

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

马甲子属 ma jia zi shu

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

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

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

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

马甲子 ma jia zi

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

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

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

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

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

388. 1894.

硬毛马甲子 ying mao ma jia zi

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

Evergreen, erect to climbing shrubs or medium-sized trees, to 20 m tall. Young branchlets, axillary buds, petioles, major leaf venation, pedicels, receptacles, and sepals ± densely brownish pubescent, mature branches glabrescent. Stipular spine 1, hooklike, recurved; petiole to 1.5 cm; leaf blade broadly ovate, ovate-elliptic, or suborbicular, 4.5–10.5 × 4–7 cm, papery or thickly papery, 3-veined from base, base obtuse to rounded or rarely cordate, often slightly oblique, margin serrulate or subentire, apex acute to acuminate. Flowers densely pubescent, in axillary cymes or cymose panicles. Calyx tube cup-shaped; lobes broadly deltoid, 1.5–1.6 × 1.4–1.5 mm. Petals spatulate, 1–5 × 1.4–1.5 mm. Stamens ca. as long as petals. Disk pentagonal, 5- or 10-lobed. Ovary 3-loculed; style deeply 3(or 4)-cleft. Drupe red or purple-red, cup-shaped, surrounded by an apically inserted, narrow, corky wing, 1–1.3 cm in diam., glabrous; fruiting pedicel 6–10 mm. Fl. Jun–Aug, fr. Aug–Oct.

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

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

铜钱树 tong qian shu

Evergreen shrubs to medium-sized trees, to 20 m tall. Young branchlets, axillary buds, petioles, and major leaf venation ± densely brownish pubescent, flowers and fruit glabrous. Leaves alternate; petiole (6–)8–20 mm, glabrous or subglabrous, with 2 erect, stipular spines restricted to vegetative shoots; leaf blade broadly ovate to broadly elliptic, 4–12 × 3–9

cm, papery or thickly papery, both surfaces glabrous, 3-veined from base, base obtuse to rounded, often \pm oblique, margin crenate or obtusely serrulate, apex acuminate to acute. Flowers glabrous, in cymes or cymose panicles, terminal or axillary together. Sepals triangular or broadly ovate, ca. 2×1.8 mm. Petals spatulate, ca. 1.8×1.2 mm. Stamens longer than petals. Disk pentagonous, 5-lobed. Ovary 3-loculed; style deeply 3-cleft. Drupe disk-shaped, comparatively large, 2–3.5 cm in diam., base conical, apex flattened; wing thinly papery to leathery; fruiting pedicel 1.2–1.5 cm. Fl. Apr–Jun, fr. Jul–Sep.

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

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

短柄铜钱树 duan bing tong qian shu

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

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

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

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

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

滨枣 bin zao

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

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

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

