

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 myrtillus 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 ± distinctly keeled. Petals broadly obovate to obcordate, base shortly clawed, apex ± 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 × 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 × 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.

欧鼠李 ou shu li

Frangula alnus Miller.

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-loc-

uled; 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. kouyitchensis* 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. *Tetarhamnus* 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. *Tetarhamnus*).
 - 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 adaxially 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 \pm 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 \pm hairy.
- 49a. Leaf blade membranous, ovate or elliptic-ovate, glabrous, or midvein adaxially and veins abaxially sparsely pilose 53. *R. liukiensis*
- 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 (Taipei, 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 equaling 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 lvi 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 [*“nivalensis”*].

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, equalling 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, uni-

sexual, 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, terminating 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-orbicu-

lar, 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-obovoid, 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 rudimentary. 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 sub-

glabrous, 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 tzekweiensis* 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. Pritzl, Bot. Jahrb. Syst. 29: 459. 1900.

小冻绿树 *xiao dong lu 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 lenticels, 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 liukuensis* (E. H. Wilson) Koidzumi, Acta Phytotax. Geobot. 4: 118. 1935.

琉球鼠李 liu qiu shu li

Rhamnus davurica Pallas var. *liukuensis* 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].

