally into 2 or 3, hard, leathery, 1-seeded endocarps. Seeds ± completely enclosed by a membranous, reddish to brownish aril; testa smooth, crustaceous; embryo straight; endocarp cartilaginous.

About ten species: SE Asia, Australia, Pacific islands; one species in China.

1. *Alphitonia incana* (Roxburgh) Teijsmann & Binnendijk ex Kurz, J. Bot. 11: 208. 1873.

麦珠子 mai zhu zi

Rhamnus incana Roxburgh, Fl. Ind. 2: 350. 1824 [“*in-*

canus”]; *Alphitonia excelsa* (Fenzl) Reissek ex Endlicher; *A. philippinensis* Braid; *Ceanothus excelsus* (Fenzl) Steudel; *Colubrina excelsa* Fenzl.

Trees, small to medium-sized, evergreen, rarely to 30 m tall. Young branches ± densely yellowish to whitish pubescent.

Leaves alternate, papery to subleathery; petiole 9–15 mm, densely pubescent; leaf blade 7–13 × 2.5–5 cm, ovate-lanceolate or ovate-elliptic, abaxially yellowish pubescent, adaxially ferruginous tomentose when young, glabrescent, primary veins prominent abaxially, impressed adaxially, lateral veins 11–15 pairs, base acute or obtuse to rounded, margin entire or slightly undulate, apex acute to shortly acuminate. Flowers light green to yellowish, 4–5 mm in diam., bisexual, 5-merous, in terminal or axillary cymes. Pedicel 1–2 mm. Calyx tube shallowly hemispherical, outside densely brownish pubescent; sepals triangular, ca. 1.5 mm, adaxially ± distinctly keeled. Petals erect to recurved, spatulate, ca. as long as stamens, clawed. Disk pentagonal, shallow, lining calyx tube, glandular. Ovary obconical, ± completely immersed in disk, 2- or 3-loculed; style

conical, nearly to half divided into 2 or 3 slightly capitate stylar branches. Drupe greenish when young, black at maturity, globose to broadly ovoid, 1–1.2(–1.4) cm in diam., basally surrounded by persistent calyx tube; exocarp irregularly dehiscent, with 2 or 3 woody locules, along ventral suture dehiscent at maturity, locules 1-seeded; fruiting pedicel 3–4 mm. Seeds red, shiny, with membranous aril, often permanently attached to receptacle after fruit dehiscence. Fl. Oct–Dec, fr. Mar–May of following year.

Sparse forests on mountains and hills; middle elevations. Hainan [Indonesia, Malaysia, Philippines].

The trees grow rapidly when young. This species is a good source of fine wood for making furniture.

13. COLUBRINA Richard ex Brongniart, Mém. Fam. Rhamnées, 61. 1826, nom. cons.

蛇藤属 she teng shu

Trees, shrubs, or scandent shrubs, deciduous or evergreen, always unarmed. Leaves alternate to rarely opposite, papery to subleathery; stipules minute, early deciduous; margin entire, serrate or crenate; venation pinnate or 3-veined from base. Flowers bisexual, 5-merous, mainly few in axillary cymes or small thyrses, sessile or shortly pedunculate. Calyx tube hemispherical; sepals 5, triangular, abaxially rather densely pubescent, adaxially conspicuously keeled, deciduous. Petals 5, erect to spreading, clawed. Stamens 5, ca. as long as petals; anthers dorsifixed, dehiscing introrsely. Disk massive, fleshy, adnate to calyx tube. Ovary semi-inferior, 3(or 4)-loculed, with 1 ovule per locule; style 3-lobed to 3-fid. Fruit a subglobose capsule; mesocarp thin, dry or rather fleshy; endocarp cartilaginous to woody, splitting explosively or slowly into 3 ventrally dehiscent, 1-seeded endocarps. Seeds shiny, broadly obovoid, rarely with a minute aril; testa leathery to bony; endosperm fleshy, thick.

About 23 species: tropical areas of Africa, S Asia, Australia, Pacific islands, and South America; two species in China.

- 1a. Young branchlets, petioles, inflorescences, and leaves glabrous; leaf blade ovate to broadly ovate or cordate; fruiting pedicel 4–6 mm 1. *C. asiatica*
 1b. Young branchlets, petioles, inflorescences, and leaves abaxially at least on veins pubescent or densely pubescent; leaf blade ovate-elliptic; fruiting pedicel 8–12 mm 2. *C. javanica*

1. *Colubrina asiatica* (Linnaeus) Brongniart, Mém. Fam. Rhamnées, 62. 1826.

蛇藤 she teng

Ceanothus asiaticus Linnaeus, Sp. Pl. 1: 196. 1753.

Shrubs scandent, evergreen. Young branchlets glabrous. Leaves alternate; petiole 1–1.6 cm, pilose; leaf blade ovate, broadly ovate, or cordate, 4–8 × 2–5 cm, submembranous or thinly papery, both surfaces glabrous or subglabrous, venation pinnate, secondary veins 2 or 3 pairs, prominent on both surfaces, base rounded or subcordate, margin coarsely crenate, apex acuminate, emarginate. Flowers yellow, 5-merous, few in axillary thyrses. Pedicel 2–3 mm. Calyx tube hemispherical; sepals 5, triangular, adaxially distinctly keeled. Petals 5, obovate, cucullate, ca. as long as stamens, clawed. Stamens 5. Disk fleshy. Ovary immersed in stout disk, 2- or 3-loculed; style ± deeply 2- or 3-fid. Capsule globose, 7–9 mm in diam., basally surrounded by remains of calyx tube, loculicidally dehiscent at maturity; locules 1-seeded; fruiting pedicel 4–6 mm. Seeds grayish brown. Fl. Jun–Sep, fr. Sep–Dec.

Forests and thickets, along beaches; sea level. S Guangdong, Guangxi, Hainan, Taiwan [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand; Africa, Australia, Pacific islands, West Indies (Greater and Lesser Antilles)]; an almost pantropical species reported for many coasts of the New and Old World Tropics].

2. *Colubrina javanica* Miquel, Fl. Ned. Ind. 1(1): 648. 1856.

毛蛇藤 mao she teng

Colubrina asiatica (Linnaeus) Brongniart var. *subpubescens* (Pitard) M. C. Johnston; *C. pubescens* Kurz (1872), not (Ruiz & Pavón) G. Don (1832); *C. pubescens* var. *subpubescens* Pitard.

Shrubs evergreen. Young branchlets, annual branches, and inflorescences densely pubescent. Leaves alternate; petiole 8–15 mm, densely pubescent; leaf blade ovate-elliptic, 4–8 × 1.5–3 cm, thinly papery or submembranous, abaxially pubescent on veins, adaxially glabrous, secondary veins 3–5 pairs, base rounded or broadly cuneate, margin inconspicuously remotely serrulate, apex acuminate. Flowers bisexual, 5-merous, in axillary cymes; peduncles 1–3 mm. Pedicels 2–3 mm. Calyx tube hemispherical; sepals triangular, adaxially keeled. Petals obovate, ca. as long as stamens. Disk thick, rounded. Ovary semi-inferior, immersed in disk; styles 3-cleft. Capsule ca. 8 mm in diam., basally almost up to middle surrounded by remnants of calyx tube, 3-loculed; locules 1-seeded, loculicidally dehiscent at maturity; fruiting pedicel 8–12 mm.

Riverbanks. S Yunnan (Lancang Jiang) [Indonesia, Malaysia, Myanmar, Thailand].

Johnston (*Brittonia* 23: 2–53. 1971) transferred this species into the synonymy of *Colubrina asiatica*. Because of the differences in habitat (*C. asiatica* is exclusively found along tropical coasts, whereas *C.*

javanica may occur in uplands quite distant from the coast) and the differences in indumentum and length of fruiting pedicels, we decided to maintain it as a separate species.