

4. LITHOCARPUS Blume, Bijdr. 526. 1826.

柯属 ke shu

Pasania Oersted.

Trees or rarely shrubs, evergreen. Winter buds terminal, ovoid to ellipsoid, scales spirally imbricate. Stipules extrapetiolar. Leaves spirally arranged. Inflorescences male, female, or androgynous, in leaf axils toward base of branchlets or in a dense panicle cluster on subterminal shoots, ± erect. Male inflorescences erect, simple or branched; flowers usually 3–5(–7) in dichasial clusters; perianth 4–6-lobed; stamens 10–12; rudimentary pistil small, enclosed by hairs. Female flowers solitary or in clusters of (2 or)3(–5), 1 or 2(or 3) well developed; perianth 6-lobed; staminodes 10–12; ovary 3(–6) loculed; styles (2 or)3(–5), (0.5–)1–2(–3) mm; stigmas a terminal pore. Cupules grouped together in cymes on rachis but often many aborted, corky, horny, woody, or crustaceous, completely or partly enclosing nut; bracts variously shaped. Nut 1 per cupule. Germination hypogeal; cotyledons flat-convex (although surface between cotyledons may not be completely flat).

About 300 species: mainly in Asia, one species in W North America; 123 species (69 endemic) in China.

The northern limit of *Lithocarpus* is on the S flank of the Qinling Mountains. Guangdong, Guangxi, and Yunnan have the highest diversity and the most primitive of the Chinese species.

1a. Nut scar convex (± concave or impressed at margin but conspicuously convex at center in *L. cinereus*, *L. crassifolius*, *L. handelianus*, *L. laetus*, *L. pachyphyllus*, and *L. variolosus*).

2a. Cupules mostly completely enclosing nut.

3a. Scar covering less than 3/4 of nut.

4a. Cupule bracts triangular, inconspicuous, fused with cupule and often apically in 2–4 rings.

5a. Scar covering 1/2–3/4 of nut; leaf blade apex falcate; petiole 1.5–2 cm 14. *L. damiaoshanicus*

5b. Scar covering ca. 1/4 of nut; leaf blade apex not falcate; petiole less than 1 cm 15. *L. irwinii*

4b. Cupule bracts triangular but subulate from middle to apex of cupule, conspicuous, obliquely spreading.

6a. Leaf blade secondary veins 8–12 on each side of midvein; young shoots and petioles with tawny to grayish waxy scalelike trichomes 19. *L. craibianus*

6b. Leaf blade secondary veins more than 12 on each side of midvein; young shoots and leaf blades at least abaxial midvein hairy.

7a. Petiole rarely longer than 1 cm; leaf blade on fruiting branches 9–20 cm wide, secondary veins 21–26 on each side of midvein 18. *L. tephrocarpus*

7b. Petiole 2–3 cm; leaf blade on fruiting branches 4–9 cm wide, secondary veins 12–19 on each side of midvein.

8a. Bracts of young cupules subulate, 4-angled; styles with short hairs 16. *L. handelianus*

8b. Bracts of young cupules linear, subterete; styles glabrous 17. *L. amoenus*

3b. Scar covering more than 3/4 of nut.

9a. Cupules solitary along rachis 13. *L. fenzelianus*

9b. Cupules in clusters of 3–5 or more, often clusters scattered along rachis.

10a. Cupules entirely covered by bracts.

11a. Cupule bracts spiny; cupules 7–9 cm in diam., including bracts; leaf blade 25–40 cm 1. *L. xizangensis*

11b. Cupule bracts not spiny; cupules less than 5 cm in diam.; leaf blade rarely to 30 cm.

12a. Cupule bracts straight, multiangular in cross section; wall of nut ca. 4 mm thick 2. *L. jenkinsii*

12b. Cupule bracts curved, ± round in cross section; wall of nut 2–3 mm thick.

13a. Cupules subglobose; cupule bracts 2–3 mm; nut subglobose to broadly ellipsoid, scar covering 4/5–5/6 of nut 3. *L. xylocarpus*

13b. Cupules globose; cupule bracts ca. 10 mm; nut turbinate, scar covering ca. 2/3 of nut 4. *L. pseudoxizangensis*

10b. Cupules sparsely covered by bracts.

14a. Cupule bracts clawlike 5. *L. howii*

14b. Cupule bracts not clawlike.

15a. Cupules corky or spongy and with smooth concentric lines outside.

16a. Rachis of inflorescences 1–2 cm thick; cupule wall 2–5 mm thick 6. *L. pasania*

16b. Rachis of inflorescences 0.6–1 cm thick; cupule wall 5–15 mm thick 7. *L. balansae*

15b. Cupules covered with squamose or scurfy bracts and with raised concentric ridges outside.

- 17a. Cupules with bracts conspicuous or inconspicuous, spirally arranged, sometimes scalelike and overlapping.
- 18a. Cupules flat at apex 12. *L. lepidocarpus*
- 18b. Cupules rounded at apex 11. *L. amygdalifolius*
- 17b. Cupules with bracts united into 4–8 thin concentric ridges.
- 19a. Cupules ellipsoid, narrowed to 1 or both ends, 1.2–1.6 cm in diam. 10. *L. levis*
- 19b. Cupules globose to subglobose, 2–3 cm in diam.
- 20a. Wall of cupule ca. 1.5 mm thick; branchlets of current year blackish when dry 8. *L. laoticus*
- 20b. Wall of cupule ca. 1 mm thick; branchlets of current year dark brown when dry 9. *L. chifui*
- 2b. Cupules mostly not completely enclosing nut.
- 21a. Wall of cupule more than 3 mm thick or rarely thinner; leaf blade concolorous or with scalelike glands (like tiny drops of water and visible only under high magnifying lens), margin dentate or if entire then abaxially covered with long or stellate hairs.
- 22a. Nut conspicuously wider than long; cupules \pm flat to discoid 41. *L. pachylepis*
- 22b. Nut \pm as long as wide; cupules cupular.
- 23a. Leaf blade glabrous or with short hairs only along midvein or at axils of secondary veins 40. *L. corneus*
- 23b. Leaf blade abaxially hairy.
- 24a. Hairs simple 38. *L. uvariifolius*
- 24b. Hairs stellate or branched.
- 25a. Leaf blade abaxially densely covered with stellate hairs; secondary veins (15–)20–28 on each side of midvein 39. *L. fordianus*
- 25b. Leaf blade sparsely covered with stellate or branched hairs; secondary veins rarely more than 16 on each side of midvein 40. *L. corneus*
- 21b. Wall of cupule rarely to 2 mm thick; leaf blade not concolorous (concolorous in *L. truncatus* and sometimes in *L. dealbatus*) abaxially covered with tightly adherent waxy or lax pulveraceous scalelike trichomes, margin entire or rarely undulate.
- 26a. Scar usually covering more than 2/3 of nut; cupules enclosing most of nut.
- 27a. Petiole 3–4 cm 24. *L. tabularis*
- 27b. Petiole less than 2.5 cm.
- 28a. Leaf blade hairy at least abaxially on midvein 20. *L. talangensis*
- 28b. Leaf blade glabrous or abaxially covered with tightly adherent waxy scalelike trichomes.
- 29a. Cupules 3–3.5 cm 21. *L. truncatus*
- 29b. Cupules less than 3 cm.
- 30a. Cupules outside glaucous; bracts imbricate or united into interrupted ring 21. *L. truncatus*
- 30b. Cupules outside grayish brown or grayish tawny; bracts (except for subulate tip) fused to cupule, rarely united into concentric rings.
- 31a. Leaf secondary veins 7–10 on each side of midvein; branches of 2nd- or 3rd-year growth with grayish lamelliform waxy scalelike trichomes 22. *L. cleistocarpus*
- 31b. Leaf secondary veins 12–16 on each side of midvein; branches without waxy scalelike trichomes 23. *L. tenuilimbus*
- 26b. Scar covering at most 1/2 of nut; cupules enclosing 1/3–3/4 of nut.
- 32a. Nut glabrous.
- 33a. Petiole 0.2–0.5 cm; leaf blade apex rounded, obtuse, or rarely shortly acute 25. *L. crassifolius*
- 33b. Petiole 1–2.5 cm; leaf blade apex acuminate to caudate.
- 34a. Leaf blade secondary veins conspicuous, abruptly curving, and fusing near margin, secondary and tertiary veins adaxially impressed 26. *L. pachyphyllus*
- 34b. Leaf blade secondary veins inconspicuous and not fusing, secondary and tertiary veins adaxially not or only slightly impressed.
- 35a. Young leaf blades abaxially covered with reddish brown to yellowish brown pulverulous scalelike trichomes 27. *L. apricus*

- 35b. Young leaf blades abaxially without pulverulous scalelike trichomes.
- 36a. Leaf buds, young branchlets, and female flower buds without resin; leaf blade abaxially glaucous when dry 28. *L. variolosus*
- 36b. Leaf buds, young branchlets, and female flower buds with dark brown \pm translucent resin;
leaf blade abaxially not glaucous when dry 22. *L. cleistocarpus*
- 32b. Nut hairy at least with pulverulent minute hairs around base of styles.
- 37a. Leaf blade abaxially hairy.
- 38a. Nut with hairs only around stylopodium 29. *L. dealbatus*
- 38b. Nut (except for scar) hairy throughout.
- 39a. Leaf blade margin usually undulate 30. *L. thomsonii*
- 39b. Leaf blade margin entire (sometimes shallowly undulate in *L. cucullatus*).
- 40a. Leaf blades of current year pubescent or rusty scurfy; wall of cupule 2–4 mm thick . 31. *L. laetus*
- 40b. Leaf blades of current year abaxially grayish brown tomentose and with waxy scalelike trichomes; wall of cupule ca. 1.5 mm thick 32. *L. cucullatus*
- 37b. Leaf blade abaxially glabrous.
- 41a. Leaf blades of current year abaxially with tightly adherent, waxy scalelike trichomes.
- 42a. Nut concave around stylopodium; petiole 2–2.5 cm 36. *L. triquetra*
- 42b. Nut flat/convex around stylopodium; petiole 1–1.5 cm 37. *L. cinereus*
- 41b. Leaf blades of current year covered with early glabrescent, loose, pulveraceous scalelike trichomes.
- 43a. Branchlets of current year puberulent 33. *L. chrysocomus*
- 43b. Branchlets of current year glabrous.
- 44a. Nut conspicuously concave around stylopodium; petiole 1.5–2 cm 34. *L. lycoperdon*
- 44b. Nut flat/convex around stylopodium; petiole 2–3 cm 35. *L. paihengii*
- 1b. Nut scar concave (margin concave or impressed but center \pm convex in *L. carolineae*, *L. cyrtocarpus*, *L. echinophorus*, *L. grandifolius*, *L. gymnocarpus*, *L. konishii*, and *L. quercifolius*).
- 45a. Cupules mostly solitary along rachis but sometimes a few in clusters of 2 or 3.
- 46a. Cupules completely enclosing nut.
- 47a. Cupules stalked; nuts white farinose; bracts inconspicuous, triangular; petiole 1.5–3 cm . 42. *L. attenuatus*
- 47b. Cupules sessile; nuts with appressed hairs; bracts linear or clawlike; petiole less than 1.5 cm.
- 48a. Cupules abruptly narrowed and \pm elongate at apex; bracts clawlike; petiole less than 1 cm 43. *L. tubulosus*
- 48b. Cupules not elongated at apex; bracts linear; petiole 1–1.5 cm 44. *L. echinotholus*
- 46b. Cupules not completely enclosing nut.
- 49a. Cupules stalked.
- 50a. Cupules enclosing only base or to 1/2 of nut.
- 51a. Nut \pm white farinose; petiole 1–1.5 cm; stalk of cupule 3–5 mm 48. *L. longipedicellatus*
- 51b. Nut not farinose; petiole less than 1 cm; stalk of cupule 4–7 mm in fruit 49. *L. brachystachyus*
- 50b. Cupules usually enclosing 1/2–3/4 of nut.
- 52a. Nut covered with appressed minute hairs 45. *L. pseudoreinwardtii*
- 52b. Nut glabrous.
- 53a. Stalk of mature cupules ca. 1.5 cm; petiole 3–4 cm 46. *L. caudatilimbus*
- 53b. Stalk of mature cupules less than 0.8 cm; petiole 1–1.5 cm 47. *L. shinsuiensis*
- 49b. Cupules sessile.
- 54a. Nut covered with minute yellowish gray appressed hairs.
- 55a. Cupule bracts linear; petiole 10–20 mm 50. *L. leucodermis*
- 55b. Cupule bracts triangular to rhomboid; petiole 2–5 mm 51. *L. quercifolius*
- 54b. Nut glabrous.
- 56a. Leaf blade margin with 3–6 obtuse teeth; nut scar margin impressed but center \pm convex 52. *L. konishii*
- 56b. Leaf blade margin entire; nut scar concave.
- 57a. Cupule bracts inconspicuous or \pm united into a few concentric rings; nut scar rarely more than
6 mm in diam.
- 58a. Leaf blade abaxially covered with lamellate waxy scalelike trichomes, apex acuminate to caudate; secondary veins 10–15 on each side of midvein; cupule discoid, 1.2–1.5 cm 53. *L. nantoensis*
- 58b. Leaf blade abaxially covered with punctiform waxy scalelike trichomes, apex acuminate to rarely acute; secondary veins 6–10 on each side of midvein; cupule bowl-shaped, 0.5–0.8 cm 54. *L. iteaphyllus*

- 57b. Cupule bracts imbricate or \pm spirally arranged (basal bracts usually united into 3 or 4 concentric rings and obscure in *L. pakhaensis*); nut scar (7–)8–19 mm in diam.
- 59a. Petiole 2–2.5 cm; nuts 2.5–3 cm in diam. 55. *L. elmerrillii*
- 59b. Petiole rarely to 2 cm; nuts 1–2.2 cm in diam.
- 60a. Petiole 0.4–0.8 cm; leaf blade 1–2 cm wide 56. *L. dodonaeifolius*
- 60b. Petiole 1–1.5 cm; leaf blade 1.5–4 cm wide.
- 61a. Leaf blade 2–3 cm wide, apex rounded 57. *L. formosanus*
- 61b. Leaf blade more than 3 cm wide, apex acuminate.
- 62a. Leaf blade lanceolate; inflorescence ca. 4 cm; basal bracts usually united into 3 or 4 concentric rings 58. *L. pakhaensis*
- 62b. Leaf blade elliptic to ovate-elliptic; inflorescence 5–15 cm; bracts imbricate 59. *L. yongfuensis*
- 45b. Cupules in clusters of 3–5 or more scattered along rachis (solitary or 3 together in *L. cyrtocarpus*).
- 63a. Cupules stalked.
- 64a. Nut glabrous.
- 65a. Nut 0.7–1.2 cm in diam., scar 4–5 mm in diam. 66. *L. farinulentus*
- 65b. Nut 1.2–1.6 cm in diam., scar 7–10 mm in diam. 67. *L. propinquus*
- 64b. Nut covered with appressed minute hairs.
- 66a. Cupules enclosing more than 2/3 of nut.
- 67a. Cupules completely enclosing nut, wall ca. 0.5 mm thick; bracts triangular 60. *L. sphaerocarpus*
- 67b. Cupules enclosing 2/3–4/5 of nut, wall 1.5–2.5 mm thick; bracts reduced to concentric rings 61. *L. magneinii*
- 66b. Cupules enclosing up to 1/2 of nut.
- 68a. Nut scar 8–12 mm in diam. 65. *L. bacgiangensis*
- 68b. Nut scar 4–6 mm or more in diam.
- 69a. Leaf secondary veins 16–22 on each side of midvein; petiole 1–1.5 cm 62. *L. microspermus*
- 69b. Leaf secondary veins 9–15 on each side of midvein; petiole rarely to 1 cm.
- 70a. Nut broadly conical, 1.6–2 cm in diam.; leaf blade oblanceolate, sometimes oblong 63. *L. pseudovestitus*
- 70b. Nut depressed globose, 1.1–1.4 cm in diam.; leaf blade elliptic to ovate-elliptic 64. *L. mekongensis*
- 63b. Cupules sessile.
- 71a. Nut (3–)4–5 cm in diam., wall 10–14 mm thick.
- 72a. Leaf blade margin lobate-dentate 68. *L. cyrtocarpus*
- 72b. Leaf blade margin entire or rarely with 1–3 teeth near apex 69. *L. gymnocarpus*
- 71b. Nut rarely over 3.5 cm in diam., wall less than 5 mm thick.
- 73a. Cupules enclosing at least 1/2 to all of nut; wall of nut crustaceous.
- 74a. Cupules enclosing less than 3/4 of nut.
- 75a. Petiole less than 1 cm.
- 76a. Branchlets tomentose; secondary veins 8–11 on each side of midvein 82. *L. fangii*
- 76b. Branchlets with crispy hairs; secondary veins 12–16 on each side of midvein 84. *L. elaeagnifolius*
- 75b. Petiole 1–2 cm.
- 77a. Leaf secondary veins 6–8 on each side of midvein; bracts, except for apex, fused to cupule 78. *L. longanoides*
- 77b. Leaf secondary veins 10–22 on each side of midvein; bracts not fused to cupule.
- 78a. Leaf secondary veins abruptly arcuate apically near margin, apical ones often fusing.
- 79a. Cupules 1.6–1.8 cm in diam., bracts 2–3 mm; nut scar 0.8–0.9 cm in diam. 79. *L. bonnetii*
- 79b. Cupules 2–2.5 cm in diam., bracts 4–6 mm; nut scar 0.9–1.2 cm in diam. 80. *L. garrettianus*
- 78b. Leaf secondary veins not curving nor fusing.
- 80a. Leaf tertiary veins abaxially numerous and conspicuous, apex caudate 81. *L. rosthornii*
- 80b. Leaf tertiary veins abaxially inconspicuous or not visible, apex acuminate.
- 81a. Branches and leaves pilose 74. *L. oleifolius*
- 81b. Branches and leaves glabrous.
- 82a. Leaf blade narrowly oblong to lanceolate; rachis of infructescence 4–6 mm thick 71. *L. elizabethiae*
- 82b. Leaf blade elliptic to narrowly elliptic; rachis of infructescence ca. 12 mm thick 72. *L. echinophorus*
- 74b. Cupules completely or sometimes almost completely enclosing nut.
- 83a. Branchlets of current year, leaf blades, and rachis of inflorescences glabrous, glabrescent, or sparsely pubescent.

- 84a. Petiole 2–3 cm; nut scar ca. 1 cm in diam. 70. *L. cryptocarpus*
84b. Petiole 0.5–2 cm; nut scar 1–1.8 cm in diam.
85a. Leaf blade abaxially pubescent along midvein; secondary veins abruptly arcuate apically near margin, apical ones often fusing; tertiary veins abaxially evident . 85. *L. fenestratus*
85b. Leaf blade glabrous; secondary veins not curving nor fusing; tertiary veins abaxially inconspicuous.
86a. Rachis of infructescence 4–6 mm thick; cupule apically elongated into a nipple 71. *L. elizabethiae*
86b. Rachis of infructescence ca. 12 mm thick; cupule apically flat 72. *L. echinophorus*
83b. Branchlets of current year and leaf blades abaxially hairy; rachis of inflorescences pilose to tomentose (puberulent in *L. trachycarpus*).
87a. Mature leaf blades abaxially densely hairy.
88a. Leaf blade 2–4 cm wide, widest at or from base to middle, abaxially covered with appressed hairs 74. *L. oleifolius*
88b. Leaf blade 4–6 cm wide, widest usually from middle to apex, abaxially pilose 75. *L. rhabdostachyus*
87b. Mature leaf blades abaxially glabrous, pilose on midvein, or with scalelike trichomes.
89a. Rachis of inflorescences and branchlets of current year sparsely pilose or subglabrous, oily and shiny when dry; leaf blade tertiary veins abaxially conspicuous 76. *L. trachycarpus*
89b. Rachis of inflorescences and branchlets of current year densely hairy, not oily and shiny when dry; leaf blade tertiary veins abaxially inconspicuous.
90a. Leaf secondary veins 6–8 on each side of midvein; bracts, except for apex, fused to cupule 78. *L. longanoides*
90b. Leaf secondary veins 10–16 on each side of midvein; bracts not fused to cupule.
91a. Leaf secondary veins abruptly curving apically; nut broadly conical 83. *L. paniculatus*
91b. Leaf secondary veins not curving; nut depressed globose.
92a. Petiole 8–12 mm; rachis of inflorescences 6–8 mm thick 77. *L. chiungchungensis*
92b. Petiole 5–8 mm; rachis of inflorescences 2–3 mm thick.
93a. Branchlets tomentose; petiole base not thickened; nut 1.4–2.2 cm in diam. 73. *L. skanianus*
93b. Branchlets with crispy hairs; petiole base thickened; nut 1.2–1.4 cm in diam. 84. *L. elaeagnifolius*
73b. Cupules usually enclosing less than 1/2 of nut (sometimes to 2/3 of nut in *L. grandifolius*); wall of nut thick and woody.
94a. Cupule bracts linear, usually curved downward.
95a. Nuts with 3 longitudinal obtuse ridges near apex 123. *L. areca*
95b. Nuts without ridges.
96a. Petiole 2–3.5 cm; nut height ± same as width 121. *L. haipinii*
96b. Petiole 1–1.5 cm; nut height less than width 122. *L. qinzhouicus*
94b. Cupule bracts triangular to rhomboid, imbricate or united into continuous or interrupted concentric rings.
97a. Cupules enclosing almost 1/2 of nut.
98a. Cupule bracts fused with wall or basal bracts connate into concentric rings.
99a. Branchlets glabrous; petiole 0.5–1 cm; leaf blade secondary veins 13–20 on each side of midvein 13–20 100. *L. grandifolius*
99b. Branchlets pilose; petiole 1–1.5 cm; leaf blade secondary veins 10–12 on each side of midvein 112. *L. silvicularum*
98b. Cupule bracts imbricate.
100a. Leaf blade abaxially with tufts of stellate hairs at axils of veins, margin serrate from middle to apex, apex caudate; cup shortly stalked 89. *L. carolineae*
100b. Leaf blade abaxially without tufts of stellate hairs, margin entire, apex not caudate; cup sessile.
101a. Branches lenticellate; leaf blade base rounded to auriculate 102. *L. obscurus*
101b. Branches not lenticellate; leaf blade base cuneate.
102a. Petiole 1.5–3.5 cm; leaf blade 12–22 cm 111. *L. henryi*
102b. Petiole 0.5–1.5 cm; leaf blade 4–11 cm.
103a. Rachis of inflorescences covered with scalelike trichomes; leaf blade secondary veins 6–10 on each side of midvein 86. *L. mairei*
103b. Rachis of inflorescences tomentose; leaf blade secondary veins 10–15 on each side of midvein 87. *L. melanochromus*
97b. Cupules enclosing basal part or at most 1/3 of nut.

- 104a. Leaf blade 5–10 × as long as wide.
- 105a. Cupules 1.2–1.8 cm in diam.; nut scar 8–12 mm in diam. 90. *L. naiadarum*
- 105b. Cupules 0.5–0.8 cm in diam.; nut scar 3–4 mm in diam. 92. *L. ithyphyllus*
- 104b. Leaf blade rarely 5 × as long as wide.
- 106a. Leaf blade when young abaxially variously pubescent.
- 107a. Leaf blade abaxially with stellate hairs.
- 108a. Petiole 2.5–4 cm; cupule 2.5–3.5 cm in diam., wall 3–6 mm thick; nut subglobose, 2.5–3.8 cm in diam. 95. *L. eriobotryoides*
- 108b. Petiole 1–2 cm; cupule 1.8–2.2 cm in diam., wall to 2 mm thick; nut conical to ellipsoid, 1–1.5 cm in diam. 94. *L. petelotii*
- 107b. Leaf blade abaxially without stellate hairs.
- 109a. Leaf blade less than 3 cm wide; petiole ca. 1 cm.
- 110a. Leaf blade midvein at least basally adaxially raised 98. *L. obovatilimbus*
- 110b. Leaf blade midvein at least from base to middle adaxially impressed.
- 111a. Leaf blade with tufts of minute crisp hairs on both surfaces when young, abaxially scurfy; nuts not white farinose; styles less than 1 mm 96. *L. macilentus*
- 111b. Leaf blade abaxially minutely scalelike glands and floccose-tomentose when young; nuts white farinose; styles to 2 mm 97. *L. floccosus*
- 109b. Leaf blade usually over 3 cm wide (sometimes ca. 2 cm wide in *L. taitoensis*); petiole longer than 1 cm.
- 112a. Leaf blade usually broadest from middle to apex 99. *L. glaber*
- 112b. Leaf blade usually broadest at middle.
- 113a. Petiole 1–1.5 cm; leaf secondary veins 14–20 on each side of midvein .. 101. *L. collettii*
- 113b. Petiole 1.5–3 cm; leaf secondary veins 11–15 on each side of midvein.
- 114a. Leaf blade 4–6 cm wide, base cuneate and decurrent on petiole; petiole 1.5–2 cm; rachis of inflorescences 1–1.3 cm thick 104. *L. mianningensis*
- 114b. Leaf blade 5–8 cm wide, base broadly cuneate to subrounded; petiole 2–3 cm; rachis of inflorescences ca. 0.9 cm thick 105. *L. gaoligongensis*
- 106b. Leaf blade when young abaxially glabrous or with scalelike glands.
- 115a. Branchlets of current year and leaf blades abaxially hairy (hairs on leaf blades wiped off easily)
- 116a. Leaf blade tertiary veins abaxially inconspicuous; branchlets with tawny minute lamellate waxy scalelike trichomes 114. *L. taitoensis*
- 116b. Leaf blade tertiary veins abaxially conspicuous; branchlets without waxy scalelike trichomes.
- 117a. Leaf blade rigidly leathery; petiole 2.5–5 cm; male catkins less than 3 cm; cupule 1.5–2.5 cm in diam. 93. *L. calophyllus*
- 117b. Leaf blade papery to subleathery; petiole 1.5–2.5 cm; male catkins to 25 cm; cupule 0.8–1.5 cm in diam. 113. *L. litseifolius*
- 115b. Branchlets of current year and leaf blades abaxially glabrous or with scalelike glands.
- 118a. Leaf blade margin obtusely lobate-dentate from middle to apex or near apex.
- 119a. Nut 2.2–2.8 cm (longer than wide); leaf tertiary veins abaxially inconspicuous 106. *L. harlandii*
- 119b. Nut 1.6–2.2 cm (shorter than or ± as long as wide); leaf tertiary veins abaxially slender, evident 107. *L. kawakamii*
- 118b. Leaf blade margin entire.
- 120a. Leaf blade base auriculate or rounded 108. *L. brevicaudatus*
- 120b. Leaf blade base neither auriculate nor rounded.
- 121a. Leaf blade secondary veins adaxially impressed.
- 122a. Leaf blade broadest at or slightly from base to middle; tertiary veins abaxially inconspicuous 114. *L. taitoensis*
- 122b. Leaf blade broadest from middle to apex; tertiary veins abaxially conspicuous.
- 123a. Bracts ± connate into concentric and ± raised rings 88. *L. fohaiensis*

- 123b. Bracts imbricate.
 124a. Leaf blade 6–13 cm wide 110. *L. megalophyllus*
 124b. Leaf blade 4–7 cm wide.
 125a. Leaf blade secondary veins 12–25 on each side of midvein; nuts
 1.6–2.2 cm, wall ca. 0.5 mm thick 107. *L. kawakamii*
 125b. Leaf blade secondary veins 9–11 on each side of midvein; nuts
 2.4–3 cm, wall 1–1.5 mm thick 109. *L. oblanceolatus*
 121b. Leaf blade secondary veins adaxially flat.
 126a. Petiole less than 1 cm.
 127a. Mature leaf blades abaxially without waxy scalelike trichomes.
 128a. Leaf blade 5–10 cm; rachis of infructescences 0.2–0.3 cm thick 91. *L. hancei*
 128b. Leaf blade 10–18 cm; rachis of infructescences 1–1.4 cm thick ... 115. *L. nitidinux*
 127b. Mature leaf blades with waxy scalelike trichomes.
 129a. Leaf blade firmly leathery, apex rounded; secondary veins 10–12 on
 each side of midvein; petiole 3–5 mm 116. *L. phansipanensis*
 129b. Leaf blade papery, apex shortly acuminate to obtuse; secondary veins
 12–16 on each side of midvein; petiole to 10 mm 117. *L. confinis*
 126b. Petiole 1–5 cm.
 130a. Leaf blade 20–35 × 8–12 cm 119. *L. listeri*
 130b. Leaf blade 5–20 × 2–8 cm.
 131a. Leaf secondary veins 12–16 on each side of midvein.
 132a. Nut scar 1.2–1.5 cm in diam. 120. *L. calolepis*
 132b. Nut scar 0.5–1 cm in diam.
 133a. Rachis of infructescences 0.8–1.8 cm thick; leaf blade secondary veins
 12–16 on each side of midvein 103. *L. arcaulus*
 133b. Rachis of infructescences 0.2–0.3 cm thick; leaf blade secondary veins
 6–13 on each side of midvein 91. *L. hancei*
 131b. Leaf secondary veins 6–11 on each side of midvein.
 134a. Leaf blade oily shiny when young 114. *L. taitoensis*
 134b. Leaf blade not oily shiny when young.
 135a. Leaf blade not glaucous 91. *L. hancei*
 135b. Leaf blade glaucous.
 136a. Tertiary veins abaxially slender, evident, lax, and reddish to
 yellowish
 brown when dry; basal bracts of cupule connate into concentric
 rings 113. *L. litseifolius*
 136b. Tertiary veins inconspicuous; cupule bracts spirally arranged 118. *L. hypoglaucus*

1. *Lithocarpus xizangensis* C. C. Huang & Y. T. Chang in C. C. Huang, *Acta Phytotax. Sin.* 16(4): 70. 1978.

西藏柯 xi zang ke

Trees to 30 m tall. Branchlets of last year growth, petioles, and abaxial leaf blade surface pubescent. Petiole 2–4 cm, stout, pubescent; leaf blade elliptic to obovate-elliptic, 25–40 × 9–15 cm, papery, abaxially pubescent, base cuneate, margin entire or sometimes apically undulate, apex acute; secondary veins 11–16 on each side of midvein, adaxially impressed when young, pubescent, covered with adherent scurfy scalelike trichomes, grayish when dry; tertiary veins abaxially conspicuous. Male inflorescences solitary, ca. 25 cm. Infructescence to 20 cm, rachis lenticellate, base 1–1.2 cm thick; cupules in clusters of 3–5. Cupule globose, (5–)7–9 cm in diam. including bracts, completely enclosing nut; bracts subulate, completely covering cupule, 1.5–2.5 cm, straight or apical ones slightly curved, ± woody, pubescent. Nut broadly

conical, ca. 2.5 × 2.8 cm, covered with minute hairs, base slightly narrowed, apex flat or slightly convex, wall 1–2 mm thick; scar covering ca. 2/3 of nut, convex. Fl. Aug–Sep, fr. Sep–Oct of following year.

• Broad-leaved evergreen forests; 1700–2000 m. SE Xizang (Mêdog Xian).

2. *Lithocarpus jenkinsii* (Bentham) C. C. Huang & Y. T. Chang, *Guihaia* 8: 36. 1988.

盈江柯 ying jiang ke

Quercus jenkinsii Bentham, *Hooker's Icon. Pl.* 14: 8. 1880; *Lithocarpus parkinsonii* A. Camus.

Trees to 10 m tall. Branchlets of current year sturdy, lenticellate, glabrous. Petiole ca. 3 cm, base ca. 4 mm thick; leaf blade elliptic to ovate-elliptic, 25–30 × 8–10 cm, leathery, concolorous, abaxially covered with minute scalelike trichomes, base broadly cuneate and symmetric, margin entire, apex acute and oblique; secondary veins 12–16 on each side of midvein,

adaxially slightly impressed, abruptly curving apically, obscure near margin; tertiary veins subparallel. Female inflorescences ca. 3; cupules solitary, scattered on rachis. Infructescence ca. 15 cm, rachis lenticellate, glabrescent, base 0.9–1.4 cm thick. Cupule subglobose, 3.5–4.5 cm in diam., completely enclosing nut, wall 4–6 mm thick and \pm woody when dry; bracts subulate, 6–10 mm, woody and multiangular, base 4–8 mm in diam., apex shortly pointed. Nut subglobose but flat at apex, 2.5–3.5 cm in diam., wall ca. 4 mm thick; scar covering more than 3/4 of nut, convex. Fr. Jun–Aug.

Moist places in broad-leaved evergreen forests; ca. 1500 m. SW Yunnan [NE India, NE Myanmar].

The nuts were originally described as being separate from the cupules except for the basal part, but the authors found a considerable portion of the nut to be adnate to the cupule.

3. *Lithocarpus xylocarpus* (Kurz) Markgraf, Bot. Jahrb. Syst. 59: 66. 1924.

木果柯 *mu guo ke*

Quercus xylocarpa Kurz, J. Asiat. Soc. Bengal Pt. 2, Nat. Hist. 44: 196. 1875; *Lithocarpus shunningensis* Hu; *Pasania xylocarpa* (Kurz) Hickel & A. Camus; *Synaedrys xylocarpa* (Kurz) Koidzumi.

Trees to 30 m tall. Young branchlets sulcate, tawny tomentose. Petiole ca. 1 cm; leaf blade narrowly oblong to sometimes lanceolate, 9–15 \times 2–5 cm, leathery, abaxially pilose when young and glaucous with age, adaxially lustrous, base cuneate, margin entire, apex acute; midvein \pm flat to slightly raised on both surfaces and usually pubescent; secondary veins 12–15 on each side of midvein; tertiary veins abaxially very slender, evident or not visible. Male inflorescences often partly androgynous, solitary, 5–10 cm; rachis tomentose. Female inflorescence rachis 5–8 cm, ca. 3 mm thick; cupules in clusters of ca. 3. Cupule subglobose but apically slightly narrowed, 3–4.5 cm in diam., completely enclosing nut, wall 3–5 mm thick; bracts linear, 2–3 mm, curved inward, densely and completely covered by minute hairs. Nut subglobose to broadly ellipsoid, 2–3 cm in diam.; scar covering 4/5–5/6 of nut, convex. Fl. May–Jun, fr. Sep–Oct of following year.

Dry mixed mesophytic forests; 1800–2300 m. SE Xizang, S Yunnan [NE India, N Laos, NE Myanmar, Vietnam].

4. *Lithocarpus pseudoxizangensis* Z. K. Zhou & H. Sun, Acta Bot. Yunnan. 18: 216. 1996.

假西藏柯 *jia xi zang ke*

Trees ca. 20 m tall. Petiole ca. 2 cm; leaf blade elliptic, 15–25 \times 10–12 cm, abaxially with sparse appressed hairs, adaxially glabrous, base cuneate to broadly cuneate and decurrent on petiole, margin entire, apex cuspidate; midvein flat above or slightly impressed; secondary veins ca. 11 on each side of midvein. Infructescence rachis 7–12 cm, ca. 1 cm thick. Cupule globose, completely enclosing nut, wall 4–6 mm thick; bracts ca. 1 cm, curved, sericeous-puberulent. Nuts

turbinate, ca. 2.5 \times 2.8 cm, appressed tomentulose, base narrow, apex depressed; scar covering ca. 2/3 of nut, convex.

• 800–2000 m. SE Xizang (Mêdog Xian).

5. *Lithocarpus howii* Chun, J. Arnold Arbor. 28: 235. 1947.

梨果柯 *li guo ke*

Trees 10–15 m tall. Branchlets of current year terete, densely pubescent; branchlets of 2 or 3 year's growth with scars of bud scales and leaf blades, sparsely lenticellate. Petiole 1.5–3.5 cm; leaf blade obovate-elliptic to oblong, 12–20 \times 4–7 cm, thickly papery, concolorous, when young abaxially with stellate hairs especially on axils of veins, base cuneate, margin shallowly undulate to obtusely dentate, apex obtuse to acute; secondary veins 15–18 on each side of midvein, ending in teeth; tertiary veins abaxially conspicuous. Inflorescences androgynous, spicate; ca. 10 cm. Female inflorescence with cupules in clusters of 3(–5), rarely solitary. Infructescence 2–3 cm; rachis 6–8 mm thick. Cupule pear-shaped to subglobose, 5–6 \times 4.5–5.5 cm including bracts, completely enclosing nut, wall 1–2 mm thick; bracts clawlike, basally reflexed, apically erect. Nut subglobose, 3–3.5 \times ca. 4 cm, apex \pm flat, wall 6–10 mm thick but basally ca. 1.5 cm thick, horny; scar covering more than 1/2 of nut, convex. Fl. May, fr. Jul–Aug.

• Broad-leaved evergreen forests; 1000–1400 m. SW Guangdong (Yangchun Xian), Hainan.

6. *Lithocarpus pasania* C. C. Huang & Y. T. Chang, Guihaia 8: 35. 1988.

石柯 *shi ke*

Pasania lithocarpaea Oersted, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1866: 84. 1867.

Trees to 20 m tall. Leaves not seen. Infructescences 14–28 cm; rachis terete, light brownish gray, 1–2 cm thick, epidermis flaky, reticulate, sparsely lenticellate; lenticels slightly raised. Cupules 5–9 fused in clusters, only 1 or 2 developed, globose or nearly so, 3.5–5 cm in diam., completely enclosing nut, apically flat or rounded, wall 2–5 mm thick and spongy; bracts \pm imbricate in young cupules and squamose but united into 8–12 concentric rings and inconspicuous with age. Nut broadly ellipsoid to subglobose, adnate to cupule except apically, apex flat, wall 1.5–4 mm thick and firmly woody.

Broad-leaved evergreen forests; ca. 800 m. SE Xizang (Mêdog Xian) [NE India].

An incompletely known species which Oersted described as *Pasania lithocarpaea*, based merely on 3 cupules. Only three infructescences have been seen by the authors.

7. *Lithocarpus balansae* (Drake) A. Camus, Rivière Sci. 18: 39. 1931 [1932].

猴面柯 *hou mian ke*

Quercus balansae Drake, J. Bot. (Morot) 4: 152. 1890; *Castanopsis balansae* (Drake) Schottky; *Lithocarpus eremiticus* Chun & C. C. Huang ex Y. C. Hsu & H. W. Jen; *L. luchunensis* Y. C. Hsu & H. W. Jen; *L. lutchuensis* Koidzumi; *Pasania balansae* (Drake) Hickel & A. Camus; *Synaedrys balansae* (Drake) Koidzumi.

Trees to 30 m tall. Branches of last-year growth yellowish gray, sparsely lenticellate; lenticels slightly raised. Petiole 1.5–2.5 cm, base thickened; leaf blade oblong to obovate-oblong, 10–38 × 5–13 cm, ± rigidly papery, abaxially glaucous when dry and with waxy scalelike trichomes, base cuneate and ± decurrent on petiole, margin entire, apex acuminate; secondary veins 9–12 on each side of midvein, abruptly curving apically near margin but not fusing; tertiary veins reticulate, conspicuous on both surfaces. Male inflorescences paniculate; rachis tawny pubescent. Female inflorescence with cupules in clusters of 5–7 scattered on rachis. Infructescences ca. 15 cm; rachis base 6–10 mm thick. Cupule obovoid, subglobose, or irregularly shaped, to 5 × 8 cm, completely enclosing nut, wall 0.5–1.5 cm thick and corky; bracts reduced to spiral or concentric lines. Nut subglobose, 2.5–3.5 × 2–3 cm, wall 2–3 mm thick; scar covering more than 1/2 of nut, convex. Cotyledons plicate. Fl. Apr–May, fr. Sep–Nov of following year.

Broad-leaved evergreen forests by streams; 400–1900 m. SE Yunnan [N Laos, Vietnam].

Possibly conspecific with *Lithocarpus pasania*, but additional specimens are needed to confirm this.

8. *Lithocarpus laoticus* (Hickel & A. Camus) A. Camus, Rivière Sci. 18: 41. 1931 [1932].

老挝柯 *lao wo ke*

Pasania laotica Hickel & A. Camus, Ann. Sci. Nat., Bot., sér. 10, 3: 402. 1921.

Trees to 20 m tall. Branchlets of current year blackish when dry; branches of previous year growth and rachis of infructescences conspicuously lenticellate. Petiole 1.5–2.5 cm; leaf blade elliptic to lanceolate, 12–20 × 4–9 cm, ± rigidly papery, abaxially light gray and with adherent, waxy scalelike trichomes, adaxially dark gray when dry, base broadly cuneate to acute, margin entire, apex narrowly acuminate to acute; secondary veins 10–13 on each side of midvein, sometimes fusing near margin on apical part of leaf; tertiary veins abaxially ± visible. Male inflorescences terminal clusters on branchlets of current year, 4–10 cm; rachis pubescent. Female inflorescences 10–15 cm; cupules in clusters of ca. 3. Infructescence rachis base 4–6 mm thick. Cupule subglobose, ca. 3.5 × 2–2.5 cm, completely enclosing nut, with many concentric ridges and inconspicuous

bract scars between ridges, wall ca. 1.5 mm thick; bracts scalelike. Nut subglobose, 2–2.5 × 1.6–2.2 cm in diam., glabrescent, apex rounded, wall less than 1 mm thick; scar covering more than 1/2 of nut, convex. Fl. Mar, fr. Sep of following year.

Broad-leaved evergreen forests; 1500–2200 m. SE Yunnan [N Laos, Vietnam].

According to A. Camus (Chênes 3: 587. 1953), the typical mature leaf blades are leathery and adaxially oily when dry, the tertiary veins are abaxially inconspicuous, and the nut apex is flat.

9. *Lithocarpus chifui* Chun & Tsiang, J. Arnold Arbor. 28: 320. 1947.

粤北柯 *yue bei ke*

Trees to 20 m tall. Young branchlets slightly sulcate, dark brown when dry. Petiole 1.5–2.8 cm; leaf blade elliptic to oblanceolate, 15–30 × 6–12 cm, leathery, abaxially with lamellate, waxy scalelike trichomes and grayish brown when dry, base attenuate and decurrent on petiole, margin entire, apex acuminate; secondary veins 10–14 on each side of midvein, abruptly curving apically, often fusing near margin; tertiary veins abaxially slender, evident, subparallel. Male inflorescences paniculate, basal spike 3–4 cm; rachis tawny scurfy. Female inflorescences 10–18 cm; cupules in clusters of 3–5. Infructescences to 17 cm; rachis base 6–10 mm thick, basal part lenticellate and without fruit. Cupule globose, 2.5–3 cm in diam., completely enclosing nut, wall ca. 1 mm thick; bracts squamose when young, in 3–5 thin concentric ridges on mature cupule. Nut subglobose, 1.8–2 cm in diam., apex with minute tawny hairs, wall 2–2.5 mm thick and woody; scar covering more than 1/2 of nut, convex. Fl. May–Jun, fr. Aug–Oct of following year.

• Mixed mesophytic forests in valleys; 1200–1400 m. NE Guangdong (Ruyuan Yaozu Zizhixian), S Guizhou.

10. *Lithocarpus levis* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, Guihaia 8: 2. 1988.

滑壳柯 *hua qiao ke*

Trees 10–15 m tall. Young branchlets sulcate; branches of last year's growth dark brown, sparsely lenticellate. Petiole 1–1.5 cm; leaf blade ovate-elliptic to elliptic, 13–20 × 4–7 cm, ± rigidly papery, abaxially with adherent, waxy scalelike trichomes and grayish when dry, adaxially glabrous, base broadly cuneate, margin entire, apex acuminate; secondary veins 12–16 on each side of midvein, abruptly curving apically near margin but not fusing; tertiary veins abaxially conspicuous, subparallel. Male inflorescences axillary, solitary, 6–9 cm; rachis pubescent. Female inflorescence with cupules in clusters of ca. 3. Infructescences 6–8 cm; rachis 7–8 mm thick, lenticellate. Cupule ellipsoid, 0.5–2 × 1.2–1.6 cm, completely enclosing nut, outside with yellowish brown to dark gray, waxy scalelike trichomes, both ends narrowed, wall ca. 1 mm thick; bracts united into concentric lines. Nut broadly ellipsoid to

subglobose, 1–1.4 cm in diam., apex with appressed minute hairs, wall 1.5–3 mm thick and thickened gradually from apex to base; scar covering more than 1/2 of nut, convex. Fl. Aug–Sep, fr. Sep–Oct of following year.

• Broad-leaved evergreen forests; 900–1500 m. S Guizhou.

11. *Lithocarpus amygdalifolius* (Skan) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

杏叶柯 xing ye ke

Quercus amygdalifolia Skan in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 506. 1899; *Lithocarpus amygdalifolius* var. *praecipitiorum* Chun; *Pasania amygdalifolia* (Skan) Schottky; *Synaedrys amygdalifolia* (Skan) Koidzumi.

Trees to 30 m tall; young shoots and young leaf blades abaxially densely covered with tawny crisp hairs, glabrescent. Petiole 1–2 cm; leaf blade lanceolate to narrowly oblong, 8–15 × 2.5–4 cm, ca. 20 × 9 cm on young shoots, thickly leathery, abaxially often oily when young and dry, grayish and covered with waxy scalelike trichomes in mature leaf blades, base cuneate, margin entire or rarely undulate near apex to obtusely undulate-dentate, apex narrowly acuminate to acute; secondary veins 10–16 on each side of midvein; tertiary veins abaxially not visible or obscure. Male inflorescences solitary or in a panicle; rachis densely pubescent. Female inflorescence with cupules in clusters of ca. 3, sometimes solitary. Infructescences 3–5 cm; rachis 2–4 mm thick. Cupule subglobose, 2–2.5 cm in diam., smooth, completely enclosing nut, wall 1–2 mm thick; bracts usually fused with cupule into intercepted concentric rings, triangular to multilateral. Nut subglobose 1.8–2 cm in diam., puberulent at apex, wall 1.5–2 mm and slightly thicker than wall of cupule; scar covering more than 1/2 of nut, convex. Fl. Mar–Sep, fr. Aug–Dec of following year.

Broad-leaved evergreen forests; 500–2300 m. S Fujian, Guangdong, S Guangxi, Hainan, C to S Taiwan [Vietnam].

12. *Lithocarpus lepidocarpus* (Hayata) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

鬼石柯 gui shi ke

Quercus lepidocarpa Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 291. 1911; *Lithocarpus castanopsifolius* (Hayata) Hayata; *Pasania lepidocarpa* (Hayata) Schottky; *Q. castanopsifolia* Hayata; *Synaedrys lepidocarpa* (Hayata) Koidzumi.

Trees tall. Branchlets of last-year growth with a thin layer of grayish wax, conspicuously lenticellate near nodes. Petiole 1–1.5 cm; leaf blade lanceolate-oblong to obovate, 15–32 × 4–10 cm, leathery, abaxially grayish, base broadly cuneate, margin entire or undulate-dentate from middle to apex, apex acuminate to shortly caudate; secondary veins 13–17 on each side of midvein; tertiary

veins abaxially slender, evident. Female inflorescence with cupules in clusters of 2 or 3, rarely solitary. Cupule subglobose, 3–3.2(–5) × 2.9–3(–3.8) cm, completely enclosing nut, apically flat; bracts imbricate to spirally arranged apically on cupule, rhomboid, squamose, with grayish waxy scalelike trichomes; midvein slightly raised and conspicuous. Nut subglobose, ca. 2 cm in diam.; scar covering more than 1/2 of nut, convex. Fl. Jul–Oct, fr. Aug–Dec of following year.

• Mixed mesophytic forests; (300–)1000–2800 m. C to S Taiwan.

This species has been reported from Vietnam (P. H. Ho, Ill. Fl. Vietnam 2(2): 786. 1993), but it is probably a misidentification.

13. *Lithocarpus fenzelianus* A. Camus, Bull. Mus. Natl. Hist. Nat., sér. 2, 7: 912. 1932.

红柯 hong ke

Quercus fenzeliana (A. Camus) Merrill.

Trees to 30 m tall. Young branchlets sulcate. Petiole 2–3 cm; leaf blade ovate, ovate-lanceolate, or obovate-elliptic, 10–18 × 3–6 cm, leathery, leaf blades of last year abaxially brownish gray to grayish and with adherent, waxy scalelike trichomes, base cuneate and decurrent on petiole, margin entire or undulate from middle to apex, apex caudate to shortly acuminate; secondary veins 7–10 on each side of midvein, usually impressed adaxially; tertiary veins abaxially obscure. Male inflorescences solitary or in a panicle; rachis pubescent. Female inflorescence ca. 15 cm; cupules solitary, scattered on rachis. Infructescence ca. 10 cm; rachis 3–4 mm thick. Cupule globose to depressed globose, 1.6–2.2 cm in diam., completely enclosing nut, wall ca. 1 mm thick; bracts triangular when young, fused into 6–8 concentric rings on mature cupules, squamose. Nut subglobose, ca. 1.5 cm in diam., apex puberulent, wall 0.5–1 mm thick; scar covering more than 2/3 of nut, convex. Fl. Feb–Apr, fr. Aug–Sep of following year.

• Broad-leaved evergreen forests, commonly in association with *Dacrydium pectinatum* and *Dacrycarpus imbricatus* var. *patulus*; 300–1000 m. Hainan.

14. *Lithocarpus damiaoshanicus* C. C. Huang & Y. T. Chang, Guihaia 16: 301. 1996.

大苗山柯 da miao shan ke

Trees 5–9 m tall. Branchlets of current year sulcate; branchlets of last-year growth dark gray to blackish when dry, sparsely lenticellate; lenticels tawny. Petiole 1.5–2 cm, white farinose when dry; leaf blade lanceolate to oblong, 5.5–13 × 2–6 cm, often asymmetric, thickly leathery, abaxially with adherent, waxy scalelike trichomes, adaxially white farinose when dry, base cuneate and decurrent on petiole, margin entire, apex narrowly acuminate and falcate; secondary veins 6–9 on each side of midvein, abruptly curving apically near margin but not fusing; tertiary veins abaxially very slender, evident to inconspicuous.

Male inflorescences solitary; rachis covered with lax, rust-colored, lamellate scalelike trichomes. Female inflorescence: cupules in clusters of ca. 3 but usually 1 or 2 developed. Infructescences rarely over 10 cm; rachis 4–8 mm thick, basally without fruit and sparsely lenticellate. Cupule broadly turbinate, 2–2.5 × 2–3 cm, completely or almost completely enclosing nut, apically flat, wall 3–5 mm thick in middle; basal bracts reduced to scars but apically imbricate to ± arranged in rings, triangular, appressed. Nut broadly depressed turbinate, ca. 1.5 cm in diam., puberulent, wall 1–2 mm thick; scar covering 1/2–3/4 of nut, convex. Fl. Nov–Dec, fr. Oct–Dec of following year.

• Dense forests; 1500–1900 m. Guangxi (Damao Shan).

15. *Lithocarpus irwinii* (Hance) Rehder, *J. Arnold Arbor.* 1: 127. 1919.

广南柯 *guang nan ke*

Quercus irwinii Hance, *Ann. Sci. Nat., Bot., sér. 2*, 18: 229. 1862; *Pasania irwinii* (Hance) Oersted; *Synaedrys irwinii* (Hance) Koidzumi.

Trees ca. 10 m tall. Young branchlets sulcate, densely tawny pilose, glabrescent; lenticels raised. Petiole usually less than 1 cm; leaf blade elliptic to lanceolate, 7–12 × 2–4 cm, thickly and rigidly leathery, abaxially with reddish brown, scurfy, waxy scalelike trichomes and when young sparsely pilose on midvein, adaxially dark brown and often oily when dry, base cuneate and decurrent on petiole, margin entire or undulate from middle to apex and ± recurved, apex acute to acuminate; secondary veins 10–15 on each side of midvein; tertiary veins abaxially very slender, evident to inconspicuous. Male inflorescences solitary in axils of leaves, or 2 or 3 in panicles; rachis tawny pubescent. Female inflorescence with cupules in clusters of ca. 3, sometimes solitary. Infructescences 2–5 cm; rachis 5–8 mm thick. Cupule turbinate, 2–2.6 × 1.8–2.4 cm, completely enclosing nut, apically broadest and ± flat, wall 2–4 mm thick; bracts imbricate, triangular, center and margin thickened in ridges. Nut subglobose, ca. 1.5 cm in diam., densely covered with appressed minute hairs, wall 2–2.5 mm thick; scar covering ca. 1/4 of nut, convex. Fl. Apr–May, fr. Oct–Nov of following year.

• Sparse forests, common in hilly regions S of the Tropic of Cancer; below 400 m. Fujian, Guangdong, Guangxi.

16. *Lithocarpus handelianus* A. Camus, *Bull. Mus. Natl. Hist. Nat., sér. 2*, 6: 93. 1934.

瘤果柯 *liu guo ke*

Trees to 28 m tall. Branchlets of current year stout, conspicuously sulcate, grayish brown pubescent; branchlets of previous year with yellowish brown, thick, waxy scalelike trichomes. Leaves congested at apex of branchlets; petiole 2–3 cm, sturdy with yellowish brown, thick, waxy scalelike trichomes; leaf blade elliptic to rarely ovate, 15–20 × 6–9 cm, ca. 45 × 17 cm on stump sprouts, thickly leathery, abaxially pubescent when young, with yellowish brown, thick, waxy

scalelike trichomes, and pale yellowish gray, usually oily, and shiny when dry, adaxially pubescent on midvein or glabrous, base broadly cuneate to acute, margin entire, apex acute to acuminate; secondary veins 12–19 on each side of midvein; tertiary veins abaxially subparallel. Male inflorescences terminal or rarely axillary, solitary, ca. 20 cm; rachis covered with appressed short hairs. Female inflorescence with cupules in clusters of ca. 3. Infructescence rachis stout. Cupule subglobose, 2–3 cm in diam., completely enclosing nut, apex narrowed, wall 0.5–1 mm thick; bracts imbricate, triangular-subulate, 2–4 mm, thickened, apex ± curved. Nut conical, 1.6–1.7 cm in diam., with tawny appressed minute hairs, apex narrowed; scar ca. 1.2 cm in diam., covering base of nut, ± concave at margin but conspicuously convex at center. Fl. May and Aug–Oct, fr. summer–autumn of following year.

• Moist sites of broad-leaved evergreen forests; 400–1000 m. Hainan.

17. *Lithocarpus amoenus* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, *Guihaia* 8: 12. 1988.

愉柯 *yu ke*

Trees 10–15 m tall. Branchlets of current year sulcate; branchlets and inflorescences densely tawny to grayish brown tomentose. Petiole 2–3 cm; leaf blade elliptic to ovate-elliptic, 12–18 × 4–8 cm, thickly leathery, abaxially covered with ± loose, lamellate, waxy scalelike trichomes, adaxially tomentose and with pulveraceous scalelike trichomes when young, base broadly cuneate, margin entire, apex acute to narrowly acuminate; secondary veins 12–16 on each side of midvein, slightly impressed adaxially, abruptly curving apically near margin but not fusing; tertiary veins abaxially usually conspicuous, subparallel. Male inflorescences solitary in axils of leaves or 3 in a panicle. Cupule globose, 2–2.5 cm in diam., usually completely enclosing nut; bracts of young cupules linear, 3–6 mm, slightly incurved, cross section terete to nearly so, grayish puberulent, wall ca. 1 mm thick; bracts of mature cupules reduced to scars or apical ones to shortly linear scales. Nut subglobose, 1.6–2.2 × 1.6–2 cm, densely covered with tawny appressed minute hairs; scar at most covering ca. 1/4 of nut, convex. Fl. May–Jun, fr. Aug–Oct of following year.

• Mixed mesophytic forests; 300–1000 m. SW Fujian, Guangdong, S Guizhou, SW Hunan.

18. *Lithocarpus tephrocarpa* (Drake) A. Camus, *Riviera Sci.* 18: 42. 1932.

灰壳柯 *hui qiao ke*

Quercus tephrocarpa Drake, *J. Bot. (Morot)* 4: 151.

1890; *Pasania tephrocarpa* (Drake) Hickel & A.

Camus; *Synaedrys tephrocarpa* (Drake) Koidzumi.

Trees 10–15 m tall; branchlets, bud scales, young leaf blades, and rachis of inflorescences densely covered with ± rough brown long hairs. Branches stout, conspicuously lenticellate. Petiole rarely longer than 1

cm, 5–7 mm thick; leaf blade spatulate, obovate-oblong, or oblong, 30–50 × 9–10 cm, leathery to thickly papery, ± glaucous and abaxially with adherent, waxy scalelike trichomes when mature, base rounded to auriculate, margin entire or with a few teeth from middle to apex, apex acute with a blunt tip; secondary veins 21–26 on each side of midvein, adaxially slightly impressed, abruptly curving apically near margin but not fusing; tertiary veins subparallel. Infructescences 8–12 cm; rachis basally ca. 1 cm thick, hairy. Cupules in clusters of ca. 3 but 1 or 2 developed, subglobose, 3–4 cm in diam., completely enclosing nut, apically narrowed and nipple-shaped, wall 3–5 mm thick; bracts imbricate, ovate-triangular, brownish pubescent. Nut subglobose, ca. 2.5 cm in diam., sparsely covered with appressed hairs, wall ca. 2 mm thick; scar covering base of nut, slightly convex. Fr. Aug.

Broad-leaved evergreen forests; 600–1100 m. SE Yunnan [NE Vietnam].

19. *Lithocarpus craibianus* Barnett, Bull. Misc. Inform. Kew 1938: 103. 1938.

白穗柯 bai sui ke

Trees to 20 m tall; young branchlets, leaf blades abaxially, and rachis of female inflorescences covered with tawny to grayish, waxy scalelike trichomes. Petiole 1–2.5 cm; leaf blade ovate to ovate-elliptic, 12–19 × 4–7 cm, leathery, adaxially oily when young and dry, base acute to broadly cuneate, margin entire, apex acuminate; secondary veins 8–12 on each side of midvein, adaxially impressed; tertiary veins abaxially inconspicuous to very slender. Male inflorescences axillary or rarely paniculate, to 15 cm. Female or androgynous inflorescences to 30 cm; cupules in clusters of 5–7. Cupule globose to slightly depressed, 1.5–2 cm in diam., completely enclosing nut, apically with a short, convex nipple, wall 0.5–1 mm thick; bracts imbricate, triangular, subulate, appressed, with tawny, lamellate, waxy scalelike trichomes. Nut subglobose, 1.3–1.8 cm, 1.3–1.8 cm in diam., sparsely covered with appressed minute hairs especially at apex, wall ca. 0.5 mm thick; scar covering ca. 1/3 of nut, convex. Fl. Aug–Sep, fr. Aug–Sep of following year.

Mixed mesophytic forests, usually on dry slopes; 1500–2700 m. SW Sichuan, S to SW Yunnan [Laos, N Thailand].

Possibly conspecific with the Vietnamese *Lithocarpus ollus* (Kurz) A. Camus, which name has priority but is based on a fruiting specimen only. More material is needed to confirm this synonymy.

20. *Lithocarpus talangensis* C. C. Huang & Y. T. Chang, Guihaia 8: 21. 1988.

石屏柯 shi ping ke

Lithocarpus dealbatus (J. D. Hooker & Thomson ex Miquel) Rehder var. *yunnanensis* A. Camus.

Trees 15–25 m tall; branchlets of current year and leaf blades abaxially densely pubescent. Branchlets of last-

year growth glabrescent, conspicuously lenticellate. Petiole 1–1.5 cm; leaf blade oblong, 12–20 × 4–7 cm, leathery, abaxially covered with dark gray, minute, waxy scalelike trichomes, base cuneate, margin entire, apex shortly acuminate; midvein slightly raised and pilose; secondary veins 10–14 on each side of midvein, adaxially impressed; tertiary veins abaxially ± conspicuous. Male inflorescences paniculate, to 27 cm; rachis pubescent. Female inflorescences 2–4 congested above middle of branches, 5–15 cm; cupules in clusters of ca. 3. Infructescence rachis 5–8 mm thick. Cupule turbinate, 2–2.4 × 1.8–2.6 cm, broadest slightly apical from middle, enclosing more than 1/2 of nut; bracts triangular to rhomboid, from base to middle of cupule fused with wall, grayish puberulent and with waxy scalelike trichomes. Nut subglobose, 1.5–1.8 × 1.6–2.6 cm, with appressed minute hairs, apex flat or concave; scar covering 1/2–2/3 of nut, convex. Fl. May–Jun, fr. Oct–Nov of following year.

• Broad-leaved evergreen forests; 2000–2400 m. S Yunnan.

21. *Lithocarpus truncatus* (King ex J. D. Hooker) Rehder & E. H. Wilson in Sargent, Pl. Wilson. 3: 207. 1916.

截果柯 jie guo ke

Trees to 30 m tall. Branchlets of last year growth lenticellate; lenticels yellowish gray, ± raised. Petiole 1–1.5 cm, basally dark brown to blackish when dry; leaf blade narrowly oblong to lanceolate, 10–25 × 3–7 cm, thinly leathery, concolorous, abaxially glaucous and with adherent waxy scalelike trichomes, adaxial surface of young leaves glossy when dry, base cuneate to narrowly so, margin entire, apex narrowly attenuate with apiculate-caudate tip; secondary veins 11–15 on each side of midvein; tertiary veins abaxially visible. Male inflorescences solitary in leaf axils or congested at apex of branches; rachis pubescent. Female inflorescences solitary or congested; cupules in clusters of 3–5(–7). Infructescence rachis base 4–7 mm thick. Cupule turbinate to obconic, 2.5–3.5 × 2.5–3 cm, enclosing most of nut, apically usually flat; bracts conspicuous, imbricate and triangular or united into interrupted rings, appressed, from base to middle of cupule, densely tawny puberulent. Nut subglobose, ca. 3 × 2.6 cm, with tawny appressed minute hairs, apex ± flat or slightly convex, wall ca. 1 mm thick on sides and ca. 1.5 mm thick near apex; scar covering 2/3–4/5 of nut, convex. Fl. Jun–Aug, fr. Aug–Oct of following year.

Broad-leaved evergreen forests, common on sides of valleys; 700–2200 m. SE Xizang, S Yunnan [NE India, NE Myanmar, N Thailand, N Vietnam].

- 1a. Cupules to 3.5 cm 21a. var. *truncatus*
- 1b. Cupules ca. 2.5 cm 21b. var. *baviensis*

21a. *Lithocarpus truncatus* var. *truncatus*

截果柯(原变种) jie guo ke (yuan bian zhong)

Quercus truncata King ex J. D. Hooker, Fl. Brit. India 5: 618. 1890; *Lithocarpus cathayanus* (Seemen) Rehder; *L. grandicupulus* Y. C. Hsu & al.; *Pasania truncata* (King ex J. D. Hooker) Schottky; *Q. cathayana* Seemen.

Cupule to 3.5 cm; bracts imbricate, triangular, squamose.

Broad-leaved evergreen forests, common on sides of valleys; 700–2200 m. SE Xizang, SW Yunnan [NE India, NE Myanmar, N Thailand, N Vietnam].

21b. *Lithocarpus truncatus* var. *baviensis* (Drake) A. Camus, Chênes, Atlas 3: 63. 1948.

小截果柯 xiao jie guo ke

Quercus baviensis Drake, J. Bot. (Morot) 4: 150. 1890; *Pasania baviensis* (Drake) Schottky; *Synaedrys baviensis* (Drake) Koidzumi.

Cupule ca. 2.5 cm; bracts triangular, except for subulate tip, fused with wall of cupule or united into concentric rings near cupule apex.

Broad-leaved evergreen forests; ca. 1500 m. S to SE Yunnan [N Vietnam].

22. *Lithocarpus cleistocarpus* (Seemen) Rehder & E. H. Wilson in Sargent, Pl. Wilson. 3: 205. 1916.

包果柯 bao guo ke

Trees 5–10 m tall. Branchlets of current year sulcate. Petiole 1–2.5 cm; leaf blade ovate-elliptic to oblong, 9–16 × 3–5 cm, leathery, abaxially with adherent, waxy scalelike trichomes, base attenuate and decurrent on petiole, margin entire, apex acuminate; secondary veins 7–10 on each side of midvein, abruptly curving apically, obscure near margin; tertiary veins abaxially slender, evident, laxly spaced. Male inflorescences solitary in a panicle cluster; rachis with lamellate waxy scalelike trichomes. Female and androgynous inflorescences with cupules in clusters of 3–5 scattered on rachis. Infructescences 7–10 cm; rachis 4–5 mm thick. Cupule subglobose or turbinate, 2–2.5 cm in diam., enclosing 2/3 to most of nut, apically flat, wall ca. 1.5 mm thick at middle; basal bracts fused to wall and reduced to scars, apically triangular, appressed, and covered with tawny or grayish brown, minute, waxy scalelike trichomes. Nut turbinate, sparsely puberulent or glabrous, apex slightly concave, ± flat, or arcuate-convex; scar covering 1/2–3/4 of nut, convex. Fl. Jun–Oct, fr. summer to winter of following year.

• Broad-leaved evergreen forests, mixed mesophytic forests; 1000–2400 m. Anhui, Fujian, N Guizhou, W Hubei, Hunan, Jiangxi, S Shaanxi, Sichuan, NE Yunnan, Zhejiang.

1a. Young leaves usually with oily resins when dry; nuts hairy 22a. var. *cleistocarpus*

1b. Young leaves without oily resins when dry; nuts glabrous 22b. var. *omeiensis*

22a. *Lithocarpus cleistocarpus* var. *cleistocarpus*

包果柯(原变种) bao guo ke (yuan bian zhong)

Quercus cleistocarpa Seemen, Bot. Jahrb. Syst. 23(Beibl. 57): 52. 1897; *Lithocarpus kiangsiensis* Hu &

F. H. Chen; *Pasania cleistocarpa* (Seemen) Schottky; *Q. fragifera* Franchet; *Q. wilsonii* Seemen; *Synaedrys cleistocarpa* (Seemen) Koidzumi.

Young leaves usually with oily resin when dry. Cupule globose, enclosing most of nut, wall with tawny scalelike trichomes. Nut hairy; scar covering more than 2/3 of nut. Fl. Jun–Oct, fr. autumn and winter of following year.

• Broad-leaved evergreen forests; mixed mesophytic forests; 1000–1900 m. Anhui, Fujian, NE Guizhou, W Hubei, Hunan, Jiangxi, S Shaanxi, E Sichuan, Zhejiang.

22b. *Lithocarpus cleistocarpus* var. *omeiensis* W. P. Fang, Ic. Pl. Omeien. 2(1): t. 117a. 1945.

峨眉包果柯 e mei bao guo ke

Lithocarpus cleistocarpus (Seemen) Rehder & E. H. Wilson var. *fangianus* A. Camus.

Young leaves without oily resins when dry. Petiole 1–2 cm or rarely longer. Cupule turbinate, enclosing 2/3–4/5 of nut, wall with grayish brown scalelike trichomes. Nut glabrous; scar covering 1/2 to essentially all of nut. Fl. Jun–Jul, fr. Aug–Sep of following year.

• Mixed mesophytic forests; 1500–2400 m. NW Guizhou, W Sichuan (Emei Shan), NE Yunnan.

23. *Lithocarpus tenuilimbus* H. T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 31. 1960.

薄叶柯 bao ye ke

Trees to 25 m tall; apex of young branchlets, petioles, and young leaf blades sparsely covered with early glabrescent long hairs. Branchlets of last-year growth sparsely lenticellate; lenticels conspicuously raised. Petiole 1–2 cm; leaf blade oblong to elliptic-lanceolate, 12–20 × 4–7 cm, rigidly papery, abaxially ± glaucous when dry and with lamellate, waxy scalelike trichomes and usually sparsely pilose from base to middle of midvein when young, base cuneate and usually asymmetric, margin entire, apex acute; secondary veins 12–16 on each side of midvein, abruptly curving apically and gradually obscured; tertiary veins abaxially visible, subparallel. Male inflorescences solitary in axils of leaves or panicle; rachis densely tawny puberulent. Female inflorescence with cupules in clusters of 3–5. Infructescence rachis 8–10 mm thick, lenticellate. Cupule turbinate, 2–3 × 2–2.8 cm, broadest apically, usually enclosing most of nut, outside pubescent when young, basally narrowed into a stalk, wall 2–3.5 mm thick; bracts basally enclosing and ± fused with cupule, apically triangular and thick. Nut subglobose, 1.5–2.2 cm in diam., with appressed minute hairs, apex ± flat, wall 1–2 mm thick on sides and ca. 3 mm near apex; scar covering 3/4–5/6 of nut, convex. Fl. May–Jun, fr. Sep–Oct of following year.

Broad-leaved evergreen forests, 700–1200 m. Guangdong, S Guangxi, SE Yunnan [NE Vietnam].

24. *Lithocarpus tabularis* Y. C. Hsu & H. W. Jen, Acta Phytotax. Sin. 14(2): 83. 1976.

平头柯 ping tou ke

Trees to 30 m tall; branchlets and petioles sparsely covered with brownish early glabrescent long hairs when young. Branchlets of current year and petioles dark brown when dry; branchlets of last-year growth lenticellate; lenticels raised. Petiole 3–4 cm; leaf blade oblong, 15–25 × 6–8 cm, leathery, adaxially with dense, tawny, puberulent scalelike trichomes, base cuneate and decurrent on petiole, margin entire, apex acuminate to acute; secondary veins 8–14 on each side of midvein. Male inflorescences axillary, solitary. Female inflorescences 8–10 cm, sometimes androgynous and to 16 cm; cupules in clusters of ca. 3. Infructescences 6–10 cm; rachis 7–9 mm thick, lenticellate. Cupule broadly turbinate, 1.5–2 × 2.5–2.8 cm, broadest apically, enclosing most of nut, wall 2–5 mm thick; bracts triangular, thickened, usually ridged in center. Nut ± depressed globose, 1.2–1.5 × 1–2 cm, with appressed minute hairs, apex ± flat; scar covering 2/3–3/4 of nut, convex. Fl. Apr–May, fr. Oct–Nov of following year.

• Broad-leaved evergreen forests in moist places; ca. 1500 m. SE Yunnan (Pingbian Miaozu Zizhixian).

25. *Lithocarpus crassifolius* A. Camus, Bull. Soc. Bot. France 86: 155. 1939.

硬叶柯 ying ye ke

Lithocarpus pachyphylloides Y. C. Hsu & al.

Trees to 10 m tall. Branchlets dark brown when dry, lenticellate. Petiole 2–5 mm; leaf blade broadly elliptic to obovate, 5–9 × 3–5 cm, rigidly leathery, yellowish brown when dry, abaxially covered with appressed hairs on midvein and with waxy scalelike trichomes when young, base broadly cuneate, margin entire and slightly recurved, apex rounded, obtuse, or rarely acute; secondary veins 6–9 on each side of midvein, adaxially slightly impressed, sometimes ramified near margin; tertiary veins abaxially slender, evident to inconspicuous. Infructescences 3–5 cm; rachis 4–6 mm thick, glabrous, lenticellate; cupules in clusters of ca. 3. Cupule cupular, 0.8–1.2 × 1.5–2.2 cm, enclosing 1/3–1/2 of nut, wall ca. 2 mm thick; bracts imbricate, triangular, appressed, with loose, rust-colored, waxy scalelike trichomes. Nut depressed, 1–1.2 × 1.5–1.8 cm, glabrous; scar covering 1/4–1/3 of nut, convex but margins ± impressed. Fr. Aug.

Broad-leaved evergreen forests; ca. 2700 m. S Yunnan [N Laos, Vietnam].

26. *Lithocarpus pachyphyllus* (Kurz) Rehder, J. Arnold Arbor. 1: 129. 1919.

厚叶柯 hou ye ke

Trees to 25 m tall. Young branchlets covered with lamellate, rust-colored, waxy scalelike trichomes, sulcate. Petiole 1.2–1.5 cm; leaf blade elliptic to ovate-elliptic, 10–20 × 4–7 cm, thinly or thickly leathery, abaxially dark red when young, glaucous with age, and with minute lamellate waxy scalelike trichomes, base broadly cuneate and ± decurrent on petiole, margin entire and usually emarginate, apex caudate with tip blunt to rounded; secondary veins 9–15 on each side of

midvein, adaxially impressed, abruptly curving apically, fusing near margin. Male inflorescences solitary in axils of leaves or terminal panicles. Female inflorescences in clusters of 2 or 3, to 15 cm; cupules in clusters of 3–5. Infructescences 3–6 mm. Cupule cupular, 0.5–2.5 × 1.5–4.6 cm, variable in size, enclosing most of nut or sometimes only 1/3–1/2 when mature, wall 2–4 mm thick; bracts fused with cupule and reduced to scars or triangular, irregularly multilateral, with rust-colored, lamellate, waxy scalelike trichomes. Nut depressed globose, 1.2–2 × 1.5–3 cm, glabrous, apex rounded to slightly pointed, wall 1–1.2 mm thick; scar 1.2–1.5 cm in diam., convex with impressed margin. Fl. May–Jun, fr. Aug–Sep of following year.

Broad-leaved evergreen and mixed forests, mixed mesophytic forests; 800–2000(–3200) m. SE Xizang, SW Yunnan [Bhutan, NE India, NE Myanmar, Nepal, Sikkim].

The two varieties are not very distinct and could be treated as a single species.

- 1a. Leaf blade thinly leathery; scar confined to nut base 26a. var. *pachyphyllus*
1b. Leaf blade thickly leathery; scar covering 1/3–1/2 of nut 26b. var. *fruticosus*

26a. *Lithocarpus pachyphyllus* var. *pachyphyllus*

厚叶柯(原变种) hou ye ke (yuan bian zhong)

Quercus pachyphylla Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 44: 197. 1875; *Lithocarpus woon-youngii* Hu; *Pasania pachyphylla* (Kurz) Schottky; *Synaedrya pachyphylla* (Kurz) Koidzumi.

Leaf blade thinly leathery. Cupule 1.5–4.6 cm in diam., enclosing most of nut when young but only 1/3–1/2 when mature; bracts fused with cupule and reduced to scars or triangular, irregularly multilateral. Scar only at base of nut.

Broad-leaved evergreen and mixed forests; 800–1000(–3200) m. SE Xizang, SW Yunnan [Bhutan, NE India, NE Myanmar, Nepal, Sikkim].

In Yunnan, this variety is found in mixed mesophytic forests from 2400–3200 m.

26b. *Lithocarpus pachyphyllus* var. *fruticosus* (G. Watt ex King) A. Camus, Chênes 3: 624. 1953.

顺宁厚叶柯 shun ning hou ye ke

Quercus pachyphylla Kurz var. *fruticosa* G. Watt ex King, Ann. Roy. Bot. Gard. (Calcutta) 2: 45. 1889; *Lithocarpus dulongensis* H. Li & Y. C. Hsu; *L. hypoviridis* Y. C. Hsu & al.; *L. variolosus* (Franchet) Chun subsp. *shunningensis* A. Camus.

Leaf blade thickly leathery. Cupule 2.2–2.8 cm in diam., enclosing most of nut; bracts united into 3–5 continuous or interrupted rings, basal ones almost completely fused with cupule. Scar covering 1/3–1/2 of nut.

Mixed mesophytic forests; ca. 2000 m. SW Yunnan [NE Myanmar].

27. *Lithocarpus apricus* C. C. Huang & Y. T. Chang, Guihaia 8: 40. 1988.

向阳柯 *xiang yang ke*

Trees 2–5 m tall. Branchlets grayish puberulent at apex, blackish when dry, densely lenticellate; lenticels gray. Petiole 1.5–2.5 cm; leaf blade ovate to elliptic, 8–15 × 3.5–6 cm, subleathery, with reddish brown, lamellate, glaucous, pulverulous scalelike glands when young, base acute, margin entire, apex narrowly acuminate to caudate; secondary veins 8–12 on each side of midvein, adaxially slightly impressed, usually fusing near margin; tertiary veins abaxially inconspicuous. Male inflorescences racemose or rarely paniculate, 8–12 cm. Infructescences 5–12 cm; rachis 6–12 mm thick; cupules in clusters of ca. 3. Cupule cupular, 0.6–1.2 × 1.4–2.2 cm, enclosing 1/2 or slightly more of nut, wall 2–4 mm thick; bracts imbricate, broadly triangular, appressed, with reddish, lamellate scalelike glands and short hairs. Nut depressed globose, 1.1–1.6 × 1.4–2.2 cm, usually with longitudinal fissures, glabrous, apex ± flat, wall ca. 0.5 mm thick; scar at basal part of nut, 1.2–1.6 cm in diam., slightly convex. Fr. Aug–Sep.

• Sunny dry slopes, usually associated with shrubs, bamboo, and ferns; ca. 2500 m. C Yunnan (Jingdong Xian, Xinping Yizu Daizu Zizhixian).

28. *Lithocarpus variolosus* (Franchet) Chun, J. Arnold Arbor. 9: 153. 1928.

麻子壳柯 *ma zi qiao ke*

Quercus variolosa Franchet, J. Bot. (Morot) 13: 156. 1899; *Lithocarpus chienchuanensis* Hu; *L. hui* A. Camus; *L. leucostachyus* A. Camus; *Pasania hui* (A. Camus) Hu; *P. variolosa* (Franchet) Schottky; *Synaedrys variolosa* (Franchet) Koidzumi.

Trees to 20 m tall. Branchlets blackish when dry, sparsely lenticellate; lenticels grayish brown. Petiole 1(–1.5) cm; leaf blade broadly ovate, ovate-elliptic, or lanceolate, 6–15(–24) × 3–5(–7) cm, leathery to thickly papery, abaxially with thick adherent, waxy scalelike trichomes and ± glaucous when dry, base subrounded to broadly cuneate, margin entire, apex acuminate and usually falcate; secondary veins 6–10 on each side of midvein, adaxially ± impressed, fusing near margin; tertiary veins abaxially inconspicuous to slender, evident. Male inflorescences solitary in axils of leaves or paniculate. Female inflorescences usually terminal clusters, 3–6(–10) cm; rachis stout, usually twisted, with tawny scalelike trichomes; cupules in clusters of ca. 3. Infructescences 4–7 cm; rachis ca. 3 mm thick. Cupule cupular, 0.6–1.8 × 1.5–2.5 cm, usually broadest slightly apically from middle, enclosing 1/2 to most of nut, wall 1–1.5 mm thick; bracts reddish to dark grayish brown, basal bracts usually united in continuous or interrupted rings and obscurely broadly ovate or multilateral, apically triangular and small. Nut depressed globose, 1–2 × 1.2–2.6 cm, glabrous, wall ca. 0.5 mm thick; scar covering 1/5–1/3(–1/2) of nut, convex but concave at margin. Fl. May–Jul, fr. Jul–Sep of following year.

Mixed mesophytic forests, usually in association with *Picea*, *Abies*, and subalpine *Quercus*; 2500–3000 m. SW Sichuan, NW Yunnan [Vietnam]

29. *Lithocarpus dealbatus* (J. D. Hooker & Thomson ex Miquel) Rehder, J. Arnold Arbor. 1: 124. 1919.

白柯 *bai ke*

Quercus dealbata J. D. Hooker & Thomson ex Miquel, Ann. Mus. Bot. Lugduno-Batavi 1: 107. 1863; *Lithocarpus tapintzensis* A. Camus; *L. viridis* (Schottky) Rehder; *Pasania dealbata* (J. D. Hooker & Thomson ex Miquel) Oersted; *P. viridis* Schottky p.p. (syntype A. Henry 9636); *P. yenshanensis* Hu; *Q. thalassica* Hance var. *vestita* Franchet; *Synaedrys dealbata* (J. D. Hooker & Thomson ex Miquel) Koidzumi.

Trees rarely to 20 m tall; bud scales, branchlets, petioles, leaf blades abaxially, rachis of inflorescences, and scales of cupule tawny tomentose with short hairs. Petiole 1–2 cm; leaf blade ovate, ovate-elliptic, or lanceolate, 7–14 × 2–5 cm, thickly papery to leathery, concolorous or abaxially grayish and with waxy scale, base cuneate, margin entire or rarely apically shallowly undulate, apex acuminate to acute; midvein adaxially slightly raised and usually sparsely pubescent; secondary veins (8–)10–13 on each side of midvein; tertiary veins abaxially conspicuous, ± parallel. Male inflorescences clustered at apex of branches, rarely to 15 cm. Female inflorescences sometimes androgynous, rarely to 20 cm; cupules in clusters of 3(–5). Infructescences usually 5–8 cm. Cupule cupular, 0.8–1.4 × 1–1.8 cm, enclosing 1/2 to most of nut; bracts imbricate, triangular, appressed or a few spreading. Nut depressed globose to subglobose, slightly smaller than cupule, apex rounded, ± flat, or rarely convex, wall ca. 1 mm thick; scar covering ca. 1/3 (–1/2) of nut, convex. Fl. Aug–Oct, fr. Aug–Oct of following year.

Mixed mesophytic forests, usually in association with *Pinus yunnanensis*, *Picea*, and other species of Fagaceae; 1000–2800 m. Guizhou, SW Sichuan, SE Xizang, Yunnan [Bhutan, NE India, N Laos, NE Myanmar, N Thailand, Vietnam].

30. *Lithocarpus thomsonii* (Miquel) Rehder, J. Arnold Arbor. 1: 132. 1919.

潞西柯 *lu xi ke*

Quercus thomsonii Miquel, Ann. Mus. Bot. Lugduno-Batavi 1: 109. 1863; *Pasania thomsonii* (Miquel) Hickel & A. Camus; *Q. turbinata* Roxburgh (1832), not Blume (1825); *Synaedrys thomsonii* (Miquel) Koidzumi. Trees 8–10 m tall; branchlets, petioles, young leaf blades abaxially, and inflorescences densely covered with grayish, crisp minute hairs. Branches of last year dark brown to blackish when dry, glabrescent, lenticellate; lenticels gray. Petiole rarely longer than 1 cm; leaf blade ovate to broadly elliptic or sometimes obovate to obovate-elliptic, 9–20 × 4–6.5 cm, thickly papery, abaxially glaucous and with adherent, waxy scalelike trichomes, base acute to cuneate, margin

usually undulate, apex obtuse to acuminate; secondary veins 10–13 on each side of midvein, ramified near margin but rarely fusing; tertiary veins abaxially slender, evident. Male inflorescences solitary in axils of leaves, 5–10 cm. Female inflorescences 5–10 cm; cupules in clusters of ca. 3; young cupules depressed globose, apically flat. Infructescence ca. 10 cm. Cupule cupular, 1.5–1.8 cm in diam., outside and nut densely covered with grayish crisp minute hairs and scurfy scalelike trichomes. Nut 1.3–1.4 × 1.4–1.6 cm; scar covering ca. 1/3 of nut, convex. Fl. Jun–Aug, fr. Aug–Oct of following year.

Broad-leaved evergreen forests; 800–3000 m. SE Xizang (Médog Xian), S and W Yunnan [NE India, Myanmar, N Thailand, Vietnam].

31. *Lithocarpus laetus* Chun & C. C. Huang ex Y. C. Hsu & H. W. Jen, *Acta Phytotax. Sin.* 14(2): 83. 1976.

屏边柯 ping bian ke

Trees to 30 m tall. Branchlets of current year tawny pubescent. Petiole 1–1.5 cm; leaf blade oblong-lanceolate, 7–11 × 1.5–3 cm, subleathery, abaxially pubescent, glabrescent, and with lax, rust-colored scalelike trichomes, adaxially pubescent when young but glabrescent except for midvein with age, base broadly cuneate and sometimes asymmetric, margin entire, apex acuminate; secondary veins 13–16 on each side of midvein; tertiary veins abaxially not visible. Infructescence ca. 4 cm; cupules in clusters of ca. 3. Cupule obconic to cupular, 1–1.2 × 2–2.2 cm, enclosing ca. 2/3 of nut, wall 2–4 mm thick; bracts imbricate, triangular, appressed. Nut broadly conical, 1.8–2 × 1.6–1.8 cm, with appressed, rust-colored minute hairs, base broadest, gradually narrowed apically, apex pointed, wall 1–2 mm thick; scar covering ca. 1/3 of nut, convex but margin ± impressed. Fr. Oct.

• Broad-leaved evergreen forests; ca. 1700 m. SE Yunnan (Pingbian Miaozu Zizhixian).

32. *Lithocarpus cucullatus* C. C. Huang & Y. T. Chang, *Guihaia* 8: 23. 1988.

风兜柯 feng dou ke

Trees ca. 15 m tall; young branchlets and young leaf blades tawny tomentose. Branchlets of last-year growth blackish, obscurely lenticellate. Petiole 1–1.5 cm; leaf blade narrowly oblong to lanceolate, 6–11 × 1.5–3 cm, rigidly papery, adaxially with a thick layer of tawny, waxy scalelike trichomes and sometimes with minute wrinkles when dry, base cuneate, margin entire or sometimes shallowly undulate, apex acuminate; secondary veins 10–14 on each side of midvein; tertiary veins abaxially not visible or very slender, evident. Androgynous inflorescence to 18 cm; rachis densely tawny tomentose with short hairs. Female inflorescences 6–10 cm; cupules in clusters of ca. 3. Infructescences 4–5 cm. Cupule obconic, ca. 1.7 cm, enclosing most of nut, wall ca. 1.5 mm thick; basal bracts fused to wall and reduced to scars, apically

separate from wall by a subulate apex, appressed, and ovate-triangular, tawny puberulent and with waxy scalelike trichomes when young, glabrescent. Nut broadly conical, ca. 1.4 cm in diam., with appressed minute hairs, wall ca. 1 mm thick; scar covering ca. 1/3 of nut, convex. Fl. Jun–Jul, fr. Jul–Aug of following year.

• Broad-leaved evergreen forests; 700–1200 m. N Guangdong, Hunan.
33. *Lithocarpus chrysocomus* Chun & Tsiang, *J. Arnold Arbor.* 28: 321. 1947.

金毛柯 jin mao ke

Lithocarpus chrysocomus var. *zhangpingensis* Q. F. Zheng.

Trees to 20 m tall; branchlets of current year and rachis of inflorescences densely tawny puberulent and with scurfy scalelike trichomes. Petiole 1–2 cm; leaf blade ovate, oblong, or rarely lanceolate, (6–)8–15 × (1.5–)2.5–5.5 cm, rigidly leathery, abaxially densely covered with lax yellowish brown to reddish brown, scurfy scalelike trichomes, adaxially glabrous, base broadly cuneate and sometimes asymmetric, margin entire, apex acuminate to acute; secondary veins 9–13 on each side of midvein; tertiary veins abaxially not visible. Male inflorescences solitary in axils of leaves or in paniculate clusters, usually androgynous. Female inflorescences in clusters of ca. 3. Infructescences less than 5 cm; developed cupules 2–6. Cupule subglobose, 2–2.5 cm in diam., enclosing most of nut, wall 1–1.5 mm thick; bracts imbricate, triangular, puberulent and with rust-colored scalelike trichomes when young, apex subulate and spreading. Nut subglobose but broadest apically, 1.7–1.8 × 1.2–2 cm, densely covered with tawny, appressed minute hairs, wall ca. 1 mm thick; scar covering ca. 1/3 of nut, convex. Fl. Jun–Aug, fr. Aug–Oct of following year.

• Broad-leaved evergreen and mixed mesophytic forests, often a dominant species of broad-leaved evergreen forest; 600–1400 m. N Guangdong, NE Guangxi, S Hunan (Yizhang Xian).

34. *Lithocarpus lycoperdon* (Skan) A. Camus, *Rivière Sci.* 18: 41. 1931 [1932].

香菌柯 xiang jun ke

Quercus lycoperdon Skan in F. B. Forbes & Hemsley, *J. Linn. Soc., Bot.* 26: 518. 1899; *Lithocarpus elatus* (Hickel & A. Camus) A. Camus; *L. krempfii* (Hickel & A. Camus) A. Camus; *Pasanía elata* Hickel & A. Camus; *P. krempfii* Hickel & A. Camus; *P. lycoperdon* (Skan) Schottky; *Synaedrys lycoperdon* (Skan) Koidzumi.

Trees to 30 m tall. Branchlets of current year sulcate, dark brown when dry. Petiole 1.5–2 cm, dark brown to blackish when dry, base ± thickened; leaf blade oblong to sometimes ovate-elliptic, 10–15 × 4–6 cm, rigidly leathery, abaxially rust-colored to tawny pulverulent-scurfy, adaxially glabrous, base cuneate and decurrent on petiole, margin entire, apex acute to acuminate;

secondary veins 8–11 on each side of midvein, sometimes ramified near margin; tertiary veins abaxially not visible or very slender, evident. Male inflorescences in a panicle, rarely solitary in leaf axils. Female inflorescences sometimes androgynous, 8–20 cm; cupules in clusters of ca. 3. Infructescences usually less than 10 cm; rachis base 7–12 mm thick; lenticels yellowish brown. Cupule turbinate to cupular, 2–2.5 × 2.4–2.8 cm, broadest at middle, enclosing most of nut, wall 2–3 mm thick; bracts triangular-subulate, appressed, puberulent and scurfy. Nut depressed globose to subglobose, ca. 1.5 × 2 cm, appressed puberulent and scurfy, apex narrowed, wall 2–2.5 mm thick; scar covering ca. 1/3 of nut, convex. Fl. May–Jun, fr. Sep–Oct of following year.

Broad-leaved evergreen forests; 1000–1500 m. W Guangxi, SE Yunnan [Laos, N Vietnam].

35. *Lithocarpus paihengii* Chun & Tsiang, J. Arnold Arbor. 28: 322. 1947.

大叶苦柯 da ye ku ke

Trees to 15 m tall. Branches glabrous. Petiole 2–3 cm, stout, sometimes white farinose; leaf blade ovate-elliptic, oblong, or rarely obovate-elliptic, 15–25 × 4–9 cm, thickly leathery, abaxially tawny to reddish brown scurfy when young, adaxially dark brown to reddish brown, glabrous, and often glossy, base broadly cuneate and decurrent on petiole, margin entire, apex acuminate to shortly acute; secondary veins 8–13 on each side of midvein; tertiary veins abaxially not visible or very slender, evident. Male inflorescences solitary in axils of leaves or in a panicle, to 20 cm; rachis sparsely tawny pubescent. Androgynous inflorescences 7–13 cm, with a few male flowers at apex. Female inflorescence with cupules in clusters of ca. 3. Infructescences 6–10 cm; rachis 6–8 mm thick, lenticellate. Cupule globose to depressed globose, 2–2.8 cm in diam., enclosing most of nut, outside grayish scurfy, wall 1.5–2.5 mm thick; basal bracts obscure, sometimes united into concentric rings but with a subulate tip, apical ones triangular, appressed. Nut depressed globose to broadly conical, 1.2–2 × 1.4–2.4 cm, covered with tawny minute hairs; scar covering ca. 1/3 of nut, convex. Fl. May–Jun, fr. Oct–Nov of following year.

• Mixed mesophytic forests; 700–1600 m. S Fujian, Guangdong, Guangxi, S Hunan, S Jiangxi.

36. *Lithocarpus triqueter* (Hickel & A. Camus) A. Camus, Riviera Sci. 18: 42. 1932.

棱果柯 leng guo ke

Pasania triquetra Hickel & A. Camus, Ann. Sci. Nat., Bot., sér 10, 3: 400. 1921.

Trees tall; Petiole 2–2.5 cm; leaf blade narrowly oblong to oblanceolate-elliptic, 15–25 × 5–7 cm, thickly papery, leaf blades abaxially and rachis of inflorescences with lamellate, appressed, waxy scalelike trichomes, abaxially grayish brown, adaxially dark brown when dry, base cuneate and decurrent on petiole, margin entire, apex shortly acuminate; secondary veins 8–11 on

each side of midvein, curving apically, obscure near margin. Male inflorescences in a panicle, to 20 cm. Female inflorescences 8–10 cm; cupules in clusters of ca. 3. Infructescence rachis stout, base ca. 1 cm thick. Cupule subglobose, ± asymmetric, 2.2–2.6 cm in diam., enclosing nut; bracts imbricate, triangular, squamose, gray to light brown when dry, densely scurfy. Nut subglobose, 1.6–2.4 cm, depressed on 1 or 2 sides, obtusely ridged from middle to apex, wall ca. 1 mm thick; scar covering ca. 1/2 of nut, convex. Fl. Jun, fr. Sep–Oct of following year.

Broad-leaved evergreen forests; 600–1200 m. SE Yunnan [N Vietnam].

37. *Lithocarpus cinereus* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, Guihaia 8: 11. 1988.

炉灰柯 lu hui ke

Trees. Branches glabrous; branchlets of current year sulcate. Petiole 1–1.5 cm; leaf blade oblong to lanceolate, 8–11 × 2–3.5 cm, thickly leathery, abaxially grayish green, dark grayish brown when dry, and with waxy scalelike trichomes, adaxially glabrous, base cuneate, margin entire or obscurely undulate near apex and ± recurved, apex narrowly acuminate; secondary veins 11–15 on each side of midvein, adaxially ± impressed; tertiary veins abaxially not visible. Infructescences 8–10 cm; rachis 6–8 mm thick, basally lenticellate; lenticels brown; cupules in clusters of ca. 3 but only 1 developed. Cupule cupular, 1.6–2.2 × 2–2.5 cm, broadest slightly from middle to apex, enclosing ca. 2/3 of nut, basally narrowed, wall 2–4 mm thick; basal bracts fused to wall except for a subulate tip, triangular, with lax dark grayish brown waxy scalelike trichomes, apical ones smaller, imbricate. Nut broadly conical, 1.6–2 × 1.6–2 cm, densely covered with tawny appressed minute hairs, wall 1–1.5 mm; scar covering ca. 1/3 of nut, convex but margin impressed. Fr. Nov.

• Broad-leaved evergreen forests; ca. 1000 m. SW Guangxi, SE Yunnan.

38. *Lithocarpus uvariifolius* (Hance) Rehder, J. Arnold Arbor. 1: 132. 1919.

紫玉盘柯 zi yu pan ke

Trees 10–15 m tall or shrubs 1–4 m tall; young branchlets, petioles, and rachis of inflorescences densely with tawny to rust-colored, ± coarse long hairs. Branches with large and conspicuous bud scars. Petiole 1–3.5 cm; leaf blade 4–22 × 2–10 cm, leathery to thickly papery, concolorous, base subrounded, margin dentate to undulate near apex or entire, apex acute, shortly caudate, or rarely shortly acuminate; secondary veins 22–35 on each side of midvein, abaxially pilose, abruptly curving apically, fusing near margin; tertiary veins abaxially conspicuous, subparallel, pilose. Male inflorescences spicate, solitary in axils of leaves or clustered at apex of branchlets; rachis stout. Female flowers usually borne on base of male inflorescence rachis, in clusters of ca. 3 or sometimes solitary.

Infructescence with 1–4 developed cupules. Cupule cupular to subglobose, 2–3.5 × 3.5–5 cm, enclosing more than 1/2 of nut, outside puberulent and scurfy or rarely glabrescent, wall 2–5 mm thick; bracts narrowly oblong to lanceolate when young, rhomboid to multilateral with age. Nut subglobose, densely covered with appressed minute hairs, apex rounded, flat, or rarely concave, wall 4–8 mm thick; scar covering more than 1/2 of nut, convex. Fl. May–Jul, fr. Oct–Dec of following year.

• Broad-leaved evergreen forests or in association with *Castanopsis* and *Cyclobalanopsis* or *Pinus massoniana*, dry, hilly areas; 200–1000 m. Fujian, N to NE Guangdong, Guangxi.

1a. Trees; leaf blade 9–22 × 5–10 cm, apex rounded, obtuse, abruptly acute, or sometimes shortly caudate; secondary veins 25–35 on each side of midvein 38a. var. *uvariifolius*

1b. Shrubs or small trees; leaf blade 4–10 × 2–4.5 cm, apex acuminate; secondary veins 14–20 on each side of midvein 38b. var. *ellipticus*

38a. *Lithocarpus uvariifolius* var. *uvariifolius*

紫玉盘柯(原变种) *zi yu pan ke* (*yuan bian zhong*)

Quercus uvariifolia Hance, J. Bot 22: 227. 1884; *Pasania uvariifolia* (Hance) Schottky; *Synaedrys uvariifolia* (Hance) Koidzumi.

Trees 10–15 m tall. Leaf blade obovate, obovate-elliptic, or rarely elliptic, 9–22 × 5–10 cm, abaxially with 2–4-branched, stellate, short hairs, margin dentate to undulate near apex or rarely entire, apex rounded, obtuse, abruptly acute, or sometimes shortly caudate; secondary veins 25–35 on each side of midvein. Cupule apically 3.5–4.5 cm in diam.

• Broad-leaved evergreen forests or in association with *Castanopsis* and *Cyclobalanopsis* or *Pinus massoniana*; 200–800 m. SW Fujian, N to NE Guangdong, Guangxi.

38b. *Lithocarpus uvariifolius* var. *ellipticus* (F. P. Metcalf) C. C. Huang & Y. T. Chang, Guihaia 8: 16. 1988.

卵叶玉盘柯 *luan ye yu pan ke*

Lithocarpus ellipticus F. P. Metcalf, Lingnan Sci. J. 20: 218. 1942; *L. kwangtungensis* H. T. Chang.

Shrubs or small trees, 1–4 m tall. Leaf blade ovate, 4–10 × 2–4.5 cm, abaxially with short hairs, margin entire, apex acuminate. Cupule rarely over 3.5 cm in diam.

• Dry, hilly areas; 400–1000 m. C to S Fujian, NE Guangdong.

39. *Lithocarpus fordianus* (Hemsley) Chun, J. Arnold Arbor. 8: 21. 1927.

密脉柯 *mi mai ke*

Quercus fordiana Hemsley, Hooker's Icon. Pl. 27: t. 2664. 1901; *Synaedrys fordiana* (Hemsley) Koidzumi.

Trees usually less than 10 m tall; branchlets, leaf blades abaxially, and inflorescences rachis tawny pilose and with stellate hairs. Petiole 1–3 cm; leaf blade oblong to obovate-elliptic, 10–25 × 3–9 cm, thickly papery, concolorous, base cuneate and sometimes asymmetric, margin at least near apex remotely dentate, apex acute, caudate, or rarely acuminate; secondary veins (15–)20–28 on each side of midvein, basal ones fusing near margin, apical ones ending in teeth; tertiary veins abaxially slender, evident, subparallel. Inflorescences usually androgynous, 3–10 cm; male flower on distal 1/2. Female inflorescence cupules fewer than 10, in clusters of ca. 3 or sometimes solitary. Infructescence rachis ca. 5 mm thick. Cupule cupular, 2–3 × 2.5–3.5 cm, enclosing 2/3–3/4 of nut, wall ca. 1 mm thick; bracts triangular to rhomboid, center and margin ridged, tawny puberulent and scurfy or rarely glabrescent. Nut turbinate, ca. 2 × 3 cm, hairy, apex rounded or flat, wall 4–10 mm thick; scar covering more than 1/2 of nut, convex. Fl. May–Sep, fr. Aug–Oct of following year. Broad-leaved evergreen forests, frequent in moist sites; 700–1500 m. SW Guizhou, S Yunnan [Vietnam].

40. *Lithocarpus corneus* (Loureiro) Rehder in Bailey, Stand. Cycl. Hort. 3569. 1917.

烟斗柯 *yan dou ke*

Trees usually less than 15 m tall. Branchlets light tawny, dark gray, or silver-gray, glabrous or pubescent, sparsely lenticellate; lenticels raised. Leaves usually congested at apex of branches; petiole 0.5–4.5 cm; leaf blade (5–)10–15 × 2–4.5 cm, papery to leathery, concolorous, with ± translucent, minute (visible under hand lens) scalelike glands, base cuneate to subrounded and symmetric or oblique, margin dentate, shallowly undulate, or rarely entire, apex acuminate to acute; secondary veins 9–26 on each side of midvein, ending in teeth; tertiary veins abaxially slender, evident, subparallel. Male inflorescences often with female flowers borne at base of rachis; Female inflorescences less than 10 cm; cupules in clusters of ca. 3 or sometimes solitary. Infructescences 5–7; rachis 3–4 mm thick. Cupule cupular to subglobose, 2.2–4.5 × 2.5–5.5 cm, enclosing ca. 1/2 of nut, wall (1–)2–3 mm thick, woody, and basally thickened; bracts triangular to rhomboid, center and margin ridged or fused with cupule and ± united into concentric rings. Nut subglobose to turbinate, rarely glabrous, apex rounded, flat, or slightly concave, wall ± horny and usually thicker than wall of cupule; scar covering 1/2 to most of nut, convex. Cotyledons 4–8-lobed. Fl. almost all year around but mainly May–Jul, fr. maturing on 1-year-old branchlets.

Broad-leaved evergreen forests, frequent on sunny slopes and in dry places, coastal regions; below 1000 m. S Fujian, Guangdong.

Guangxi, S Guizhou, Hainan, S Hunan, Taiwan, EC and SE Yunnan [NE Vietnam].

A widespread and variable species. A critical review of the pattern of variation within *Lithocarpus corneus* may show that the acceptance of most of the varieties below is unjustified.

- 1a. Leaf blade abaxially hairy 40e. var. *hainanensis*
- 1b. Leaf blade glabrous or abaxially with short hairs only along midvein or at axils of secondary veins.
 - 2a. Bracts on cupule mostly reduced and often united into a few concentric rings, slightly convex 40b. var. *zonatus*
 - 2b. Bracts triangular to rhomboid, center and margin ridged and interweaved.
 - 3a. Cupules 2–5.5 cm in diam.
 - 4a. Leaf blade elliptic, obovate-oblong, or ovate; secondary veins less than 20 on each side of midvein 40a. var. *corneus*
 - 4b. Leaf blade narrowly oblong to oblanceolate; secondary veins 20–26 on each side of midvein 40c. var. *angustifolius*
 - 3b. Cupules to 2 cm in diam..
 - 5a. Leaf blade secondary veins flat or adaxially slightly impressed; fruit to 16 per infructescence 40d. *fructuosus*
 - 5b. Leaf blade secondary and tertiary veins adaxially conspicuously impressed; fruit ca. 5 per infructescence 40f. var. *rhytidophyllus*

40a. *Lithocarpus corneus* var. *corneus*

烟斗柯(原变种) *yan dou ke* (yuan bian zhong) *Quercus cornea* Loureiro, Fl. Cochinch. 2: 572. 1790; *Lithocarpus ellipticus* F. P. Metcalf var. *glabratus* F. P. Metcalf; *L. kodaihoensis* (Hayata) Hayata; *L. tsangii* A. Camus; *Pasania cornea* (Loureiro) Oersted; *Q. kodaihoensis* Hayata; *Synaedrys cornea* (Loureiro) Koidzumi.

Petiole 0.5–4 cm; leaf blade elliptic, obovate-oblong, or ovate, 4–20 × 1.5–7 cm, with ± translucent, minute (visible under hand lens) scalelike glands. Cupule 2.2–4.5 × 2.5–5.5 cm, enclosing ca. 1/2 of nut, wall woody and basally thickened; bracts triangular to rhomboid, center and margin ridged. Nut subglobose to turbinate, rarely glabrous, apex rounded, flat, or slightly concave, wall ± horny and usually thicker than wall of cupule; scar covering ca. 1/2 to most of nut.

Broad-leaved evergreen forests, frequent on sunny slopes and in dry places. S Fujian, Guangdong, Guangxi, S Guizhou, S Hunan, Taiwan, SE Yunnan [NE Vietnam].

40b. *Lithocarpus corneus* var. *zonatus* C. C. Huang & Y. T. Chang, Guihaia 8: 14. 1988.

环鳞烟斗柯 *huan lin yan dou ke*

Lithocarpus hemisphaericus (Drake) Barnett; *Pasania hemisphaerica* (Drake) Hickel & A. Camus; *Quercus hemisphaerica* Drake (1890) not W. Bartram ex Willdenow (1805); *Synaedrys hemisphaerica* (Drake) Koidzumi.

Petiole 2–4.5 cm; leaf blade lanceolate to narrowly oblong, variable in size, large blades ca. 20 × 6 cm, small blades ca. 7 × 2 cm, sparsely pubescent on midvein or sometimes abaxially at axils of veins. Cupule 3.5–4.5 × 4–5 cm. Nut with appressed minute hairs, glabrescent, apex flat but with center slightly impressed, wall rigidly horny and 2–4 × thicker than wall of cupule.

Guangdong, Guangxi [NE Vietnam].

40c. *Lithocarpus corneus* var. *angustifolius* C. C. Huang & Y. T. Chang, Guihaia 8: 15. 1988.

窄叶烟斗柯 *zhai ye yan dou ke*

Petiole 1.5–2 cm; leaf blade narrowly oblong to oblanceolate, 2.5–3.8 × 1–2.3 cm, abaxially with branched, short hairs when young, usually sparsely pilose on midvein, occasionally with tuft of hairs at axils of veins. Cupule 2–3 cm in diam. Nut hairy at apex, wall thicker than that of cupule.

• W Guangxi, SE Yunnan.

40d. *Lithocarpus corneus* var. *fructuosus* C. C. Huang & Y. T. Chang, Guihaia 8: 15. 1988.

多果烟斗柯 *duo guo yan dou ke*

Petiole 0.5–1.5 cm; leaf blade abaxially with tuft of hairs at axils of veins. Cupule 1.5–2.5 cm in diam. Nut rounded, 1.5–2 cm in diam., apex pointed, wall 2–4 mm thick and slightly thicker than wall of cupule.

• Guangxi.

40e. *Lithocarpus corneus* var. *hainanensis* (Merrill) C. C. Huang & Y. T. Chang, Guihaia 8: 14. 1988.

海南烟斗柯 *hai nan yan dou ke*

Quercus hainanensis Merrill, Philipp. J. Sci. 23: 239. 1923.

Petiole 1–2(–3.5) cm; leaf blade obovate, obovate-oblong, or rarely elliptic, abaxially sparsely covered with short, early glabrescent stellate hairs, sometimes short hairs remaining on midvein and secondary veins. Cupule apically flat or slightly convex, outside densely hairy. Nut wall much thicker than cupule wall.

• Coastal regions. S and SW Guangdong, Hainan.

40f. *Lithocarpus corneus* var. *rhytidophyllus* C. C. Huang & Y. T. Chang, Guihaia 8: 15. 1988.

皱叶烟斗柯 *zhou ye yan dou ke*

Petiole less than 1 cm; leaf blade adaxially bullate. Cupule less than 2 cm in diam. Nut convex at apex.

• Forests on dry slopes. EC Yunnan (Mile Xian).

41. *Lithocarpus pachylepis* A. Camus, Bull. Soc. Bot. France 82: 437. 1935.

厚鳞柯 *hou lin ke*

Quercus wangii Hu & W. C. Cheng.

Trees 10–20 m tall; branchlets of current year, petioles, and rachis of inflorescences covered with short stellate hairs. Petiole 1.5–2.5 cm; leaf blade obovate-oblong to oblong, 20–35 × 6–11 cm, rigidly papery, concolorous, abaxially covered with short, stellate hairs along veins and sometimes with tuft of hairs on axils of veins, base broadly cuneate, margin serrate-dentate, apex obtuse to acute; secondary veins 25–30 on each side of midvein, ending in teeth; tertiary veins abaxially conspicuous, subparallel. Male inflorescences solitary in axils of leaves or in a panicle. Female inflorescences 3–5 cm; cupules in clusters of ca. 3. Infructescence ca. 7 cm; rachis ca. 5 mm thick. Cupule turbinate when young, discoid when mature, 1.5–3 × 4.5–6 cm, covering base of nut, wall 7–9 mm thick and woody; bracts ovate-triangular to oblique rhomboid margin and midvein ridged, apex subulate and incurved. Nut broadly conical when young and densely tawny puberulent, depressed globose when mature, 1.5–2.5 × 4–6.5 cm, apex flat but slightly concave in center, wall horny and 7–10 mm thick; scar covering ca. 1/2 of nut, ± convex. Fl. Apr–Jun, fr. Oct–Dec of following year.

Broad-leaved evergreen forests, also on dry slopes; 900–1800 m. W Guangxi, SE Yunnan [N Vietnam].

42. *Lithocarpus attenuatus* (Skan) Rehder, J. Arnold Arbor. 1: 123. 1919.

尖叶柯 jian ye ke

Quercus attenuata Skan in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 506. 1899; *Pasania attenuata* (Skan) Schottky; *Synaedrys attenuata* (Skan) Koidzumi.

Trees 10–15 m tall. Branchlets of last-year growth white farinose. Petiole 1.5–3 cm; leaf blade ovate-elliptic to lanceolate, 7–13 × 2–4 cm, thinly leathery, abaxially glaucous when dry and with adherent, waxy scalelike trichomes, adaxially glabrous, base cuneate and decurrent on petiole, margin entire or sometimes undulate, apex narrowly acuminate; secondary veins 9–13 on each side of midvein, slender, evident; tertiary veins abaxially not visible or obscure. Male inflorescences axillary, paniculate or racemose, 10–14 cm; rachis with grayish, waxy scalelike trichomes. Female inflorescences racemose, 10–12 cm; rachis sulcate, with grayish, waxy scalelike trichomes; cupules often solitary, scattered. Cupule globose, 3–3.5 × 2.5–3 cm, completely enclosing nut, basally slightly narrowed into a stalk, wall less than 0.5 mm thick and crustaceous; basal bracts united into concentric rings, triangular, apical ones reduced to a subulate tip or a wartlike appendage, small and obscure. Nut subglobose, 2–2.5 × 1.8–2.8 cm, white farinose, base flat, apex slightly narrowed and obtuse, wall ca. 0.5 mm thick; scar 7–12 mm in diam., concave to 1–1.5 mm. Fl. Jun–Oct, fr. Jun–Oct of following year.

• Broad-leaved evergreen forests, in coastal mountains; below 1000 m. S Guangdong, SW Guangxi.

43. *Lithocarpus tubulosus* (Hickel & A. Camus) A. Camus, Rivière Sci. 18: 42. 1931 [1932].

壺嘴柯 hu zui ke

Pasania tubulosa Hickel & A. Camus, Ann. Sci. Nat., Bot., sér. 10, 3: 405. 1921; *Cyclopasania tubulosa* (Hickel & A. Camus) Nakai.

Trees ca. 15 m tall; branchlets, bud scales, and infructescences densely grayish brown tomentose. Petiole rarely to 1 cm, stout, hairy; leaf blade elliptic, 20–25 × 7–10 cm, both surfaces with simple and branched hairs but more densely so on midvein and secondary veins, base rounded, apex shortly caudate and falcate; secondary veins 12–15 on each side of midvein, abruptly curving near margin, apical ones often fusing; tertiary veins abaxially conspicuous, subparallel. Male inflorescences paniculate. Female and androgynous inflorescences 6–8 cm; rachis ca. 5 mm thick, tawny tomentose. Cupules solitary, scattered on rachis, ca. 3.5 × 2.5–3 cm, completely enclosing nut, apically abruptly narrowed and ± elongate, wall less than 1 mm thick; bracts clawlike, reflexed. Nut chestnut brown, depressed globose, 1.2–1.7 × 2–2.3 cm, with appressed minute hairs, apex shortly pointed, wall ca. 1 mm thick; scar 1–1.3 cm in diam., concave. Fl. Apr–May, fr. Sep–Oct.

Mixed mesophytic forests; ca. 1000 m. SE Yunnan [Laos, N Thailand, NE Vietnam].

44. *Lithocarpus echinotholus* (Hu) Chun & C. C. Huang ex Y. C. Hsu & H. W. Jen, Acta Phytotax. Sin. 14(2): 74. 1976.

刺壳柯 ci qiao ke

Pasania echinothola Hu, Bull. Fan Mem. Inst. Biol., Bot. 10: 96. 1940; *Lithocarpus echinocupula* Hu ex A. Camus; *L. hamatus* A. Camus.

Trees 10–20 m tall; young branchlets and leaf blades abaxially covered with adherent waxy scalelike trichomes. Petiole 1–1.5 cm; leaf blade elliptic to rarely obovate-elliptic, 15–35 × 5–11 cm, rigidly papery, brown to brownish gray when dry, base acute, margin entire, apex narrowly acuminate to acute; secondary veins 11–14 on each side of midvein, adaxially slightly impressed, abruptly curving apically near margin but not fusing; tertiary veins abaxially slender, evident or not visible. Male inflorescences axillary, 8–12 cm. Female inflorescences 10–15 cm; rachis slender, densely pubescent, sometimes with a few male flowers near apex; cupules solitary, scattered on rachis. Infructescence rachis 4–6 mm thick. Cupule depressed globose, 1–2 × 2–3 cm, completely enclosing nut, often apically split, wall less than 1 mm thick and crustaceous; bracts linear, curved, 3–5 mm, tawny appressed pubescent. Nut depressed globose, 1.2–1.5 × 2–2.8 cm, with tawny appressed ± glossy long hairs, wall ca. 1 mm thick; scar 1.5–1.8 cm in diam., concave. Fl. Mar, fr. Sep–Oct.

Broad-leaved evergreen forests; 200–1200 m. SE Yunnan [N Vietnam].

45. *Lithocarpus pseudoreinwardtii* A. Camus, Chênes, Atlas 3: 72. 1948.

单果柯 dan guo ke

Lithocarpus gagnepainianus A. Camus.

Trees ca. 20 m tall; branchlets of current year and young leaf blades brownish black and oily glossy when dry. Branches sulcate. Petiole 1–1.5 cm; leaf blade ovate to ovate-elliptic, 8–15 × 4–6 cm, papery, abaxially with waxy scalelike trichomes and glaucous when dry, adaxially glabrous, base broadly cuneate, margin entire, apex abruptly acute with a tip blunt to caudate; secondary veins 7–10 on each side of midvein; tertiary veins abaxially slender, evident, subparallel. Male inflorescences 10–15 cm. Female inflorescences to 20 cm; rachis and cupule stalks grayish scurfy; cupules solitary, rarely in clusters of 2, stalk 2–4 mm but 8–10 mm in fruit. Young cupules shortly tubular, concave in center, apex flat; mature cupules basin-shaped, 1–1.2 × 1.6–2.4 cm excluding stalk, enclosing more than 3/4 of nut, with ca. 8 concentric rings, tawny scurfy, wall ca. 1 mm thick. Nut depressed globose, ca. 1 × 1.4–1.8 cm, with tawny appressed minute hairs, base flat, apex rounded; scar ca. 1 cm in diam., concave. Fl. Mar–Jun, fr. Mar–Jun of following year.

Broad-leaved evergreen forests; ca. 1200 m. S Yunnan [Laos, C to NW Vietnam].

46. *Lithocarpus caudatilimbus* (Merrill) A. Camus, Notul. Syst. (Paris) 6: 185. 1938.

尾叶柯 wei ye ke

Quercus caudatilimba Merrill, Sunyatsenia 2: 212. 1935; *Pasania caudatilimba* (Merrill) Chun.

Trees 15–25 m tall. Young branchlets sulcate. Petiole 3–4 cm; leaf blade broadly ovate to suborbicular, 7–14 × 3–8 cm, rigidly papery, abaxially with adherent, waxy scalelike trichomes, adaxially glabrous, base broadly cuneate and decurrent on petiole, margin entire, apex abruptly acute, shortly caudate, or rarely acuminate; secondary veins 6–10 on each side of midvein; tertiary veins abaxially slender, evident or not visible. Male inflorescences in a panicle, 6–10 cm. Female inflorescences solitary or in pairs, terminal on branches; cupules stalked, often solitary, scattered on rachis. Infructescences 5–10 mm; rachis ca. 4 mm thick. Cupule subglobose, 2.5–3 × 2–2.5 cm including stalk, enclosing 1/2–3/4 of nut, wall (0.5–)1 mm thick and crustaceous; bracts triangular, wartlike, apical ones reduced to scars. Nut depressed globose, 1.4–1.8 × 1.8–2.3 cm, glabrous, base flat, wall ca. 1 mm thick; scar

1.2–1.4 cm in diam., concave. Fl. Oct–Dec, fr. Oct–Dec of following year.

• Broad-leaved evergreen forests; ca. 700 m. SW Guangdong (Yangchun Xian), Hainan.

47. *Lithocarpus shinsuiensis* Hayata & Kanehira in Hayata, Icon. Pl. Formosan. 10: 30. 1921.

浸水营柯 jin shui ying ke

Lithocarpus ternaticupulus (Hayata) Hayata var. *shinsuiensis* (Hayata & Kanehira) Nakai; *Pasania shinsuiensis* (Hayata & Kanehira) Nakai; *Synaedryx shinsuiensis* (Hayata & Kanehira) Kudo.

Trees. Branchlets grayish brown, densely lenticellate. Petiole 1–1.5 cm; leaf blade oblong-lanceolate, 8–18 × 2–5 cm, abaxially glaucous, base cuneate and decurrent on petiole, margin entire, apex caudate-acuminate; midvein raised on both surfaces; secondary veins 6–12 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescence with cupules in clusters of 1–3, usually only 1 developed. Cupule subglobose, ca. 1.8 × 2.2 cm, enclosing 1/2–2/3 of nut, basally narrowed into a stalk to 7 mm, wall thin and crustaceous; basal bracts imbricate or in concentric rings, squamose, tawny puberulent. Nut subglobose, ca. 2 cm in diam.; scar concave. Fl. Feb–Apr, fr. Oct–Dec of following year.

• Broad-leaved evergreen forests; 300–1000 m. S Taiwan.

48. *Lithocarpus longipedicellatus* (Hickel & A. Camus) A. Camus, Riviera Sci. 18: 41. 1931 [1932].

柄果柯 bing guo ke

Pasania longipedicellata Hickel & A. Camus, Bull. Mus. Natl. Hist. Nat. 34: 365. 1928; *Lithocarpus podocarpus* Chun.

Trees to 20 m tall. Branches glabrous. Petiole, 1–1.5 cm; leaf blade elliptic, ovate, or ovate-elliptic, 8–15 × 3–6 cm, subleathery, abaxially with adherent, waxy scalelike trichomes and glaucous when dry, adaxially glabrous, base broadly cuneate, margin entire or sometimes undulate, apex acuminate to acute with tip obtuse to rounded; secondary veins 9–14 on each side of midvein, abruptly curving apically near margin but usually not fusing; tertiary veins abaxially slender, evident or not visible. Male inflorescences in a panicle or solitary in axils of leaves; rachis light yellowish gray scurfy. Female inflorescence 3–5 mm; cupules solitary, scattered on rachis soon after anthesis. Infructescence rachis base 8–10 mm thick, thicker than branches. Cupule discoid, 1.2–1.5 cm in diam., enclosing basal part or rarely to middle of nut, wall less than 1 mm thick; bracts sometimes entirely or partly united into concentric rings, triangular, tiny but visible under lens, tawny scurfy. Nut depressed globose to subglobose, 1–1.4 × 1.2–2.2 cm, ± white glaucous, base flat, wall 0.5–

1 mm thick; scar 0.7–1.8 cm in diam., concave. Fl. Oct–Jan, Fl. Oct–Jan of following year.

Scattered in broad-leaved evergreen forests; below 1200 m. W Guangxi, Hainan, SE Yunnan [N Vietnam].

49. *Lithocarpus brachystachyus* Chun, J. Arnold Arbor. 28: 230. 1947.

短穗柯 duan sui ke

Trees 3–8 m tall; bud scales and young leaf blades often with brown ± translucent resin when dry. Branchlets dark brown to blackish when dry, glabrous, sparsely lenticellate. Petiole less than 1 cm; leaf blade ovate to ovate-elliptic, 3–7 × 1–3 cm, rigidly leathery, dark brown when dry, abaxially with grayish adherent waxy scalelike trichomes, adaxially glabrous, base sometimes asymmetric, margin entire, apex acute to caudate-acuminate with tip obtuse to rounded. Male inflorescences axillary, solitary, rarely in clusters of 2–4, 3–5 cm; rachis slender, 1–2 mm thick. Female inflorescences rarely over 5 cm; rachis grayish scurfy; cupules 3–10, solitary; cupule stalks ca. 1 mm, 4–7 mm in fruit. Cupule discoid, 2–5 mm × 1–1.5 cm, enclosing ca. 1/3 of nut; bracts ± united into concentric rings from base to middle of cupule, triangular, obscure. Nut depressed globose to conical, 1–1.4 × 1.2–1.6 cm, glabrous, base flat; scar 7–10 mm in diam., concave. Fl. Oct–Nov or Feb, fr. Aug–Oct of following year.

• Mixed mesophytic forests; 800–1000 m. SW Guangdong, Hainan (Changjiang Xian).

50. *Lithocarpus leucodermis* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, Guihaia 8: 18. 1988.

白枝柯 bai zhi ke

Trees to 25 m tall. Branches of last-year growth covered with a ± translucent, longitudinally splitting, thin waxy layer. Petiole 1–2 cm; leaf blade narrowly oblong, 14–20 cm, leathery, concolorous, glabrous, base cuneate, apex acuminate with tip obtuse; secondary veins 8–10 on each side of midvein, curving apically near margin, apical ones fusing. Inflorescences unknown. Fruit solitary, sessile; rachis 4–5 mm thick, grayish, glabrous or glabrescent. Cupule bowl-shaped, 5–8 mm × 1.8–2.5 cm, enclosing ca. 1/2 of nut, basally ± flat, wall less than 1 mm thick and crustaceous; bracts linear, 1–3 mm, ± curved. Nut depressed globose, 1.6–2 × 1.7–2.4 cm, densely covered with appressed, short hairs; scar 1–1.2 cm in diam., concave; stylopodium to 4 mm. Fr. Oct.

• Broad-leaved evergreen forests; ca. 1600 m. SE Yunnan (Pingbian Miaozu Zizhixian).

51. *Lithocarpus quercifolius* C. C. Huang & Y. T. Chang, Guihaia 8: 16. 1988.

栎叶柯 li ye ke

Trees 5–6 m tall. Branchlets of current year pubescent. Leaves usually congested at apex of branches; petiole 2–5 mm; leaf blade oblong to obovate-elliptic, 4–11 × 1–3 cm, rigidly papery, concolorous, abaxially usually with tuft of hairs in axils of veins, base rounded to

broadly cuneate, margin with a few acute teeth, apex acute; secondary veins 8–11 on each side of midvein, branched near margin with outer branch ending in a marginal tooth; tertiary veins conspicuous, slender. Male inflorescences ca. 5 cm. Female flowers solitary, scattered above middle of male inflorescence rachis; rachis tawny pubescent. Infructescences 2–3 cm; rachis ca. 2 mm thick. Cupule discoid, 2–5 mm × 2–2.5 cm, enclosing basal part of nut; bracts imbricate, lanceolate when young, rhomboid to broadly triangular when mature, appressed, midvein ridged. Nut depressed globose, 1.2–1.6 × 2–2.4 cm, covered with appressed minute hairs; scar 1.6–2 cm in diam., margin concave but center ± convex. Fl. Apr–Jun, fr. Sep–Oct.

• Secondary forests or scrub; ca. 600 m. Guangdong (Huiyang Xian), Jiangxi (Suichuan Xian).

52. *Lithocarpus konishii* (Hayata) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

油叶柯 you ye ke

Quercus konishii Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 201. 1908; *Pasania konishii* (Hayata) Schottky; *Q. cornea* Loureiro var. *konishii* (Hayata) Hayata; *Synaedrys konishii* (Hayata) Koidzumi.

Trees usually less than 5 m tall. Spring shoots glabrous, autumn shoots tawny pubescent. Petiole 0.5–1.5 cm; leaf blade ovate, obovate, elliptic, or obovate-elliptic, 4–9 × 1–4 cm, papery and slightly rigid, concolorous, abaxially with tufts of hairs at axils of veins, base cuneate, margin with 3–6 obtuse teeth, apex acute to caudate-acuminate; midvein puberulent adaxially; secondary veins 7–10 on each side of midvein, adaxially slightly impressed; tertiary veins slender, evident. Female flowers borne on basal part of androgynous inflorescences; rachis tawny tomentose; cupules 1 (or 2). Infructescences 2–3 cm; rachis 1.5–2 mm thick, lenticellate. Cupule discoid, 4–8 mm × 1.5–2.5 cm, enclosing basal part of nut, wall 1.5–2 mm thick; bracts imbricate, broadly triangular, covered with grayish brown, shortly tomentose hairs, midvein ridged. Nut depressed globose, 1–1.8 × 2–3 cm, glabrous, apex rounded or flat, wall 3–6 mm thick and horny; scar 1.3–2.4 cm in diam., margin impressed but center ± convex. Fl. Apr and Aug, fr. Jul–Oct of following year.

• Broad-leaved evergreen forests; 300–1600 m. E Hainan, C to S Taiwan.

53. *Lithocarpus nantoensis* (Hayata) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

南投柯 nan tou ke

Quercus nantoensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 293. 1911; *Pasania nantoensis* (Hayata) Schottky; *Synaedrys nantoensis* (Hayata) Koidzumi.

Trees to 15 m tall. Branchlets chestnut brown, glabrous, conspicuously lenticellate. Petiole usually less than 1 cm; leaf blade lanceolate to narrowly oblong, 7–14 × 2–

4.5 cm, subleathery, abaxially glaucous to light green and with adherent, waxy scalelike trichomes, base cuneate and decurrent on petiole, apex acuminate to caudate; midvein abaxially slender, evident and adaxially conspicuously raised; secondary veins 10–15 on each side of midvein. Male inflorescences arising near apex of branchlets of current year; rachis with scalelike glands, sparsely waxy. Female inflorescences 10–16 cm; cupules solitary, scattered, glabrous. Infructescence rachis ca. 3 mm thick. Cupule enclosing ca. 1/2 of nut when young; discoid when mature, 1.2–1.5 cm in diam., enclosing only basal part of nut, basally narrowed; bracts reduced and united into concentric rings, with tawny, waxy scalelike glands. Nut conical, 1–2 cm; scar 5–8 mm in diam., concave. Fl. Jun–Aug, fr. Oct–Dec of following year.

• Broad-leaved evergreen forests; 300–1500 m. C to S Taiwan.

54. *Lithocarpus iteaphyllus* (Hance) Rehder, J. Arnold Arbor. 1: 127. 1919.

鼠刺叶柯 *shu ci ye ke*

Quercus iteaphylla Hance, J. Bot. 22: 229. 1884; *Lithocarpus iteaphylloides* Chun; *Pasania iteaphylla* (Hance) Schottky; *Synaedrys iteaphylla* (Hance) Koidzumi.

Trees 5–10 m tall. Branchlets of current year conspicuously sulcate, dark reddish brown, glabrous. Petiole 5–8 mm, sometimes to 3 cm, base ± thickened; leaf blade narrowly oblong to lanceolate, 8–13 × 2.5–4.5 cm, thick to rigidly papery, base broadly cuneate and decurrent on petiole, margin entire, apex acuminate; midvein raised on both surfaces; secondary veins 6–10 on each side of midvein, slender, conspicuous on both surfaces; tertiary veins inconspicuous. Inflorescence solitary or congested at apex of branches of last-year growth, usually androgynous; rachis with early glabrescent, tawny minute hairs. Male flowers above middle of inflorescence, solitary, scattered on rachis. Infructescences 5–8 cm; rachis ca. 2 mm thick, lenticellate. Cupule bowl-shaped, 5–8 mm × 1–1.4 cm, enclosing 1/8–1/5 of nut, wall 0.5–1 mm thick with basal part woody; bracts reduced and united into 6–8 irregular concentric rings, with tawny, waxy scalelike glands and sparsely puberulent. Nut ellipsoid, 1–1.8 × 1–1.4 cm, glabrous, apex pointed to rounded, wall 0.2–0.5 mm thick; scar 5–6 mm in diam., concave. Fl. Apr–May, fr. Jul–Oct of following year.

• Stream banks, sunny slopes; ca. 500 m. Guangdong, Guangxi, S Hunan, S Jiangxi, Zhejiang.

55. *Lithocarpus elmerrillii* Chun, J. Arnold Arbor. 28: 232. 1947.

万宁柯 *wan ning ke*

Trees to 25 m tall. Branchlets of current year sulcate, glabrous, dark brown when dry. Petiole 2–2.5 cm; leaf blade oblong to rarely obovate-elliptic, 10–17 × 3–6 cm, thinly leathery, abaxially with adherent waxy scale and glaucous when dry, base attenuate and decurrent on petiole, margin entire, apex acuminate; secondary veins

9–12 on each side of midvein, abruptly curving apically; tertiary veins slender, evident. Female inflorescences rachis 6–7 mm thick; cupules solitary, scattered above middle of rachis. Cupule bowl-shaped, 0.6–1 × 1.7–2.5 cm, basally narrowed into a stalk, wall woody; basal bracts usually united into concentric rings, others imbricate, triangular, appressed, apical ones smaller. Nut subglobose to depressed globose, 2–2.5 × 2.5–3 cm, glabrous, apex pointed, wall to 2.5 mm thick; scar 1.4–1.6 cm in diam., concave. Fr. Sep–Oct.

• Broad-leaved evergreen forests; 500–800 m. Hainan (Baoting Xian).

56. *Lithocarpus dodonaeifolius* (Hayata) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

柳叶柯 *liu ye ke*

Quercus dodonaeifolia Hayata, Icon. Pl. Formosan. 3: 181. 1913; *Pasania dodonaeifolia* (Hayata) Hayata; *Synaedrys formosana* (Hayata) Koidzumi f. *dodonaeifolia* (Hayata) Kudo.

Trees ca. 10 m tall. Young shoots ± sulcate; branchlets of last year growth obscurely lenticellate. Petiole 4–8 mm, base ± thickened; leaf blade narrowly lanceolate to oblanceolate, 5–14 × 1–2 cm, rigidly leathery, base cuneate and decurrent on petiole, margin entire, apex obtuse, rounded, or acute and usually slightly recurved; secondary veins 8–12 on each side of midvein, abaxially inconspicuous, adaxially slightly impressed; tertiary veins not visible. Male inflorescences unknown. Infructescences 3–5 cm; rachis slender, 1.5–3 mm thick, conspicuously lenticellate. Cupules solitary, scattered on rachis, discoid, 3–6 mm × 1–1.4 cm, enclosing basal part of nut, wall thickly woody; bracts spirally arranged or basal ones united into concentric rings, triangular, small, appressed, tawny tomentose. Nut broadly conical, 1–1.5 × 1–1.4 cm, base flat, apex pointed; scar 7–10 mm in diam., concave. Fl. Feb–May, fr. Oct–Dec.

• Mixed mesophytic forests; 500–1500 m. S Taiwan.

57. *Lithocarpus formosanus* (Skan) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

台湾柯 *tai wan ke*

Quercus formosana Skan in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 513. 1899; *Pasania formosana* (Skan) Schottky; *Synaedrys formosana* (Skan) Koidzumi.

Trees tall. Young shoots ± sulcate, glabrous. Petiole 1–1.3 cm, base ± thickened; leaf blade elliptic to sometimes obovate-elliptic and ± recurved, 5–8 × 2–3 cm, thickly leathery, rigid and crustaceous when dry, abaxially glaucous, turning grayish brown when dry, and with adherent, waxy scalelike trichomes, adaxially glabrous, base cuneate and decurrent on petiole, margin entire, apex rounded; secondary veins 7–11 on each side of midvein, abaxially slightly raised or not; tertiary

veins not visible or very slender, evident. Male inflorescences congested at apex of branches, 3–6 cm. Female inflorescence with cupules solitary, scattered on rachis. Infructescence ca. 3 cm; rachis equaling branches in thickness. Cupule discoid, ca. 3 mm × 1.2 cm; bracts imbricate, triangular, small, appressed, grayish tomentose. Nut broadly conical, ca. 1.3 × 1.6 cm, glabrous, apex pointed; scar ca. 8 mm in diam., concave. Fl. Feb–Mar, fr. Sep–Nov.

• Mixed mesophytic forests; 100–500 m. S Taiwan.

58. *Lithocarpus pakhaensis* A. Camus, *Chênes*, Atlas 3: 65. 1948.

滇南柯 dian nan ke

Trees to 25 m tall; branchlets of current year and petioles dark brown to blackish and slightly white farinose when dry, glabrous. Petiole 1–1.5 cm; leaf blade lanceolate, 7–12 × 1.5–3 cm, thinly leathery, concolorous, adaxial surface of young leaves oily glossy when dry, base narrowly cuneate and decurrent on petiole, margin entire, apex narrowly acuminate; secondary veins 8–12 on each side of midvein; tertiary veins not visible. Female inflorescences rachis 4–6 mm thick, tomentose and with small, waxy scalelike trichomes; cupules mostly solitary, scattered on rachis, sometimes in clusters of ca. 3 near apex of rachis. Infructescence ca. 4 cm; rachis ca. 3 mm, thick; with 2–5 fruit. Cupule discoid, 0.8–1.2 × 1.5–2 cm, enclosing basal part of nut, basally abruptly narrowed, wall to 3 mm near base; basal bracts usually united into 3 or 4 concentric rings, triangular, lax and obscure, appressed. Nut conical, rarely depressed globose, 1.5–2 × 1.6–2 cm, glabrous, apex pointed, wall ca. 1 mm thick; scar 1–1.5 cm in diam., concave. Fl. Feb–Mar, fr. Sep–Oct of following year.

Dense forests in moist places; 1000–1400 m. SE Yunnan [N Vietnam].

59. *Lithocarpus yongfuensis* Q. F. Zheng, *Acta Phytotax. Sin.* 23: 149. 1985.

永福柯 yong fu ke

Trees to 16 m tall; bud scales, branchlets, and rachis of inflorescences with sparse and lax, waxy scalelike glands. Petiole ca. 1 cm; leaf blade elliptic to ovate-elliptic, 7–13 × 2–4 cm, thinly leathery, abaxially scurfy, base cuneate to acute, margin entire, apex acuminate; secondary veins 10–14 on each side of midvein, abaxially slightly raised, adaxially slightly impressed; tertiary veins not visible. Female and androgynous inflorescences sometimes congested at apex of branches, 5–15 cm; cupules solitary, scattered on rachis. Infructescences 5–10 cm; rachis base 3–5 mm thick. Cupule discoid, 1.5–1.8 cm in diam., covering basal part of nut, basally narrowed into an elongated stalk; bracts imbricate, triangular, appressed. Nut broadly conical, 1.6–1.8 × 2–2.2 cm, glabrous, base

flat, apex pointed; scar 0.7–1.9 cm in diam., concave. Fl. Jul–Aug, fr. Oct–Nov of following year.

• Mixed mesophytic forests; 800–900 m. Fujian (Zhangping Xian).

60. *Lithocarpus sphaerocarpus* (Hickel & A. Camus) A. Camus, *Riviera Sci.* 18: 42. 1931 [1932].

球壳柯 qiu qiao ke

Pasania sphaerocarpa Hickel & A. Camus, *Bull. Mus. Natl. Hist. Nat.* 29: 603. 1923.

Trees 10–20 m tall. Branchlets dark gray when dry, glabrous. Petiole 1.5–2 cm; leaf blade elliptic to ovate-elliptic, 12–20 × 4–7 cm, thickly leathery, abaxially glaucous and with adherent, waxy scalelike trichomes, adaxially glabrous and surface of young leaves oily glossy when dry, base cuneate and decurrent on petiole, margin entire, apex acuminate to acute; secondary veins 14–18 on each side of midvein; tertiary veins abaxially slender, evident to inconspicuous, subparallel. Male inflorescences in a panicle, sometimes solitary in axils of leaves. Female inflorescences 10–20 cm; cupules in clusters of (2 or)3, rarely solitary near base of rachis; stalk of cupule clusters 3–7 mm, with tiny triangular bracts. Infructescence rachis 7–12 mm thick. Cupule globose to ± depressed globose, 1.5–2 cm in diam., completely enclosing nut, outside grayish puberulent, wall ca. 0.5 mm thick and crustaceous; bracts triangular, small, lax. Nut depressed globose, 1.2–1.6 × 1.4–1.9 cm, densely tawny scurfy; scar 0.8–1.2 cm in diam., concave. Fl. Dec–Jan, fr. Sep–Oct of following year.

Broad-leaved evergreen forests; 600–1300 m. W Guangxi, S Yunnan [Vietnam].

61. *Lithocarpus magneinii* (Hickel & A. Camus) A. Camus, *Riviera Sci.* 18: 41. 1931 [1932].

黑家柯 hei jia ke

Pasania magneinii Hickel & A. Camus, *Ann. Sci. Nat., Bot., sér.* 10, 3: 405. 1921.

Trees 5–25 m tall. Young parts with oily resin when dry; branchlets and petioles drying blackish. Petiole 1–1.5 cm; leaf blade obovate-oblong to elliptic, 8–15 × 4–6 cm, papery, abaxially with waxy scalelike trichomes and glaucous when dry, base broadly cuneate, margin entire, apex abruptly acute with a blunt tip to caudate; secondary veins 7–10 on each side of midvein; tertiary veins abaxially slender, obscure, subparallel. Male inflorescences solitary in axils of leaves or in a panicle. Female inflorescences usually 6–10 cm; cupules in clusters of ca. 3, rarely solitary, scattered on basal part of rachis; stalk of cupule clusters 3–8 mm × 3–4 mm, to 7 mm thick in fruit. Infructescence rachis thicker than branches from which it arises, sparsely lenticellate; lenticels conspicuous. Cupule bowl-shaped, 1–1.5 × 1.6–2.2 cm, enclosing 2/3–4/5 of nut, with 6–8 linear concentric rings, wall 1.5–2.5 mm thick. Nut broadly conical to depressed globose, 1.2–1.6 × 1.8–2 cm, covered with tawny, appressed, silky minute hairs, wall

ca. 1.5 mm thick; scar 1.2–1.5 cm in diam., concave. Fl. Feb–Apr, fr. Feb–Apr of following year.

Broad-leaved evergreen forests; 700–1200 m. SE Yunnan [Laos, N Vietnam].

62. *Lithocarpus microspermus* A. Camus, Bull. Soc. Bot. France 81: 818. 1934 [1935].

小果柯 xiao guo ke

Pasania microsperma (A. Camus) Hu.

Trees 10–15 m tall. Branches and leaf blades. Petiole 1–1.5 cm; leaf blade oblong, 15–25 × 5–8 cm, abaxially with adherent waxy scalelike trichomes and ± glaucous when dry, adaxially glabrous, base broadly cuneate, margin entire, apex acute to acuminate; midvein raised adaxially; secondary veins 16–22 on each side of midvein; tertiary veins abaxially conspicuous, subparallel. Male inflorescences solitary in axils of leaves or 3–5 arranged in a panicle; rachis densely scurfy. Female inflorescence with cupules in clusters of 2 or 3. Infructescences 10–18 cm; rachis ca. 5 mm thick. Cupule shallowly bowl-shaped, 3–5 × 8–10 mm, enclosing 1/4–1/3 of nut, wall 0.2–0.5 mm thick; bracts inconspicuous, imbricate or united into rings at base of cupule, triangular. Nut depressed globose, 5–7 mm, rarely over 1 cm in diam., sparsely pulverulous, apex flat, wall 0.2–0.5 mm thick; scar 4–6 mm in diam., concave. Fl. Oct–Dec, fr. Oct–Dec of following year.

Broad-leaved evergreen forests; 800–1500 m. S Yunnan [Laos, N Vietnam].

63. *Lithocarpus pseudovestitus* A. Camus, Bull. Soc. Bot. France 86: 155. 1939.

毛果柯 mao guo ke

Trees to 25 m tall. Branches glabrous. Petiole rarely longer than 1 cm, leaf blade lanceolate to rarely oblong, 8–18 × 2–4 cm, thickly papery, abaxially gray and with a thick layer of waxy scalelike trichomes, adaxially glabrous, base cuneate and decurrent on petiole, margin entire, apex obtuse, subrounded, or rarely acute; secondary veins 9–14 on each side of midvein, adaxially sometimes slightly impressed, not fusing; tertiary veins abaxially not visible. Male inflorescences solitary in axils of leaves or in a panicle; rachis scurfy. Female inflorescences with cupules in clusters of 2 or 3, rarely solitary; base of cupule clusters narrowed, stalklike, to 5 mm. Infructescence rachis to 1 cm thick, sparsely lenticellate. Cupule discoid, 2–5 mm × 1–2 cm, covering base of nut, wall 0.2–0.5 mm thick; basal bracts united into concentric rings, small, tawny puberulent. Nut broadly conical, 1.2–1.5 × 1.6–2 cm, tawny puberulent, wall ca. 0.5 mm thick; scar 4–6 mm in diam., concave. Fl. Aug–Oct, fr. Aug–Oct of following year.

Broad-leaved evergreen forests in valleys; 200–900(–1500) m. SW Guangdong, SW Guangxi, Hainan, SE Yunnan [N Vietnam].

64. *Lithocarpus mekongensis* (A. Camus) C. C. Huang & Y. T. Chang, Guihaia 12: 2. 1992.

澜沧柯 lan cang ke

Lithocarpus microspermus A. Camus subsp. *mekongensis* A. Camus, Chênes, Atlas 3: 116. 1948.

Trees ca. 10 m tall. Petiole less than 1 cm; leaf blade elliptic to ovate-elliptic, 10–15 × 4–5 cm, papery, abaxially with waxy scalelike trichomes and glaucous when dry, adaxially glabrous, base cuneate, margin entire, apex acuminate; secondary veins 12–15 on each side of midvein, apical ones fusing near margin; tertiary veins abaxially slender, evident. Male inflorescences solitary, axillary, 8–15 cm; rachis scurfy, puberulent, or glabrous. Female inflorescences 8–15 cm; cupules of ca. 3, sometimes solitary. Infructescence rachis 5–6 mm thick, lenticellate; lenticels small. Cupule bowl-shaped, 3–5 mm × 1–1.2 cm, enclosing basal part of nut; bracts imbricate, triangular, small. Nut depressed globose, 5–8 mm × 1.1–1.4 cm, sparsely puberulent, apex ± flat or sometimes concave; scar ca. 6 mm in diam., concave. Fl. Oct–Dec, fr. Aug–Oct of following year.

Broad-leaved evergreen forests, frequent on dry slopes; ca. 1000 m. S Yunnan [Laos, Vietnam].

65. *Lithocarpus bacgiangensis* (Hickel & A. Camus) A. Camus, Riviera Sci. 18: 39. 1931 [1932].

茸果柯 rong guo ke

Pasania bacgiangensis Hickel & A. Camus, Ann. Sci.

Nat., Bot., sér. 10, 3: 396. 1921; *P. tomentosinus* Hu.

Trees 10–15 m tall. Branches glabrous, lenticellate.

Petiole rarely longer than 1 cm, leaf blade elliptic, ovate-elliptic, or occasionally ovate, 10–15 × 3–6 cm, papery, ± rigid, abaxially with adherent, waxy scalelike trichomes and glaucous when dry, adaxially glabrous, base broadly cuneate, margin entire, apex narrowly acuminate to acute; secondary veins 10–15 on each side of midvein; tertiary veins abaxially conspicuous. Male inflorescences solitary in axils of leaves or 3–5 arranged in a panicle; rachis densely scurfy. Female and androgynous inflorescences with cupules in cluster of 2 or 3. Infructescences 8–18 cm; rachis 6–8 mm thick. Cupule bowl-shaped, 0.5–1 × 1.2–2 cm, enclosing rarely 1/2 of nut, basally with a stalk 3–5 mm, wall to 2 mm and woody near base; bracts triangular, small, densely tawny scurfy. Nut depressed globose to conical, 1–2 × 1.2–2.5 cm, densely covered with tawny minute hairs, apex rounded to pointed; scar 0.8–1.2 cm in diam., concave. Fl. Dec–Mar, fr. Oct–Dec.

Broad-leaved evergreen forests; 200–1700 m. Guangxi, Hainan, SE Yunnan [N Vietnam].

66. *Lithocarpus farinulentus* (Hance) A. Camus, Riviera Sci. 18: 40. 1931 [1932].

易武柯 yi wu ke

Quercus farinulenta Hance, J. Bot. 13: 365. 1875; *Pasania farinulenta* (Hance) Hickel & A. Camus. Trees 6–12 m tall. Branches glabrous, light brown, ± oily when dry. Petiole ca. 1 cm; leaf blade broadly ovate to elliptic, 8–15 × 3–7 cm, thinly leathery, abaxially ± glaucous and with appressed, lamellate, waxy scalelike trichomes, adaxially glabrous, base broadly cuneate and decurrent on petiole, margin entire, apex obtuse to shortly acuminate; secondary veins 8–11 on each side of midvein, abruptly curving apically, obscure near margin; tertiary veins abaxially not visible or very slender, evident. Female inflorescences often with a few male flowers above middle of rachis, 8–22 cm; rachis 1.5–2.5 mm thick, glabrous or pulverulous; cupules in clusters of 2 or 3 but often solitary on basal part of rachis. Infructescences to 20 cm; rachis 3–4 mm thick. Cupule discoid, 3–5 × 8–10 mm, enclosing basal part of nut, basally with a stalk 3–4 × 3–4 mm, wall ca. 0.5 mm thick; bracts almost fused with cupule wall, basal ones united into 6–8 concentric rings, triangular, small. Nut broadly conical, 7–10 × 7–12 mm, glabrous, apex pointed, wall ca. 5 mm thick; scar 4–5 mm in diam., concave. Fl. Aug–Oct, fr. Oct–Nov of following year.

Broad-leaved evergreen forests in mountains; below 1000 m. S Yunnan [Cambodia, Thailand, Vietnam].

67. *Lithocarpus propinquus* C. C. Huang & Y. T. Chang, Guihaia 8: 19. 1988.

三柄果柯 san bing guo ke

Trees 10–15 m tall. Branches glabrous, dark brown when dry, lenticellate with age. Petiole 6–10 mm; leaf blade oblong, 10–15 × 3–4.5 cm, thinly leathery, abaxially with scurfy, waxy scalelike trichomes and ± glaucous, adaxially glabrous, base cuneate, margin entire, apex narrowly acuminate; secondary veins 10–13 on each side of midvein; tertiary veins abaxially slender, evident. Male inflorescences solitary in axils of leaves or arranged in a panicle; rachis scurfy. Female inflorescence with cupules in clusters of ca. 3; clusters stalked. Infructescences 8–12 cm; stalk of fruit clusters 3–6 mm. Cupule bowl-shaped, 5–7 mm × 1.2–1.5 cm; basal bracts united into obscure concentric rings, triangular, small, with scurfy, waxy scalelike trichomes. Nut depressed globose, 0.8–1.1 × 1.2–1.6 cm, glabrous, base flat, apex rounded; scar 7–10 mm in diam., concave. Fl. Dec–Jan, fr. Dec–Jan of following year.

• Broad-leaved evergreen forests; 1300–1700 m. SE Yunnan (Pingbian Miaozu Zizhixian, Xichou Xian).

68. *Lithocarpus cyrtocarpus* (Drake) A. Camus, Rivière Sci. 18: 40. 1931 [1932].

鱼篮柯 yu lan ke

Quercus cyrtocarpa Drake, J. Bot. (Morot) 4: 150. 1890; *Lithocarpus anisobalanos* Chun & F. C. How; *L. uncinatus* A. Camus; *Pasania cyrtocarpa* (Drake) Schottky; *Synaedrys cyrtocarpa* (Drake) Koidzumi.

Trees 10–18 m tall. Branchlets densely pubescent and with early glabrescent, brown long hairs. Petiole 1–2 cm; leaf blade ovate, ovate-elliptic, or oblong, 5–10 × 2–4 cm, papery, concolorous, abaxially covered with stellate, minute scalelike trichomes and sparsely pilose on midvein, adaxially crisply pubescent when young, base acute and sometimes ± asymmetric, margin with a few undulate teeth, apex acute to acuminate; secondary veins 8–12 on each side of midvein, ending in teeth; tertiary veins abaxially slender, evident. Male inflorescences axillary, solitary, 3–6 cm; rachis slender, sparsely pubescent. Female inflorescences 2–5 cm; cupules solitary or in clusters of ca. 3. Cupule disc- to bowl-shaped, 1–2 × 3.5–4.5 cm, enclosing basal part of nut, wall thickly woody; bracts clawlike, woody when dry, apex curved. Nut depressed globose, 1.5–2.2 × 4–5 cm, densely tawny pubescent, apex flat, wall 1–1.5 cm thick and horny; scar 2.5–3.5 cm in diam., concave but with center conspicuously convex. Fl. Apr and Sep–Oct, fr. Oct–Dec.

Broad-leaved evergreen forests; 400–900 m. SW Guangdong, SW Guangxi [NE Vietnam].

69. *Lithocarpus gymnocarpus* A. Camus, Bull. Soc. Bot. France 81: 818. 1934 [1935].

假鱼篮柯 jia yu lan ke

Trees 10–15 m tall. Branches and glabrous. Petiole ca. 1.5 cm; leaf blade elliptic to sometimes obovate-elliptic, 11–13 × 3–5 cm, papery, concolorous, abaxially with early glabrescent stellate hairs, adaxially glabrous, base cuneate and decurrent on petiole, margin usually entire or rarely apically with 1–3 obtuse teeth, apex acuminate; secondary veins 16–18 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescence with cupules in clusters of 3(–5). Infructescences to 18 cm; rachis base 7–10 mm thick, scurfy. Cupule shallowly bowl-shaped, ca. 3 cm in diam., covering basal 1/4 of nut, wall ca. 1 mm thick and basally thickened; bracts imbricate, appressed, warty, grayish brown when dry. Nut slightly depressed globose, 2–2.5 × (3–)4.5 cm, glabrous, wall ca. 5 mm thick; scar concave but rarely with convex center, ca. 2 cm in diam. Fr. Aug–Oct.

Broad-leaved evergreen forests; 800–1000 m. SW Guangdong, SW Guangxi, SE Yunnan [NE Vietnam].

70. *Lithocarpus cryptocarpus* A. Camus, Bull. Soc. Bot. France 81: 816. 1934 [1935].

闭壳柯 bi qiao ke

Trees 10–15 m tall; branches and leaf blades glabrous. Petiole 2–3 cm; leaf blade elliptic to sometimes obovate-elliptic, 18–25 × 6–8 cm, papery, concolorous or abaxially ± glaucous, base cuneate and decurrent on petiole, margin entire, apex acuminate; secondary veins 10–12 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescence with cupules in clusters of 3(–5). Infructescences to 18 cm; rachis base 7–10 mm thick, scurfy. Cupule depressed globose, 1.5–

2 cm in diam., completely enclosing nut, wall ca. 2.5 mm thick; bracts imbricate, broadly triangular, appressed, grayish brown when dry. Nut slightly depressed globose, 1.2–1.6 cm in diam., glabrous, wall ca. 1 mm thick; scar slightly concave, ca. 1 cm in diam. Fr. Aug–Oct.

Broad-leaved evergreen forests by streams, at low elevations. Yunnan (Hekou Yaozu Zizhixian) [C to NE Vietnam].

71. *Lithocarpus elizabethiae* (Tutcher) Rehder, J. Arnold Arbor. 1: 125. 1919.

厚斗柯 *hou dou ke*

Quercus elizabethiae Tutcher, J. Bot. 49: 273. 1911;

Pasania elizabethiae (Tutcher) Schottky; *Synaedrys elizabethiae* (Tutcher) Kudo.

Trees 9–15 m tall; branches and leaf blades glabrous. Petiole 1–2 cm; leaf blade narrowly oblong to lanceolate, 9–17 × 2–4 cm, thickly papery, concolorous to ± glaucous abaxially, base cuneate and decurrent on petiole, margin entire, apex acuminate; secondary veins 13–16 on each side of midvein, slender, evident; tertiary veins abaxially inconspicuous. Male inflorescences 3–many in a panicle, sometimes solitary in axils of leaves; rachis sparsely pubescent. Female inflorescences 2–4 congested at apex of branches; cupules usually in clusters of ca. 3. Infructescence rachis 4–6(–10) mm thick. Cupule subglobose, 1.5–3 × 1.5–2.8 cm, usually enclosing nut, apically abruptly narrowed and slightly elongated into a nipple, wall apically ca. 2 mm thick and basally to 4 mm thick; bracts imbricate, broadly triangular to rhomboid, apical ones incurved. Nut depressed globose to subglobose, 1.4–2.4 cm in diam., wall ca. 1 mm thick; scar 1.3–1.6 cm in diam., concave. Fl. Jul–Sep, fr. Aug–Nov of following year.

• Mixed mesophytic forests, frequent in moist places; 100–1200 m. SW Fujian, Guangdong, Guangxi, SE Guizhou, SE Yunnan.

72. *Lithocarpus echinophorus* (Hickel & A. Camus) A. Camus, Rivière Sci. 18: 40. 1932.

壺壳柯 *hu qiao ke*

Trees ca. 15 m tall; branchlets, petioles, and rachis of inflorescences covered with early glabrescent, short hairs. Branchlets blackish when dry, inconspicuously lenticellate. Petiole 1–1.5 cm; leaf blade elliptic, narrowly elliptic, oblong, or lanceolate, 9–15 × 1.5–4 cm, subleathery, base cuneate, margin entire, apex acuminate; secondary veins 10–17 on each side of midvein; tertiary veins abaxially not visible. Infructescences ca. 10 cm; rachis ca. 1.2 cm thick; immature cupules in clusters of ca. 3, oblong when young, apically flat. Cupule enclosing all of nut or occasionally only 1/2, wall ca. 3 mm thick; bracts linear to subulate, ± curved. Nut depressed globose; scar concave but center ± convex. Fr. Oct–Nov.

Sparse forests in dry places, broad-leaved evergreen forests; 1900–2000 m. S and SE Yunnan [Laos, Myanmar, N and NE Vietnam].

1a. Leaf blade glabrous 72b. var. *chapensis*

1b. Leaf blade (at least on midvein when young) abaxially pubescent, glabrescent.

2a. Cupules completely enclosing nut 72a. var. *echinophorus*

2b. Cupules enclosing ca. 1/2 of nut 72c. var. *bidoupensis*

72a. *Lithocarpus echinophorus* var. *echinophorus*

壺壳柯(原变种) *hu qiao ke (yuan bian zhong)*

Pasania echinophora Hickel & A. Camus, Bull. Mus. Natl. Hist. Nat. 34: 364. 1928.

Petiole 1–1.5 cm; leaf blade narrowly elliptic to lanceolate, 9–15 × 1.5–3 cm, abaxially pubescent at least on midvein when young, glabrescent, glaucous, and with adherent waxy scalelike trichomes; secondary veins 13–17 on each side of midvein. Cupule usually enclosing all of nut; bracts imbricate, linear, ± curved, basal ones ca. 1.5 mm, apical ones 3–4 mm, scurfy. Nut depressed globose, 1–1.2 × 1.4–1.8 cm. Fr. Nov.

Sparse forests in dry places; ca. 2000 m. S Yunnan (Yuanjiang Xian) [Laos, Myanmar, N Vietnam].

72b. *Lithocarpus echinophorus* var. *chapensis* A. Camus, Notul. Syst. (Paris) 13: 266. 1948.

沙坝柯 *sha ba ke*

Petiole ca. 1 cm; leaf blade oblong to lanceolate, 10–12 × 3 cm, glabrous; secondary veins 10–15 on each side of midvein, obscure near margin. Cupule depressed globose, 1.5–2 × 3–3.5 cm including bracts, enclosing ca. 3/4 of nut, wall crustaceous; bracts many, curved linear, 5–8 mm. Nut depressed globose, 2.2–2.5 cm in diam.; scar 1.5–1.8 cm in diam.

Broad-leaved evergreen forests; ca. 1900 m. SE Yunnan (Pingbian Miaozu Zizhixian) [NE Vietnam].

72c. *Lithocarpus echinophorus* var. *bidoupensis* A. Camus, Notul. Syst. (Paris) 13: 267. 1948.

金平柯 *jin ping ke*

Leaf blade elliptic to oblong, 10–14 × 2–4 cm, abaxially with sparse and slender hairs; secondary veins 12–14 on each side of midvein, not fusing. Cupule depressed globose, 2–2.5 cm in diam., enclosing ca. 1/2 of nut; bracts linear to subulate, 2–3 mm, curved to appressed, with tawny waxy scalelike trichomes. Nut glabrous, apex ± flat; scar concave, 1.5–2 cm in diam. Fl. Jul–Aug, fr. Oct–Nov of following year.

SE Yunnan [N Vietnam].

73. *Lithocarpus skanianus* (Dunn) Rehder, J. Arnold Arbor. 1: 131. 1919.

滑皮柯 *hua pi ke*

Quercus skaniana Dunn, J. Linn. Soc., Bot. 38: 366. 1908; *Pasania skaniana* (Dunn) Schottky.

Trees to 20 m tall; bud scales, branchlets, petioles, and rachis of inflorescences tawny tomentose. Petiole rarely to 1 cm; leaf blade obovate-elliptic, oblanceolate, or rarely elliptic to oblong, 6–20 × 4–9 cm, thickly papery, abaxially pilose on midvein but otherwise pubescent with simple and branched hairs, base cuneate, margin entire or ± undulate near apex, apex shortly caudate-acute to acuminate; secondary veins 9–14 on each side of midvein, adaxially usually slightly impressed; tertiary veins abaxially conspicuous, subparallel. Male panicle terminal or rarely solitary spikes in axils of leaves, to 25 cm. Female inflorescence with cupules in clusters of ca. 3. Infructescences 1–1.2 cm; rachis 2–3 mm thick. Cupule depressed globose to subglobose, 1.4–2 × 1.5–2.5 cm, almost completely enclosing nut, wall ca. 1 mm thick; bracts subulate to linear and 2–3 mm or triangular-squamiform and appressed, puberulent and scurfy. Nut depressed globose to broadly conical, 1.2–1.8 × 1.4–2.2 cm, glabrous, wall ca. 0.5 mm thick; scar 1.1–1.3 cm in diam., concave. Fl. Sep–Oct, fr. Sep–Oct of following year.

• Broad-leaved evergreen forests; 500–1000 m. C and S Fujian, Guangdong, Guangxi, Hainan, S Hunan, S Jiangxi, SE Yunnan.

74. *Lithocarpus oleifolius* A. Camus, Bull. Soc. Bot. France 94: 271. 1947.

榄叶柯 lan ye ke

Trees 8–15 m tall; branchlets, petioles, leaf blades abaxially, and rachis of inflorescences rusty pilose. Petiole 1–1.5 cm; leaf blade oblong to lanceolate, 8–16 × 2–4 cm, rigidly papery, abaxially with appressed hairs and waxy scalelike trichomes, base cuneate, margin entire or rarely ± undulate on apical part, apex narrowly acuminate; secondary veins 11–14 on each side of midvein; tertiary veins abaxially not visible. Male inflorescences 3–many in a panicle, rarely solitary. Female inflorescence with cupules in clusters of ca. 3. Infructescences 8–12 cm; rachis 4–5 mm thick. Cupule globose, depressed globose, or pear-shaped, 2.6–3.2 cm in diam., completely enclosing nut or sometimes 3/4 of nut, wall to 2 mm thick near base; bracts imbricate, triangular, appressed, with lanceolate, ± lax scalelike trichomes. Nut depressed globose to subglobose, 2–2.5 cm in diam., glabrous; scar 1.4–2 cm in diam., concave. Fl. Aug–Sep, fr. Oct–Nov of following year.

Mixed mesophytic forests; 500–1200 m. S Fujian, Guangdong, Guangxi, S Guizhou, S Hunan, S Jiangxi [Vietnam].

Very close to *Lithocarpus echinophorus*, and additional work is needed.

75. *Lithocarpus rhabdostachyus* (Hickel & A. Camus) A. Camus subsp. **dakhaensis** A. Camus, Bull. Soc. Bot. France 92: 84. 1945.

毛枝柯 mao zhi ke

Trees 8–15 m tall; branchlets, petioles, and rachis of inflorescences densely covered with rust-colored simple and branched hairs. Petiole 1–2 cm; leaf blade obovate

to obovate-elliptic on sterile shoots, sometimes elliptic on fruiting branches, 16–30 × 5–12 cm, subleathery, rusty pilose, adaxially with hairs crisp and early glabrescent, base broadly cuneate, margin entire, apex acute; secondary veins 11–17 on each side of midvein, abruptly curving apically near margin, apical ones fusing; tertiary veins abaxially slender, evident, subparallel. Male panicle terminal or rarely solitary spikes in axils of leaves, to 25 cm. Female inflorescences to 30 cm; cupules in clusters of ca. 3. Infructescence rachis to 1 cm thick. Cupule depressed globose, 1.5–2 × 2.5–3 cm, entirely or almost completely enclosing nut, wall 0.5–1.5 cm thick; bracts imbricate, ovate-triangular, appressed, puberulent. Nut depressed globose, 2.2–2.7 cm in diam., glabrous, wall 0.5–1 mm thick; scar 1.5–1.8 cm in diam., ± concave. Fl. Sep–Oct, fr. Oct–Dec of following year.

Broad-leaved evergreen forests, 900–2200 m. W Guangxi, SE Yunnan [C to N Vietnam].

Lithocarpus rhabdostachyus subsp. *rhabdostachyus* occurs in Laos and Vietnam.

76. *Lithocarpus trachycarpus* (Hickel & A. Camus) A. Camus, Riviera Sci. 18: 42. 1931 [1932].

糙果柯 cao guo ke

Pasania trachycarpa Hickel & A. Camus, Bull. Mus. Natl. Hist. Nat. 29: 604. 1923; *Lithocarpus trachycarpus* var. *jakhuangensis* Hu ex A. Camus; *Pasania yui* Hu.

Trees to 20 m tall. Branchlets sulcate, sparsely covered with early glabrescent long hairs. Leaf blade lanceolate to elliptic, 8–15 × 2–6 cm, rigidly papery, base cuneate, margin entire, apex acuminate to acute; midvein abaxially covered with early glabrescent long hairs; secondary veins 12–16 on each side of midvein, abruptly curving near margin but not fusing; tertiary veins abaxially slender, evident to conspicuous, subparallel. Male inflorescences paniculate, 5–9 cm. Female inflorescences to 20 cm; rachis puberulent; cupules in clusters of ca. 3. Cupule globose to depressed, 1.5–2 cm, completely enclosing nut, outside with oily scalelike glands, reddish brown when dry, wall ca. 0.5 mm thick; bracts subulate, 1–1.5 mm. Nut ± depressed globose, 1–1.3 × 1.6–1.8 cm, glabrous, wall ca. 1 mm thick; scar at basal part of nut, ca. 1 cm in diam., slightly concave. Fl. Nov–Mar, fr. Nov–Mar of following year.

Broad-leaved evergreen forests; 800–1300 m. S to SW Yunnan [Laos, N Thailand, Vietnam].

77. *Lithocarpus chungchungensis* Chun & P. C. Tam, Acta Phytotax. Sin. 10: 207. 1965.

琼中柯 qiong zhong ke

Trees 5–10 m tall; branchlets and rachis of inflorescences densely tawny pubescent. Petiole 0.8–1.2 cm; leaf blade obovate, ovate-elliptic, or oblong, 6–15 × 2–5 cm, rigidly papery, pubescent but early

glabrescent, abaxially ± glaucous and with waxy scalelike trichomes, base cuneate and decurrent on petiole, margin entire or undulate, apex caudate-acuminate; midvein pilose abaxially; secondary veins 10–14 on each side of midvein, obscure near margin; tertiary veins abaxially inconspicuous or not visible. Male inflorescences sometimes androgynous, 2–5 cm; rachis with short, tomentose hairs. Female inflorescence with cupules in clusters of 3–5. Infructescences 9–15 cm; rachis 6–8 mm thick. Cupule globose to ± depressed, 1.5–2 cm in diam., usually completely enclosing nut, wall less than 1 mm thick and crustaceous when dry; bracts triangular to shortly subulate, small. Nut depressed globose, 0.7–1.2 × 1.2–1.8 cm, glabrous, apex flat; scar ± concave. Fl. Jul, fr. Oct–Nov of following year.

• Broad-leaved evergreen forests; ca. 800 m. Hainan.

78. *Lithocarpus longanoides* C. C. Huang & Y. T. Chang, *Guihaia* 8: 26. 1988.

龙眼柯 long yan ke

Trees 8–18 m tall. Young branchlets covered with tawny, crisp, short hairs, blackish when dry. Branches of last-year growth densely lenticellate; lenticels visible only under lens. Petiole ca. 1.5 cm; leaf blade ovate, elliptic, or lanceolate, 4–10 × 1.5–3.5 cm, rigidly papery, abaxially at least along midvein densely covered with tawny, early glabrescent, short hairs and with tiny, grayish glandular dots, adaxially reddish brown to dark brown when dry, base decurrent on petiole, margin entire or rarely ± undulate near apex, apex narrowly acuminate to caudate; secondary veins 6–8 on each side of midvein, abruptly curving apically near margin but not fusing; tertiary veins abaxially not visible or very slender, evident. Male inflorescences in a panicle, 8–15 cm; rachis densely tawny puberulent. Androgynous inflorescences often with male flowers above middle; cupules in clusters of ca. 3. Cupule globose to ± depressed, 1–1.8 cm in diam., usually almost completely enclosing nut, wall less than 1 mm thick and crustaceous when dry; bracts fused to cupule except for subulate apex ca. 1 mm, triangular, reddish brown when dry. Nut depressed globose to subglobose, 0.8–1.6 cm in diam., glabrous; scar 6–12 mm in diam., concave. Fl. Jul–Oct, fr. Jul–Oct of following year.

• Broad-leaved evergreen forests; 500–1200 m. Guangdong, Guangxi, SE Yunnan.

79. *Lithocarpus bonnetii* (Hickel & A. Camus) A. Camus, *Riviera Sci.* 18: 39. 1931 [1932].

帽柯 mao ke

Pasania bonnetii Hickel & A. Camus, *Ann. Sci. Nat., Bot.*, sér. 10, 3: 402. 1921.

Trees to 20 m tall. Branchlets stout, terete, tawny tomentose. Petiole 1.5–2 cm, thick; leaf blade oblanceolate to obovate-oblong, 15–24 × 6–9 cm, leathery, abaxially tawny tomentose when young, base narrowed, margin entire or ± undulate near apex, apex

acute; secondary veins 12–16 on each side of midvein, adaxially impressed, apical ones abruptly curving apically, fusing near margin; tertiary veins abaxially inconspicuous, ± parallel. Infructescences 6–13 cm; rachis tawny tomentose. Cupules in clusters of ca. 3 but only 1 or 2 developed, 0.8–1 × 1.6–1.8 cm, enclosing slightly more than 1/2 of nut, wall less than 1 mm thick; bracts linear, 2–3 mm, puberulent. Nut depressed conical, 1.2–1.4 × 1.4–1.6 cm, apex narrowed, wall less than 0.5 mm thick; scar 8–9 mm in diam., deeply concave. Fl. May–Jun, fr. Jul–Aug of following year.

Mixed mesophytic forests in mountain valleys; 700–1300 m. SW Hainan, SE Yunnan [C to NE Vietnam].

Very close if not the same as *Lithocarpus garrettianus*; the only difference is the length of the cupule bracts.

80. *Lithocarpus garrettianus* (Craib) A. Camus, *Riviera Sci.* 18: 40. 1931 [1932].

望楼柯 wang lou ke

Quercus garrettiana Craib, *Bull. Misc. Inform. Kew* 1911: 471. 1911; *Pasania garrettiana* (Craib) Hickel & A. Camus.

Trees ca. 20 m tall. Branchlets stout, densely tawny tomentose. Petiole 1–2 cm, stout, hairy; leaf blade oblanceolate to sometimes ovate, 12–22 × 4–8 cm, leathery, tawny tomentose when young, abaxially glabrescent but with tawny, waxy scalelike trichomes with age, base cuneate, apex acute; midvein abaxially pilose; secondary veins 10–13 on each side of midvein, adaxially ± impressed, abruptly curving apically near margin, apical ones fusing; tertiary veins abaxially conspicuous, subparallel. Male inflorescences spicate or paniculate; rachis tomentose. Female and androgynous inflorescences to 20 cm; cupules in clusters of ca. 3. Cupule ca. 1.5 × 2–2.5 cm including bracts, enclosing ± 2/3 of nut, outside hairy, wall less than 1 mm thick; bracts 4–6 mm, squamose when young but elongating after flowering and linear and curved in fruit. Nut depressed globose, 0.8–1.2 × 1.2–1.5 cm, apex ± pointed, wall ca. 0.5 mm thick; scar 0.9–1.2 cm in diam., concave. Fl. Jun–Aug, fr. in Autumn of following year.

Mixed mesophytic forests; above 1000 m. SW Yunnan [Laos, Myanmar, N Thailand, Vietnam].

81. *Lithocarpus rosthornii* (Schottky) Barnett, *Trans. & Proc. Bot. Soc. Edinburgh* 34: 179. 1944.

南川柯 nan chuan ke

Pasania rosthornii Schottky, *Bot. Jahrb. Syst.* 47: 674. 1912; *Lithocarpus dictyoneuron* Chun; *Synaedrys rosthornii* (Schottky) Koidzumi.

Trees 10–15 m tall; branchlets and petioles covered with crisp, early glabrescent hairs and tawny, lamellate waxy scalelike trichomes. Petiole 1–2 cm; leaf blade obovate-elliptic, oblanceolate, or sometimes elliptic, 12–30 × 4–10 cm, ± thickly papery, abaxially pilose along midvein when young but soon glabrescent, margin entire, apex abruptly narrowed and caudate;

secondary veins 14–22 on each side of midvein, adaxially conspicuously impressed; tertiary veins abaxially conspicuous, numerous, subparallel. Male inflorescences paniculate or rarely spicate, to 15 cm. Female inflorescences usually with a few male flowers near apex; cupules in cluster of ca. 3. Infructescences 10–12 cm; rachis 4–5 mm thick. Cupule 1–1.6 × 2–3 cm, enclosing 1/2–3/4 of nut, wall ca. 0.5 mm thick and crustaceous; bracts imbricate, triangular, small, covered with tawny waxy scalelike trichomes. Nut depressed globose, 1.4–2 × ca. 2.8 cm, glabrous, apex ± narrowed and pointed, wall ca. 0.5 mm in diam.; scar 1–1.5 cm in diam., concave. Fl. Aug–Oct, fr. Aug–Oct of following year.

• Mixed mesophytic forests; 300–900 m. EC to SW Guangdong, S to SW Guangxi, NE Guizhou, Hunan, SE Sichuan.

82. *Lithocarpus fangii* (Hu & W. C. Cheng) C. C. Huang & Y. T. Chang, *Guihaia* 8: 32. 1988.

川柯 *chuan ke*

Pasania fangii Hu & W. C. Cheng, *Acta Phytotax. Sin.* 1: 118. 1951; *Lithocarpus glaber* (Thunberg) Nakai var. *szechuanicus* W. P. Fang.

Trees 8–15 m tall. Branchlets ± sulcate, tawny tomentose. Petiole less than 1 cm; leaf blade obovate, elliptic, oblanceolate, or oblong, 5–10(–16) × 2–3(–4) cm, ± thickly papery, abaxially covered with appressed hairs more densely along midvein, base cuneate, margin entire, apex abruptly acute and shortly caudate; secondary veins 8–11 on each side of midvein, abruptly curving apically, obscure near margin; tertiary veins abaxially not visible. Male inflorescences congested at apex of branches, to 12 cm. Female and androgynous inflorescences terminal, to 15 cm. Female inflorescence with rachis 3–4 mm thick; cupules in clusters of ca. 3. Cupule bowl-shaped, 7–9 mm × 1.8–2 cm, enclosing ca. 1/2 of nut, wall 1–1.5 mm thick; bracts imbricate, triangular, squamose, appressed, tawny scurfy. Nut subglobose, glabrous, apex ± narrowed, wall ca. 1 mm thick; scar 1–1.2 cm in diam., concave. Fl. Oct–Dec, fr. Oct–Dec of following year.

• Mixed mesophytic forests; 800–1000 m. Guizhou, SW to W Sichuan.

83. *Lithocarpus paniculatus* Handel-Mazzetti, *Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl.* 59: 51. 1922.

圆锥柯 *yuan zhui ke*

Pasania paniculata (Handel-Mazzetti) Chun.

Trees to 15 m tall; bud scales, branchlets, and rachis of inflorescences hairy. Petiole 6–10 mm; leaf blade oblong to obovate-oblong, 6–15 × 2.5–5 cm, rigidly papery, abaxially hairy along midvein when young, base cuneate, margin entire, apex abruptly acute to caudate; secondary veins 10–14 on each side of midvein, abruptly curving apically, obscure near margin; tertiary veins abaxially not visible. Male inflorescences paniculate. Female and androgynous inflorescences to 20 cm; cupules in clusters of 3–5. Infructescence rachis

4–7 mm thick. Cupule depressed globose to subglobose, 0.8–1.8 × 1.8–2.5 cm, enclosing most of nut or occasionally completely enclosing nut, wall 0.2–0.5 mm thick and crustaceous; bracts imbricate, triangular, rarely longer than 1 mm. Nut broadly conical to slightly depressed, 1.6–2.3 cm in diam., apex pointed to rounded, wall ca. 0.5 mm thick; scar 1–1.4 cm in diam., concave. Fl. Jul–Sep, fr. Jul–Sep of following year.

• Broad-leaved evergreen forests; 600–1200 m. N Guangdong, NE Guangxi, S Hunan, SW Jiangxi.

84. *Lithocarpus elaeagnifolius* (Seemen) Chun, *J. Arnold Arbor.* 9: 151. 1928.

胡颓子叶柯 *hu tui zi ye ke*

Quercus elaeagnifolia Seemen, *Bot. Jahrb. Syst.* 23 (Beibl. 57): 51. 1897; *Pasania elaeagnifolia* (Seemen) Schottky; *Synaedrys elaeagnifolia* (Seemen) Koidzumi.

Trees 10–15 m tall. Branchlets of current year covered with early glabrescent, tawny crisp hairs; branches of last-year growth blackish brown, with gray to pale yellowish brown, lamellate wax layer, densely and minutely lenticellate. Petiole 5–8(–10 or more) mm, base thickened; leaf blade narrowly oblong to sometimes narrowly oblanceolate, 7–15 × 1–2.5 cm, rigidly papery, with tawny crisp hairs on both surfaces when young, soon glabrescent, adaxially with waxy scalelike trichomes and grayish brown when dry, base cuneate, margin entire or ± undulate near apex, apex narrowly acuminate; secondary veins 12–16 on each side of midvein, obscure near margin; tertiary veins abaxially very slender, evident or not visible. Male inflorescences terminal panicles, 3–7 cm; rachis tomentose with tawny, short hairs. Female and androgynous inflorescences to 18 cm. Female inflorescence with rachis 2–3 mm thick; cupules in clusters of ca. 3. Cupule depressed globose to subglobose, 1–1.2 × 1.4–1.7 cm, enclosing 3/4–4/5 of nut, wall ca. 1 mm thick and crustaceous; bracts triangular, squamose, appressed, tawny scurfy. Nut ± depressed globose, 1–1.2 × 1.2–1.4 cm, glabrous, apex ± pointed, wall ca. 0.5 mm thick; scar 1–1.1 cm in diam., concave. Fl. Jul–Sep, fr. Jul–Sep of following year.

Mixed mesophytic forests in valleys; below 300 m. C to S Hainan [Vietnam].

85. *Lithocarpus fenestratus* (Roxburgh) Rehder, *J. Arnold Arbor.* 1: 126. 1919.

泥柯 *ni ke*

Quercus fenestrata Roxburgh, *Fl. Ind.* ed. 1832, 3: 633. 1832; *Lithocarpus fenestratus* var. *brachycarpus* A. Camus; *Pasania fenestrata* (Roxburgh) Oersted; *Synaedrys fenestrata* (Roxburgh) Koidzumi.

Trees 25–30 m tall. Branchlets of current year pubescent or with tawny lamellate waxy scalelike trichomes. Petiole 5–10 mm, pilose; leaf blade lanceolate, ovate-oblong, or ovate-elliptic, 5–22 × 2–7 cm, papery to thickly papery, abaxially with yellowish gray to gray, adherent, waxy or lamellate scalelike

trichomes, base cuneate to narrowly so and decurrent on petiole, margin entire, apex acute to acuminate; secondary veins 12–17 on each side of midvein, sometimes adaxially impressed, abruptly arcuate apically near margin, apical ones often fusing; tertiary veins abaxially slender, evident, numerous, subparallel. Male inflorescences usually in a panicle. Female inflorescences to 25 cm. Infructescences to 18 cm; rachis 5–8 mm thick; cupules in clusters of ca. 3, only 1 or 2 developed. Cupule depressed globose, 1–2.8 cm in diam., enclosing most of nut, wall 0.5–1 mm thick; bracts imbricate, triangular, appressed, sparsely covered with minute hairs and brown waxy scalelike trichomes. Nut depressed globose to broadly conical, wall 0.4–1 mm thick; scar 1–1.8 cm in diam., concave. Fl. Aug–Oct, fr. Aug–Dec of following year.

Broad-leaved evergreen forests; below 1700 m. C to S Guangdong, SW Guangxi, Hainan, SE Xizang (Mêdog Xian), Yunnan [Bhutan, NE India, Laos, NE Myanmar, Sikkim, N Thailand, NE Vietnam].

86. *Lithocarpus mairei* (Schottky) Rehder, J. Arnold Arbor. 1: 128. 1919.

光叶柯 *guang ye ke*

Pasania mairei Schottky, Bot. Jahrb. Syst. 47: 665. 1912; *Synaedrys mairei* (Schottky) Koidzumi.

Trees rarely to 10 m tall, glabrous except branchlets and inflorescences covered with tawny, waxy scalelike trichomes. Petiole 0.8–1.5 cm; leaf blade lanceolate to elliptic, 5–10 × 1.5–4 cm, leathery to papery, yellowish brown when dry, base cuneate and decurrent on petiole, margin entire, apex acuminate; secondary veins 7–10 on each side of midvein, slender, evident, adaxially slightly impressed; tertiary veins abaxially not visible. Male inflorescences paniculate, 4–8 cm, sometimes spicate. Female inflorescences 5–8 cm; rachis covered with tawny, lamellate, waxy scalelike trichomes; cupules in clusters of ca. 3. Infructescences 3–5 cm. Cupule bowl-shaped, 5–8 mm × 1–1.8 cm, enclosing ca. 1/2 of nut, wall ca. 1 mm thick; bracts imbricate, triangular, squamose, appressed, covered with tawny, waxy scalelike trichomes. Nut broadly conical to ± depressed globose, 1–1.5 × 1.1–1.8 cm, glabrous, apex ± flat, wall 0.5–1 mm thick; scar 6–8 mm in diam., slightly concave. Fl. Aug–Sep, fr. Aug–Sep of following year.

• Mixed mesophytic forests in dry places; 1500–2500 m. C to N Yunnan.

87. *Lithocarpus melanochromus* Chun & Tsiang ex C. C. Huang & Y. T. Chang, Guihaia 8: 29. 1988.

黑柯 *hei ke*

Trees 8–15 m tall; young branchlets and petioles tawny pilose, soon glabrescent. Petiole 0.5–1.5 cm; leaf blade narrowly oblong to lanceolate, 4–11 × 1–3.5 cm, rigidly leathery, abaxially glaucous and with adherent, waxy

scalelike trichomes, adaxially tawny pilose when young, base cuneate and decurrent on petiole, margin entire and ± recurved, apex acuminate to abruptly acute and with a blunt tip; secondary veins 10–15 on each side of midvein, slender, inconspicuous to ± conspicuous; tertiary veins abaxially not visible. Male inflorescences in a panicle, 3–5 cm; rachis pubescent. Female inflorescences 3–8 cm; rachis ca. 3 mm thick; cupules in clusters of ca. 3. Cupule cupular, 5–8 mm × 1.2–1.8 cm, enclosing ca. 1/2 of nut, wall 1–1.5 mm thick and basally thickened; bracts imbricate, triangular, squamose, appressed. Nut covered with tawny, lamellate, waxy scalelike trichomes, apex pointed, wall 0.5–1 mm thick; scar 8–11 mm in diam., concave. Fl. May–Jul, fr. Aug–Oct of following year.

• Broad-leaved evergreen forests; 600–1200 m. SW Guangdong, SW Guangxi.

88. *Lithocarpus fohaiensis* (Hu) A. Camus, Bull. Soc. Bot. France 94: 271. 1947.

勐海柯 *meng hai ke*

Pasania fohaiensis Hu, Bull. Fan Mem. Inst. Biol., Bot. 10: 97. 1940; *Lithocarpus cheliensis* (Hu) A. Camus; *P. cheliensis* Hu.

Trees to 25 m tall, glabrous except for inflorescences and nuts. Petiole 1–3 cm, base thickened; leaf blade narrowly oblong to rarely obovate-oblong, 15–24 × 5–8 cm, thickly papery, concolorous, base broadly cuneate, decurrent on petiole, and often asymmetric, margin entire, apex shortly acuminate; secondary veins 11–16 on each side of midvein; tertiary veins abaxially slender, evident. Male inflorescences solitary or clustered; rachis densely tawny pubescent or sometimes glabrescent. Female inflorescences in clusters of 2 or 3 at apex of branches, to 25 cm; cupules in clusters of 3–5. Infructescence rachis 6–8 mm thick. Cupule shallowly bowl-shaped, 0.8–1.3 × 2–2.5 cm, enclosing less than 1/2 of nut, wall woody and basally thickened; bracts ± connate into concentric and ± raised rings, broadly triangular, densely rusty puberulent. Nut depressed globose to conical, 1.4–3 × 1.5–2.5 cm, densely tawny to rusty farinose. Fl. Mar–May, fr. Aug of following year.

• Sparse forests; 600–1500 m. S Yunnan.

89. *Lithocarpus carolineae* (Skan) Rehder, J. Arnold Arbor. 1: 123. 1919.

红心柯 *hong xin ke*

Quercus carolineae Skan in Dunn, J. Linn. Soc., Bot. 35: 518. 1903; *Pasania carolineae* (Skan) Schottky; *Synaedrys carolineae* (Skan) Koidzumi.

Trees to 20 m tall, glabrous except for inflorescences and leaf blade vein axils. Branchlets of current year sulcate, dark brown when dry. Petiole 1.5–2 cm; leaf

blade oblong to rarely obovate-oblong, 13–18 × 4–6 cm, thickly papery, concolorous, dark brown when dry, with tuft of stellate hairs on axils of veins, base cuneate, margin serrate from middle to apex, apex shortly caudate; secondary veins 15–20 on each side of midvein, ending in teeth or abruptly curving apically near margin and gradually obscured. Infructescence with cupules in clusters of 3–5. Cupule plate-shaped, 1–1.5 × 3–4 cm, enclosing ca. 1/2 of nut, dark brown when dry, basally with a short stalk; bracts imbricate, broadly triangular, appressed, base rhomboid, midvein thickened. Nut depressed globose, 2.4–3 × 4–4.5 cm, ± glossy, apex flat with a ± concave center, wall 6–10 mm thick; scar 2.5–3 cm in diam., margin concave but center ± convex. Fr. Sep–Oct.

• Mixed mesophytic forests; 1500–2000 m. S to SE Yunnan.

90. *Lithocarpus naiadarum* (Hance) Chun, J. Arnold Arbor. 9: 152. 1928.

水仙柯 shui xian ke

Quercus naiadarum Hance, J. Bot. 22: 227. 1884;
Pasania naiadarum (Hance) Schottky; *Q. neriifolia*
Seemen; *Synaedrys naiadarum* (Hance) Koidzumi.

Trees 4–10 m tall, glabrous except for inflorescences. Branchlets with a thin translucent wax layer. Leaf blade narrowly oblong to lanceolate, (5–)10–15(–30) × (0.7–)1–1.5 (–2.5) cm, rigidly papery, concolorous and without waxy scalelike trichomes, base attenuate and decurrent on a very short petiole, apex shortly acuminate and with a blunt tip; secondary veins 11–15 on each side of midvein, slender, evident; tertiary veins abaxially reticulate. Male inflorescences in a panicle; rachis densely tawny pubescent. Female inflorescences to 20 cm; rachis ca. 3 mm thick; cupules in clusters of ca. 3. Cupule discoid, 1.2–1.8 cm in diam., enclosing basal part of nut, outside puberulent, wall to 1 mm thick and ± woody near base; bracts usually connate into concentric rings, triangular, appressed. Nut broadly conical to rarely subglobose, 1–2 × 1.5–2.5 cm, apex pointed or flat; scar concave to almost flat. Fl. Jul–Aug, fr. Aug–Sep of following year.

• Frequent on stream banks; near sea level. Hainan.

91. *Lithocarpus hancei* (Benth) Rehder, J. Arnold Arbor. 1: 127. 1919.

硬壳柯 ying qiao ke

Quercus hancei Benth, Fl. Hongk. 322. 1861; *Cyclobalanopsis ternaticupula* (Hayata) Kudo; *C. ternaticupula* f. *arisanensis* (Hayata) Kudo; *Cyclobalanus hancei* (Benth) Oersted; *C. ternaticupula* (Hayata) Nakai; *Lithocarpus arisanensis* (Hayata) Hayata; *L. jingdongensis* Y. C. Hsu & H. J. Qian; *L. matsudai* Hayata; *L. mupinensis* (Rehder & E. H. Wilson) A. Camus; *L. omeiensis* A. Camus; *L. spicatus* (Smith) Rehder & E. H. Wilson var. *mupinensis* Rehder & E. H. Wilson; *L. subreticulatus*

(Hayata) Hayata; *L. ternaticupulus* (Hayata) Hayata; *Pasania brevicaudata* (Skan) Schottky var. *arisanensis* (Hayata) Ying; *P. confertifolia* Hu; *P. hancei* (Benth) Schottky; *P. hancei* var. *arisanensis* (Hayata) J. C. Liao; *P. hancei* var. *ternaticupula* (Hayata) J. C. Liao; *P. rhododendrophylla* Hu; *Q. arisanensis* Hayata; *Q. subreticulata* Hayata; *Q. ternaticupula* Hayata; *Synaedrys hancei* (Benth) Koidzumi; *S. kuaruensis* Tomiya.

Trees usually less than 15 m tall, glabrous except for inflorescences. Branchlets ± tawny to gray, usually with a thin layer of translucent wax. Petiole 0.5–4 cm; leaf blade variable in shape and size, ovate, broadly elliptic, obovate-elliptic, narrowly elliptic, or lanceolate, 5–10 × 2.5–5 cm, thinly papery to rigidly leathery, concolorous and sometimes adaxially white farinose when dry, base usually decurrent on petiole, margin entire and ± recurved, apex rounded, obtuse, acute, or narrowly acuminate; secondary veins 6–13 on each side of midvein, slender, evident; tertiary veins abaxially obscure, reticulate. Male inflorescences usually in a panicle, sometimes with female flowers from base to middle, rarely longer than 10 cm; rachis sometimes twisted. Female inflorescences 2–many congested at apex of branches; cupules usually in clusters of 3–5, rarely solitary. Infructescence 6–8 cm; rachis less than 8 mm thick. Cupule shallowly bowl-shaped to plate-shaped, 3–7 mm × 1–2 cm, enclosing nearly 1/3 of nut, wall 1–2 mm thick; bracts imbricate and appressed or connate into a few concentric rings, triangular, squamose. Nut depressed globose, subglobose, or broadly conical, 0.8–2 × 0.6–2.5 cm, apex rounded, pointed, or rarely flat, wall ca. 0.5 mm thick; scar 5–10 mm in diam., concave. Fl. Jul–Aug, fr. Aug–Nov of following year.

• Various habitats; below 2600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

92. *Lithocarpus ithyphyllus* Chun ex H. T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 32. 1960.

挺叶柯 ting ye ke

Trees to 15 m tall, glabrous except for inflorescences. Branches of current year conspicuously sulcate. Petiole rarely to 3 mm; leaf blade narrowly oblong, 1–2 × 5–20 cm, rigidly leathery, concolorous, abaxially often white farinose, base rounded to auriculate, margin entire and recurved, apex narrowed and obtuse; secondary veins 12–18 on each side of midvein, slender, evident, adaxially impressed; tertiary veins abaxially not visible or very slender, evident. Male inflorescences sometimes androgynous, often congested at apex of branches, to 10 cm; rachis puberulent. Female inflorescence with cupules in clusters of ca. 3. Infructescences 6–8 cm; rachis puberulent, ca. 2 mm thick. Cupule plate- to shallowly bowl-shaped, 2–4 × 5–8 mm, covering base

of nut, wall to 1 mm thick near base; bracts imbricate and appressed or sometimes connate into 3 or 4 concentric rings, triangular, small. Nut narrowly ellipsoid to conical, 1.2–1.8 × 1–1.2 cm, often ± white farinose, base flat, apex pointed, wall ca. 0.5 mm thick; scar 3–4 mm in diam., concave. Fl. May–Jun, fr. Aug–Sep of following year.

• Broad-leaved evergreen forests, more frequent in secondary forests; 400–900 m. E Guangdong.

93. *Lithocarpus calophyllus* Chun ex C. C. Huang & Y. T. Chang, *Guihaia* 8: 27. 1988.

美叶柯 mei ye ke

Trees to 28 m tall. Young branchlets sparsely puberulent above middle; branchlets of last year growth blackish, lenticellate. Petiole 2.5–5 cm; leaf blade broadly elliptic, ovate, or oblong, 8–15 × 4–9 cm, rigidly leathery, abaxially densely tawny to rusty scurfy when young and ± glaucous with age, adaxially glabrous, base subrounded to slightly auriculate and sometimes asymmetric, apex acute to acuminate with a caudate tip; secondary veins 7–11 on each side of midvein, adaxially impressed, abruptly curving, obscure near margin; tertiary veins abaxially slender, evident, subparallel. Male inflorescences in a panicle, less than 3 cm. Female inflorescences to 20 cm; rachis 5–6 mm thick; cupules in clusters of 3–5, rarely solitary on basal part of rachis. Cupule 0.5–1 × 1.5–2.5 cm, shallowly cupular, enclosing 1/6–1/5 of nut, wall to 3 mm thick and thickly woody near base. Nut 1.5–2 × 1.8–2.6 cm, often slightly white farinose, apex flat with a ± concave to shortly pointed center, wall ca. 1 mm thick; scar 1–1.4 cm in diam., concave. Fl. Jun–Jul, fr. Aug–Sep of following year.

• Broad-leaved evergreen forests; 500–1200 m. SW Fujian, SW Guangdong, Guangxi, S Guizhou, S Hunan, SW Jiangxi.

94. *Lithocarpus petelotii* A. Camus, *Notul. Syst. (Paris)* 5: 75. 1935.

星毛柯 xing mao ke

Trees to 28 m tall. Branchlets and rachis of inflorescences tawny pubescent. Petiole 2.5–4 cm, pubescent when young; leaf blade elliptic to ovate-elliptic or sometimes obovate to obovate-elliptic, 9–15 × 3.5–6 cm, rigidly leathery, abaxially with rust-colored, scurfy scalelike trichomes and stellate hairs, base subrounded to broadly cuneate and sometimes asymmetric, margin entire, apex acuminate to acute; secondary veins 7–13 on each side of midvein, abaxially pubescent; tertiary veins abaxially conspicuous. Male inflorescences in a panicle, less than 3 cm. Female inflorescences to 20 cm; rachis ca. 8 mm thick; cupules in clusters of 3–5, rarely solitary on basal part of rachis. Cupule shallowly bowl-shaped, 0.8–1.5 × 2.5–3.5 cm, covering base of nut, basally narrowed and slightly elongate into a short stalk, wall 3–6 mm thick and woody; bracts imbricate, triangular to rhomboid, densely tawny puberulent; midvein ridged. Nut sub-

globose, 3–7.5 × 2.5–3.8 cm, often white farinose, apex shortly pointed; scar 1–1.4 cm in diam., concave. Fl. Aug–Sep, fr. Sep–Oct of following year.

Mixed mesophytic forests; 1000–1800 m. Guangxi, S Guizhou, W Hunan, SE Yunnan [Vietnam].

Lithocarpus wenxianensis Y. J. Zhang & al. (*Acta Bot. Yunnan.* 16: 121. 1994), from SE Gansu, is close to *L. petelotii*, but its status needs further study. With such a disjunct distribution, it seems unlikely that the two species are the same.

95. *Lithocarpus eriobotryoides* C. C. Huang & Y. T. Chang, *Guihaia* 8: 25. 1988.

枇杷叶柯 pi pa ye ke

Trees 10–15 m tall; branches of current year and leaf blades abaxially with tawny stellate or forked long hairs. Petiole 1–2 cm; leaf blade obovate-elliptic, obovate, or sometimes elliptic, 12–20 × 4–7 cm, rigidly papery, concolorous, base cuneate to broadly so and decurrent on petiole, margin entire, apex acute to acuminate; secondary veins 12–16 on each side of midvein, adaxially impressed, abruptly curving apically, partly fusing near margin; tertiary veins abaxially conspicuous, ± parallel. Male inflorescences in a panicle. Female inflorescence with cupules in clusters of ca. 3. Infructescences ca. 12 mm; rachis 5–8 mm thick. Cupule plate-shaped, 5–8 mm × 1.8–2.2 cm, enclosing 1/8–1/5 of nut, wall to 2 mm thick and woody near base; bracts imbricate, triangular to rhomboid, appressed, puberulent. Nut conical to ellipsoid, 2.5–3 × 1–1.5 cm, apex ± flattened, wall ca. 1 mm thick; scar ca. 1.3 cm in diam., concave. Fl. May–Jun, fr. Aug–Oct of following year.

• Mixed mesophytic forests; 1000–1500 m. NE Guizhou, W Hubei, NW Hunan, E Sichuan.

96. *Lithocarpus macilentus* Chun & C. C. Huang in C. C. Huang & Y. T. Chang, *Guihaia* 8: 30. 1988.

粉叶柯 fen ye ke

Trees 7–12 m tall; branches of current year, petioles, and rachis of inflorescences tawny tomentose. Petiole under 1 cm; leaf blade lanceolate to rarely oblanceolate, 6–11 × 2–3 cm, thinly leathery, with tufts of minute crisp hairs on both surfaces when young, abaxially scurfy, narrowed at both ends, base broadly cuneate and decurrent on petiole, margin entire, apex acuminate with a caudate tip; secondary veins 6–8 on each side of midvein; tertiary veins abaxially inconspicuous. Male inflorescences in a panicle. Female inflorescence with cupules in clusters of ca. 3. Cupule bowl-shaped, 6–8 mm × 1.5–2 cm, enclosing basal part of nut, wall thin but basally ± thickened. Nut broadly conical to depressed globose, 1.3–1.5 × 1.5–1.7 cm, glabrous; scar 7–8 mm in diam., concave. Fl. Jul–Aug, fr. Oct–Nov of following year.

• Broad-leaved evergreen forests on stream banks; below 400 m. W Guangdong, E Guangxi.

97. *Lithocarpus floccosus* C. C. Huang & Y. T. Chang, *Guihaia* 8: 20. 1988.

卷毛柯 *juan mao ke*

Trees 7–10 m tall; young branchlets, petioles, and rachis of inflorescences densely floccose-tomentose. Petiole ca. 1 cm; leaf blade ovate to elliptic, 5–10 × 1.5–3 cm, papery, abaxially with minute scalelike glands and floccose-tomentose but glabrescent, base cuneate, margin entire, apex abruptly acute to shortly caudate and with a blunt tip; secondary veins 6–9 on each side of midvein, not fusing; tertiary veins abaxially inconspicuous. Inflorescences usually androgynous, 8–15 cm. Female inflorescence with cupules in clusters of ca. 3. Infructescences 5–9 cm; rachis ca. 2 mm thick. Cupule cupular, 1–1.5 cm in diam., enclosing 1/5–1/3 of nut, wall ca. 0.5 mm thick but basally × thickened; bracts imbricate, triangular, small, appressed, sparsely puberulent. Nut broadly conical, 1–1.5 cm in diam., ± white farinose; scar ca. 5 mm in diam., ± concave. Fl. May–Jun, fr. Jul–Aug of following year.

• Broad-leaved evergreen forests with *Ormosia*, *Schefflera*, and species of Lauraceae; 400–700 m. Fujian, E Guangdong, S Jiangxi.

98. *Lithocarpus obovatilimbus* Chun, J. Arnold Arbor. 28: 236. 1947.

卵叶柯 *luan ye ke*

Trees to 15 m tall; branches and rachis of inflorescences pubescent. Petiole 3–10 mm; leaf blade obovate, oblanceolate, or elliptic, 4–8 × 1.5–2.5 cm, subleathery, abaxially with grayish scalelike glands and pubescent on basal part of midvein when young, base broadly cuneate to cuneate, margin entire, apex obtuse, acute, shortly caudate, or rarely acuminate; secondary veins 7–9(–13) on each side of midvein; tertiary veins abaxially slender, evident or not visible. Male inflorescences in a panicle. Female inflorescence with cupules in clusters of ca. 3. Infructescences 2 or 3, congested at apex of branches; rachis pubescent. Cupule cupular, 4–7 mm × 0.8–1.4 cm, enclosing 1/4–1/2 of nut, wall ca. 1 mm thick and basally woody; bracts imbricate, triangular, small, appressed, puberulent. Nut ellipsoid to broadly conical, 1–1.5 × 0.8–1.4 cm, often ± white farinose; scar 4–7 mm in diam., concave. Fr. Oct–Dec.

• Broad-leaved evergreen forests; 800–1100 m. Hainan (Lingshui Xian).

99. *Lithocarpus glaber* (Thunberg) Nakai, Cat. Hort. Bot. Univ. Tokyo 8. 1916.

柯 *ke*

Quercus glabra Thunberg in Murray, Syst. Veg., ed. 14, 858. 1784; *Kuromatea glabra* (Thunberg) Kudo; *Lithocarpus thalassicus* (Hance) Rehder; *Pasania glabra* (Thunberg) Oersted; *P. sieboldiana* (Blume)

Nakai; *P. thalassica* (Hance) Oersted; *Q. sieboldiana* Blume; *Q. thalassica* Hance; *Q. thalassica* var. *obtusiglans* Dunn; *Synaedrys glabra* (Thunberg) Koidzumi.

Trees to 15 m tall; branchlets and rachis of inflorescences densely tawny tomentose. Petiole 1–2 cm, tomentose when young; leaf blade obovate, obovate-elliptic, or oblong, 6–12 × 2.5–5.5 cm, leathery to thickly papery, abaxially with dense scalelike glands and shortly tomentose when young, base cuneate, margin entire or with 2–4 teeth on apical part, apex abruptly acute, shortly acute, or long acuminate; secondary veins rarely over 10 on each side of midvein; tertiary veins abaxially usually not visible. Male inflorescences in a panicle or solitary in leaf axils, to 15 cm. Female inflorescences often with a few male flowers; cupules in clusters of 3(–5). Infructescences ca. 6 cm; rachis usually pubescent. Cupule plate- to cupular, 5–10 mm × 1–1.5 cm, enclosing 1/5–2/5 of nut, wall to 1.5 mm and woody near base; bracts imbricate or connate into concentric rings, triangular, small, appressed, densely puberulent. Nut ellipsoid, 1.2–2.5 × 0.8–1.5 cm, ± white glaucous, apex pointed, wall 0.5–1 mm thick; scar 3–5(–8) mm in diam., concave. Fl. Jul–Nov, fr. Jul–Nov of following year.

Mixed mesophytic forests, frequent on sunny slopes; below 1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [Japan].

100. *Lithocarpus grandifolius* (D. Don) S. N. Biswas, Bull. Bot. Surv. India 10: 258. 1968.

耳叶柯 *er ye ke*

Quercus grandifolia D. Don in Lambert, Descr. Pinus 2: 27. 1824; *Lithocarpus spicatus* (Smith) Rehder & E. H. Wilson; *Q. spicata* Smith (1814), not Humboldt & Bonpland (1806); *Q. squamata* Roxburgh.

Trees 10–15 m tall, glabrous except for inflorescences. Petiole 5–10 mm; leaf blade obovate, oblanceolate, or sometimes oblong, 15–40 × 5–15 cm, leathery to rigidly papery, concolorous, base often oblique and ± auriculate, subrounded, or rarely cuneate, margin entire, apex acute; secondary veins 13–20 on each side of midvein, fusing near margin; tertiary veins abaxially conspicuous. Male inflorescences usually solitary, occasionally 3–many in a panicle; rachis tomentose with short hairs, rarely glabrescent. Female inflorescences terminal, usually in pairs, to 20 cm; rachis base 1–1.6 cm thick; cupules in clusters of 3–5, usually 1 or 2 developed. Cupule cupular, ca. 2.6 cm in diam., enclosing 1/3–2/3 of nut, wall to 4 mm near base and woody; basal bracts often connate into horizontal ridges, broadly ovate to broadly rhomboid, puberulent. Nut depressed globose, 1.5–2.2 × 2–2.6 cm, apex flat and ± concave or rarely rounded and pointed, wall 1.5–2 mm thick; scar 1.6–2 cm in diam., concave but center sometimes convex. Fl. Apr–May, fr. Aug–Sep of following year.

Broad-leaved evergreen forests; 600–1900 m. S to SW Yunnan [Bhutan, NE India, N Laos, Nepal, NE Myanmar, Sikkim, N Thailand].

Records of *Lithocarpus elegans* (Blume) Hatusima ex Soepadmo from China are referable to *L. grandifolius*.

101. *Lithocarpus collettii* (King ex J. D. Hooker) A. Camus, *Chênes*, Atlas 3: 117. 1948.

格林柯 ge lin ke

Quercus spicata Smith var. *collettii* King ex J. D.

Hooker, *Fl. Brit. India* 5: 610. 1888; *Lithocarpus gelinicus* C. C. Huang & Y. T. Chang, nom. illeg. (included *Q. spicata* var. *collettii*); *L. himalaicus* C. C. Huang & Y. T. Chang.

Trees 8–25 m tall. Branchlets of current year purplish brown, sulcate, sparsely hairy and with early glabrescent, stellate scalelike trichomes. Petiole 1–1.5 cm, base thickened; leaf blade oblong, elliptic, or obovate-elliptic, (6–)15–28 × 3.5–5(–11) cm, thinly papery to rigid and crustaceous, abaxially with scalelike trichomes when young and glaucous with age, base attenuate, decurrent on petiole, and sometimes asymmetric, margin entire, apex acute, acuminate, or shortly caudate; midvein sparsely hairy abaxially; secondary veins (6–)14–20 on each side of midvein, adaxially impressed, abruptly curving apically, fusing near margin; tertiary veins abaxially reticulate.

Infructescence ca. 4 cm; rachis ca. 4 mm thick, obscurely lenticellate; cupules in clusters of 3–5 but 1 or 2 developed. Cupule cupular, 4–10 mm × 1.5–2.2 cm, enclosing ca. 1/4 of nut, wall woody and basally thickened; bracts broadly triangular, with grayish minute hairs. Nut depressed globose to broadly conical, 1.2–1.5 × 1.5–2 cm, glabrous, apex flat to rounded; scar 0.8–1.5 cm in diam., concave. Fr. Aug.

Broad-leaved evergreen forests, on slopes and along river banks; 700–2400 m. SE Xizang (Mêdog Xian) [NE India, NE Myanmar, N Thailand].

102. *Lithocarpus obscurus* C. C. Huang & Y. T. Chang in C. C. Huang, *Acta Phytotax. Sin.* 16(4): 71. 1978.

墨脱柯 mo tuo ke

Trees to 30 m tall, glabrous except for inflorescences. Branchlets blackish brown when dry, sparsely lenticellate; lenticels slightly raised. Petiole 3–7 mm; leaf blade 10–19 × 4–8 cm, papery, concolorous, without scalelike glands, base rounded to auriculate, sometimes obtuse, and often asymmetric, margin entire, apex acute to obtuse; secondary veins 9–12 on each side of midvein; tertiary veins abaxially conspicuous. Female inflorescences 10–35 cm; rachis puberulent; cupules in clusters of 3–5. Infructescences to 35 cm; rachis 0.8–1.4 cm thick. Cupule cupular, 6–8 mm × 1–1.5 cm, enclosing hardly 1/2 of nut, dark gray when dry, wall basally thickened; bracts imbricate, small, appressed, usually only subulate apex conspicuous. Nut broadly conical, 1–1.4 × 1.5–2 cm; scar concave. Fr. Oct–Nov.

• Broad-leaved evergreen forests; 1500–2500 m. SE Xizang (Mêdog Xian), W Yunnan.

103. *Lithocarpus arcaulus* (Buchanan-Hamilton ex Sprengel) C. C. Huang & Y. T. Chang in C. C. Huang, *Acta Phytotax. Sin.* 16(4): 72. 1978.

小箱柯 xiao xiang ke

Quercus arcaula Buchanan-Hamilton ex Sprengel, *Syst. Veg.* 3: 857. 1826.

Trees to 30 m tall, glabrous except for inflorescences. Branchlets dark purplish brown. Petiole ca. 1.5 cm, base thickened; leaf blade ovate-elliptic to oblong, 10–20 × 5–8 cm, papery, concolorous, without scalelike glands, margin entire, apex shortly acuminate; secondary veins 12–15 on each side of midvein, abruptly curving apically near margin but not fusing; tertiary veins abaxially reticulate. Male inflorescences in a panicle or sometimes solitary, 15–30 cm. Female and androgynous inflorescences 25–40 cm; rachis pubescent; cupules in clusters of (3–)5–7.

Infructescences 20–40 cm; rachis base 8–18 mm thick, sparsely lenticellate. Cupule plate-shaped, 5–8 mm × 1.5–2 cm, wall ± woody; bracts imbricate or sometimes basal ones connate into concentric rings, sometimes triangular, appressed, obscure. Nut depressed conical, 1.4–2 × 1.5–2 cm, glabrous, ± white farinose, wall thin; scar 8–10 mm in diam., concave. Fl. May–Jun, fr. Sep–Oct of following year.

Broad-leaved evergreen forests; 1100–2300 m. Xizang (Nyalam Xian, Mêdog Xian), Yunnan (Tengchong Xian) [Nepal].

104. *Lithocarpus mianningensis* Hu, *Acta Phytotax. Sin.* 1: 106. 1951.

缅宁柯 mian ning ke

Trees to 25 m tall. Young branchlets purplish brown, sparsely pubescent. Petiole 1.5–2 cm, sparsely pubescent when young; leaf blade ovate, broadly elliptic, or obovate-elliptic, 10–20 × 4–6 cm, ± rigidly papery, abaxially with silky scalelike glands, sparsely pubescent along midvein when young, and grayish brown to ± purplish when dry, base broadly cuneate and sometimes slightly asymmetric, margin entire, apex acute to shortly acuminate; secondary veins 11–16 on each side of midvein, abaxially impressed; tertiary veins abaxially slender, evident or not visible.

Inflorescences terminal at apex of current year's branches; Male inflorescences in a panicle; rachis puberulent. Female inflorescence with cupules in clusters of ca. 3 or solitary, scattered on rachis. Infructescences 8–15 cm; rachis 0.7–1.3 cm thick, sparsely lenticellate. Cupule plate-shaped, 0.7–1.2 × 2.5–3 cm, wall basally woody; bracts imbricate, broadly triangular to rhomboid, densely puberulent. Nut broadly ellipsoid, 2–2.6 × 2–3 cm, densely puberulent, apex rounded to flat or sometimes with a ± concave center; scar concave. Fl. Jun, fr. Aug–Oct of following year.

• Broad-leaved evergreen forests; 1100–2500 m. SW Yunnan (Lincang Xian).

105. *Lithocarpus gaoligongensis* C. C. Huang & Y. T. Chang, *Guihaia* 8: 39. 1988.

高黎贡柯 gao li gong ke

Trees to 25 m tall. Branchlets of current year densely dark gray puberulent. Petiole 2–3 cm; leaf blade oblong to obovate-elliptic, 15–20 × 5–8 cm, subleathery, abaxially sparsely pilose and scurfy on midvein when young, base broadly cuneate to subrounded, margin entire, apex acuminate to acute; secondary veins 12–15 on each side of midvein, adaxially impressed; tertiary veins abaxially slender, obscure. Infructescences to 7 cm; rachis ca. 9 mm thick; cupules in clusters of ca. 3. Cupule shallowly cupular, 1–1.4 × 2–2.6 cm, enclosing ca. 1/3 of nut, wall basally woody; bracts imbricate, triangular to rhomboid, appressed, thickened, adaxially ± raised, gray puberulent. Nut depressed globose, 1.2–1.6 × 2–2.4 cm, apex rounded; scar concave. Fl. Oct–Nov.

• Broad-leaved evergreen forests; ca. 2000 m. W Yunnan (W flank of Gaoligong Shan).

106. *Lithocarpus harlandii* (Hance ex Walpers) Rehder, *J. Arnold Arbor.* 1: 127. 1919.

港柯 gang ke

Quercus harlandii Hance ex Walpers, *Ann. Bot. Syst.* 3: 382. 1852; *Lithocarpus cuneiformis* A. Camus; *L. kawakamii* (Hayata) Hayata var. *chiaratuangensis* J. C. Liao; *Pasania chiaratuangensis* (J. C. Liao) J. C. Liao; *P. harlandii* (Hance ex Walpers) Oersted; *Q. harlandii* var. *integrifolia* Dunn; *Synaedrys harlandii* (Hance ex Walpers) Koidzumi.

Trees to 18 m tall, glabrous except for inflorescences. Branchlets purplish brown, dark brown when dry, sulcate. Petiole 2–3 cm; leaf blade lanceolate, elliptic, or oblanceolate, 7–18 × 3–6 cm, rigidly leathery, abaxially with scalelike glands, base often asymmetric and attenuate-cuneate to rarely acute or subrounded, margin obtusely undulate-dentate on apical part or rarely entire, apex caudate and often falcate; secondary veins 8–13 on each side of midvein; tertiary veins abaxially obscure. Inflorescences terminal at apex of current year's branches. Male inflorescences arranged in a panicle; rachis puberulent. Female inflorescence with cupules in clusters of ca. 3 or solitary, scattered on rachis. Infructescences 10–15 cm; rachis 4–5 mm thick. Cupule cupular, 6–10 mm × 1.4–2 cm, enclosing 1/10–1/6 of nut, wall 1–2 mm thick; bracts imbricate, triangular to rhomboid, lamellate, puberulent, margin and midvein ± ridged. Nut conical to broadly ellipsoid, 2.2–2.8 × 1.6–2.2 cm, apex rounded to obtuse, wall 1.5–2 mm thick; scar 0.9–1.2 cm in diam., concave. Fl. May–Jun, fr. Sep–Oct of following year.

• Broad-leaved evergreen forests; 400–700 m. Fujian, Guangdong, S Guangxi, Hainan, Hunan, S Jiangxi, Taiwan, Zhejiang.

107. *Lithocarpus kawakamii* (Hayata) Hayata, *Icon. Pl. Formosan.* 6 Suppl.: 72. 1917.

齿叶柯 chi ye ke

Quercus kawakamii Hayata, *J. Coll. Sci. Imp. Univ. Tokyo* 25(19): 201. 1908; *Pasania kawakamii* (Hayata) Schottky; *Synaedrys kawakamii* (Hayata) Koidzumi. Trees; trunk to 70 cm d.b.h. Branchlets grayish, densely lenticellate. Petiole 2–5 cm; leaf blade obovate-oblong to oblong, 12–25 × 5–7.2 cm, papery to thinly leathery, with scalelike glands when young, abaxially rusty scurfy along midvein, adaxially glabrous, base acute to attenuate and decurrent on petiole, margin with a few obtuse teeth near apex or sometimes entire, apex acute to shortly acuminate; secondary veins 12–25 on each side of midvein; tertiary veins abaxially conspicuous, subparallel. Male panicles to 20 cm; rachis and branches stout, with grayish scalelike glands. Female inflorescence rachis puberulent; cupules in clusters of ca. 3. Infructescence rachis 1–1.2 cm thick, lenticellate. Cupule plate-shaped, 7–10 mm × 1.5–2.5 cm, enclosing 1/5–1/4(–1/3) of nut, wall 1–2 mm thick and woody; bracts imbricate, triangular to rhomboid, appressed, with puberulent-scalelike glands. Nut chestnut brown, depressed globose to broadly conical, 1.6–2.2 × 2–2.8 cm, apex flat or pointed, wall ca. 0.5 mm thick; scar 1–1.5 cm in diam., concave. Fl. May–Aug, fr. Aug–Nov of following year.

• Broad-leaved evergreen forests; 700–2900 m. Taiwan.

108. *Lithocarpus brevicaudatus* (Skan) Hayata, *Icon. Pl. Formosan.* 6 Suppl.: 72. 1917.

短尾柯 duan wei ke

Quercus brevicaudata Skan in F. B. Forbes & Hemsley, *J. Linn. Soc., Bot.* 26: 508. 1899; *Lithocarpus brevicaudatus* var. *pinnativenus* Yamamoto; *L. impressivenus* (Hayata) Hayata; *L. impressivenus* var. *falcatacaudata* Yamamoto; *Pasania brevicaudata* (Skan) Schottky; *Q. impressivena* Hayata; *Synaedrys brevicaudata* (Skan) Koidzumi.

Trees 10–15 m tall. Branchlets of current year purplish brown, sulcate. Petiole 2–3 cm; leaf blade usually ovate, sometimes elliptic, oblong, or suborbicular, 6–15 × 4–6.5 cm, leathery, abaxially with pulverulent scalelike glands, base broadly cuneate, subrounded, or acute, ± auriculate, and sometimes asymmetric, margin entire, apex acute, acuminate, or long caudate; secondary veins 9–13 on each side of midvein; tertiary veins abaxially inconspicuous, reticulate. Male inflorescences arranged in a panicle, 4–8 cm; rachis tawny puberulent. Female inflorescences 8–10 cm; cupules in clusters of 3–5, rarely solitary. Cupule disc-shaped to cupular, rarely to 7 mm, 1.4–2 cm in diam., enclosing 1/8–1/6 of nut, outside tawny puberulent, wall to 3 mm and woody near base; bracts imbricate, triangular to rhomboid, squamose. Nut broadly conical, 1.4–2.2 cm in diam., often ± white farinose, apex shortly pointed or flat, wall ca. 3 mm thick near base; scar at base of nut, 0.9–1.2 cm in diam., concave. Fl. May–Jul, fr. Sep–Nov of following year.

• Mixed mesophytic forests, 300–1900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Zhejiang.

Very close to *Lithocarpus hancei*, and further studies may show that they are conspecific.

109. *Lithocarpus oblanceolatus* C. C. Huang & Y. T. Chang, *Guihaia* 8: 24. 1988.

峨眉柯 e mei ke

Trees to 15 m tall. Branchlets glabrous, lenticellate. Petiole 2–3 cm; leaf blade oblanceolate to sometimes oblong, 15–30 × 4–7 cm, rigidly leathery, concolorous, abaxially with grayish, pulverulent scalelike glands (visible under lens), adaxially glabrous, base cuneate and decurrent on petiole, margin entire, apex acuminate; secondary veins 9–11 on each side of midvein, adaxially ± impressed; tertiary veins abaxially conspicuous. Male inflorescences paniculate; rachis tawny pubescent. Female inflorescences to 20 cm, often with a few male flowers near apex; cupules in clusters of 3(–5). Infructescence rachis 6–10 mm thick. Cupule plate-shaped to cupular, 5–8(–13) mm × 1.5–3 cm, enclosing ca. 1/3 of nut, wall to 2.5 mm thick and woody near base; bracts imbricate, triangular to rhomboid, appressed, grayish puberulent. Nut conical, 2.4–3 × 1.8–2.8 cm, wall 1–1.5 mm thick; scar 1.2–1.8 cm in diam., concave. Fl. Jul–Aug, fr. Aug–Sep of following year.

• Sparse forests; ca. 2000 m. W Sichuan (Emei Shan).

110. *Lithocarpus megalophyllus* Rehder & E. H. Wilson in Sargent, *Pl. Wilson*. 3: 208. 1916.

大叶柯 da ye ke

Lithocarpus pleiocarpus A. Camus; *Quercus mairei* H. Léveillé (1913), not *Pasania mairei* Schottky (1912). Trees 15–25 m tall. Branchlets glaucous, glabrous, lenticellate. Petiole 2.5–6 cm, 3–6 mm thick; leaf blade obovate, obovate-elliptic, or elliptic, 14–30 × 6–13 cm, rigidly leathery, concolorous, abaxially with grayish, pulverulent scalelike glands (visible under hand lens), adaxially glabrous, base cuneate to subrounded, margin entire, apex acute; secondary veins 14–18 on each side of midvein, abaxially strongly raised, adaxially impressed; tertiary veins abaxially conspicuous, subparallel. Male panicle to 20 cm; rachis sparsely pubescent when young. Female inflorescences usually at apex of branches; cupules in clusters of 3(–5), sometimes solitary. Infructescences 10–14 cm; rachis 1–1.5 cm thick. Cupule plate-shaped to cupular, 4–10 mm × 2–3 cm, enclosing 1/6–1/3 of nut, wall 1–2 mm thick; bracts 1–1.4 mm. Nut conical and 2.4–2.8 × 2–2.5 cm to depressed globose and 1.6–1.8 × 2.8–3.2 cm, slightly shining, sometimes ± white farinose, apex flat or with a ± concave center, wall ca. 1 mm thick; scar 1.2–1.8 cm in diam., concave. Fl. May–Jun, fr. May–Jun of following year.

Mixed mesophytic forests; 900–2200 m. W Guangxi, N Guizhou, W Hubei, W Sichuan, E Yunnan [NE Vietnam].

111. *Lithocarpus henryi* (Seemen) Rehder & E. H. Wilson in Sargent, *Pl. Wilson*. 3: 209. 1916.

灰柯 hui ke

Quercus henryi Seemen, *Bot. Jahrb. Syst.* 23(Beibl. 57): 50. 1897; *Pasania henryi* (Seemen) Schottky.

Trees to 20 m tall. Branchlets of current year purplish brown. Petiole 1.5–3.5 cm; leaf blade narrowly oblong, 12–22 × 3–6 cm, leathery to rigidly leathery, abaxially with scalelike glands and grayish when dry, adaxially glabrous, base broadly cuneate and often asymmetric, margin entire, apex shortly acuminate; secondary veins 11–15 on each side of midvein, ± adaxially impressed; tertiary veins abaxially not visible. Male inflorescences solitary in leaf axils, racemose, 10–14 cm. Female and androgynous inflorescences to 20 cm; rachis tawny puberulent; cupules in clusters of ca. 3. Infructescences 7–12 cm; rachis 6–9 mm thick. Cupule cupular, 0.6–1.4 × 1.5–2.4 cm, enclosing ca. 1/2 of nut, wall to ca. 1.5 mm thick and ± woody near base; bracts imbricate, triangular, appressed, apical ones often separated. Nut depressed globose, 1.6–2 × 1.8–2.2 cm, often white farinose, apex rounded, wall 0.5–1 mm thick; scar 1–1.5 cm in diam., concave. Fl. Aug–Oct, fr. Aug–Oct of following year.

• Mixed mesophytic forests; 1400–2100 m. Anhui, NE Guizhou, W Hubei, W Hunan, Jiangsu, Jiangxi, S Shaanxi, E Sichuan.

112. *Lithocarpus silvicularum* (Hance) Chun, *J. Arnold Arb. bor.* 9: 152. 1928.

犁耙柯 li pa ke

Quercus silvicularum Hance, *J. Bot.* 22: 229. 1884; *Lithocarpus nariakii* (Hayata) Sakaki ex Kudo; *Pasania silvicularum* (Hance) Schottky; *Q. nariakii* Hayata; *Synaedrys silvicularum* (Hance) Koidzumi.

Trees to 20 m tall. Branchlets tawny pilose. Petiole 1–1.5 cm; leaf blade elliptic to obovate-elliptic, 10–20 × 3.5–6 cm, papery, abaxially with scalelike glands and tawny pilose along side, base cuneate and decurrent on petiole, margin entire or undulate on apical part, apex acute to narrowly acuminate; secondary veins 10–12 on each side of midvein; tertiary veins slender, inconspicuous to conspicuous. Male inflorescences in a panicle, rarely solitary; rachis sparsely pubescent. Female inflorescences 8–20 cm; cupules in clusters of 3–5. Infructescence rachis 1–1.2 cm thick. Cupule cupular, 0.8–1.5 × 2–3.5 cm, enclosing ca. 1/2 of nut, wall 1–1.5 mm thick and basally ± woody; bracts dark reddish brown, fused with wall of cupule or sometimes only subulate apex free, broadly triangular to rhomboid. Nut depressed globose, 1.2–1.6 × 2–2.5(–3) cm, glabrous, base flat, apex rounded or flat, wall 0.5–1 mm

thick; scar 1.4–1.8(–2.5) cm in diam., concave. Fl. Mar–May, fr. Jul–Sep of following year.

Broad-leaved evergreen forests; below 1200 m. SW Guangdong, SW Guangxi, Hainan, SE Yunnan [NE Vietnam].

113. *Lithocarpus litseifolius* (Hance) Chun, J. Arnold Arbor. 9: 152. 1928.

木姜叶柯 mu jiang ye ke

Trees to 20 m tall; branchlets and petioles sometimes ± white farinose when dry. Petiole 1.5–2.5 cm; leaf blade elliptic, obovate-elliptic, ovate, or rarely narrowly elliptic, 8–18 × 3–8 cm, papery to subleathery, concolorous to ± glaucous abaxially, base cuneate to broadly so, margin entire, apex acuminate to acute; secondary veins 8–11 on each side of midvein, obscure near margin; tertiary veins abaxially slender, evident, lax, reddish to yellowish brown when dry. Male inflorescences in a panicle, rarely solitary, to 25 cm. Female and androgynous inflorescences usually 2–6 congested at apex of branches, spiciform, to 35 cm; rachis sparsely pubescent; cupules in clusters of 3–5. Infructescences to 30 cm; rachis slender, rarely over 5 mm thick. Cupule plate-shaped, 0.8–1.5 cm in diam., covering base of nut, outside glabrous, wall 0.5–1 mm thick and woody basally; bracts imbricate but basal ones connate into concentric rings, triangular, appressed. Nut broadly conical, subglobose, or rarely depressed globose, 0.8–1.5 × 1.2–2 cm, glabrous or often ± white farinose, wall 0.2–0.5 mm thick; scar ca. 1.1 cm in diam., concave. Fl. May–Sep, fr. Apr–Oct of following year.

Broad-leaved evergreen forests, dense forests; 500–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Laos, NE Myanmar, N Vietnam]. Specimens reported from China as the Indian *Lithocarpus polystachyus* (Wallich ex A. de Candolle) Rehder are referable to *L. litseifolius* var. *litseifolius*.

1a. Rachis of infructescences glabrous 113a. var. *litseifolius*

1b. Rachis of infructescences densely pubescent 113b. var. *pubescens*

113a. *Lithocarpus litseifolius* var. *litseifolius*

木姜叶柯(原变种) mu jiang ye ke (yuan bian zhong) *Quercus litseifolia* Hance, J. Bot. 22: 228. 1884; *Lithocarpus mucronatus* (Hickel & A. Camus) A. Camus; *L. synbalanos* (Hance) Chun; *Pasania litseifolia* (Hance) Schottky; *P. lysistachya* Hu; *P. mucronata* Hickel & A. Camus; *P. synbalanos* (Hance) Schottky; *P. viridis* Schottky p.p. (all syntypes except A. Henry 9636); *P. wenshanensis* Hu; *Q. synbalanos* Hance; *Synaedrys litseifolia* (Hance) Koidzumi.

Branchlets glabrous. Rachis of infructescences glabrous. Cupule 0.8–1.4 cm in diam. Fr. Jun–Oct.

Broad-leaved evergreen forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Laos, NE Myanmar, N Vietnam].

This variety is drought resistant and is common in areas of high light intensity.

113b. *Lithocarpus litseifolius* var. *pubescens* C. C. Huang & Y. T. Chang, Guihaia 8: 11. 1988.

毛枝木姜叶柯 mao zhi mu jiang ye ke

Branchlets puberulent at apex. Leaf blade secondary veins adaxially impressed when young. Rachis of infructescences densely pubescent. Cupule 5–8 mm × 1.2–1.5 cm. Fr. Apr–May.

• Dense forests. Guangxi (Tian'e Xian).

114. *Lithocarpus taitoensis* (Hayata) Hayata, Icon. Pl. Formosan. 6 Suppl.: 72. 1917.

菱果柯 ling guo ke

Quercus taitoensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 297. 1911; *Lithocarpus brunneus* Rehder; *L. nakaii* Hayata; *L. rhombocarpus* (Hayata) Hayata; *L. suishaensis* Kanehira & Yamamoto; *L. tremulus* Chun; *Pasania nakaii* (Hayata) Nakai; *P. suishaensis* (Kanehira & Yamamoto) Nakai; *P. taitoensis* (Hayata) J. C. Liao; *Q. rhombocarpa* Hayata; *Synaedrys nakaii* (Hayata) Kudo; *S. rhombocarpa* (Hayata) Kudo; *S. taitoensis* (Hayata) Koidzumi.

Trees to 20 m tall. Branches of current year glabrous, sparsely puberulent, or densely pubescent. Petiole 1.5–3.5 cm; leaf blade ovate, broadly elliptic, narrowly elliptic, or sometimes obovate-elliptic, 6–12 × 2–5 cm, leathery, abaxially with lamellate scalelike glands and oily and shiny when young, base broadly cuneate to sometimes cuneate and often ± asymmetric, margin entire, apex abruptly acuminate and shortly caudate; secondary veins 7–10 on each side of midvein, usually adaxially impressed; tertiary veins abaxially not visible or rarely slender, reticulate. Male inflorescences usually solitary in leaf axils, 4–6 cm. Female inflorescences to 20 cm; cupules in clusters of ca. 3. Infructescence rachis 3–7 mm thick. Cupule plate-shaped, 1–1.5 cm in diam., covering base of nut, wall woody and basally thickened; bracts usually connate into concentric rings but apical ones imbricate, triangular, small, appressed. Nut conical, 1.2–1.8 × 1–1.5 cm, often white farinose, apex shortly pointed or rarely flat, wall 0.5–1 mm thick; scar 5–9 mm in diam., concave. Fl. May–Sep, fr. Aug–Dec of following year.

• Mixed mesophytic forests; ca. 1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

Very close to *Lithocarpus litseifolius*, and could be treated as conspecific.

115. *Lithocarpus nitidinix* (Hu) Chun ex C. C. Huang & Y. T. Chang, Guihaia 8: 27. 1988.

光果柯 guang guo ke

Pasania nitidinix Hu, Acta Phytotax. Sin. 1: 115. 1951.

Trees to 18 m tall, glabrous except for inflorescences. Petiole ca. 1 cm; leaf blade narrowly oblong, 10–18 × 4–6 cm, thickly papery, concolorous, base cuneate, margin entire, apex acuminate; secondary veins 11–16 on each side of midvein; tertiary veins reticulate,

abaxially slender, conspicuous on both surfaces. Infructescence rachis 1–1.4 cm thick, sparsely lenticellate; lenticels small. Cupules in clusters of ca. 3, cupular, enclosing 1/5–1/4 of nut, wall ± woody and basally thickened; bracts imbricate, broadly triangular, appressed, grayish puberulent. Nut depressed globose, ca. 1.4 × 2.5 cm, apex ± flat; scar ca. 1.3 cm in diam., concave. Fr. Aug–Oct.

• Sparse forests on calcareous mountains; ca. 1100 m. SW Guizhou, SE Yunnan (Xichou Xian).

116. *Lithocarpus phansipanensis* A. Camus, Bull. Soc. Bot. France 90: 199. 1943 [1944].

桂南柯 *gui nan ke*

Trees ca. 3 m tall. Branchlets of current year sulcate. Petiole 3–5 mm, white farinose when dry; leaf blade broadly obovate, 4–6.5 × 2.5–4 cm, rigidly leathery, abaxially with dense scalelike glands and ± glaucous when dry, base broadly cuneate and decurrent on petiole, apex rounded; secondary veins 10–12 on each side of midvein, ending at margin; tertiary veins abaxially not visible. Female inflorescences 2–4, congested at apex of branches, 4–7 cm; rachis ± with scalelike glands; cupules in clusters of ca. 3. Mature cupules unknown. Fl. Feb.

Scrub on hill tops; ca. 1000 m. Guangxi (Shangsi Xian) [N Vietnam].

Further study is needed to determine whether plants named as *Lithocarpus phansipanensis* from Guangxi are in fact this species.

117. *Lithocarpus confinis* C. C. Huang ex Y. C. Hsu & H. W. Jen, Acta Phytotax. Sin. 14(2): 84. 1976.

窄叶柯 *zhai ye ke*

Trees to 10 m tall, glabrous except for inflorescences. Branchlets blackish when dry. Petiole rarely to 1 cm, base ± thickened; leaf blade oblong to lanceolate, 5–13 × 1.2–3.5 cm, thickly papery, abaxially ± glaucous and with scalelike glands, base cuneate and decurrent on petiole, margin entire, apex shortly acuminate to obtuse; secondary veins 12–16 on each side of midvein, slender, evident, irregularly spaced, sometimes ramified far from margin; tertiary veins abaxially very slender, evident or not visible. Male inflorescences solitary or in a panicle; rachis glabrous or subglabrous. Female inflorescences in clusters of 2–6 at apex of branches; rachis ± puberulent, with tawny scalelike glands; cupules in clusters of ca. 3. Infructescence rachis 4–7 mm thick. Cupule plate-shaped, 1–3 mm × 1–1.6 cm, covering only base of nut, wall 0.5–1 mm thick; bracts imbricate, triangular, very small, appressed, with puberulent scalelike glands. Nut depressed globose to rarely conical, 1–1.8 × 1.4–2 cm, sometimes ± white farinose, apex ± flat with a concave center to rarely shortly pointed, wall ca. 1 mm thick; scar 5–8 mm in diam., concave. Fl. Jun–Aug, fr. Aug–Oct of following year.

• Secondary forests on dry slopes; 1500–2400 m. W Guizhou, C to E Yunnan.

118. *Lithocarpus hypoglaucus* (Hu) C. C. Huang ex Y. C. Hsu & H. W. Jen, Acta Phytotax. Sin. 14(2): 76. 1976.

灰背叶柯 *hui bei ye ke*

Pasania hypoglauca Hu, Bull. Fan Mem. Inst. Biol., Bot. 10: 101. 1940; *Lithocarpus houanglipinensis* A. Camus; *L. wangianus* A. Camus; *Pasania yungjenensis* Hu.

Trees 10–20 m tall. Branchlets glabrous. Petiole 1.5–2 cm; leaf blade ovate to lanceolate, 7–15 × 2–6 cm, thickly papery, concolorous when young, abaxially glaucous and often with scurfy scalelike glands with age, adaxially glabrous, base attenuate-cuneate and decurrent on petiole, margin entire, apex acuminate to acute; secondary veins 7–9 on each side of midvein; tertiary veins abaxially inconspicuous. Male inflorescences solitary or in a panicle, 6–15 cm. Female inflorescences at apex of branches, 7–15 cm; rachis with scurfy scalelike glands; cupules in clusters of (2 or)3. Cupule plate-shaped when mature, 1.5–5 mm × 1.2–1.8 cm, covering on base of nut, wall 0.5–1.5 mm thick; bracts imbricate, triangular, small, appressed, with tawny, scurfy scalelike glands. Nut depressed globose to broadly conical, 1–1.5 × 0.8–2 cm, apex slightly concave to pointed, wall ca. 0.5 mm thick; scar 0.8–1.2 cm in diam., concave. Fl. Jul–Sep, fr. Aug–Oct of following year.

• Mixed mesophytic forests; 1700–3000 m. SW Sichuan, NW Yunnan.

119. *Lithocarpus listeri* (King) Grierson & D. G. Long, Notes Roy. Bot. Gard. Edinburgh 40: 134. 1982.

谊柯 *yi ke*

Quercus listeri King, Ann. Roy. Bot. Gard. (Calcutta) 2: 89. 1889.

Trees to 15 m tall. Branchlets of current year sulcate, glabrous, dark brown when dry, sparsely lenticellate. Petiole 3–5 cm; leaf blade ovate-lanceolate to narrowly lanceolate, 20–35 × 8–12 cm, leathery, base cuneate, margin entire, apex acuminate; secondary veins 9–12 on each side of midvein; tertiary veins subparallel. Male inflorescences in a panicle, 2–3 cm; rachis densely pubescent. Female inflorescences with cupules in clusters of ca. 3; bracts of young cupules imbricate, ovate-triangular. Mature cupules unknown. Fl. Jun–Aug.

Broad-leaved evergreen forests; ca. 1000 m. SE Xizang (Mêdog Xian) [Bhutan, NE India, NE Myanmar, Nepal].

120. *Lithocarpus calolepis* Y. C. Hsu & H. W. Jen, Acta Phytotax. Sin. 14(2): 83. 1976.

美苞柯 *mei bao ke*

Trees ca. 15 m tall. Young branchlets dark purplish brown, conspicuously sulcate. Petiole 1–2.5 cm; leaf blade lanceolate to oblanceolate, 8–15 × 2.5–5 cm, rigidly papery, base shortly cuneate to broadly so, margin entire, apex shortly to long acuminate; secondary veins 13–16 on each side of midvein, very slender, evident; tertiary veins abaxially not visible.

Male inflorescences in a panicle; rachis puberulent. Female and androgynous inflorescences 6–18 cm; cupules in clusters of ca. 3. Infructescence rachis 6–10 mm thick, basally minutely lenticellate. Cupule plate-shaped, 0.5–1.5 × 1.8–2.5 cm, basally narrowed; bracts triangular to rhomboid, squamate, appressed, with grayish puberulent scalelike glands, sometimes basal ones connate into 2 or 3 concentric rings. Nut depressed globose, 1.5–2 × 2–2.5 cm, apex rounded to ± flat, wall 1–1.5 mm thick; scar 1.2–1.5 cm in diam., concave. Fl. May–Jun, fr. Oct–Nov of following year.

• Mixed mesophytic forests of calcareous formation; 1000–1800 m. SE Yunnan (Xichou Xian).

121. *Lithocarpus haipinii* Chun, J. Arnold Arbor. 28: 233. 1947.

耳柯 an er ke

Trees to 30 m tall; branchlets, petioles, and rachis of inflorescences densely with grayish to tawny long hairs. Petiole 2–3.5 cm; leaf blade broadly elliptic, ovate, obovate, or obovate-elliptic, 8–15 × 4–8 cm, rigidly leathery, abaxially densely pilose, margin recurved, apex rounded to acute, sometimes shortly cuneate, and often asymmetric; secondary veins 9–13 on each side of midvein, secondary and tertiary veins adaxially impressed; tertiary veins abaxially slender, evident. Male inflorescences in a panicle, densely brown tomentose. Female inflorescences shorter than male, usually terminal at apex of branches, 6–14 cm; cupules in clusters of 3–5. Young cupules completely enclosing nut; bracts linear. Mature cupules plate-shaped, 3–6 mm × 1.5–2.5 cm, wall ± woody; bracts reflexed, tip hooked. Nut subglobose but slightly depressed, 1.8–2.6 × 2–3 cm, white farinose when young, base flat; scar 0.8–1.4 cm in diam., concave. Fl. Jul–Aug, fr. Jul–Aug of following year.

• Mixed mesophytic forests, frequent on gentle dry slopes; below 1000 m. Guangdong, Guangxi, S Guizhou, S Hunan.

122. *Lithocarpus qinzhouicus* C. C. Huang & Y. T. Chang, Guihaia 8: 17. 1988.

钦州柯 qin zhou ke

Trees; branchlets, petioles, and rachis of inflorescences densely tomentose with short hairs. Petiole 1–1.5 cm; leaf blade lanceolate, 8–12 × 2–3 cm, rigidly leathery, abaxially densely tomentose with short hairs, soon glabrescent, with scalelike glands, and glaucous or grayish when dry, base attenuate, decurrent on petiole, margin entire or undulate from middle to apex; apex attenuate, secondary veins 9–14 on each side of midvein, adaxially slightly impressed; tertiary veins abaxially not visible but very slender, evident. Female and/or androgynous inflorescences in pairs, terminal at apex of branches, 10–15 cm. Female inflorescences with cupules in clusters of 3–5. Cupule plate-shaped, 1.5–2.2 cm in diam., enclosing basal part of nut; bracts spiny when young, thickly linear, 3–5 mm when mature, reflexed, tip hooked, grayish pubescent. Nut depressed

globose, less than 1 cm, 1.5–2 cm in diam., grayish farinose; scar 1–1.2 cm in diam., concave. Fr. Sep–Oct.

• Broad-leaved evergreen forests or in association with *Pinus massoniana* and other species of *Lithocarpus*; ca. 200 m. Guangxi (Qinzhou Xian), Guizhou (Libo Xian).

123. *Lithocarpus areca* (Hickel & A. Camus) A. Camus, Riviera Sci. 18: 39. 1931 [1932].

槟榔柯 bin lang ke

Pasania areca Hickel & A. Camus, Ann. Sci. Nat., Bot., sér. 10, 3: 404. 1921; *P. longinux* Hu.

Trees 10–15 m tall. Branchlets grayish, glabrous, lenticellate. Petiole 0.5–1.5 cm; leaf blade oblanceolate to narrowly oblong, 13–25 × 3.5–5.5 cm, papery, concolorous, both surfaces glabrous or with tuft of hairs at axils of veins, both ends attenuate, base decurrent on petiole, margin with a few sharp teeth from middle to apex or sometimes entire; secondary veins 9–15 on each side of midvein and usually adaxially ± impressed; tertiary veins abaxially conspicuous. Male inflorescences axillary, solitary or rarely in a panicle, 5–8 cm, densely flowered; rachis slender. Female inflorescences 4–10 cm, often androgynous with female flowers on basal part of rachis; cupules in clusters of 3–5, usually 1 developed. Infructescence rachis ca. 5 mm thick. Cupule discoid, 1.6–1.8 cm in diam., covering base of nut, wall 1–2 mm thick; bracts linear, 2–4 mm when young, to 8 mm when mature. Nut ellipsoid to long conical but flat at apical part, 4–5 × 2–3.5 cm, with 3 longitudinal obtuse ridges, glabrous, apex pointed, wall 2–3 mm thick; scar 0.8–1.5 cm in diam., concave. Fl. Oct, fr. Nov of following year.

Broad-leaved evergreen forests; 800–1500 m. W Guangxi, SE Yunnan [N Vietnam].

Flora of China 4: 333–369. 1999.