

3. CASTANOPSIS (D. Don) Spach, Hist. Nat. Vég. 11: 142, 185. 1841, nom. cons.

锥属 zhui shu

Quercus Linnaeus [unranked] *Castanopsis* D. Don, Prodr. Fl. Nepal. 56. 1825; *Limlia* Masamune & Tomiya; *Pasaniopsis* Kudo; *Shiia* Makino.

Trees evergreen. Winter buds ovoid to ellipsoid, with decussate scales. Stipules extrapetiolar. Leaves alternate, distichous, or for a few species spirally arranged. Inflorescences usually unisexual, erect, spicate or paniculate. Male flowers in fascicles of 3–7, rarely solitary and scattered; perianth 5- or 6(–8)-lobed; stamens (8 or)9–12; rudimentary pistil very small, densely covered with curved woolly hairs. Female flowers solitary or in clusters of 3–5(–7) per cupule; staminodes when present opposite perianth lobes; ovary 3-loculed; styles (2 or)3(or 4); stigmas punctiform or shallow terminal pores. Cupules solitary on rachis, actinomorphic or zygomorphic, rarely indehiscent, completely or partially enclosing nut; bracts sparsely to densely covering outside of cupule, spinelike or rarely scalelike or tubercles (cupule measurement always includes bracts). Nuts 1–3 per cupule, maturing after 2nd year or rarely in 1st year; abortive ovule apical. Germination hypogeal; cotyledons slightly convex, rarely cerebriform rugose.

About 120 species: tropical and subtropical Asia; 58 species (30 endemic) in China.

Most species are used for timber, and the nuts of many are edible.

- 1a. Cupules each with 2 or 3(–7) female flowers at anthesis (occasionally on a given inflorescence a cupule can be found with only 1 flower); mature cupules with (1 or)2 or 3 nuts.
 - 2a. Cupule bracts 1–2 cm; leaf blade midvein adaxially slightly raised.
 - 3a. First-year branchlets and leaf blades densely pilose; leaf blade secondary veins 16–22 on each side of midvein 49. *C. tessellata*
 - 3b. First-year branchlets and leaf blades with scalelike trichomes; leaf blade secondary veins 10–17 on each side of midvein.
 - 4a. Leaf blade margin serrate; secondary veins 10–13 on each side of midvein 47. *C. xichouensis*
 - 4b. Leaf blade margin entire; secondary veins 14–17 on each side of midvein 48. *C. rockii*
 - 2b. Cupule bracts less than 1 cm (to 1.5 cm in *C. lamontii*); leaf blade midvein adaxially impressed or flat.
 - 5a. First-year branchlets and leaf blades abaxially at least adjacent to midvein pilose or villous.
 - 6a. Leaf blade 16–30 × 5–8 cm; secondary veins 16–22 on each side of midvein 50. *C. kweichowensis*
 - 6b. Leaf blade 10–18 × 2–5 cm; secondary veins 13–17 51. *C. ceratocantha*
 - 5b. First-year branchlets and leaf blades glabrous or apex of young branchlets and midvein of young leaf blades abaxially with sparse coarse hairs.
 - 7a. Nuts glabrous or with sparse short hairs only around scar when young 52. *C. fabri*
 - 7b. Nuts covered with appressed hairs.
 - 8a. Leaf blade apex mucronate or caudate.
 - 9a. Leaf blade apex mucronate; cupule bracts transversely united to discontinuous cristate rings 55. *C. crassifolia*
 - 9b. Leaf blade apex caudate and bent; cupule bracts in bundles 56. *C. chunii*
 - 8b. Leaf blade apex acute to acuminate.
 - 10a. Petiole 1.5–3 cm 54. *C. lamontii*
 - 10b. Petiole 0.8–1.5 cm.
 - 11a. First-year leaf blades glabrous 57. *C. orthacantha*
 - 11b. First-year leaf blades abaxially covered with reddish brown to yellowish brown slightly loose waxy scalelike trichomes.
 - 12a. Leaf blade secondary veins 13–19 on each side of midvein 53. *C. wattii*
 - 12b. Leaf blade secondary veins 9–13 on each side of midvein 58. *C. platyacantha*
 - 1b. Cupules each with 1 female flower at anthesis (on a given inflorescence occasionally a cupule can be found with up to 3 flowers); mature cupules with 1(–3) nut.
 - 13a. Cupule bracts scalelike or only bract base transversely adnate to rib rings; nuts maturing and falling in 1st year but empty cupules persisting on rachis; shoot leaves spirally arranged (distichous in *C. uraiana*).
 - 14a. Cotyledons cerebriform rugose; young leaf blades glaucous, covered with brown to reddish brown waxy scalelike trichomes.
 - 15a. Base of cupules shortly stipitate; branchlets pubescent 3. *C. cerebrina*

- 15b. Base of cupules sessile; branchlets glabrous.
- 16a. Cupules cupular, enclosing 1/2–2/3 of nut; nut 0.3–0.6 cm in diam. 1. *C. calathiformis*
- 16b. Cupules ellipsoid to ovoid, completely or almost completely enclosing nut; nut 1.1–1.6 cm in diam. 2. *C. fissa*
- 14b. Cotyledons plano-convex; young leaf blades not glaucous, without or only abaxially with ± adherent waxy scalelike trichomes.
- 17a. Cupules globose to subglobose, completely or almost completely enclosing nut; nut scar 7–9 mm in diam. 6. *C. sclerophylla*
- 17b. Cupules shallowly cupular, rarely enclosing more than 1/4–1/3 of nut; nut scar 4–6 mm in diam.
- 18a. Leaf blade base inaequilateral; fruit maturing on previous year's branches 4. *C. uraiana*
- 18b. Leaf blade base attenuate; fruit maturing on current year's branches 5. *C. longzhouica*
- 13b. Cupule bracts spiny or rarely tubercular; nuts maturing and falling in 2nd year, cupules falling with nut; shoot leaves usually distichous.
- 19a. Cupule outside wall completely covered by spinelike bracts.
- 20a. Leaf blade margin serrate.
- 21a. First-year branchlets, petioles, and leaf blades abaxially glabrous or sparsely pubescent.
- 22a. Leaf blade margin shallowly serrate from middle to apex; secondary veins usually not reaching margin; petiole rarely longer than 1 cm 8. *C. hystrix*
- 22b. Leaf blade margin serrate from near base to apex; secondary veins reaching margin; petiole 1–3 cm.
- 23a. Leaf blade usually narrower than 5 cm; young leaf blades abaxially covered with sometimes early glabrescent brownish powdery waxy scalelike trichomes; cupules 2.5–4 cm in diam. 17. *C. choboensis*
- 23b. Leaf blade 5–10 cm wide; young leaf blades abaxially thinly covered with reddish brown to yellowish brown waxy scalelike trichomes; cupules 6–8 cm in diam. 13. *C. tibetana*
- 21b. First-year branchlets, petioles, and leaf blades abaxially puberulent.
- 24a. Transverse section of cupule bracts triangular or trapeziform 16. *C. clarkei*
- 24b. Transverse section of cupule bracts circular.
- 25a. Leaf blade secondary veins 15–25 on each side of midvein, reticulate veins abaxially conspicuous; petiole usually less than 1 cm 14. *C. indica*
- 25b. Leaf blade secondary veins 10–15 on each side of midvein, reticulate veins abaxially very slender and evident to inconspicuous; petiole 1–1.8 cm 15. *C. hainanensis*
- 20b. Leaf blade margin entire or rarely a few leaves shallowly serrate toward leaf blade apex.
- 26a. Branches and leaf blades glabrous or leaves abaxially with membranous scalelike trichomes.
- 27a. Cupules 6–8 cm in diam., wall ca. 3 mm thick; bracts 2–3 cm; nuts oblate, puberulent, scar covering 1/3 of nut 7. *C. kawakamii*
- 27b. Cupules 2–3 cm in diam., wall ca. 1 mm thick; bracts 0.4–1 cm; nuts broadly conical, glabrous, scar covering only basal part of nut 34. *C. eyrei*
- 26b. Branches and leaf blades hairy (at least on 1st-year branchlets and abaxial midvein) or leaf blades abaxially covered with waxy scalelike trichomes.
- 28a. Leaf blade base cordate, shallowly auriculate, or rarely rounded; petiole 1–3(–5) mm 12. *C. fordii*
- 28b. Leaf blade base not cordate or auriculate but may be rounded; petiole (4–)8–20 mm.
- 29a. Leaf blade 4–10 cm.
- 30a. Infructescences ca. 15 cm; cupules 2.5–4 cm in diam., bracts 0.6–1 cm 8. *C. hystrix*
- 30b. Infructescences 4–8 cm; cupules 5–6 cm in diam., bracts 1–2 cm 9. *C. concinna*
- 29b. Leaf blade 10–25 cm.
- 31a. Petiole 1–2 cm; leaf blade 15–25 cm, midvein adaxially usually impressed, secondary veins 12–16 on each side of midvein; nuts oblate, 1.5–2 cm in diam., scar covering ca. 1/3 of nut 10. *C. mekongensis*
- 31b. Petiole 0.8–1 cm; leaf blade 10–15 cm, midvein adaxially raised, secondary veins 9–12 on each side of midvein; nuts broadly conical, 2–3.5 cm in diam., scar covering only basal

- part
of nut 11. *C. globigemmata*
- 19b. Cupule outside wall visible (if spinelike bracts completely cover wall then spines transversely adnate to cristate rings)
- 32a. Scar covering basal 2/3 or more of nut.
- 33a. Rachis of infructescences covered with pale grayish brown, feltlike, short hairs, glabrescent; cupule bracts 2–6 mm 19. *C. argyrophylla*
- 33b. Rachis of infructescences glabrous or very shortly and sparsely mealy puberulent; cupule bracts 7–12 mm 20. *C. tcheponensis*
- 32b. Scar at base or covering only basal 1/3 of nut.
- 34a. Mature nuts with appressed hairs.
- 35a. Rachis of infructescences 5–8 mm thick and leaf blade margin entire.
- 36a. Cupules 2–2.5 cm in diam.; petiole 0.3–0.6 cm; leaf blade margin subconvolute 23. *C. damingshanensis*
- 36b. Cupules 2.5–4.5 cm in diam.; petiole 1–3 cm; leaf blade margin not subconvolute.
- 37a. Leaf blade 26–45 cm, young leaf blades abaxially with slender stellate hairs along midvein; secondary veins 16–20 or more on each side of midvein; petiole 2–3 cm 21. *C. megaphylla*
- 37b. Leaf blade 8–15 cm, young leaf blades abaxially covered with yellowish brown tightly adnate layers of waxy scalelike trichomes; secondary veins 10–13 on each side of midvein; petiole 1–2 cm 22. *C. nigrescens*
- 35b. Rachis of infructescences less than 5 mm thick but if 5 mm thick then leaf blade margin with short and sharp serrations.
- 38a. Petiole 2.5–3.5 cm; young leaf blades abaxially sometimes with slender stellate hairs 24. *C. jianfenglingensis*
- 38b. Petiole rarely to 2.5 cm; young leaf blades abaxially without stellate hairs.
- 39a. Leaf blade secondary veins and midvein adaxially slightly raised; cupules 3–3.5 cm in diam. 25. *C. remotidenticulata*
- 39b. Leaf blade secondary veins and sometimes midvein adaxially impressed; cupules 1.5–3 cm in diam.
- 40a. Leaf blade margin mostly entire.
- 41a. Leaf blade lanceolate, 1.5–4 cm wide, apex caudate to sometimes shortly acute, secondary veins 9–13 on each side of midvein; nuts densely pilose 26. *C. tonkinensis*
- 41b. Leaf blade ovate-elliptic, ovate, or oblong, 4–6 cm wide, apex acuminate, secondary veins 13–17 on each side of midvein; nuts puberulent 28. *C. boisii*
- 40b. Leaf blade margin serrate but some leaves on same plant may be entire.
- 42a. First-year leaf blades concolorous or adaxially darker green and abaxially greenish 29. *C. densispinosa*
- 42b. First-year leaf blades not concolorous.
- 43a. Cupules ca. 3 cm in diam.; leaf blade midvein adaxially usually slightly raised at base 32. *C. oblonga*
- 43b. Cupules 1.5–2 cm in diam.; leaf blade midvein adaxially impressed.
- 44a. Petiole usually shorter than 1 cm; leaf blade abaxially covered with slightly adherent waxy scalelike trichomes 30. *C. ledongensis*
- 44b. Petiole ca. 1.5 cm; leaf blade abaxially covered with early glabrescent waxy scalelike trichomes 31. *C. subuliformis*
- 34b. Mature nuts glabrous or glabrescent, or sparsely covered with appressed hairs only near apex, or rarely puberulent.
- 45a. Cupules 0.7–2(–2.2) cm in diam.; bracts 1–6 mm.
- 46a. Leaf blade margin predominantly entire but sometimes shallowly serrate at apex.

- 47a. First-year leaf blades abaxially greenish; cupules 0.7–1.1 cm in diam.; leaf blade secondary veins
7–10 on each side of midvein 40. *C. fleuryi*
- 47b. First-year leaf blades abaxially red-brown; cupules 1.2–2.2 cm in diam.; leaf blade secondary veins 11–18 on each side of midvein.
- 48a. Petiole shorter than 1 cm; leaf blade secondary veins 14–18 on each side of midvein; leaf blades abaxially and infructescence rachises densely covered with early glabrescent powdery waxy scalelike trichomes 41. *C. rufotomentosa*
- 48b. Petiole 1–1.5 cm; leaf blade secondary veins 11–14 on each side of midvein; leaf blades abaxially and infructescence rachises pubescent, covered with slightly adherent waxy scalelike trichomes 42. *C. tribuloides*
- 46b. Leaf blade margin predominantly serrate but sometimes entire.
- 49a. First-year leaf blades abaxially with a thin greenish layer of adnate scalelike trichomes when young, concolorous with age 43. *C. wenchangensis*
- 49b. First-year leaf blades abaxially covered with reddish brown to yellowish brown waxy scalelike trichomes, remaining distinctly different in color from adaxial surface with age.
- 50a. Leaf blade apex acute to rounded; midvein adaxially slightly raised; leaf blade widest usually from middle to apex 44. *C. delavayi*
- 50b. Leaf blade apex acuminate to caudate; midvein adaxially impressed when dry (flat when fresh); leaf blade widest from base to middle.
- 51a. Petiole base not pillow-shaped; mature cupules rarely splitting; nut scar 8–9 mm in diam. 45. *C. echinocarpa*
- 51b. Petiole base pillow-shaped; mature cupules splitting at apex; nut scar ca. 5 mm in diam.
46. *C. carlesii*
- 45b. Cupules 2–3.5 cm in diam.; bracts 4–15 mm.
- 52a. Leaf blade midvein adaxially raised at least from base to middle of blade.
- 53a. Petiole 1.5–2 cm; rachis of infructescences pubescent; mature cupules and bracts glabrescent 33. *C. chinensis*
- 53b. Petiole 0.7–1.2 cm; rachis of infructescences glabrous; mature cupules and bracts pubescent.
- 54a. Bracts usually not in bundles; nuts broadly conical 34. *C. eyrei*
- 54b. Bracts usually in bundles; nuts subglobose but apex pointed 35. *C. ferox*
- 52b. Leaf blade midvein adaxially flat to impressed.
- 55a. Leaf blade margin predominantly serrate.
- 56a. Cupule splitting irregularly 36. *C. fargesii*
- 56b. Cupule splitting regularly.
- 57a. Leaf blade 4–8 cm wide; bud scales and 1st-year branchlets covered with reddish brown slightly loose waxy scalelike trichomes; petiole 1–2.5 cm; cupules 2.5–3.5 cm in diam. 38. *C. jucunda*
- 57b. Leaf blade 1.5–3.5 cm wide; bud scales and 1st-year branchlets glabrous or covered with early glabrescent waxy scalelike trichomes; petiole 0.3–0.7 cm; cupules 2–2.2 cm in diam. 39. *C. hupehensis*
- 55b. Leaf blade margin predominantly entire.
- 58a. Leaf blade apex caudate 27. *C. amabilis*
- 58b. Leaf blade apex acute to acuminate.
- 59a. Petiole 2–2.5 cm; leaf blade elliptic to obovate-elliptic; cupule bracts 0.4–0.8 cm 37. *C. ouonbiensis*
- 59b. Petiole 1–2 cm; leaf blade oblong, obovate-oblong, lanceolate, or rarely ovate; cupule bracts 0.8–1.5 cm.
- 60a. Young shoots tufted puberulent; leaf blade abaxially stellate cespitose along midvein; cupule bracts 1.3–1.5 cm; nuts ellipsoid 18. *C. longispina*
- 60b. Young shoots from middle to apex with scalelike trichomes; leaf blade abaxially with a thick and mealy layer of scalelike trichomes; cupule bracts 0.8–1 cm; nuts conical to subglobose 36. *C. fargesii*

1. *Castanopsis calathiformis* (Skan) Rehder & E. H. Wilson in Sargent, Pl. Wilson. 3: 204. 1916.

托丝锥 bao si zhui

Quercus calathiformis Skan in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 508. 1899; *Lithocarpus calathiformis* (Skan) A. Camus; *Pasania calathiformis* (Skan) Hickel & A. Camus; *Synaedrys calathiformis* (Skan) Koidzumi.

Trees 5–10(–20) m tall. First-year branchlets black, dark black-brown, or dusky when dry, glabrous. Leaves spirally arranged, yellowish brown to gray; petiole 1–2.5 cm; leaf blade oblong to obovate-elliptic, very variable in size, often 15–25 × 5–9 cm, thickly papery, covered with brown-red slightly adnate small lamellate waxy scalelike trichomes when young, base cuneate, margin from base to middle undulate and crenate, apex acute, acuminate, or rounded; midvein adaxially raised; secondary veins 20–28 on each side of midvein or rarely fewer. Female inflorescences usually borne more toward apex of branches and if axillary then solitary, 8–16 cm. Infructescences 10–20 cm. Cupules yellowish brown to dark grayish brown when dry, cupular, 0.8–1.2 cm in diam., wall ca. 1 cm thick; bracts scalelike, triangular, annular or sometimes imbricate when young, thickened with age, adnate, arranged in 4–7 rib rings, waxy. Nut ovoid to ellipsoid, 1–1.5 cm × 3–6 mm, apically brown-red tomentose; scar basal, 3–6 mm in diam. Fl. Mar–May, fr. Oct–Dec.

Mixed and broad-leaved evergreen forests; 700–2200 m. SE Xizang, S Yunnan [Laos, Myanmar, N Thailand, N Vietnam].

Castanopsis calathiformis, *C. cerebrina*, *C. fissa*, *C. longzhouica*, *C. sclerophylla*, and *C. uraiana* form a group of related species with 1 flower per cupule, and cupule bracts reduced to scales. The first two species are also united by having plicate cotyledons, and the latter three by having flat-convex cotyledons.

2. *Castanopsis fissa* (Champion ex Benth) Rehder & E. H. Wilson in Sargent, Pl. Wilson. 3: 203. 1916.

黧蒴锥 li shuo zhui

Quercus fissa Champion ex Benth, Hooker's J. Bot. Kew Gard. Misc. 6: 114. 1854; *Castanopsis fissanoides* Chun & C. C. Huang ex Luong; *C. tunkinensis* (Drake) Barnett (1944), not *C. tonkinensis* Seemen (1897); *Lithocarpus fissus* (Champion ex Benth) A. Camus; *Pasania fissa* (Champion ex Benth) Oersted; *Q. tunkinensis* Drake; *Shiia fissa* (Champion ex Benth) Kudo; *Synaedrys fissa* (Champion ex Benth) Koidzumi.

Trees; bud scales, shoot apices, and young leaf blades abaxially yellowish brown puberulent and covered with rust-colored, small, lamellate, slightly adnate, waxy scalelike trichomes. Branchlets red-purple, prominently angular. Leaves spirally arranged, yellowish brown to gray; petiole 1–2.5 cm; leaf blade oblong to obovate-elliptic, very variable in sizes, often 15–25 × 5–9 cm, thickly papery, base cuneate, margin from base to middle undulate and crenate, apex acute, acuminate, or

rounded; midvein raised adaxially; secondary veins 20–28 on each side of midvein or rarely fewer.

Infructescence 8–18 cm; rachis glabrous. Cupule 1–1.5 cm in diameter, irregularly 2- or 3(or 4)-valved with valves often curled, covered with dark reddish brown mealy waxy scalelike trichomes, apex slightly cuspidate, wall 0.5–1 mm thick; bracts scalelike, triangular to squarish, imbricate when young but mostly united and in ring ribs with age. Nut globose to elliptic, 1.3–1.8 × 1.1–1.6 cm, apically brown-red tomentose; scar basal, 4–7 mm in diam. Fl. Apr–Jun, fr. Oct–Dec.

Broad-leaved evergreen forests; below 1600 m. S Fujian, Guangdong, Guangxi, S Guizhou, Hainan, S Hunan, S Jiangxi, SE Yunnan [N Thailand, N Vietnam].

Cupule shape of this species ranges from ellipsoid to ovoid and correlates with the distribution. Ellipsoid cupules occur in Fujian, E Guangdong, Jiangxi, and Hunan, while ovoid cupules occur in more western regions such as SE Yunnan and neighboring regions, including W Hainan and NE Vietnam.

3. *Castanopsis cerebrina* (Hickel & A. Camus) Barnett, Trans. & Proc. Bot. Soc. Edinburgh 34: 183. 1944.

毛叶杯锥 mao ye bei zhui

Pasania cerebrina Hickel & A. Camus, Ann. Sci. Nat., Bot., sér. 10, 3: 408. 1921; *Lithocarpus cerebrinus* (Hickel & A. Camus) A. Camus.

Trees; young branchlets and leaf blades reddish brown, densely puberulent with simple and stellate hairs and covered with slightly loose, small, lamellate, waxy scalelike trichomes. Branchlets red-purple, prominently angular. Leaves spirally arranged, yellowish brown to gray; petiole 1–2.5 cm; leaf blade oblong to obovate-elliptic, often 15–25 × 5–9 cm, thickly papery, base cuneate, margin from base to middle undulate and crenate, apex acute, acuminate, or rounded; midvein adaxially raised; secondary veins 20–28 on each side of midvein or rarely fewer. Rachis of female inflorescences sparsely puberulent and covered with waxy scalelike trichomes. Cupule cupular, 1.8–2.2 × 1.5–2.5 cm, base stipitate, stipe 5–8 mm, wall 0.5–1 mm thick; bracts mound-shaped, arranged in disconnected rings, sparsely puberulent, covered with waxy scalelike trichomes. Nut narrowly conical, 2–2.5 × 1.4–2.2 cm, tomentulose, apex sometimes 3-angled; scar 0.8–1.2 cm in diam. Fl. Apr, fr. Oct.

Broad-leaved evergreen forests; 200–700 m. SE Yunnan [N Thailand, N Vietnam].

4. *Castanopsis uraiana* (Hayata) Kanehira & Hatusima, Trans. Nat. Hist. Soc. Taiwan 29: 155. 1939.

淋漓锥 lin li zhui

Quercus uraiana Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 299. 1911; *Limlia uraiana* (Hayata) Masamune & Tomiya; *Lithocarpus uraiana* (Hayata) Hayata; *Pasania uraiana* (Hayata) Schottky; *Q. paohangii* Chun & Tsiang; *Q. randaiensis* Hayata; *Shiia uraiana*

(Hayata) Kanehira & Hatusima; *Synaedrys uraiana* (Hayata) Koidzumi.

Trees. Young shoots often sparsely puberulent and with small, lamellate, waxy scalelike trichomes or glabrous, sparsely lenticellate. Leaves distichous; petiole 0.7–1.5 cm; leaf blade ovate-elliptic, ovate, lanceolate, or sometimes obovate, 7–13 × 2–3 cm, papery, abaxially covered with brown to reddish brown, tight, waxy scalelike trichomes when young but grayish brown to nearly concolorous with age, base attenuate and inaequilateral, margin apically sparsely serrate or entire, apex slightly pointed, acute, or caudate and often bent to 1 side; midvein adaxially flat to slightly impressed or from middle to apex slightly raised; secondary veins 7–12 on each side of midvein, very slender, evident. Infructescences 5–10 cm; rachis ca. 2 mm thick, sparsely gray lenticellate. Cupule shallowly cupular, 5–6 × 7–12 mm, enclosing 1/4–1/3 of nut, wall less than 1 mm thick; bracts reduced to scales, triangular to ovate, adnate, imbricate, dusky puberulent. Nut 1 per cupule, broadly conical, 0.7–1.5 cm; scar basal, 5–6 mm in diam. Fl. Mar–May, fr. Sep–Oct of following year.

• Broad-leaved evergreen forests; 400–1500 m. Fujian, E to N Guangdong, NE Guangxi, S Hunan, S Jiangxi, Taiwan.

5. *Castanopsis longzhouica* C. C. Huang & Y. T. Chang, *Guihaia* 5: 186. 1985.

龙州锥 long zhou zhui

Trees; branchlets, leaf blades, and infructescences glabrous. Young shoots grayish, sparsely lenticellate; lenticels grayish, slightly raised. Petiole 1–1.5 cm; leaf blade elliptic, ovate-elliptic, or sometimes obovate, 8–10 cm, firmly papery, slightly brittle, concolorous, abaxially with a thin layer of closely adherent grayish waxy scalelike trichomes, base attenuate, margin from middle to apex dentate to crenate, apex acute and slightly pointed; midvein abaxially prominently raised; secondary veins 9–12 on each side of midvein. Female inflorescences 1–2 cm; flowers few, solitary along rachis. Infructescences almost as long as rachis, sparsely lenticellate; lenticels grayish. Cupule shallowly cupular, 5–6 mm, covering base or no more than basal 1/4 of nut; bracts imbricate, adnate, broadly ovate to ovate-elliptic, gray puberulent, margin slightly membranous. Nut broadly conical, 1–1.5 cm in diam.; scar basal, ca. 4 mm in diam. Fl. Feb–Mar, fr. Aug–Sep.

• Broad-leaved evergreen forests; 400–600 m. Guangxi (Longzhou Xian).

6. *Castanopsis sclerophylla* (Lindley & Paxton) Schottky, *Bot. Jahrb. Syst.* 47: 638. 1912.

苦槠 ku zhu

Quercus sclerophylla Lindley & Paxton, *Paxt. Fl. Gard.* 1: 59. 1850; *Lithocarpus chinensis* (Abel) A. Camus; *Q. chinensis* Abel (1818), not *Castanopsis chinensis*

Hance (1868); *Q. cuspidata* Thunberg var. *sinensis* A. de Candolle; *Synaedrys sclerophylla* (Lindley & Paxton) Koidzumi.

Trees; branches and leaf blades glabrous. Young shoots reddish brown, slightly angulate. Petiole 1.5–2.5 cm; leaf blade oblong, ovate-elliptic, or obovate-elliptic, 7–15 cm, leathery, adaxially silver-gray with age, base rounded to broadly cuneate and usually inaequilateral, margin from middle to apex serrulate or rarely entire, apex acuminate, cuspidate, or shortly caudate; midvein slightly impressed from base to middle and slightly raised from middle to apex; secondary veins 10–15 on each side of midvein, prominent to very slender, evident. Rachis of inflorescences glabrous. Female inflorescence ca. 15 cm. Infructescences 8–15 cm. Cupule globose to subglobose, 1.2–1.5 cm in diam., completely or almost completely enclosing nut, irregularly valved, outside yellowish brown puberulent, wall to 1 mm thick; bracts scalelike, 3- or 4-angled, sometimes only base connate, in annular umbones. Nut 1(–3) per cupule, subglobose, 1–1.4 cm in diam., tomentulose, apex mucronulate; scar basal, 7–9 mm in diam. Fl. Apr–May, fr. Oct–Nov.

• Broad-leaved evergreen forests; 200–1000 m. Anhui, Fujian, Guangxi, NE Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, E Sichuan, Zhejiang.

The nuts are used for food.

Castanopsis ×kuchugouzhui C. C. Huang & Y. T. Chang (*Guihaia* 16: 301. 1996) is a hybrid between *C. sclerophylla* and *C. tibetana* with a population on Yuelu Shan in Changsha Shi, Hunan. The bracts apically and along the sides of the cupule are 5–8 mm and spinelike, like those of *C. tibetana*, but among them, as well as the basal bracts, are small, triangular to multiangular, and lamellate bracts like those of *C. sclerophylla*.

7. *Castanopsis kawakamii* Hayata, *J. Coll. Sci. Imp. Univ. Tokyo* 30(1): 300. 1911.

吊皮锥 diao pi zhui

Castanopsis greenii Chun; *C. oerstedii* Hickel & A. Camus.

Trees. Branches glabrous; young shoots dark reddish brown, glabrous, sparsely lenticellate; lenticels dark gray. Petiole 1–2.5 cm; leaf blade ovate to lanceolate, 6–12 × 2–5 cm, dark reddish brown when young and remaining so abaxially, leathery with age, base broadly cuneate to rounded and inaequilateral, margin entire or rarely 1–3-toothed near apex, apex caudate; midvein adaxially slightly raised from base to middle but flat to slightly impressed from middle to apex; secondary veins 9–12 on each side of midvein; tertiary veins reticulate, conspicuous. Female inflorescences 5–10 cm; rachis glabrous. Cupule globose, 6–8 cm in diam., splitting into 4(or 5) segments when mature, inside densely dusky tomentulose, wall ca. 3 mm thick; bracts spinelike, connected to radial branched bundles in middle part of cupule or slightly basally, 2–3 cm, sparsely pubescent to nearly glabrous. Nut 1 per cupule, obovate,

1.2–1.5 × 1.7–2 cm, densely orangish brown puberulent; scar covering ca. 1/3(–1/2) of nut. Fl. Mar–Apr, fr. Aug–Oct of following year.

Broad-leaved evergreen forests; below 1000 m. S Fujian, Guangdong, SE Guangxi, S Jiangxi, C Taiwan [Vietnam].

Reports of *Castanopsis borneensis* King from Taiwan are referable to *C. kawakamii*, *Castanopsis concinna*, *C. fordii*, *C. globigemmata*, *C. hainanensis*, *C. hystrix*, *C. indica*, *C. kawakamii*, *C. mekongensis*, and *C. tibetana* form a group of related species with cupules splitting regularly into 4 parts, bract with varying length that are basally connate into fascicles, and a scar that occupies the basal 1/4 to 1/3 of the nut.

8. *Castanopsis hystrix* J. D. Hooker & Thomson ex A. de Candolle, J. Bot. 182. 1863.

红锥 hong zhui

Castanea bodinieri H. Léveillé & Vaniot; *Castanopsis bodinieri* (H. Léveillé & Vaniot) Koidzumi; *C. brunnea* (H. Léveillé) A. Camus; *C. lohfaensis* Hu; *C. tapuensis* Hu; *Quercus brunnea* H. Léveillé.

Trees. Young shoots purple-brown, slender, sparsely to densely puberulent and with yellowish brown small lamellate waxy scalelike trichomes. Petiole ca. 1 cm or rarely longer; leaf blade lanceolate to obovate-elliptic, 4–9 × 1.5–4 cm or rarely smaller or larger, papery to thinly leathery, pubescent when young but early glabrescent, at least adaxially along midvein with very lax and thick or tight and thin, reddish brown to yellowish brown, small, lamellate, waxy scalelike trichomes, base sharply acute to rounded and inaequilateral, apex mucronate to caudate; midvein adaxially impressed; secondary veins 9–15 on each side of midvein, very slender, evident. Female inflorescence solitary in leaf axil. Infructescence ca. 15 cm. Cupule globose, 2.5–4 cm in diam., splitting into 4 segments, wall ca. 2.5 mm thick; bracts spinelike, completely covering cupule, 6–10 mm, sparsely puberulent, base of some connate into bundles. Nut 1 per cupule, broadly conical, 1–1.5 × 0.8–1.3 cm, glabrous; scar basal. Fl. Apr–Jun, fr. Aug–Nov of following year.

Broad-leaved evergreen forests; near sea level to 1600 m. SE Fujian, Guangdong, Guangxi, Guizhou, Hainan, SW Hunan, SE Xizang (Médog Xian), S Yunnan [Bhutan, Cambodia, NE India, Laos, Myanmar, Nepal, Sikkim, Vietnam].

9. *Castanopsis concinna* (Champion ex Bentham) A. de Candolle in Hance, J. Bot. 1: 182. 1863.

华南锥 hua nan zhui

Castanea concinna Champion ex Bentham, Hooker's J. Bot. Kew Gard. Misc. 6: 115. 1854; *Castanopsis oblongifolia* W. C. Cheng & C. S. Chao.

Trees; young shoots and rachis of inflorescences yellowish brown to reddish brown puberulent and with early glabrescent, very thick, small, lamellate, waxy scalelike trichomes. Petiole ca. 4–12 mm; leaf blade elliptic, oblong-orbicular, or sometimes oblanceolate, 5–10 × 1.5–3.5(–5) cm, leathery, brittle, margin and midvein pilose when young, base shortly attenuate to broadly cuneate and usually symmetric but sometimes

slightly asymmetric, margin entire or apically sparsely serrulate, apex mucronate to acuminate; midvein adaxially prominently impressed; secondary veins 12–16 on each side of midvein. Female inflorescences 5–10 cm. Infructescences 4–8 cm; rachis 4–6 mm thick.

Cupule globose, 5–6 cm in diam., splitting into 4 regular segments, wall 2–4 mm thick; bracts spinelike, entirely covering cupule, 1–2 cm, puberulent, base connate into bundles. Nut 1 per cupule, ± conical, ca. 1 × 1.4 cm, densely pubescent; scar covering ca. 1/3 but no more than 1/2 of nut. Fl. Apr–May, fr. Sep–Oct of following year.

• Broad-leaved evergreen forests; below 500 m. S Guangdong, S Guangxi.

10. *Castanopsis mekongensis* A. Camus, Bull. Soc. Bot. France 85: 653. 1938 [1939].

湄公锥 mei gong zhui

Castanopsis fohaiensis Hu; *C. lantsangensis* Hu; *C. wangii* Hu & W. C. Cheng.

Trees; young shoots, petioles, leaf blades abaxially, and rachis of inflorescences densely pubescent. Petiole 1–2 cm; leaf blade ovate-elliptic, broadly elliptic, or sometimes ovate, 15–25 × 5–8 cm, thickly papery to leathery, abaxially grayish, adaxially dark black-brown when young, grayish brown to yellowish gray when dry, puberulent on midvein, base rounded to acute and symmetric or inaequilateral, margin entire, apex acuminate; midvein and secondary veins adaxially usually impressed; secondary veins 12–16 on each side of midvein. Infructescence ca. 10 cm or rarely longer. Cupule globose, 5–6 cm in diam., wall ca. 2 mm thick; bracts spinelike, entirely covering cupule, 1–1.5 cm, sparsely pubescent, base connate into bundles. Nut 1 per cupule, obovate, 1.3–1.6 × 1.5–2 cm, densely pubescent; scar covering ca. 1/3 of nut. Fl. Mar–Apr, fr. Aug–Oct of following year.

Broad-leaved evergreen forests; 600–2000 m. S to SE Yunnan [Laos].

11. *Castanopsis globigemmata* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, Guihaia 16: 300. 1996.

圆芽锥 yuan ya zhui

Trees. Branchlet black-brown when dry, densely lenticellate; lenticels slightly raised. Petiole 8–10 mm; leaf blade ovate-elliptic to lanceolate, 10–15 × 3.5–5 cm, nearly leathery, pilose and with tight brown, waxy scalelike trichomes, abaxially when young and on both sides along midvein, base broadly cuneate to acute and inaequilateral, margin entire or with 1–3 shallow teeth from middle to apex, apex long acuminate to caudate; midvein at least from base to middle adaxially raised; secondary veins 9–12 on each side of midvein. Rachis of inflorescences sparsely puberulent and with brown, stellate, waxy scalelike trichomes. Infructescences 5–7 cm; cupules clustered from middle to apex of rachis. Cupule globose, 6–7 cm in diam., splitting into 4 regular segments when mature, wall 3–4 mm thick;

bracts spinelike, entirely covering cupule, 1–1.5 cm, base connate into bundles. Nut 1 per cupule, broadly conical, 2–3.5 cm in diam., densely pubescent; scar basal. Fl. Aug–Sep, fr. Oct–Nov of following year.

• Broad-leaved evergreen forests; ca. 1400 m. SE Yunnan (Pingbian Miaozu Zizhixian).

12. *Castanopsis fordii* Hance, J. Bot. 22: 230. 1884.

毛锥 mao zhui

Trees; bud scales, young shoots, petioles, leaf blades abaxially, and rachis of inflorescences densely covered with brown to reddish brown, slightly rough long tomentum. Petiole 1–3(–5) mm, usually tapering toward apex; leaf blade oblong, lanceolate, or oblanceolate-oblong, 9–18 × 3–7 cm, leathery, abaxially reddish brown when young but grayish brown to grayish with age, base cordate, shallowly auriculate, or rarely rounded, margin entire and revolute, apex acute, mucronate, or rarely rounded; midvein adaxially prominently impressed; secondary veins 14–18 on each side of midvein or fewer. Infructescences dense, 6–12 cm. Cupule 5–6 cm in diam., splitting into 4(or 5) regular segments, wall 3–4 mm thick; bracts spinelike, entirely covering cupule, 1–2 cm, pubescent, base connate into many bundles. Nut 1 per cupule, ± conical, 1.2–1.5 × 1.5–2 cm, densely pubescent; scar covering ca. 1/3 of nut. Fl. Mar–Apr, fr. Sep–Oct of following year.

• Broad-leaved evergreen forests; below 1200 m. S Fujian, Guangdong, SE Guangxi, S Hunan, S Jiangxi, S Zhejiang.

13. *Castanopsis tibetana* Hance, J. Bot. 13: 367. 1875.

钩锥 gou zhui

Castanopsis chengfengensis Hu; *Quercus franchetiana* H. Léveillé ex A. Camus.

Trees. Young shoots black to black-brown when dry, glabrous. Petiole 1.5–3 cm; leaf blade ovate-elliptic, ovate, oblong, or obovate-elliptic, 15–30 × 5–10(–13) cm, leathery, dark purple-brown when young, abaxially thinly covered with reddish brown to yellowish brown, waxy scalelike trichomes, base rounded to shortly cuneate and symmetric or sometimes inaequilateral, margin serrate except basally entire, apex acuminate, mucronate, or caudate; midvein adaxially impressed; secondary veins 15–18 on each side of midvein. Female inflorescences 5–25 cm; rachis 4–6 mm thick. Cupule globose, 6–8 cm in diam., splitting into 4(or 5) regular segments, wall 3–4 mm thick; bracts spinelike, entirely covering cupule, 1.5–2.5 cm, subglabrous to sparsely puberulent, base usually connate into bundles. Nut 1 per cupule, ± conical, 1.5–1.8 × 2–2.8 cm, hairy; scar covering ca. 1/4 of nut. Fl. Apr–May, fr. Aug–Oct of following year.

• Broad-leaved evergreen forests; below 1500 m. S Anhui, Fujian, Guangdong, Guangxi, Guizhou, SW Hubei, Hunan, Jiangxi, SE Yunnan, S Zhejiang.

14. *Castanopsis indica* (Roxburgh ex Lindley) A. de Candolle in Hance, J. Bot. 1: 182. 1863.

印度锥 yin du zhui

Castanea indica Roxburgh ex Lindley in Wallich, Pl. Asiat. Rar. 2: 5. 1830; *Castanopsis macrostachya* Hu; *C. sinensis* A. Chevalier; *C. subacuminata* Hayata; *Quercus indica* (Roxburgh ex Lindley) Drake.

Trees; young shoots, petioles, leaf blades abaxially, and rachis of inflorescences yellowish brown puberulent. Petiole 5–10(–15) mm; leaf blade ovate-elliptic, elliptic, or sometimes obovate-elliptic, 9–20 × (4–)6–10 cm, thickly papery, abaxially puberulent or glabrescent, base cuneate to rounded and usually inaequilateral, margin serrate except basally entire, apex mucronate to acuminate; midvein adaxially impressed; secondary veins 15–25 on each side of midvein. Female inflorescence ca. 40 cm. Infructescences dense, 10–27 cm. Cupule globose, 3.5–4 cm in diam., usually splitting into 4 segments when mature, wall ca. 1 mm thick; bracts spinelike, entirely covering cupule, to 1.5 cm, straight or bent, base connate into bundles. Nut 1(or 2) per cupule, broadly conical, 1–1.4 cm in diam., densely hairy; scar covering ca. 1/4 of nut. Fl. Mar–May, fr. Sep–Nov of following year.

Broad-leaved evergreen forests; below 1500 m. S Guangdong, S Guangxi, S Hainan, Taiwan, SE Xizang (Mêdog Xian), S Yunnan [Bangladesh, Bhutan, NE India, Laos, Myanmar, Nepal, Sikkim, Thailand, Vietnam].

15. *Castanopsis hainanensis* Merrill, Philipp. J. Sci. 21: 340. 1922.

海南锥 hai nan zhui

Trees; branchlets, petioles, young leaf blades abaxially, rachis of inflorescences, and perianth covered with reddish brown, dusky, or grayish brown, very short, felted puberulence. Petiole 1–1.8 cm; leaf blade obovate, obovate-elliptic, ovate-elliptic, or broadly ovate, 5–12(–17) × 2.5–5(–6) cm, thickly papery to nearly leathery, abaxially often grayish with age, base acute to broadly cuneate, margin serrate except basally entire, apex rounded to mucronate; midvein adaxially impressed but often slightly raised on sprouted branch leaves; secondary veins 10–15(–18) on each side of midvein. Infructescences 10–17 cm; rachis 5–6 mm thick. Cupule 4–5 cm in diam., wall ca. 1 mm thick; bracts spinelike, congested, entirely covering cupule, to 1.5 cm, basally connate. Nut 1 per cupule, broadly conical, 1.2–1.5 × 1.6–2 cm, densely pubescent; scar exceeding base of nut. Fl. Mar–Apr, fr. Aug–Oct of following year.

• Broad-leaved evergreen forests; below 400 m. Hainan. Could be recognized as an insular subspecies of *Castanopsis indica*. The status of *C. undulatifolia* G. A. Fu (Guihaia 14: 301. 1994) is uncertain, but it may be conspecific with *C. hainanensis*.

16. *Castanopsis clarkei* King ex J. D. Hooker, Fl. Brit. India 5: 623. 1888.

棱刺锥 leng ci zhui

Trees; young shoots and rachis of inflorescences densely puberulent. Winter bud scales velutinous. Petiole 1.5–3 cm; leaf blade elliptic to oblong, 10–20 × 5–9 cm, thickly papery to nearly leathery, base acute and inaequilateral, margin serrate except basally entire, apex mucronate; midvein abaxially conspicuously raised, adaxially slightly impressed; secondary veins 14–20. Female inflorescences ca. 20 cm. Infructescence rachis 4–5 mm thick. Cupule subglobose, 3.5–4(–5) cm in diam., wall ca. 1.5 mm thick; bracts spinelike, congested, entirely covering cupule, 1–1.5 cm, 3- or 4-angled in cross section, free or base connate into bundles, nearly glabrous. Nut 1 per cupule, broadly conical, 1.4–1.6 cm, apex cuspidate; scar basal. Fl. Mar–May, fr. Oct–Dec of following year.

Broad-leaved evergreen forests; 500–800 m. SE Xizang (Mêdog Xian), S Yunnan [NE India, NE Myanmar].

17. *Castanopsis choboensis* Hickel & A. Camus, Notul. Syst. (Paris) 4: 122. 1928.

窄叶锥 zhai ye zhui

Trees. Petiole 1–2 cm; leaf blade narrowly elliptic to lanceolate, 8–15 × 3–5 cm or rarely larger, thickly papery, base acute to cuneate and often oblique, margin serrate-dentate, apex mucronate to caudate; midvein slightly impressed; secondary veins 16–20 on each side of midvein, adaxially shallowly furrowed and impressed or slightly raised. Inflorescence rachis sparsely and shortly hairy. Infructescences 8–18 cm. Cupule wall 1–2 mm thick; bracts spinelike, congested, entirely covering cupule, free or base connate into bundles. Nut 1 per cupule, ovoid, ca. 1.5 cm, pubescent; scar basal, ca. 1 cm in diam. Fl. Apr–Jun, fr. Oct–Dec of following year.

Broad-leaved evergreen forests on limestone; below 1000 m. W Guangxi, S Guizhou, SE Yunnan [NE Vietnam].

Very similar, if not identical, to *Castanopsis indica*.

18. *Castanopsis longispina* (King ex J. D. Hooker) C. C. Huang & Y. T. Chang, Guihaia 12: 1. 1992.

长刺锥 chang ci zhui

Castanopsis tribuloides Smith var. *longispina* King ex J. D. Hooker, Fl. Brit. India 5: 623. 1888; *C. ferox* Spach var. *longispina* (King ex J. D. Hooker) A. Camus.

Trees. Young shoots purple-brown, slightly angulate, tufted puberulent, glabrescent. Petiole 1–1.5 cm; leaf blade oblong to obovate-oblong, 14–24 × 5–8 cm, 1st-year leaf blades papery and abaxially covered with very small stellate cespitose hairs along midvein, base acute to rounded, margin entire, apex shortly acuminate; secondary veins 12–16 on each side of midvein,

adaxially ± impressed. Infructescence rachis 4–5 mm thick. Cupule wall ca. 1 mm thick; bracts spinelike, congested, almost completely covering cupule, 1.3–1.5 cm, stiff, free or a few in bundles, puberulent. Nut ellipsoid, 2–3 × ca. 1 cm, glabrescent; scar ca. 8 mm in diam.

Broad-leaved evergreen forests; 800–900 m. SE Xizang (Mêdog Xian) [Bangladesh, NE India, Myanmar, Sikkim].

In India, the species grows at elevations from 200–1200 m.

19. *Castanopsis argyrophylla* King ex J. D. Hooker, Fl. Brit. India 5: 622. 1888.

银叶锥 yin ye zhui

Trees; branches and leaf blades glabrous. Shoots blackish brown when dry. Petiole 1–2.5 cm; leaf blade elliptic, ovate, lanceolate, or sometimes obovate, 10–20 × 4–7 cm, thickly leathery, abaxially often grayish, adaxially yellow-green when dry, base cuneate to rounded, margin entire, apex mucronate to acuminate; midvein adaxially raised; secondary veins 10–13 on each side of midvein. Infructescences 10–25 cm; rachis covered with pale grayish brown, feltlike, short hairs, glabrescent. Cupule globose, 2.5–3.5 cm in diam., puberulent when young, outside glabrescent, wall 1–1.5 mm thick; bracts spinelike, arranged in discontinuous rings or spirals, 2–6 mm, free or base slightly connate. Nut 1(–3) per cupule, subglobose, 1.5–1.8 cm in diam., densely puberulent. Fl. May–Jun, fr. Oct–Dec of following year.

Broad-leaved evergreen forests; 1000–1500 m. S Yunnan [NE India, Laos, Myanmar, Thailand, Vietnam].

20. *Castanopsis tcheponensis* Hickel & A. Camus, Notul. Syst. (Paris) 4: 123. 1928.

薄叶锥 bao ye zhui

Trees; branches and leaf blades glabrous. Petiole ca. 1 cm; leaf blade elliptic to ovate-elliptic, 10–15 × 4–6 cm, papery, yellow-green when dry; midvein and secondary veins adaxially slightly raised; secondary veins 9–13 on each side of midvein. Rachis of inflorescences glabrous or very shortly and sparsely mealy puberulent. Female inflorescences 10–25 cm. Cupules shortly stalked when young, subglobose when mature, ca. 3 cm in diam., blackish brown when dry, wall ca. 1 mm thick; bracts spinelike, almost entirely covering cupule, 7–12 mm, slender, free or a few in bundles, glabrous, without scalelike trichomes, basally blackish brown when dry, apically yellowish brown. Nut 1 per cupule, broadly ovoid to subglobose, 1.5–1.8 × 1.2–1.4 cm, glabrous or subglabrous; scar covering more than 3/4 of nut. Fl. Mar–Apr, fr. Oct–Nov.

Broad-leaved evergreen forests; 900–1400 m. S Yunnan [Laos, Myanmar, Vietnam].

21. *Castanopsis megaphylla* Hu, Bull. Fan Mem. Inst. Biol., Bot. 10: 85. 1940.

大叶锥 da ye zhui

Trees; bud scales, young shoots, and rachis of inflorescences grayish brown puberulent with small, lamellate, waxy scalelike trichomes. First-year branchlets thick, black-brown when dry, lenticellate; lenticels yellowish brown. Petiole 2–3 cm; leaf blade elliptic, sometimes obovate-elliptic, 26–45 × 8–18 cm, thinly leathery, abaxially midvein and secondary veins stellate puberulent and with small lamellate waxy scalelike trichomes when young, surface with a thick tight layer of lamellate waxy scalelike trichomes with age, buff when dry, base cuneate to rounded and often oblique, margin entire, apex obtuse to mucronate; midvein adaxially impressed; secondary veins 16–20 or more on each side of midvein. Female inflorescence ca. 28 cm; rachis densely tawny to dusky puberulent. Infructescence rachis 6–8 mm thick, sparsely lenticellate. Cupule subglobose, ca. 2.5 cm in diam., outside sparsely puberulent and with waxy scalelike trichomes, basally blackish brown, wall ca. 3 mm thick near base and ca. 1 mm thick near apex; bracts of young cupules spinelike, congested, yellowish brown when dry. Nut subglobose, 1 per cupule, ca. 1 cm in diam., pubescent when young. Fl. May–Jul, fr. of following year.

- Broad-leaved evergreen forests; 1100–1500 m. SE Yunnan (Pingbian Miaozu Zizhixian).

May be the same as the earlier published Vietnamese *Castanopsis chevalieri* Hickel & A. Camus.

22. *Castanopsis nigrescens* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, *Guihaia* 16: 301. 1996.

黑叶锥 hei ye zhui

Trees usually 8–15 m tall. First-year branchlets dull blackish brown, often sparsely and thinly grayish pruinose. Petiole 1–2 cm; leaf blade ovate, ovate-elliptic, or rarely lanceolate, 8–15 × 3–6 cm, leathery, abaxially covered with yellowish brown, tightly adnate layers of waxy scalelike trichomes when young, but layers becoming grayish, sparser and thinner with age, adaxially blackish brown to brownish black when dry, base rounded and symmetric or slightly oblique, margin entire, apex acuminate to mucronate; midvein at least from middle to apex adaxially slightly impressed or rarely flat; secondary veins 10–13 on each side of midvein, slender, evident, abaxially slightly raised. Rachis of inflorescences grayish puberulent, glabrescent. Infructescences 5–15 cm; rachis 5–7 mm thick, with cupules crowded from middle to apex. Cupule subglobose, 4–4.5 cm in diam., outside grayish to yellowish gray puberulent, inside brown long tomentose, wall 3–5 mm thick; bracts spinelike, very dense, 1–1.6 cm, grayish to yellowish gray puberulent, free or connate at base or to apical 1/2 and in bundles, usually united to cristate rings. Nut 1 per cupule, broadly ovoid, ca. 2.5 cm, densely pubescent, apex

acute; scar covering ca. 1/3 of nut. Fl. May–Jun, fr. Set-Oct of following year.

- Mixed mesophytic and broad-leaved evergreen forests; 200–1000 m. S Fujian, Guangdong, S Guangxi, S Hunan, Jiangxi (Dingnan Xian, Ningdu Xian).

23. *Castanopsis damingshanensis* S. L. Mo ex C. C. Huang & Y. T. Chang, *Guihaia* 16: 300. 1996.

大明山锥 da ming shan zhui

Trees 5–9 m tall. Branches glabrous. Petiole 3–6 mm; leaf blade ovate to broadly elliptic, 5–8 × 2.5–4 cm, leathery, concolorous, abaxially sparsely covered with a thin layer of small, yellowish, lamellate scalelike trichomes, base broadly cuneate, margin entire and subconvolute, apex obtuse, rounded, or mucronate; midvein adaxially flat but slightly raised from base to middle; secondary veins 7–10 on each side of midvein. Infructescences few fruited, glabrous; rachis ca. 5 mm thick. Cupule broadly ovoid, 2–2.5 cm in diam., outside and bracts puberulent and with scalelike trichomes, wall 1–2 mm thick; bracts spinelike, basal bracts with a few connected to cristate rings. Nut 1 per cupule, broadly conical, ca. 1.2 cm in diam., brownish pubescent; scar basal, ca. 1 cm in diam. Fr. Oct–Nov.

- Broad-leaved evergreen forests; 1100–1400 m. C Guangxi (Daming Shan).

24. *Castanopsis jianfenglingensis* Duanmu in W. C. Cheng & al., *Sci. Silvae* 8: 187. 1963.

尖峰岭锥 jian feng ling zhui

Trees ca. 20 m tall; branchlets and young leaf blades abaxially covered with simple or stellate hairs. Petiole 2.5–3.5 cm, very short when young; leaf blade ovate-elliptic, oblong, or rarely broadly ovate, 12–24 × 5–8 cm, thickly papery, concolorous, base broadly cuneate and often slightly inaequilateral, margin entire or rarely subcrenate from middle to apex, apex caudate; midvein adaxially slightly impressed or rarely flat to slightly raised from base to middle; secondary veins 12–14 on each side of midvein. Infructescences 5–15 cm; rachis 2–3 mm thick. Cupule subglobose, 2–3 cm in diam., wall 1–2 mm thick; bracts spinelike, 3–6 mm, free but usually some in bundles. Nut ellipsoid, 1.2–2 cm, densely rust-colored pubescent; scar basal, 8–10 mm in diam. Fr. Oct–Nov.

- Broad-leaved evergreen forests; 500–800 m. SW Hainan (Dongfang Xian).

25. *Castanopsis remotidenticulata* Hu, *Acta Phytotax. Sin.* 1: 104. 1951.

疏齿锥 shu chi zhui

Trees ca. 25 m tall. Branches glabrous; 1st-year branchlets purplish brown. Petiole to 1 cm; leaf blade oblong to obovate-elliptic, 6–12 × 3–4 cm, firmly papery, abaxially covered with tight grayish waxy scalelike trichomes, base broadly cuneate to rounded

and often slightly oblique, margin sparsely serrate, apex acuminate to sometimes caudate; midvein and secondary veins adaxially with small ribs; secondary veins 10–13 on each side of midvein. Infructescences 7–10 cm; rachis 4–5 mm thick. Cupule subglobose, 3–3.5 cm in diam., wall 1–2 mm thick; bracts spinelike, 3–6 mm, free but a few in bundles and transversely united to discontinuous cristate rings. Nut 1 per cupule, flat-conical, 1.8–2.4 cm, puberulent; scar basal, 1.8–2.4 cm in diam. Fl. Apr–May, fr. Sep–Nov.

• Broad-leaved evergreen forests; 1000–2200 m. C to SE Yunnan.

26. *Castanopsis tonkinensis* Seemen, Bot. Jahrb. Syst. 23 (Beibl. 57): 55. 1897.

公孙锥 gong sun zhui

Trees 10–20 m tall. Branches glabrous. Petiole 1–2 cm; leaf blade lanceolate, 6–13 × 1.5–4 cm, membranous, abaxially greenish and sparsely covered with reddish brown, small, lamellate, waxy scalelike trichomes when young, glabrous at maturity, adaxially deep green, base narrowly cuneate, decurrent on petiole, and symmetric or slightly oblique, margin entire, apex caudate to sometimes shortly acute; midvein adaxially somewhat impressed and villous but glabrescent; secondary veins 9–13 on each side of midvein. Female inflorescence ca. 20 cm. Cupule broadly ellipsoid, ovoid, or rarely subglobose, 2–3 cm in diam., dark brownish black when dry, outside glabrescent, wall 0.5–1 mm thick; bracts spinelike, rarely entirely covering cupule, 6–10 mm, glabrescent. Nut 1 per cupule, narrowly conical to broadly ellipsoid, 0.9–1.2 cm in diam., densely brown pilose; scar basal, 8–9 mm in diam. Fl. May–Jun, fr. Sep–Oct of following year.

Broad-leaved evergreen forests; below 2000 m. Guangdong, SW Guangxi, Hainan, SE Yunnan [NE Vietnam].

Most Chinese collections are var. *tonkinensis*, but some specimens from Guangxi and SE Yunnan may be var. *laocaiensis* Luong, which has broader and thicker leaf blades, and bracts of cupules thicker and shorter than those of var. *tonkinensis*.

27. *Castanopsis amabilis* W. C. Cheng & C. S. Chao in W. C. Cheng & al., Sci. Silvae 8: 5. 1963.

南宁锥 nan ning zhui

Castanopsis amabilis var. *brevispinosa* W. C. Cheng & C. S. Chao.

Trees ca. 20 m tall; branches and rachis of inflorescences glabrous. Petiole 0.5–1.5 cm; leaf blade lanceolate to narrowly ovate, 7–12 × 2–3.5 cm, firmly papery, abaxially with tight layers of yellowish brown scalelike trichomes when young, often grayish with age, base broadly cuneate and symmetric or slightly oblique, margin entire or with 1–3 shallow teeth, apex caudate; midvein adaxially shallowly impressed or occasionally flat; secondary veins 9–13 on each side of midvein, slender, evident. Female inflorescence ca. 26 cm. Infructescence rachis 2–3 mm thick. Cupule broadly ellipsoid to subglobose, 2.2–2.8 cm in diam., outside

grayish pubescent or with yellowish brown waxy scalelike trichomes, wall ca. 1 mm thick and exterior visible through bracts; bracts spinelike, 4–8 mm, dispersed or subannular. Nut 1 per cupule, broadly ovoid to subglobose, 0.8–1.2 cm in diam., glabrous; scar basal, 7–10 mm in diam. Fl. Aug–Oct, fr. Oct–Dec of following year.

• Broad-leaved evergreen forests; 300–900 m. SW Guangxi.

28. *Castanopsis boisii* Hickel & A. Camus, Bull. Soc. Bot. France 68: 396. 1921.

榄壳锥 lan qiao zhui

Castanopsis hamata Duanmu; *C. megaphyllya* Hu (1948 [1949]), not *C. megaphylla* Hu (1940).

Trees ca. 25 m tall; branchlets, petiole of young leaves, and mature leaf blades abaxially pubescent and with usually glabrescent yellowish brown to reddish brown, small, lamellate, waxy scalelike trichomes. Petiole 1.5–2 cm; leaf blade ovate-elliptic, ovate, or narrowly oblong, 9–18 × 4–6 cm, thickly papery, base rounded to shortly cuneate and symmetric or slightly oblique, margin entire or rarely from middle to apex shallowly undulate, apex acuminate; midvein adaxially impressed or sometimes slightly raised or flat from base to middle; secondary veins 13–17 on each side of midvein.

Infructescence 27 cm; rachis from base to middle 2–3.5 mm thick. Cupule ellipsoid to broadly obovoid, 2.5–3 cm in diam., outside and bracts pubescent and with usually glabrescent yellowish brown to reddish brown small lamellate waxy scalelike trichomes, wall 0.5–1 mm thick and exterior visible through bracts; bracts spinelike, 8–10 mm, greatly variable in thickness, base connate into scattered bundles. Nut 1 (or 2) per cupule, broadly ovoid, 1.2–1.4 × 0.9–1.2 cm, puberulent; scar basal, 8–10 mm in diam. Fl. Jun–Aug, fr. Oct–Nov of following year.

Broad-leaved evergreen forests; 1000–1500 m. Guangdong, SW Guangxi, Hainan, SE Yunnan [NE Vietnam].

29. *Castanopsis densispinosa* Y. C. Hsu & H. W. Jen, Acta Phytotax. Sin. 13(4): 16. 1975.

密刺锥 mi ci zhui

Trees ca. 15 m tall. Branchlets glabrous, densely lenticellate; lenticels small, grayish. Petiole 1–2 cm; leaf blade ovate to oblong-lanceolate, 13–18 × 3.5–6 cm, green on both surfaces, glabrous, margin coarsely dentate but entire on leaves borne apically on branchlet; midvein abaxially raised and adaxially impressed; secondary veins 10–13 on each side of midvein; tertiary veins abaxially conspicuous. Infructescences to 18 cm. Cupule 2–3 cm in diam., splitting into 3 segments, inside densely grayish villous, wall 1–2 mm thick; bracts spinelike, densely covering outside of cupule, ca. 1 cm, free but basal bracts in bundles. Nut 1 per cupule, ovoid, 1–1.4 × ca. 1 cm, sparsely brownish puberulent, apex obscurely 4- or 5-ridged. Fr. Dec.

• Broad-leaved evergreen forests; ca. 1700 m. Yunnan (Jinping Xian).

30. *Castanopsis ledongensis* C. C. Huang & Y. T. Chang, *Guihaia* 16: 301. 1996.

乐东锥 le dong zhui

Trees ca. 18 m tall; young shoots and rachis of male inflorescences pubescent, with reddish brown, small, lamellate, waxy scalelike trichomes, glabrescent. Branchlets dull brown to brownish black. Petiole ca. 1 cm or rarely longer; leaf blade oblong to sometimes obovate-elliptic, $5-9 \times 2-3.5$ cm, when young abaxially covered with slightly tight layers of reddish brown, small, lamellate scalelike trichomes and with sparsely but soon glabrescent pilose hairs along midvein, base acute and sometimes slightly asymmetric, margin somewhat crenate, apex mucronate to shortly caudate; midvein adaxially impressed; secondary veins 9–12 on each side of midvein. Infructescence ca. 16 cm; rachis 1.5–2 mm thick, glabrous. Cupule subglobose, to ca. 2 cm in diam., splitting into 2 segments, basally abruptly narrowed and slightly decurrent to shortly stalked, wall ca. 1 mm thick; bracts spinelike, 3–5 mm or rarely longer, 3- or 4-angular in cross section, base wide and sometimes several transversely united in a cockscomblike pattern, puberulent and with brownish scalelike trichomes. Nut broadly conical, 1–1.2 cm in diam., apex sparsely puberulent; scar basal, ca. 1 cm in diam. Fr. Oct–Nov.

• Broad-leaved evergreen forests; ca. 800 m. Hainan (Ledong Xian).

31. *Castanopsis subuliformis* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, *Guihaia* 16: 301. 1996.

钻刺锥 zuan ci zhui

Trees ca. 25 m tall. First-year branchlets dark brown, glabrous. Petiole ca. 1.5 cm; leaf blade oblong to lanceolate, $7-14 \times 3-5$ cm, firmly papery, abaxially covered with reddish brown to yellowish brown, small, lamellate waxy scalelike trichomes but soon glabrescent, base rounded to very acute and sometimes slightly inaequilateral, margin from middle to apex with shallow teeth or rarely entire, apex acute to caudate; midvein adaxially impressed; secondary veins 11–14 on each side of midvein. Infructescences ca. 11 cm; rachis 3–4 mm thick, glabrous. Cupules blackish brown, globose, 1.5–2 cm in diam., wall ca. 1 mm thick; bracts spinelike, scattered, conical, 2–5 cm, yellowish gray pubescent and with small, lamellate, waxy scalelike trichomes, base wide. Nut 1 per cupule, slightly flat-conical, ca. 1.2×1.5 cm, densely brown pilose; scar basal, ca. 1.3 cm in diam. Fr. Dec.

• Broad-leaved evergreen forests; 700–900 m. Guangdong, Guangxi.

32. *Castanopsis oblonga* Y. C. Hsu & H. W. Jen, *Acta Phytotax. Sin.* 13(4): 19. 1975.

矩叶锥 ju ye zhui

Trees 8–10 m tall. First-year branchlets blackish brown when dry. Petiole 6–10 mm; leaf blade ovate, broadly elliptic, narrowly elliptic, or lanceolate, $6-9 \times 2-3.5$ cm, thickly papery, brittle when dry, puberulent along midvein and abaxially reddish brown and with a tight

layer of scalelike trichomes when young, brownish gray with age, base broadly cuneate to acute and symmetric, margin somewhat crenate to dentate or entire, apex acuminate, caudate, or obtuse; midvein adaxially flat to slightly impressed but usually slightly raised from base to middle; secondary veins 10–14 on each side of midvein. Infructescences 5–10 cm; rachis 2–4 mm thick. Cupule broadly obovoid, ca. 3 cm in diam., dark grayish brown when mature and dry, wall ca. 1 mm thick and exterior \pm visible through bracts; bracts spinelike, 4–7 mm, free and evenly scattered or connate at base into short rings, basally gray puberulent, apically yellowish brown and glabrous. Nut broadly conical, 1–1.8 cm in diam., puberulent; scar basal, 0.8–1.4 cm in diam. Fr. Oct–Nov.

• Broad-leaved evergreen forests; ca. 2000 m. SE Yunnan (Yuanjiang Xian).

33. *Castanopsis chinensis* (Sprengel) Hance, *J. Linn. Soc., Bot.* 10: 201. 1868.

锥 zhui

Castanea chinensis Sprengel, *Syst. Veg.* 3: 856. 1826; *Castanopsis remotiserrata* Hu.

Trees 10–20 m tall; branches and leaf blades glabrous. Petiole 1.5–2 cm; leaf blade lanceolate to rarely ovate, $7-18 \times 2-5$ cm, thickly papery to nearly leathery, concolorous, base rounded to acute, margin at least from middle to apex serrate, apex caudate; midvein and secondary veins adaxially raised; secondary veins 9–12 on each side of midvein. Female inflorescences borne on apical part of 1st-year branchlets; flowers 1 per cupule. Infructescences 8–15 cm. Cupule globose, 2.5–3.5 cm in diam., usually splitting into 3–5 segments, outside densely grayish brown puberulent when young but glabrescent, inside densely brown villous, wall 1–1.5 mm thick; bracts spinelike, almost entirely covering outside cupule, 6–12 mm, connate into bundles from base to nearly middle. Nut conical, $1.2-1.6 \times 1-1.3$ cm, glabrous or rarely puberulent from middle to apex; scar basal, 8–10 mm in diam. Fl. May–Jul, fr. Sep–Nov of following year.

Mixed and broad-leaved evergreen forests; below 1500 m. Guangdong, Guangxi, SW Guizhou, Hunan, SE Yunnan [Vietnam].

34. *Castanopsis eyrei* (Champion ex Benth) Tutch, *J. Linn. Soc., Bot.* 37: 68. 1905.

甜槠 tian zhu

Quercus eyrei Champion ex Benth, *Hooker's J. Bot. Kew Gard. Misc.* 6: 114. 1854; *Castanopsis asymetrica* H. Léveillé; *C. brachyacantha* Hayata; *C. caudata* Franchet; *C. chingii* A. Camus; *C. eyrei* var. *brachyacantha* (Hayata) C. F. Shen; *C. incana* A. Camus; *C. neocavaleriei* A. Camus; *Lithocarpus eyrei* (Champion ex Benth) Rehder; *Pasania eyrei* (Champion ex Benth) Oersted; *Q. castanopsis* H. Léveillé; *Q. cavaleriei* H. Léveillé & Vaniot; *Q.*

cepifera H. Léveillé; *Q. trinervis* H. Léveillé; *Shiia brachyacantha* (Hayata) Kudo & Masamune; *Synaedrys brachyacantha* (Hayata) Koidzumi.

Trees 8–20 m tall; branches glabrous. Petiole 0.7–1.5 cm or rarely longer; leaf blade lanceolate, ovate, ovate-elliptic, or oblong, 5–13 × 1.5–5.5 cm, leathery, abaxially reddish brown to dark reddish brown when dry and with brownish to silver-gray, membranous scalelike trichomes, base slightly decurrent on petiole and inaequilateral or sometimes symmetric, margin entire or with few shallow teeth from middle to apex, apex long acuminate; midvein at least from base to middle adaxially slightly raised; secondary veins 7–11 on each side of midvein, very slender, evident. Infructescence rachis 2–5 mm thick, glabrous or glabrescent. Cupule broadly ovoid to subglobose, 2–3 cm in diam., splitting into 2–4 segments, outside and bracts grayish to yellowish gray puberulent, apically acute to obtuse, wall ca. 1 mm thick; bracts spinelike, usually entirely covering outside of cupule, more densely toward apex but if cupule subglobose then basally glabrous and spines sparser, 4–10 mm but apical ones shorter. Nut 1 per cupule, broadly conical, 0.8–1.4 cm in diam., glabrous; scar basal, 8–10 mm in diam. Fl. Apr–Jun, fr. Sep–Nov of following year.

• Mixed and broad-leaved evergreen forests; 300–1700 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Qinghai, Sichuan, Taiwan, Xizang, Zhejiang.

35. *Castanopsis ferox* (Roxburgh) Spach, Hist. Nat. Vég. 11: 185. 1842.

思茅锥 si mao zhui

Quercus ferox Roxburgh, Fl. Ind., ed. 1832, 3: 639. 1832; *C. tribuloides* (Smith) A. de Candolle var. *ferox* King ex J. D. Hooker.

Trees 10–20 m tall. Branches glabrous. Petiole 0.8–1.2 cm; leaf blade lanceolate, oblong, or rarely ovate, 8–16 × 2–5 cm, leathery, abaxially with a grayish tight layer of scalelike trichomes, rarely concolorous, base broadly cuneate to cuneate, inaequilateral or symmetric, margin entire, apex acute to acuminate; midvein at least from base to middle adaxially slightly raised or from middle to apex flat to slightly impressed; secondary veins 9–14 on each side of midvein. Rachis of inflorescences tomentulose. Female inflorescence ca. 20 cm. Perianth puberulent. Infructescence rachis glabrous. Cupule globose to rarely broadly ovoid, 2–2.8 cm in diam., outside and bracts brown to grayish brown pubescent and with waxy scalelike trichomes, wall to 1 mm thick; bracts spinelike, 4–8 mm, base connate into bundles or united to discontinuous rings. Nut subglobose, 0.8–1.2 × 0.9–1.2 cm, glabrous, apex pointed; scar basal, 8–10 mm in diam. Fl. Aug–Oct, fr. Sep–Nov of following year.

Broad-leaved evergreen forests; 700–2000 m. SE Xizang, S to SW Yunnan [Bangladesh, NE India, Laos, Myanmar, Sikkim, N Thailand, Vietnam].

36. *Castanopsis fargesii* Franchet, J. Bot. (Morot) 13: 195. 1899.

栲 kao

Castanopsis argyracantha A. Camus; *C. cryptoneuron* (H. Léveillé) A. Camus ex Rehder; *C. taiwaniana* Hayata; *Pasania ischnostachya* Hu; *Quercus cryptoneuron* H. Léveillé; *Q. pinfaensis* H. Léveillé & Vaniot.

Trees 10–30 m tall; bud scales, young branchlets from middle to apex, petiole of young leaf blades, and leaf blades abaxially covered with glabrescent, rust-colored, small, lamellate, waxy scalelike trichomes. Branches glabrous. Petiole 1–2 cm; leaf blade oblong, lanceolate, or rarely ovate, 7–15 × 2–5 cm, abaxially covered with a thick and mealy layer of scalelike trichomes, reddish brown to yellowish brown when young, but tawny with age, base rounded to broadly cuneate and sometimes inaequilateral, margin entire or sometimes with few shallow teeth from middle to apex, apex acute to acuminate; midvein at least from middle to apex adaxially impressed; secondary veins 11–15 on each side of midvein. Female inflorescences solitary, glabrous, to 30 cm; cupules scattered on rachis. Infructescence rachis 1.5–3 mm thick. Cupule globose to broadly ovoid, 2.5–3 cm in diam., splitting irregularly, outside and bracts whitish gray to brownish puberulent or with reddish brown waxy scalelike trichomes and sparse pubescence, wall ca. 1 mm thick; bracts spinelike, 8–10 mm, connate and in bundles basally or rarely from base to middle. Nut 1 per cupule, conical and 1–1.5 × 0.8–1.2 cm to subglobose and 0.8–1.4 cm in diam., glabrous; scar basal, 8–10 mm in diam. Fl. Apr–Jun and Aug–Oct, fr. Apr–Oct of following year.

• Broad-leaved evergreen forests; 200–2100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

37. *Castanopsis ouonbiensis* Hickel & A. Camus, Bull. Soc. Bot. France 68: 398. 1921.

屏边锥 ping bian zhui

Trees ca. 25 m tall; 1st-year branchlets, petioles, and rachis of infructescences yellowish brown to dark dirty brown tomentulose. Petiole 2–2.5 cm; leaf blade elliptic to obovate-elliptic, 10–18 × 4–6 cm, subleathery, abaxially puberulent and with early glabrescent, reddish brown, mealy, waxy scalelike trichomes, base broadly cuneate to rounded and often inaequilateral, margin entire, apex shortly acuminate to acute; midvein adaxially impressed; secondary veins 10–15 on each side of midvein. Female inflorescences 10–20 cm. Infructescences 10–16 cm; rachis slender. Cupule

subglobose to broadly ellipsoid, 2.5–3 cm in diam., outside and bracts rusty brown puberulent and with lamellate, waxy scalelike trichomes, wall 1–2 mm thick and exterior visible through bracts; bracts spinelike, 4–8 mm, in separated bundles, usually connate at middle or apically, rarely connate basally. Nut conical, 1.4–1.8 × 1.2–1.4 cm, glabrous; scar basal, 1–1.2 cm in diam. Fl. Oct–Nov, fr. Oct–Nov of following year.

Broad-leaved evergreen forests; 1100–1600 m. SE Yunnan [N Vietnam].

38. *Castanopsis jucunda* Hance, J. Bot. 22: 230. 1884.
秀丽锥 xiu li zhui

Castanopsis formosana (Skan) Hayata; *C. tribuloides* (Smith) A. de Candolle var. *formosana* Skan.

Trees 10–26 m tall; 1st-year branchlets and leaf blades adaxially brownish black when dry; bud scales, branchlets, petiole of young leaf, mature leaf blades abaxially, and rachis of inflorescences sparsely covered with glabrescent, reddish brown, waxy scalelike trichomes. Petiole 1–2.5 cm; leaf blade ovate, ovate-elliptic, or oblong, sometimes obovate to obovate-elliptic, (4–)10–18 × (2–)4–8 cm, base rounded to broadly cuneate and inaequilateral or symmetric, margin at least from middle to apex serrate or rarely undulate, apex acute to acuminate; midvein adaxially impressed; secondary veins (5–)8–11 on each side of midvein. Female inflorescences axillary, solitary. Infructescences 10–15 cm. Cupule subglobose, 2.5–3.5 cm in diam., splitting into 3–5 segments, outside and bracts pubescent and with grayish brown, lamellate, waxy scalelike trichomes especially when young, wall 0.5–1(–1.5) mm thick; bracts spinelike, 6–10 mm, free but a few in bundles, sometimes transversely united to discontinuous rings. Nut broadly conical to ovoid, 1–2 × 1–1.5 cm, glabrous or glabrescent; scar basal, 1–1.2(–1.5) cm in diam. Fl. Apr–May, fr. Aug–Oct of following year.

Broad-leaved evergreen forests; below 1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, E to SC Taiwan, Yunnan, Zhejiang [Vietnam].

39. *Castanopsis hupehensis* C. S. Chao in W. C. Cheng & al, Sci. Silvae 8(2): 187. 1963.

湖北锥 hu bei zhui

Trees 10–20 m tall; 1st-year branchlets and bud scales glabrous. Petiole 3–7(–10) mm; leaf blade lanceolate to oblong, sometimes obovate-elliptic to oblanceolate, 6–11 × 1.5–3.5 cm, subleathery, abaxially brownish when young and dry but grayish with age and with tight layers of scalelike trichomes, base broadly cuneate and often slightly oblique, margin serrate from middle to apex or entire, apex acuminate to abruptly narrowly caudate; midvein adaxially slightly impressed; secondary veins 10–13 on each side of midvein. Rachis of inflorescences glabrous, without waxy scalelike trichomes. Infructescence rachis 1.5–3 mm thick. Cupule ellipsoid to subglobose when mature, 2–2.2 cm

in diam., outside grayish to yellowish brown puberulent, basally often shortly stalked, wall ca. 1 mm thick; bracts spinelike, 4–6 mm, few of them connate into bundles, others transversely united to 4 or 5 cristate rings. Nut 1 per cupule, broadly conical, glabrescent; scar basal, 9–12 mm in diam. Fl. Jun–Sep, fr. Jun–Nov of following year.

• Broad-leaved evergreen forests; 600–1000 m. NE Guizhou, W Hubei, NW Hunan, E Sichuan.

40. *Castanopsis fleuryi* Hickel & A. Camus, Bull. Soc. Bot. France 68: 395. 1921.

小果锥 xiao guo zhui

Castanopsis microcarpa Hu.

Trees to 10 m tall. Branches glabrous. Petiole 0.8–1.5 cm; leaf blade elliptic, lanceolate, or ovate, 9–20 × 3–7 cm, subleathery, abaxially with tight layers of trichomes, 1st-year leaf blades concolorous, base cuneate to rounded and sometimes oblique, margin entire, apex acuminate; midvein adaxially raised from base to middle and slightly impressed from middle to apex; secondary veins 7–10 on each side of midvein. Infructescences 8–15 cm; rachis 2–4 mm thick, yellowish gray pubescent. Cupule ellipsoid to broadly ovoid, 7–11 mm in diam., outside sparsely covered with spinelike bracts and yellowish gray to grayish brown pubescence and waxy scalelike trichomes, basally shortly stalked, apically narrowly pointed, wall to 0.5 mm thick; bracts 1–3 mm, in rows, 3- or 4-angular in cross section, free or a few connected at base to continuous or discontinuous rings. Nut 1 per cupule, broadly conical, 8–12 × 7–10 mm, glabrescent when mature; scar basal, 6–8 mm in diam. Fl. May–Jul or Oct–Nov, fr. Oct–Nov of following year.

Broad-leaved evergreen forests; 600–2400 m. S to SW Yunnan [Laos, Vietnam].

41. *Castanopsis rufotomentosa* Hu, Bull. Fan Mem. Inst. Biol., n.s. 1: 223. 1948 [1949].

红壳锥 hong qiao zhui

Trees 18–25 m tall; 1st-year branchlets, petioles, and leaf blades abaxially covered with early glabrescent, dark reddish brown, small, lamellate, waxy scalelike trichomes. Petiole 2–8 mm; leaf blade narrowly lanceolate to oblong, 10–20 cm × 2–4 mm, leathery, base acute to rounded, margin entire or rarely with a few shallow teeth from middle to apex, apex narrow and obtuse; midvein and secondary veins adaxially impressed; secondary veins 14–18 on each side of midvein. Infructescences 8–15 cm; rachis covered with mealy, waxy scalelike trichomes. Cupule globose, 1.2–2.2 cm in diam., outside and bracts covered with early glabrescent, dark reddish brown, small, lamellate, waxy scalelike trichomes, wall ca. 1 mm thick and exterior visible through bracts; bracts spinelike, 3–6 mm, free or several with base connate into bundles. Nut 1 per

cupule, oblate-globose to subglobose, ca. 1 cm in diam., glabrous, apex pointed; scar basal, ca. 9 mm in diam. Fr. Nov–Dec.

• Broad-leaved evergreen forests; ca. 1300 m. SE Yunnan (Xichou Xian).

42. *Castanopsis tribuloides* (Smith) A. de Candolle in Hance, J. Bot. 1: 182. 1863.

蒺藜锥 ji li zhui

Quercus tribuloides Smith in Rees, Cycl. 29: *Quercus* no. 13. 1814; *Castanea tribuloides* (Smith) Lindley.

Trees 5–10 m tall; young branchlets and young leaf blades abaxially pubescent and with glabrescent, rusty brown, waxy scalelike trichomes. Petiole 1–1.5 cm; leaf blade elliptic to ovate, 9–16 × 3.5–5 cm, abaxially reddish brown but may become gray to grayish brown with age, base acute to rounded, margin entire or rarely with 1 or 2 teeth, apex acute; midvein adaxially impressed; secondary veins 11–14 on each side of midvein, sometimes impressed. Infructescences ca. 25 cm; rachis slender. Cupules loosely arrange, globose to ellipsoid, 1.6–2.2 cm in diam., outside covered with brownish, small, lamellate, waxy scalelike trichomes, sometimes pubescent, wall to 1 mm thick; bracts spinelike, sparsely covering cupule, 3–5 mm, slender, free but a few in bundles. Nut 1 per cupule, broadly conical, 1.5–2 × 1–1.6 cm, glabrous; scar basal, 8–10 mm in diam. Fl. Apr–May, fr. Sep–Oct of following year.

Broad-leaved evergreen forests; ca. 1300 m. SE Xizang (Médog Xian), SW Yunnan [N India, Myanmar, Nepal, N Thailand].

43. *Castanopsis wenchangensis* G. A. Fu & C. C. Huang, Acta Phytotax. Sin. 27: 151. 1989.

文昌锥 wen chang zhui

Trees 5–8 m tall; branches, bud scales, and rachis of inflorescences glabrous. Petiole 1–2 cm; leaf blade lanceolate to ovate, (3–)5–9(–12) × (1.2–)2–3.5(–6) cm, leathery, abaxially with thin greenish layers of adnate scalelike trichomes when young, concolorous with age, base rounded to acute, margin with shallow to deep teeth, apex acuminate to rarely acute; midvein at least from base to middle adaxially raised to rarely slightly impressed; secondary veins 6–10 on each side of midvein, adaxially raised. Female inflorescences 3–8 cm. Infructescences 4–5 cm, with 1–6 fruit; rachis 1–1.5 mm thick. Cupule subglobose, 1.5–2 cm in diam., completely enclosing nut, irregularly splitting into 3 or 4 segments, outside sparsely pubescent and with small, lamellate, waxy scalelike trichomes, basally without bracts, wall 1–2 mm thick; bracts spinelike, scattered, free or a few in bundles, 2–4 mm. Nut subglobose, 1.3–1.4 cm in diam., puberulent; scar basal, 1–1.2 cm in diam. Fl. Jul–Aug, fr. Oct–Dec of following year.

• Broad-leaved evergreen forests. Hainan (Wenchang Xian).

44. *Castanopsis delavayi* Franchet, J. Bot. (Morot) 13: 194. 1899.

高山锥 gao shan zhui

Castanopsis tsaii Hu; *Synaedrys delavayi* (Franchet) Koidzumi.

Trees ca. 20 m tall. Branches glabrous. Petiole 0.7–1.5 cm; leaf blade obovate, obovate-elliptic, ovate, or elliptic, 5–13 × 3–7 cm, subleathery, abaxially sparsely covered with yellowish brown membranous trichomes when young, grayish to silver-gray with age, base acute to rounded, margin serrate or rarely undulate, apex acute to rounded; midvein adaxially raised; secondary veins 6–9 on each side of midvein, slightly raised. Female inflorescence rachis glabrous. Infructescences 10–15 cm; rachis 2–3 mm thick. Cupule ellipsoid when young but broadly ovoid to subglobose with age, 1.5–2 cm in diam. or slightly larger, splitting into 2 or 3 segments, outside with yellowish brown, waxy scalelike trichomes and adnate pubescence, basally long stalked, wall 0.5–1 mm thick; bracts spinelike, 3–6 mm, free or connate at base and transversely united to 3–5 circular or spiral rings, covered with yellowish brown waxy scalelike trichomes and adnate pubescence. Nut broadly ovoid, 1.3–1.4 cm in diam.; scar basal, 6–8 mm in diam. Fl. Apr–May, fr. Sep–Nov of following year.

• Mixed and broad-leaved evergreen forests; 1500–2800 m. Guangdong, SW Guizhou, SW Sichuan, Yunnan.

45. *Castanopsis echinocarpa* J. D. Hooker & Thomson ex Miquel, Ann. Mus. Bot. Lugduno-Batavi 1: 119. 1863.

短刺锥 duan ci zhui

Castanopsis echinocarpa var. *seminuda* W. C. Cheng & C. S. Chao; *C. longispicata* Hu; *C. tribuloides* (Smith) A. de Candolle var. *echinocarpa* (J. D. Hooker & Thomson ex Miquel) King ex J. D. Hooker.

Trees 7–15(–25) m tall. Branches glabrous; branchlets dark brown to brownish black when dry. Petiole 1–1.5 cm; leaf blade elliptic, ovate, or lanceolate, (5.5–)7–12.5(–14.5) × (1.5–)2.5–5(–6) cm, thickly papery, abaxially covered with a very tight layer of scalelike trichomes and reddish brown to yellowish brown when young but grayish brown with age, base rounded to sometimes acute, margin serrate to rarely subentire, apex acuminate to abruptly narrowly caudate; midvein adaxially slightly impressed to rarely nearly flat; secondary veins 9–13 on each side of midvein. Rachis of inflorescences glabrous or glabrescent.

Infructescence rachis base 2–3.5 mm thick. Cupule globose, 1.5–2 cm in diam., rarely splitting, wall ca. 1 mm thick; bracts spinelike, thick, 1–3 mm, sometimes no more than tubercles, 3- or 4-angular in cross section, pale grayish brown pubescent, sometimes base loosely connected to discontinuous rings. Nut 1 per cupule, subglobose to conical, 1–1.3 cm in diam., glabrous, apex acute; scar basal, 8–9 mm in diam. Fl. Apr–May, fr. Sep–Oct of following year.

Broad-leaved evergreen forests; 500–2300 m. SE Xizang, S Yunnan [Bangladesh, Bhutan, NE India, Myanmar, Nepal, Thailand, Vietnam].

46. *Castanopsis carlesii* (Hemsley) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

米楮 mi zhu

Trees ca. 20 m tall; young shoots and rachis of inflorescences sparsely covered with reddish brown, lamellate, waxy scalelike trichomes. Petiole to ca. 1 cm, base becoming thick, pillow-shaped; leaf blade lanceolate to ovate, 4–12 × 1–4.5 cm, leathery, abaxially with layers of reddish brown to yellowish brown, slightly adnate, small, lamellate scalelike trichomes when young but grayish brown to silvery with age, base slightly cuneate to broadly so and oblique, margin entire or with a few shallow teeth, apex acuminate to narrowly caudate; midvein adaxially flat to slightly impressed but impressed when dry; secondary veins 8–13 on each side of midvein. Rachis of male catkins glabrous or glabrescent. Infructescence rachis 2–3 mm thick, glabrous. Cupule subglobose to ovoid, 1–1.5 cm, outside yellowish brown to reddish brown feltlike pubescent and covered with waxy scalelike trichomes, wall 0.5(–1) mm thick; bracts spinelike or reduced to tubercles. Nut subglobose to broadly conical, apex shortly pointed; scar basal, ca. 5 mm in diam. Fl. Mar–Jun, fr. Sep–Nov of following year.

• Mixed and broad-leaved evergreen forests, mixed mesophytic forests; below 1700 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

The variation in cupule spines length is continuous between the two extremes, and it is not always possible to distinguish the two varieties.

- 1a. Cupules tuberculate or cupules from middle to apex with free scattered spinelike bracts 1–2 mm and from base to middle without bracts or with very short bracts 46a. var. *carlesii*
1b. Cupules covered with adnate to fascicled spinelike bracts 2–5(–7) mm ... 46b. var. *spinulosa*

46a. *Castanopsis carlesii* var. *carlesii*

米楮(原变种) mi zhu (yuan bian zhong)

Quercus carlesii Hemsley, Hooker's Icon. Pl. 26: t. 2591. 1899; *Castanopsis carlesii* var. *sessilis* Nakai; *C. cuspidata* (Thunberg) Schottky var. *carlesii* (Hemsley) T. Yamazaki; *C. cuspidata* var. *longicaudata* (Hayata) S. S. Ying; *C. longicaudata* (Hayata) Nakai; *C. stipitata* (Hayata ex Koidzumi) Nakai; *Lithocarpus stipitatus* Hayata ex Koidzumi; *Q. longicaudata* Hayata; *Shiia carlesii* (Hemsley) Kudo; *Synaedrya carlesii* (Hemsley) Koidzumi.

Cupules with tubercles or sometimes apically with spinelike bracts ca. 1–2 mm, sometimes adnate but not connate into fascicles.

• Mixed and broad-leaved evergreen forests. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

46b. *Castanopsis carlesii* var. *spinulosa* W. C. Cheng & C. S. Chao in W. C. Cheng & al., Sci. Silvae 8: 6. 1963.

短刺米楮 duan ci mi zhu

Cupule bracts spinelike, more dense apically, 2–5(–7) mm, longer from middle to apex of cupule, basal bracts connate into bundles.

• Mixed mesophytic forests; 1000–1700 m. Guangxi, Guizhou, Hunan, Sichuan, Yunnan.

47. *Castanopsis xichouensis* C. C. Huang & Y. T. Chang, Guihaia 10: 2. 1990.

西畴锥 xi chou zhui

Trees ca. 15 m tall. Branches glabrous. Petiole 1.5–2.5 cm; leaf blade elliptic, ovate-elliptic, or rarely obovate-elliptic, 10–15 × 3.5–6 cm, firmly leathery, abaxially reddish brown, sparsely covered with adnate, black-brown, rounded, lamellate, waxy scalelike trichomes when young, grayish and waxy with age, base shortly attenuate to broadly cuneate and sometimes oblique, margin serrate from middle to apex, apex acute; midvein adaxially slightly raised; secondary veins 10–13 on each side of midvein. Infructescences dense, 10–30 cm; rachis 6–10 mm thick. Cupule 4–4.5 cm in diam., wall 1–2 mm thick; bracts spinelike, entirely covering outside of cupule, connate at base or to middle 1/2 into 3–7-spined bundles. Nuts (2 or) 3 per cupule, broadly conical, ca. 1.2 cm in diam., densely brown puberulent; scar 6–10 mm in diam. Fr. Oct.

• Broad-leaved evergreen forests; 1400–1700 m. Yunnan (Xichou Xian).

48. *Castanopsis rockii* A. Camus, Bull. Bimens. Soc. Linn. Lyon 8: 88. 1929.

龙陵锥 long ling zhui

Castanopsis lunglingensis Hu.

Trees 20–27 m tall. Branches glabrous; young shoots dark purplish red, dark brown when dry. Petiole 1.5–2 cm; leaf blade oblong, narrowly elliptic, or sometimes oblanceolate, 15–25 × 4–7 cm, papery, abaxially with a tight and thin layer of scalelike trichomes, base cuneate and oblique, margin entire, apex acute to acuminate; midvein and secondary veins adaxially slightly raised; secondary veins 14–17 on each side of midvein. Male inflorescences ca. 20 cm; rachis sparsely puberulent. Female flowers 3 per cupule. Infructescence rachis glabrous, 5–8 mm thick, fruit loosely arranged. Cupule subglobose to broadly elliptic, 4–5 cm in diam., outside glabrescent, dark brown when dry, wall 2–3 mm thick; bracts spinelike, entirely covering cupule, 1–1.5 cm, base connate into bundles. Nuts 2 or 3 per cupule, broadly conical, ca. 1.2 mm in diam., densely hairy; scar covering ca. 1/3 of nut. Fr. Oct–Nov.

Mixed and broad-leaved evergreen forests; below 2100 m. S and W Yunnan [Thailand, Vietnam].

49. *Castanopsis tessellata* Hickel & A. Camus, Bull. Soc. Bot. France 68: 399. 1921.

棕毛锥 zong mao zhui

Trees 10–15 m tall; bud scales, young shoots, petioles, leaf blades abaxially, and rachis of inflorescences densely brown pilose. Petiole 1.5–3 cm; leaf blade oblong, sometimes lanceolate, 15–30 × 5–8 cm, base acute to broadly cuneate and symmetric to sometimes oblique, margin entire, apex long acuminate; midvein adaxially slightly raised and puberulent; secondary veins 16–22 on each side of midvein, slightly impressed. Male flowers spirally arranged on rachis. Female inflorescences crowded from middle to apex of branchlets; flowers 3 per cupule, often with staminodes.

Infructescences 10–30 cm. Cupule subglobose, 5–6 cm in diam., base narrowing into a stalk 3–5 mm, wall 1–1.5 mm thick, outside except basally densely covered with spinelike bracts, inside densely yellowish brown pilose, spinelike bracts basally in bundles, yellowish brown pilose. Nuts 2 or 3 per cupule, broadly conical, 1.5–1.8 × 1.5–2 cm, pilose; scar basal, 1–1.5 cm in diam. Fl. Apr–Jun, fr. Sep–Oct.

Broad-leaved evergreen forests; below 500 m. SE Yunnan [C to N Vietnam].

50. *Castanopsis kweichowensis* Hu, Bull. Fan Mem. Inst. Biol., n.s. 1: 221. 1948 [1949].

贵州锥 gui zhou zhui

Trees ca. 20 m tall; young shoots, petioles, leaf blades abaxially, and rachis of inflorescences densely yellowish brown pilose. Petiole 0.5–1.5 cm, thick; leaf blade narrowly oblong to oblanceolate-oblong, 16–30 × 5–9 cm, firmly papery, base rounded to broadly cuneate and symmetric or oblique, margin apically serrate, apex abruptly acute; midvein and secondary veins adaxially impressed; secondary veins 16–25 on each side of midvein. Female inflorescences 10–25 cm; flowers 3 per cupule. Infructescence rachis 7–12 mm thick. Cupule irregularly globose, 3–3.5 cm in diam., outside pubescent, basally narrowed, wall 2–2.5 mm thick; bracts spinelike, basal bracts often transversely connected to ring but apically in bundles, 5–8 mm, pubescent. Nuts 2 or 3 per cupule, broadly conical, 1.6–2 × 1.6–2.2 cm, tomentose; scar basal, 1–1.5 cm in diam. Fl. May–Jun, fr. Oct–Dec of following year.

• Broad-leaved evergreen forests; 400–800 m. N Guangxi, S Guizhou. Very similar to *Castanopsis ceratocantha* but with denser cupule spines and larger leaves; it could be conspecific.

51. *Castanopsis ceratocantha* Rehder & E. H. Wilson in Sargent, Pl. Wilson. 3: 199. 1916.

瓦山锥 wa shan zhui

Castanopsis chuniana W. P. Fang.

Trees 8–15 m tall; 1st-year branchlets and rachis of inflorescences yellowish brown to brownish villous. Petiole ca. 1 cm; leaf blade lanceolate, oblong, or

sometimes oblanceolate, 10–18 × 2–5 cm or rarely shorter or wider, papery, 1st-year leaf blades at least along veins abaxially villous and with layers of reddish brown to yellowish brown scalelike trichomes, base broadly cuneate to acute and oblique, margin apically with 2–5 shallow teeth or entire, apex long acuminate to mucronate; midvein adaxially impressed; secondary veins 13–17 on each side of midvein, slightly impressed to raised. Female inflorescences in clusters on apical part of branchlet of previous year; flowers 2 or 3 per cupule. Cupule subglobose, ca. 3 cm in diam., outside and bracts brown villous and with small, lamellate, waxy scalelike trichomes, wall 1–1.5 mm thick; bracts spinelike, to 5 mm, several connate into bundles from middle or apical part, sometimes cristate. Nuts 1 or 2 (or 3) per cupule, broadly conical, 1.5–1.8 × 1.4–1.8 cm, pubescent; scar basal, ca. 1 cm in diam. Fl. Apr–May, fr. autumn to early winter of following year.

Mixed and broad-leaved evergreen forests; 1500–2500 m. Guizhou, Hubei, SW Sichuan, Yunnan [Laos, NE Thailand, Vietnam].

52. *Castanopsis fabri* Hance, J. Bot. 22: 230. 1884.

罗浮锥 luo fu zhui

Castanopsis brevispina Hayata; *C. brevistella* Hayata & Kanehira ex A. Camus; *C. ceratocantha* Rehder & E. H. Wilson var. *semiserrata* (Hickel & A. Camus) A. Camus; *C. hickelii* A. Camus; *C. kusanoi* Hayata; *C. matsudai* Hayata ex A. Camus; *C. ninbienensis* Hickel & A. Camus; *C. quangtrienensis* Hickel & A. Camus; *C. semiserrata* Hickel & A. Camus; *C. sinsuiensis* Kanehira; *C. stellatospina* Hayata; *C. tenuispinula* Hickel & A. Camus; *C. traninhensis* Hickel & A. Camus.

Trees 8–20 m tall. Young shoots sparsely pubescent. Petiole rarely to 1.5 cm; leaf blade ovate, narrowly oblong, or lanceolate, 8–18 × 2.5–5 cm, leathery, base oblique and rounded to rarely cuneate, margin serrate or rarely entire, apex acuminate and rarely mucronate; midvein adaxially conspicuously impressed; secondary vein 9–15 on each side of midvein. Rachis of male catkins sparsely pubescent. Female flowers 2 or 3 per cupule. Infructescences 8–17 cm. Cupule globose, broadly ellipsoid, or ovoid, 2–4 cm in diam., splitting irregularly, wall ca. 1 mm thick; bracts spinelike, 5–10 mm, brown to yellowish brown when dry, sparsely pubescent to glabrescent, base connate into bundles, apex branched. Nut (1 or)2 (or 3) per cupule, conical, 1–1.4 × 1–1.2 cm, glabrous; scar basal, 8–10 mm in diam. Fl. Apr–May, fr. Sep–Nov of following year.

Broad-leaved evergreen forests; 100–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang [Laos, Vietnam].

53. *Castanopsis wattii* (King ex J. D. Hooker) A. Camus, Côtagniers 421. 1929.

变色锥 bian se zhui

Castanopsis tribuloides (Smith) A. de Candolle var. *wattii* King ex J. D. Hooker, Fl. Brit. India 6: 663. 1888.

Trees 15–20 m tall. Young shoots purplish brown, sparsely pubescent, glabrescent, or glabrous. Petiole 0.8–1.5 cm; leaf blade narrowly ovate, lanceolate, or narrowly oblong, (7–)11–20 × 3–5 cm, firmly papery, base broadly cuneate to acute and oblique, margin apically with 2–5 shallow teeth, apex long acuminate; midvein adaxially impressed; secondary veins 13–19 on each side of midvein. Female inflorescence ca. 20 cm; rachis glabrous. Female flowers 3 per cupule. Cupule subglobose when mature, ca. 3 cm in diam., outside and bracts yellowish gray villous and with red to brownish small lamellate waxy scalelike trichomes, wall 1–1.5 mm thick; bracts spinelike, 5–8 mm, several basally or apically connate into bundles. Nuts (1 or) 2 or 3 per cupule, 2–2.5 × 1–1.5 cm, hairy; scar basal, triangular to lenticular, 7–10 mm in diam. Fl. Jul–Sep, fr. Aug–Oct of following year.

Broad-leaved evergreen forests; 900–1700 m. SE Xizang (Médog Xian), W Yunnan [NE India, Sikkim].

Reports in the literature of *Castanopsis rufescens* J. D. Hooker & Thomson ex A. Camus in China are referable to *C. wattii*.

54. *Castanopsis lamontii* Hance, J. Bot. 13: 368. 1875.

鹿角锥 lu jiao zhui

Castanopsis goniacantha A. Camus; *C. lamontii* var. *shanghangensis* Q. F. Zheng; *C. pachyrachis* Hickel & A. Camus; *C. robustispina* Hu.

Trees 8–15(–25) m tall; branches, leaf blades, and rachis of inflorescences glabrous. Petiole 1.5–3 cm; leaf blade elliptic, ovate, or oblong, 12–30 × 4–10 cm, thickly papery to subleathery, base rounded to acute and oblique, margin entire or sometimes apically with few shallow teeth, apex acuminate; midvein adaxially flat; secondary veins 10–15 on each side of midvein. Female inflorescences axillary, borne above male catkins; flowers 3(–7) per cupule. Infructescences 10–20 cm; rachis thick, base 6–10 mm thick. Cupule globose, subglobose, or ovoid, 2.5–6 cm in diam., wall 1.5–7 mm thick; bracts spinelike, thick, ca. 1.5 cm, connate into bundles with a deer-hornlike pattern, or base connate and united to 4–6-cristate rings. Nuts 2 or 3 per cupule, broadly conical, (1.5–)2–2.8 (–4.8) × (1.5–)3(–3.8) cm, densely pubescent; scar covering 2/5–1/2 of nut. Fl. Mar–May, fr. Sep–Nov of following year.

Montane and broad-leaved evergreen forests; 500–2500 m. S Fujian, Guangdong, Guangxi, S Guizhou, S Hunan, S Jiangxi, SE Yunnan [N Vietnam].

55. *Castanopsis crassifolia* Hickel & A. Camus, Notul. Syst. (Paris) 4: 122. 1928.

厚叶锥 hou ye zhui

Trees ca. 15 m tall; branches and leaf blades glabrous. Branchlets brownish black when dry, covered with a thin grayish waxy layer. Petiole 2–5 mm; leaf blade broadly ovate, (6–)12–18 × (4–)8–11 cm, leathery, base shortly attenuate to broadly cuneate, margin entire, apex mucronate and oblique; midvein adaxially flat; secondary veins 8–12 on each side of midvein. Rachis of male catkins glabrous. Infructescence rachis ca. 5 mm thick. Cupule ca. 3.5 cm in diam., outside pubescent, wall ca. 2 mm thick; bracts spinelike, densely covering cupules, 6–8 mm, transversely united to discontinuous cristate rings. Nuts 3 per cupule, broadly ovoid, ca. 1.2 × 1.2–1.4 cm, pubescent; scar basal, round to slightly elliptic, 5–7 mm in diam. to 5–7 × 7–10 mm. Fl. Apr–May, fr. Aug–Oct of following year.

Broad-leaved evergreen forests; 1000–1300 m. SW Guangxi [N Thailand, NE Vietnam].

56. *Castanopsis chunii* W. C. Cheng in W. C. Cheng, S. Y. Chang, T. Hong & al., Sci. Silvae 8: 5. 1963.

厚皮锥 hou pi zhui

Trees 10–15 m tall; branches, leaf blades, and rachis of inflorescences glabrous. Young shoots dark purplish brown, angulate. Petiole 1–1.5 cm; leaf blade ovate, broadly elliptic, or ovate-elliptic, 8–18 × 4–9 cm, thickly leathery, base rounded and oblique, margin entire or rarely with 1–3 shallow teeth apically, apex caudate and bent; midvein adaxially impressed to flat; secondary veins 9–12 on each side of midvein. Inflorescences sometimes androgynous, ca. 20 cm. Female flowers 3 per cupule. Cupule subglobose and with 1 or 2 nuts or broadly ellipsoid and with 3 nuts, 3–4 cm in diam., splitting irregularly, wall 2–3 mm thick; bracts spinelike, 4–7 mm, yellowish brown pubescent, basally connate into bundles, often a few bundles connected to cristate rings. Nuts 1–3 per cupule, broadly conical, 1.5–1.8 × 1.7–2 cm, densely brown pubescent; scar covering ca. 2/5 of nut. Fl. May–Jun, fr. Sep–Oct of following year.

• Mixed and broad-leaved evergreen forests; 1000–2000 m. N Guangdong, NE Guangxi, SE Guizhou, S Hunan, S Jiangxi.

57. *Castanopsis orthacantha* Franchet, J. Bot. (Morot) 13: 194. 1899.

元江锥 yuan jiang zhui

Castanopsis concolor Rehder & E. H. Wilson; *C. mianningensis* Hu; *C. tenuinervis* A. Camus; *C. yanshanensis* Hu.

Trees 10–15(–20) m tall; branches, leaf blades, and rachis of inflorescences glabrous. Petiole ca. 1 cm; leaf blade ovate, ovate-elliptic, or lanceolate, 7–14 × 2.5–5 cm, leathery, base rounded to acute and oblique or symmetric, margin serrulate or entire, apex acute and bent; midvein adaxially flat; secondary veins 9–13 on each side of midvein. Female flowers 2 or 3 per cupule.

Infructescences ca. 15 cm. Cupule subglobose, sometimes broadly ovoid when young, 3–3.5 cm in diam., splitting into 4 segments, outside and bracts pubescent and with brown, small, lamellate, waxy scalelike trichomes, wall 2–3.5 mm thick; bracts spinelike, ca. 7 mm, basally connate and transversely united to 4–6-cristate rings or basally connate into bundles. Nuts 1–3 per cupule, conical, 1–1.5 cm in diam., densely pubescent; scar basal. Fl. Apr–May, fr. Sep–Nov of following year.

• Mixed and broad-leaved evergreen forests; 1500–3200 m. W Guizhou, SW Sichuan, Yunnan.

58. *Castanopsis platyacantha* Rehder & E. H. Wilson in Sargent, Pl. Wilson. 3: 200. 1916.

扁刺锥 bian ci zhui

Trees ca. 20 m tall. Branches glabrous. Petiole 0.8–1.5 cm; leaf blade ovate, oblong, or obovate elliptic, 10–18 × 3–6 cm, covered with early glabrescent, reddish brown, small, lamellate, waxy scalelike trichomes when young, yellowish gray to silver-gray with age, base rounded to broadly cuneate and oblique, margin serrate or entire, apex acute to acuminate; midvein flat or adaxially slightly impressed; secondary veins 9–13 on each side of midvein. Female flowers 1–3 per cupule. Infructescences 8–15 cm. Cupule subglobose to broadly ellipsoid, 3–4 cm in diam., irregularly splitting into 2–4 segments, outside grayish brown pubescent; bracts spinelike, ca. 3 mm, basally connate into bundles, sometimes united to cristate rings, grayish brown pubescent. Nuts 1–3 per cupule, broadly conical, 1.5–2 × 1.4–2 cm, wall 1.5–2 mm thick, densely brown pubescent; scar covering ca. 1/3 of nut. Fl. May–Jun, fr. Sep–Nov of following year.

• Broad-leaved evergreen forests; 1500–2500 m. NW Guizhou, Sichuan, NE Yunnan.

