

5. **LINDERA** Thunberg, Nov. Gen. Pl. 64. 1783, nom. cons., not Adanson (1763).

山胡椒属 shan hu jiao shu

Cui Hongbin (崔鸿宾 Tsui Hung-pin); Henk van der Werff

Aperula Blume; *Benzoin* Schaeffer; *Daphnidium* Nees; *Parabenzoin* Nakai; *Polyadenia* Nees.

Evergreen or deciduous trees or shrubs, aromatic, dioecious. Leaves alternate, entire on margins or 3-lobed, pinninerved, tri-nerved, or triplinerved. Umbels singular and axillary, or 2 to numerous tufted on abbreviated and axillary branch, pedunculate or not; involucre bracts 4, decussate. Flowers unisexual, yellow or greenish yellow. Tepals 6, sometimes 7–9, equal in size or outer whorl slightly larger, usually deciduous. Male flowers with 9 fertile stamens, sometimes 12, stamens usually arranged into 3 whorls; anthers 2-celled, introrse, with 2 stipitate glands at filament base; reduced pistil small, sometimes style and stigma joined in a small mucro. Female flowers: staminodes usually 9, sometimes 12 or 15, fasciated, with 2 flat sessile reniform glands, on both sides of staminodes; ovary globose or ellipsoid. Berry or drupe, globose or ellipsoid, green when young and red or purple at maturity, with 1 seed; perianth tubes inflated into a hypocarpium at base of fruit or cup-shaped and enclosed from base to middle of fruit.

About 100 species: temperate to tropical regions of Asia and North America; 38 species (23 endemic) in China; one additional species is of uncertain placement.

The following species were described from China but could not be treated here because no material was seen by the present authors:

Lindera sinensis (Blume) Hemsley (J. Linn. Soc., Bot. 26: 392. 1891; *Daphnidium sinense* Blume, Mus. Bot. 1: 352. 1851), described from China.

Lindera velutina H. Liu (Laurac. Chine & Indochine, 137. 1932), described from Guizhou.

1a. Leaves trinerved or triplinerved.

2a. Deciduous; fruits globose; short branchlets bearing inflorescence in leaf axil developing into normal branch.

3a. Leaves trifid, occasionally pentafid, trinerved, sometimes pentanerved 24. *L. obtusiloba*

3b. Leaves entire, trinerved or triplinerved.

4a. Umbels pedunculate; leaves trinerved or triplinerved 23. *L. neesiana*

4b. Umbels not pedunculate or peduncles less than 3 mm; leaves triplinerved 22. *L. rubronervia*

2b. Evergreen; fruits ellipsoid; short branchlets bearing inflorescence usually not developing into normal branch.

5a. Umbels solitary, inserted at upper leaf axil and lower bract axil on current year branchlets, peduncles slender, 1–2.5 cm, 10–20 × length of flower stipe; male flowers: stamens in 3rd whorl sometimes sterile, fasciated 25. *L. tienchuanensis*

5b. Inflorescences 1 to several, inserted on short branchlets, short branchlets usually not developing into normal branchlets, not pedunculate or shortly pedunculate and peduncles rather thick, usually less than 1 cm; male flowers: stamens in 3rd whorl fertile.

6a. Umbels distinctly pedunculate.

7a. Leaf blade elliptic to narrowly elliptic, caudate at apex, densely golden or white appressed sericeous abaxially, first and second pairs lateral veins not joined at apex and not inflexed 26. *L. chunii*

7b. Leaf blade ovate or ovate-oblong, apex acuminate, densely ferruginous pubescent on veins and then glabrous abaxially, first and second pairs lateral veins joined at apex and inflexed 27. *L. tonkinensis*

6b. Umbels not pedunculate or shortly pedunculate, peduncle less than 3 mm.

8a. Leaf blade usually 15 cm, rarely 10–12 cm; branchlets stout, current year branchlets usually more than 3 mm in diam.

9a. Young branchlets and abaxial surface of leaf blade glabrous 30. *L. lungshengensis*

9b. Young branchlets and abaxial surface of leaf blade densely hairy.

10a. Young branchlets and abaxial surface of leaf blade ferruginous or brown pubescent; leaf blade elliptic or oblong, leathery; fruit stipes more than 5 mm 28. *L. prattii*

10b. Young branchlets and abaxial surface of leaf blade densely yellowish villous or tomentose; leaf blade broadly ovate, papery; fruit stipes not more than 5 mm 29. *L. guangxiensis*

8b. Leaf blade usually 6–11 cm (ca. 3.5 cm in *L. fragrans*, ca. 5 cm in *L. supracostata*); current year branchlets usually less than 3 mm in diam.

11a. Young branchlets and abaxial surface of leaf blade very densely hairy, 2-year-old branchlets and leaves rather densely hairy, at least on furcate part of branchlet and veins of leaf blade abaxially.

12a. Leaf blade ovate, elliptic, or subrounded, acuminate or caudate-acuminate at apex, young branchlets and abaxial surface of leaf blade densely golden sericeous, brown pubescent, or glabrous 38. *L. aggregata*

- 12b. Leaf blade elliptic, oblong, or ovate, apex acuminate, young branchlets and abaxial surface of leaf blade densely gray-brown tomentose or yellowish brown tomentose.
- 13a. Buds, young branchlets, and abaxial surface of leaf blade densely gray-brown tomentose; 2-year-old branchlets gray-brown, slightly pubescent, rather smooth; leaf blade ovate or elliptic, old leaves at least tomentose abaxially on veins 36. *L. floribunda*
- 13b. Buds densely brown pubescent, young branchlets and abaxial surface of leaf blade, especially petiole, densely yellowish brown pubescent; 2-year-old branchlets yellowish brown, nearly glabrous, many lenticellate, rather scabrous; leaf blade oblong or obovate, later glabrate or only villous on midrib 37. *L. villipes*
- 11b. Young branchlets and abaxial surface of leaf blade laxly or densely pubescent, later glabrate or nearly glabrous.
- 14a. Fruits up to 1.4 cm; old leaves sometimes slightly black pubescent abaxially 35. *L. thomsonii*
- 14b. Fruits less than 1 cm; old leaves not slightly black pubescent abaxially.
- 15a. Leaf veins more convex adaxially than abaxially; filament, ovary, and style pubescent or glabrous.
- 16a. Leaf blade caudate-acuminate at apex, ± repand on margin, first pair of lateral veins not elongate along margin up to apex; filament, ovary, and style pubescent 31. *L. supracostata*
- 16b. Leaf blade acuminate at apex, not repand on margin, first pair of lateral veins elongate along margin up to apex, sometimes very near margin; filament, ovary, and style glabrous 32. *L. fragrans*
- 15b. Leaf veins more convex abaxially than adaxially; filament, ovary, and style ± pubescent.
- 17a. Branch surface with a thin layer of white exudations; leaf blade broadly ovate or broadly elliptic, sometimes ovate or elliptic, acute at apex 33. *L. limprichtii*
- 17b. Branch surface without white exudations; leaf blade narrowly ovate, oblong, or oblong-lanceolate, caudate-acuminate at apex 34. *L. pulcherrima*
- 1b. Leaves pinninerved.
- 18a. Umbels each one inserted at both sides under apical or axillary buds (i.e., short branch) or mixed bud (e.g., *L. glauca*), short branchlet developing into normal branchlet.
- 19a. Umbels distinctly pedunculate; hypocarpium developed, cup-shaped or shallowly cup-shaped, enclosed at or above base of fruit; fertile stamens with funnellform and long-stipitate glands.
- 20a. Leaves loose; fruits globose 3. *L. chienii*
- 20b. Leaves clustered at apex of branch; fruits ellipsoid.
- 21a. Hypocarpium cup-shaped; trees 1. *L. megaphylla*
- 21b. Hypocarpium shallowly cup-shaped; shrubs 2. *L. setchuenensis*
- 19b. Umbels not pedunculate or peduncles shorter than pedicels and fruit stipes; hypocarpium not distinctly developed; fertile stamens with broadly reniform and stipitate glands.
- 22a. Umbels pedunculate, peduncles shorter than stipes of flowers and fruits.
- 23a. Leaf blade oblanceolate or obovate, red in autumn; young branchlets grayish white or grayish yellow, scabrous 4. *L. erythrocarpa*
- 23b. Leaf blade elliptic or broadly elliptic; young branchlets smooth, greenish gray or yellow-green.
- 24a. Young branchlets without lenticels, yellow-green; fruits less than 1 cm in diam., stipes without lenticels 5. *L. reflexa*
- 24b. Young branchlets with lenticels, greenish gray; fruits more than 1 cm in diam., stipes with lenticels 6. *L. praecox*
- 22b. Umbels not pedunculate or peduncles less than 3 mm.
- 25a. Leaf blade obovate to oblanceolate, usually apex rounded; branchlets gray or grayish black 9. *L. kariensis*
- 25b. Leaf blade broadly ovate, elliptic, or elliptic-lanceolate, acuminate or acute at apex; branchlets yellow-green or white-yellow.
- 26a. Young branchlets white-yellow, brown pubescent; leaf blade broadly ovate or elliptic, occasionally nearly lanceolate; bud scales not keeled 7. *L. glauca*
- 26b. Young branchlets yellow-green, glabrous; leaf blade elliptic-lanceolate, apex rounded; bud scales keeled 8. *L. angustifolia*

- 18b. Inflorescences clustered in leaf axil (i.e., many umbels inserted under apical bud of short branchlets in leaf axil), short branchlet usually 2–3 mm, developing or not developing into normal branchlet.
- 27a. Umbels not pedunculate or shortly pedunculate, less than 3 mm, short branchlets bearing umbels not developed.
- 28a. Young branchlets and abaxial surface of leaves densely yellow-brown villous, later slightly villous; leaf blade 6–11 × 3.5–6 cm 19. *L. nacusua*
- 28b. Young branchlets and abaxial surface of leaves laxly or densely yellow-white, gray-green, or yellow-brown pubescent, later glabrous or glabrate; leaf blade 3–9 × 1.5–3.5 cm.
- 29a. Perianth tube indistinct; leaf blade 4–9 cm 20. *L. communis*
- 29b. Perianth tube obconical; leaf blade 3–5 cm 21. *L. akoensis*
- 27b. Umbels and infructescences pedunculate, peduncles usually longer than or equaling length of pedicels and fruit stipes, short branchlets bearing umbels developing into normal branchlets.
- 30a. Peduncles slender, more than ca. 4 × length of pedicels and ca. 7 × length of fruit stipes; fruits ovate 10. *L. gracilipes*
- 30b. Peduncles less than 4 × length of pedicels and 7 × length of fruit stipes; fruits globose.
- 31a. Leaf blade glabrous or laxly pubescent abaxially and on veins.
- 32a. Leaf blade narrowly elliptic, usually more than 13 cm, reddish when dry 11. *L. longipedunculata*
- 32b. Leaf blade elliptic-lanceolate, lanceolate, or oblong, usually less than 13 cm, not reddish when dry.
- 33a. Lateral veins on both surfaces of leaf blade indistinct, leaf blade elliptic-lanceolate, papery 12. *L. kwangtungensis*
- 33b. Lateral veins on both surfaces of leaf blade distinct, leaf blade oblong, elliptic, or lanceolate, leathery, thinly leathery, or papery.
- 34a. Leaf blade leathery, oblong, grayish brown when dry; young branchlets robust, usually more than 3 mm thick 13. *L. robusta*
- 34b. Leaf blade papery or thinly leathery, elliptic to lanceolate, grayish brown or purple-brown when dry; young branchlets usually less than 3 mm thick 14. *L. metcalfiana*
- 31b. Leaf blade densely pubescent abaxially.
- 35a. Leaf blade subleathery, densely brown pubescent or villous.
- 36a. Lateral veins 5–7 pairs, reticulate veins convex, honeycombed adaxially; young branchlets cylindric; leaf blade narrowly elliptic, 7.5–20.5 × 3–8 cm, shortly acuminate at apex 15. *L. foveolata*
- 36b. Lateral veins 9 or 10 pairs, reticulate veins not convex, not honeycombed adaxially; young branchlets angular; leaf blade usually ovate-oblong, 11–18 × 4–7 cm, cuneate at apex 16. *L. menghaiensis*
- 35b. Leaf blade papery, yellow-white pannose or gray-white or gray-yellow hirsute abaxially.
- 37a. Leaf blade yellow-white pannose abaxially; fruits 4–5 mm in diam. 17. *L. motuoensis*
- 37b. Leaf blade gray-white or gray-yellow hirsute abaxially; fruits ca. 6 mm in diam. 18. *L. latifolia*

1. *Lindera megaphylla* Hemsley, J. Linn. Soc., Bot. 26: 389. 1891.

黑壳楠 hei ke nan

Actinodaphne crassa Handel-Mazzetti; *Benzoin grandifolium* Rehder; *B. oldhamii* (Hemsley) Rehder; *B. pricei* (Hayata) Kamikoti; *B. touyunense* (H. Léveillé) Rehder; *B. touyunense* f. *megaphyllum* (Hemsley) Rehder; *B. touyunense* f. *trichocladum* Rehder; *Lindera megaphylla* f. *touyunensis* (H. Léveillé) Rehder; *L. megaphylla* f. *trichoclada* (Rehder) W. C. Cheng; *L. oldhamii* Hemsley; *L. pricei* Hayata; *Litsea touyunensis* H. Léveillé.

Trees evergreen, 3–15(–25) m tall, more than 35 cm d.b.h. Bark gray-black. Branchlets terete, robust, purple-black, glabrous or pubescent, with subrounded and longitudinally dehiscent lenticels. Terminal bud ovate, ca. 1.5 cm; bud scales white

puberulent outside. Leaves alternate; petiole 1.5–3 cm, glabrous or pubescent; leaf blade green and shiny abaxially, greenish white adaxially, oblanceolate to obovate-oblong, sometimes narrowly ovate, 10–23 cm, leathery, glabrous on both surfaces or laxly or densely pubescent abaxially, later glabrate, pinnately nerved, lateral veins 15–21 pairs, base attenuate, apex acute or acuminate. Umbel inserted in both sides of short branchlet, many flowered, with 16 male flowers and 12 female flowers; short branchlets axillary, ca. 3.5 mm, with terminal bud; peduncles of male inflorescence 1–1.5 cm and of female inflorescence ca. 6 mm, both densely yellow-brown or nearly ferruginous puberulent. Male flowers yellow-green, ca. 6 mm, pedicellate; tepals 6, elliptic, outer 3 ca. 4.5 × 2.8 mm, laxly yellow-brown puberulent on lower and abaxial parts, inner 3 rather short; filaments laxly pubescent, 2-glandular at base in 3rd whorl; glands funnelform, ca. 2 mm, stipitate; reduced pistil ca. 2.5 mm, glabrous; ovary ovate; style slender; stigma indistinct.

Female flowers yellow-green, 1.5–3 mm, pedicellate, densely yellow-brown pubescent; tepals 6, linear-spatulate, ca. 2.5 × 1 mm, yellow-brown pubescent outside on lower part or along keel; reduced stamens 9; anthers linear or clavate, barbate at base, 2-glandular at middle of filament in 3rd whorl; glands funnelform; ovary ovate, ca. 1.5 mm, glabrous; style very slender, ca. 4.5 mm; stigma peltate, papillose. Fruit ellipsoid or ovate, ca. 1.8 × 1.3 cm, purple-black at maturity, glabrous; stipes ca. 1.5 cm, scabrous; persistent hypocarpium cup-shaped, ca. 8 mm × 1.5 cm, entire, slightly sinuous. Fl. Feb–Apr, fr. Sep–Dec.

• Evergreen broad-leaved forests or thickets in wet places on mountain slopes or in valleys; 1600–2000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan.

Two sympatric forms have been recognized: f. *megaphylla*, with branchlets and leaf blade glabrous, and f. *touyunensis* (毛黑壳楠 *mao hei qiao nan*), with branchlets and leaf blade ± pubescent, later at least slightly pubescent on the veins.

The wood is used in woodwork and as building materials. The leaves and pericarp are processed for their aromatic oil. The seed oil is used for making soap.

2. *Lindera setchuenensis* Gamble in Sargent, Pl. Wilson. 2: 82. 1914.

四川山胡椒 *si chuan shan hu jiao*

Actinodaphne setchuenensis (Gamble) C. K. Allen; *Benzoin setchuenense* (Gamble) Rehder.

Shrubs evergreen, ca. 2.5 m tall. Bark gray-brown. Branchlets gray-green, many lenticellate, brown or black-brown when dry. Buds conical, ca. 5 mm; bud scales glabrous. Leaves alternate, usually congregated at apex of branch, fasciated; leaf blade 9–12(–17) × 1.4–1.5(–2.8) cm, blue-green and yellow pubescent abaxially, densely pubescent on veins, green and glabrous adaxially, brown-yellow abaxially and black-brown adaxially when dry, pinninerved, lateral veins (10–)15–17(–21) pairs, base cuneate, apex acuminate. Umbels inserted at both sides of leaf bud; peduncles 4–5 mm, puberulent; involucre bracts 4, glabrous, persistent in bloom, 5-flowered inside. Male flowers: pedicels 3–4 mm, pedicels and perianth tubes villous; tepals oblanceolate, ca. 1.7 mm, ca. 1.5 mm in inner whorl, glabrous; stamens ca. 2 mm in 1st and 2nd whorls, ca. 1.5 mm in 3rd whorl; filaments slender, glabrous, 2-glandular on upper part of base in 3rd whorl; glands funnelform, stipitate; reduced pistil small; ovary ellipsoid, less than 0.5 mm; style and stigma thickly mucro-shaped. Female flowers: pedicels ca. 3 mm, pedicels and perianth tubes villous; tepals fasciated, glabrous, ca. 1.5 × 0.3 mm in outer whorl, ca. 1.2 × 0.2 mm in inner whorl, sometimes becoming reduced-stamenlike with a clavate gland inserted at base; stamens of 1st and 2nd whorl ca. 1.5 mm, stamens of 3rd whorl ca. 1.2 mm, 2-glandular above base of filament; glands funnelform, long stipitate; anthers of reduced stamens fasciated, slightly broad at apex, glabrous; pistil glabrous; ovary ellipsoid, ca. 0.7 mm; style ca. 1.5 mm; stigma disciform. Fruit 1, ellipsoid, ca. 2 cm × 8 mm; stipes ca. 5 mm, glabrous; hypocarpium enveloped above base of fruit, ca. 6 mm in diam. Fl. Feb, fr. Sep.

• Mountain slopes, under sparse forests; ca. 1500 m. Guizhou, Sichuan.

3. *Lindera chienii* W. C. Cheng, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 9: 193. 1934.

江浙山胡椒 *jiang zhe shan hu jiao*

Shrubs or small trees, deciduous, up to 5 m tall. Bark gray. Branchlets usually gray, sometimes slightly brown, striate, densely white pubescent, later glabrate. Terminal bud narrowly ovate, apex acuminate. Leaves alternate; petiole 2–10 mm, white pubescent; leaf blade oblanceolate or obovate, 6–10(–15) × 2.5–4(–5) cm, papery, abaxially greenish and white pubescent on veins, adaxially dark green and laxly pubescent on midrib, later glabrate, pinninerved, lateral veins 5–7 pairs, reticulate veins distinct, base cuneate, apex shortly acuminate. Umbels usually each inserted at both sides of axillary bud; peduncles 5–7 mm, white pubescent; involucre bracts 4, 6–12-flowered inside. Pedicels ca. 1.5 mm, densely white pubescent. Male flowers: tepals elliptic, 3.5–4 × 1–1.5 mm, pubescent outside, glabrous inside; filaments in 1st and 2nd whorls ca. 3 mm, in 3rd whorl ca. 2.5 mm, 2-glandular at base of filament; glands funnelform, long stipitate; reduced pistil broadly ovate, ca. 1 mm, glabrous. Female flowers: tepals elliptic or ovate, 1.5–1.8 × 0.5–1 mm, pubescent outside, glabrous inside; reduced stamens fasciated, glabrous; filament in 1st and 2nd whorls ca. 1.5 mm, in 3rd whorl ca. 1 mm, 2-glandular at middle of filament; glands triangular, stipitate; ovary ovoid, glabrous; stigma capitate. Fruit red at maturity, subglobose, 10–11 mm in diam.; hypocarpium enlarged, ca. 7 mm in diam.; fruiting pedicels 6–12 mm. Fl. Mar–Apr, fr. Sep–Oct.

• Roadsides, mountain slopes, forests. Anhui, Henan, Jiangsu, Zhejiang.

4. *Lindera erythrocarpa* Makino, Bot. Mag. (Tokyo) 11: 219. 1897.

红果山胡椒 *hong guo shan hu jiao*

Benzoin erythrocarpum (Makino) Rehder; *Lindera erythrocarpa* var. *longipes* S. B. Liang; *L. funiushanensis* C. S. Zhu; *L. henanensis* H. P. Tsui.

Shrubs or trees, deciduous, up to 5 m tall. Bark gray-brown. Young branchlets usually gray-white or gray-yellow, many lenticellate, scabrous from corky protuberances. Winter buds long conical, ca. 1 cm. Leaves alternate; petiole 0.5–1 cm; leaf blade usually oblanceolate, occasionally obovate, (5–)9–12(–15) × (1.5–)4–5(–6) cm, papery, greenish white and appressed pubescent abaxially and densely on veins, green and laxly appressed pubescent adaxially, pinninerved, lateral veins 4 or 5 pairs, base narrowly cuneate, usually decurrent, apex acuminate. Umbels each inserted at both sides of axillary bud; peduncles ca. 5 mm; involucre bracts 4, ciliate, 15–17-flowered inside. Male flowers: pedicels laxly pubescent, ca. 3.5 mm; tepals 6, yellow-green, nearly equal, elliptic, apex rounded, ca. 2 × 1.5 mm, laxly pubescent outside, glabrous inside; stamens 9, equal in length, ca. 1.8 mm; filaments glabrous, 2-glandular at base in 3rd whorl; glands broadly reniform, shortly stipitate; reduced pistil exerted at center. Female flowers rather small;

pedicels ca. 1 mm; tepals 6, nearly equal in inside and outside whorls, elliptic, apex rounded, ca. 1.2×0.6 mm, densely pubescent outside and laxly appressed pubescent inside; reduced stamens 9, ca. 0.8 mm, 2-glandular at base of filaments in 3rd whorl; glands elliptic, sessile; anthers fasciated; pistils ca. 1 mm; ovary narrowly ellipsoid; style rather thick, equal to length of ovary; stigma disciform. Fruits globose, 7–8 mm in diam., red at maturity; stipes 1.5–1.8 cm, gradually thickening toward hypocarpium; hypocarpium indistinctly enlarged, 3–4 mm in diam. Fl. Apr, fr. Sep–Oct.

Mountain slopes, valleys, riversides, forests; below 1000 m. Anhui, Fujian, Guangdong, Guangxi, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan [Japan, Korea].

Records of *Lindera thunbergii* (Siebold) Makino (*Sassafras thunbergii* Siebold) and *L. umbellata* Thunberg from China are referable to *L. erythrocarpa*.

5. *Lindera reflexa* Hemsley, J. Linn. Soc., Bot. 26: 391. 1891.

山檀 shan jiang

Benzoin reflexum (Hemsley) Rehder; *B. sericeum* Siebold & Zuccarini var. *tenu* Nakai; *B. umbellatum* (Thunberg) Kuntze var. *latifolium* (Gamble) W. C. Cheng; *Lindera umbellata* Thunberg var. *latifolia* Gamble.

Shrubs or trees, deciduous. Bark brown, with longitudinal splits and pits. Young branchlets yellow-green, smooth, non-lenticellate, sericeous-pubescent when young, deciduous. Winter buds corniform-conical; bud scales red. Leaves alternate; petiole 6–17(–30) mm, pubescent when young, later glabrate; leaf blade usually ovate or obovate-elliptic, sometimes narrowly obovate or narrowly elliptic, (5–)9–12(–16.5) \times (2.5–)5.5–8(–12.5) cm, papery, abaxially greenish pale and white pubescent, later glabrate, adaxially green and pubescent on midrib, later glabrate, pinninerved, lateral veins 6–8(–10) pairs, base rounded or broadly cuneate, sometimes slightly cordate, apex acuminate. Umbels each inserted at both sides of leaf bud; peduncles red, ca. 3 mm, densely red-brown pubescent, deciduous in fruitage; involucre bracts 4, 5-flowered inside. Male flowers: pedicels 4–5 mm, densely white pubescent; tepals 6, yellow, elliptic, equal in length, ca. 2 mm; filaments glabrous, 2-glandular at base in 3rd whorl; glands broadly reniform, long stipitate, stipe base and filament connate; reduced pistil small, ca. 1.5 mm, narrowly corniform-conical. Female flowers: pedicels 4–5 mm, densely white pubescent; tepals yellow, broadly oblong, ca. 2 mm, slightly small in outer whorl, white pubescent on dorsal keel outside, laxly pubescent inside; reduced stamens fasciated, ca. 1.2 mm in 1st and 2nd whorls, slightly short in 3rd whorl, 2-glandular at base of filament; glands equal to reduced stamens in size, lower part and reduced stamen connate, sometimes only glands visible; pistil ca. 2 mm; ovary elliptic; style and ovary equal in length; stigma disciform. Fruits globose, ca. 7 mm, red at maturity; stipes ca. 1.5 cm, laxly pubescent. Fl. Apr, fr. Aug.

• Valleys, forests and thickets on mountain slopes; below 1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Yunnan, Zhejiang.

6. *Lindera praecox* (Siebold & Zuccarini) Blume, Mus. Bot. 1:

324. 1851.

大果山胡椒 da guo shan hu jiao

Benzoin praecox Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 205. 1846; *Parabenzoin praecox* (Siebold & Zuccarini) Nakai.

Deciduous shrubs, up to 4 m tall. Bark black-gray. Young branchlets slender, greenish gray, many lenticellate, rugose; current year branchlets brown, many lenticellate, glabrous. Winter buds corniform-conical, ca. 5 mm. Leaves alternate; petiole 0.5–1 cm, glabrous; leaf blade greenish abaxially, dark green adaxially, ovate or elliptic, 5–9 cm \times 2.5–4 mm, glabrous, pinninerved, lateral veins 4 pairs, convex abaxially, slightly concave adaxially, base broadly cuneate, apex acuminate. Umbels each inserted at both sides of leaf bud; peduncles glabrous, 4–4.5 mm; involucre bracts 4, red, exserted parts glabrous, 5-flowered inside. Male flowers: tepals broadly elliptic, ca. 2×1.5 mm in outer whorl, ca. 1.7×1.3 mm in inner whorl, glabrous or laxly white pubescent on outer surface, densely pubescent on inner surface; stamens equal in length, glabrous, 2-glandular at filament base in 3rd whorl; glands broadly reniform, long stipitate, various in shape and size; reduced pistil long corniform-conical. Female flowers: pedicels densely white pubescent; tepals broadly elliptic, ca. 1.5×1 mm in outer whorl, ca. 1.2 mm and less than 1 mm wide in inner whorl, laxly white pubescent on outer surface, rather densely pubescent on inner surface; reduced stamens fasciated, 2-glandular at filament base in 3rd whorl; glands reniform, long stipitate; ovary ellipsoid, ca. 1 mm, glabrous; style ca. 1/2 as long as ovary; stigma small, disciform, red-brown. Fruits globose, up to 1.5 cm in diam., yellow-brown at maturity; stipes 7–10 mm, lenticellate, gradually thickened toward apex; hypocarpium nearly 3 mm in diam. Fl. Mar, fr. Sep.

Thickets on hills or mountain slopes. Anhui, Hubei, Zhejiang [Japan].

7. *Lindera glauca* (Siebold & Zuccarini) Blume, Mus. Bot. 1: 325. 1851.

山胡椒 shan hu jiao

Benzoin glaucum Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 205. 1846; *B. glaucum* var. *kawakamii* (Hayata) Sasaki; *Lindera glauca* var. *kawakamii* Hayata.

Deciduous shrubs or trees, up to 8 m tall. Bark smooth, gray or gray-white. Young branchlets white-yellow, brown pubescent, later glabrate. Winter buds (mixed bud) long corniform-conical, ca. $1.5 \text{ cm} \times 4 \text{ mm}$; bud scales red on exserted parts. Leaves alternate; leaf blade broadly elliptic, elliptic, obovate, or narrowly obovate, 4–9 \times 2–4(–6) cm, papery, greenish and white pubescent abaxially, green adaxially, pinninerved, lateral veins (4 or)5 or 6 pairs. Umbels axillary; involucre bracts inserted in mixed bud, green, membranous, 3–8-flowered inside. Male flowers: pedicels ca. 1.2 cm, densely white pubescent; tepals yellow, elliptic, ca. 2.2 mm, nearly equal in size in 1st and 2nd whorls, pubescent on dorsal keels; stamens 9, equal in length; filaments glabrous, 2-glandular at base in 3rd whorl;

glands broadly reniform, connate, stipe base and filament base connate, sometimes a small gland at filament in 2nd whorl; reduced pistil small, elliptic, ca. 1 mm, mucronate at apex. Female flowers: pedicels 3–6 mm, black-brown at maturity; tepals yellow, elliptic or obovate, equal in length in outer and inner whorl, ca. 2 mm, laxly pubescent on dorsal keel of outer surface or rarely pubescent at base; reduced stamens ca. 1 mm, fasciated, 2-glandular at filament base in 3rd whorl; glands ca. 0.5 mm, irregularly reniform, stipitate, stipe and below middle of reduced stamens connate; ovary ellipsoid, ca. 1.5 mm; style ca. 0.3 mm; stigma disciform. Fruit stipes 1–1.5 cm. Fl. Mar–Apr, fr. Jul–Aug.

Forests, roadsides on mountain slopes; below 900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, SW Henan, Hubei, Hunan, Jiangxi, SW Shaanxi, E Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [Japan, Korea, Myanmar, Vietnam].

The wood is used in woodwork. The leaves and pericarp are processed for their aromatic oil. The seed oil is used for making soap and machine oil. The roots, branchlets, leaves, and fruit are used medicinally.

8. *Lindera angustifolia* W. C. Cheng, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 18: 294. 1933.

狭叶山胡椒 xia ye shan hu jiao

Benzoin angustifolium (W. C. Cheng) Nakai.

Deciduous shrubs and small trees, 2–8 m tall. Young branchlets yellow-green, glabrous. Winter buds purple-brown, ovate; bud scales keeled, glabrous outside, sericeous-pubescent on dorsum, glabrous on inner surface. Leaves alternate; leaf blade elliptic-lanceolate, 6–14 × 1.5–3.5 cm, subleathery, pale and laxly pubescent along veins abaxially, green and glabrous adaxially, pinninerved, lateral veins 8–10 pairs, base cuneate, apex acuminate. Umbels 2 or 3, inserted at base of winter bud, male umbel 3- or 4-flowered, female umbel 2–7-flowered. Male flowers: pedicels 3–5 mm; tepals 6; fertile stamens 9. Female flowers: pedicels 3–6 mm; tepals 6; reduced stamens 9; ovary ovate, glabrous; style ca. 1 mm; stigma capitate. Fruits globose, ca. 8 mm in diam., black at maturity; stipes 0.5–1.5 cm, puberulent or glabrous; hypocarpium ca. 2 mm in diam. Fl. Mar–Apr, fr. Sep–Oct.

Thickets or sparse forests on mountain slopes. Anhui, Fujian, Guangdong, Guangxi, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shandong, Zhejiang [Korea].

The leaves are processed for their aromatic oil. The seed oil is used for making soap and machine oil.

9. *Lindera kariensis* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 165. 1921.

更里山胡椒 geng li shan hu jiao

Benzoin kariense (W. W. Smith) Handel-Mazzetti; *Lindera kariensis* f. *glabrescens* H. W. Li.

Deciduous shrubs or trees, 2–10 m tall, up to 20 cm d.b.h. Bark gray-white. Branchlets cylindrical, laxly yellow-brown puberulent, later glabrate; current year branchlets brownish, becoming gray or grayish black, lenticellate, lenticels ovate, ex-

serted and longitudinally split. Leaves alternate; petiole 0.5–1.5 cm, brown pubescent, becoming glabrous; leaf blade elliptic, obovate, or oblanceolate, (3–)5.5–6.5(–9.5) × (1.5–)3–3.5(–4.5) cm, membranous, papery at maturity, greenish and densely brown pubescent along veins, later glabrate abaxially, green and laxly brown puberulent along veins, becoming glabrous or nearly glabrous adaxially, or glabrous on both surfaces, pinninerved, lateral veins 4 or 5 pairs, slightly distinct abaxially, base broadly cuneate or subrounded, apex rounded. Umbels (2 or)3–6-flowered, inserted in leaf axil at apex of current year branchlet, not pedunculate; involucre bracts early deciduous. Male flowers green-yellow or nearly white; pedicels (3–)5–7 mm, slender, densely dirty yellow pubescent; tepals 6, ovate or broadly ovate, 3.5–4 × ca. 3 mm, apex rounded, laxly yellow-brown pubescent on dorsal keel; stamens 9, ca. 2 mm; filaments equal to length of anther, 2-glandular; glands broadly reniform, stipitate; reduced pistil very small, less than 1 mm, glabrous; style and stigma small mucro-shaped. Female flowers yellow-green; tepals 6, broadly ovate, ca. 3.5 × 2.5 mm, obtuse at apex, laxly yellow-brown pubescent on dorsal keel; reduced stamens 9, ca. 1.5 mm; filaments rather thick, 2 × length of anther, 2-glandular at base in 3rd whorl; glands ovate, shortly stipitate; anthers sterile; ovary ovate, ca. 2 mm; style equal to length of ovary, slender; stigma peltate, papillose. Fruit ovate to subglobose, ca. 0.8 × 7 mm, mucronate at apex, glabrous; stipes 2–3 mm, later glabrous. Fl. Mar–Jun, fr. Jul–Oct.

• Mixed forests, thickets, bamboo forests or forest margins on mountain slopes or at ravine sides, *Rhododendron* forest margins; (2700–)2800–3700 m. W Yunnan.

Two forms have been recognized: f. *kariensis*, with leaf blade pubescent on both surfaces or only abaxially, and f. *glabrescens* (无毛山胡椒 wu mao shan hu jiao), with leaf blade glabrous on both surfaces or at first pubescent adaxially and later glabrate.

10. *Lindera gracilipes* H. W. Li, Acta Phytotax. Sin. 16(4): 64. 1978.

纤梗山胡椒 xian geng shan hu jiao

Lindera gracilipes var. *macrocarpa* H. Zhu & H. Wang.

Evergreen shrubs or trees, 2–3 m tall. Branchlets cylindrical, slender, thinly striate, ± angular when young, yellow-brown pubescent. Terminal bud ca. 2 mm; bud scales densely yellow-brown pubescent. Leaves alternate; petiole 5–8 mm, densely yellow-brown pubescent; leaf blade oblong, 12–20 × 3.5–7 cm, papery, gray-brown and densely yellow-brown pubescent abaxially, green-brown and laxly yellow-brown pubescent adaxially, later glabrate, lateral veins ca. 8 pairs, veins convex abaxially and concave adaxially, veinlets distinctly reticulate abaxially, base broadly cuneate to subrounded, apex acuminate. Umbels 1–5(or 6) inserted on axillary short branchlets, male umbel 10-flowered, female umbel 8-flowered, involucre; peduncles more than 4 × length of pedicel (ca. 7 × length of fruit stipe), very slender, (2–)2.5–3(–5) cm, densely yellow-brown pubescent; involucre bracts 4, yellow-brown pubescent outside. Male flowers yellow; pedicels 1.2–2 mm, densely yellow-brown pubescent; tepals 4–6, unequal in size, ovate to oblong, 2–3.5 × 1.2–1.5 mm, acute at apex; stamens 9, 2–3.2 mm; filaments pubescent, 2-glandular at middle in 3rd whorl; glands broadly

reniform, cornute; reduced pistil nearly globose, ca. 1 mm, densely pubescent. Female flowers yellow; pedicels 1–2.5 mm, densely yellow-brown pubescent; tepals 4–6, unequal in size, oblong to linear, 2–3.5 mm, acute at apex, glabrous; reduced stamens 9; filaments pubescent; anthers linear, sterile; ovary ovate, ca. 1.2 mm, pubescent; style 3–8 mm; stigma disciform, lobulate. Fruit red at maturity, ovoid, 1.3(–2) × ca. 1 cm, rounded or apiculate at apex. Fl. Apr, fr. Oct–Nov.

Wet areas in forests, thickets in valleys; (600–)700–1900 m. SE Xizang, Yunnan [N Vietnam].

11. *Lindera longipedunculata* C. K. Allen, J. Arnold Arbor. 22: 61. 1941.

山柿子果 shan shi zi guo

Evergreen trees, 3–6 m tall. Branchlets cylindrical; old branchlets longitudinally dehiscent and laxly orbicular-lenticellate; young branchlets angular, striate, glabrous. Terminal bud narrowly conical, ca. 5 mm; bud scales densely golden pubescent. Leaves alternate; petiole 10–12(–15) cm, glabrous; leaf blade pale abaxially, green-brown adaxially, slightly red on both surfaces when dry, narrowly elliptic to oblong, usually more than 13 cm, 3–5 cm wide, papery or subleathery, yellowish pubescent on both surfaces, later glabrate, pinninerved, midrib convex abaxially, distinctly concave adaxially, lateral veins 8–10 pairs, combinate venose, distinct abaxially, slightly convex adaxially, midrib and lateral veins red when dry, veinlets reticulate, distinct on both surfaces, base broadly cuneate or nearly rounded, apex acute. Umbels solitary, axillary; male umbel ca. 10-flowered, peduncle slender, (1–)1.5–2.5 cm, usually pendent, glabrous; female umbel 8-flowered, peduncle less than 1 cm in bloom, 1–1.5 cm in fruit stage; involucre bracts 4, sub-orbicular. Male flowers yellowish green; pedicels 2–3 mm, yellowish pubescent; tepals 6, oblong, ca. 3 × 1.5 mm, red glandular punctate; stamens 9–11, 2.5–3.5 mm; filaments densely yellowish pubescent, inner 5 or 6 filaments 2-glandular near base; glands subsessile; reduced pistil clavate; ovary ca. 1 mm; style ca. 1.5 mm; stigma capitate, papillose. Female flowers greenish; pedicels ca. 3 mm, yellowish pubescent; tepals 6, equal in size, oblong, ca. 1.5 × 0.6 mm, red glandular punctate; reduced stamens 9, fasciated, ca. 2 mm, 2-glandular near base of inner 6 filaments; glands ovate; ovary ovate, ca. 1.2 mm; style thick, ca. 1.8 mm, angular; stigma peltate. Fruits globose, 5–6 mm in diam., black when dry; stipes 1–1.2 cm, slightly thickened. Fl. Oct–Nov, fr. Jun–Aug.

• *Pinus* forests or evergreen broad-leaved forests on mountain slopes; 2100–2900 m. SE Xizang (Médog), NW Yunnan.

12. *Lindera kwangtungensis* (H. Liu) C. K. Allen, J. Arnold Arbor. 22: 2. 1941.

广东山胡椒 guang dong shan hu jiao

Lindera meisneri King f. *kwangtungensis* H. Liu, Laurac. Chine & Indochine, 126. 1932.

Evergreen trees, 6–30 m tall. Bark grayish brown, with thick and longitudinal dehiscent. Branchlets green, black-brown when dry, many corky-lenticellate; current year branchlets angular. Leaves alternate; leaf blade pale green abaxially,

green and shiny adaxially, elliptic-lanceolate, 6–12 × 1.5–3 cm, papery or sometimes nearly leathery, glabrous on both surfaces, pinninerved, lateral veins (4 or)5 or 6 pairs, indistinct, midrib yellowish green, convex abaxially, base cuneate, apex acuminate. Umbels 2 or 3, inserted at top of axillary branchlets, yielded before leaf; peduncles 10–20 mm, brown pubescent; involucre bracts 4, brown pubescent, 4–9-flowered inside. Pedicels 5–6 cm. Tepals oblong or ovate-oblong, ca. 4 mm, brown-yellow pubescent, rather dense outside, distinctly glandular punctate. Male flowers: stamens subequal, 4–5 mm; filaments pubescent, 2-glandular at base in 3rd whorl; glands reniform, stipitate, stipes ca. 1 mm; reduced pistil less than 1 mm, ovate, glabrous; style and stigma forming a small mucro. Female flowers: reduced stamens fasciated, laxly pubescent, ca. 3 mm in 1st whorl, ca. 3.5 mm in 2nd whorl, 2–3 mm in 3rd whorl, 2-glandular at upper part or near apex of filaments; glands narrowly elliptic, ca. 1 mm; pistil glabrous; ovary ovate, ca. 2 × 1.5 mm; style ca. 3 mm; stigma 2-lobed, papillose. Fruits globose, 5–6 mm in diam.; stipes 4–6 mm. Fl. Mar–Apr, fr. Aug–Sep.

• Forests on mountain slopes; below 1300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan.

13. *Lindera robusta* (C. K. Allen) H. P. Tsui, Acta Phytotax. Sin. 16(4): 64. 1978.

海南山胡椒 hai nan shan hu jiao

Lindera kwangtungensis (H. Liu) C. K. Allen f. *robusta* C. K. Allen, J. Arnold Arbor. 22: 3. 1941.

Evergreen trees, 5–10 m tall. Bark gray-brown, with longitudinal dehiscent. Branchlets black-brown, striate and corky-lenticellate; young branchlets stout, usually more than 3 mm in diam. Leaves alternate; petiole 1.5–2 cm, glabrous; leaf blade pale green abaxially, green adaxially, brown-gray when dry, oblong, 8–16 × 2.5–2.6 cm, leathery, glabrous on both surfaces, pinninerved, lateral veins 4 or 5 pairs, distinctly convex abaxially and slightly convex adaxially, midrib distinctly convex abaxially, slightly concave adaxially, reticulate veins rather thick, sometimes indistinct abaxially, base cuneate, revolute on margin, apex acuminate. Umbels 2–5, inserted at apex of axillary short branchlets; peduncles 1–1.2 cm, glabrous; involucre bracts 4, 7–9-flowered inside. Pedicels ca. 2 mm, densely white or brownish pubescent. Male flowers: tepals equal in length, oblong, ca. 3.5 × 1 mm, apex rounded, white pubescent on both surfaces, rather dense outside, densely hyaline glandular punctate; anthers of stamens triangular; filaments pubescent, ca. 3 mm in 1st and 3rd whorls, ca. 4 mm in 2nd whorl, 2-glandular below middle; glands elliptic, shortly stipitate; reduced pistil small. Female flowers: perianth tube ca. 1/2 length of tepals; tepals narrowly elliptic, apex acuminate, ca. 1.5 mm, ca. 0.6 mm wide in outer whorl and ca. 0.4 mm wide in inner whorl; reduced stamens ligulate, ca. 1.5 mm in 1st and 2nd whorls, 2–3 mm in 3rd whorl, 2-glandular at middle of filaments; glands elliptic, ca. 1.5 mm; ovary laxly pubescent; style ca. 4 mm; stigma with subglobose minute papillae. Fruits globose, ca. 6 mm in diam.

• Sparse forests on mountain slopes. Hainan.

14. *Lindera metcalfiana* C. K. Allen, J. Arnold Arbor. 22: 3.

1941.

滇粤山胡椒 dian yue shan hu jiao

Shrubs or trees, (2.5–)3–12 m tall, up to 20 cm d.b.h. Bark gray-black or brownish. Branchlets brown or gray-brown, slender, terete and ± angular when young, thinly striate, laxly yellow-brown sericeous-pubescent, later glabrate. Terminal bud small, corniform-conical, ca. 3 mm, bud scales densely yellow-brown sericeous-pubescent outside. Leaves alternate; petiole 5–8(–10) mm, yellow-brown pubescent; leaf blade gray-green abaxially, yellow-green and gray-brown when dry adaxially, elliptic, narrowly elliptic, or lanceolate, 5–13 × 2–4.5 cm, papery or thinly leathery, laxly yellow-brown pubescent along veins on both surfaces, later glabrate, pinninerved, lateral veins 5–10 pairs, purple-brown on both surfaces when dry or only adaxially, reticulate veinlets obvious abaxially and indistinct adaxially, base broadly cuneate, apex long acuminate or caudate-acuminate, falcate or not falcate. Male umbels 1 or 2(or 3), inserted at axillary and yellow-brown pubescent short branch, 6–8-flowered, peduncles slender, 1–1.6 cm, involucre bracts 4; female umbels 4–8-flowered, peduncles 0.6–0.8 cm, thickened at top, laxly yellow-brown pubescent. Male flowers yellow; pedicels 2–3 mm, densely yellow-brown pubescent; tepals 6, nearly equal, broadly ovate, ca. 2 × 1–1.2 mm, yellow-brown pubescent on both surfaces, glandular-punctate, apex obtuse; fertile stamens 9; filaments 2–2.5 mm, laxly pubescent, 2-glandular near base in 3rd whorl; glands rounded-reniform, stipitate; pistil reduced; ovary ovate, ca. 1.2 × 0.6 mm, mucronate at apex. Female flowers yellow; pedicels 2–2.5 mm; tepals 6, ovate, ca. 1.5 mm, apex obtuse; reduced stamens 9, ca. 1.3 mm, 2-glandular near base of filaments in 3rd whorl; glands rounded-reniform, stipitate; ovary ovate, glabrous, ca. 1 mm; style stout; stigma peltate, papillose. Fruits globose, ca. 6 mm in diam., purple-black at maturity; stipes ca. 6 mm, stout, slightly yellow-brown pubescent. Fl. Mar–May, fr. Jun–Oct.

Forest margins, roadsides, evergreen broad-leaved forests, mountain slopes, sparse forests, thickets; (500–)700–2000 m. Fujian, Guangdong, Guangxi, Hainan, Yunnan [N Vietnam].

- 1a. Leaf blade elliptic or narrowly elliptic, long acuminate or caudate-acuminate at apex, usually falcate, papery, lateral veins 6–10 pairs, purple-brown when dry 14a. var. *metcalfiana*
- 1b. Leaf blade lanceolate, apex acuminate, not falcate, thinly leathery or leathery, lateral veins 5–8 pairs, purple-brown adaxially when dry 14b. var. *dictyophylla*

14a. *Lindera metcalfiana* var. *metcalfiana*

滇粤山胡椒(原变种) dian yue shan hu jiao (yuan bian zhong)

Leaf blade elliptic or narrowly elliptic, papery, lateral veins 6–10 pairs, purple-brown when dry, apex long acuminate or caudate-acuminate, usually falcate.

• Forest margins, roadsides, evergreen broad-leaved forests, mountain slopes; 1200–2000 m. Fujian, Guangdong, Guangxi, Hainan, Yunnan.

14b. *Lindera metcalfiana* var. *dictyophylla* (C. K. Allen) H. P. Tsui, Acta Phytotax. Sin. 16(4): 64. 1978.

网叶山胡椒 wang ye shan hu jiao

Lindera dictyophylla C. K. Allen, J. Arnold Arbor. 22: 5. 1941.

Leaf blade lanceolate, thinly leathery or leathery, lateral veins 5–8 pairs, purple-brown adaxially when dry, apex acuminate, not falcate.

Sparse forests, forest margins, thickets on mountain slopes or in ravines; (500–)700–2000 m. Fujian, Guangxi, Yunnan [N Vietnam].

15. *Lindera foveolata* H. W. Li, Acta Phytotax. Sin. 16(4): 64. 1978.

蜂房叶山胡椒 feng fang ye shan hu jiao

Evergreen trees, up to 25 cm tall. Bark brown, distinctly lenticellate. Branchlets terete; 1-year-old branchlets gradually glabrate, brownish and slightly convex lenticellate; current year branchlets densely ferruginous tomentose. Terminal bud ovate, ca. 7 mm; bud scales densely ferruginous pubescent on outer surface, especially on keel, glabrous on inner surface. Leaves alternate; petiole 1.2–2 cm, densely ferruginous tomentose; leaf blade greenish and gray-brown when dry abaxially, dark green and slightly red-brown when dry adaxially, narrowly elliptic, 7.5–20.5 × 3–8 cm, subleathery, reticulate veins densely ferruginous villous abaxially, along midrib and lateral veins pubescent adaxially, pinninerved, lateral veins 5–7 pairs, reticulate veins convex, honeycombed adaxially, base cuneate or subrounded, apex shortly acuminate. Umbels 1–3, inserted at axillary short branchlets, each umbel 12-flowered; short branchlets 0.5–1.2 cm, densely ferruginous tomentose; peduncles more than 1.5 cm, densely ferruginous tomentose; involucre bracts 4. Male flowers: tepals 6, broadly ovate, equal in size, ca. 3 × 2 mm, villous on both surfaces, apex acute or obtuse; filaments 2-glandular at base in 3rd whorl; glands reniform, subsessile; reduced pistil ovate, ca. 1.5 mm, glabrous. Fruit subglobose, green when young. Fl. Nov–Dec, fr. May.

• Evergreen broad-leaved forests on mountain slopes; 1400–2100 m. SE Yunnan.

16. *Lindera menghaiensis* H. W. Li, Acta Phytotax. Sin. 16(4): 64. 1978.

勐海山胡椒 meng hai shan hu jiao

Trees, up to 15 m tall, ca. 20 cm d.b.h. Branchlets angular, densely ferruginous tomentose when young, later gradually glabrate and red-brown. Leaves alternate; petiole ca. 1.5 cm, densely ferruginous pubescent, later gradually glabrate; leaf blade gray-brown abaxially, shiny and slightly brown when dry adaxially, usually ovate-oblong, 11–18 × 4–7 cm, thinly leathery, densely tomentose abaxially, laxly ferruginous tomentose adaxially when young, pinninerved, lateral veins 9 or 10 pairs, midrib and lateral veins not convex adaxially, lateral veins convex abaxially, base cuneate, margin revolute, apex acute or acuminate. Umbels 1–5, inserted at axillary and densely ferruginous pubescent short branch, ca. 13-flowered; peduncles 0.6–1 cm, densely ferruginous pubescent. Male flowers not seen. Fe-

male flowers 4.5–5 mm; tepals 6, oblong, equal in size, 3–4 mm, slightly pubescent outside, glabrous inside, acute at apex; reduced stamens 9 or fewer; filaments pubescent, 2-glandular at base in 3rd whorl; glands rounded-reniform, subsessile; anthers fasciated; pistil clavate, ca. 5 mm; ovary and style densely pubescent; style angular; stigma disciform, trifid. Fruits not seen.

• Shady places in evergreen broad-leaved forests; ca. 1300 m. S Yunnan.

17. *Lindera motuoensis* H. P. Tsui, Acta Phytotax. Sin. 16(4): 65. 1978.

西藏山胡椒 xi zang shan hu jiao

Lindera gracilis H. P. Tsui.

Evergreen trees, 8–15 m tall, 8–20 cm d.b.h. Bark black-brown when dry, striate and lenticellate. Young branchlets green-brown, densely gray pannose, striate. Leaves alternate; leaf blade green and dark green when dry, narrowly obovate or oblong, 8–17 × 3–6 cm, papery, densely yellow-white pannose abaxially, glabrous adaxially, pinninerved, lateral veins 8–10 pairs, distinct on both surfaces, convex adaxially, base cuneate, apex acuminate. Umbels 4–7, inserted at axillary and yellow-white pannose short branch; peduncles 0.7–1 cm; involucre bracts 4, apex acuminate, 6–12-flowered inside, densely gray-white pannose on peduncles and involucre bracts. Flowers not matured; anthers dicoelous. Fruits subglobose, 4–5 mm in diam., purple-red at maturity; tepals persistent; stipes 6–10 mm; peduncles of infructescence 8–10 mm, glabrous.

• Broad-leaved forests on mountain slopes; 1500–2000 m. SE Xizang (Médog).

18. *Lindera latifolia* J. D. Hooker, Fl. Brit. India 5: 183. 1886.

团香果 tuan xiang guo

Evergreen trees, 3–15(–20) m tall, ca. 30 cm d.b.h. Bark gray-green or gray-black. One-year-old branchlets subterete, gradually glabrate, with subrounded longitudinally split and brownish lenticels; current year branchlets angular and striate, black-brown, densely gray or yellowish brown tomentose. Terminal bud brown, ovate, ca. 7 mm; bud scales densely yellow-brown tomentose on outer surface. Leaves alternate; petiole 1–1.5 cm, densely gray-yellow or yellow-brown tomentose; leaf blade pale and slightly dark red-brown when dry abaxially, shiny, green, and black-brown when dry adaxially, obovate or oblong, (5–)7.5–15 × (3.5–)4–8 cm, papery, densely gray-white or gray-yellow hirsute abaxially, pinninerved, lateral veins 6–8 pairs, midrib and lateral veins convex abaxially and distinctly concave adaxially, base broadly cuneate or subrounded, margin revolute, apex acute or acuminate. Umbels 1–3, inserted at axillary short branch, 10–12(or 13)-flowered; peduncle of male umbel ca. 1.6 cm, of female umbel 5–9 mm, both densely yellow-brown pubescent; involucre bracts 4, densely yellow-brown pubescent outside, glabrous inside. Male flowers yellowish; pedicels 3.5–5 mm, densely yellow-brown pubescent; tepals 6(or 7), oblong, 3.5–4 × ca. 2 mm, densely yellow-brown pubescent on both surfaces, apex obtuse or acute; stamens 8–10, ca. 5.5 mm; filaments laxly pubescent, 3–5, 2-glandular at

base adaxially; glands rounded-reniform, subsessile; reduced pistil ovate, ca. 1.2 mm, glabrous, longitudinally furrowed adaxially, hebetate at apex. Female flowers green-yellow; pedicels 1.5–3.5 mm; tepals linear-lanceolate, ca. 2 × 0.6 mm, apex obtuse or acuminate; reduced stamens fasciated, ca. 2.5 mm; filaments 3 or 4, 2-glandular at middle adaxially; glands ovate, subsessile; pistil glabrous; ovary ovate, ca. 1.4 × 1 mm; style ca. 1.6 mm; stigma obtuse. Fruits globose, ca. 6 mm in diam., glabrous, shiny, purple-red at maturity; stipes 6–9 mm, slightly yellow-brown pubescent. Fl. Feb–Apr, fr. May–Nov.

Evergreen broad-leaved forests, thickets, forest margins or roadsides on mountain slopes or in ravines; 1500–2300(–2900) m. SE Xizang, NW, SE, and W Yunnan [Bangladesh, India, N Vietnam].

The fruit contains aromatic oil. The seed oil is used for making soap and machine oil.

19. *Lindera nacusua* (D. Don) Merrill, Lingnan Sci. J. 15: 419. 1936.

绒毛山胡椒 rong mao shan hu jiao

Evergreen shrubs or trees, 2–10(–15) m tall, 10–15 cm d.b.h. Bark gray, longitudinally split striate. Branchlets brown, striate, densely yellow-brown villous, later slightly villous. Terminal bud broadly ovate, ca. 7 mm; bud scales densely yellow-brown pubescent except margin. Leaves alternate; petiole stout, 5–7(–10) mm, densely yellow-brown pubescent; leaf blade shiny adaxially, broadly ovate, elliptic, narrowly elliptic, elliptic-lanceolate, or lanceolate, 6–11(–15) × (3–)3.5–6(–7.5) cm, leathery, densely or sometimes laxly yellow-brown villous abaxially, slightly yellow-brown pubescent on midrib adaxially, lateral veins 6–8 pairs, rather thick, midrib convex abaxially, concave adaxially, base acute or cuneate, sometimes subrounded, apex acute. Umbels solitary or 2–4-fasciated in leaf axil, with 2–3 mm long peduncle and involucre bracts, male umbel 8-flowered, female umbel (2 or)3–6-flowered. Male flowers yellow; pedicels 4–5.5 mm, densely yellow-brown pubescent; tepals 6, ovate, ca. 3.5 × 2 mm, yellow-brown pubescent or glabrous on keel outside, glabrous inside; stamens 9, 4–4.5 mm; filaments glabrous, 2-glandular near middle in 3rd whorl; glands broadly reniform, cornute; pistil reduced; ovary ovate, ca. 1.5 mm; style ca. 1 mm; stigma obscure. Female flowers yellow; pedicels 3–5 mm; tepals 6, broadly ovate, ca. 2 × 1.5 mm; reduced stamens 9, ca. 1.5 mm, 2-glandular at middle of filament in 3rd whorl; glands rounded-reniform, nearly equal to length of filament; anther sterile or reduced to 1-celled, sometimes fertile and 2-celled; ovary obovate, ca. 2 mm, glabrous; style stout, ca. 1 mm, glabrous; stigma capitate. Fruits subglobose, red at maturity; stipes stout, 5–7 mm, thickened toward apex, slightly yellow-brown pubescent. Fl. May–Jun, fr. Jul–Oct.

Evergreen broad-leaved forests in valleys or on mountain slopes; 700–2500 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Sichuan, SE Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Vietnam].

- 1a. Leaf blade elliptic, oblong, or ovate, densely pubescent 19a. var. *nacusua*
- 1b. Leaf blade elliptic-lanceolate or lanceolate, slightly laxly

pubescent 19b. var. *menglungensis*

19a. *Lindera nacusua* var. *nacusua*

绒毛山胡椒(原变种) rong mao shan hu jiao (yuan bian zhong)

Laurus nacusua D. Don, Prodr. Fl. Nepal. 64. 1825; *Benzoin bifarium* (Nees) Chun; *B. nacusuum* (D. Don) Kuntze; *Daphnidium bifarium* Nees; *Lindera bifaria* (Nees) Benth. ex J. D. Hooker; *L. communis* Hemsley var. *grandifolia* Lecomte; *L. duclouxii* Lecomte; *L. nacusua* var. *sutchuanensis* Yen C. Yang.

Leaf blade elliptic, oblong, or ovate, densely pubescent.

Evergreen broad-leaved forests in valleys or on mountain slopes; 700–2500 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Sichuan, SE Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Vietnam].

The morphological characters of *Lindera duclouxii* and *L. nacusua* var. *sutchuanensis* fall within the range of variation of *L. nacusua* var. *nacusua*, so the former two names are included here in synonymy.

19b. *Lindera nacusua* var. *menglungensis* H. P. Tsui, Acta Phytotax. Sin. 16(4): 65. 1978.

勐仑山胡椒 meng lun shan hu jiao

Leaf blade elliptic-lanceolate or lanceolate, slightly laxly pubescent.

• S Yunnan.

20. *Lindera communis* Hemsley, J. Linn. Soc., Bot. 26: 387. 1891.

香叶树 xiang ye shu

Beilschmiedia parvifolia Lecomte; *Benzoin commune* (Hemsley) Rehder; *B. formosanum* (Hayata) Kamikoti; *Lindera bodinieri* H. Léveillé; *L. communis* var. *esquirolii* (H. Léveillé) S. Y. Hu; *L. formosana* Hayata; *L. glauca* Blume var. *nitidula* Lecomte; *L. paxiana* H. Winkler; *L. sterrophylla* C. K. Allen; *L. yunnanensis* H. Léveillé; *Litsea cavaleriei* H. Léveillé; *L. esquirolii* H. Léveillé (1911), not (H. Léveillé) C. K. Allen (1936).

Evergreen shrubs or trees, (1–)3–4(–5) m tall, ca. 25 cm d.b.h. Bark brownish. One-year-old branchlets stout, glabrous, with irregular longitudinal splits; current year branchlets slender, green and brown when dry, striate, laxly or densely yellow-white pubescent, with many bud scale scars at base. Terminal bud ovate, ca. 5 mm. Leaves alternate; petiole 5–8 mm, yellow-brown pubescent or nearly glabrous; leaf blade gray-green or yellowish abaxially, green adaxially, lanceolate, ovate, or elliptic, (3–)4–9(–12.5) × (1–)1.5–3(–4.5) cm, thinly leathery or thickly leathery, yellow-brown pubescent, later laxly pubescent or glabrous abaxially, glabrous adaxially, pinninerved, lateral veins 5–7 pairs, curved, midrib convex abaxially, concave adaxially, base broadly cuneate or subrounded, margin involute, apex acuminate, acute, or sometimes nearly caudate-acuminate. Umbels solitary or 2, inserted in leaf axil; peduncles very short; involucral bracts 4, early deciduous. Male flowers yellow, ca. 4 mm in diam.; pedicels 2–2.5 mm, slightly golden pubescent; tepals 6, ovate, nearly equal in size, ca. 3 × 1.5 mm, laxly

golden pubescent or nearly glabrous outside, apex rounded; stamens 9, 2.5–3 mm; filament slightly pubescent or glabrous, equal to length of anthers, 2-glandular at base in 3rd whorl; glands broadly reniform, cornute; pistil reduced; ovary ovate, ca. 1 mm, glabrous; style and stigma hebetate. Female flowers yellow or yellow-white; tepals 6, ovate, ca. 2 mm, pubescent outside; reduced stamens 9, fasciated, ca. 1.5 mm, 2-glandular at filament base in 3rd whorl; ovary elliptic, ca. 1.5 mm, glabrous; style ca. 2 mm; stigma peltate, papillate. Fruit ovate, ca. 1 cm × 7–8 mm, sometimes rather small and subglobose, glabrous, red at maturity; stipes 4–7 mm, yellow-brown pubescent. Fl. Mar–Apr, fr. Sep–Oct.

Dry sandy places, evergreen broad-leaved forests. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Laos, Myanmar, Thailand, Vietnam].

The morphological characters of an isotype of *Lindera sterrophylla* match those of *L. communis*, so the former name is here treated as a synonym of the latter.

The pericarp contains aromatic oil. The seed oil is used in food and for making soap and machine oil. The branchlets and leaves are used medicinally.

21. *Lindera akoensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 252. 1911.

台湾香叶树 tai wan xiang ye shu

Benzoin akoense (Hayata) Kamikoti.

Evergreen shrubs or small trees. Bark dark brown. Branchlets rather densely pubescent, later deciduous and glabrate. Leaves alternate; petiole 5–12 mm, pubescent; leaf blade ovate, narrowly elliptic, or obovate, 3–5 × 2–3.5 cm, leathery, laxly pubescent with rather dense pubescence along midrib abaxially, glabrous and shiny adaxially, pinninerved, midrib convex abaxially and concave adaxially, lateral veins 4 or 5 pairs, reticulate veins distinct, base broadly cuneate or subrounded, apex acute. Umbels axillary, not pedunculate, 5- or 6-flowered. Male flowers: pedicels 1–2 mm; perianth tube obconic, ca. 1 mm, densely brown pubescent; tepals 6, ovate, ca. 1.5 × 1 mm, slightly small in inner whorl, laxly pubescent at dorsal keel and at base inside; stamens 9, nearly equal to length of tepal; filament glabrous, equal to length of anther, 2-glandular at base in 3rd whorl; glands broadly reniform, several cornute; reduced pistil ca. 1.2 mm; ovary ovate, ca. 0.5 mm; stigma disciform. Female flowers: pedicels ca. 0.6 mm, densely brown pubescent; perianth tube obconic, ca. 0.6 mm, densely brown pubescent; tepals 6, triangular, ca. 1 mm; reduced stamens fasciated, ca. 0.6 mm, 2-glandular at filament in 3rd whorl; ovary obovate, ca. 1.5 mm. Fruits subglobose, red at maturity.

• Thickets; low to medium elevations. Taiwan.

22. *Lindera rubronervia* Gamble in Sargent, Pl. Wilson. 2: 84. 1914.

红脉钓樟 hong mai diao zhang

Benzoin rubronervium (Gamble) Rehder.

Deciduous shrubs or trees, up to 5 m tall. Bark black-

gray, lenticellate. Young branchlets gray-black or black-brown, smooth. Winter buds long corniform-conical, 5–7 × 2–3 mm, glabrous. Leaves alternate; petiole 5–10 mm, pubescent; leaf blade greenish abaxially, dark green adaxially, ovate, narrowly ovate, sometimes lanceolate, (4–)6–8(–13) × (2–)3–4(–5.5) cm, papery, sometimes subleathery, pubescent abaxially, along midrib laxly pubescent adaxially, triplinerved, usually lateral veins 3 or 4 pairs above middle of blade, veins and petiole red in autumn, base cuneate, apex acuminate. Umbels axillary, usually one inserted at both sides of leaf bud; peduncles ca. 2 mm; involucre bracts 8, persistent, 5–8 flowers included. Male flowers: pedicels 2–2.5 mm, densely white pubescent; perianth tube pubescent; tepals 6, yellow-green, elliptic, white pubescent inside, apex rounded, ca. 2.7 mm in outer whorl, ca. 2.2 mm in inner whorl; fertile stamens 9, equal in length, ca. 2.2 mm; filaments glabrous, 2-glandular near base in 3rd whorl; glands broadly reniform; reduced pistil less than 1 mm; ovary narrowly elliptic; style and stigma forming an obtuse mucro. Female flowers: pedicels 2–3.5 mm, pubescent; perianth tube densely white pubescent; tepals elliptic, same length as male flowers, white pubescent inside; reduced stamens fasciated, glabrous, ca. 1.5 mm in 3rd whorl, 2-glandular at middle and lower part of filaments; glands oblong, sometimes 1 or 2 in 2nd whorl; pistil ca. 2 mm; ovary ovate, ca. 1 mm; style ca. 0.8 mm; stigma disciform. Fruits subglobose, ca. 1 cm in diam.; stipes 1–1.5 cm, curved at maturity; hypocarpium ca. 3 mm in diam. Fl. Mar–Apr, fr. Aug–Sep.

• Forests on mountain slopes, riversides, valleys. Anhui, Henan, Jiangxi, Jiangsu, Zhejiang.

The leaves and pericarp contain aromatic oil.

23. *Lindera neesiana* (Wallich ex Nees) Kurz, Prelim. Rep. Forest Pegu, App. A, ciii; App. B, 74. 1875.

绿叶甘柃 lü ye gan jiang

Benzoin neesianum Wallich ex Nees in Wallich, Pl. Asiat. Rar. 2: 63. 1831; *Aperula neesiana* (Wallich ex Nees) Blume; *Benzoin fruticosum* (Hemsley) Rehder; *Lindera fruticosa* Hemsley; *L. fruticosa* var. *pomiensis* H. P. Tsui; *L. pomiensis* (H. P. Tsui) H. P. Tsui; *Litsea fruticosa* (Hemsley) Gamble.

Deciduous shrubs or trees, up to 12 m tall. Bark green or green-brown. Young branchlets green, brownish yellow or brown when dry, smooth. Winter buds ovate; stipe ca. 1 mm. Leaves alternate; petiole 10–12 mm; leaf blade greenish pale abaxially, dark green adaxially, ovate, broadly ovate, or narrowly ovate, 5–14 cm or less than 5 cm, 2.5–8 cm wide, papery, densely pubescent, later gradually glabrate abaxially, glabrous adaxially, trinerved or triplinerved, base rounded, sometimes broadly cuneate, apex acuminate. Umbels with 4 involucre bracts; peduncles ca. 4 mm, glabrous; involucre bracts ciliate, pubescent on base inside, 7–9 flowers included. Male flowers: tepals green before bloom, broadly elliptic or subrounded, glabrous, apex rounded, ca. 1 mm in outside whorl; filaments glabrous, 2-glandular at base in 3rd whorl; glands triangular-reniform, stipitate, sometimes 1 at filament in 1st and 2nd whorl; pistil exerted at center, less than 1 mm. Female flowers yellow; pedicels ca. 2 mm, pubescent; tepals broadly ovate, glabrous, apex rounded, ca. 1.5 mm in outer whorl, ca. 1.2 mm in inner

whorl; reduced stamens fasciated, ca. 0.8 mm in 1st and 2nd whorls, 2-glandular at filament base in 3rd whorl; glands triangular or oblong, unequal in size, irregular long stipitate; ovary elliptic, glabrous. Fruits subglobose, 6–8 mm in diam.; stipes 4–7 mm. Fl. Apr, fr. Sep.

Mountain slopes, roadsides, forests, forest margins, valleys, thickets; below 2500 m. Anhui, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, India, N Myanmar, Nepal].

24. *Lindera obtusiloba* Blume, Mus. Bot. 1: 325. 1851.

三桠乌药 san ya wu yao

Deciduous trees or shrubs, 3–10 m tall. Bark black-brown. Branchlets yellow-green, smooth and striate when young, brown scurfy, longitudinally dehiscent, and corky lenticellate when old. Buds ovate, apex acuminate; outer bud scales 3, yellow-brown, elliptic, 6–9 × 6–7 mm, leathery, glabrous, acute at apex; inner bud scales 3, very densely brownish yellow sericeous; sometimes mixed budded, including leaf buds and floral buds. Leaves alternate; petiole 1.5–2.8 cm, yellow-white pubescent; leaf blade pale greenish or sometimes red abaxially, dark green adaxially, suborbicular, compressed-rounded, or elliptic, 5.5–10 × 4.8–10.8 cm, brown-yellow pubescent or glabrate abaxially, trinerved, sometimes pentanerved, reticulate veins distinct, base broadly cuneate, subrounded, rounded, cordate, or subcordate, margin usually entire, sometimes emarginate or wavy, or usually trifid and sometimes pentafid, apex acute or rounded. Mixed buds axillary, elliptic, acute at apex, outer 2 bud scales leathery, brown-yellow, rugose, glabrous, inner bud scales subleathery, adnate-pubescent, with 1 or 2 floral buds inside; floral bud 5 or 6, umbels included. Umbels not pedunculate, with 4 involucre bracts; involucre bracts narrowly elliptic, membranous, villous outside, glabrous inside, 5 flowers included. Male flowers: tepals 6, narrowly elliptic, villous outside and glabrous inside; stamens 9; filaments glabrous, 2-glandular at base in 3rd whorl; glands broadly reniform, cornute, long stipitate, sometimes 1 at filament base in 2nd whorl; reduced pistil narrowly elliptic, glabrous; style and stigma forming a mucro. Female flowers: tepals 6, narrowly elliptic, ca. 2.5 × 1 mm, slightly short in inner whorl, villous on dorsal keel, glabrous inside; reduced stamens fasciated, ca. 1.7 mm in 1st and 2nd whorls, ca. 1.5 mm in 3rd whorls, 2-glandular at filament base; glands long stipitate; stipe base and filament base coadnate; ovary ellipsoid, ca. 2.2 × 1 mm, glabrous; style less than 1 mm, curved downward before bloom. Fruits broadly ellipsoid, ca. 8 × 5–6 mm, red at maturity, later purple-black, black-brown when dry. Fl. Mar–Apr, fr. Aug–Sep.

Valleys, thickets in dense forests, forests on mountain slopes; near sea level to 3000 m. Anhui, Fujian, S Gansu, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Liaoning, S Shaanxi, E Shandong, Sichuan, Xizang, NW Yunnan, Zhejiang [Bhutan, India, Japan, Korea, Nepal].

The seed oil is used medicinally and for light industrial materials. The wood is used in woodwork.

- 1a. Leaf blade suborbicular or compressed-rounded, apex acute, base broadly cuneate, subrounded, or cordate, margin usually trifid, sometimes pentafid 24a. var. *obtusiloba*
- 1b. Leaf blade elliptic, sometimes compressed-

rounded, apex rounded or acute, base subrounded or subcordate, margin usually entire, sometimes emarginate or wavy 24b. var. *heterophylla*

24a. *Lindera obtusiloba* var. *obtusiloba*

三桠乌药(原变种) san ya wu yao (yuan bian zhong)

Benzoin cercidifolium (Hemsley) Rehder; *B. obtusilobum* (Blume) Kuntze; *Lindera cercidifolia* Hemsley; *L. mollis* Oliver; *L. obtusiloba* var. *praetermissa* (Grierson & D. G. Long) H. P. Tsui; *L. praetermissa* Grierson & D. G. Long.

Leaf blade suborbicular or compressed-rounded, base broadly cuneate, subrounded, or cordate, margin usually trifid, sometimes pentafid, apex acute. Fl. Mar–Apr, fr. Aug–Sep.

Valleys, thickets in dense forests; near sea level to 3000 m. Anhui, Fujian, S Gansu, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Liaoning, S Shaanxi, E Shandong, Sichuan, Xizang, Zhejiang [Japan, Korea].

Lindera obtusiloba and *L. cercidifolia* are different in leaf surface (pubescent vs. glabrous) and distributional range, but the present authors have observed several specimens from China, Japan, and Korea and have found that their floral morphological characters do not differ and that the leaf pubescence is more or less irregular.

24b. *Lindera obtusiloba* var. *heterophylla* (Meisner) H. P. Tsui in H. W. Li, Fl. Reipubl. Popularis Sin. 31: 416. 1982.

滇藏钓樟 dian zang diao zhang

Lindera heterophylla Meisner in A. Candolle, Prodr. 15(1): 246. 1864.

Leaf blade elliptic, sometimes compressed-rounded, densely golden sericeous when young, base subrounded or subcordate, margin usually entire, sometimes emarginate or wavy, apex rounded or acute.

Forests on mountain slopes. Xizang, NW Yunnan [Bhutan, India, Nepal].

25. *Lindera tienchuanensis* W. P. Fang & H. S. Kung ex Yen C. Yang et al., Acta Phytotax. Sin. 16(4): 66. 1978.

天全钓樟 tian quan diao zhang

Lindera chengii H. P. Tsui.

Evergreen shrubs or trees, 2–4 m tall. Bark brown. Branchlets brown, striate; current year branchlets ferruginous tomentose, later glabrate. Buds narrowly ovate, ca. 2 mm; bud scales ferruginous tomentose. Leaves alternate; petiole 0.6–1 cm, ferruginous tomentose, later nearly glabrous; leaf blade greenish pale abaxially, green adaxially, broadly ovate or narrowly ovate, sometimes elliptic, 4–6(–9) × 1.5–3(–4) cm, subleathery, densely brown pubescent abaxially, especially on veins, later glabrous or nearly glabrous, trinerved, veins distinctly convex abaxially, slightly concave adaxially, reticulate veins distinct, base usually rounded, rarely broadly cuneate, apex acute, acuminate, or caudate-acuminate. Umbels solitary, inserted at upper leaf axil and lower bract axil on current year branchlets, usually 5-flowered; peduncles slender, 1–2.5 cm, ferruginous tomentose, later gradually deciduous. Pedicels 2–3 mm, densely brown pubescent. Tepals 6, yellow or green, sometimes red, broadly ovate, obtuse at apex, ca. 2.5 × 2 mm in

outer whorl, ca. 2 × 1.5 mm in inner whorl, rather densely white pubescent on dorsal keel, glabrous inside. Male flowers: stamens 9, fertile in 1st and 2nd whorls; anthers elliptic, ca. 0.8 mm; filaments in 1st whorl equal to length of anther, in 2nd whorl ca. 1/2 length of anther, very laxly white pubescent; stamens in 3rd whorl sometimes reduced, fasciated or slightly ovate at apex, ca. 1.2 mm, 2-glandular near filament base; glands broadly reniform, cornute; pistil reduced; ovary ovate, ca. 0.7 mm, laxly white pubescent; style and stigma forming a mucro. Female flowers: sterile stamens 9, fasciated, ca. 1.2 mm, very laxly white pubescent, 2-glandular near filament base in 3rd whorl; glands reniform, stipitate; ovary ovate, ca. 1 mm; style thick, slightly shorter than ovary, all laxly white pubescent; stigma 2-lobed. Young fruit ellipsoid.

• Forests or valleys on high mountains; 1700–3000 m. Sichuan (Maoxian, Tianquan), SE Xizang (Mêdog).

26. *Lindera chunii* Merrill, Lingnan Sci. J. 7: 307. 1931.

鼎湖钓樟 ding hu diao zhang

Shrubs or small trees, ca. 6 m tall. Young branchlets slender, ca. 1 mm in diam., pubescent, later gradually deciduous. Leaves alternate; petiole 5–10 mm, white or golden and appressed sericeous, later deciduous; leaf blade elliptic or narrowly elliptic, 5–10 × 1.5–4 cm, papery, white or golden and appressed sericeous on both surfaces when young, later only sericeous on veins and nerve axil, olivaceous when dry, trinerved, lateral veins reaching apex, base cuneate or acute, apex caudate-acuminate. Umbels several inserted at short branch in leaf axil, short branch elongate in bloom, later umbel inserted at branch base, 4–6-flowered; male umbel pedunculate, peduncles 5–7 mm, pubescent; female umbel pedunculate, peduncles 3–4 mm, pubescent. Male flowers: pedicels 2–3 mm, densely brown pubescent, with involucre trace at base; perianth tube densely villous; tepals oblong, ca. 1.4 × 0.5 mm, pubescent on outer surface, glabrous on inner surface, apex shortly acuminate or rounded; stamens ca. 1.3 mm; anthers broadly elliptic; filaments ca. 1 mm, brown-yellow pubescent, 2-glandular near base in 2nd whorl; glands obovate, stipitate; reduced pistil ca. 0.5 mm; ovary ellipsoid; style and stigma forming an obtuse mucro. Female flowers: perianth tube funnelform, ca. 1 mm; tepals fasciated, apex acuminate, with obtuse mucro, ca. 1.5 × 0.3 mm, slightly longer in inner whorl, brown pubescent on outer surface; reduced stamens fasciated, ca. 1.2 mm, brown pubescent, 2-glandular below middle in 3rd whorl; glands elliptic, ca. 0.5 mm; ovary ellipsoid, ca. 0.7 mm, pubescent; style ca. 1 mm, pubescent; stigma disciform. Fruits ellipsoid, 8–10 × 6–7 mm, glabrous. Fl. Feb–Mar, fr. Aug–Sep.

• Guangdong, Guangxi, Hainan.

A record from Vietnam (in Fl. Hainan. 1: 298. 1964) is erroneous.

The swollen parts of the roots are used as medicine and for making starch and aromatic oil.

27. *Lindera tonkinensis* Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 112. 1913.

假桂钓樟 jia gui diao zhang

Evergreen trees, 4.5–12 m tall, 5–12 cm d.b.h. Branchlets green, brown when dry, cylindric, longitudinally striate, densely brown pubescent or nearly glabrous. Leaves alternate; petiole 10–15(–20) mm, slightly pubescent or nearly glabrous; leaf blade greenish abaxially, yellow-green when dry, green adaxially, green-brown when dry, ovate or ovate-oblong, 8–14 × 2.5–5 cm, thinly papery, nearly glabrous or densely ferruginous pubescent along veins on both surfaces when young, later pubescent along midrib or glabrous, trinerved, first and second pairs lateral veins joined at apex and inflexed, midrib and lateral veins distinctly convex abaxially, slightly concave adaxially, base cuneate or subrounded, asymmetrical at sides, apex acuminate. Umbels (1 or) 2–5, inserted in leaf axil of short branchlets, 6-flowered; short branchlets 2–3 mm, densely ferruginous pubescent; peduncle of male umbel 0.6–1.2 cm, of female umbel 0.5–0.6 cm; involucre bracts 6, slightly pubescent on outer surface or glabrate. Male flowers yellow-green; pedicels obconic, ca. 1 mm, ferruginous pubescent; tepals 6, oblong-ovate, ca. 3 × 1.2–1.5 mm, only slightly pubescent on lower part of outer surface, glabrous on inner surface, densely glandular punctate; stamens 9, ca. 2.5 mm; filaments densely villous, 2-glandular near base in 3rd whorl; glands ovate, shortly stipitate; reduced ovary nearly clavate, ca. 1 mm, attenuate at apex into a style; style ca. 1 mm; stigma peltate, papillose. Female flowers yellowish; pedicels 2–2.5 mm, densely ferruginous pubescent; tepals 6, oblong, ca. 2.5 × 0.7 mm, slightly pubescent on lower part of outer surface; reduced stamens 9; filaments villous, 2-glandular near base in 3rd whorl; glands ovate, shortly stipitate, without anthers; ovary ovate, ca. 1.5 × 0.4 mm, glabrous, attenuate at apex into a style; style ca. 2 mm; stigma peltate, papillose. Fruit ellipsoid, ca. 9 mm, glabrous, mucronate at apex; stipes ca. 6 mm, densely ferruginous; hypocarpium 1–1.5 mm. Fl. Oct–Mar of next year, fr. May–Aug.

Sparse forests, mixed forests, or forest margins on mountain slopes; 100–2300 m. Guangdong, Guangxi, Hainan, S Yunnan [Laos, Vietnam].

- 1a. Inflorescences pedunculate; young branchlets, leaves, and petioles ± pubescent 27a. var. *tonkinensis*
1b. Inflorescences not pedunculate or peduncles less than 3 mm; young branchlets, leaves, and petioles nearly glabrous 27b. var. *subsessilis*

27a. *Lindera tonkinensis* var. *tonkinensis*

假桂钓樟(原变种) *jia gui diao zhang* (*yuan bian zhong*)

Young branchlets, leaves, and petioles ± pubescent. Inflorescences pedunculate.

Sparse forests or forest margins on mountain slopes; 100–800 m. Guangdong, Guangxi, Hainan, SE Yunnan [Laos, Vietnam].

The seed oil is used for making soap and machine oil.

27b. *Lindera tonkinensis* var. *subsessilis* H. W. Li, *Acta Phytotax. Sin.* 16(4): 66. 1978.

无梗钓樟 *wu geng diao zhang*

Young branchlets, leaves, and petioles nearly glabrous. Inflorescences not pedunculate or peduncles less than 3 mm.

• Sparse forests, mixed forests, or forest margins on mountain slopes; 1100–2300 m. N Guangxi, S Yunnan.

28. *Lindera prattii* Gamble in Sargent, *Pl. Wilson.* 2: 83. 1914.

峨眉钓樟 *e mei diao zhang*

Benzoin prattii (Gamble) Rehder.

Evergreen trees or small trees, up to 20 m tall. Bark gray-green. Branchlets rather stout, ca. 3 mm in diam.; old branchlets black-gray or brown, lenticellate; current year branchlets ferruginous pannose, later gradually deciduous or becoming black. Buds ovate; bud scales densely ferruginous or brown villous. Leaves alternate; petiole 1.5–3 cm, yellowish brown pannose, later glabrous or nearly glabrous; leaf blade pale greenish abaxially, green adaxially, elliptic or oblong, 10–25 × 5–12.5 cm, leathery, brown-yellow pubescent on both surfaces when young, densely brown-yellow pubescent along veins abaxially, later nearly glabrous abaxially, glabrous adaxially, base usually rounded, apex acute or shortly acuminate. Umbels several, inserted at short branch in leaf axil; peduncles ca. 2 mm or subsessile, densely brown-yellow pubescent. Pedicels ca. 1 cm, densely brown-yellow pubescent. Male flowers: tepals 6, elliptic or oblong, 4–5 × 2.5–3 mm, apex rounded, pubescent on keel of outer surface, laxly pubescent on inner surface in outer whorl, shorter in inner whorl; stamens ca. 5 mm; filament glabrous, 2-glandular below middle in 3rd whorl; glands reniform, stipitate; reduced pistil 3–3.5 mm; ovary ovate, ca. 1 mm, ovary and style laxly pubescent or glabrous; stigma capitate, equal to diam. of ovary. Female flowers: tepals narrowly ovate, ca. 2.5 × 1 mm; reduced stamens fasciated, ca. 2 mm, apex acuminate, 2-glandular near base of filament in 3rd whorl; glands elliptic, stipitate; tepals and reduced stamens laxly pubescent on outer surface, glabrous on inner surface; ovary not seen. Fruits ellipsoid, ca. 1 cm × 6 mm; stipes 2–4 mm, densely brown-yellow pubescent. Fl. Mar–Apr, fr. Aug–Sep.

• Mixed forests; below 2200 m. Guizhou, Sichuan.

29. *Lindera guangxiensis* H. P. Tsui, *Acta Phytotax. Sin.* 16(4): 67. 1978.

广西钓樟 *guang xi diao zhang*

Evergreen trees, 9–10 m tall, 15–16 cm d.b.h. Branchlets cylindric, densely yellowish villous; 2-year-old branchlets gray, gradually glabrate. Petiole 1.6–2 cm, densely tomentose; leaf blade pale abaxially, green and shiny adaxially, ovate or oblong, 15–20 × 8.5–10 cm, papery, densely yellowish tomentose abaxially, trinerved, first pair of lateral veins curved, elongate to near apex, reticulate veins distinctly convex abaxially, apex acuminate. Umbels 5–10, congregated at short branch in leaf axil; involucre bracts 3–5, pubescent on outer surface, 5-flowered inside. Male flowers: tepals 6, narrowly elliptic, in outer whorl larger than in inner whorl, pubescent on outer surface, glabrous on inner surface; stamens 9; filaments glabrous, 2-glandular near base in 3rd whorl; glands rounded-reniform, shortly stipitate; reduced pistil glabrous; ovary ellipsoid; style convolute; stigma semiglobose, rather large, densely glandular pubescent. Female flowers: tepals 6, oblong, in outer whorl longer than in inner whorl, silvery-white pubescent on outer surface, glabrous on inner surface; reduced stamens 9, fasci-

ated, pubescent, 2-glandular slightly above filament base in 3rd whorl; glands narrowly elliptic; ovary ovate, ovary and style silvery-white sericeous; stigma semiglobose. Fruits ellipsoid, ca. 1 cm × 8 mm, mucronate at top; stipe ca. 5 mm, pubescent.

- Valleys; ca. 1300 m. W Guangxi.

30. *Lindera lungshengensis* S. K. Lee ex Yen C. Yang et al., *Acta Phytotax. Sin.* 16(4): 67. 1978.

龙胜钓樟 long sheng diao zhang

Evergreen shrubs or trees, 5–10 m tall. Bark gray-brown or dark gray-brown, lenticellate, lenticels 1–3 mm in diam. Branchlets green, yellow-green or yellow-brown when dry, longitudinally striate, glabrous. Buds ovate, ca. 4 mm; bud scales laxly pubescent outside. Petiole ca. 1.5 cm, glabrous; leaf blade pale greenish and gray-green when dry abaxially, green and yellow-green when dry adaxially, ovate or oblong, (12–)14–22 × (4–)5–7 cm, glabrous adaxially, trinerved, midrib and lateral veins convex, veinlets obscure adaxially, lateral veins elongating to apex, involute on margin, midrib, lateral veins, and transverse veinlets distinct abaxially, base broadly cuneate or subrounded, caudate-acuminate and 0.5–2.5 cm at apex. Umbels 2–6, inserted at short branch in leaf axil; involucre bracts 4 or 5, 5-flowered inside. Male flowers: tepals ca. 2.5 mm in outer whorl, ca. 2.2 cm in inner whorl, oblong, pubescent on dorsal keel; stamens equal in length; filaments pubescent, 2-glandular at base in 3rd whorl; glands subglobose; reduced pistil ca. 1.3 mm; ovary subglobose, equal to length of style, laxly pubescent; stigma disciform. Female flowers: tepals ca. 2 mm in outer whorl, ca. 1.8 mm in inner whorl, narrowly elliptic, pubescent on dorsal keel; reduced stamens fasciated, ca. 1 mm, laxly pubescent, 2-glandular below middle of filament in 3rd whorl; glands narrowly ovate, compressed; ovary ovate, ca. 0.6 mm; style rather stout, ca. 0.3 mm, laxly pubescent; stigma semiglobose, papillose. Fruits blue-black, ellipsoid, ca. 1.1 cm × 7 mm, plane or slightly concave at apex, mucronate, pubescent when young; stipes ca. 1.5 cm; hypocarpium ca. 2 mm in diam. Fl. Feb–Mar, fr. Sep.

- Dense forests, shady areas of thickets in valleys; 1000–1700 m. Guangxi (Lingui, Longsheng).

31. *Lindera supracostata* Lecomte, *Nouv. Arch. Mus. Hist. Nat.*, sér. 5, 5: 112. 1913.

菱叶钓樟 ling ye diao zhang

Benzoin supracostatum (Lecomte) Rehder; *Lindera supracostata* var. *attenuata* C. K. Allen.

Evergreen shrubs or trees, (1.5–)3–15(–25) m tall, ca. 20 cm d.b.h. Bark brown, with longitudinally split striae, gray-brown. Terminal bud broadly ovate; bud scales gray-white sericeous-pubescent outside. Leaves alternate; petiole ca. 1 cm, glabrous; leaf blade pale abaxially, green and shiny adaxially, elliptic, ovate, or lanceolate, 5–10 × 2.3–4 cm, glabrous on both surfaces, trinerved or triplinerved, veins more convex adaxially than abaxially, base cuneate or broadly cuneate, margin ± repand, apex caudate-acuminate. Umbels 1 or 2, inserted at upper part of branch in leaf axil, subsessile, male umbel 5-flowered, female umbel 3–8-flowered. Male flowers yellow-green; tepals

6, oblong, ca. 3.5 mm, pubescent outside; stamens 9, ca. 2.5 × 1 mm; filament pubescent, 2-glandular near base of filament in 3rd whorl; glands globose, shortly stipitate; reduced pistil ca. 2.5 mm; ovary ovate, ca. 1 mm; style equal to length of ovary, pubescent. Female flowers yellow-green; tepals 6, oblong, ca. 2 mm; filament 2-glandular at middle in 3rd whorl; glands oblong-globose, shortly stipitate; ovary ellipsoid, ca. 2 × 1.2 mm, pubescent; style ca. 1.5 mm, pubescent; stigma disciform. Fruits ovate, 8–9 mm, black-purple at maturity; stipes 7–11 mm, gradually thickened into a disciform 3–5 mm in diam. hypocarpium. Fl. Mar–May, fr. Jul–Sep.

- Valleys or dense forests on mountain slopes; 2400–2800 m. W Guizhou, W Sichuan, C and NW Yunnan.

The width and basal shape of the leaf blade are variable in different plants, as well as on the same plant, so separate varieties based on those characters are not recognized here.

32. *Lindera fragrans* Oliver, *Hooker's Icon. Pl.* 18: t. 1788. 1888.

香叶子 xiang ye zi

Benzoin fragrans (Oliver) Rehder; *Lindera fragrans* var. *linearifolia* Y. K. Li; *L. rosthornii* Diels; *L. supracostata* Lecomte var. *chuaneensis* H. S. Kung.

Evergreen small trees, up to 5 m tall. Bark yellow-brown, with longitudinal dehiscences and lenticels. Young branchlets blue-green or brown-yellow, slender, smooth, longitudinally striate, glabrous or white pubescent. Leaves alternate; petiole 5–8 mm; leaf blade pale green abaxially, green adaxially, lanceolate or narrowly ovate, glabrous or white pubescent abaxially, glabrous adaxially, trinerved, first pair of lateral veins elongate along margin toward leaf apex, sometimes very near margin, thin and obscure, base cuneate or broadly cuneate, apex acuminate. Umbels axillary; involucre bracts 4, 2–4-flowered inside. Male flowers yellow, aromatic; tepals 6, nearly equal in length, densely yellow-brown pubescent on outer surface; stamens 9; filaments glabrous, 2-glandular at base in 3rd whorl; glands broadly reniform, subsessile; reduced ovary narrowly ellipsoid; stigma disciform. Female flowers not seen. Fruits ovate, ca. 1 × 0.7 cm, blue-green when young, purple-black at maturity; stipes 0.5–0.7 cm, laxly pubescent; hypocarpium inflated.

- Ditch sides or thickets on mountain slopes; 700–2100 m. Guangxi, Guizhou, Hubei, Shaanxi, Sichuan.

The leaf blade is variable at different elevations: not shiny, 3–5 cm, papery, and white pubescent at 700–1000 m; shiny, papery or subleathery, and glabrous at 1000–1500 m; at higher elevations the first pair of lateral veins is very near the margin.

33. *Lindera limprichtii* H. Winkler, *Repert. Spec. Nov. Regni Veg. Beih.* 12: 382. 1922.

卵叶钓樟 luan ye diao zhang

Lindera strychnifolia (Siebold & Zuccarini) Fernández-Villar var. *limprichtii* (H. Winkler) Yen C. Yang.

Evergreen trees, ca. 10 m tall. Branchlets brown, white pubescent, later deciduous, with thin layer of white exudations

on branch surface, usually becoming yellowish brown, laxly lenticellate. Leaves alternate; petiole 0.5–1.5 cm, densely pubescent, later glabrous; leaf blade grayish white abaxially, dark green adaxially, broadly elliptic or broadly ovate, sometimes elliptic or ovate, 6–11 × 2.5–6(–7.5) cm, subleathery, densely adnate-pubescent abaxially, later glabrous or laxly slightly pubescent, densely adnate-pubescent adaxially, later pubescent, deciduous, and glabrous, base rounded, apex acute, sometimes acuminate or caudate-acuminate. Umbels 6–8, inserted at short branch in leaf axil, ca. 6-flowered. Male flowers: pedicels 3–4 mm, white pubescent; tepals ca. 3.2 × 1.5 mm in outer whorl, ca. 2.2 × 1.3 mm in inner whorl; stamens equal to length of tepals; filament white pubescent, 2-glandular at base in 3rd whorl; glands elliptic, stipitate; reduced pistil ca. 3 mm; ovary ovate, ca. 1 mm, ovary and style densely white pubescent. Female flowers: pedicels 3–4 mm, white pubescent; tepals 6, narrowly elliptic, apex rounded, ca. 2.7 × 1 mm in outer whorl, slightly short in inner whorl; reduced stamens fasciated, ca. 2.3 mm, slightly wide near apex, laxly pubescent, 2-glandular at filament base in 3rd whorl; glands elliptic, stipitate. Fruits ellipsoid, ca. 9 × 6 mm; stipes usually 1 cm, sometimes up to 1.5 cm, inflated at apex, ca. 3 mm in diam., pubescent, later deciduous. Fl. Apr–May, fr. Aug–Sep.

• Forests, roadsides, valleys; 1000–2200 m. Gansu, Shaanxi, Sichuan.

34. *Lindera pulcherrima* (Nees) J. D. Hooker, Fl. Brit. India 5: 185. 1886.

西藏钓樟 xi zang diao zhang

Evergreen trees, 7–10 m tall. Branchlets green, smooth, striate, white pubescent, later deciduous. Buds ovate-oblong, ca. 4 mm, or ellipsoid and 7–8 mm; bud scales white pubescent. Leaves alternate; petiole 8–12 mm, white pubescent; leaf blade blue-gray abaxially, green adaxially, narrowly ovate, obovate, oblong, oblong-lanceolate, or elliptic, 8–13 × 2–4.5 cm, white pubescent on both surfaces when young, later glabrous or nearly glabrous, trinerved, midrib and lateral veins yellow, distinctly convex abaxially, slightly convex adaxially, base rounded or broadly cuneate, apex acuminate or caudate-acuminate and up to 2–3 cm. Umbels 3–5, inserted at top of 1–3 mm short branchlets in leaf axil, sometimes short branchlets developing into normal branchlets. Male flowers: tepals 6, elliptic, equal in length, laxly white pubescent on dorsal keel, glabrous inside; stamens 9; filaments white pubescent, 2-glandular near base in 3rd whorl; glands reniform, stipitate; reduced pistil white pubescent. Female flowers not seen. Fruits ellipsoid, ca. 8 × 6 mm when mature, laxly white pubescent and densely white pubescent on apex or glabrous when young. Fr. Jun–Aug.

Forests, mountain slopes, riversides, forest margins, thickets; below 100–3700 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal].

- 1a. Ovary and style densely pubescent; young fruits laxly or densely pubescent 34a. var. *pulcherrima*
- 1b. Ovary glabrous, style laxly or densely pubescent; young fruits glabrous.
 - 2a. Leaf blade lanceolate, rarely

narrowly ovate, apex

acuminate 34b. var. *attenuata*

- 2b. Leaf blade elliptic, oblong, or obovate, acuminate or sometimes caudate-acuminate and rather

short at apex 34c. var. *hemsleyana*

34a. *Lindera pulcherrima* var. *pulcherrima*

西藏钓樟(原变种) xi zang diao zhang (yuan bian zhong)

Daphnidium pulcherrimum Nees in Wallich, Pl. Asiat. Rar. 2: 63. 1831; *Benzoin pulcherrimum* (Nees) Kuntze.

Leaf blade narrowly ovate, oblong, or oblong-lanceolate, apex caudate-acuminate and up to 2–3 cm. Ovary and style densely pubescent. Young fruits laxly or densely pubescent. Fr. Jun–Aug.

Forests on mountain slopes; 2200–3700 m. Xizang [Bhutan, India, Nepal].

34b. *Lindera pulcherrima* var. *attenuata* C. K. Allen, J. Arnold Arbor. 22: 21. 1941.

香粉叶 xiang fen ye

Benzoin subcaudatum (Merrill) Chun; *Lindera subcaudata* (Merrill) Merrill; *Neolitsea subcaudata* Merrill.

Buds ellipsoid, 7–8 mm. Leaf blade lanceolate, rarely narrowly ovate, apex acuminate. Ovary glabrous; style laxly or densely pubescent. Young fruits glabrous.

• Mountain slopes, riversides; below 100–1600 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

The leaves and bark contain aromatic oil and gum. The leaves usually are used for pig food. The bark is used medicinally.

34c. *Lindera pulcherrima* var. *hemsleyana* (Diels) H. P. Tsui, Acta Phytotax. Sin. 16(4): 67. 1978.

川钓樟 chuan diao zhang

Lindera strychnifolia (Siebold & Zuccarini) Fernández-Villar var. *hemsleyana* Diels, Bot. Jahrb. Syst. 29: 352. 1901; *Benzoin strychnifolium* (Siebold & Zuccarini) Kuntze var. *hemsleyanum* (Diels) C. K. Allen; *B. urophyllum* Rehder; *Daphnidium strychnifolium* Siebold & Zuccarini var. *hemsleyanum* (Diels) Nakai; *L. gambleana* C. K. Allen; *L. hemsleyana* (Diels) C. K. Allen; *L. stewardiana* C. K. Allen; *L. urophylla* (Rehder) C. K. Allen.

Leaves elliptic, oblong, or obovate, rarely elliptic-lanceolate, apex acuminate or shortly caudate-acuminate. Ovary glabrous; style laxly or densely pubescent. Young fruits glabrous.

• Forest margins, thickets, mountain slopes; ca. 2000 m. Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

35. *Lindera thomsonii* C. K. Allen, J. Arnold Arbor. 22: 22. 1941.

三股筋香 san gu jin xiang

Evergreen trees, 3–10 m tall, 4–25 cm d.b.h. Bark brown. Branchlets greenish or greenish and slightly red, cylindrical,

longitudinally striate, distinctly lenticellate; young branchlets densely sericeous, later glabrous. Terminal bud ovate; bud scales brown, densely sericeous pubescent. Leaves alternate; petiole 7–15 mm; leaf blade pale abaxially, green adaxially, ovate, narrowly ovate, or lanceolate, 7–11 × 2.5–4.5 cm, papery, densely coadnate white or yellow sericeous-pubescent on both surfaces when young, or more laxly adaxially, later glabrous or laxly gray or black pubescent, trinerved or triplinerved, veins convex and distinct, base acute or subrounded, apex caudate-acuminate, up to 3.5 cm, and straight or falcate. Male umbel axillary, 3–10-flowered, peduncles 2–3 mm, involucre bracts early deciduous; female umbel axillary, 4–12-flowered, peduncles ca. 2 mm, involucre bracts early deciduous. Male flowers yellow; pedicels 3–4 mm, gray pubescent; tepals 6, ovate-lanceolate, 3.5–4 mm; filaments laxly pubescent, 2-glandular near base in 3rd whorl; glands rounded-reniform, shortly stipitate; reduced pistil ca. 4 mm; style gray pubescent. Female flowers white, yellow, or yellow-green; pedicels 4–5 mm, gray pubescent; staminodes 9, ca. 2.5 mm, sometimes petaloid in 3rd whorl, 2-glandular at filament base; glands rounded-reniform, subsessile; ovary ellipsoid, ca. 2 mm, equal to length of style, gray pubescent. Fruits ellipsoid, 1–1.4 cm × 7–10 mm, red becoming black at maturity; stipes 1–1.5 cm, pubescent; hypocarpium ca. 2 mm in diam. Fl. Feb–Mar, fr. Jun–Sep.

Sparse forests on mountains, evergreen broad-leaved forests on mountain slopes; 1100–2500(–3000) m. Guangxi, W Guizhou, Yunnan [India, Myanmar, Vietnam].

- 1a. Leaf blade ovate or narrowly ovate, apex caudate-acuminate, up to 3.5 cm, and straight, densely coadnate white or yellow sericeous-pubescent on both surfaces, later glabrous or laxly black pubescent 35a. var. *thomsonii*
- 1b. Leaf blade narrowly ovate or lanceolate, apex caudate-acuminate, 2–3 cm, and falcate, laxly sericeous pubescent adaxially, densely coadnate and white sericeous abaxially, later gradually deciduous and becoming laxly gray or black sericeous 35b. var. *velutina*

35a. *Lindera thomsonii* var. *thomsonii*

三股筋香(原变种) san gu jin xiang (yuan bian zhong)

Lindera pulcherrima (Nees) J. D. Hooker var. *glauca* Lecomte.

Leaf blade ovate or narrowly ovate, densely coadnate white or yellow sericeous-pubescent on both surfaces, later glabrous or laxly black pubescent, apex caudate-acuminate, up to 3.5 cm, and straight.

Sparse forests on mountains; 1100–2500(–3000) m. Guangxi, W Guizhou, SE and W Yunnan [India, Myanmar, Vietnam].

35b. *Lindera thomsonii* var. *velutina* (Forrest) L. C. Wang, Acta Bot. Boreal.-Occid. Sin. 6: 64. 1986.

长尾钓樟 chang wei diao zhang

Lindera strychnifolia (Siebold & Zuccarini) Fernández-

Villar var. *velutina* Forrest, Notes Roy. Bot. Gard. Edinburgh 13: 166. 1921; *L. hemsleyana* (Diels) C. K. Allen var. *velutina* (Forrest) C. K. Allen; *L. thomsonii* var. *vernayana* (C. K. Allen) H. P. Tsui, nom. superfl.; *L. vernayana* C. K. Allen.

Leaf blade narrowly ovate or lanceolate, densely coadnate and white sericeous abaxially, laxly sericeous-pubescent adaxially, later gradually deciduous and becoming laxly gray or black sericeous, apex caudate-acuminate, 2–3 cm, and falcate.

Evergreen broad-leaved forests on mountain slopes; 1500–3000 m. N and W Yunnan [N Myanmar].

36. *Lindera floribunda* (C. K. Allen) H. P. Tsui, Acta Phytotax. Sin. 16(4): 68. 1978.

绒毛钓樟 rong mao diao zhang

Lindera gambleana C. K. Allen var. *floribunda* C. K. Allen, J. Arnold Arbor. 22: 28. 1941.

Evergreen trees, 4–10 m tall. Young branchlets densely gray-brown tomentose, with longitudinal dehiscences and lenticels. Buds ovate; bud scales densely gray-white pubescent. Leaves alternate; petiole ca. 1 cm; leaf blade gray-blue abaxially, green and not shiny adaxially, obovate or elliptic, (6.5–)7–10(–11) × 4.5–6.5 cm, papery, trinerved, reticulate veins distinct, convex and densely yellow-brown tomentose abaxially, apex acuminate. Umbels 3–7, inserted at short branch; involucre bracts 4, silver-white villous outside, 5-flowered inside. Male flowers: tepals 6, elliptic, ca. 4 × 2 mm, densely villous on outer surface, glabrous on inner surface; stamens 9; filaments villous, ca. 4 mm in 1st and 2nd whorl, ca. 3 mm in 3rd whorl, 2-glandular near base; glands reniform; reduced ovary ovoid; style densely villous; stigma disciform. Female flowers small; tepals ca. 1 mm, less than 0.5 mm wide; reduced stamens 9, fasciated, ca. 1 mm, laxly villous; anther slightly enlarged in 1st and 2nd whorl; filaments 2-glandular above middle in 3rd whorl; glands rounded-reniform; ovary ellipsoid; style densely silver-white sericeous; stigma disciform, 2-cleft. Fruits ellipsoid, ca. 0.8 × 0.4 cm, tomentose when young; stipes ca. 0.8 cm; hypocarpium disciform, inflated. Fl. Mar–Apr, fr. Apr–Aug.

• Mixed forests on mountain slopes or riversides; 300–1300 m. Gansu, Guangdong, Guizhou, Hubei, Hunan, Shaanxi, Sichuan.

37. *Lindera villipes* H. P. Tsui, Acta Phytotax. Sin. 16(4): 68. 1978.

毛柄钓樟 mao bing diao zhang

Evergreen small trees, 5–8 m tall. Two-year-old branchlets yellowish brown, nearly glabrous, many lenticellate, rather scabrous; young branchlets densely yellowish brown tomentose. Bud scales yellowish or brown sericeous. Leaves alternate; petiole 0.1–1.5 cm, densely yellowish brown villous; leaf blade gray-green abaxially, green and shiny adaxially, oblong or obovate, 4.5–15 × 2.3–5.2 cm, leathery, dirty yellowish tomentose abaxially, rather dense along veins and on base, later deciduous and nearly glabrous, trinerved, reticulate veins distinct, more convex abaxially than adaxially, base rounded, apex long acuminate. Umbels 2 or 3, axillary, not pedunculate; involucre bracts 4, decussate, nearly equal in length, yellow-brown tomentose outside, 5- or 6-flowered inside. Male flowers: tepals 6 or

8; stamens 9–12, 2-glandular at filament base in 3rd whorl; glands rounded-reniform, stipitate, sometimes 1 at filament base in 2nd whorl; reduced ovary obovate; style densely yellowish villous; stigma disciform. Female flowers not seen. Young fruits green, ferruginous pubescent. Fl. Mar–Apr, fr. Jun–Jul.

• Evergreen broad-leaved forests on mountain slopes; 2400–3200 m. SE Xizang, W Yunnan.

38. *Lindera aggregata* (Sims) Kostermans, Reinwardtia 9: 98. 1974.

乌药 wu yao

Evergreen shrubs or small trees, up to 5 m tall, ca. 4 cm d.b.h.; roots fusiform-inflated or nodose-inflated, 3.5–8 × 0.7–2.5 cm, brown-yellow or brown-black and rugose on surface, aromatic. Bark gray-brown. Young branchlets blue-green, longitudinally striate, densely golden sericeous or laxly pubescent, later gradually deciduous and glabrous, brown when dry. Terminal bud narrowly elliptic. Leaves alternate; petiole 0.5–1 cm, brown pubescent, later gradually deciduous; leaf blade pale abaxially, green and shiny adaxially, narrowly ovate, broadly elliptic, subrounded, or lanceolate, 2.7–6 × 1.3–4 cm, sometimes up to 7 cm, leathery or subleathery, densely brown pubescent abaxially, later gradually deciduous, sometimes slightly black pubescent, trinerved, midrib and lateral veins distinctly convex abaxially, concave adaxially, rarely convex, base rounded, apex acuminate or caudate-acuminate. Umbels 6–8, inserted in short branchlet, axillary, not pedunculate, each with a bract and 7 flowers; short branchlets 1–2 mm. Pedicels ca. 0.4 mm, pubescent. Tepals 6, yellow or yellow-green, sometimes milky white and slightly purple-red, white pubescent outside, glabrous inside. Male flowers: tepals ca. 4 × 2 mm; stamens 3–4 mm; filament laxly pubescent, 2-glandular at base in 3rd whorl; glands reniform, stipitate, sometimes 1 or 2 at filament base in 2nd whorl; reduced pistil urceolate. Female flowers: tepals ca. 2.5 × 2 mm; reduced stamens fasciated, ca. 1.5 mm, laxly pubescent, 2-glandular at filament base in 3rd whorl; glands stipitate; ovary ellipsoid, ca. 1.5 mm, brown pubescent; stigma capitate. Fruits ovate or sometimes subrounded, 0.6–1 cm × 4–7 mm. Fl. Mar–Apr, fr. May–Nov.

Sunny mountain slopes, valleys, sparse forests and thickets; 200–1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Zhejiang [Philippines, Vietnam].

1a. Young branchlets densely golden sericeous; leaf blade abaxial surface brown pubescent,

later becoming somewhat laxly and black pubescent, broadly elliptic or subrounded, 2.7–5 × 1.5–4 cm, caudate-acuminate at apex 38a. var. *aggregata*

1b. Young branchlets and abaxial surface of leaf blade glabrous or laxly pubescent, later deciduous and becoming glabrous; leaf blade narrowly ovate or lanceolate, 4–6 × 1.3–2 cm, caudate-acuminate or caudate at apex 38b. var. *playfairii*

38a. *Lindera aggregata* var. *aggregata*

乌药(原变种) wu yao (yuan bian zhong)

Laurus aggregata Sims, Bot. Mag. 51: t. 2497. 1824; *Benzoin strychnifolium* (Siebold & Zuccarini) Kuntze; *Daphnidium strychnifolium* Siebold & Zuccarini; *Lindera eberhardtii* Lecomte; *L. strychnifolia* (Siebold & Zuccarini) Fernández-Villar.

Young branchlets densely golden sericeous. Leaf blade broadly elliptic or subrounded, 2.7–5 × 1.5–4 cm, abaxial surface brown pubescent, later becoming somewhat laxly and black pubescent, caudate-acuminate at apex.

Sunny mountain slopes, valleys, sparse forests and thickets; 200–1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Zhejiang [Philippines, Vietnam].

The roots are used medicinally. The fruits, leaves, and roots may yield aromatic oil. The seeds are used for making agricultural medicine.

38b. *Lindera aggregata* var. *playfairii* (Hemsley) H. P. Tsui, Acta Phytotax. Sin. 16(4): 69. 1978.

小叶乌药 xiao ye wu yao

Litsea playfairii Hemsley, J. Linn. Soc., Bot. 26: 384. 1891; *Lindera alongensis* Lecomte; *L. playfairii* (Hemsley) C. K. Allen; *Neolitsea playfairii* (Hemsley) Chun.

Young branchlets and abaxial surface of leaf blade glabrous or laxly pubescent, later deciduous and becoming glabrous. Leaf blade narrowly ovate or lanceolate, 4–6 × 1.3–2 cm, caudate-acuminate or caudate at apex.

• Sunny mountain slopes, valleys, sparse forests and thickets; 200–1000 m. Guangdong, Guangxi, Hainan.

A record from Vietnam (in Fl. Hainan. 1: 299. 1964) is erroneous.

The roots are used medicinally.

Species incertae sedis

Lindera doniana C. K. Allen, J. Arnold Arbor. 22: 10. 1941.

贡山胡椒 gong shan shan hu jiao

?Small trees. Branchlets slightly stout, striate, gray-brown, glabrous, ferruginous tomentose on young parts. Leaves alternate; petiole 5–8 mm, stout, pubescent; leaf blade usually shiny and rather pale abaxially, broadly lanceolate or elliptic, 5–9 × 2–2.5(–3) cm, subleathery, nearly glabrous and later glabrous adaxially, pinninerved, lateral veins 7–10 pairs, distinctly convex abaxially, rather concave adaxially, densely villous, reticu-

late veins dense and distinct, base cuneate, apex acuminate, acutely subrounded, or slightly emarginate. Male umbels 1–3, inserted at leaf axil, shortly pedunculate, 6–8-flowered; bracts usually persistent, adnate pubescent on middle of outside; tepal ?6 (seen after bloom). Fruits subglobose, ca. 6 mm in diam.; stipes ca. 3.5 mm, stout, pubescent; hypocarpium slightly plano-compressed, ca. 3 mm in diam., pubescent.

Broad-leaved forests; ca. 2300 m. NW Yunnan (Gongshan) [NE India].

According to the specimen *T. T. Yu 20015*, which was cited by

Flora of China 7: 142–159. 2008.

Allen in the protologue, *Lindera doniana* is similar to *L. nacusua*, but its leaves, petioles, and peduncles are rather long. Flowering and fruiting materials have not been seen by the present authors, so a definitive placement for the species cannot be made.

