

6. QUERCUS Linnaeus, Sp. Pl. 2: 994. 1753.

栎属 li shu

Trees or sometimes shrubs, evergreen or deciduous. Trunk bark deeply splitting or exfoliating longitudinally. Winter buds ovoid-globose, ovoid-conical, or rarely ovoid-ellipsoid; scales few to many, imbricate. Leaves spirally arranged. Stipules extrapetiolar. Male inflorescence pendulous, solitary in leaf axils toward base of branchlets or in paniculate clusters on lateral or subterminal shoots; flower solitary and scattered on rachis; perianth calyciform, 4–7-lobed or more lobed; stamens 4–7 or fewer, filaments slender; staminodes small. Female inflorescences in leaf axils toward apex of branchlets, with few to many cupules; flowers solitary; perianth 5- or 6-lobed; staminodes sometimes present, small; ovary (2-or)3(or 4)-loculed; stigmas dilated or ligulate, lining inner faces of styles. Cupules solitary; bracts imbricate, scalelike, linear, or conical, adherent, prostrate, or reflexed. Nut 1 per cupule. Germination hypogeal.

About 300 species: N Africa, Asia, Europe, North America, South America (Colombia); 35 species (15 endemic, two introduced) in China.

1a. Leaves deciduous or marcescent in winter.

2a. Leaf blade narrowly elliptic-lanceolate to ovate-lanceolate, margin spiniform dentate; bracts of cupule subulate, ligulate, or linear, often reflexed.

3a. Mature leaf blades densely grayish stellate tomentose; cork of bark developed; branchlets glabrous 3. *Q. variabilis*

3b. Mature leaf blades glabrous or pubescent only abaxially along veins; cork of bark undeveloped; young branchlets pubescent.

4a. Cupules including bracts 2–4 cm in diam.; nuts 1.5–2 cm in diam. 1. *Q. acutissima*

4b. Cupules including bracts ca. 1.5 cm in diam.; nuts 1.3–1.5 cm in diam. 2. *Q. chenii*

2b. Leaf blade elliptic-obovate, narrowly obovate, or elliptic, margin dentate or undulate; bracts of cupule narrowly lanceolate, triangular, or tubercular.

5a. Cupule bracts narrowly lanceolate, erect or reflexed.

6a. Cupule bracts ca. 10 mm 4. *Q. dentata*

6b. Cupule bracts 5–8 mm 5. *Q. yunnanensis*

5b. Cupule bracts triangular, narrowly triangular, or ovate-lanceolate, adherent to outside wall of cupule.

7a. Mature leaf blades abaxially with stellate or simple hairs.

8a. Branchlets glabrous or glabrescent 8. *Q. aliena*

8b. Branchlets densely yellowish brown or grayish brown tomentose.

9a. Leaf secondary veins 12–18 on each side of midvein 7. *Q. griffithii*

9b. Leaf secondary veins 8–12 on each side of midvein.

10a. Branchlet and leaf blades abaxially densely with yellowish brown stellate hairs; leaf blade margin dentate; tertiary veins abaxially inconspicuous 5. *Q. yunnanensis*

10b. Branchlets and leaf blades abaxially with grayish brown to yellowish gray stellate hairs; leaf blade margin crenate to dentate; tertiary veins abaxially conspicuous 6. *Q. fabri*

7b. Mature leaf blades abaxially glabrous or glabrescent.

11a. Leaf margin glandular 9. *Q. serrata*

11b. Leaf margin not glandular.

12a. Leaf margin serrate or with rounded lobes.

13a. Leaf margin with 5–7 lobes on each side ending in 10–30 awns; blade glabrous or barbate; bracts of cupule glabrous; nuts mature 1 year after flowering 11. *Q. palustris*

13b. Leaf margin with 5–7 rounded or retuse lobes on each side; blade abaxially glabrous; bracts of cupule gray tomentose; nuts mature the same year as flowering 12. *Q. robur*

12b. Leaf margin undulate.

14a. Petiole 1–3 cm 8. *Q. aliena*

14b. Petiole shorter than 1 cm 10. *Q. mongolica*

1b. Leaves mostly evergreen.

15a. Leaf blade apex obtuse or rarely retuse or mucronate; midvein apically slightly flexuous.

16a. Cupules shallowly cupular to discoid; nuts 2–3 cm in diam. 13. *Q. semecarpifolia*

- 16b. Cupules cupular to cuculliform; nuts to 2 cm in diam.
 - 17a. Leaf blade abaxially with both stellate and simple hairs.
 - 18a. Leaf blade abaxially persistently hairy; cupule rim expanded and wavily rugose at maturity; cupule bracts grayish brown tomentose from base to middle, apex reddish brown glabrous; fruit maturing on 1-year-old branchlets, nut 1.5–1.8 cm in diam. 14. *Q. guajavifolia*
 - 18b. Leaf blade abaxially glabrescent; cupule slightly expanded at maturity but not wavily rugose; cupule bracts gray pubescent; fruit maturing in 1st year, nut 1–1.5 cm in diam. 15. *Q. aquifolioides*
 - 17b. Leaf blade abaxially with only stellate hairs.
 - 19a. Female inflorescences 3.5–16 cm 16. *Q. rehderiana*
 - 19b. Female inflorescences less than 3 cm.
 - 20a. Mature leaf blades abaxially uniformly with pale grayish brown fascicled hairs 19. *Q. senescens*
 - 20b. Mature leaf blades abaxially glabrous, glabrescent, or only midvein hairy.
 - 21a. Trees 6–10(–20) m tall; cupules 4–9 × 7–15 mm, enclosing 1/4–1/2 of nut; cupule bracts triangular to triangular-ovate, 1–1.5 mm, gray pubescent except for apex 17. *Q. spinosa*
 - 21b. Shrub (0.5–)1(–2) m tall; cupules 3–4 × ca. 10 mm, covering base of nut; cupule bracts ovate-lanceolate, ca. 1 mm, grayish brown tomentose 18. *Q. monimotricha*
- 15b. Leaf blade apex acute (if obtuse then blade spatulate); midvein straight.
 - 22a. Cupule bracts linear-lanceolate or subuliform, curved or inflexed.
 - 23a. Leaf blade obovate-spatulate to elliptic-spatulate 20. *Q. dolicholepis*
 - 23b. Leaf blade ovate-lanceolate to narrowly elliptic.
 - 24a. Leaf blade 5–12 × 2–6 cm; cupules 1.2–1.5 × 1.8–2.5 cm; cupule bracts linear-lanceolate, ca. 5 mm, yellowish brown tomentose; nut 2–2.5 cm 21. *Q. oxyphylla*
 - 24b. Leaf blade 3–6 × 1.3–2.5 cm; cupules 0.8–1 × 1.2–1.8 cm; cupule bracts subulate, 3–5 mm, grayish pubescent; nut 1.5–1.8 cm 22. *Q. baronii*
 - 22b. Cupule bracts scalelike, triangular, ovate, or elliptic, adherent to outside wall of cupule.
 - 25a. Petiole 0.2–0.8(–1) cm.
 - 26a. Mature leaf blades abaxially densely yellowish gray stellate tomentose 23. *Q. acrodonta*
 - 26b. Mature leaf blades abaxially glabrous, glabrescent or only midvein hairy.
 - 27a. Leaf blade base cuneate and decurrent on petiole 28. *Q. utilis*
 - 27b. Leaf blade base usually rounded to cordate, if cuneate then not decurrent on petiole.
 - 28a. Leaf margin with spiniform teeth 27. *Q. tarokoensis*
 - 28b. Leaf margin with blunt teeth.
 - 29a. Cupule 6 mm or less, enclosing 1/4–1/3 of nut 26. *Q. bawanglingensis*
 - 29b. Cupule 6 mm or more, enclosing 1/3 or more of nut.
 - 30a. Leaf blade papery; secondary veins 6–8 on each side of midvein; cupules enclosing ca. 3/4 of nut; bracts of cupule not adhering to outside wall of cupule 24. *Q. cocciferoides*
 - 30b. Leaf blade leathery; secondary veins 8–13 on each side of midvein; cupules enclosing 1/3–1/2 of nut; bracts adhering to the outside wall of cupule 25. *Q. phillyreoides*
 - 25b. Petiole 1–3 cm.
 - 31a. Mature leaf blades abaxially with yellowish brown or yellowish gray stellate hairs.
 - 32a. Cupules 1.8–2.2 cm in diam.
 - 33a. Leaf secondary veins 14–18 on each side of midvein; margin sharply serrate apical to base 29. *Q. lodicosa*

- 33b. Leaf secondary veins 8–12 on each side of midvein; margin dentate from middle to apex 30. *Q. kingiana*
- 32b. Cupules 1–1.5 cm in diam.
- 34a. Leaf blade adaxially rugose, abaxially with brown to yellowish brown stellate hairs, margin entire or with scattered teeth 34. *Q. lanata*
- 34b. Leaf blade adaxially smooth, abaxially with yellowish gray glandular hairs, margin with glandular teeth from middle to apex 31. *Q. franchetii*
- 31b. Mature leaf blades abaxially glabrous or early glabrescent.
- 35a. Leaf blade leathery, margin entire, with scattered teeth or serrate from middle to apex.
- 36a. Leaf blade narrowly elliptic to obovate-elliptic, 6–11 cm wide; secondary veins 16–20 on each side of midvein 32. *Q. marlipensis*
- 36b. Leaf blade elliptic to ovate-lanceolate, 2.5–5.5 cm wide; secondary veins 10–13 on each side of midvein 33. *Q. engleriana*
- 35b. Leaf blade thinly leathery or papery, margin serrate from middle to apex.
- 37a. Leaf narrowly elliptic-lanceolate, 10–20 cm; margin sharply serrate; secondary veins 14–17 on each side of midvein 34. *Q. lanata*
- 37b. Leaf ovate to ovate-lanceolate, 4.5–11 cm; margin hispidulous; secondary veins 9–12 on each side of midvein 35. *Q. setulosa*

1. *Quercus acutissima* Carruthers, J. Linn. Soc., Bot. 6: 33. 1862.

麻栎 ma li

Quercus acutissima var. *depressinucata* H. W. Jen & R. Q. Gao; *Q. acutissima* var. *septentrionalis* Liou; *Q. lunglingensis* Hu.

Trees to 30 m tall, deciduous. Young branchlets 1.5–2 mm, yellowish gray tomentose, glabrescent, yellowish gray with age, lenticellate; lenticels yellowish brown. Petiole 1–3(–5) cm, tomentose, glabrescent; leaf blade narrowly elliptic-lanceolate, 8–19 × 2–6 cm, concolorous, tomentose, glabrescent or only veins abaxially tomentose with age, base rounded to broadly cuneate, margin with spiniform teeth, apex long acuminate; secondary veins 13–18 on each side of midvein, fusing at serration; tertiary veins abaxially slender, evident, ± parallel. Cupules on previous year's branchlets, 1 or 2, cupular to discoid, 1.9–4.2 cm in diam. including bracts, enclosing 1/4–1/2 of nut; bracts subulate to ligulate, ca. 1.5, reflexed, canescent. Nut ovoid to ellipsoid, 1.5–2 × 1.7–2.2 cm, apex impressed; scar ca. 1 cm in diam., raised; stylopodium ca. 4 mm in diam., pale grayish brown sericeous. Fl. Mar–Apr, fr. Sep–Oct of following year.

Deciduous forests; below 100–2200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, SE Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, NE India, Japan, Korea, Myanmar, Nepal, N Thailand, Vietnam].

2. *Quercus chenii* Nakai, J. Arnold Arbor. 5: 74. 1924.

小叶栎 xiao ye li

Quercus acutissima Carruthers subsp. *chenii* (Nakai) A. Camus; *Q. acutissima* var. *brevipetiolata* G. Hoo; *Q. acutissima* var. *chenii* (Nakai) Menitsky; *Q. chenii* var. *linanensis* M. C. Liu & X. L. Shen.

Trees to 30 m tall, deciduous. First-year branchlets ca. 1.5 mm thick. Petiole 0.5–1.5 cm; leaf blade broadly lanceolate to ovate-lanceolate, 7–12 × 2–3.5 cm, yellowish brown tomentose, glabrescent or only veins abaxially tomentose at axils, base shortly attenuate to broadly cuneate and slightly oblique, margin with spiniform teeth, apex acuminate; secondary veins 12–16 on each side of midvein; tertiary veins abaxially inconspicuous. Cupule cupular, ca. 8 mm × 1.5 cm including bracts, enclosing ca. 1/3 of nut; bracts from base to middle triangular, adherent to cupule, tomentose, ca. 3 mm, apical bracts linear, ca. 5 mm, rectiseriate or inflexed. Nut ellipsoid, 1.5–2.5 × 1.3–1.5 cm, apex pale brown sericeous; scar ca. 5 mm in diam., slightly raised, stylopodium ca. 2 mm in diam., pale brown sericeous. Fl. Apr, fr. Oct of following year.

• Mixed mesophytic forests; below 600 m. Anhui, Fujian, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Zhejiang. Very closely related to *Quercus acutissima*, and could just represent the small extreme of that species.

3. *Quercus variabilis* Blume, Mus. Bot. 1: 297. 1850.

栓皮栎 shuan pi li

Quercus bungeana F. B. Forbes; *Q. chinensis* Bunge (1833), not Abel (1818); *Q. variabilis* var. *megaphylla* T. B. Chao; *Q. variabilis* var. *pyramidalis* T. B. Chao & al.

Trees to 30 m tall, deciduous. Branchlets grayish brown, glabrous. Petiole 1–3(–5) cm, glabrous; leaf blade ovate-lanceolate to narrowly elliptic, 8–15(–20) × 2–6(–8) cm, abaxially densely grayish stellate tomentose, base rounded to broadly cuneate, margin with spiniform teeth, apex acuminate; secondary veins 13–18 on each side of midvein; tertiary veins abaxially slender, evident, ± parallel. Female inflorescences axillary on apical part of young shoot. Cupule cupular, ca. 1.5 × 2.5–4 cm

including bracts, enclosing 2/3 of nut; bracts subulate, inflexed, pilose. Nut subglobose to broadly ovoid, ca. 1.5 cm in diam., apex rounded, pale brown sericeous; scar ca. 1 cm in diam., raised; stylopodium ca. 2 mm in diam., pale brown tomentose. Fl. Mar–Apr, fr. Sep–Oct of following year.

Evergreen and deciduous forests; below 3000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

4. *Quercus dentata* Thunberg in Murray, Syst. Veg., ed. 14, 858. 1784.

榲桲 hu shu

Quercus obovata Bunge.

Trees to 25 m tall, deciduous. Branchlets strong, sulcate, densely yellowish gray stellate tomentose. Petiole 2–5 mm, densely brown tomentose; leaf blade obovate to narrowly so, 10–30 × 6–30 cm, abaxially densely grayish brown stellate tomentose, adaxially dark green and pubescent but glabrescent, base rounded, margin with a few undulate to rough serrations on each side, apex with short, blunt tip; secondary veins 4–10 on each side of midvein; tertiary veins abaxially prominent. Female inflorescences axillary on apical part of young shoot, 1–3 cm. Cupule cupular, 1.2–2 × 2–5 cm including bracts, enclosing 1/2–2/3 of nut; bracts reddish brown, narrowly lanceolate, ca. 1 cm, inflexed or erect, leathery, abaxially with brown filiform hairs, adaxially glabrous. Nut ovoid to broadly so, 1.5–2.3 × 1.2–1.5 cm, glabrous; scar ca. 1 cm in diam., slightly raised; stylopodium ca. 2 mm in diam. Fl. Apr–May, fr. Sep–Oct.

Mixed mesophytic forests; below 100–2700 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

A number of species have been named for what are probably hybrids between *Quercus dentata* and other species. These species are morphologically intermediate between their putative parental species and include the following: *Quercus fangshanensis* Liou (Contr. Inst. Bot. Natl. Acad. Peiping 4: 7. 1936), which is probable a hybrid with *Quercus aliena* var. *pekingensis* and has been found in Hebei, Henan, and Shanxi; *Quercus stewardii* Rehder (J. Arnold Arbor. 6: 207. 1925) and *Q. fenchengensis* H. W. Jen & L. M. Wang (in H. W. Jen & al., Bull. Bot. Res., Harbin 4(4): 196. 1984), which are probable hybrids with *Quercus aliena* var. *acutiserrata* and have been found in Anhui, Hubei, Jiangxi, Liaoning, Shaanxi, and Zhejiang; *Quercus mongolicodentata* Nakai (Bot. Mag. (Tokyo) 40: 164. 1926) and *Quercus hopeiensis* Liou (Contr. Inst. Bot. Natl. Acad. Peiping 4: 8. 1936), which are probable hybrids with *Quercus mongolica* and have been found in Gansu, Hebei, Henan, Liaoning, Shandong, and Shanxi, as well as in Korea.

5. *Quercus yunnanensis* Franchet, J. Bot. (Morot) 13: 146. 1899.

云南波罗栎 yun nan bo luo li

Quercus dentata Thunberg var. *oxyloba* Franchet; *Q. dentata* subsp. *yunnanensis* (Franchet) Menitsky; *Q. dentatoides* Liou; *Q. griffithii* J. D. Hooker & Thomson

ex Miquel var. *urticifolia* Franchet; *Q. malacotricha* A. Camus; *Q. yui* Liou.

Trees to 20 m tall, deciduous. Branchlets sulcate, densely yellowish brown stellate tomentose, lenticellate. Petiole ca. 4–8 mm, densely yellowish brown tomentose; leaf blade elliptic to broadly obovate, (8–)12–25 × (3–)6–20 cm, densely yellowish brown stellate tomentose, base cuneate to narrowly rounded, margin with 8–10 large serrations on each side, apex shortly acuminate; secondary veins 8–13 on each side of midvein. Female inflorescences borne on apical portion of shoot, 2–4 cm; cupules usually 1–3. Cupule campanulate, (0.5–)1.5–1.8 × 1–2.5 cm, enclosing 1/3–2/3 of nut; bracts yellowish gray to brown, narrowly lanceolate to narrowly ovate, 2.5–8 mm, erect or prostrate, leathery, abaxially with gray filiform hairs. Nut ovoid, 1.5–2 × 1–1.5 cm; stylopodium ca. 3 mm. Fl. Mar–Apr, fr. Sep–Oct.

• Broad-leaved and mixed mesophytic forests; 1000–2800 m. Guangdong, Guangxi, Guizhou, W Hubei, Sichuan, Yunnan.

Very close to *Quercus dentata*; the slightly shorter cupule bract length of *Q. yunnanensis* is the only difference between them, and they could be treated as conspecific.

6. *Quercus fabri* Hance, J. Linn. Soc., Bot. 10: 202. 1869.

白栎 bai li

Trees or occasionally large shrubs, to 20 m tall, deciduous. Branchlets densely gray to grayish brown tomentose. Petiole 3–5 mm, yellowish brown pubescent; leaf blade obovate to elliptic-obovate, 7–15 × 3–8 cm, both surfaces with yellowish gray stellate hairs, base cuneate to narrowly rounded, margin undulate to serrate, apex obtuse to shortly acuminate; secondary veins 8–12 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescences 1–4 cm; cupules 2–4. Cupule cupular, 4–8 × 8–11 mm, enclosing ca. 1/3 of nut; bracts ovate-lanceolate, crowded. Nut narrowly ellipsoid to ovoid, ca. 1.7 × 0.7–1.2 cm, glabrous; scar 5–7 mm in diam., slightly raised. Fl. Apr, fr. Oct.

• Mixed mesophytic forests; below 100–1900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Yunnan, Zhejiang.

7. *Quercus griffithii* J. D. Hooker & Thomson ex Miquel, Ann. Mus. Bot. Lugduno-Batavi 1: 104. 1863.

大叶栎 da ye li

Quercus aliena Blume var. *griffithii* (J. D. Hooker & Thomson ex Miquel) Schottky.

Trees to 25 m tall, deciduous. Branchlets yellowish gray pilose or pubescent, glabrescent. Petiole 0.5–1 cm, grayish brown shaggy; leaf blade obovate to obovate-elliptic, 10–20(–30) × 4–10 cm, abaxially densely with grayish stellate hairs, sometimes glabrescent, base rounded to narrowly cuneate, margin serrulate, apex shortly acuminate to acuminate; midvein abaxially with long simple hairs; secondary veins 12–18 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescences axillary on young shoots;

cupules solitary or in fascicles of 2 or 3. Cupule cupular, 1.2–1.5 cm in diam., enclosing 1/3–1/2 of nut; bracts narrowly ovate-triangular. Nut ellipsoid to ovoid-ellipsoid, 1.5–2 × 0.8–1.2 cm; scar ca. 6 mm in diam., slightly raised; stylopodium ca. 1 mm in diam. Fr. Sep–Oct.

Mixed mesophytic forests; 700–2800 m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, NE India, Myanmar, Sikkim, Sri Lanka, N Thailand].

Very close to *Quercus aliena* var. *acutiserrata* and could be treated as its synonym.

8. *Quercus aliena* Blume, Mus. Bot. 1: 298. 1850.

槲栎 hu li

Trees to 30 m tall, deciduous. Branchlets grayish brown, glabrescent, lenticellate; lenticels brownish, rounded. Petiole 1–1.3 cm, glabrous; leaf blade narrowly elliptic-obovate to obovate, (5–)10–20(–30) × 5–14(–16) cm, base cuneate to rounded, apex slightly obtuse to shortly acuminate; secondary veins 10–15 on each side of midvein. Female inflorescences axillary on young shoots; cupules solitary or in fascicles of 2 or 3. Cupule cupular, 1–1.5 × 1.2–2 cm, enclosing ca. 1/2 of nut; bracts ovate-lanceolate, ca. 2 mm, crowded, grayish pubescent. Nut ellipsoid to ovoid, 1.7–2.5 × 1.3–1.8 cm; scar slightly raised; stylopodium ca. 1 mm in diam. Fl. Mar–May, fr. Sep–Nov.

Mixed mesophytic forests; 100–2700 m. Anhui, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

1a. Leaf blade margin undulate 8a. var. *aliena*

1b. Leaf margin serrate.

2a. Apices of leaf blade serrations acute 8b. var. *acutiserrata*

2b. Apices of leaf blade serrations rounded 8c. var. *pekingensis*

8a. *Quercus aliena* var. *aliena*

槲栎(原变种) hu li (yuan bian zhong)

Quercus hirsutula Blume.

Leaf blade abaxially grayish brown, margin undulate.

Fl. Apr–May, fr. Sep–Oct.

Mixed mesophytic forests; 100–2000 m. Anhui, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [Japan, Korea].

8b. *Quercus aliena* var. *acutiserrata* Maximowicz ex Wenzig, Jahrb. Königl. Bot. Gart. Berlin 4: 219. 1886.

锐齿槲栎 rui chi hu li

Quercus acutidentata (Maximowicz ex Shirai)

Koidzumi; *Q. acutidentata* var. *latifolia* Liou; *Q. aliena*

Blume var. *acutidentata* Maximowicz ex Shirai; *Q.*

meridionalis Liou (1936), not Gandoger (1890); *Q.*

meridionalis Liou var. *chungnanensis* Liou; *Q.*

tsinglingensis Liou ex S. Z. Qu & W. H. Zhang.

Leaf abaxially densely gray tomentose, margin serrate, apex of serrations acute.

Mixed mesophytic forests; 100–2700 m. Anhui, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, SE Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

This variety has been introduced to Taiwan and may be becoming locally naturalized.

8c. *Quercus aliena* var. *pekingensis* Schottky, Bot. Jahrb. Syst. 47: 636. 1912.

北京槲栎 bei jing hu li

Quercus aliena Blume var. *alticupuliformis* H. W. Jen & L. M. Wang; *Q. aliena* var. *jeholensis* Liou & S. X. Li; *Q. aliena* var. *pekingensis* f. *jeholensis* (Liou & S. X. Li) H. W. Jen & L. M. Wang.

Leaf blade abaxially glabrous, pilose, or glabrescent, margin serrate, apex of serrations rounded.

• Mixed mesophytic forests; 200–1900 m. Hebei, Henan, Liaoning, Shaanxi, Shandong, Shanxi.

9. *Quercus serrata* Murray, Syst. Veg., ed. 14, 858. 1784.

托栎 bao li

Quercus glandulifera Blume; *Q. glandulifera* var. *brevipetiolata* (A. de Candolle) Nakai; *Q. glandulifera* var. *stellatopilosa* W. H. Zhang; *Q. glandulifera* var. *tomentosa* B. C. Ding & T. B. Chao; *Q. ningqiangensis* S. Z. Qu & W. H. Zhang; *Q. serrata* var. *brevipetiolata* (A. de Candolle) Nakai; *Q. serrata* var. *tomentosa* (B. C. Ding & T. B. Chao) Y. C. Hsu & W. Jen; *Q. urticifolia* Blume var. *brevipetiolata* A. de Candolle.

Trees to 25 m tall, deciduous. Leaves subsessile to petiolate; petiole to 3 cm, glabrous or glabrescent; leaf blade narrowly elliptic-ovate, ovate-lanceolate, or obovate, (5–)7–17 × (1.5–)3–9 cm, thinly leathery, with adherent single hairs when young, abaxially glabrous or occasionally stellate tomentose, base cuneate to nearly rounded, margin glandular serrate, apex acuminate to acute; secondary veins 7–12 on each side of midvein. Female inflorescences 1.5–3 cm. Cupule cupular, 5–8 mm × 1–1.2 cm, enclosing 1/4–1/3 of nut; bracts triangular, adherent, margin pilose. Nut ovoid to ovoid-globose, 1.7–2 × 0.8–1.2 cm; scar 5–6 mm in diam., flat; stylopodium ca. 1 mm in diam. Fl. Mar–Apr, fr. Sep–Oct.

Deciduous forests; below 100–2000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Liaoning, Shaanxi, Shandong, S Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

Quercus monnula Y. C. Hsu & H. W. Jen (Acta Bot. Yunnan. 1(1): 148. 1979), from Sichuan, is probably a hybrid between *Quercus serrata* and *Q. aliena*.

10. *Quercus mongolica* Fischer ex Ledebour, Fl. Ross. 3(2): 589. 1850.

蒙古栎 meng gu li

Quercus crispula Blume; *Q. crispula* var. *manschurica* Koidzumi; *Q. grosseserrata* Blume; *Q. kirinensis* Nakai; *Q. liaotungensis* Koidzumi; *Q. mongolica* subsp. *crispula* (Blume) Menitsky; *Q. mongolica* var. *grosseserrata* (Blume) Rehder & E. H. Wilson; *Q.*

mongolica var. *kirinensis* (Nakai) Kitagawa; *Q. mongolica* var. *liaotungensis* (Koidzumi) Nakai; *Q. mongolica* var. *macrocarpa* H. W. Jen & L. M. Wang; *Q. mongolica* var. *manschurica* (Koidzumi) Nakai; *Q. sessiliflora* Salisbury var. *mongolica* (Fischer ex Ledebour) Franchet; *Q. wutaishanica* Mayr.
Trees to 30 m tall, deciduous. Branchlets purple-brown, angular, glabrous, lenticellate. Petiole 2–8 mm, glabrous; leaf blade obovate to narrowly so, (5–)7–19(–23) × (2–)3–11 cm, hairy along veins, glabrescent, base narrowly rounded to auriculate, margin with (5–)7–10 undulate to rough serrations on each side, apex truncate, shortly mucronate, or cuspidate; secondary veins (5–)10–18 on each side of midvein; tertiary veins abaxially slender, evident. Female inflorescences axillary on apical part of young shoot, 0.5–2 cm; cupules 4 or 5 but usually only 1 or 2 fertile. Perianth 6-lobed. Cupule cupular, 0.8–1.5 × 1.2–1.8(–2.8) cm, enclosing 1/3–1/2 of nut; bracts basal from cupule rim triangular-ovate, abaxial surface semiglobose tuberculate, sparsely to densely grayish pubescent; bracts at rim of cupule patent, margin fimbriate. Nut narrowly ovoid, ovoid, or ovoid-ellipsoid, (1.5–)2–2.4 × (1–)1.3–1.8(–2.3) cm, glabrous except for apex; scar 5–8(–13) mm in diam., slightly raised; stylopodium ca. 1 mm in diam. Fl. May–Jun, fr. Sep–Oct.

Mixed mesophytic forests; 200–2500 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Korea, Russia].

A widespread and variable species. The name *Quercus wutaishanica* (*Q. liaotungensis*) has been used for those plants from NW China that have smaller leaves and flatter cupule bracts, but these are clinal differences. In addition, many leaf forms of *Q. mongolica* have been recognized as varieties, but these are merely extreme cases within the variation of the species and do not warrant even varietal rank.

11. *Quercus palustris* Münchhausen, Hausvater 5: 253. 1770.

沼生栎 zhao sheng li

Trees to 25 m tall, deciduous. Branchlets brown, glabrous. Petiole 2.5–5 cm, glabrescent; leaf blade ovate to elliptic, 10–20 × 7–10 cm, abaxially greenish and glabrous or floccose, adaxially dark green, base cuneate, margin with 5–7 lobes on each side ending in 10–30 awns, apex acuminate. Female inflorescence ca. 1 cm; cupules solitary or 2 or 3. Cupule cupular, 1–1.2 × 1.5–1.8 cm, enclosing 1/4–1/3 of nut; bracts triangular, crowded, glabrous. Nut brownish, narrowly ellipsoid, 2–2.5 × ca. 1.5 cm, pubescent, glabrescent, apex rounded; scar flat or slightly impressed; stylopodium present. Fl. Apr–May, fr. Sep of following year.

Cultivated. Beijing Shi, Liaoning, Shandong [native to North America].

12. *Quercus robur* Linnaeus, Sp. Pl. 2: 996. 1753.

夏栎 xia li

Trees 40–50 m tall, deciduous. Young branchlets pubescent, soon glabrescent; branchlets reddish brown, glabrous, lenticellate; lenticels brownish, rounded. Petiole 2–5 mm, glabrous; leaf blade obovate to narrowly so, 5–17 × 2–10 cm, abaxially greenish and hairy along veins but glabrescent, adaxially green, base narrowly rounded to auriculate, margin with 5–7 rounded or retuse lobes on each side, apex truncate to shortly acuminate; secondary veins 5–7(–10) on each side of midvein. Female inflorescences axillary on apical part of young shoot, 0.5–2 cm. Perianth usually 6-lobed. Cupule shallowly cupular, ca. 8 mm × 1.2–1.5 cm, enclosing ca. 1/3 of nut; bracts triangular, ca. 1.5 mm, flat or abaxially slightly protruding, sparsely pubescent. Nut ovoid to ovoid-ellipsoid, 1.5–1.8 × 1–1.3 cm, apex pubescent; scar ca. 5 mm in diam., slightly raised. Fl. May–Jun, fr. Sep–Oct.

Cultivated. Beijing Shi, Shandong, Xinjiang [native to Europe].

13. *Quercus semecarpifolia* Smith in Rees, Cycl. 29: *Quercus* no. 20. 1814.

高山栎 gao shan li

Quercus obtusifolia D. Don.

Trees to 30 m tall, evergreen. Branchlets with prominent stellate hairs, glabrescent, lenticellate; lenticels narrowly rounded. Petiole 2–6 mm, brown tomentose and with stellate hairs, glabrescent; leaf blade elliptic to narrowly so, 5–12 × 3–6.5 cm, abaxially with brown stellate hairs and scurfy powder, adaxially glabrescent or sparsely with stellate hairs, base shallowly cordate, margin entire or with spiniform teeth, apex obtuse; secondary veins 8–14 on each side of midvein; tertiary veins usually abaxially obscured by indumentum. Infructescence with 1 or 2 cupules, 2–7 cm, glabrous. Cupule shallowly bowl-shaped to discoid, 5–8 mm × 1.5–2.5 cm, at maturity inside wall usually in contact with nut ± only in region of scar, inside with a thick pale grayish brown indumentum; bracts lanceolate, 2–3 mm, grayish pubescent, apex brown. Nut sometimes purple-brown, subglobose, 2–3 cm in diam., glabrous or apex glabrescent; scar ca. 6 mm in diam., flat or slightly raised; stylopodium ca. 1 mm in diam. Fl. May–Jun, fr. Aug–Oct of following year.

Montane forests; 2600–4000 m. S Xizang [Afghanistan, India, Nepal, Pakistan].

14. *Quercus guajavifolia* H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 363. 1913.

帽斗栎 mao dou li

Quercus aquifolioides Rehder & E. H. Wilson var. *rufescens* (Franchet) Rehder & E. H. Wilson; *Q. ilex* Linnaeus var. *rufescens* Franchet; *Q. pannosa* Handel-Mazzetti; *Q. pileata* Hu & W. C. Cheng; *Q. semecarpifolia* Smith var. *rufescens* (Franchet) Schottky.

Shrubs or trees to 15 m tall, evergreen. Branchlets densely reddish to dark brown tomentose, glabrescent.

Petiole (1–)2–4(–7) mm, brown tomentose; leaf blade oblong, elliptic, ovate, or obovate, 2–9 × 1.5–5 cm, abaxially with brown spongy glandular hairs and pale brown stellate hairs and not glabrescent, adaxially hairy along midvein, base rounded, margin entire or with spiniform teeth, apex obtuse to mucronate; secondary veins 5–12 on each side of midvein; tertiary veins often hidden by indumentum. Female inflorescences 2–6 cm. Cupule cuculliform to shallowly cupular, 0.6–1 × 1–3 cm, margin of rim expanded to wavyly rugose at maturity, inside with a thick, pale grayish brown indumentum; bracts lanceolate to narrowly ovate, 1–2 mm, grayish brown tomentose from base to middle, apex reddish brown, obtuse, distinct from cupule wall, and glabrous. Nut ovoid to subglobose, 1.5–1.8 cm in diam., glabrous, apex obtuse; scar ca. 5 mm in diam., slightly raised; stylopodium ca. 2 mm in diam. Fl. May–Jul, fr. Sep–Nov of following year.

• Montane forests to subalpine scrub; 2500–4000 m. Guizhou, Sichuan, Yunnan.

15. *Quercus aquifolioides* Rehder & E. H. Wilson in Sargent, Pl. Wilson. 3: 222. 1916.

川滇高山栎 *chuan dian gao shan li*

Trees 10(–20) m tall, evergreen. Young branchlets pale brown stellate tomentose. Petiole 2–5 mm, sometimes nearly sessile; leaf blade elliptic to obovate, 2.5–7 × 1.5–3.5 cm, densely with reddish brown to orangish brown glandular hairs (especially abaxially on midvein) when young, abaxially with slender reddish brown to orangish brown stellate hairs and simple hairs or mealy scurfy scalelike trichomes with age, adaxially glabrescent but pubescent along midvein, base rounded to shallowly cordate, margin entire or with spiniform teeth, apex obtuse; midvein apically flexuous; secondary veins 6–8 on each side of midvein; tertiary veins abaxially obscure. Female inflorescences 0.5–2.5 cm; cupules 1–4. Cupule shallowly cupular, 5–6 cm × 0.9–1.2 cm, covering base of nut, outside gray pubescent, inside densely tomentose; bracts ovate-elliptic to lanceolate, apex obtuse and often free from cupule wall. Nut ovoid to narrowly so, 1.2–2 × 1–1.5 cm, glabrous. Fl. May–Jun, fr. Sep–Oct.

Montane forests to subalpine scrub; 2000–4500 m. Guizhou, W Sichuan, Xizang, Yunnan [Bhutan, Myanmar].

16. *Quercus rehderiana* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 129. 1925.

毛脉高山栎 *mao mai gao shan li*

Quercus longispica (Handel-Mazzetti) A. Camus; *Q. pseudosemecarpifolia* A. Camus; *Q. semecarpifolia* Smith var. *glabra* Franchet; *Q. semecarpifolia* var. *longispica* Handel-Mazzetti.

Trees to 20 m tall, evergreen. Young branchlets pale brown tomentose, glabrescent. Petiole 2–5(–7) mm, pubescent or glabrous; leaf blade narrowly elliptic, elliptic, oblong, or obovate, 3–8(–13) × 2–5(–6) cm,

reddish brown to orangish brown stellate, abaxially glabrescent but usually retaining some stellate hairs, adaxially glabrescent but pubescent along the midvein, base rounded to shallowly cordate, margin entire or with spiniform teeth, apex obtuse; midvein flexuous; secondary veins 4–8(–12) on each side of midvein; tertiary veins abaxially obscure. Female inflorescences 3.5–16 cm. Infructescences 6–16 cm; rachis brown tomentose. Cupule shallowly cupular, 4–7 mm × (0.6–)1–1.5 cm, enclosing less than 1/2 of nut; bracts linear-lanceolate to triangular-ovate, ca. 1.5 mm, densely yellowish gray pubescent, apex obtuse, brown, and glabrous. Nut ovoid, 1–1.2 × 0.7–1.2 cm, glabrous or apex slightly pubescent. Fl. May–Jun, fr. Oct–Nov of following year.

Montane forests to subalpine scrub; 1500–4000 m. Guizhou, Sichuan, Xizang, Yunnan [Thailand].

17. *Quercus spinosa* David ex Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 7: 84. 1884.

刺叶高山栎 *ci ye gao shan li*

Quercus bullata Seemen; *Q. gilliana* Rehder & E. H. Wilson; *Q. ilex* Linnaeus var. *spinosa* (David ex Franchet) Franchet; *Q. semecarpifolia* Smith var. *spinosa* (David ex Franchet) Schottky; *Q. spinosa* var. *miyabei* Hayata; *Q. taiyunensis* Ling; *Q. tatakaensis* Tomiya.

Trees 6–10(–20) m tall, evergreen. Young branchlets with yellowish brown stellate hairs, glabrescent. Petiole 1–3 mm; leaf blade obovate to elliptic, 2.5–7(–16) × 1.5–4 cm, rugose or smooth, with glandular simple and fascicled hairs when young, abaxially glabrescent but often some hairs remaining on base of midvein, adaxially glabrescent, base rounded to cordate, margin with spiniform teeth or entire, apex rounded to obtuse (sometimes acute to acuminate in Taiwan); midvein and secondary veins adaxially impressed; midvein flexuous; secondary veins 4–8 on each side of midvein; tertiary veins abaxially evident. Female inflorescences 1–3 cm. Cupule cupular, 4–9 × 7–15 mm, enclosing 1/4–1/2 of nut; bracts triangular to triangular-ovate, 1–1.5 mm, crowded, gray pubescent except for apex. Nut ovoid to ellipsoid, 1.2–2 × 0.7–1.3 cm; scar ca. 5 mm in diam.; stylopodium ca. 1 mm in diam. Fl. May–Aug, fr. Sep–Dec of following year.

Montane forests; 900–3100 m. Fujian, Gansu, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [Myanmar].

Quercus tatakaensis Tomiya (*Q. spinosa* var. *miyabei* Hayata) has been named for plants from mountains of Taiwan with leaf blades 6.5–16 cm and leaf blade apices acute to acuminate. These plants grow in populations with typical *Q. spinosa*, and their status needs further study.

18. *Quercus monimotricha* (Handel-Mazzetti) Handel-Mazzetti, Symb. Sin. 7: 41. 1929.

矮高山栎 ai gao shan li

Quercus spinosa David ex Franchet var. *monimotricha* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 1925: 129. 1925.

Shrubs (0.5–)1(–2) m tall, evergreen. Branchlets nearly whorled, with brown fascicled indumentum. Petiole ca. 3 mm, densely pubescent; leaf blade elliptic to obovate, 2–3.5 × 1.2–3 cm, with conspicuously stipitate fascicled and floccose hairs when young, abaxially retaining scattered fascicled hairs but sometimes subglabrescent, adaxially glabrescent but base of fascicled hairs remaining evident (under a hand lens), base rounded to shallowly cordate, margin with long spiniform teeth, sometimes entire, apex obtuse to mucronate; secondary veins 4–7 on each side of midvein; tertiary veins abaxially inconspicuous. Infructescence rachis 5–10 mm; cupules 1 or 2. Cupule shallowly cupular, 3–4 × ca. 10 mm, covering base of nut; bracts ovate-lanceolate, ca. 1 mm, grayish brown tomentose, patent at rim of cupule. Nut ovoid, 1–1.3 × 0.8–1 cm, glabrous or apex glabrescent; scar ca. 4 mm in diam., slightly raised, stylopodium ca. 1.5 mm in diam. Fl. Jun–Jul, fr. Sep of following year.

2000–3500 m. W Sichuan, NW Yunnan [Myanmar].

19. *Quercus senescens* Handel-Mazzetti, Symb. Sin. 7: 37. 1929.

灰背栎 hui bei li

Trees or shrubs to 15 m tall, evergreen. Young branchlets densely yellowish grayish brown stellate tomentose, somewhat glabrescent but with a persistent brown indumentum. Petiole 2–4 mm, densely yellowish grayish brown stellate tomentose, glabrescent; leaf blade oblong to obovate-elliptic, (2.5–)3–5(–8) × 1.2–2.5(–4.5) cm, when young densely with pale grayish brown non-glandular fascicled hairs and fascicled hairs on short stalks, abaxially with pale grayish brown fascicled hairs, adaxially glabrescent but base of fascicled hairs remaining evident (under a hand lens), base rounded to shallowly cordate, margin entire or with spiniform teeth, apex obtuse; secondary veins 6–10 on each side of midvein; tertiary veins abaxially obscure under thick indumentum. Infructescence ca. 1 cm, rachis densely pale grayish brown tomentose, glabrescent. Cupule cupular, 5–8 × 7–15 mm, enclosing ca. 1/2 of nut; bracts triangular, ca. 1 mm, crowded, gray tomentose. Nut ovoid, 1.2–1.8 × 0.8–1.1 cm, glabrous; scar 4–5 mm in diam., raised; stylopodium ca. 1 mm in diam. Fl. Apr–May, fr. Sep–Oct.

• 1900–3300 m. Guizhou, Sichuan, Xizang, Yunnan.

Quercus muliensis Hu (Acta Phytotax. Sin. 1: 147. 1951), from Sichuan (Muli Zangzi Zizhixian), is probably a hybrid between *Q. senescens* and *Q. monimotricha*. It has also been treated as *Q. sene-*

scens var. *muliensis* (Hu) Y. C. Hsu & H. W. Jen (J. Beijing Forest Univ. 15(4): 44. 1993). *Quercus muliensis* has the growth habit and leaf dimensions characteristic of *Q. monimotricha* but the leaf and branchlet indumentum characteristic of *Q. senescens*.

20. *Quercus dolicholepis* A. Camus, Chênes 3: 1215. 1954.

匙叶栎 chi ye li

Quercus dolicholepis var. *elliptica* (Y. C. Hsu & H. W. Jen) Y. C. Hsu & H. W. Jen; *Q. spathulata* Seemen (1897), not Watelet (1866); *Q. spathulata* Seemen var. *elliptica* Y. C. Hsu & H. W. Jen.

Trees to 16 m tall, evergreen. Young branchlets yellowish gray stellate tomentose, glabrescent. Petiole 4–5 mm, tomentose; leaf blade elliptic, obovate-spatulate, or obovate-elliptic, 2–8 × 1.5–4 cm, leathery, with yellowish brown simple or fascicled hairs when young, abaxially pubescent or glabrescent, adaxially smooth or rugose, base broadly cuneate, rounded, or cordate, margin entire or apically serrate, apex obtuse to mucronate; secondary veins 7 or 8 on each side of midvein; tertiary veins abaxially slender, evident to obscure. Infructescence with 1 or 2 cupules; rachis ca. 1 cm, tomentose. Cupule cupular, ca. 1 × 2 cm including bracts, enclosing 2/3–3/4 of nut; bracts reddish brown, linear-lanceolate, ca. 5 mm, grayish pilose, apex reflexed. Nut ovoid to subglobose, 1.2–1.7 × 1.3–1.5 cm, apex tomentose; scar ca. 5 mm in diam., slightly raised; stylopodium ca. 1 mm in diam., easily broken. Fl. Mar–May, fr. Oct of following year.

• Forests in mountains; 500–2800 m. Gansu, Guizhou, Henan, Hubei, Hunan, Shaanxi, Shanxi, Sichuan, Yunnan.

Quercus fimbriata Chun & C. C. Huang ex Y. C. Hsu & H. W. Jen (Acta Phytotax. Sin. 14(2): 86. 1976) from Sichuan and Yunnan, is probably a hybrid between *Q. dolicholepis* and *Q. aquifolioides*.

21. *Quercus oxyphylla* (E. H. Wilson) Handel-Mazzetti, Symb. Sin. 7: 46. 1929.

尖叶栎 jian ye li

Quercus spathulata Seemen var. *oxyphylla* E. H. Wilson in Rehder & E. H. Wilson, J. Arnold Arbor. 8: 100. 1927.

Trees to 20 m tall, evergreen. Branchlets densely yellowish brown stellate tomentose, often finely striate. Petiole 0.5–1.5 cm, densely with yellowish brown stellate hairs; leaf blade ovate-lanceolate, oblong, or elliptic, 5–12 × 2–6 cm, stellate tomentose when young, abaxially pubescent with age, base rounded to cordate, margin apically with shallow teeth or entire, apex acuminate to shortly acuminate; secondary veins 6–12 on each side of midvein; tertiary veins abaxially slender, evident. Infructescence 1–2 cm, rachis pubescent, with 1 or 2 cupules. Cupule cupular, 1.2–1.5 × 1.8–2.5 cm including bracts, enclosing ca. 1/2 of nut; bracts linear-lanceolate, ca. 5 mm, yellowish brown tomentose, apex inflexed. Nut narrowly ellipsoid to ovoid, 2–2.5 × 1–1.4

cm, apex yellowish brown pubescent; scar 3–5 mm in diam., slightly raised; stylopodium ca. 1 mm in diam., easily broken. Fl. May–Jun, fr. Sep–Oct of following year.

• Mixed mesophytic forests; 200–2900 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Zhejiang.

22. *Quercus baronii* Skan in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 507. 1899.

托子栎 *jiang zi li*

Quercus baronii f. *capillata* Kozlov; *Q. baronii* var. *capillata* (Kozlov) Liou; *Q. baronii* var. *pendula* S. Y. Wang & C. L. Chang; *Q. kozloviana* Liou; *Q. pseudoserrata* Liou.

Shrubs or trees to 15 m tall, semievergreen. Branchlets and abaxial surface of blades with grayish white stellate pubescence on 1st-year growth, usually glabrescent. Petiole 3–7 mm, yellowish gray tomentose; leaf blade ovate-lanceolate, 3–6 × 1.3–2 cm, loose stellate pubescent when young; midvein abaxially with yellowish gray villous hairs, glabrescent, base rounded to broadly cuneate, margin apical 1/3 or more sharply serrate, apex acuminate; secondary veins 6 or 7 on each side of midvein and slightly protruding from margin; tertiary veins abaxially slender, evident to inconspicuous. Female inflorescences 1–1.5 cm; cupules 1–several. Infructescence with 1 or 2 cupules; rachis 0.5–1.5 cm, thinly tomentose, glabrescent. Cupule cupular, 0.8–1 × 1.2–1.8 cm, enclosing 1/2–2/3 of nut; bracts subulate, 3–5 mm, inflexed, grayish pubescent. Nut ovoid to ellipsoid, 1.5–1.8 × 1–1.2 cm, apex flat or slightly depressed; scar 4–5 mm in diam., slightly raised; stylopodium ca. 2 mm, white pubescent. Fl. Apr, fr. Sep of following year.

• Mixed mesophytic forests, frequently on limestone; 500–2200 m. Gansu, Henan, Hubei, Hunan, Shaanxi, Shanxi, Sichuan.

23. *Quercus acrodonta* Seemen, Bot. Jahrb. Syst. 23(Beibl. 57): 48. 1897.

岩栎 *yan li*

Quercus handeliana A. Camus; *Q. ilex* Linnaeus var. *acrodonta* (Seemen) Skan; *Q. parvifolia* Handel-Mazzetti (1925), not Bentham (1889) nor Small (1895).

Trees or sometimes shrubs, to 15 m tall, evergreen. Young branchlets densely yellowish gray shortly stellate tomentose. Petiole 3–5 mm, densely yellowish gray tomentose; leaf blade elliptic, elliptic-lanceolate, or narrowly obovate, 2–6 × 1–2.5 cm, abaxially densely yellowish gray stellate tomentose, base rounded to nearly cordate, margin with spiniform scattered teeth from middle to apex, apex shortly acuminate; secondary veins 7–11 on each side of midvein, densely pubescent; tertiary veins abaxially

inconspicuous beneath indumentum. Female inflorescences axillary on branches toward apex of tree; rachis yellowish brown tomentose; cupules 2 or 3. Infructescence with 1 or 2 cupules; rachis ca. 5 mm, densely yellowish gray tomentose. Cupule cupular, 5–8 mm × 1–1.5 cm, enclosing ca. 1/2 of nut; bracts elliptic, ca. 1.5 mm, imbricate, crowded, grayish tomentose except for reddish apex. Nut narrowly ellipsoid, 8–10 × 5–8 mm, apex yellowish gray tomentose; scar ca. 2 mm in diam., slightly raised; stylopodium ca. 1 mm in diam. Fl. May, fr. Sep–Oct.

• Valleys and mountains; 300–2300 m. Gansu, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

24. *Quercus cocciferoides* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 128. 1925.

铁橡栎 *tie xiang li*

Quercus cocciferoides var. *taliensis* (A. Camus) Y. C. Hsu & H. W. Jen; *Q. taliensis* A. Camus.

Trees to 15 m tall, semievergreen. Young branchlets tomentose, glabrescent. Petiole 5–8 mm, tomentose; leaf blade narrowly elliptic, ovate-lanceolate, or ovate, 3–8 × 1.5–3 cm, papery, pubescent when young, glabrescent, base rounded to cuneate and often oblique, margin serrate from middle to apex, apex acuminate to shortly acuminate; secondary veins 6–8 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescences ca. 2.5 cm, cupules 4 or 5. Cupule cupular to kettle-shaped, 1–1.2 × 1–1.5 cm, enclosing 2/3–3/4 of nut; bracts triangular, ca. 1 mm, usually not adhered to cupule, with appressed grayish hairs. Nut subglobose, 1–1.2 × ca. 1 cm, apex mucronate, tomentose; scar 2–3 mm in diam., slightly raised; stylopodium ca. 1 mm in diam. Fl. Apr–Jun, fr. Sep–Nov.

• Sunny mountains slopes, dry river valleys; 1000–2600 m. Shaanxi, Sichuan, Yunnan.

Quercus yiwuensis C. C. Huang ex Y. C. Hsu & H. W. Jen (Acta Phytotax. Sin. 14(2): 85. 1976), from Yunnan, is probably a hybrid between *Q. cocciferoides* and *Q. aquifolioides*.

25. *Quercus phillyreoides* A. Gray, Mem. Amer. Acad. Arts., n.s., 6: 406. 1859.

乌冈栎 *wu gang li*

Maesa singuliflora H. Léveillé; *Quercus fokienensis* Nakai; *Q. fooningensis* Hu & W. C. Cheng; *Q. ilex* Linnaeus var. *phillyreoides* (A. Gray) Franchet; *Q. lichuanensis* W. C. Cheng; *Q. myricifolia* Hu & W. C. Cheng; *Q. phillyreoides* subsp. *fokienensis* (Nakai) Menitsky; *Q. singuliflora* (H. Léveillé) A. Camus. Shrubs or trees to 10 m tall, evergreen. Branchlets slender, grayish brown pubescent, gradually glabrescent. Petiole 3–5 mm, pilose; leaf blade green, obovate, narrowly elliptic, or narrowly ovate, 2–6(–8) × 1.5–3 cm, glabrescent or midvein abaxially remaining pilose with age, base rounded to nearly cordate, margin glandular serrulate, apex mucronate to shortly acuminate; secondary veins 8–13 on each side of midvein;

tertiary veins abaxially inconspicuous to evident but very slender. Female inflorescences 1–4 cm. Cupule cupular, 6–8 mm × 1–1.2 cm, enclosing 1/3–1/2 of nut; bracts triangular, ca. 1 mm, crowded, grayish pubescent except for apex. Nut ellipsoid, 1–2 × 0.5–1 cm; scar 3–4 mm in diam., flat or slightly raised; stylopodium ca. 1 mm in diam., easily broken. Fl. Mar–Apr, fr. Sep–Oct.

Mixed mesophytic forests; 300–1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

26. *Quercus bawanglingensis* C. C. Huang & al., in C. C. Huang & Y. T. Chang, *Guihaia* 10: 10. 1990.

坝王栎 *ba wang li*

Trees 6–8 m tall, evergreen. Petiole 5–8 mm; leaf blade ovate to elliptic, 4–6 × 1.5–2.5 cm, thickly papery, base broadly cuneate to rounded and sometimes oblique, margin denticulate, apex acute to acuminate; secondary veins 6–9 on each side of midvein; tertiary veins slender, reticulate. Infructescences 3–6 mm, usually 1-fruited at maturity. Cupule cupular, 3–5 × 0.9–1.2 cm, enclosing 1/4–1/3 of nut; bracts ovate to obtusely triangular, appressed imbricate, covered with short, gray hairs and scalelike glands. Nut broadly ellipsoid, 1–1.2 cm, glabrous; scar 5–6 mm in diam.; stylopodium ca. 1 mm.

• Mountains on limestone; ca. 1000 m. Hainan (Changjiang Xian). Related to *Quercus phillyreoides*, but its status is uncertain.

27. *Quercus tarokoensis* Hayata, *Icon. Pl. Formosan.* 7: 38. 1918.

太鲁阁栎 *tai lu ge li*

Trees to 12 m tall, evergreen. Branchlets slender, grayish brown pubescent, glabrescent, lenticellate; lenticels brownish, orbicular. Petiole 3–5 mm, brown tomentose; leaf blade narrowly ovate, 2–4 × 1.5–2.8 cm, thinly leathery, abaxially midvein densely with brown stellate hairs or glabrous, adaxially midvein basal portion sometimes stellate, base shallowly cordate, margin with spiniform teeth, apex acuminate; midvein and secondary veins adaxially inconspicuous. Cupule cupular, 5–7 mm × 1–1.3 cm, enclosing ca. 1/2 of nut; bracts ovate, ca. 1 mm, densely grayish brown pubescent except for apex. Nut narrowly ovoid, 1.4–1.8 × 0.8–1 cm, glabrous; scar ca. 3 mm in diam. Fl. Jun–Jul, fr. Nov–Dec of following year.

• Steep slopes and ridges on limestone; 400–1300 m. E Taiwan.

28. *Quercus utilis* Hu & W. C. Cheng in Hu, *Acta Phytotax. Sin.* 1: 146. 1951.

炭栎 *tan li*

Trees to 10 m tall, evergreen. Branchlets thin, finely striate, sparsely stellate tomentose, grayish with age, glabrescent. Petiole thin, 2–5 mm, glabrescent; leaf blade ovate, elliptic-lanceolate, or obovate, 2.5–5.5 × 1.5–2.5 cm, thinly leathery, abaxially greenish and with stellate hairs in axil of secondary veins, adaxially brightly green and sparsely stellate on midvein, base cuneate and decurrent on petiole, margin glandular serrulate, apex shortly mucronate; secondary veins 9–11 on each side of midvein, slender, evident, adaxially

impressed; tertiary veins abaxially conspicuous. Infructescence with 1 or 2 cupules; rachis ca. 5 mm thick, with stellate hairs. Cupule bowl-shaped, 6–7 mm in diam., enclosing ca. 1/3 of nut; bracts ovate, ca. 1 mm, crowded, densely yellowish brown tomentose. Nut ovoid to narrowly ellipsoid, ca. 10 × 7 mm, brown, glabrous but apex with filiform hairs and acuminate; scar ca. 2 mm in diam., raised; stylopodium ca. 1 mm in diam., easily broken. Fl. Apr–May, fr. Sep–Nov.

• Open or dense woods on rocky hills; 1000–1500 m. SW Guangxi, S Guizhou, SE Yunnan (Xichou Xian).

29. *Quercus lodicosa* O. E. Warburg & E. F. Warburg, *J. Roy. Hort. Soc.* 58: 188. 1933.

西藏栎 *xi zang li*

Trees 15–20 m tall, evergreen. Young branchlets densely reddish tomentose, grayish brown with age, glabrescent, lenticellate; lenticels inconspicuous. Petiole 0.8–2 cm, tomentose, glabrescent; leaf blade elliptic to ovate-elliptic, 7–14 × 3.5–5 cm, densely reddish tomentose when young, abaxially densely yellowish gray tomentose with age; midvein basal portion adaxially pubescent, base broadly cuneate and nearly unequal, margin except basal portion sharply serrate, apex cuspidate to shortly acuminate; midvein adaxially slightly raised; secondary veins 14–18 on each side of midvein and adaxially impressed. Infructescences short, usually 1-fruited. Cupule discoid, 5–10 mm × 1.8–2.2 cm; bracts broadly ovate, thick and hard, crowded, tomentose. Nut oblate-conical, ca. 2 cm in diam., glabrous or apex slightly brown tomentose; scar 1–1.2 cm in diam., flat.

Forests in mountains; 1800–2400 m. SE Xizang [Myanmar].

30. *Quercus kingiana* Craib, *Bull. Misc. Inform. Kew* 1911: 472. 1911.

澜沧栎 *lan cang li*

Trees to 12 m tall, evergreen. Branchlets of current year densely with yellowish gray stellate hairs, 2nd-year branchlets glabrous or sparsely hairy. Petiole 1–1.5 cm, densely yellowish brown tomentose; leaf blade narrowly elliptic, 7–11 × 3–5 cm, abaxially with yellowish gray stellate hairs, base nearly rounded to oblique, margin apical portion serrate, apex shortly acuminate to cuspidate; secondary veins 8–12 on each side of midvein, abaxially raised, adaxially inconspicuous; tertiary veins abaxially conspicuous. Infructescences ca. 1.5 cm; rachis with yellowish gray stellate hairs. Cupule campanulate, ca. 1.5 × 2 cm, enclosing more than 1/2 of nut, wall ca. 2 mm thick; bracts triangular-ovate, crowded, gray tomentose. Nut ellipsoid, ca. 2 × 1.5 cm, apex rounded; scar raised.

Mixed mesophytic forests; 800–1600 m. NW and SW Yunnan [Myanmar, N Thailand].

31. *Quercus franchetii* Skan in F. B. Forbes & Hemsley, *J. Linn. Soc., Bot.* 26: 513. 1899.

锥连栎 *zhui lian li*

Trees to 15 m tall, evergreen. Branchlets densely with yellowish gray simple and fascicled hairs. Petiole 1–2 cm, densely yellowish gray tomentose; leaf blade obovate to elliptic, 5–12 × 2.5–6 cm, thinly leathery, with dense yellowish gray glandular fascicled or simple hairs when young, abaxially densely with yellowish gray and glandular hairs with age, base cuneate to rounded, margin glandular-tipped serrate from middle to apex, apex acuminate to obtuse; secondary veins 8–12 on each side of midvein; tertiary veins abaxially prominent. Female inflorescences 1–2 cm; cupules 5 or 6. Infructescence 1–2 cm; rachis densely yellowish gray tomentose. Cupule cupular to sometimes discoid, (0.4–)0.7–1.2 × 1–1.4 cm, enclosing to 1/2 of nut; bracts triangular, ca. 2 mm, abaxially tuberculate, gray tomentose. Nut subglobose, 1.1–1.3 × 0.9–1.3 cm, sparsely gray tomentose, apex truncate to depressed; scar ca. 5 mm in diam., raised; stylopodium ca. 2 mm in diam. Fl. Feb–Mar, fr. Sep.

Mixed mesophytic forests; 800–2600 m. Sichuan, C to S Yunnan [N Thailand].

32. *Quercus marlipoensis* Hu & W. C. Cheng in Hu, Acta Phytotax. Sin. 1: 142. 1951.

麻栗坡栎 ma li po li

Trees to 18 m tall, evergreen. Branchlets ca. 4 mm in diam., yellowish brown tomentose, glabrescent, lenticellate, lenticels brownish, oblong, convex. Petiole 1.5–3 cm, thinly tomentose; leaf blade narrowly elliptic to obovate, 15–22 × 6–11 cm, leathery, abaxially stellate tomentose along midvein, base rounded, margin with scattered teeth or entire and slightly inflexed, apex shortly acuminate; midvein adaxially impressed; secondary veins 16–20 on each side of midvein; tertiary veins abaxially conspicuous. Cupule cupular, ca. 0.8 × 1.4 cm, inside grayish brown tomentose, wall ca. 2 mm thick; bracts ovate, crowded, purple-red tomentose except for apex.

• Mixed evergreen forests; ca. 1100 m. Yunnan (Malipo Xian).

Very close to *Quercus engleriana* as expressed in its southern range in Guangxi and SE Yunnan. The only difference is that *Q. marlipoensis* has larger leaves that are sometimes obovate.

33. *Quercus engleriana* Seemen, Bot. Jahrb. Syst. 23(Beibl. 57): 47. 1897.

巴东栎 ba dong li

Myrica cavaleriei H. Léveillé; *Quercus dolichostyla* A. Camus; *Q. kongshanensis* Y. C. Hsu & H. W. Jen; *Q. lanceolata* S. Z. Qu & W. H. Zhang (1984), not Humboldt & Bonpland (1809); *Q. lyoniifolia* W. C. Cheng; *Q. obscura* Seemen; *Q. shangxiensis* Z. K. Zhou; *Q. sutchuenensis* Franchet.

Trees to 25 m tall, evergreen. Young branchlets yellowish gray tomentose, glabrescent. Petiole 1–2 cm, tomentose, glabrescent; leaf blade lanceolate, ovate, ovate-elliptic, or elliptic, 6–16 × 2.5–5.5 cm, densely yellowish brown pubescent but glabrescent or

abaxially retaining fascicled hairs on axil of veins, adaxially flat to rugose, base rounded, broadly cuneate, or rarely shallowly cordate, margin serrate from middle to apex or sometimes entire, apex acuminate; midvein and secondary veins adaxially flat or sometimes impressed; secondary veins 10–13 on each side of midvein; tertiary veins abaxially slender, evident to prominent or obscured by indumentum when young. Female inflorescences axillary on apical portion of young shoots, 1–3 cm. Infructescence 1–5 cm; cupules 1–10. Cupule bowl-shaped, 4–7 × 8–12 mm, enclosing 1/3–1/2 of nut; bracts ovate-lanceolate, ca. 1 mm, grayish brown pubescent basal to middle, apex purple red and glabrous. Nut narrowly ovoid, 1–2 × 0.6–1 cm, glabrous; scar 3–5 mm in diam., raised; stylopodium 2–3 mm. Fl. May–Jun, fr. Nov.

• Mixed mesophytic forests; 700–2700 m. Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang.

34. *Quercus lanata* Smith in Rees, Cycl. 29: *Quercus* no. 27. 1814.

通麦栎 tong mai li

Quercus leucotrichophora A. Camus; *Q. tungmaiensis* Y. T. Chang.

Trees to 30 m tall, evergreen. Young branchlets densely grayish brown pubescent, glabrescent. Petiole 0.5–1.5 cm, grayish brown tomentose, glabrescent; leaf blade narrowly ovate-lanceolate to narrowly elliptic, 9–20 × 3–8.5 cm, thinly leathery, abaxially densely with grayish stellate hairs but glabrescent, adaxially densely pubescent especially on midvein, base rounded to broadly cuneate, margin sharply serrate, apex acuminate; secondary veins 12–17 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescences axillary on young shoots, 4–14 cm; cupules 10 or more. Cupule cupular, 0.6–1 × 0.8–1.5 cm, enclosing 1/4–1/2 of nut, wall ca. 1 mm thick; bracts triangular, ca. 1 mm, basal bracts abaxially tuberculate, grayish brown pubescent. Nut ovoid-conical, 1.5–2 × 1–1.2 cm, glabrous; scar ca. 4 mm in diam., slightly raised; stylopodium ca. 1 mm. Fl. Jun–Jul, fr. Jun–Jul of following year.

Mixed mesophytic forests; 1900–3000 m. Guangxi, Xizang, Yunnan [Bhutan, N India, Myanmar, Nepal, N Thailand, Vietnam].

35. *Quercus setulosa* Hickel & A. Camus, Bull. Mus. Natl. Hist. Nat. 29: 598. 1923.

富宁栎 fu ning li

Quercus sinii Chun.

Trees to 20 m tall, evergreen. Branchlets glabrous. Petiole 1–2 cm; leaf blade ovate to ovate-lanceolate, 4.5–11 × 1.5–4.5 cm, abaxially greenish and glabrous or midvein and axil of veins with yellowish brown stellate hairs, adaxially brightly green, base rounded to broadly cuneate, margin hispidulous, apex narrowly acuminate; secondary veins 9–12 on each side of midvein, adaxially inconspicuous. Cupule cupular, ca. 5

Flora of China 4: 370–380. 1999.

× 10 mm, enclosing 1/4–1/3 of nut; bracts ovate, ca. 1 mm, grayish tomentose. Nut brown, narrowly ellipsoid, 1.5–2 × ca. 0.9 cm, glabrous or apex slightly pubescent; scar ca. 3 mm in diam., slightly raised; stylopodium short. Fl. Apr–May, fr. Oct.

Mixed mesophytic forests; 100–1300 m. Guangdong, Guangxi, Guizhou, Yunnan [Laos, Thailand, Vietnam].

