

## LAURACEAE

樟科 zhang ke

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Trees or shrubs (*Cassytha* a twining parasitic perennial herb with leaves reduced or absent), mostly evergreen (deciduous in temperate regions), sometimes dioecious. Bark and foliage usually aromatic. Leaves usually alternate, occasionally opposite or sub-opposite or verticillate, simple, usually entire, rarely lobed (*Sassafras*), mostly pinninerved and subpalmately veined, or often triplinerved, usually punctate and leathery, estipulate. Flowers in usually axillary, occasionally subterminal, panicles, spikes, racemes, or pseudumbels, generally bisexual, sometimes unisexual, actinomorphic, mostly 3-merous, also 2-merous, small, greenish, yellowish, or white. Perianth biseriata, of usually 4 or 6 basally connate usually undifferentiated sepal-like segments, deciduous or persistent; perianth tube usually persisting as a cupule at base of fruit. Androecium typically of 4 whorls of 3 stamens each, adnate to perianth tube, innermost whorl rarely united, usually reduced to staminodes; filaments usually free, 3rd whorl usually bearing 2 usually sessile and distinct basal glandular protuberances; anthers basifixed, 2-celled or 4-celled at anthesis, those of 2 outer whorls mostly introrse, inner 3rd whorl extrorse, dehiscing by flaplike valves opening upward. Pistil 1; ovary usually superior, 1-loculed; ovule solitary, anatropous, pendulous, placentation parietal; style 1; stigma 1, occasionally 2- or 3-lobed. Fruit a drupe or berry usually surrounded at base by enlarged and often persistent perianth tube seated on a large receptacle or pedicel. Seed with large straight embryo; endosperm absent.

About 45 genera and 2000–2500 species: tropical and subtropical regions but mostly in tropical SE Asia and tropical America; 25 genera (two endemic, two introduced) and 445 species (316 endemic, three introduced) in China; two additional species (one endemic) are of uncertain placement.

The Lauraceae are economically important as sources of medicine, timber, nutritious fruits (e.g., *Persea americana*), spices (e.g., *Cinnamomum cassia*, *C. subavenium*, *Laurus nobilis*), and perfumes. The fruits of *Actinodaphne*, *Cinnamomum*, *Cryptocarya*, *Lindera*, *Litsea*, and *Syndiclis* contain abundant oil and fat. *Cinnamomum* trees, such as *Cinnamomum camphora*, *C. glanduliferum*, and *C. parthenoxylon*, yield camphor and essential oil, which are used for making perfumes and medicines. The bark of *C. cassia* and the roots of *Lindera aggregata* are famous traditional Chinese medicines.

The Chinese species of Lauraceae remain poorly known and difficult to identify. The main reason for this is that for a substantial number of species the fruits or flowers are not known. This makes generic placement of such species uncertain, since most genera are defined by floral characters. A second problem is that characters of both flowers and fruits are used in most generic keys and since specimens almost never bear both flowers and fruits, identification is often almost impossible. A drastic remedy for this problem would be to make keys based on flowering specimens and list species known only with fruits as incompletely known species and not include them in the keys. This approach has not been followed in this treatment.

The genera are here maintained as they have been recognized in earlier works on Chinese Lauraceae. The present authors are aware that this will seem inconsistent; for instance, in the case of *Sassafras*, species with 2-celled and 4-celled anthers are included in the same genus, while in other cases pairs of genera are separated based on this character (for example *Lindera-Litsea*, *Alseodaphne-Nothaphoebe*, and *Parasassafras-Sinosassafras*). Generic boundaries in the *Litsea* group (*Actinodaphne*, *Dodecadenia*, *Iteadaphne*, *Lindera*, *Litsea*, *Neolitsea*, *Parasassafras*, and *Sinosassafras*) are not well defined, and generic concepts are likely to change after further research.

Aside from these problems, there are a number of vegetative characters that are helpful in the identification process. They are listed below.

Leaves opposite or subopposite: *Beilschmiedia* p.p., *Caryodaphnopsis*, *Cinnamomum* p.p.

Leaves verticillate or clustered: *Actinodaphne*, *Neolitsea*; rarely in *Lindera* (*L. megaphylla*) and *Litsea* (*L. verticillata*); weakly clustered in *Alseodaphne*, *Dehaasia*, *Machilus*, *Phoebe*.

Leaves triplinerved and alternate: *Cinnamomum* p.p., *Cryptocarya* p.p., *Lindera* p.p., *Neocinnamomum*.

Leaves triplinerved and clustered: *Neolitsea*.

Leaves triplinerved and opposite: *Caryodaphnopsis*, *Cinnamomum* p.p.

Leaves lobed: *Lindera* p.p., *Sassafras*.

Leaves with tufts of hairs in axils of lateral veins: *Cinnamomum* p.p.

The three genera *Machilus*, *Persea*, and *Phoebe* cannot be identified adequately by floral characters; they have been separated traditionally on the fruit characters listed in the key.

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**Key to genera**

- 1a. Twining parasitic vines ..... 25. *Cassytha*
- 1b. Leafy trees or shrubs.
- 2a. Flowers unisexual, rarely bisexual, in pseudoumbels or racemes, rarely solitary; bracts large, forming an involucre.
- 3a. Flowers 2-merous; perianth lobes 4.
- 4a. Male flowers: 12 stamens in 3 whorls, all stamens or those of 2nd and 3rd whorl glandular, anthers 2-celled; female flowers: staminodes 4 ..... 1. *Laurus*
- 4b. Male flowers: 6 stamens in 3 whorls, only those of 3rd whorl glandular, anthers 4-celled; female flowers: staminodes 6 ..... 2. *Neolitsea*
- 3b. Flowers 3-merous; perianth lobes 6.
- 5a. Bracts of involucre imbricate, caducous or late deciduous.
- 6a. Deciduous habit; leaves alternate, unlobed or 2- or 3-lobed; inflorescence of racemes ..... 7. *Sassafras*
- 6b. Evergreen habit; leaves usually whorled, rarely opposite or alternate, unlobed; inflorescence of umbels ..... 8. *Actinodaphne*
- 5b. Bracts of involucre decussate, persistent or late deciduous.
- 7a. Anthers 4-celled.
- 8a. Inflorescence many flowered ..... 3. *Litsea*
- 8b. Inflorescence 1-flowered ..... 4. *Dodecadenia*
- 7b. Anthers 2-celled.
- 9a. Flowers functionally unisexual; umbel mostly many flowered ..... 5. *Lindera*
- 9b. Flowers unisexual or polygamous; pseudoumbel 1-flowered ..... 6. *Headaphne*
- 2b. Flowers bisexual, rarely unisexual, in panicles or clusters, rarely in pseudoumbels; bracts small, not forming an involucre.
- 10a. Anthers (1 or)2-celled.
- 11a. Fruit enveloped by dilated perianth tube ..... 24. *Cryptocarya*
- 11b. Fruit not enveloped by perianth tube.
- 12a. Flowers 2-merous; perianth lobes 4; fertile stamens 4 ..... 23. *Syndiclis*
- 12b. Flowers 3-merous; perianth lobes 6; fertile stamens 3 or 9.
- 13a. Flowers functionally unisexual, in pseudoumbels ..... 19. *Sinosassafras*
- 13b. Flowers bisexual, in panicles.
- 14a. Fertile stamens 3 ..... 20. *Endiandra*
- 14b. Fertile stamens 6 or 9.
- 15a. Tepals longer than stamens; stamens included in flower; anther cells laterally opening, slit-like ..... 21. *Beilschmiedia*
- 15b. Tepals shorter than stamens; stamens exerted from flower; anther cells apically opening, small, roundish ..... 22. *Sinopora*
- 10b. Anthers 4-celled.
- 16a. Perianth tube forming a perianth cup when in fruit.
- 17a. Flowers in umbels ..... 9. *Parasassafras*
- 17b. Flowers in panicles or glomerules.
- 18a. Flowers in panicles; anther cells in pairs above each other; perianth lobes deciduous or persistent but not thickened when in fruit; leaves alternate or subopposite, pinninerved, trinerved, or triplinerved ..... 10. *Cinnamomum*
- 18b. Flowers in glomerules; anther cells in an arc or in pairs above each other, lower 2 cells large and lateral; perianth lobes persistent and dilated when in fruit; leaves alternate, triplinerved ..... 11. *Neocinnamomum*
- 16b. Perianth tube not forming a perianth cup when in fruit.
- 19a. Perianth lobes persistent when in fruit.
- 20a. Persistent perianth lobes soft, longer, reflexed or patent, not tightly clasped at fruit base ..... 14. *Machilus*
- 20b. Persistent perianth lobes durable, shorter, erect or patent, tightly clasped at fruit base.
- 21a. Perianth lobes equal in size, sometimes outer 3 somewhat smaller; filaments long ..... 12. *Phoebe*
- 21b. Perianth lobes unequal in size, outer 3 conspicuously smaller; filaments very short ..... 13. *Nothaphoebe*
- 19b. Perianth lobes deciduous when in fruit.
- 22a. Fruit stalk dilated, fleshy, always colored; anthers 2-celled ..... 15. *Dehaasia*
- 22b. Fruit stalk barely or not dilated; if fruit stalk dilated, anthers 4-celled.

- 23a. Leaves opposite, trinerved or triplinerved; perianth lobes unequal in size, outer 3 smaller ..... 16. *Caryodaphnopsis*  
 23b. Leaves alternate, pinninerved; perianth lobes equal or subequal in size.  
 24a. Perianth large; fruit fleshy, large-sized; plants cultivated ..... 17. *Persea*  
 24b. Perianth small- or medium-sized; fruit somewhat fleshy, small- to medium-sized; plants native ..... 18. *Alseodaphne*

### Alternative key to genera

One of the present authors (van der Werff) provides this alternative key to genera. *Nothaphoebe* is deliberately not included; see the comment under that genus (p. 200).

- 1a. Twining parasitic vines with minute scalelike leaves ..... 25. *Cassytha*  
 1b. Leafy trees or shrubs.  
 2a. Plants deciduous, flowering when leafless or with unfolding young leaves.  
 3a. Inflorescences racemose ..... 7. *Sassafras*  
 3b. Inflorescences umbellate.  
 4a. Stamens with 4 locelli or staminodia with 4 rudimentary locelli ..... 3. *Litsea*  
 4b. Stamens with 2 locelli or staminodia with 2 rudimentary locelli ..... 5. *Lindera*  
 2b. Plants evergreen, flowering when mature leaves are present.  
 5a. Flowers unisexual.  
 6a. Flowers 2-merous, with 4 tepals.  
 7a. Anthers 2-celled; leaves evenly distributed along twigs; plants cultivated ..... 1. *Laurus*  
 7b. Anthers 4-celled; leaves clustered; plants native ..... 2. *Neolitsea*  
 6b. Flowers 3-merous, with 6 tepals.  
 8a. Inflorescences umbellate, involucre bracts present at base of young umbels.  
 9a. Anthers 2-celled ..... 5. *Lindera*  
 9b. Anthers 4-celled.  
 10a. Leaves verticillate and umbels sessile along leafless internodes ..... 8. *Actinodaphne*  
 10b. Leaves alternate or rarely whorled, if whorled, umbels pedicellate and predominantly in axils of leaves ..... 3. *Litsea*  
 8b. Inflorescences paniculate, racemose, 1-flowered or umbellate, if umbellate, involucre bracts lacking.  
 11a. Inflorescences paniculate ..... 8. *Actinodaphne*  
 11b. Inflorescences racemose, umbellate, or 1-flowered.  
 12a. Inflorescences umbellate.  
 13a. Anthers 2-celled ..... 19. *Sinosassafras*  
 13b. Anthers 4-celled ..... 9. *Parasassafras*  
 12b. Inflorescences 1-flowered, sometimes several 1-flowered inflorescences along a leafless short shoot and thus appearing racemose.  
 14a. Anthers 2-celled ..... 6. *Itadaphne*  
 14b. Anthers 4-celled ..... 4. *Dodecadenia*  
 5b. Flowers bisexual.  
 15a. Leaves opposite and tepals strongly unequal, outer 3 much smaller than inner 3 ..... 16. *Caryodaphnopsis*  
 15b. Leaves alternate, if leaves subopposite, tepals equal.  
 16a. Flowers 2-merous, tepals 4 ..... 23. *Syndiclis*  
 16b. Flowers 3-merous, tepals 6.  
 17a. Anthers 2-celled.  
 18a. Stamens 3 ..... 20. *Endiandra*  
 18b. Stamens 9.  
 19a. Leaves clustered; bark of twigs pale gray, contrasting with dark petioles ..... 15. *Dehaasia*  
 19b. Leaves evenly distributed or subopposite; bark of twigs and petioles concolorous.  
 20a. Base of tepals united in a short tube; free parts of tepals falling off in old flowers, leaving pistil enclosed in floral tube ..... 24. *Cryptocarya*  
 20b. Tepals free or nearly so, falling off in old flowers and leaving pistil fully exposed on pedicel.  
 21a. Stamens 6 or 9, included in flowers, shorter than tepals; anther cells lateral ..... 21. *Beilschmiedia*  
 21b. Stamens 6, as long as or longer than tepals; anther cells apical ..... 22. *Sinopora*  
 17b. Anthers 4-celled.

- 22a. Leaves strongly triplinerved, alternate; flowers in fascicles arranged along a branched inflorescence or sessile in leaf axils; tepals to 2 mm ..... 11. *Neocinnamomum*
- 22b. Leaves pinnately veined or infrequently triplinerved; flowers in panicles, not in fascicles; tepals mostly more than 2 mm.
- 23a. Leaves alternate, pinnately veined, clustered along twigs, without domatia; terminal buds not protected by whorls of bracts, rings of bract scars lacking at base of seasonal growth ..... 18. *Alseodaphne*
- 23b. Leaves alternate or opposite, pinnately veined or triplinerved, domatia sometimes present, if somewhat clustered then terminal buds protected by whorls of bracts and rings of bract scars present at base of seasonal growth.
- 24a. Leaves triplinerved or pinnately veined, if pinnately veined then domatia present ..... 10. *Cinnamomum*
- 24b. Leaves pinnately veined and domatia lacking.
- 25a. Tepals clasping fruits ..... 12. *Phoebe*
- 25b. Tepals spreading to reflexed or deciduous.
- 26a. Tepals spreading to reflexed in fruit ..... 14. *Machilus*
- 26b. Tepals deciduous in fruit.
- 27a. Fruit large (5–15 cm), pear-shaped; plants cultivated for their fruit ..... 17. *Persea*
- 27b. Fruit small (ca. 1 cm in diam.), ± round; plants native ..... 14. *Machilus*

## 1. LAURUS Linnaeus, Sp. Pl. 1: 369. 1753.

月桂属 yue gui shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Trees evergreen, small. Leaves alternate; leaf blade leathery, pinninerved. Flowers unisexual, in pedunculate umbels enveloped by 4 decussate involucre bracts before anthesis, axillary, always in pairs, usually 1 or 3 in cluster on short raceme. Perianth tube short; perianth lobes 4, subequal. Male flowers: stamens 8–14, usually 12, in 3 whorls; filaments of 1st whorl eglandular, but those of 2nd or 3rd whorls each with 2 reniform glands at middle part; anthers 2-celled, cells introrse; ovary infertile. Female flowers: staminodes 4, alternate to perianth lobes; filaments each with 2 sessile glands and a lanceolate ligule between glands at apex; ovary 1-celled; style short; stigma slightly dilated, obtusely trigonous, 1-ovuled. Fruit ovoid; perianth tube not or slightly dilated, ruptured or not.

Two species: Macaronesian islands, Mediterranean region; one species (introduced) in China.

### 1. *Laurus nobilis* Linnaeus, Sp. Pl. 1: 369. 1753.

月桂 yue gui

Evergreen shrublike or small trees, up to 12 m tall, dioecious. Bark blackish brown. Branchlets terete, striate, puberulent on young part or wholly subglabrous. Leaves alternate; petiole purple-red when fresh, 0.7–1 cm, sparsely puberulent or subglabrous, sulcate adaxially; leaf blade greenish abaxially, dark green adaxially, oblong or oblong-lanceolate, 5.5–12 × 1.8–3.2 cm, leathery, glabrous on both surfaces, lateral veins 10–12 pairs, curved and interconnected at ends near leaf margin, midrib elevated on both surfaces, reticulate veinlets ± conspicuous on both surfaces, foveolate, base cuneate, margin slightly undulate, apex acute or acuminate. Umbels 1–3 in cluster on short raceme, globose; involucre bracts suborbicular, glabrous outside, sericeous inside; peduncle up to 7 mm,

sparsely puberulent or subglabrous. Male flowers 5 in each umbel, green, small; pedicels ca. 2 mm, pilose; perianth tube short, densely pilose outside; perianth lobes 4, broadly obovate or suborbicular, appressed villous on both surfaces; fertile stamens usually 12, in 3 whorls; filaments of 1st whorl eglandular but those of 2nd and 3rd whorls each with 2 reniform glands at middle part; anthers ellipsoid, 2-celled, cells introrse; ovary infertile. Female flowers: staminodes 4; ovary 1-celled; style short; stigma slightly dilated, obtusely trigonous. Fruit dark purple when mature, ovoid. Fl. Mar–May, fr. Jun–Sep.

Cultivated. Fujian, Jiangsu, Sichuan, Taiwan, Yunnan, Zhejiang [native to Mediterranean region].

The leaves and fruits contain essential oil, 0.3%–0.5% (or even up to 3%) and ca. 1%, respectively. The leaves also are used as a spice. The seeds contain oil and fat, which are used in soap manufacture.

## 2. NEOLITSEA (Bentham & J. D. Hooker) Merrill, Philipp. J. Sci. 1(Suppl. 1): 56. 1906, nom. cons.

新木姜子属 xin mu jiang zi shu

Huang Puhua (黄普华 Huang Pu-hwa); Henk van der Werff

*Litsea* sect. *Neolitsea* Bentham & J. D. Hooker, Gen. Pl. 3: 161. 1880; *Bryantea* Rafinesque; *Tetradenia* Nees (1831), not Bentham (1830).

Trees or shrubs, evergreen, dioecious. Leaves alternate, clustered, or verticillate, rarely subopposite, triplinerved, rarely pinninerved or subtriplinerved. Umbels solitary or fasciculate, pedunculate or not; bracts opposite, large, late deciduous; perianth segments 4, in 2 whorls. Flowers unisexual. Male flowers: fertile stamens 6 in 3 whorls of 2 each; filaments of 1st and 2nd whorls eglandular, of 3rd whorls 2-glandular at base; anthers all introrse, 4-celled. Female flowers: staminodes 6, clavate, of 1st and 2nd whorls eglandular, of 3rd whorls 2-glandular at base; ovary superior; style conspicuous; stigma peltate. Fruit seated on slightly enlarged disciform or concave perianth tube; pedicel often slightly thickened.

About 85 species: Indo-Malaysia to E Asia; 45 species (35 endemic) in China.

*Neolitsea bawangensis* R. H. Miao (Acta Sci. Nat. Univ. Sunyatseni 32(4): 57. 1993) was described from Hainan but could not be treated here because no material was seen by the present authors.

1a. Leaf blade pinninerved or subtriplinerved.

2a. Young branchlets glabrous.

3a. Young branchlets and petioles stouter; leaf blade thickly leathery, oblong or elliptic, larger, 6.5–13 × 1–4.2 cm, transverse veins distinct abaxially ..... 1. *N. pinninervis*

3b. Young branchlets and petioles relatively slender; leaf blade thinly leathery, ovate-lanceolate to lanceolate, elliptic, or oblong-lanceolate, smaller, 5–9 × 1.7–3.5 cm, transverse veins indistinct abaxially.

4a. Leaf blade lateral veins 8–12 pairs; filaments glabrous; fruit globose ..... 2. *N. wushanica*

4b. Leaf blade lateral veins 5 pairs; filaments pubescent at base; fruit ovoid ..... 3. *N. acuminatissima*

2b. Young branchlets with ferruginous tomentum or appressed pubescence.

5a. Young branchlets with dense ferruginous tomentum; fruit globose; perianth segments often persistent.

6a. Leaf blade 4–10 × 0.8–2.3 cm, petiole less than 7 mm; filaments and style glabrous ..... 4. *N. oblongifolia*

6b. Leaf blade 10–17 × 3.5–6 cm, petiole more than 10 mm; filaments and style hairy ..... 5. *N. cambodiana*

5b. Young branchlets with appressed gray-brown pubescence; fruit ellipsoid; perianth segments deciduous.

7a. Leaf blade lateral veins 13–15 pairs; fruiting tube cup-shaped, ca. 5 mm in diam. .... 6. *N. undulatifolia*

7b. Leaf blade lateral veins 4–6 pairs; fruiting tube shallowly discoid, ca. 2 mm in diam. .... 7. *N. confertifolia*

1b. Leaf blade trinerved at base or triplinerved.

8a. Leaf blade trinerved at base ..... 8. *N. menglaensis*

8b. Leaf blade triplinerved.

9a. Leaf blade glabrous abaxially when young.

10a. Leaf blade distinctly foveolate on both surfaces.

11a. Young branchlets with dense ferruginous or yellow-brown pubescence.

12a. Leaf blade elliptic or rounded-elliptic, abruptly acute at apex, acumen obtuse, base rotund or rounded ..... 29. *N. hainanensis*

12b. Leaf blade obovate, apex obtusely rounded, base cuneate ..... 30. *N. buisanensis*

11b. Young branchlets glabrous.

13a. Leaf blade oblong-lanceolate or oblong-obovate, apex obtusely rounded, lateral veins flat on both surfaces or impressed adaxially ..... 31. *N. obtusifolia*

13b. Leaf blade not as above, apex acuminate, lateral veins prominent on both surfaces.

14a. Petiole more than 15 mm, leaf blade ovate-oblong or obovate-oblong; style densely pubescent ..... 32. *N. parvigemma*

14b. Petiole less than 10 mm, leaf blade ovate; style glabrous ..... 33. *N. ovatifolia*

10b. Leaf blade not foveolate on both surfaces.

15a. Petiole 2–4 cm.

16a. Leaf blade less than 10 cm, lateral veins 2 or 3 pairs, indistinct abaxially; fruit ellipsoid, 1.3–1.8 cm ..... 34. *N. ellipsoidea*

16b. Leaf blade more than 10 cm, lateral veins 3–5 pairs, distinct abaxially; fruit globose or subglobose (*N. chui* sometimes ellipsoid, but less than 1 cm).

17a. Leaf blade broadly ovate, ovate, or ovate-oblong, 11–20 × 6.8–13 cm; fruit globose, 15–16 mm in diam. .... 35. *N. kwangsiensis*

17b. Leaf blade elliptic to ovate-elliptic, 8–16 × 2.7–9 cm; fruit subglobose or ellipsoid, ca. 8 mm in diam. .... 36. *N. chui*

15b. Petiole 0.7–1.5 cm, longest less than 2 cm.

18a. Midrib and lateral veins impressed adaxially, prominent abaxially ..... 38. *N. impressa*

18b. Midrib and lateral veins prominent on both surfaces.

19a. Leaf blade caudate-acuminate or shortly caudate-acuminate at apex.

20a. Leaf blade lateral veins 2 or 3 pairs, except for lowermost pairs, veins arising from above middle of blade; fruit ellipsoid ..... 39. *N. shingningensis*

- 20b. Leaf blade lateral veins 3–6 pairs, except for lowermost pairs, veins arising from middle or below middle of blade; fruit ovoid or obovoid.
- 21a. Young branchlets glabrous; fruit ovoid ..... 40. *N. homilantha*
- 21b. Young branchlets ferruginous pubescent; fruit obovoid ..... 41. *N. purpurascens*
- 19b. Leaf blade acute or acuminate at apex.
- 22a. Leaf blade often larger, 7.5–13 × 2.5–4.5 cm, veinlets indistinct abaxially ..... 37. *N. sutchuanensis*
- 22b. Leaf blade often smaller, 3.5–6.5(–9) × 1.3–2.5(–4) cm, veins distinctly prominent abaxially.
- 23a. Leaf blade oblong, obtusely acute at apex; style hirsute ..... 45. *N. hiiranensis*
- 23b. Leaf blade ovate, ovate-lanceolate, ovate-elliptic, or elliptic, acuminate or acute at apex; style with dense sericeous pubescence or pilose at base.
- 24a. Petiole pubescent; filaments with sericeous pubescence ..... 42. *N. pingbienensis*
- 24b. Petiole glabrous; filaments pilose only at base ..... 44. *N. daibuensis*
- 9b. Leaf blade hairy abaxially, at least on young leaves.
- 25a. Leaf blade with golden yellow or pale yellow sericeous hairs abaxially.
- 26a. Leaf blade shortly acuminate at apex, acumen obtuse; fruit globose ..... 9. *N. sericea*
- 26b. Leaf blade falcate-acuminate, acuminate, or abruptly acute at apex, acumen not obtuse; fruit ellipsoid.
- 27a. Leaf blade with dense golden yellow sericeous hairs abaxially, falcate-acuminate or acuminate at apex; rudimentary pistil glabrous ..... 10. *N. aurata*
- 27b. Leaf blade with dense appressed pale yellow sericeous pubescence abaxially, abruptly acute at apex; rudimentary pistil densely puberulent ..... 11. *N. lunglingensis*
- 25b. Leaf blade with pubescence or tomentum, not sericeous hairs abaxially.
- 28a. Young branchlets glabrous ..... 43. *N. konishii*
- 28b. Young branchlets hairy.
- 29a. Midrib and lateral veins distinctly impressed adaxially on leaf blade; umbel many flowered ..... 12. *N. velutina*
- 29b. Midrib and lateral veins elevated adaxially on leaf blade; umbel 6-flowered.
- 30a. Leaf blade lateral veins 1 pair, arising 3–8 mm from base and extending to apex, veinlets 6–9 at one side near margin ..... 13. *N. chrysotricha*
- 30b. Leaf blade lateral veins 2–6 pairs, lowermost pair arising from base or a little above base and extending to above middle of blade.
- 31a. Leaf blade larger, mostly more than 12 cm, largest 15–30 cm.
- 32a. Leaf blade obovate, ovate, or elliptic, often 2–2.5 × as long as broad.
- 33a. Young branchlets and petioles with dense appressed gray-white short pubescence; fruiting pedicel 4–5 mm ..... 14. *N. howii*
- 33b. Young branchlets and petioles with dense ferruginous-yellow tomentum; fruiting pedicel ca. 10 mm ..... 15. *N. alongensis*
- 32b. Leaf blade mostly oblong shapes, often 3 × or more as long as broad.
- 34a. Leaf blade ovate-oblong or oblong, gray pubescent abaxially, transverse veinlets indistinct ..... 16. *N. villosa*
- 34b. Leaf blade oblong-lanceolate or oblong-oblancheolate, with yellow-brown villous hairs or tomentum abaxially, transverse veinlets distinct.
- 35a. Leaf blade caudate-acuminate at apex, broadly cuneate or rotund at base, abaxially with relatively dense yellow-brown tomentum, slightly glaucous or not ..... 17. *N. tomentosa*
- 35b. Leaf blade shortly acute or abruptly acute at apex, base cuneate, glabrate abaxially, mostly glaucous ..... 18. *N. levinei*
- 31b. Leaf blade smaller, mostly less than 10 cm, largest not over 13 cm.
- 36a. Young branchlets, leaf blade abaxially, and petioles with dense ferruginous-yellow tomentum; petiole ca. 5 mm ..... 19. *N. hsiangkweiensis*
- 36b. Young branchlets, leaf blade abaxially, and petioles with pubescence; petiole often more than 10 mm.
- 37a. Fruit obovoid-ellipsoid or ellipsoid to ovoid.
- 38a. Leaf blade lanceolate or obovate-lanceolate, pubescent abaxially when old; rudimentary pistil densely hairy ..... 27. *N. aciculata*
- 38b. Leaf blade elliptic or oblong-elliptic, becoming glabrous abaxially when old; rudimentary pistil glabrous ..... 28. *N. polycarpa*
- 37b. Fruit globose or nearly globose.
- 39a. Fruiting pedicels more than 15 mm ..... 20. *N. longipedicellata*
- 39b. Fruiting pedicels less than 12 mm.
- 40a. Leaf blade slightly appressed pubescent or along veins yellow pubescent abaxially.

- 41a. Leaf blade apex acuminate, base obtuse to cuneate, not decurrent, with gray appressed pubescence abaxially when young; fruiting pedicels ca. 10 mm ..... 25. *N. variabilissima*
- 41b. Leaf blade narrowly acuminate at apex, base cuneate, slightly decurrent, only along veins with yellow pubescence abaxially when young; fruiting pedicels 4–5 mm ..... 26. *N. zeylanica*
- 40b. Leaf blade densely brown or gray villous abaxially when young.
- 42a. Leaf blade lateral veins, except for lowermost pair, arising from middle or below middle of blade, most distinct adaxially; petiole 1–2 cm ..... 21. *N. phanerophlebia*
- 42b. Leaf blade lateral veins, except for lowermost pair, arising from above middle of blade, often indistinct adaxially; petiole 0.5–0.8 cm.
- 43a. Leaf blade thickly leathery, shiny adaxially, margin not sinuous-rugose in a dry state ..... 22. *N. pulchella*
- 43b. Leaf blade thinly leathery, somewhat shiny adaxially, margin sinuous-rugose in a dry state.
- 44a. Fruiting pedicels (6–)10–12 mm; leaf blade distinctly gray-white abaxially, lateral veins 4 or 5 pairs ..... 23. *N. pallens*
- 44b. Fruiting pedicels 3–5 mm; leaf blade grayish green abaxially, lateral veins 3 or 4 pairs ..... 24. *N. brevipes*

**1. *Neolitsea pinninervis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 38. 1978.

羽脉新木姜子 *yu mai xin mu jiang zi*

Shrubs or small trees, up to 12 m tall. Branchlets glabrous. Leaves alternate or clustered at apex of branchlet, subverticillate; petiole to 2 cm, glabrous; leaf blade oblong or elliptic, 6.5–13 × 1–4.2 cm, thickly leathery, shiny, glabrous on both surfaces, pinninerved, lateral veins 7–9 pairs, transverse veins distinct abaxially, base cuneate or broadly cuneate, apex abruptly acute or falcate-acute. Umbels 2 or 3 in leaf axils, male umbel 5-flowered; peduncle 1–2 mm. Pedicel villous. Perianth segments 4, elliptic. Male flowers: fertile stamens 6–8; filaments covered with pubescence at base, of 3rd whorls each with 2 stipitate shield-shaped glands at base; rudimentary pistil ovoid; style pubescent. Fruit subglobose, ca. 6 mm in diam., black at maturity; fruiting pedicel 1–1.2 cm, pubescent or subglabrous, thickened at apex. Fl. Mar–Apr, fr. Aug–Sep.

• Dense or sparse mountain forests, mountaintops; 700–1700 m. N Guangdong, Guangxi, Guizhou, Hunan.

**2. *Neolitsea wushanica*** (Chun) Merrill, Sunyatsenia 3: 250. 1937.

巫山新木姜子 *wu shan xin mu jiang zi*

Small trees, 4–10 m tall. Branchlets glabrous or pubescent. Leaves alternate or clustered toward apex of branchlet; petiole 8–15 mm, glabrous or pubescent; leaf blade elliptic or oblong-lanceolate, 5–9 × 1.7–3.5 cm, glabrous on both surfaces, glaucous abaxially, pinninerved or sometimes subtriplinerved, lateral veins 8–12 pairs, base somewhat acuminate, apex acute or subacuminate. Umbels axillary or lateral, sessile, 5-flowered. Pedicel sericeous-pubescent. Perianth segments 4. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 small glands at base; rudimentary pistil small, glabrous. Fruit globose or ellipsoid, 5–7 mm in diam., seated on shallowly discoid perianth tube, purple-black at maturity; fruiting pedicel slightly thickened at apex.

• Mountain slopes, forest margins, mixed forests, dense forests;

400–1500 m. Fujian, Guangdong, Guizhou, Hubei, SW Hunan, Shaanxi, Sichuan, NE Yunnan.

- 1a. Young branchlets and petioles glabrous; petiole more than 1 cm; fruit globose, 6–7 mm in diam. .... 2a. var. *wushanica*
- 1b. Young branchlets and petioles pubescent; petiole less than 1 cm; fruit ellipsoid, 8–9 × 5–6 mm ..... 2b. var. *pubens*

**2a. *Neolitsea wushanica* var. *wushanica***

巫山新木姜子(原变种) *wu shan xin mu jiang zi* (*yuan bian zhong*)

*Litsea wushanica* Chun, J. Arnold Arbor. 9: 153. 1928; *L. gracilipes* Hemsley (1891), not J. D. Hooker (1886); *Neolitsea gracilipes* H. Liu; *N. viridis* W. C. Cheng & S. Y. Hu.

Young branchlets and petioles glabrous; petiole slender, 10–15 mm. Fruit globose, 6–7 mm in diam. Fl. Oct, fr. Jun–Jul of next year.

• Mountain slopes, forest margins, mixed forests; 400–1500 m. Fujian, Guangdong, Guizhou, Hubei, Shaanxi, Sichuan, NE Yunnan (Yiliang).

**2b. *Neolitsea wushanica* var. *pubens*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 38. 1978.

紫云山新木姜子 *zi yun shan xin mu jiang zi*

Young branchlets and petioles pubescent; petiole shorter, 8–10 mm. Fruit ellipsoid, 8–9 × 5–6 mm.

• Dense forests; ca. 1200 m. SW Hunan.

**3. *Neolitsea acuminatissima*** (Hayata) Kanehira & Sasaki, Trans. Nat. Hist. Soc. Formosa 20: 381. 1930.

尖叶新木姜子 *jian ye xin mu jiang zi*

*Tetradenia acuminatissima* Hayata, Icon. Pl. Formosan. 3: 166. 1913.

Small trees. Branchlets subverticillate, glabrous. Leaves alternate or clustered at apex of branchlet; petiole 1–1.5 cm,

glabrous; leaf blade ovate-lanceolate to lanceolate, 6–9 × 1.8–2.5 cm, glabrous on both surfaces, pinninerved or subtriplinerved, lateral veins 5 pairs, base obtuse or cuneate, apex acuminate to caudate-acuminate. Umbels axillary or lateral, sessile or subsessile, male umbel 4-flowered. Pedicel 4–5 mm. Perianth segments 4, rotund. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 reniform glands at base; rudimentary pistil ovoid. Fruit ovoid, 7–10 mm; fruiting pedicel ca. 1 cm, pubescent to glabrous. Fr. Oct–Nov.

- Evergreen broad-leaved forests on high mountains. Taiwan.

**4. *Neolitsea oblongifolia*** Merrill & Chun, *Sunyatsenia* 2: 234. 1935.

长圆叶新木姜子 *chang yuan ye xin mu jiang zi*

Trees, 8–10 m tall, sometimes up to 22 m tall. Young branchlets, petioles, and inflorescences ferruginous pubescent. Leaves alternate, sometimes 4–6 clustered at apex of branchlet, subverticillate; petiole 3–7 mm; leaf blade oblong-lanceolate, 4–10 × 0.8–2.3 cm, glabrous on both surfaces, except for midrib with ferruginous pubescence when young abaxially, pinninerved, lateral veins 4–6 pairs, base acute, apex obtuse, acute, or acuminate. Umbels 3–5, axillary or lateral, sessile, 4- or 5-flowered. Pedicel ca. 5 mm. Perianth segments 4, ovate, with ferruginous pubescence outside. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 rounded glands at base. Fruit globose, 8–10 mm in diam., dark black-brown at maturity; fruiting pedicel thickened at apex; perianth segments often persistent. Fl. Aug–Nov, fr. Sep–Dec.

- Valleys, dense forests, forest margins; 300–900 m. Guangxi, Hainan.

The wood is used for construction, furniture, and agricultural tools. The seeds contain 25%–30% oil.

**5. *Neolitsea cambodiana*** Lecomte, *Notul. Syst.* (Paris) 2: 335. 1913.

锈叶新木姜子 *xiu ye xin mu jiang zi*

Trees, 8–12 m tall, 10–15 cm d.b.h. Young branchlets densely ferruginous tomentose or yellow-brown appressed pubescent. Leaves 3–5-subverticillate; petiole 1–1.5 cm, pubescence similar to that on young branchlets; leaf blade oblong-lanceolate, oblong-elliptic, lanceolate, obovate, or elliptic, 10–17 × 3.5–6 cm, densely ferruginous tomentose on both surfaces when young and becoming glabrous, glabrate abaxially, pinninerved or subtriplinerved, lateral veins 4 or 5 pairs, base narrow or cuneate, apex acuminate, subcaudate, or abruptly acute. Umbels 5–7-clustered, sessile or subsessile, 4- or 5-flowered. Male flowers: perianth segments ovate; fertile stamens 6, exerted; filaments villous at base, of 3rd whorls each with 2 small glands at base; rudimentary pistil glabrous. Fruit globose, 8–10 mm in diam., seated on flat discoid perianth tube; fruiting pedicel ca. 7 mm.

Mixed forests, sparse forests, roadsides, thickets; below 1000 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, S Jiangxi [Cambodia, Laos].

- 1a. Young branchlets and petioles densely ferruginous tomentose ..... 5a. var. *cambodiana*

- 1b. Young branchlets and petioles yellow-brown appressed pubescent ..... 5b. var. *glabra*

**5a. *Neolitsea cambodiana* var. *cambodiana***

锈叶新木姜子(原变种) *xiu ye xin mu jiang zi* (*yuan bian zhong*)

*Neolitsea ferruginea* Merrill.

Young branchlets and petioles densely ferruginous tomentose. Leaf blade oblong-oblong-lanceolate, oblong-elliptic, or lanceolate, densely ferruginous tomentose on both surfaces when young and becoming glabrous, base cuneate, apex subcaudate or abruptly acute. Fl. Oct–Dec, fr. Jul–Aug of next year.

Mixed forests; below 1000 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, S Jiangxi [Cambodia, Laos].

The bark, branchlets, and leaves contain glue and may be used for making incense. The leaves are used medicinally for treating furunculosis.

**5b. *Neolitsea cambodiana* var. *glabra*** C. K. Allen, *Ann. Missouri Bot. Gard.* 25: 418. 1938.

香港新木姜子 *xiang gang xin mu jiang zi*

*Actinodaphne hongkongensis* Chun; *Neolitsea hongkongensis* (Chun) C. K. Allen.

Young branchlets and petioles yellow-brown appressed pubescent. Leaf blade oblong-lanceolate, obovate, or elliptic, glabrous on both surfaces, base narrow or cuneate, apex acuminate or abruptly acute.

- Roadsides, thickets, sparse forests; below 1000 m. Fujian, Guangdong, Guangxi.

**6. *Neolitsea undulatifolia*** (H. Léveillé) C. K. Allen, *J. Arnold Arbor.* 17: 328. 1936.

波叶新木姜子 *bo ye xin mu jiang zi*

*Litsea undulatifolia* H. Léveillé, *Fl. Kouy-Tchéou*, 220. 1914–1915.

Shrubs or small trees, 2–7 m tall. Young branchlets appressed pubescent and becoming glabrous. Leaves clustered at apex of branchlet, subverticillate; petiole 6–12 mm; leaf blade lanceolate or narrowly elliptic, 6–10 × 1.4–2.5 cm, glabrous on both surfaces, except puberulent along midrib adaxially, pinninerved, lateral veins 13–15 pairs, acuminate at both ends. Umbels 2 or 3, clustered, sessile, 4- or 5-flowered. Pedicel ca. 2 mm, yellow villous. Male flowers: perianth segments 4 (or 5 or 6), ovate; fertile stamens 6 (–8 or 9); filaments glabrous, of 3rd whorls each with 2 broadly cordate glands at base; rudimentary pistil small, glabrous. Fruit ellipsoid, ca. 12 × 8 mm, seated on cup-shaped perianth tube, ca. 5 mm in diam.; fruiting pedicel 8–10 mm, thickened at apex, pubescent. Fl. Nov, fr. Jan–Feb.

- Stony mountains, thickets; 1400–2000 m. SW Guangxi, Guizhou, SE Yunnan.

This species is extremely variable, especially in the number of stamens and perianth segments. These variations sometimes occur on the same plant.

**7. *Neolitsea confertifolia*** (Hemsley) Merrill, *Lingnan Sci. J.* 15: 419. 1936.

簇叶新木姜子 *cu ye xin mu jiang zi*

*Litsea confertifolia* Hemsley, *J. Linn. Soc., Bot.* 26: 379. 1891; *Actinodaphne confertifolia* (Hemsley) Gamble; *Fiwa confertifolia* (Hemsley) Nakai.

Small trees, 3–7 m tall. Young branchlets and petioles covered with gray-brown pubescence and becoming glabrous. Leaves conferted, subverticillate; petiole 6–7 mm; leaf blade oblong or lanceolate to narrowly lanceolate, 5–12 × 1.2–3.5 cm, glaucous abaxially and pubescent when young, shiny and glabrous adaxially, pinninerved or sometimes subtriplinerved, lateral veins 4–6 pairs, base cuneate, apex acuminate. Umbels often 3–5-fascicled in leaf axils, subsessile, 4-flowered. Pedicel ca. 2 mm, sericeous-villous. Perianth segments 4, broadly ovate. Male flowers: fertile stamens 6; filaments hirsute at base, of 3rd whorls each with 2 large stipitate glands at base; rudimentary pistil glabrous. Fruit ovoid or ellipsoid, 8–12 × 5–6 mm, seated on flat discoid perianth tube, ca. 2 mm in diam.; fruiting pedicel 4–8 mm. Fl. Apr–May, fr. Sep–Oct.

• Watersides, thickets, dense forests; 400–2000 m. N Guangdong, NE Guangxi, Guizhou, SW Henan, Hubei, S Hunan, W Jiangxi, SE Shaanxi, Sichuan.

Leaf size in this species is extremely variable. The plants of Shaanxi and Henan usually have smaller and narrower leaves, while in Guizhou, Hubei, Hunan, and Sichuan the leaves are broader and larger.

The wood is used for furniture. The seeds are used for their oil.

**8. *Neolitsea menglaensis*** Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 39. 1978.

勐腊新木姜子 *meng la xin mu jiang zi*

Large trees, ca. 10 m tall, ca. 35 cm d.b.h. Branchlets stout, glabrous. Leaves alternate or 3–5 clustered at apex of branchlet; petiole 1–2 cm, slightly flat, glabrous; leaf blade elliptic or obovate-elliptic, 4.5–10.5 × 1.2–4.3 cm, glabrous on both surfaces, trinerved, lateral veins 3 or 4 pairs, lowermost pair arising from base, with 6–8 curved thin veinlets at one side near margin, apex acuminate, rotund, or broadly cuneate. Umbels 1- to more fascicled in leaf axils, female umbel 5-flowered; peduncle stout and short. Pedicel 3–4 mm, densely sericeous-pubescent. Perianth segments 4, ovate. Female flowers: staminodes 6(–8); filaments pubescent, of 3rd whorls each with 2 stipitate rounded glands at base; ovary ellipsoid, glabrous; style slender, exerted, with sericeous pubescence; stigma large, 2-lobed. Fl. Jan.

• Sparse forest at foothill of calcareous mountain. S Yunnan.

**9. *Neolitsea sericea*** (Blume) Koidzumi, *Bot. Mag. (Tokyo)* 40: 343. 1926.

舟山新木姜子 *zhou shan xin mu jiang zi*

*Laurus sericea* Blume, *Bijdr.* 554. 1826; *Litsea glauca* Siebold; *Malapoëna sieboldii* Kuntze; *Neolitsea glauca* (Siebold) Koidzumi; *N. sieboldii* (Kuntze) Nakai; *Tetradenia glauca* (Siebold) Matsumura.

Trees up to 10 m tall. Young branchlets and petioles with dense golden yellow sericeous pubescence and becoming glabrous. Leaves alternate; petiole 2–3 cm; leaf blade elliptic to lanceolate-elliptic, 6.6–20 × 2–4.5 cm, with dense golden yellow sericeous hairs on both surfaces when young and becoming glabrous, shiny adaxially, glaucous abaxially with yellow-brown or orange-brown appressed sericeous hairs, triplinerved, lateral veins 4 or 5 pairs, lowermost pair arising 6–10 mm from base, with 4–6 curved thin veinlets at one side near margin, apex shortly acuminate, acumen obtuse. Umbels axillary or lateral, sessile, clustered, 5-flowered. Pedicel 3–6 mm, densely villous. Perianth segments 4, elliptic. Male flowers: fertile stamens 6; filaments villous at base, of 3rd whorls each with 2 stipitate reniform glands at base; rudimentary pistil glabrous. Fruit globose, ca. 1.3 cm in diam., seated on shallowly discoid perianth tube. Fl. Sep–Oct, fr. Jan–Feb.

Forests on mountain slopes. Taiwan, Zhejiang [Japan, Korea].

**10. *Neolitsea aurata*** (Hayata) Koidzumi, *Bot. Mag. (Tokyo)* 23: 256. 1918.

新木姜子 *xin mu jiang zi*

Trees, up to 14 m tall, ca. 18 cm d.b.h. Young branchlets and petioles ferruginous or yellow-brown pubescent or glabrous. Leaves alternate or clustered toward apex of branchlet; petiole 8–12 mm; leaf blade oblong, elliptic, oblong-lanceolate, lanceolate, oblanceolate, or oblong-obovate, 8–14 × 2.5–4 cm, densely golden yellow sericeous or white, yellow, brown-yellow, or red-brown sericeous abaxially when young, glabrous adaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 2–3 mm from base, base cuneate or rotund, apex acuminate or falcate-acuminate. Umbels 3–5-fascicled toward apex of branchlet or internode, 5-flowered. Pedicel ca. 2 mm. Perianth segments 4, elliptic. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 stipitate glands at base; rudimentary pistil glabrous. Fruit ellipsoid, ca. 8 × 6 mm, seated on shallowly discoid perianth tube; fruiting pedicel 5–7 mm, pilose.

Broad-leaved forests and forest margins on mountain slopes, weed-tree forests; 500–1900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan].

*Neolitsea aurata* is extremely variable in leaf shape and indument color.

- 1a. Young branchlets and petioles glabrous.
  - 2a. Leaf blade sparsely yellow sericeous abaxially when young, margin not undulate, not hyaline, base not decurrent ..... 10d. var. *paraciculata*
  - 2b. Leaf blade red-brown sericeous abaxially when young, margin undulate, hyaline, base decurrent ..... 10e. var. *undulatula*
- 1b. Young branchlets and petioles ferruginous or yellow-brown pubescent.
  - 3a. Leaf blade often oblong-obovate, densely white appressed sericeous abaxially when young ..... 10c. var. *glauca*

- 3b. Leaf blade densely golden yellow or sparsely brown-yellow sericeous abaxially when young.
- 4a. Leaf blade oblong, elliptic, oblong-lanceolate, or oblong-obovate, broader, more than 2.5 cm wide, densely golden yellow sericeous abaxially when young ..... 10a. var. *aurata*
- 4b. Leaf blade lanceolate or oblanceolate, narrower, less than 2.4 cm wide, sparsely brown-yellow sericeous abaxially when young .. 10b. var. *chekiangensis*

**10a. *Neolitsea aurata* var. *aurata***

新木姜子(原变种) *xin mu jiang zi* (yuan bian zhong)

*Litsea aurata* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 246. 1911; *Neolitsea aurata* f. *glabrescens* H. Liu; *N. kwangtungensis* Hung T. Chang; *N. sericea* (Blume) Koidzumi var. *aurata* (Hayata) Hatusima; *Tetradenia aurata* (Hayata) Hayata.

Young branchlets and petioles ferruginous pubescent. Leaf blade oblong, elliptic, oblong-lanceolate, or oblong-obovate, 8–14 × 2.5–4 cm, densely golden yellow sericeous abaxially when young. Fl. Feb–Mar, fr. Sep–Oct.

Forest margins on mountain slopes, weed-tree forests; 500–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan [Japan].

The roots are used medicinally for treating stomach pain and edema.

**10b. *Neolitsea aurata* var. *chekiangensis*** (Nakai) Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 39. 1978.

浙江新木姜子 *zhe jiang xin mu jiang zi*

*Neolitsea chekiangensis* Nakai, J. Jap. Bot. 16: 128. 1940.

Young branchlets and petioles ferruginous pubescent. Leaf blade lanceolate or oblanceolate, 8–13 × 0.9–2.4 cm, sparsely brown-yellow sericeous abaxially when young, indumentum easily deciduous, glabrate.

• Weed-tree forests on mountains; 500–1300 m. Anhui, Fujian, Jiangsu, Jiangxi, Zhejiang.

The seed core contains oil that is used for making soaps and lubricants. Aromatic oil may be extracted from the branchlets and leaves for use in cosmetics. The bark is used medicinally for treating stomach pain.

**10c. *Neolitsea aurata* var. *glauca*** Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 80. 1945.

粉叶新木姜子 *fen ye xin mu jiang zi*

Young branchlets and petioles sparsely yellow-brown pubescent. Leaf blade often oblong-obovate, glabrate, densely white appressed sericeous abaxially when young and becoming sparsely hairy when old.

• Broad-leaved forests on mountain slopes; 800–900 m. Sichuan.

**10d. *Neolitsea aurata* var. *paraciculata*** (Nakai) Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 40. 1978.

云和新木姜子 *yun he xin mu jiang zi*

*Neolitsea paraciculata* Nakai, Fl. Sylv. Kor. 22: 46. 1939.

Young branchlets and petioles glabrous. Leaf blade often narrower, sparsely yellow sericeous abaxially when young, indumentum easily deciduous, glabrate.

• Weed-tree forests on mountains; 500–1900 m. N Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang.

**10e. *Neolitsea aurata* var. *undulatula*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 40. 1978.

浙闽新木姜子 *zhe min xin mu jiang zi*

Young branchlets and petioles glabrous. Leaf blade red-brown sericeous abaxially when young and becoming glabrous when old, base decurrent, margin undulate and hyaline.

• Weed-tree forests on mountain slopes. Fujian, S Zhejiang.

**11. *Neolitsea lunglingensis*** H. W. Li, Acta Phytotax. Sin. 16(4): 40. 1978.

龙陵新木姜子 *long ling xin mu jiang zi*

Small trees, ca. 5 m tall. Young branchlets densely yellow-brown puberulent and becoming glabrous. Leaves clustered toward apex of branchlet; petiole 1–2.2 cm, densely puberulent; leaf blade elliptic or elliptic-oblong, 4.5–9 × 1.7–3.5 cm, densely appressed villous abaxially, glabrous or along midrib slightly puberulent adaxially, triplinerved, lateral veins 4 pairs, lowermost pair arising 2–5 mm from base, base acute, apex abruptly acuminate with acumen. Umbels 1–3-fascicled in leaf axils, sessile, male umbel 5-flowered. Pedicel ca. 4 mm. Perianth segment 4, broadly ovate. Male flowers: fertile stamens 6; filaments pilose, of 3rd whorls each with 2 stipitate adnate cordate-reniform glands at base; rudimentary pistil densely pilose. Fruit ovoid, ca. 10 × 8 mm, glabrous; fruiting pedicel 0.8–1 cm, thickened at apex. Fl. Dec, fr. Sep.

• Evergreen broad-leaved forests on mountain slopes; 1700–2000 m. W Yunnan.

**12. *Neolitsea velutina*** W. T. Wang, Acta Phytotax. Sin. 6: 216. 1957.

毛叶新木姜子 *mao ye xin mu jiang zi*

Small trees. Branchlets white or ferruginous velutinous. Leaves often 2 or 3 clustered at apex of branchlet; petiole ca. 6 mm, white or ferruginous velutinous; leaf blade elliptic or broadly obovate, 4.8–7.5(–15) × 1.8–3.5(–5.5) cm, ferruginous pubescent abaxially, more densely so along veins, glabrous adaxially, triplinerved, lateral veins 3 pairs, lowermost pair arising from near base, nearly vertical, midrib and lateral veins distinctly impressed adaxially. Umbels fascicled, many flowered; peduncle short. Pedicel 2–3 mm, densely yellow velutinous. Perianth segments 4, ovate-elliptic. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 stipitate ovoid glands at base; rudimentary pistil lacking. Female flowers: staminodes glabrous; ovary ovoid; style slender, glabrous. Fl. Nov–Dec.

• Mixed broad-leaved forests; 600–1400 m. Guangdong, Guangxi, SE Yunnan.

**13. *Neolitsea chrysotricha*** H. W. Li, Acta Phytotax. Sin. 16(4): 40. 1978.

金毛新木姜子 jin mao xin mu jiang zi

Small trees, 3–6 m tall. Young branchlets densely golden yellow villous. Leaves alternate or 3–5 clustered toward apex of branchlet; petiole 1–2 cm, puberulent; leaf blade elliptic-lanceolate or oblanceolate, 7.5–13.5 × 2.5–4.5 cm, glaucous and densely golden yellow villous abaxially, glabrous or along veins golden yellow villous adaxially, triplinerved, lateral veins 1 pair, arising 3–5 mm from base, obliquely spreading toward leaf apex, with 6–9 curved veinlets at one side near margin, base acute, apex caudate-acuminate with acumen. Fruiting inflorescence umbellate, axillary, with (3–)6–8 fruits. Fruit ovoid, ca. 9 × 5 mm, abruptly acute at apex; fruiting pedicel ca. 7 mm, slightly thickened at apex, densely yellow villous. Fr. Jun.

• Evergreen broad-leaved forests in valleys; 2500–3000 m. W Yunnan.

**14. *Neolitsea howii*** C. K. Allen, Ann. Missouri Bot. Gard. 25: 424. 1938.

保亭新木姜子 bao ting xin mu jiang zi

Trees or shrubs, up to 9 m tall. Young branchlets and petioles appressed gray pubescent. Leaves alternate or clustered at apex of branchlet, subverticillate; petiole 1–1.5 cm, stout, wrinkled; leaf blade obovate or elliptic, 9.5–18 × 3.5–7 cm, glaucous, gray-white pubescent, and becoming glabrous abaxially, glabrous and shiny adaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 0.5–1 cm from base, with 6–8 fine veinlets at one side near margin, base acute, apex acuminate. Fruiting inflorescence umbellate, axillary, with 7 fruits, sessile. Fruit ellipsoid or nearly globose, ca. 12 × 9 mm, glabrous, seated on shallowly discoid perianth tube; fruiting pedicel 4–5 mm, stout, pubescent. Fr. Aug.

• Mixed forests on mountains. Hainan.

**15. *Neolitsea alongensis*** Lecomte, Fl. Indo-Chine 5: 143. 1914.

下龙新木姜子 xia long xin mu jiang zi

Small trees, 6–8 m tall. Young branchlets densely ferruginous-yellow tomentose and becoming glabrous. Leaves alternate, subverticillate, or subopposite toward apex of branchlet; petiole 1–2 cm, densely ferruginous-yellow tomentose; leaf blade ovate, obovate, or elliptic, 8–16 × 4–7.5 cm, glaucous, covered with gray pubescence, and becoming glabrous abaxially, glabrous adaxially, triplinerved, lateral veins 4 or 5 pairs, lowermost pair arising 5–10 mm from base, other pairs arising from above middle of blade. Umbels 3–5-fascicled, axillary or lateral, male umbel 5-flowered; peduncle short or lacking. Pedicel short. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments ca. 1 mm, villous at base, of 3rd whorls each with 2 stipitate rounded glands at base; rudimentary pistil ovoid, glabrous. Fruit ellipsoid, 1.6–1.8 × ca. 1.3 cm, seated on shallowly discoid perianth tube; fruiting pedicel ca. 1 cm. Fl. Jun–Jul, fr. Aug–Sep.

Sparse forests, valleys, streamsides, seashores. Guangxi, S Yunnan [Vietnam].

**16. *Neolitsea villosa*** (Blume) Merrill, Philipp. J. Sci., C, 4: 261. 1909.

兰屿新木姜子 lan yu xin mu jiang zi

*Litsea villosa* Blume, Mus. Bot. 1: 349. 1851; *L. kotoensis* (Hayata) Kanehira; *Neolitsea kotoensis* (Hayata) Kanehira & Sasaki; *Tetradenia hayatae* Nemoto; *T. kotoensis* Hayata.

Trees. Young branchlets densely yellow-brown pubescent. Leaves alternate or clustered toward apex of branchlet, subverticillate; petiole 8–12 mm, densely yellow-brown pubescent; leaf blade ovate-oblong or oblong, 8–20 × 3–4.5 cm, glaucous and gray pubescent abaxially, with pubescence denser along midrib, glabrous and shiny adaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 3–5 mm from base, obliquely extending to mid-blade, vanishing near margin, other pairs arising from above middle of leaf. Fruit ellipsoid, ca. 12 mm; fruiting pedicel ca. 7 mm. Fr. Jun–Jul.

• Broad-leaved forests. Taiwan.

This species was treated in FRPS (31: 356. 1982) as *Neolitsea kotoensis*. However, the original description and type material of *Tetradenia kotoensis* show its characters to be quite similar to those of *N. villosa*, and so the two entities are here treated as conspecific.

**17. *Neolitsea tomentosa*** H. W. Li, Acta Phytotax. Sin. 16(4): 41. 1978.

绒毛新木姜子 rong mao xin mu jiang zi

Small trees, 3–5 m tall. Young branchlets and petioles densely yellow-brown tomentose. Leaves alternate or often 3–5-verticillate at apex of branchlet; petiole 1–2 cm; leaf blade oblong or rotund-oblanceolate, 16.5–28 × 5–7.5 cm, densely yellow-brown tomentose abaxially, shiny and along veins yellow-brown tomentose adaxially, triplinerved, lateral veins 4 pairs, lowermost pair arising 5–15 mm from base, with numerous slightly conspicuous veinlets at one side near margin, base broadly cuneate or rotund, apex caudate-acuminate with acute acumen. Umbels 4–6-fascicled in leaf axils, 5-flowered. Pedicel ca. 1 mm. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments pubescent, of 3rd whorls each with 2 stipitate rounded-cordate glands at base; rudimentary pistil ellipsoid, glabrous. Fruit ovoid, ca. 10 × 8 mm, apiculate at apex; fruiting pedicel 5–6 mm, densely tomentose. Fr. Sep.

• Dense forests in valleys or on mountains; 1400–1700 m. SE Yunnan.

**18. *Neolitsea levinei*** Merrill, Philipp. J. Sci., C, 13: 138. 1918.

大叶新木姜子 da ye xin mu jiang zi

*Benzoin levinei* (Merrill) Chun ex H. Liu; *Neolitsea chinensis* (Gamble) Chun; *N. lanuginosa* Gamble var. *chinensis* Gamble.

Trees, up to 22 m tall. Young branchlets and petioles covered with dense yellow-brown pubescence. Leaves 4- or 5-verticillate; petiole 1.5–2 cm; leaf blade oblong-lanceolate to oblong-oblanceolate or elliptic, 15–31 × 4.5–9 cm, glabrate and mostly glaucous abaxially, densely yellow-brown villous when young, shiny and glabrous adaxially, triplinerved, lateral veins 3

or 4 pairs, transverse veins conspicuous abaxially, base acute, apex shortly acute or abruptly acute. Umbels lateral, 5-flowered; peduncle ca. 2 mm. Pedicel ca. 3 mm, with dense pubescence. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 stipitate ellipsoid glands at base; rudimentary pistil ovoid. Fruit ellipsoid or globose, 12–18 × 8–15 mm, black at maturity; fruiting pedicel 7–10 mm, densely pubescent. Fl. Mar–Apr, fr. Aug–Oct.

• Roadsides, watersides, dense forests in valleys; 300–1300 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan.

*Neolitsea levinei* var. *tibetica* H. P. Tsui (Acta Bot. Yunnan. 16: 35. 1994) was described from SE Xizang (Mêdog) but could not be treated here because no material was seen by the present authors. Judging from the description in the protologue, it almost certainly belongs in *Cinnamomum*, rather than in *Neolitsea*, and is perhaps a synonym of *C. iners* (species no. 41).

The roots are used medicinally.

**19. *Neolitsea hsiangkweiensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 41. 1978.

湘桂新木姜子 xiang gui xin mu jiang zi

Trees, up to 22 m tall. Young branchlets and petioles densely ferruginous-yellow tomentose and becoming glabrate. Leaves 6–8 clustered toward apex of branchlet, subverticillate; petiole ca. 5 mm; leaf blade oblong or obovate-oblong, 10–12 × 2.5–4 cm, densely ferruginous-yellow tomentose abaxially and becoming glabrate, glabrous and shiny adaxially, triplinerved, lateral veins 4–6 pairs, lowermost pair arising ca. 1 cm from base, other pairs arising from middle or above middle of blade, base broadly cuneate, apex shortly acuminate or abruptly acute. Umbels 7- or 8-fascicled, sessile, male umbel 5-flowered. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 sessile small glands at base; rudimentary pistil lacking. Fruit globose, ca. 1 cm in diam., seated on small discoid perianth tube; fruiting pedicel ca. 5 mm. Fl. Feb–Mar, fr. Oct–Nov.

• Dense forests on mountains, mountains of calcareous rock; 800–1000 m. W Guangxi, W Hunan.

**20. *Neolitsea longipedicellata*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 42. 1978.

长梗新木姜子 chang geng xin mu jiang zi

Trees, up to 11 m tall. Young branchlets and petioles appressed puberulent and becoming glabrous. Leaves alternate or subverticillate; petiole 1–1.2 cm, flat; leaf blade ovate or oblong, 5–8.5 × 2–3.5 cm, glaucous, appressed puberulent, and becoming glabrous abaxially, glabrous adaxially, triplinerved, lateral veins 2 or 3 pairs, lowermost pair arising 2–3 mm from base, other pairs arising from above middle of blade, base rounded or rotund, apex shortly caudate or acuminate. Umbels axillary or lateral, male umbel 5-flowered. Pedicel sericeous-villous. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 peltate stipitate glands at base; rudimentary pistil ovoid, glabrous. Fruit globose, ca. 8 mm in diam., black at maturity,

seated on shallowly small discoid perianth tube; fruiting pedicel 1.5–2 cm. Fl. Mar–Apr, fr. Nov.

• Dense forests in valleys, roadsides on mountains; ca. 1500 m. N Guangxi.

**21. *Neolitsea phanerophlebia*** Merrill, Lingnan Sci. J. 7: 305. 1931.

显脉新木姜子 xian mai xin mu jiang zi

Small trees, up to 10 m tall. Branchlets and petioles densely ferruginous pubescent. Leaves verticillate or scattered; petiole 1–2 cm; leaf blade oblong to oblong-elliptic or oblong-lanceolate to ovate, 6–13 × 2–4.5 cm, glaucous, densely appressed pubescent and villous abaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 5–10 mm from base, with 6–8 veinlets at one side near margin, base acute or obtuse, apex acuminate. Umbels 2–4-fascicled, axillary, sessile, male umbel 5- or 6-flowered. Pedicel 2–3 mm. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 rounded glands at base; rudimentary pistil lacking. Fruit subglobose, 5–9 mm in diam., glabrous, purple-black at maturity; fruiting pedicel 5–7 mm, with appressed pubescence. Fl. Oct–Nov, fr. Jul–Aug of next year.

• Sparse forests in valleys; below 1000 m. Guangdong, Guangxi, Hainan, Hunan, Jiangxi.

**22. *Neolitsea pulchella*** (Meisner) Merrill, Philipp. J. Sci., C, 13: 137. 1918.

美丽新木姜子 mei li xin mu jiang zi

*Litsea pulchella* Meisner in A. Candolle, Prodr. 15(1): 224. 1864; *L. zeylanica* Nees & T. Nees var. *chinensis* Benth.

Small trees, 6–8 m tall. Young branchlets and petioles covered with brown pubescence and becoming glabrate. Leaves alternate or clustered toward apex of branchlet, subverticillate; petiole 6–8 mm; leaf blade elliptic or oblong-elliptic, 4–6 × 2–3 cm, thickly leathery, glaucous, gray villous, and becoming glabrous or glabrate abaxially, shiny and glabrous when young adaxially, except pubescent along midrib, triplinerved, lateral veins 2 or 3 pairs, lowermost pair arising 4–6 mm from base, other pairs arising from above middle of blade. Umbels axillary, solitary, or 2- or 3-fascicled, male umbel 4- or 5-flowered. Perianth segments 4, elliptic. Male flowers: fertile stamens 6; filaments below middle villous, of 3rd whorls each with 2 stipitate rounded small glands at base; rudimentary pistil lacking. Fruit globose, 4–6 mm in diam., seated on shallowly discoid perianth tube; fruiting pedicel 5–6 mm. Fl. Oct–Nov, fr. Aug–Sep of next year.

• Mixed forests, valleys. Fujian, Guangdong, Guangxi, Hainan.

**23. *Neolitsea pallens*** (D. Don) Momiyama & H. Hara, J. Jap. Bot. 47(9): 269. 1972.

灰白新木姜子 hui bai xin mu jiang zi

*Tetradenia pallens* D. Don, Prodr. Fl. Nepal. 66. 1825; *Litsea consimilis* (Nees) Nees; *L. umbrosa* Nees var. *consimilis* (Nees) J. D. Hooker; *Tetradenia consimilis* Nees.

Small trees, 5–15 m tall. Young branchlets and petioles yellowish brown pubescent and becoming glabrous. Leaves

alternate or 3–5 clustered toward apex of branchlet; petiole 6–15 mm; leaf blade elliptic or elliptic-lanceolate, 5–8 × 2–3 cm, glabrous on both surfaces when old, triplinerved, lateral veins 4 or 5 pairs, lowermost pair arising 3–6 mm from base, sometimes with most inconspicuous veinlets at one side near margin, base cuneate or broadly cuneate to rotund, margin often undulate in a dried state, apex acuminate to caudate-acuminate. Fruit globose, ca. 8 mm in diam., glabrous, apiculate at apex, seated on flat discoid perianth tube; fruiting pedicel slender, (6–)10–12 mm, yellowish brown pubescent. Fr. Jun–Jul.

Evergreen broad-leaved forests; 2100–2400 m. S Xizang [India, Nepal, Pakistan].

This species is one of the main trees in its habitat.

**24. *Neolitsea brevipes*** H. W. Li, Acta Phytotax. Sin. 16(4): 43. 1978.

短梗新木姜子 duan geng xin mu jiang zi

Small trees, 4–10 m tall. Young branchlets and petioles densely brown pubescent. Leaves alternate or 3–5 clustered at apex of branchlet; petiole 5–8 mm; leaf blade elliptic or oblong-lanceolate, 6–12 × 2–4 cm, glaucous and gray-yellow pubescent when young abaxially, glabrous adaxially, except midrib puberulent, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 3–6 mm from base, other pairs arising from above middle of blade, apex caudate-acuminate. Umbels solitary or fascicled, sessile, 5-flowered. Pedicel 1–1.5 mm, pubescent. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 stipitate rounded-cordate glands at base; rudimentary pistil lacking. Fruit globose, ca. 6 mm in diam., seated on flat discoid perianth tube; fruiting pedicel 3–5 mm. Fl. Dec–Jan, fr. Sep–Nov.

Streamsides on mountains, thickets, sparse forests, evergreen broad-leaved forests; 1300–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, SE Yunnan [India, Nepal].

**25. *Neolitsea variabilis*** (Hayata) Kanehira & Sasaki, Trans. Nat. Hist. Soc. Formosa 20: 382. 1930.

变叶新木姜子 bian ye xin mu jiang zi

*Tetradenia variabilis* Hayata, Icon. Pl. Formosan. 3: 167. 1913; *Neolitsea aciculata* (Blume) Koidzumi var. *variabilis* (Hayata) J. C. Liao.

Trees. Young branchlets covered with pubescence and becoming glabrous. Leaves alternate or clustered toward apex of branchlet, subverticillate; petiole ca. 1 cm, pubescent; leaf blade ovate-lanceolate, obovate-lanceolate, or long obovate, 8–15 × 3–5 cm, gray appressed pubescent and becoming glabrous abaxially, shiny and glabrous adaxially when young, except base of midrib pubescent, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising ca. 5 mm from base, base cuneate or obtuse, apex acuminate. Umbels 2- or 3-fascicled, axillary or lateral, 4- or 5-flowered. Pedicel ca. 2 mm, densely pubescent. Perianth segments 4, lanceolate. Female flowers: staminodes 6, glabrous, of 3rd whorls each with 2 stipitate glands at base; ovary ovoid; style pubescent. Fruit obovate-ellipsoid, ca. 5 mm in diam.; fruiting pedicel ca. 1 cm. Fl. Feb–Jul, fr. Nov–Dec.

• Broad-leaved forests; 600–2300 m. C Taiwan.

**26. *Neolitsea zeylanica*** (Nees & T. Nees) Merrill, Philipp. J. Sci. 1(Suppl. 1): 57. 1906.

南亚新木姜子 nan ya xin mu jiang zi

*Litsea zeylanica* Nees & T. Nees, Cinnam. Disp. [Amoen. Bot. Bonn. Fasc. 1:] 58. 1823; *Tetradenia zeylanica* (Nees & T. Nees) Nees.

Trees, up to 20 m tall. Young branchlets yellow puberulent and becoming glabrous. Leaves alternate or clustered toward apex of branchlet; petiole 1–1.5 cm, yellow pubescent when young; leaf blade ovate-oblong or oblong, 7–11 × 2.5–4 cm, glaucous, yellow pubescent along midrib, and becoming glabrous abaxially, shiny and glabrous adaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 5–8 mm from base, other pairs arising from above middle or middle of blade, base cuneate, slightly decurrent, apex narrowly acuminate. Umbels axillary, subsessile, 4- or 5-flowered. Pedicel ca. 2 mm, pubescent. Perianth segments 4. Male flowers: fertile stamens 6; filaments villous, of 3rd whorls each with 2 rounded small glands; rudimentary pistil small; style villous. Fruit subglobose, 6–7 mm in diam., seated on small nearly flat perianth tube; fruiting pedicel 4–5 mm. Fl. Oct–Nov, fr. Oct–Dec.

Forests, thickets; 700–1000 m. S Guangxi [India, Malaysia, Sri Lanka, Thailand, Vietnam, and probably elsewhere in SE Asia; Australia].

**27. *Neolitsea aciculata*** (Blume) Koidzumi, Bot. Mag. (Tokyo) 32: 258. 1918.

台湾新木姜子 tai wan xin mu jiang zi

*Litsea aciculata* Blume, Mus. Bot. 1: 347. 1851; *Neolitsea acutotrineria* (Hayata) Kanehira & Sasaki; *Tetradenia acutotrineria* Hayata.

Trees. Branchlets gray pubescent. Leaves alternate or clustered at apex of branchlet, subverticillate; petiole 0.5–1 cm, pubescent; leaf blade lanceolate or obovate-lanceolate, 6–9 × 2–3.2 cm, glaucous and appressed gray pubescent abaxially, glabrous adaxially, triplinerved, lateral veins 3 or 4 pairs, base acute or acuminate, apex caudate-acuminate or acuminate. Umbels axillary or lateral, 4-flowered; peduncles extremely short or lacking. Pedicel 2–3 mm, pubescent. Perianth segments 4, ovate or elliptic. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 sagittal glands at base; rudimentary pistil densely pubescent. Fruit obovate-ellipsoid, ca. 7 × 5–6 mm, seated on flat discoid perianth tube; fruiting pedicel 7–9 mm, gradually thickened at apex. Fr. Jun–Jul.

Evergreen broad-leaved forests; 1300–2000 m. Taiwan [Japan].

This species was treated in FRPS (31: 364. 1982) as *Neolitsea acutotrineria*. However, the original description and type material of *Tetradenia acutotrineria* show its characters to be quite similar to those of *N. aciculata*, from Japan, and so the two entities are here treated as conspecific.

**28. *Neolitsea polycarpa*** H. Liu, Laurac. Chine & Indochine, 150. 1932.

多果新木姜子 duo guo xin mu jiang zi

*Neolitsea chui* Merrill var. *brevipes* Yen C. Yang.

Trees, up to 20 m tall. Young branchlets pubescent and becoming glabrous or glabrate. Leaves alternate or clustered at apex of branchlet, subverticillate; petiole 8–15 mm, pubescent and becoming glabrous; leaf blade elliptic or oblong-elliptic, 6–11 × 1.7–4 cm, glaucous, pubescent, and becoming glabrous abaxially, shiny and glabrous adaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising ca. 5 mm from base, base cuneate, apex acuminate or long acuminate. Umbels 5- or 6-fascicled in leaf axils, 5-flowered. Pedicel 2.5–3 mm, densely pubescent. Perianth segments 4, elliptic or rounded. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 stipitate small glands at base; rudimentary pistil ellipsoid, glabrous. Fruit ovoid, 7–10 × 3–4 mm, seated on flat shallowly discoid perianth tube; fruiting pedicel 7–8 mm, subglabrous. Fl. Mar–Apr, fr. Oct–Nov.

Broad-leaved forests; 1200–2400 m. SE Yunnan [Vietnam].

The seeds contain ca. 45% oil.

**29. *Neolitsea hainanensis*** Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 43. 1978.

海南新木姜子 *hai nan xin mu jiang zi*

Trees or small trees, up to 10 m tall. Young branchlets and petioles pubescent. Leaves subverticillate or alternate; petiole 5–10 mm; leaf blade elliptic or rounded-elliptic, 3.7–7 × 2–3.5 cm, glabrous and distinctly foveolate on both surfaces, triplinerved, lateral veins 2 or 3 pairs, lowermost pair arising ca. 3 mm from base, other pairs arising from above middle of blade, base broadly cuneate or rotund, apex abruptly acute, with acuminate. Umbels solitary or fascicled, axillary or lateral, 5-flowered. Pedicel villous. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments villous at base, of 3rd whorls each with 2 stipitate rounded glands at base; rudimentary pistil glabrous. Fruit globose, 6–8 mm in diam., seated on nearly flat discoid perianth tube; perianth segments often persistent; fruiting pedicel 4–4.5 mm, pubescent. Fl. Nov, fr. Jul–Aug.

• Mixed forests on mountain slopes; above 700 m. Hainan.

**30. *Neolitsea buisanensis*** Yamamoto & Kamikoti, *Trans. Nat. Hist. Soc. Formosa* 22: 411. 1932.

武威山新姜子 *wu wei shan xin jiang zi*

*Neolitsea zeylanica* (Nees & T. Nees) Merrill var. *obovata* H. Liu.

Shrubs or small trees, 4–6 m tall. Young branchlets and petioles densely ferruginous pubescent. Leaves alternate or clustered on top branchlets; petiole 1 cm; leaf blade obovate, 3.5–6 × 1.5–2.5 cm, glabrous, distinctly foveolate on both surfaces, triplinerved, lateral veins 2 or 3 pairs, lowermost pair arising ca. 5 mm from base, other pairs arising from above middle of blade, base cuneate, apex obtuse or abruptly acute. Umbels axillary, sessile, solitary or 2- or 3-fascicled, male umbel 4-flowered. Pedicel 2–3 mm, sericeous-pubescent. Perianth segments 4, elliptic. Male flowers: fertile stamens 6; filaments villous at base, of 3rd whorls each with 2 small subsessile glands at base; rudimentary pistil glabrous. Fruit globose, 4–5 mm in diam.; fruiting pedicel 6–9 mm, pubescent. Fl. Dec–Jan.

• Dense forests in valleys; ca. 1000 m. S Guangxi, Hainan, S Taiwan.

*Neolitsea buisanensis* f. *sutsuoensis* J. C. Liao (Mem. Coll. Agric. Natl. Taiwan Univ. 26(2): 119. 1986) was recognized in Fl. Taiwan, ed. 2 (2: 489. 1996), as a separate form with ovate leaf blades acuminate at the apex.

**31. *Neolitsea obtusifolia*** Merrill, *Lingnan Sci. J.* 14: 6. 1933.

钝叶新木姜子 *dun ye xin mu jiang zi*

Trees, 8–20 m tall, ca. 50 cm d.b.h. Branchlets glabrous. Leaves alternate or clustered, subverticillate; petiole 1–1.2 mm; leaf blade oblong-lanceolate or nearly oblong-obovate, 4.5–10 × 2–3.5 cm, foveolate on both surfaces, glaucous abaxially, triplinerved, lateral veins 4 or 5 pairs, fine, lowermost pair arising 2–7 mm from base, base cuneate, apex obtuse. Umbels axillary or lateral, solitary or 2- or 3-fascicled, 3–5-flowered. Pedicel ca. 3 mm, appressed pubescent. Perianth segments 4, oblong-ovate. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 small rounded glands at base; rudimentary pistil ovoid, glabrous. Fruit globose, 8–10 mm in diam., seated on discoid perianth tube; fruiting pedicel 8–9 mm, pilose. Fl. Sep–Nov, fr. Dec–Feb of next year.

• Mixed forests on mountain slopes; ca. 600 m. Hainan.

The wood is yellow-brown, hard, heavy, finely textured, more or less straight-grained, and does not become fissile or warped in a dried state. It is used in industry and construction.

**32. *Neolitsea parvigemma*** (Hayata) Kanehira & Sasaki, *Trans. Nat. Hist. Soc. Formosa* 20: 381. 1930.

小芽新木姜子 *xiao ya xin mu jiang zi*

*Tetradenia parvigemma* Hayata, *Icon. Pl. Formosan.* 5: 175. 1915.

Small trees. Branchlets and petioles glabrous. Leaves alternate or clustered, subverticillate; petiole 1.5–2 cm; leaf blade ovate-oblong or obovate-oblong, 8–9 × 3.5–4 cm, distinctly foveolate on both surfaces, glaucous abaxially, triplinerved, lateral veins 3 pairs, lowermost pair arising ca. 5 mm from base, base obtusely rounded or sometimes acute, apex acuminate. Umbels axillary, 5–7-flowered; peduncle extremely short or lacking. Pedicel ca. 2 mm, yellow-brown pubescent. Perianth segments 4, triangular-oblong. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 small stipitate rounded glands at base; rudimentary pistil present; style pubescent. Female flowers: staminodes 1–1.5 mm, pubescent at base; ovary ovoid, glabrous at base. Fl. Feb–Mar.

• Evergreen broad-leaved forests. SC Taiwan.

**33. *Neolitsea ovatifolia*** Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 44. 1978.

卵叶新木姜子 *luan ye xin mu jiang zi*

*Neolitsea ovatifolia* var. *puberula* Yen C. Yang & P. H. Huang; *N. phanerophlebia* Merrill f. *glabra* H. Liu.

Shrubs. Branchlets glabrous. Leaves alternate or clustered toward apex of branchlet; petiole 8–10(–15) mm, slightly flat, glabrous; leaf blade glaucous abaxially, ovate, 4–6(–8.5) × 2–

2.5(–4) cm, glabrous and distinctly foveolate on both surfaces, triplinerved, lateral veins 4 or 5 pairs, lowermost pair arising ca. 2 mm from base, other pairs arising from middle or below middle of blade, base obtusely rounded to cuneate, apex acuminate. Umbels solitary or 3- or 4-fascicled, 5-flowered; peduncle very short or lacking. Pedicel sericeous-pubescent. Perianth segments 4, elliptic. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 sessile rounded small glands at base; rudimentary pistil glabrous; style glabrous. Fruit globose or subglobose, ca. 10 mm in diam., glabrous; fruiting pedicel 5–8 mm, very stout, glabrous. Fr. Aug.

• Sparse forests in valleys. Guangdong, Guangxi, Hainan, SE Yunnan.

**34. *Neolitsea ellipsoidea*** C. K. Allen, Ann. Missouri Bot. Gard. 25: 428. 1938.

香果新木姜子 *xiang guo xin mu jiang zi*

Trees, up to 30 m tall, ca. 2 m d.b.h. Branchlets glabrous, stout. Leaves alternate or clustered toward apex of branchlet; petiole flat, 2–3 cm, glabrous; leaf blade elliptic or broadly elliptic, 7–10 × 2.3–5 cm, glabrous on both surfaces, glaucous abaxially, triplinerved, lateral veins 2 or 3 pairs, lowermost pair arising ca. 6 mm from base, other pairs arising from above middle of blade, base broadly cuneate, apex shortly acute. Umbels axillary or lateral, solitary or 2-fascicled, 2–5-flowered; peduncle 1–2 mm. Pedicel 3–4 mm, ferruginous pubescent. Perianth segments 4, elliptic, fragrant, ferruginous pubescent outside. Male flowers: fertile stamens 6; filaments pubescent, of 3rd whorls each with 2 reniform glands at base; rudimentary pistil glabrous. Fruit ellipsoid, 13–18 × 10–13 mm, seated on flat discoid perianth tube, black-brown at maturity; fruiting pedicel stout, wrinkled. Fl. Jun–Jul, fr. Oct–Nov, or fl. Oct–Dec, fr. Apr–May of next year.

• Forest margins, roadsides, sparse forests on mountains, mixed forests; 700–1000 m. Hainan.

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

The wood is light and relatively easy to work; it is used for making furniture, musical instruments, plywood, decorative veneer, etc. The seed core contains ca. 60% oil.

**35. *Neolitsea kwangsiensis*** H. Liu, Laurac. Chine & Indochine, 146. 1932.

广西新木姜子 *guang xi xin mu jiang zi*

Shrubs or small trees, ca. 5 m tall. Branchlets stout, glabrous. Leaves alternate or clustered toward apex of branchlet; petiole 2.5–4 mm, glabrous; leaf blade broadly ovate, ovate, or ovate-oblong, 11–20 × 6.8–13 cm, glabrous on both surfaces, glaucous abaxially, triplinerved, lowermost lateral veins arising 5–8 mm from base, with 10–13 veinlets at one side near margin, transverse veins prominent on both surfaces, base rotund or attenuate, apex acuminate or obtuse. Umbels 5–8-fascicled, axillary or lateral, pedunculate. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments glabrous, of 3rd whorls each with 2 shortly stipitate peltate glands at base; rudimentary pistil glabrous. Fruit globose, 15–16 mm in diam.; fruiting pedicel 6–7 mm, pubescent. Fl. Dec, fr. Aug of next year.

• Roadsides, sparse or dense forests in valleys; 500–1100 m. S Fujian (Nanjing), Guangdong, Guangxi.

**36. *Neolitsea chui*** Merrill, Lingnan Sci. J. 7: 306. 1931 [“*chuii*”].

鸭公树 *ya gong shu*

*Neolitsea subfoveolata* Merrill.

Trees, 8–18 m tall, ca. 40 cm d.b.h., glabrous, except for pubescent inflorescence. Leaves alternate or clustered toward apex of branchlet; petiole 2–4 cm; leaf blade elliptic to oblong-elliptic or ovate-elliptic, 8–16 × 2.7–9 cm, glaucous abaxially, triplinerved, lateral veins 3–5 pairs, lowermost pair arising 2–5 mm from base, other pairs arising from middle or above middle of blade, base acute, apex acuminate. Umbels axillary or lateral, clustered, 5- or 6-flowered; peduncle very short or lacking. Pedicel 4–5 mm. Perianth segments 4, ovate or oblong. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 reniform glands at base; rudimentary pistil ovoid. Fruit ellipsoid or subglobose, ca. 10 × 8 mm; fruiting pedicel ca. 7 mm, slightly thickened. Fl. Sep–Oct, fr. Dec.

• Sparse forests in valleys or on hills; 500–1400 m. Fujian, Guangdong, Guangxi, Hunan, Jiangxi, SE Yunnan.

The seed core contains ca. 60% oil.

**37. *Neolitsea sutchuanensis*** Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 82. 1945.

四川新木姜子 *si chuan xin mu jiang zi*

*Neolitsea sutchuanensis* var. *gongshanensis* H. W. Li; *N. sutchuanensis* f. *longipedicellata* Yen C. Yang.

Small trees, up to 10 m tall. Young branchlets glabrous or sparsely puberulent. Leaves alternate or in clusters of 2–4; petiole 1–2 cm, glabrous or puberulent when young; leaf blade glaucous abaxially, elliptic or ovate-elliptic, 7.5–13 × 2.5–4.5 cm, glabrous on both surfaces or sometimes abaxially ± appressed brown-yellow puberulent, triplinerved, lateral veins 3–5 pairs, lowermost pair arising 5–8 mm from base, other pairs arising from above middle of blade, base broadly cuneate or slightly rounded, apex acute or ± acuminate. Fruiting inflorescences umbellate, solitary or 2-fascicled; peduncle stout and short, ca. 2 mm, glabrous. Fruits 5 or 6 per inflorescence, ellipsoid, 5–6(–11) × 4–5(–9) mm, glabrous; fruiting pedicel 5–15 mm, thickened at apex, puberulent; perianth tube discoid. Fr. Nov–Dec.

• Dense forests on mountain slopes; 1200–1800 m. Guizhou, SW Hunan (Xinning), Sichuan, Yunnan.

**38. *Neolitsea impressa*** Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 81. 1945.

凹脉新木姜子 *ao mai xin mu jiang zi*

Shrubs or small trees, ca. 5 m tall. Branchlets glabrous except at top. Leaves alternate or clustered toward apex of branchlet; petiole 5–8 mm, glabrous or puberulent; leaf blade ovate or elliptic-obovate, 5–9.5 × 2.4–4 cm, glabrous on both surfaces, glaucous abaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 5–6 mm from base, other pairs

arising from middle or below middle of blade, base broadly cuneate or rotund, apex abruptly acute or subcaudate. Umbels 2–4-fascicled, sessile, 5-flowered. Pedicel short, densely pubescent. Perianth segments 4, elliptic. Male flowers: fertile stamens 6; filaments glabrous or pubescent only at base, of 3rd whorls each with 2 stipitate large peach-shaped glands at base; rudimentary pistil glabrous. Fruit ellipsoid or ovoid-ellipsoid, ca. 10 × 6 mm; fruiting pedicel 5–6 mm. Fl. Apr–May, fr. Aug–Sep.

- Mixed forests. Sichuan.

**39. *Neolitsea shingningensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 44. 1978.

新宁新木姜子 *xin ning xin mu jiang zi*

Shrubs or small trees, ca. 5 m tall. Branchlets glabrous. Leaves alternate or subverticillate; petiole 1 cm, slightly flat, glabrous; leaf blade ovate or ovate-oblong, 5–9 × 1.7–3 cm, glabrous on both surfaces, triplinerved, lateral veins 2 or 3 pairs, lowermost pair arising 4–6 mm from base, other pairs arising from middle or above middle of blade, with 1 pair of lateral veinlets at one side near margin, ca. 1 mm from base, acutely projecting to middle, base rounded or broadly cuneate, apex shortly caudate or acuminate. Umbels 2-fascicled, lateral, 4-flowered; peduncle ca. 1 mm. Pedicel villous. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 sessile orbicular glands at base; rudimentary pistil glabrous. Fruit ellipsoid, 6–7 × ca. 5 mm; fruiting pedicel 5–7 mm, slightly thickened at apex. Fl. Mar–Apr, fr. Sep–Oct.

- Sparse forests on mountain slopes; 1200–1500 m. NE Guizhou (Fanjing Shan), Hunan.

**40. *Neolitsea homilantha*** C. K. Allen, Ann. Missouri Bot. Gard. 25: 419. 1938.

团花新木姜子 *tuan hua xin mu jiang zi*

Shrubs or small trees. Branchlets glabrous. Leaves clustered toward apex of branchlet, subverticillate or scattered; petiole 7–16 mm, glabrous; leaf blade elliptic, 4.5–8 × 2–3.5 cm, glabrous on both surfaces, triplinerved, lateral veins 4–6 pairs, lowermost pair arising 2–10 mm from base, other pairs arising from middle or below middle of blade, base cuneate or rotund, apex subcaudate-acuminate. Umbels 3–7-fascicled, axillary, 5-flowered; peduncle very short or lacking. Pedicel 2–3 mm, densely pubescent. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 shortly stipitate rounded-cordate glands at base; rudimentary pistil ca. 1.5 mm, pubescent. Fruit ovoid, ca. 9 × 8 mm; fruiting pedicel 7–9 mm, slightly thickened at apex. Fl. Oct–Nov or Jan–Mar, fr. Oct–Nov.

- Mixed forests in wet ditch sides, thickets on calcareous rock; 1200–2000 m. Xizang, Yunnan.

The fresh leaves contain ca. 0.7% aromatic oil.

**41. *Neolitsea purpurascens*** Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 81. 1945.

紫新木姜子 *zi xin mu jiang zi*

*Neolitsea zeylanica* (Nees & T. Nees) Merrill var. *fangii* H. Liu.

Small trees, ca. 7 m tall. Young branchlets ferruginous pubescent and becoming glabrous. Leaves alternate or clustered toward apex of branchlet; petiole 1–1.4 cm, pubescent when young; leaf blade ovate or elliptic, 4.5–7.4 × 1.7–3 cm, glaucous abaxially, triplinerved, lateral veins 3 or 4 pairs, lowermost pair arising 3–4 mm from base, other pairs arising from middle or below middle of blade, base rotund or broadly cuneate, apex caudate. Umbels solitary or fascicled, sessile, male umbel 5-flowered. Pedicel pubescent. Perianth segments 4, ovate. Male flowers: fertile stamens 6; filaments pubescent at base, of 3rd whorls each with 2 shortly stipitate small glands at base; rudimentary pistil ovoid. Fruit obovoid, 6–7 × ca. 5 mm, black at maturity; fruiting pedicel 6–8 mm, slightly thickened at apex, glabrous. Fl. Apr–May, fr. Aug–Sep.

- Mixed forests; 1500–2000 m. Sichuan.

**42. *Neolitsea pingbienensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 45. 1978.

屏边新木姜子 *ping bian xin mu jiang zi*

Shrubs, 1–2 m tall. Branchlets glabrous. Leaves alternate or clustered toward apex of branchlet; petiole 8–12 mm, pubescent; leaf blade elliptic or ovate-elliptic, 5–9 × 2.2–4 cm, glabrous on both surfaces, slightly glaucous abaxially when old, triplinerved, lateral veins 4 or 5 pairs, lowermost pair arising 5 mm from base, extending over ca. 2/3 of leaf, other pairs arising from above middle of blade, base slightly rounded-obtuse, apex acuminate or acute. Umbels 1 or 2, axillary or lateral, female umbel 5-flowered; peduncle extremely short or lacking. Pedicel 2–3 mm. Perianth segments 4, yellow, elliptic. Female flowers: staminodes 6; filaments covered with sericeous pubescence, of 3rd whorls each with 2 stipitate peltate glands at base; ovary ovoid, densely gray-yellow sericeous at apex; style ca. 1 mm; stigma capitate. Fl. Apr–May.

- Moist dense forests; 1800–1900 m. SE Yunnan.

**43. *Neolitsea konishii*** (Hayata) Kanehira & Sasaki, Trans. Nat. Hist. Soc. Formosa 20: 381. 1930.

五掌楠 *wu zhang nan*

*Litsea konishii* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 248. 1911; *Tetradenia konishii* (Hayata) Hayata.

Large trees, ca. 80 cm d.b.h. Bark brown, smooth. Branchlets glabrous. Leaves alternate or clustered toward apex of branchlet, subverticillate; petiole ca. 1 cm; leaf blade lanceolate or oblong, 10–15 × 3–4 cm, glaucous, appressed pubescent when young, and becoming glabrous abaxially, glabrous adaxially, triplinerved, lateral veins 3 pairs, lowermost pair arising 3–5 mm from base, base cuneate, apex abruptly acuminate. Umbels numerous, axillary or lateral, 5- or 6-flowered. Male pedicel ca. 4 mm, pubescent. Perianth segments 4, ovate-lanceolate. Male flowers: fertile stamens 6, exerted; filaments pubescent at base, of 3rd whorls each with 2 stipitate glands at base; rudimentary pistil lacking. Fruit ovoid, ca. 1.5 × 1.2 cm, black at maturity. Fl. Apr–May, fr. Sep–Oct.

- Evergreen broad-leaved forests; ca. 1500 m. Taiwan [Japan].

The wood is used for construction and furniture-making.

**44. *Neolitsea daibuensis*** Kamikoti, Trans. Nat. Hist. Soc. Formosa 22: 411. 1932.

大武山新木姜子 *da wu shan xin mu jiang zi*

Trees. Branchlets glabrous. Leaves alternate or clustered at apex of branchlet; petiole glabrous; leaf blade ovate or ovate-lanceolate, 4.5–6.5 × 1.5–2.5 cm, glabrous on both surfaces, glaucous abaxially, triplinerved, lateral veins 2 or 3 pairs, at angle of 30° from midrib, extending toward leaf apex, base obtuse or obtuse-cuneate, apex acuminate. Umbels axillary, sessile, 3–5-flowered. Male perianth tube short, segments 4, narrowly ovate, ciliate. Male flowers: fertile stamens 6; filaments pilose at base, of 3rd whorls each with 2 shortly stipitate large glands at base; rudimentary pistil ellipsoid-globose, covered with pubescence. Female flowers and fruit not seen.

- Broad-leaved forests on mountains. S Taiwan.

**45. *Neolitsea hiiranensis*** T. S. Liu & J. C. Liao, Quart. J. Taiwan. Mus. 24: 409. 1971.

南仁山新木姜子 *nan ren shan xin mu jiang zi*

Small trees. Young branchlets and petioles glabrous. Leaves clustered at apex of branchlet; petiole 6–10 mm; leaf blade oblong, 3.5–6 × 1.3–2.3 cm, glabrous on both surfaces, glaucous abaxially, triplinerved, lateral veins 2 or 3 pairs, base obtuse to acute, apex obtuse. Pedicels ca. 3 mm. Perianth tube densely hispid; segments 4, oblong, 2.5–3 mm, apex obtuse or acute, ciliate. Male flowers: fertile stamens 6; filaments pilose at base, of 3rd whorls each with 2 glands at base; rudimentary pistil cylindrical. Female flowers: staminodes 6, of 1st and 2nd whorls linear-clavate, hispid, of 3rd whorls sagittate, each with 2 glands at base; ovary ellipsoid, glabrous; style hispid. Fruit ovoid, glabrous.

- S Taiwan.

### 3. *LITSEA* Lamarck, Encycl. 3: 574. 1792, nom. cons.

木姜子属 *mu jiang zi shu*

Huang Puhua (黄普华 *Huang Pu-hwa*), Li Jie (李捷), Li Xiwen (李锡文 *Li Hsi-wen*); Henk van der Werff

*Hexanthus* Loureiro; *Iozoste* Nees; *Malapoëna* Adanson; *Pseudolitsea* Yen C. Yang; *Tetranthera* Jacquin.

Trees or shrubs, evergreen or deciduous, dioecious. Leaves alternate, rarely opposite or verticillate, pinninerved. Umbels, or umbellate cymes or panicles, solitary or clustered in leaf axils; involucre bracts 4–6, decussate, persistent at flowering. Perianth tube long or short, segments usually 6, in 2 whorls of 3 each, equal or unequal, rarely lacking or 8. Flowers unisexual. Male flowers: fertile stamens 9 or 12, rarely more, in 3 or 4 whorls of 3 each; filaments of 1st and 2nd whorls usually glandular, of 3rd and 4th 2-glandular at base; anthers all introrse, 4-celled, cells opening by lids; rudimentary pistil present or lacking. Female flowers: staminodes as many as stamens of male flowers; ovary superior; style conspicuous. Fruit seated on perianth tube; perianth tube ± enlarged, shallowly discoid or deeply cup-shaped or unaltered at fruit.

About 200 species: mainly in tropical and subtropical Asia, a few species in Australia and from North America to subtropical South America; 74 species (47 endemic) in China.

*Litsea mishmiensis* J. D. Hooker (Fl. Brit. India 5: 161. 1886; see FRPS 31: 336. 1982) was described from the border region between NE India and SE Xizang.

*Tetranthera floribunda* Champion ex Bentham (Hooker's J. Bot. Kew Gard. Misc. 5: 199. 1853) was described from Hong Kong but could not be treated here because no material was seen by the present authors.

*Litsea chaffanjonii* H. Léveillé (Repert. Spec. Nov. Regni Veg. 12: 182. 1913) is a synonym of *Symplocos stellaris* Brand in the Symplocaceae (see Fl. China 15: 250. 1996), according to Lauener (Notes Roy. Bot. Gard. Edinburgh 35: 279. 1977).

*Litsea mairei* H. Léveillé and *L. myricopsis* H. Léveillé (Cat. Pl. Yun-Nan, 150. 1916) are synonyms of *Myrica nana* A. Chevalier and *M. esculenta* Buchanan-Hamilton ex D. Don, respectively, in the Myricaceae (see Fl. China 4: 275–276. 1999), according to Lauener (Notes Roy. Bot. Gard. Edinburgh 40: 505. 1983).

1a. Leaf blade papery or membranous and deciduous.

2a. Petiole 2–8 cm; leaf blade orbicular or orbicular-elliptic to broadly ovate.

3a. Leaf blade more than 9.5 cm, auriculate at base; fruit ovoid, 1.3–1.7 × 1.1–1.3 cm, perianth tube cup-shaped ..... 1. *L. auriculata*

3b. Leaf blade less than 8 cm, base orbicular or cuneate; fruit globose, 0.5–0.6 cm in diam., perianth tube shallowly discoid ..... 2. *L. populifolia*

2b. Petiole less than 2 cm; leaf blade not as above.

4a. Branchlets glabrous.

5a. Leaf blade glabrous abaxially.

6a. Leaf blade elliptic or lanceolate-elliptic; flowers 10–12 per umbel; filaments glabrous; pedicels hairy ..... 5. *L. rubescens*

6b. Leaf blade lanceolate or oblong; flowers 4–6 per umbel; filaments glabrous or with hairs below middle; pedicels glabrous.

7a. Terminal bud ± hairy; leaf blade ± hairy abaxially when young or in bud ..... 3. *L. cubeba*

7b. Terminal bud glabrous; leaf blade glabrous on both surfaces even when young or in bud ..... 4. *L. kingii*

5b. Leaf blade hairy abaxially or at least in axils of veins.

- 8a. Young leaves gray-white tomentose abaxially; leaf blade obovate or obovate-elliptic, often larger, 7–11 × 3–5 cm ..... 8. *L. tsinlingensis*
- 8b. Young leaves hairy only in axils of veins or on each side of midrib; leaf blade often smaller, 2–5 × 1–3 cm.
- 9a. Leaf blade usually obovate or rotund, sometimes glandular-domed in axils of veins; lateral veins 4–6 pairs ..... 6. *L. ichangensis*
- 9b. Leaf blade elliptic, elliptic-lanceolate, or elliptic-obovate, not glandular-domed in axils of veins; lateral veins 5–8 pairs ..... 7. *L. chunii*
- 4b. Branchlets covered with hairs.
- 10a. Branchlets and leaf blade abaxially covered with pubescence or tomentum, indumentum of young branchlets scarcely deciduous, persistent in 2-year-old branchlets.
- 11a. Leaf blade sericeous-pubescent or with white pubescence abaxially; flowers 4–6 per umbel ..... 11. *L. mollis*
- 11b. Leaf blade densely gray-yellow tomentose abaxially; flowers 8–14 per umbel.
- 12a. Leaf blade ovate, rhombic-ovate, or oblong, 4–15 × 1.5–7 cm; umbel solitary ..... 9. *L. moupinensis*
- 12b. Leaf blade elliptic or oblong, 1–13.5 × 3.2–4.5 cm; umbels in pairs seated on common peduncle .... 10. *L. taronensis*
- 10b. Branchlets and leaf blade abaxially sericeous, indumentum of young branchlets soon deciduous, mostly glabrous in 2-year-old flowering and fruiting branchlets.
- 13a. Young branchlets and leaf blade abaxially shortly gray sericeous; leaf blade lanceolate or obovate-lanceolate ..... 12. *L. pungens*
- 13b. Young branchlets and leaf blade long yellow or brown sericeous; leaf blade oblong-lanceolate, obovate-oblong, or obovate.
- 14a. Leaf blade oblong-lanceolate, apex acuminate; peduncles glabrous ..... 13. *L. sericea*
- 14b. Leaf blade obovate or obovate-oblong, acute or obtuse at apex; peduncles hairy ..... 14. *L. veitchiana*
- 1b. Leaf blade leathery or thinly leathery and evergreen.
- 15a. Perianth segments imperfect, lacking, or 3 or 4.
- 16a. Perianth segments imperfect or lacking; fertile stamens usually 15 or more; fruit globose; leaf blade gray-yellow tomentose or subglabrous abaxially ..... 15. *L. glutinosa*
- 16b. Perianth segments 3 or 4; fertile stamens 9; fruit ellipsoid; leaf blade along veins shortly hirsute abaxially ..... 16. *L. morrisonensis*
- 15b. Perianth segments 6–8.
- 17a. Perianth tube not or slightly enlarged at fruit; fruiting tube complanate or shallowly discoid.
- 18a. Leaves verticillate, usually 3–6 per whorl.
- 19a. Young branchlets and petioles densely ferruginous tomentose; leaf blade leathery, obovate-lanceolate, 3.5–6.8 × 0.9–2.8 cm; umbels lateral in leaf axils ..... 17. *L. verticillifolia*
- 19b. Young branchlets and petioles densely yellow or ferruginous hirsute; leaf blade subleathery, lanceolate or oblanceolate-oblong, 7–25 × 2–6 cm; umbels usually clustered at apex of branchlet ..... 18. *L. verticillata*
- 18b. Leaves opposite or alternate.
- 20a. Leaves opposite or subopposite (rarely alternate on same tree).
- 21a. Leaf blade glabrous or subglabrous abaxially; leaves and buds usually tinged with red after autumn ..... 19. *L. variabilis*
- 21b. Leaf blade yellow-brown or ferruginous tomentose abaxially; leaves and buds not tinged with red after autumn ..... 20. *L. lancifolia*
- 20b. Leaves alternate.
- 22a. Peduncles and pedicels absent ..... 21. *L. rotundifolia*
- 22b. Peduncles and pedicels present, if peduncles absent, pedicels still present.
- 23a. Perianth segments deciduous at fruit; fruit long ellipsoid or long ovoid to globose.
- 24a. Flowers 2 or 3 per umbel.
- 25a. Leaf blade smaller, 4–11 × 1.5–3.5 cm, yellow-brown pubescent abaxially ..... 29. *L. balansae*
- 25b. Leaf blade larger, 9–16.5 × 3–6.5 cm, glabrous abaxially ..... 30. *L. biflora*
- 24b. Flowers 4–6 or more per umbel.
- 26a. Leaf blade long caudate at apex, foveolate on both surfaces; fruit globose ..... 31. *L. beilschmiedifolia*
- 26b. Leaf blade acuminate, acute, obtuse, or rounded at apex, not foveolate on both surfaces; fruit long ellipsoid or long ovoid.
- 27a. Branchlets and petioles glabrous; leaf blade yellow-brown puberulent abaxially ..... 32. *L. salicifolia*
- 27b. Branchlets and petioles hairy; leaf blade ferruginous pubescent, pubescent along veins, or glabrous abaxially.
- 28a. Branchlets and petioles ferruginous pubescent; leaf blade abaxially ferruginous pubescent, apex obtuse or rounded ..... 33. *L. monopetala*
- 28b. Branchlets and petioles gray appressed pubescent; leaf blade glaucous, glabrous, or pubescent along veins abaxially, apex acuminate ..... 34. *L. albescens*

- 23b. Perianth segments persistent at fruit; fruit globose or subglobose.
- 29a. Peduncles absent; fruiting pedicels stout; persistent perianth segments 6, regular, usually erect.
- 30a. Young branchlets and young leaf blade abaxially glabrous or densely gray-yellow villous; leaf blade obovate-elliptic, obovate-lanceolate, oblong, or lanceolate, 4.5–9.5 × 1.4–4 cm ..... 22. *L. coreana*
- 30b. Young branchlets gray pubescent and young leaf blade abaxially glaucous and gray-white villous along midrib; leaf blade narrowly lanceolate or lanceolate to elliptic, 10–13 × 2–3.5 cm ..... 23. *L. hupehana*
- 29b. Peduncles present; fruiting pedicels usually slender; persistent perianth segments 2–4, irregular, reflexed.
- 31a. Branchlets, petioles, and filaments glabrous; fruit larger, 2–3 cm in diam.
- 32a. Leaf blade not foveolate on both surfaces and adaxially glabrous but ± hairy abaxially along veins; fruit globose, fruiting pedicel somewhat thickened at apex, as peduncle ± hairy and not verrucose ..... 24. *L. honghoensis*
- 32b. Leaf blade foveolate and glabrous on both surfaces; fruit ovoid, fruiting pedicel shallowly cup-shaped at apex, as peduncle glabrous and verrucose ..... 25. *L. cangyuanensis*
- 31b. Branchlets, petioles, and filaments hairy; fruit smaller, less than 1 cm in diam.
- 33a. Leaf blade abaxially, petioles, and peduncles densely ferruginous tomentose ..... 28. *L. umbellata*
- 33b. Leaf blade abaxially, petioles, and peduncles covered with brown pubescence or long gray-yellow pubescence.
- 34a. Leaf blade greenish abaxially; umbels 2 in leaf axils at tips of branchlets; fruiting pedicels shorter, less than 2 mm ..... 26. *L. foveola*
- 34b. Leaf blade blue-green abaxially; several umbels axillary on shortened branchlets; fruiting pedicels longer, more than 6 mm ..... 27. *L. coelestis*
- 17b. Perianth tube very enlarged at fruit; fruit ± surrounded by discoid or cup-shaped fruiting tube.
- 35a. Some umbels inserted on long or slightly long peduncles in panicles, racemes, or near corymbs.
- 36a. Young branchlets and leaf blade abaxially glabrous.
- 37a. Leaf blade larger, 21–50 × 11–14.5 cm, lateral veins 15–22 pairs ..... 35. *L. dilleniifolia*
- 37b. Leaf blade smaller, 10–21 × 3–8 cm, lateral veins 7–12 pairs.
- 38a. Leaf blade midrib prominent adaxially, lateral veins 10–12 pairs; fertile stamens 26–32 ..... 36. *L. liyuyingii*
- 38b. Leaf blade midrib impressed adaxially, lateral veins 7–9 pairs; fertile stamens 9 ..... 37. *L. szemaonis*
- 36b. Young branchlets and leaf blade abaxially hairy (only in *L. panamanja* glabrous abaxially).
- 39a. Leaf blade abaxially and petiole glabrous; fruit compressed globose ..... 38. *L. panamanja*
- 39b. Leaf blade abaxially and petiole yellow-brown or ferruginous pubescent (at least young leaves so); fruit oblong or compressed globose.
- 40a. Petiole more than 2 cm; perianth segments 8; fertile stamens 12–14; fruit compressed globose ..... 39. *L. semecarpifolia*
- 40b. Petiole less than 2 cm; perianth segments 6; fertile stamens 9; fruit oblong.
- 41a. Leaf blade obovate to obovate-oblong, rounded, mucronate at apex ..... 42. *L. longistaminata*
- 41b. Leaf blade elliptic or elliptic-lanceolate, acuminate, long acuminate, or falcate-acuminate at apex.
- 42a. Leaf blade lateral veins 6–8 pairs; fruiting tube deeply cup-shaped ..... 40. *L. martabanica*
- 42b. Leaf blade lateral veins 8–12 pairs; fruiting tube shallowly discoid ..... 41. *L. tibetana*
- 35b. Umbels solitary or fascicled.
- 43a. Leaves clustered toward apex of branchlet, subverticillate ..... 74. *L. machiloides*
- 43b. Leaves alternate.
- 44a. Young branchlets glabrous or subglabrous; petiole usually glabrous when young.
- 45a. Leaf blade smaller, mostly less than 9 cm.
- 46a. Young branchlets glabrous or densely pubescent; leaf blade midrib prominent adaxially; peduncles slender ..... 43. *L. pedunculata*
- 46b. Young branchlets glabrous; leaf blade midrib plane or impressed adaxially; peduncles stouter and shorter.
- 47a. Leaf blade oblong or narrowly oblong, usually 4 × as long as wide, slightly acute or obtuse at apex ..... 46. *L. kwangtungensis*
- 47b. Leaf blade elliptic, obovate, obovate-lanceolate, or lanceolate, ca. 2–3 × as long as wide, rounded-obtuse or shortly acute or acuminate at apex.
- 48a. Leaf blade elliptic or rarely obovate, 2 × as long as wide, rounded-obtuse at both ends or base cuneate; fruiting tube cup-shaped ..... 44. *L. pittosporifolia*
- 48b. Leaf blade obovate-lanceolate or lanceolate, 3 × as long as wide, shortly acute or acuminate at apex, cuneate or acute at base; fruiting tube discoid ..... 45. *L. hunanensis*

- 45b. Leaf blade larger, mostly more than 10 cm.
- 49a. Branchlets with corky cortices or spots.
- 50a. Branchlets with corky cortices; leaf blade oblanceolate or narrowly long elliptic; fertile stamens 9; filaments villous ..... 47. *L. suberosa*
- 50b. Branchlets with corky spots; leaf blade elliptic; fertile stamens 12(–14); filaments pubescent ..... 48. *L. chengshuzhii*
- 49b. Branchlets without corky cortices or spots.
- 51a. Fruit compressed globose, 2–2.2 × ca. 3 cm.
- 52a. Leaf blade lateral veins 6–10 pairs ..... 49. *L. depressa*
- 52b. Leaf blade lateral veins 16–20 pairs ..... 50. *L. garciae*
- 51b. Fruit ellipsoid or oblong, 1–2.5 × 0.3–1.4 cm.
- 53a. Leaf blade midrib conspicuously prominent on both surfaces; fruit oblong, larger, 1.5–2.5 × 1–1.4 cm; fruiting tube discoid ..... 51. *L. lancilimba*
- 53b. Leaf blade midrib impressed adaxially; fruit ellipsoid, smaller, ca. 1.5 × 0.8 cm; fruiting tube cup-shaped ..... 52. *L. subcoriacea*
- 44b. Young branchlets and petioles hairy (petioles glabrous in *L. baviensis* and *L. chinpingensis*).
- 54a. Young branchlets and petioles puberulent or pubescent, soon deciduous, 2-year-old flowering and fruiting branchlets mostly glabrous.
- 55a. Terminal bud scaly; fruit smaller, less than 1.5 × 1 cm.
- 56a. Leaf blade glabrous abaxially ..... 53. *L. greenmaniana*
- 56b. Leaf blade gray-yellow pubescent or along veins pilose abaxially.
- 57a. Young branchlets pubescent; leaf blade pubescent abaxially; lateral veins 5–7 pairs ..... 54. *L. hypophaea*
- 57b. Young branchlets puberulent or subglabrous; leaf blade puberulent abaxially; lateral veins 8–10 pairs.
- 58a. Leaf blade lanceolate, oblanceolate, or oblong, usually narrower; rudimentary pistil present ..... 55. *L. gongshanensis*
- 58b. Leaf blade elliptic, usually broader; rudimentary pistil absent ..... 56. *L. viridis*
- 55b. Terminal bud naked; fruit larger, more than 2 × 1.3 cm.
- 59a. Fruiting peduncles and pedicels 2–3 mm.
- 60a. Leaf blade lateral veins 7 or 8 pairs; fruiting tube thickly woody, larger, warty outside ..... 60. *L. baviensis*
- 60b. Leaf blade lateral veins 10–12 pairs; fruiting tube leathery, smaller, not warty outside ..... 61. *L. litseifolia*
- 59b. Fruiting peduncles more than 5 mm; fruiting pedicels more than 10 mm.
- 61a. Leaf blade gray puberulent or along veins pubescent abaxially; fruiting tube cup-shaped ..... 57. *L. yunnanensis*
- 61b. Leaf blade glabrous abaxially; fruiting tube discoid or cup-shaped.
- 62a. Leaf blade lanceolate or narrowly elliptic, usually narrower, less than 4 cm in diam.; lateral veins 7–11 pairs; fruiting tube discoid, not dehiscent ..... 58. *L. chinpingensis*
- 62b. Leaf blade elliptic, usually broader, more than 4 cm in diam.; lateral veins 5–7 pairs; fruiting tube cup-shaped, with many lenticels ..... 59. *L. vang*
- 54b. Young branchlets and petioles covered with tomentum or pubescence, indumentum late deciduous, 2-year-old branchlets still covered with more hairs.
- 63a. Leaf blade broadly linear; fruit long ovoid ..... 62. *L. pseudoelongata*
- 63b. Leaf blade not broadly linear; fruit not long ovoid.
- 64a. Petiole less than 8 mm.
- 65a. Leaf blade lateral veins 4 or 5 pairs, impressed abaxially; perianth segments persistent at fruit ..... 63. *L. oligophlebia*
- 65b. Leaf blade lateral veins 8–12 pairs, slightly prominent or prominent adaxially; perianth segments deciduous at fruit ..... 64. *L. yaoshanensis*
- 64b. Petiole mostly more than 10 mm.
- 66a. Leaf blade glabrous or only along veins hairy abaxially.
- 67a. Leaf blade obovate or oblong-obovate, along veins pubescent abaxially, lateral veins 5–8 pairs ..... 65. *L. akoensis*
- 67b. Leaf blade lanceolate or oblong-oblanceolate, glabrous abaxially, lateral veins 8–12 pairs ..... 66. *L. kwangsiensis*
- 66b. Leaf blade hairy abaxially.
- 68a. Flowers ca. 20 per umbel ..... 67. *L. liboshengii*
- 68b. Flowers 3–6 per umbel.
- 69a. Fruit globose or subglobose; leaf buds axillary ..... 68. *L. sinoglobosa*
- 69b. Fruit ellipsoid; leaf buds mostly inserted at apex of branchlet.

- 70a. Leaf blade obovate or broadly oblong, broader, mostly more than 5 cm in diam.  
 71a. Young branchlets, leaf blade abaxially, petioles, and inflorescences covered with gray-white tomentum; fruit ca. 1.3 cm ..... 69. *L. wilsonii*  
 71b. Young branchlets, leaf blade abaxially, petioles, and inflorescences gray-brown pubescent; fruit ca. 0.8 cm ..... 70. *L. hayatae*  
 70b. Leaf blade lanceolate, narrowly lanceolate, oblong-lanceolate to oblanceolate, or oblong to lanceolate-elliptic, usually narrower, mostly less than 4 cm in diam.  
 72a. Young branchlets densely brown tomentose; leaf blade lateral veins 10–20 pairs; umbels mostly solitary ..... 73. *L. elongata*  
 72b. Young branchlets densely gray-yellow or yellow-brown villous; leaf blade lateral veins 5–10 pairs; umbels mostly clustered.  
 73a. Leaf blade lanceolate-elliptic, narrower, less than 2.5 cm in diam., midrib slightly prominent abaxially, transverse veinlets inconspicuous abaxially ..... 71. *L. kobuskiana*  
 73b. Leaf blade lanceolate, oblanceolate, or oblong-lanceolate, broader, mostly more than 2.5 cm in diam., midrib impressed adaxially, transverse veinlets conspicuously prominent ..... 72. *L. acutivena*

**1. *Litsea auriculata*** S. S. Chien & W. C. Cheng, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 6: 59. 1931.

天目木姜子 *tian mu mu jiang zi*

Deciduous trees, 10–20 m tall, 40–60 cm d.b.h. Branchlets glabrous. Leaves alternate; petiole 3–8 cm, glabrous; leaf blade elliptic, rounded-elliptic, subcordate, or obovate, 9.5–23 × 5.5–13.5 cm, glaucous, pubescent abaxially, pinninerved, lateral veins 7 or 8 pairs, base auriculate, apex obtuse, obtuse-acute, or rounded. Umbels shortly pedunculate or sessile, 6–8-flowered, flowering before leaves or at same time. Pedicel 1.3–1.6 cm, sericeous-pubescent. Perianth segments 6 (or 8), yellow, obovate. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 stipitate glands at base; rudimentary pistil ovoid, glabrous. Fruit ovoid, 13–17 × 11–13 mm, seated on cup-shaped perianth tube, black at maturity; fruiting pedicel 12–16 mm. Fl. Mar–Apr, fr. Jul–Aug.

- Mixed forests; 500–1000 m. S Anhui, Zhejiang.

The wood is yellow, heavy, and dense, and is used for making furniture, etc. The root bark, leaves, and fruits are used medicinally.

**2. *Litsea populifolia*** (Hemsley) Gamble in Sargent, Pl. Wilson. 2: 77. 1914.

杨叶木姜子 *yang ye mu jiang zi*

*Lindera populifolia* Hemsley, J. Linn. Soc., Bot. 26: 390. 1891; *Benzoin obovatum* (Franchet) Rehder; *L. obovata* Franchet; *Litsea longipetiolata* Lecomte.

Deciduous small trees, 3–5 m tall, glabrous except for hairy inflorescence. Leaves alternate, usually clustered at apex of branchlet; petiole 2–3 cm; leaf blade orbicular to broadly obovate, 6–8 × 5–7 cm, glaucous abaxially, pinninerved, lateral veins 5 or 6 pairs, base rounded or cuneate, apex rounded. Umbels clustered at apex of branchlet, 9–11-flowered, flowering with leaves; peduncle 3–4 mm. Pedicel slender, 1–1.5 cm. Perianth segments 6, yellow, ovate or broadly ovate. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 stipitate large glands at base; rudimentary pistil glabrous. Fruit globose, 5–6 mm in diam., seated on shallowly discoid perianth tube; fruiting pedicel 1–1.5 cm, slightly thickened at apex. Fl. Apr–May, fr. Aug–Sep.

- Sunny slopes on mountains, along banks in river valleys, thickets on shady slopes, arid and barren secondary forests, sometimes in pure stands; 700–2000 m. Sichuan, Xizang, NE Yunnan.

The leaves and fruit may be processed for their aromatic oil and used in cosmetics and soap. The fresh leaves contain ca. 0.5% of aromatic oil. The seeds contain ca. 36% oil and are used in industry.

**3. *Litsea cubeba*** (Loureiro) Persoon, Syn. Pl. 2: 4. 1807.

山鸡椒 *shan ji jiao*

Deciduous shrubs or small trees, 8–10 m tall. Branchlets glabrous or sericeous-pubescent. Leaves alternate; petiole 6–20 mm, glabrous; leaf blade lanceolate, oblong, or elliptic, 4–11 × 1.1–2.4 cm, glabrous on both surfaces or sericeous-pubescent abaxially, glaucous and sericeous-pubescent when young abaxially, lateral veins 6–16 pairs, base cuneate, apex acuminate or acute. Umbels solitary or clustered, 4–6-flowered, flowering before leaves or with leaves; peduncle 2–10 mm, reflexed or straight, glabrous or sericeous-pubescent. Male flowers: perianth segments 6, broadly ovate; fertile stamens 9; filaments hairy below middle, of 3rd whorls each with 2 shortly stipitate glands at base; rudimentary pistil glabrous. Fruit subglobose, ca. 5 mm in diam., black at maturity; fruiting pedicel 2–4 mm. Fl. Feb–Mar, fr. Jul–Aug.

Sunny slopes, thickets, sparse forests, roadsides, watersides; 300–3200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [S and SE Asia].

- 1a. Branchlets, buds, both surfaces of leaf blade, and umbels glabrous ..... 3a. var. *cubeba*
- 1b. Branchlets, buds, leaf blade abaxially, and umbels sericeous-pubescent ..... 3b. var. *formosana*

**3a. *Litsea cubeba* var. *cubeba***

山鸡椒(原变种) *shan ji jiao* (*yuan bian zhong*)

*Laurus cubeba* Loureiro, Fl. Cochinch. 1: 252. 1790; *Benzoin cubeba* (Loureiro) Hatusima; *Lindera dielsii* H. Léveillé; *Litsea cubeba* f. *obtusifolia* Yen C. Yang & P. H. Huang; *L. dielsii* (H. Léveillé) H. Léveillé; *L. mollifolia* Chun var. *glabrata* (Diels) Chun; *L. mollis* Hemsley var. *glabrata* Diels.

Branchlets, buds, both surfaces of leaf blade, and umbels glabrous.

Sunny slopes, thickets, sparse forests, roadsides, watersides; 300–1800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [S and SE Asia].

The wood is used for general furniture-making and construction. The flowers, leaves, and fruit walls are processed for citral and are used for their fragrance and medicinal properties. The fruit core contains ca. 62% oil and is used in industry. The roots, branchlets, leaves, and fruits are all used medicinally for treating internal health problems, such as swelling and pain. In Kunming, Shanghai, and Sichuan, the fruits are used as a medicine known as “bi cheng qie” (毕澄茄).

**3b. *Litsea cubeba* var. *formosana*** (Nakai) Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 46. 1978.

毛山鸡椒 mao shan ji jiao

*Aperula formosana* Nakai, *J. Jap. Bot.* 14: 195. 1938.

Branchlets, buds, leaf blade abaxially, and umbels sericeous-pubescent.

• Fujian, N Guangdong, Jiangxi, Taiwan, S Zhejiang.

**4. *Litsea kingii*** J. D. Hooker, *Fl. Brit. India* 5: 156. 1886.

秃净木姜子 tu jing mu jiang zi

Deciduous shrubs or small trees, 8–15 m tall. Terminal buds quite glabrous. Branchlets stout, glabrous, smooth, black when dry. Leaves alternate; petiole 9–12 mm, glabrous; leaf blade elliptic to ovate-lanceolate, 4–11 × 1.1–2.4 cm, abaxially glaucous, adaxially green and shining, glabrous on both surfaces even when young, lateral veins 11–16 pairs, base acute or cuneate, apex acute. Umbels 5- or fewer flowered, solitary or few corymbosely arranged; peduncle 6–10 mm, strongly reflexed. Male flowers: perianth segments 6, oblong; fertile stamens 6, 2-glandular; filaments glabrous. Female flowers in smaller fewer-flowered umbels; perianth more irregular; stigma discoid. Fruit globose, ca. 5 mm in diam., black at maturity; fruiting pedicel 2–4 mm. Fl. Feb–Mar, fr. Jul–Aug.

Sunny slopes, thickets, sparse forests, roadsides, watersides; 1000–3200 m. Fujian, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Xizang, Yunnan [Bhutan, India, N Myanmar, Nepal].

**5. *Litsea rubescens*** Lecomte, *Nouv. Arch. Mus. Hist. Nat.*, sér. 5, 5: 86. 1913.

红叶木姜子 hong ye mu jiang zi

Deciduous shrubs or small trees, 4–10 m tall. Young branchlets red, glabrous. Leaves alternate; petiole 12–16 mm, red when young, glabrous; leaf blade elliptic, lanceolate-elliptic, or rounded-elliptic, 4–6 × 1.7–3.5 cm, glabrous on both surfaces, pinninerved, lateral veins 5–7 pairs, prominent on both surfaces and red when young, base and apex attenuate or apex rounded-obtuse. Umbels axillary, male umbel 10–12-flowered; peduncle 5–10 mm, glabrous. Male flowers: pedicel 3–4 mm, with gray-yellow pubescence; perianth segments 6, yellow, broadly elliptic; fertile stamens 9; filaments short, glabrous, of 3rd whorls each with 2 small yellow glands at base; rudimentary pistil small. Fruit globose, ca. 8 mm in diam.; fruiting pedicel ca. 8 mm, pilose. Fl. Mar–Apr, fr. Sep–Oct.

• Forests, forest margins, gaps of evergreen broad-leaved forests in valleys, thickets on mountain slopes; 700–3800 m. Chongqing, Guizhou, Hubei, Hunan, S Shaanxi, Sichuan, Xizang, Yunnan.

- 1a. Leaf blade elliptic or lanceolate-elliptic;  
male umbel 10–12-flowered ..... 5a. var. *rubescens*  
1b. Leaf blade rounded-elliptic; male  
umbel 15–18-flowered ..... 5b. var. *yunnanensis*

**5a. *Litsea rubescens* var. *rubescens***

红叶木姜子(原变种) hong ye mu jiang zi (yuan bian zhong)

*Litsea forrestii* Diels; *L. rubescens* f. *nanchuanensis* Yen C. Yang.

Leaf blade elliptic or lanceolate-elliptic. Male umbel 10–12-flowered.

• Forest margins, gaps of evergreen broad-leaved forests in valleys; 700–3800 m. Chongqing, Guizhou, Hubei, Hunan, S Shaanxi, Sichuan, Xizang, Yunnan.

*Litsea forrestii* was treated in FRPS (31: 332. 1982) as an insufficiently known species. Its short original description shows the branchlets and flowers to be quite similar to those of *L. rubescens* (except for the slightly longer peduncles), and so the two entities are here treated as conspecific.

**5b. *Litsea rubescens* var. *yunnanensis*** Lecomte, *Nouv. Arch. Mus. Hist. Nat.*, sér. 5, 5: 86. 1913.

滇木姜子 dian mu jiang zi

Leaf blade rounded-elliptic. Male umbel 15–18-flowered.

• Forests, thickets on mountain slopes; 2300–3400 m. Guizhou, N Yunnan.

**6. *Litsea ichangensis*** Gamble in Sargent, *Pl. Wilson.* 2: 77. 1914.

宜昌木姜子 yi chang mu jiang zi

Deciduous shrubs or small trees, up to 8 m tall. Branchlets glabrous. Leaves alternate; petiole 5–15 mm, glabrous; leaf blade obovate or rotund, 2–5 × 2–3 cm, glaucous, barbate in axils of veins, and becoming glabrous abaxially, glabrous adaxially, sometimes glandular-domed in axils of veins abaxially, pinninerved, lateral veins 4–6 pairs, base cuneate, apex acute or rounded-obtuse. Umbels solitary or 2-fascicled, male umbel 9-flowered; peduncle ca. 5 mm, glabrous. Pedicel ca. 5 mm, sericeous-pubescent. Perianth segments 6, yellow, obovate or rotund, 4-nerved outside. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 yellow small glands at base; rudimentary pistil small, glabrous. Fruit subglobose, ca. 5 mm in diam., black at maturity; fruiting pedicel 1–1.5 cm, glabrous, slightly thickened at apex. Fl. Apr–May, fr. Jul–Aug.

• Thickets, dense forests on mountain slopes; 300–2200 m. SW and W Hubei, W Hunan, E and NE Sichuan.

**7. *Litsea chunii*** W. C. Cheng, *Contr. Biol. Lab. Sci. Soc. China, Bot. Ser.* 9: 196. 1934.

高山木姜子 gao shan mu jiang zi

Deciduous shrubs, up to 5 m tall. Young branchlets gla-

brous. Leaves alternate; petiole flat, 5–10 cm; leaf blade elliptic, elliptic-lanceolate, or elliptic-obovate, 2–9 × 1–4 cm, glabrous or subglabrous, except barbate in vein axils or midrib and vein axils with yellow pubescence, pinninerved, lateral veins 5–8 pairs, fine, base cuneate or rounded, apex acute or obtuse-rounded. Umbels solitary, male umbel 8–12-flowered; peduncle 4–6 mm, glabrous. Male flowers: pedicel 5–10 mm, with yellow pubescence; perianth segments 6, ovate, ovate-oblong, or oblong; fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 yellow sessile small glands at base. Fruit ovoid, 6–8 × 4–6 mm; fruiting pedicel 5–10 mm, thickened at apex, pubescent. Fl. Mar–Apr, fr. Jul–Aug.

• Margins of *Abies-Picea* secondary forests, sunny mountain slopes, streamsides, thickets; 1500–3400 m. S Gansu, W Sichuan, NW Yunnan.

- 1a. Leaf blade inconspicuously reticulate-veined, not scabrous adaxially, glabrous or subglabrous abaxially when young, except for barbate vein axils; petiole pubescent adaxially, glabrous abaxially when young ..... 7a. var. *chunii*
- 1b. Leaf blade conspicuously reticulate-veined, scabrous adaxially, midrib and vein axils with yellow pubescence abaxially; petiole completely pubescent ..... 7b. var. *likiangensis*

#### 7a. *Litsea chunii* var. *chunii*

高山木姜子(原变种) *gao shan mu jiang zi* (yuan bian zhong)

*Litsea chunii* f. *latifolia* Yen C. Yang; *L. chunii* var. *latifolia* (Yen C. Yang) H. S. Kung; *L. chunii* var. *longipedicellata* Yen C. Yang.

Petiole glabrous abaxially when young, pubescent adaxially; leaf blade not scabrous adaxially, glabrous or subglabrous abaxially when young, except for barbate vein axils, inconspicuously reticulate-veined.

• Margins of *Abies-Picea* secondary forests, sunny mountain slopes, streamsides, thickets; 1500–3400 m. S Gansu (Huanxian, Zhugu), W Sichuan, NW Yunnan.

The leaves and fruits are used for their aromatic oil.

7b. *Litsea chunii* var. *likiangensis* Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 46. 1978.

丽江木姜子 *li jiang mu jiang zi*

Petiole completely pubescent; leaf blade scabrous adaxially, midrib and vein axils with yellow pubescence abaxially, conspicuously reticulate-veined.

• NW Yunnan.

8. *Litsea tsinlingensis* Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 47. 1978.

秦岭木姜子 *qin ling mu jiang zi*

Deciduous shrubs or small trees, up to 6 m tall. Branchlets glabrous. Leaves alternate; petiole ca. 1 cm, white tomentose when young; leaf blade obovate or obovate-elliptic, 7–11 × 3–5

cm, white tomentose on both surfaces when young, pinninerved, lateral veins 6–8 pairs, base attenuate, apex shortly acuminate or obtuse-rounded. Umbel solitary at apex of branchlet, 10- or 11-flowered, flowering before leaves or with leaves; peduncle 3–4 mm, pubescent. Pedicel 8–12 mm, pubescent. Perianth segments 6, broadly elliptic, 3-nerved and glandular-punctate. Male flowers: fertile stamens 9; filaments short, glabrous, of 3rd whorls each with 2 yellow rounded glands at base; rudimentary pistil lacking. Fruit globose, 5–6 mm in diam., black at maturity; fruiting pedicel 1.5–2 cm, gray-yellow pubescent when young. Fl. Mar–Apr, fr. Jul–Aug.

• Mountain slopes, thickets; 1000–2400 m. SE Gansu, Henan, SW Shaanxi, SW Shanxi (Yongji).

The leaves and fruits are processed for their aromatic oil and are used in food and cosmetics. The seeds contain ca. 54% of oil, which is used for making soap and lauric acid.

9. *Litsea moupinensis* Lecomte, Bull. Soc. Bot. France 60: 84. 1913.

宝兴木姜子 *bao xing mu jiang zi*

Deciduous trees, 15–20 m tall. Young branchlets densely or sparsely yellow-brown tomentose. Leaves alternate; petiole 3–13 mm, densely yellow tomentose; leaf blade ovate, rhombic-ovate, oblong, elliptic, or obovate, rarely rotund, 4–15 × 1.5–7 cm, glabrous or sparsely or densely yellow-brown tomentose abaxially, glabrous adaxially, lateral veins 5–7 pairs, base acuminate or cuneate, apex acuminate, shortly acuminate, obtuse, or abruptly acute. Umbel solitary at apex of 1-year-old branchlets, flowering before leaves, male umbel 8–10-flowered; peduncle 2–10 mm, tomentose. Male flowers: pedicel 5–8 mm, tomentose; perianth segments 6, rotund, yellow; fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 stipitate yellow glands at base; rudimentary pistil glabrous. Fruit globose, 3–4 mm in diam., black at maturity; fruiting pedicel 5–10 mm, pubescent. Fl. Mar–Apr, fr. Jul–Aug.

• Roadsides, streamsides, sparse forests, weed-tree forests; 500–2300 m. Sichuan.

- 1a. Leaf blade ovate, rhombic-ovate, or oblong, rarely obovate, acuminate at both ends; fruiting peduncle less than 3 mm ..... 9a. var. *moupinensis*
- 1b. Leaf blade elliptic or obovate, rarely rotund, apex shortly acuminate, obtuse, or abruptly acute, base cuneate; fruiting peduncle more than 3 mm ..... 9b. var. *szechuanica*

#### 9a. *Litsea moupinensis* var. *moupinensis*

宝兴木姜子(原变种) *bao xing mu jiang zi* (yuan bian zhong)

*Benzoin puberulum* (Franchet) Rehder; *Lindera puberula* Franchet; *Litsea microcarpa* Yen C. Yang; *L. moupinensis* var. *glabrescens* H. S. Kung.

Leaf blade ovate, rhombic-ovate, or oblong, rarely obovate, acuminate at both ends. Fruiting peduncle less than 3 mm.

• Roadsides, weed-tree forests; 700–2300 m. Sichuan.

*Litsea moupinensis* var. *glabrescens* was established only on the basis of having sparse hairs on the branchlets and leaves. The present authors do not consider these differences to justify formal taxonomic recognition.

The leaves may be processed for their aromatic oil.

**9b. *Litsea moupinensis* var. *szechuanica*** (C. K. Allen) Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 47. 1978.

四川木姜子 *si chuan mu jiang zi*

*Litsea szechuanica* C. K. Allen, *J. Arnold Arbor.* 22: 18. 1941.

Leaf blade elliptic or obovate, rarely rotund, apex shortly acuminate, obtuse, or abruptly acute, base cuneate. Fruiting peduncle more than 3 mm.

- Streamsides, sparse forests in mountain valleys; 500–2100 m. Sichuan.

The fruit is used medicinally.

**10. *Litsea taronensis*** H. W. Li, *Acta Phytotax. Sin.* 16(4): 47. 1978.

独龙木姜子 *du long mu jiang zi*

Deciduous trees, ca. 15 m tall. Branchlets gray-yellow pubescent. Leaves alternate; petiole 1.2–1.5 cm, gray-yellow pubescent when young; leaf blade elliptic or oblong, 11–13.5 × 3.2–4.5 cm, densely shortly tomentose and along veins sparsely pubescent abaxially, puberulent adaxially when young, pinninerved, lateral veins 5 or 6 pairs, transverse veins connected, base and apex attenuate. Umbels in pairs seated on short branchlets ca. 3 mm, male umbel 12–14-flowered; peduncle 5–6 mm, sericeous-pubescent. Pedicel 3–4 mm, densely sericeous-pubescent. Perianth segments 6, ovate or ovate-rounded. Male flowers: fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 subsessile rounded-cordate glands at base; rudimentary pistil lacking. Fl. Nov.

- Broad-leaved forests on mountain slopes; ca. 2200 m. NW Yunnan.

**11. *Litsea mollis*** Hemsley, *J. Linn. Soc., Bot.* 26: 383. 1891.

毛叶木姜子 *mao ye mu jiang zi*

*Litsea euosma* W. W. Smith; *L. mollifolia* Chun, nom. illeg. superfl.

Deciduous shrubs or small trees, up to 4 m tall. Young branchlets covered with pubescence. Leaves alternate or clustered at apex of branchlet; petiole 1–1.5 cm, covered with white pubescence; leaf blade oblong or elliptic, 4–12 × 2–4.8 cm, glaucous and with dense white pubescence abaxially, glabrous adaxially, pinninerved, lateral veins 6–9 pairs, base cuneate, apex abruptly acute. Umbels axillary, often 2- or 3-fascicled on short branchlets, male umbel 4–6-flowered, flowering before leaves or with leaves; peduncle ca. 6 mm, white pubescent. Male flowers: perianth segments 6, yellow, broadly obovate; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 yellow peltate-cordate glands at base; rudimentary pistil absent. Fruit globose, ca. 5 mm in diam., blue-black at maturity;

fruiting pedicel 5–6 mm, sparsely pubescent. Fl. Mar–Apr, fr. Sep–Oct.

Thickets or broad-leaved forests on mountain slopes; 600–2800 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, E Xizang, Yunnan [N Thailand].

The fruit is processed for its aromatic oil (3%–5%). The seeds contain ca. 25% oil and are used as a main ingredient in soaps. The roots and fruit are also used medicinally.

**12. *Litsea pungens*** Hemsley, *J. Linn. Soc., Bot.* 26: 384. 1891.

木姜子 *mu jiang zi*

*Litsea kangdingensis* H. S. Kung.

Deciduous small trees, 3–10 m tall. Young branchlets pubescent. Leaves alternate, often clustered at apex of branchlet; petiole 1–2 cm, pubescent when young; leaf blade lanceolate or obovate-lanceolate, 4–15 × 2–5.5 cm, sericeous-pubescent abaxially when young and becoming glabrous or pilose along midrib, pinninerved, lateral veins 5–7 pairs, base cuneate, apex shortly acute. Umbel axillary, 8–12-flowered, flowering before leaves; peduncle 5–8 mm, glabrous. Pedicel 5–6 mm, sericeous-pubescent. Perianth segments 6, yellow, obovate. Male flowers: fertile stamens 9; filaments pubescent at base, of 3rd whorls each with 2 yellow rounded glands at base; rudimentary pistil small, glabrous. Fruit globose, 7–10 mm in diam., blue-black at maturity; fruiting pedicel 1–2.5 cm, slightly thickened at apex. Fl. Mar–May, fr. Jul–Sep.

- Streamsides, weed-tree forests or forest margins on sunny slopes; 800–2300 m. Gansu, N Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, S Shanxi, Sichuan, Xizang, Yunnan, S Zhejiang.

The fruit contains aromatic oil (dry fruit 2%–6%, fresh fruit 3%–4%); its main ingredients are citral (60%–90%) and geraniol (5%–19%). The fruit is used in food and cosmetics and is also widely used as a component of high-grade spices, vitamin A, and ionone. The seeds contain ca. 48% of oil, which may be used in industry and for making soap.

**13. *Litsea sericea*** (Wallich ex Nees) J. D. Hooker, *Fl. Brit. India* 5: 156. 1886.

绢毛木姜子 *juan mao mu jiang zi*

*Tetranthera sericea* Wallich ex Nees in Wallich, *Pl. Asiat. Rar.* 2: 67. 1831; *Lindera esquirolii* H. Léveillé; *L. griffithii* Meisner; *L. hookeri* Meisner; *Litsea oreophila* J. D. Hooker.

Deciduous shrubs or small trees, up to 6 m tall. Young branchlets covered with dense ferruginous or yellow-white sericeous long hairs. Leaves alternate; petiole 1–1.2 cm, densely hairy like young branchlets; leaf blade oblong-lanceolate, 8–12 × 2–4 cm, densely yellow-white or ferruginous long sericeous on both surfaces when young, pinninerved, lateral veins 7 or 8 pairs, base cuneate, apex acuminate. Umbels solitary at apex of 1-year-old branchlets, 8–20-flowered, flowering before leaves or with leaves; peduncle 6–7 mm, glabrous. Pedicel 5–7 mm, pubescent. Perianth segments 6, elliptic, 3-nerved. Male flowers: fertile stamens 9, sometimes 6 or 12; filaments short, glabrous, of 3rd whorls each with 2 yellow glands at base; rudi-

mentary pistil ovoid. Fruit subglobose, ca. 5 mm in diam., apiculate at apex; fruiting pedicel 1.5–2 cm. Fl. Apr–May, fr. Aug–Sep.

Roadsides, thickets, mixed forests of coniferous and broad-leaved trees; 400–3400 m. Guizhou, W Sichuan, SE Xizang, NW Yunnan [India, Nepal].

**14. *Litsea veitchiana*** Gamble in Sargent, Pl. Wilson. 2: 76. 1914.

钝叶木姜子 *dun ye mu jiang zi*

Deciduous shrubs or small trees, up to 4 m tall. Young branchlets yellow-white long sericeous and becoming glabrous. Leaves alternate; petiole 1–1.2 cm, densely hairy like young branchlets and becoming glabrous; leaf blade obovate or obovate-oblong, 4–15 × 2.5–5.5 cm, densely hairy like young branchlets on both surfaces when young, becoming sparsely long sericeous abaxially, glabrous or only midrib hairy adaxially, pinninerved, lateral veins 6–9 pairs, base cuneate or broadly cuneate, apex acute or obtuse. Umbels solitary at apex of 1-year-old branchlets, 10–13-flowered, flowering before leaves or with leaves. Male flowers: pedicel 5–7 mm; perianth segments 6, elliptic or rotund, 3-nerved and glandular; fertile stamens 9; filaments pubescent at base, of 3rd whorls each with 2 large glands at base; rudimentary pistil ovoid. Fruit globose, ca. 5 mm in diam., young fruit glabrous or appressed puberulent, black at maturity; fruiting pedicel 1.5–2 cm, sparsely long hairy. Fl. Apr–May, fr. Aug–Sep.

• Roadsides or thickets on mountain slopes; 400–3800 m. Guizhou, Hubei, Sichuan, NW Yunnan.

- 1a. Young fruit glabrous; leaf blade smaller, mostly less than 10 cm ..... 14a. var. *veitchiana*  
 1b. Young fruit appressed puberulent; leaf blade larger, mostly more than 10 cm ..... 14b. var. *trichocarpa*

**14a. *Litsea veitchiana* var. *veitchiana***

钝叶木姜子(原变种) *dun ye mu jiang zi* (yuan bian zhong)

*Litsea chenii* H. Liu.

Leaf blade smaller, mostly less than 10 cm. Young fruit glabrous.

• Roadsides or thickets on mountain slopes; 400–3800 m. Guizhou, Hubei, Sichuan, NW Yunnan.

**14b. *Litsea veitchiana* var. *trichocarpa*** (Yen C. Yang) H. S. Kung ex Yen C. Yang et al., Acta Phytotax. Sin. 16(4): 48. 1978.

毛果木姜子 *mao guo mu jiang zi*

*Litsea sericea* (Wallich ex Nees) J. D. Hooker var. *trichocarpa* Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 79. 1945.

Leaf blade larger, mostly more than 10 cm. Young fruit appressed puberulent.

• Thickets; 2200–2500 m. Sichuan.

**15. *Litsea glutinosa*** (Loureiro) C. B. Robinson, Philipp. J. Sci., C, 6: 321. 1911.

潺槁木姜子 *chan gao mu jiang zi*

Evergreen or deciduous trees, 3–15 m tall. Young branchlets gray-yellow tomentose. Leaves alternate; petiole 1–2.6 cm, gray-yellow tomentose; leaf blade obovate, obovate-oblong, or elliptic-lanceolate, 3.5–10(–26) × 1.5–11 cm, tomentose on both surfaces when young, tomentose or subglabrous abaxially and only midrib slightly tomentose adaxially when old, pinninerved, lateral veins 5–12 pairs, base cuneate, obtuse, or rotund, apex obtuse or rounded. Umbels solitary or several on short branchlets, few flowered; short branchlets 2–4 cm or more; peduncle 1–1.5 cm. Male flowers: pedicel tomentose; perianth segments imperfect or lacking; fertile stamens often 15 or more; filaments pubescent, of 3rd each with 2 long stipitate glands at base; rudimentary pistil glabrous. Fruit globose, 5–7 mm in diam.; fruiting pedicel 3–6 mm, slightly thickened at apex. Fl. May–Jun, fr. Sep–Oct.

Forest margins, streamsides, sparse forests or thickets; 500–1900 m. Fujian, Guangdong, Guangxi, Hainan, S Yunnan [Bhutan, India, Myanmar, Nepal, Philippines, Thailand, Vietnam].

- 1a. Leaf blade larger, 6.5–26 × 5–11 cm; lateral veins 8–12 pairs; fruit ca. 7 mm in diam., pedicel more than 5 mm ..... 15a. var. *glutinosa*  
 1b. Leaves smaller, 3.5–6.5 × 1.5–3.3 cm; lateral veins 5–8 pairs; fruit ca. 5 mm in diam., pedicel ca. 3 mm ..... 15b. var. *brideliifolia*

**15a. *Litsea glutinosa* var. *glutinosa***

潺槁木姜子(原变种) *chan gao mu jiang zi* (yuan bian zhong)

*Sebifera glutinosa* Loureiro, Fl. Cochinch. 2: 638. 1790; *Litsea sebifera* Persoon.

Leaf blade larger, 6.5–26 × 5–11 cm, lateral veins 8–12 pairs. Fruit ca. 7 mm in diam.; fruiting pedicel 5–6 mm.

Forest margins, streamsides, sparse forests or thickets on mountains; 500–1900 m. Fujian, Guangdong, Guangxi, S Yunnan [Bhutan, India, Nepal, Philippines, Vietnam].

The wood is yellow-brown, slightly hard, and used for making furniture. The bark and wood contain gluten and may be used as binders. The seed core contains ca. 50% of oil, which is used to make soap. The root bark and leaves are used medicinally to reduce fever, reduce swelling, and treat diarrhea; they also may be used for treating furunculosis.

**15b. *Litsea glutinosa* var. *brideliifolia*** (Hayata) Merrill, Lingnaam Agric. Rev. 1: 84. 1923.

白野槁树 *bai ye gao shu*

*Litsea brideliifolia* Hayata, Icon. Pl. Formosan. 5: 166. 1915; *L. glutinosa* var. *brachyphylla* (Handel-Mazzetti) L. C. Wang; *L. sebifera* var. *brachyphylla* Handel-Mazzetti.

Leaf blade smaller, 3.5–6.5 × 1.5–3.3 cm, lateral veins 5–8 pairs. Fruit ca. 5 mm in diam.; fruiting pedicel ca. 3 mm.

Sparse forests or thickets; 500–1400 m. Guangdong, Guangxi, Hainan [Myanmar, Thailand].

**16. *Litsea morrisonensis*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 350. 1911.

玉山木姜子 *yu shan mu jiang zi*

*Actinodaphne morrisonensis* (Hayata) Hayata; *Fiwa morrisonensis* (Hayata) Nakai.

Small trees. Branchlets slender, glabrous. Leaves alternate; petiole ca. 1 cm, glabrous; leaf blade oblanceolate, 9–15 × 2.5–3 cm, shortly hirsute along veins abaxially, glabrous adaxially, pinninerved, lateral veins ca. 12 pairs, prominent abaxially, obscure adaxially, base cuneate or obtuse, apex obtusely acuminate. Umbels axillary, pedunculate; involucre bracts ca. 4, decussate. Pedicel short, densely pubescent. Perianth tube short; perianth segments 3 or 4, oblong, ca. 2.5 cm, villous outside. Male flowers: fertile stamens 9, ca. 4.5 mm, exerted; filaments pubescent, of 3rd whorls each with 2 stipitate glands at base; anthers of 1st and 2nd whorls all introrse and 4-celled, of 3rd whorls upper 2 cells introrse, lower 2 cells lateral; rudimentary pistil lacking. Fruit ellipsoid, seated on shallowly cup-shaped perianth tube. Fl. Jun–Sep.

- Evergreen broad-leaved forests; 1000–2800 m. Taiwan.

This species was treated in FRPS (31: 257. 1982) as *Actinodaphne morrisonensis*. However, its four decussate involucre bracts are characteristic of *Litsea*, and so it should be included in that genus.

**17. *Litsea verticillifolia*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 48. 1978.

琼南木姜子 *qiong nan mu jiang zi*

Evergreen shrubs, ca. 3 m tall. Branchlets densely ferruginous tomentose. Leaves 3–6-verticillate; petiole ca. 5 mm, densely hairy like branchlets; leaf blade obovate-lanceolate, 3.5–6.8 × 0.9–2.8 cm, glabrous except for midrib on both surfaces and glaucous abaxially, pinninerved, lateral veins 9–11 pairs, base cuneate, apex obtuse or obtuse-acute. Umbels lateral, usually 3- or 4-clustered, male umbel 5-flowered; peduncle almost absent; involucre bracts 5, broadly ovate. Pedicel short, densely ferruginous sericeous-pubescent. Perianth segments 6, ovate. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 rounded small glands at base. Fruit not seen.

- Dense forests. S Hainan.

**18. *Litsea verticillata*** Hance, J. Bot. 21: 356. 1883.

轮叶木姜子 *lun ye mu jiang zi*

*Litsea brevipetiolata* Lecomte; *L. multumbellata* Lecomte; *L. multumbellata* f. *annamensis* H. Liu; *L. verticillata* f. *annamensis* (H. Liu) C. K. Allen; *L. verticillata* var. *brevipes* Merrill & F. P. Metcalf; *L. verticillata* var. *brevipetiolata* (Lecomte) C. K. Allen.

Evergreen shrubs or small trees, 2–5 m tall. Young branchlets densely yellow hirsute and becoming glabrous. Leaves 4–6-verticillate; petiole 2–6 mm, densely yellow villous; leaf blade long lanceolate or long elliptic-oblanceolate, 7–25 × 2–6 cm, pubescent abaxially, pinninerved, lateral veins 12–14 pairs, base acute, obtuse, or rotund, apex acuminate. Umbels in cluster of

2–10 at apex of branchlet, 5–8-flowered, pale yellow, subsessile. Perianth segments (4–)6, lanceolate. Male flowers: fertile stamens 9; filaments exerted, villous, of 3rd whorls each with 2 peltate-cordate glands at base; rudimentary pistil lacking. Fruit ovoid or ellipsoid, 10–15 × 5–6 mm, seated on discoid perianth tube; fruiting pedicel short. Fl. Apr–Nov, fr. Nov–Jun of next year.

Valleys, streamsides, thickets, weed-tree forests; below 1300 m. Guangdong, Guangxi, Hainan, S Yunnan [Cambodia, NE Thailand, Vietnam].

This species has a strong capacity for sprouting. The wood is relatively hard and is used for fuel. The roots and leaves are used medicinally for treating rheumatism and relieving menstrual cramping and soreness; the leaves are also applied to fractured bones and snake bites.

**19. *Litsea variabilis*** Hemsley, J. Linn. Soc., Bot. 26: 386. 1891.

黄椿木姜子 *huang chun mu jiang zi*

Evergreen shrubs or trees, up to 15 m tall. Branchlets puberulent, subglabrous, or appressed pubescent. Leaves opposite or subopposite, rarely alternate on same tree; petiole 8–10 mm, hairy like branchlets; leaf blade usually elliptic, oblong, or obovate, 5–14 × 2–4.5 cm, glabrous or subglabrous on both surfaces or densely gray-yellow pubescent abaxially, lateral veins 5 or 6 pairs, base cuneate or broadly cuneate, often red in a dried state, apex acuminate, obtuse, or slightly rounded. Umbels often in cluster of 3–8, axillary, 3-flowered; peduncle short, pubescent. Male flowers: pedicel very short; perianth segments 6, spatulate; fertile stamens 9; filaments pilose, of 3rd whorls each with 2 yellow subsessile rounded small glands at base. Fruit globose, 7–8 mm in diam., seated on discoid perianth tube, black at maturity; fruiting pedicel extremely stout and short. Fl. May–Nov, fr. Sep–May of next year.

Broad-leaved forests, streamsides, dense forests on mountain slopes; 300–1700 m. Guangdong, S and W Guangxi, Hainan, SE Yunnan [Laos, N Thailand, Vietnam].

- 1a. Branchlets, petioles, and leaf blade abaxially puberulent, subglabrous, or glabrous; leaf blade conspicuously reticulate-veined abaxially ..... 19a. var. *variabilis*
- 1b. Branchlets, petioles, and leaf blade abaxially densely gray-yellow appressed pubescent; leaf blade inconspicuously reticulate-veined abaxially ..... 19b. var. *oblonga*

**19a. *Litsea variabilis* var. *variabilis***

黄椿木姜子(原变种) *huang chun mu jiang zi* (*yuan bian zhong*)

*Litsea iteodaphne* (Nees) J. D. Hooker f. *chinensis* C. K. Allen; *L. variabilis* f. *chinensis* (C. K. Allen) Yen C. Yang & P. H. Huang.

Branchlets and petioles puberulent or subglabrous. Leaf blade glabrous or subglabrous on both surfaces, conspicuously reticulate-veined abaxially.

Broad-leaved forests, streamsides; 300–1700 m. Guangdong, S Guangxi, Hainan, SE Yunnan [Laos, Vietnam].

The wood is heavy, slightly hard, not fissile, resistant to water and borer insects, and is used for furniture and construction.

**19b. *Litsea variabilis* var. *oblonga*** Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 90. 1913.

毛黄椿木姜子 *mao huang chun mu jiang zi*

*Litsea variabilis* var. *tonkinensis* Lecomte.

Branchlets and petioles densely gray-yellow appressed pubescent. Leaf blade abaxially densely gray-yellow appressed pubescent, inconspicuously reticulate-veined abaxially.

Dense forests on mountain slopes; 600–900 m. W Guangxi, SE Yunnan [Vietnam].

**20. *Litsea lancifolia*** (Roxburgh ex Nees) Benth & J. D. Hooker ex Fernández-Villar in Blanco, Fl. Filip., ed. 3, 4(Nov. App.): 181. 1880.

剑叶木姜子 *jian ye mu jiang zi*

Evergreen shrubs, ca. 3 m tall. Branchlets ferruginous tomentose or gray-yellow appressed pubescent. Leaves opposite or alternate on same tree; petiole 3–10 mm, hairy like branchlets; leaf blade elliptic, oblong, lanceolate, oblong-lanceolate, or elliptic-lanceolate, 5–10 × 2.4–4.5 cm, yellow-brown or ferruginous tomentose or gray-yellow appressed pubescent abaxially, lateral veins 5–8 pairs, base cuneate or rotund, apex acute or acuminate. Umbel axillary, solitary or clustered, male umbel 3-flowered; peduncle nearly absent or 5–7 mm. Male flowers: pedicel ca. 1 mm; perianth segments 6, lanceolate or oblong; fertile stamens 9, sometimes 6; filaments pubescent, of 3rd whorls each with 2 sessile small rounded glands at base; rudimentary pistil small. Fruit globose or ellipsoid, seated on shallowly discoid perianth tube; fruiting pedicel ca. 3 mm. Fl. May–Jun, fr. Jul–Aug.

Thickets, streamsides, forests; 100–2000 m. SW Guangxi, Hainan, S and SW Yunnan [Bhutan, India, Philippines, Thailand, Vietnam].

- 1a. Branchlets, petioles, and leaf blade abaxially gray-yellow appressed pubescent; petiole more than 5 mm; peduncle 5–7 mm ..... 20c. var. *pedicellata*
- 1b. Branchlets, petioles, and leaf blade abaxially yellow-brown or ferruginous tomentose; petiole ca. 3 mm; peduncle short or nearly absent.
- 2a. Fruit globose, ca. 10 mm in diam.; leaf blade elliptic, oblong, or elliptic-lanceolate ..... 20a. var. *lancifolia*
- 2b. Fruit ellipsoid, ca. 15 × 7 mm; leaf blade lanceolate or oblong-lanceolate ..... 20b. var. *ellipsoidea*

**20a. *Litsea lancifolia* var. *lancifolia***

剑叶木姜子(原变种) *jian ye mu jiang zi (yuan bian zhong)*

*Tetranthera lancifolia* Roxburgh ex Nees in Wallich, Pl. Asiat. Rar. 2: 65. 1831.

Branchlets ferruginous tomentose. Petiole ca. 3 mm,

densely ferruginous tomentose; leaf blade elliptic, oblong, or elliptic-lanceolate, yellow-brown or ferruginous tomentose abaxially. Peduncle nearly absent. Fruit globose, ca. 1 cm in diam.

Streamsides, mixed forests in valleys; below 1000 m. SW Guangxi, Hainan, S Yunnan [Bhutan, India, Philippines, Vietnam].

**20b. *Litsea lancifolia* var. *ellipsoidea*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 49. 1978.

椭圆果木姜子 *tuo yuan guo mu jiang zi*

Branchlets ferruginous tomentose. Petiole ca. 3 mm, densely ferruginous tomentose; leaf blade lanceolate or oblong-lanceolate, ferruginous tomentose abaxially. Fruit ellipsoid, ca. 15 × 7 mm.

- Forests in valleys; 1200–2000 m. SW Yunnan.

**20c. *Litsea lancifolia* var. *pedicellata*** J. D. Hooker, Fl. Brit. India 5: 159. 1886.

有梗木姜子 *you geng mu jiang zi*

Branchlets gray-yellow appressed pubescent. Petiole 5–10 mm, hairy like branchlets; leaf blade oblong or lanceolate, gray-yellow appressed pubescent abaxially. Peduncle 5–7 mm. Fruit globose, ca. 1 cm in diam.

Thickets, streamsides, and mixed forests on mountain slopes; 100–1700 m. S Yunnan [India].

**21. *Litsea rotundifolia*** Hemsley, J. Linn. Soc., Bot. 26: 385. 1891.

圆叶豺皮樟 *yuan ye chai pi zhang*

Evergreen shrubs or small trees, up to 3 m tall. Branchlets glabrous or subglabrous. Leaves scattered; petiole 3–10 mm, pubescent when young and becoming glabrous; leaf blade broadly ovate-rounded, rotund, ovate, or ovate-oblong, glabrous on both surfaces and glaucous abaxially, pinninerved, lateral veins 3 or 4 pairs, base rotund, rounded, obtuse, or cuneate, apex obtuse-rounded, acuminate, or shortly acuminate. Umbels often in cluster of 3, axillary, almost sessile, 3- or 4-flowered. Male flowers subsessile; perianth segments 6, obovate-rounded, unequal in size; filaments pilose, of 3rd whorls each with 2 rounded small glands at base; rudimentary pistil glabrous. Fruit globose, ca. 6 mm in diam., subsessile, gray-blue-black at maturity. Fl. Aug–Sep, fr. Sep–Nov.

Sparse forests, thickets on lower areas of mountains, roadsides on mountains, riversides; below 800 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, Zhejiang [Vietnam].

- 1a. Leaf blade broadly ovate-rounded to rotund, base rotund ..... 21a. var. *rotundifolia*
- 1b. Leaf blade ovate or ovate-oblong, base rounded, cuneate, or obtuse.
- 2a. Leaf blade ovate, base rounded; petiole more than 6 mm ..... 21b. var. *ovatifolia*
- 2b. Leaf blade ovate-oblong, base cuneate or obtuse; petiole less than 5 mm ..... 21c. var. *oblongifolia*

**21a. *Litsea rotundifolia* var. *rotundifolia***

圆叶豺皮樟(原变种) yuan ye chai pi zhang (yuan bian zhong)

*Actinodaphne chinensis* Nees var. *rotundifolia* (Nees) Nees; *A. rotundifolia* (Nees) Merrill; *Iozoste chinensis* Blume var. *rotundifolia* (Nees) Blume; *I. rotundifolia* Nees.

Petiole stout and short, 3–5 mm; leaf blade broadly ovate-rounded to rotund, 2.2–4.5 × 1.5–4 cm, base rotund, apex obtuse-rounded or shortly acuminate, inconspicuously reticulate-veined on both surfaces.

• Sparse forests, thickets on lower areas of mountains; low elevations. Guangdong, Guangxi.

**21b. *Litsea rotundifolia* var. *ovatifolia*** Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 49. 1978.

卵叶豺皮樟 luan ye chai pi zhang

Petiole longer, 6–10 mm; leaf blade ovate, 4–7 × 1.5–2.7 cm, base rounded, apex acuminate or shortly acuminate, conspicuously reticulate-veined on both surfaces.

• Riversides. Guangdong.

**21c. *Litsea rotundifolia* var. *oblongifolia*** (Nees) C. K. Allen, *Ann. Missouri Bot. Gard.* 25: 386. 1938.

豺皮樟 chai pi zhang

*Actinodaphne chinensis* var. *oblongifolia* Nees, *Syst. Laur.* 600. 1836, based on *Litsea chinensis* Blume, *Bijdr.* 565. 1826, not Lamarck (1792); *A. chinensis* Nees, nom. illeg. superfl.; *A. hypoleucophylla* Hayata; *Fiwa hypoleucophylla* (Hayata) Nakai; *Iozoste chinensis* Blume; *I. rotundifolia* var. *oblongifolia* Nees ex Hooker & Arnott; *L. hypoleucophylla* (Hayata) T. S. Liu & J. C. Liao.

Petiole 3–5 mm; leaf blade ovate-oblong, 2.5–5.5 × 1–2.2 cm, base cuneate or obtuse, apex obtuse or shortly acuminate, inconspicuously reticulate-veined on both surfaces.

Sparse forests, thickets on lower areas of mountains, roadsides on mountains; below 800 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, Zhejiang [Vietnam].

The seeds contain ca. 64% oil and may be used in industry. The leaves and fruit are used for their aromatic oil. The roots and leaves are used as medicine.

**22. *Litsea coreana*** H. Léveillé, *Repert. Spec. Nov. Regni Veg.* 10: 370. 1912.

朝鲜木姜子 chao xian mu jiang zi

Evergreen trees, 8–15 m tall, 30–40 cm d.b.h. Bark gray, scaly peeled off, with collated spots exposed. Branchlets glabrous or densely gray-yellow villous. Leaves alternate; petiole 6–22 mm, glabrous or hairy; leaf blade obovate-elliptic, obovate-lanceolate, oblong, or lanceolate, 4.5–9.5 × 1.4–4 cm, glabrous or villous on both surfaces, lateral veins 7–10 pairs, base cuneate, apex obtuse-acuminate or acute. Umbels axillary, 3- or 4-flowered; peduncle very short or absent. Male flowers: pedicel stout and short, densely villous; perianth segments 6, ovate or elliptic; fertile stamens 9; filaments villous, of 3rd whorls each with 2 stipitate sagittate glands at base; rudimentary pistil

lacking. Fruit subglobose, 7–8 mm in diam., seated on flat perianth tube; perianth segments persistent; fruiting pedicel ca. 5 mm. Fl. Aug–Sep, fr. summer of next year.

Evergreen broad-leaved forests, weed-tree forests; 300–2300 m. Anhui, Fujian, N Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Korea, Japan].

One of the four syntypes of *Litsea coreana*, *Taquet 1356* (E), belongs to *Machilus thunbergii* according to Lauener (*Notes Roy. Bot. Gard. Edinburgh* 40: 353. 1982).

- 1a. Branchlets, leaf blade abaxially, and petioles densely gray-yellow villous ..... 22c. var. *lamuginosa*
- 1b. Branchlets glabrous; leaf blade glabrous abaxially or on both surfaces; petiole glabrous or pubescent adaxially and glabrous abaxially.
  - 2a. Leaf blade obovate-elliptic or obovate-lanceolate, apex obtuse-acuminate; petiole glabrous ..... 22a. var. *coreana*
  - 2b. Leaf blade oblong or lanceolate, apex acute; petiole pubescent adaxially and glabrous abaxially .... 22b. var. *sinensis*

**22a. *Litsea coreana* var. *coreana***

朝鲜木姜子(原变种) chao xian mu jiang zi (yuan bian zhong)

*Actinodaphne lancifolia* (Siebold & Zuccarini) Meisner; *Daphnidium lancifolium* Siebold & Zuccarini; *Iozoste lancifolia* (Siebold & Zuccarini) Blume; *Litsea orientalis* C. E. Chang; *L. zuccarinii* Kostermans.

Branchlets glabrous. Petiole 6–16 mm, glabrous; leaf blade obovate-elliptic or obovate-lanceolate, glabrous on both surfaces and glaucous abaxially, apex obtuse-acuminate.

Evergreen broad-leaved forests. C Taiwan [Korea, Japan].

This species was long known as *Actinodaphne lancifolia*. However, the species is characterized by scattered leaves, sessile umbels, and persistent bracts, and so does not belong in *Actinodaphne*.

The wood is used for construction, tools, musical instruments, etc.

**22b. *Litsea coreana* var. *sinensis*** (C. K. Allen) Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 49. 1978.

豹皮樟 bao pi zhang

*Actinodaphne lancifolia* var. *sinensis* C. K. Allen, *Ann. Missouri Bot. Gard.* 25: 406. 1938; *Iozoste hirtipes* Migo.

Branchlets glabrous. Petiole 6–16 mm, glabrous abaxially, pubescent adaxially; leaf blade oblong or lanceolate, glabrous abaxially, along midrib pubescent at base adaxially when young, apex acute.

• Weed-tree forests on mountains; below 900 m. Anhui, Fujian, Henan, Hubei, Jiangsu, Jiangxi, Zhejiang.

This variety has often been confused with *Litsea rotundifolia* var. *oblongifolia* by some authors, but it differs in having scaly fissured bark, a stout and flat fruiting pedicel, black mature fruit, and persistent perianth segments.

The roots are used medicinally for curing stomach pain.

**22c. *Litsea coreana* var. *lanuginosa*** (Migo) Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 50. 1978.

毛豹皮樟 mao bao pi zhang

*Iozoste hirtipes* var. *lanuginosa* Migo, Bull. Shanghai Sci. Inst. 14: 300. 1944.

Branchlets densely gray-yellow villous. Petiole 10–22 mm, gray-yellow villous; young leaf blade gray-yellow villous on both surfaces, more densely so abaxially.

• Weed-tree forests in valleys; 300–2300 m. Anhui, Fujian, N Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang.

**23. *Litsea hupehana*** Hemsley, J. Linn. Soc., Bot. 26: 382. 1891.

湖北木姜子 hu bei mu jiang zi

Evergreen trees or small trees, up to 10 m tall, ca. 20 cm d.b.h. Young branchlets gray pubescent and becoming glabrous. Leaves alternate; petiole 10–18 mm; leaf blade narrowly lanceolate or lanceolate to elliptic, 10–13 × 2–3.5 cm, glaucous and along midrib gray-white villous abaxially, midrib near base pubescent adaxially, pinninerved, lateral veins 10–19 pairs, prominent on both surfaces, base rotund or cuneate, apex acuminate or acute. Umbels solitary or in cluster of 2, axillary, male umbel 4- or 5-flowered; peduncle ca. 2 mm, sericeous-pubescent. Pedicel 3–4 mm, gray sericeous-pubescent. Perianth segments 6, ovate. Male flowers: fertile stamens 9; filaments gray villous, of 3rd whorls each with 2 sessile peltate glands at base. Fruit subglobose, 7–8 mm in diam., seated on flat perianth tube; perianth segments persistent, straight and regular; fruiting pedicel 3–4 mm, stout. Fl. Aug–Sep, fr. May–Jun.

• Broad-leaved forests on mountain slopes; 800–1400 m. W Hubei, E Sichuan.

**24. *Litsea honghoensis*** H. Liu, Bull. Soc. Bot. France 80: 567. 1933.

红河木姜子 hong he mu jiang zi

*Litsea wenshanensis* Hu.

Evergreen trees up to 10 m tall, ca. 30 cm d.b.h. Branchlets glabrous. Leaves alternate or clustered at apex of branchlet; petiole 1–1.5 cm, glabrous; leaf blade long elliptic to obovate-lanceolate, 10–19 × 2–6 cm, glaucous and glabrous or along veins hairy abaxially, glabrous adaxially, pinninerved, lateral veins 7–10 pairs, base cuneate, apex acuminate to acute. Umbels solitary or clustered, axillary, male umbel 3–5-flowered; peduncle 8–12 mm, glabrous. Pedicel ca. 2 mm, pubescent. Perianth segments 6, rounded. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 sessile large long ellipsoid glands at base; rudimentary pistil glabrous. Fruit globose, 2–3 cm in diam.; fruiting pedicel ca. 3 mm, slightly stout, somewhat thickened at apex; perianth segments persistent; infructescence peduncles ± hairy. Fl. Feb–Mar, fr. Aug–Sep.

• Forests in valleys; 1300–2200 m. S and SE Yunnan.

**25. *Litsea cangyuanensis*** J. Li & H. W. Li, Acta Bot. Yunnan. 28: 104. 2006.

沧源木姜子 cang yuan mu jiang zi

Trees, up to 28 m tall, 30–50 cm d.b.h. Branchlets yellow-brown when dry, slender, 2–3 mm in diam., glabrous. Leaves alternate; petiole 1–1.5 cm, concave-convex, glabrous; leaf blade abaxially glaucous-green, adaxially yellow-green, oblong, 11.5–18 × 4.5–7.5 cm, glabrous and conspicuously foveolate on both surfaces, pinninerved, midrib elevated on both surfaces, lateral veins 7–10 pairs, obliquely patent, anastomosing near margin, base broadly cuneate to subrotund, apex mucronate. Pseudoumbels 1 or 2, inserted on axillary short shoot 1–3 cm with a vegetable-terminal bud, ca. 5-flowered, flowers subsessile when in bud; peduncles 1.5–3 mm, glabrous; involucre bracts 4, orbicular. Fruits ovoid, 2.5–3 cm in diam., ca. 3.5 cm; fruiting pedicel 7–10 mm in fruit, glabrous, verrucose, shallowly cup-shaped at apex; cupules undulate-lobed on margin; infructescence peduncles ca. 1 cm, glabrous, verrucose. Fl. Oct, fr. Jun of next year.

• Dense forests in humid valleys, evergreen broad-leaved forests; 1000–1300 m. SW Yunnan (Cangyuan).

**26. *Litsea foveola*** Kostermans, Reinwardtia 10: 466. 1988.

蜂窝木姜子 feng wo mu jiang zi

*Litsea foveolata* Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 50. 1978, not (Merrill) Kostermans (1970).

Evergreen shrubs or small trees, 3–5 m tall. Young branchlets gray-yellow villous. Leaves alternate or clustered at apex of branchlet; petiole 4–7(–20) mm, densely gray-yellow villous; leaf blade elliptic or oblong, 5–22 × 2.2–7 cm, along veins pubescent abaxially, conspicuously foveolate adaxially, pinninerved, lateral veins 10–16 pairs, base cuneate, apex abruptly acute or shortly acuminate. Umbels axillary, often 2-clustered at apex of branchlet, 4- or 5-flowered; peduncle 2–3 mm, pubescent. Male flowers: pedicel ca. 1 mm, gray pubescent; perianth segments 6, ovate or obovate; fertile stamens 9–12; filaments exerted, gray-yellow villous, of 3rd whorls each with 2 shortly stipitate peltate or obconic glands at base; rudimentary pistil small, ca. 1.5 mm. Fruit globose, ca. 10 mm in diam.; perianth segments persistent; fruiting pedicel very short, 1–2 mm, thickened at apex. Fl. Jul, fr. Dec.

• Sparse or dense forests on calcareous mountain slopes; 300–700 m. SW Guangxi.

**27. *Litsea coelestis*** H. P. Tsui, Acta Bot. Yunnan. 16: 34. 1994.

蓝叶木姜子 lan ye mu jiang zi

Evergreen trees, ca. 10 m tall. Branchlets brown tomentose when young, gradually becoming sparsely so. Leaves alternate; petiole 1–2 cm, with dense black-brown pubescence; leaf blade blue-green abaxially, long elliptic, long ovate, or obovate-lanceolate, 12–25 × 4–9 cm, brown pubescent abaxially, more densely so along veins, sparsely brown pubescent adaxially, pinninerved, lateral veins 7–13 pairs, base cuneate or rotund, apex acuminate. Umbels few on axillary short branchlets, with dense brown pubescence, male umbel 4- or 5-flowered, female 12-flowered. Male flowers: perianth segments 6; stamens 9; filaments pilose, of 3rd whorls each with 2 stipitate glands at base. Female flowers: staminodes 9; ovary ellipsoid, glabrous.

Fruit globose, ca. 7 mm in diam., black at maturity, seated on discoid perianth tube; fruiting pedicel 6–9 mm, with sparse brown pubescence.

- Evergreen broad-leaved forests; 800–2100 m. SE Xizang.

**28. *Litsea umbellata*** (Loureiro) Merrill, Philipp. J. Sci. 14: 242. 1919.

伞花木姜子 *san hua mu jiang zi*

*Hexanthus umbellatus* Loureiro, Fl. Cochinch. 1: 196. 1790; *Litsea amara* Blume; *L. hexantha* Jussieu; *Tetranthera amara* (Blume) Nees.

Evergreen shrubs or small trees, 3–9 m tall, ca. 20 cm d.b.h. Branchlets ferruginous tomentose. Leaves alternate; petiole 6–8 mm, ferruginous tomentose; leaf blade elliptic or oblong-ovate, 6–12 × 3–4.2 cm, ferruginous tomentose abaxially, glabrous adaxially, pinninerved, lateral veins 8–15 pairs, vertically spreading, base obtuse, apex acuminate. Umbels often in cluster of 3–6 at short branchlets, 4-flowered; short branchlets 2–3 mm, stout, ferruginous tomentose; peduncle 2–3 mm, ferruginous tomentose. Male flowers: pedicel 1–1.5 mm, ferruginous villous; perianth segments 6, lanceolate or ovate, unequal in size; fertile stamens 9; filaments villous, of 3rd whorls each with 2 sessile reniform glands at base; rudimentary pistil lacking. Fruit globose, ca. 6 mm in diam., apiculate at apex, seated on shallowly discoid perianth tube; perianth segments often persistent; fruiting pedicel ca. 3 mm, thickened at apex, ferruginous tomentose. Fl. Apr–May, fr. Aug–Sep.

Thickets or sparse forests in valleys or on hills; 300–1000 m. SW Guangxi, S Yunnan [Cambodia, Indonesia, Laos, Malaysia, Thailand, Vietnam].

**29. *Litsea balansae*** Lecomte, Fl. Indo-Chine 5: 135. 1914.

假辣子 *jia la zi*

Evergreen shrubs or small trees, 2–7 m tall, ca. 10 cm d.b.h. Young branchlets yellow-brown pubescent and becoming glabrous. Leaves alternate; petiole 3–6 mm, hairy like young branchlets; leaf blade lanceolate or oblong, 4–11 × 1.5–3.5 cm, yellow-brown pubescent abaxially, more densely so along veins, glabrous adaxially, pinninerved, lateral veins 6 or 7 pairs, transverse veinlets conspicuous, base cuneate, apex acuminate. Umbels solitary or in cluster of 3 or 4, male umbel 3-flowered; peduncle 2–4 mm, pubescent or subglabrous. Male flowers: pedicel 1–2 mm, pilose; perianth segments 6, sometimes 4 or 5, ovate; fertile stamens 9; filaments villous, of 3rd whorls each with 2 subsessile small glands at base. Fruit long ellipsoid, ca. 8 × 3 mm, apiculate at apex; fruiting pedicel ca. 2 mm, thickened at apex. Fl. Apr–May, fr. Jun–Jul.

Mixed forests; 200–1200 m. S Yunnan [Vietnam].

**30. *Litsea biflora*** H. P. Tsui, Acta Bot. Yunnan. 16: 32. 1994.

少花木姜子 *shao hua mu jiang zi*

Evergreen trees, ca. 8 m tall, glabrous. Leaves alternate; petiole 0.8–1.4 cm; leaf blade long elliptic or long ovate, 9–16.5 × 3–6.5 cm, glaucous abaxially, pinninerved, lateral veins 6–9 pairs, conspicuously reticulate-veined on both surfaces, base

broadly cuneate or rounded, apex acuminate. Umbels axillary, 2- or 3-flowered; peduncle slender, 1–1.5 cm. Male flowers: pedicel ca. 2 mm; perianth segments 6, subequal, long ovate; stamens 12, of 1st and 2nd whorls each with 2 stipitate glands, of 3rd and 4th whorls each with 1 stipitate gland; anthers 4-celled, all introrse; rudimentary pistil ca. 3 mm. Female flowers: ovary long ellipsoid; stigma 3-lobed. Young fruit long ellipsoid, ca. 9 × 5 mm; perianth tube ca. 5 mm in diam.; fruiting pedicel ca. 1.5 cm.

- Evergreen broad-leaved forests; 1900–2300 m. SE Xizang.

**31. *Litsea beilschmiediiifolia*** H. W. Li, Acta Phytotax. Sin. 16(4): 50. 1978.

琼楠叶木姜子 *qiong nan ye mu jiang zi*

Evergreen trees, 15–25 m tall, ca. 20 cm d.b.h. Young branchlets yellow-brown sericeous-pubescent. Leaves alternate; petiole ca. 2 cm, gray-yellow puberulent when young and becoming glabrous; leaf blade elliptic, 10.5–14 × 3.5–5 cm, glabrous, conspicuously foveolate on both surfaces and glaucous abaxially, pinninerved, lateral veins 6–8 pairs, prominent on both surfaces, base falcate-curved, apex long caudate-acute. Umbels 2–4-clustered on short branch, 5- or 6-flowered; short branch ca. 5 mm; peduncle 6–10 mm, puberulent. Male flowers: perianth segments 6, ovate-rounded; fertile stamens 9; filaments gray-yellow pubescent, of 3rd whorls each with 2 sessile rounded glands at base; rudimentary pistil lacking. Fruit globose, ca. 1.5 cm in diam., black at maturity; fruiting pedicel ca. 1 cm, gray-yellow puberulent when young and becoming glabrous, gradually thickened toward apex. Fl. Apr–May, fr. Sep–Oct.

- Moist areas of sparse forests on mountains; 1700–1900 m. SE Yunnan.

**32. *Litsea salicifolia*** (Roxburgh ex Nees) J. D. Hooker, Fl. Brit. India 5: 167. 1886.

黑木姜子 *hei mu jiang zi*

*Tetranthera salicifolia* Roxburgh ex Nees in Wallich, Pl. Asiatic. Rar. 2: 66. 1831; *Litsea atrata* S. K. Lee; *L. polyantha* Jussieu f. *glabra* H. Liu; *Litsea salicifolia* f. *glabra* (H. Liu) C. K. Allen.

Evergreen trees, up to 10 m tall. Branchlets glabrous. Leaves alternate; petiole 1–1.5 cm, glabrous; leaf blade long elliptic, 9–19 × 3–5.5 cm, glaucous and yellow-brown puberulent when young abaxially, glabrous adaxially, pinninerved, lateral veins 10–15 pairs, base acute, apex acuminate or acute. Umbels axillary, in cluster of 2–6; peduncle 3–7 mm, glabrous or subglabrous; male umbel 4–6-flowered. Male flowers: pedicel ca. 1 mm, pubescent; perianth segments 6, ovate or lanceolate; fertile stamens 9; filaments villous at base, of 3rd whorls each with 2 stipitate globose glands at base; rudimentary pistil lacking. Fruit oblong, 10–11 × 5–6 mm; fruiting pedicel 4–7 mm, glabrous. Fl. Apr–May, fr. Jun–Sep.

Sparse forests in valleys; 300–1200 m. Guangdong, Guangxi, SW Guizhou, Hainan, S Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Vietnam].

**33. *Litsea monopetala*** (Roxburgh) Persoon, Syn. Pl. 2: 4. 1807.

假柿木姜子 *jia shi mu jiang zi*

*Tetranthera monopetala* Roxburgh, Pl. Coromandel 2: 26. 1798; *Litsea polyantha* Jussieu.

Evergreen trees up to 18 m tall, ca. 15 cm d.b.h. Branchlets densely ferruginous pubescent. Leaves alternate; petiole 1–3 cm, densely hairy like branchlets; leaf blade broadly ovate or obovate to ovate-oblong, 8–20 × 4–12 cm, densely ferruginous pubescent abaxially, along midrib ferruginous pubescent adaxially when young, pinninerved, lateral veins 8–12 pairs, base rounded or acute, apex obtuse or rounded, rarely acute. Umbels clustered on shortest branchlets, 4–6-flowered or more; peduncle 4–6 mm. Male flowers: pedicel 6–7 mm, ferruginous pubescent; perianth segments 5 or 6, yellow-white, lanceolate; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 stipitate glands at base. Fruit long ovoid, ca. 7 × 5 mm, seated on shallowly discoid perianth tube; fruiting pedicel ca. 1 cm. Fl. Nov–May or Jun of next year, fr. Jun–Jul.

Thickets or sparse forests on sunny slopes; below 1500 m, but mostly found on hills at low elevations. Guangdong, Guangxi, SW Guizhou, Hainan, S Yunnan [Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

The wood is used for furniture. The seed core contains ca. 30% oil and is used for industrial oil. The leaves are used as a topical medicine for the treatment of arthritis.

**34. *Litsea albescens*** (J. D. Hooker) D. G. Long, Notes Roy. Bot. Gard. Edinburgh 41: 508. 1984.

白叶木姜子 *bai ye mu jiang zi*

*Litsea oblonga* (Nees) J. D. Hooker var. *albescens* J. D. Hooker, Fl. Brit. India 5: 169. 1886.

Evergreen shrubs or small trees, up to 6 m tall. Branchlets brown when dry, almost smooth, gray appressed pubescent. Leaves alternate; petiole 4–6 mm; leaf blade elliptic-lanceolate, 10–17 × 2.5–4.5 cm, abaxially glaucous and glabrous or pubescent along veins, adaxially brownish green and glabrous, lateral veins 7–9 pairs, somewhat or conspicuously impressed adaxially but elevated abaxially, base cuneate, apex acuminate. Umbels axillary, ca. 3 mm in diam., 3–6-flowered when in bud, racemously arranged in an axillary short shoot of 8–12 mm; peduncle 2–8 mm, slender, pubescent. Flowers unknown. Fruit oblong-ellipsoid, 17–23 × 9–10 mm, on shallow entire perianth cup 6–7 mm across; fruiting pedicel thick, 4–7 mm. Fr. Nov–Dec.

Evergreen broad-leaved forests; 1500–2000 m. SE Xizang [Bhutan, India (Darjeeling, Sikkim)].

**35. *Litsea dilleniifolia*** P. Y. Pai & P. H. Huang, Acta Phytotax. Sin. 16(4): 51. 1978.

五椴果叶木姜子 *wu ya guo ye mu jiang zi*

Evergreen trees, 20–26 m tall, 28–30 cm d.b.h. Branchlets stout, glabrous, conspicuously angulate with elliptic lenticels; leaf scars rotund, large, 4–5 mm in diam. Leaves alternate; petiole 2.5–5 cm, stout, glabrous; leaf blade oblong or obovate-ob-

long, 21–60 × 11–14.5 cm, glabrous on both surfaces and glaucous abaxially, pinninerved, lateral veins 15–22 pairs, midrib stout, transverse veinlets conspicuous on both surfaces, base cuneate or oblique, apex shortly acuminate or rotund. Umbels 6–8 in racemes on short branchlets, 5-flowered; short branchlets ca. 4 mm in diam., densely ferruginous pubescent. Male flowers: pedicel 3–4 mm, densely ferruginous pubescent; perianth segments 8, long ovate; fertile stamens 16 or 17; filaments below middle yellow pubescent, of 3rd whorls each with 2 shortly stipitate rounded-cordate glands at base; rudimentary pistil ovoid, glabrous. Fruit compressed globose, ca. 1.5 × 2–2.3 cm, purple-red at maturity, seated on cup-shaped perianth tube; fruiting pedicel ca. 4 mm, stout, pilose. Fl. Apr–May, fr. Jul.

• Moist areas of riverbanks in rain forests; ca. 500 m. S Yunnan.

**36. *Litsea liuyingii*** H. Liu, Bull. Soc. Bot. France 80: 566. 1933 [*“liyuyingi”*].

圆锥木姜子 *yuan zhui mu jiang zi*

Evergreen trees. Branchlets glabrous. Leaves alternate; petiole 1.5–2 cm, furrowed, glabrous; leaf blade elliptic or lanceolate, 10–20 × 3–8 cm, glabrous on both surfaces and glaucous abaxially, pinninerved, lateral veins 10–12 pairs, transverse veinlets conspicuous, base cuneate, apex acute or obtuse. Umbels in panicles on short branchlets, male umbel 3-flowered; short branchlets 3–4 cm, pubescent. Male flowers: pedicel ca. 3 mm, pubescent; perianth segments 6, ovate, 5-nerved; fertile stamens 26–32; filaments stout and short, pubescent, of outside 6- or 8-glandular, of inside each with 2 sessile subglobose glands at middle; rudimentary pistil lacking. Female flower and fruit unknown. Fl. Oct.

• Evergreen broad-leaved forests. S Yunnan.

After checking the type specimen (*Henry 12839*, A [HUH-00041720]), the present authors confirm that the perianth segments are 6, not 8 as described in FRPS (31: 304. 1982).

**37. *Litsea szemaonis*** (H. Liu) J. Li & H. W. Li, Acta Bot. Yunnan. 28: 105. 2006.

思茅木姜子 *si mao mu jiang zi*

*Litsea pierrei* Lecomte var. *szemaonis* H. Liu, Laurac. Chine & Indochine, 174. 1932 [*“szemois”*]; *L. baviensis* Lecomte var. *szemaonis* (H. Liu) C. K. Allen.

Evergreen trees, 6–25 m tall, 17–30 cm d.b.h. Branchlets glabrous. Leaves alternate; petiole 2–3 cm, glabrous; leaf blade elliptic or oblong-elliptic, rarely ovate-oblong, 10–21 × 3–5 cm, glabrous on both surfaces, lateral veins 7–9 pairs, base and apex attenuate. Umbels 3–5 in racemes on short branchlets, 4- or 5-flowered; short branchlets 2–3 cm; peduncle 3–4 mm, pubescent. Male flowers: pedicel pubescent; perianth segments 6, lanceolate or oblanceolate to oblong; fertile stamens 9; filaments long exserted, yellow-brown pubescent, of 3rd whorls each with 2 shortly stipitate rounded glands at base; rudimentary pistil yellow-brown pubescent. Fruit globose or compressed globose, ca. 1.5 cm in diam., seated on cup-shaped perianth tube; tube thin, truncate at apex; fruiting pedicel ca. 1 cm, stout, glabrous. Fl. Jun–Jul, fr. Oct–Nov.

• Broad-leaved forests; 800–1500 m. S Yunnan.

**38. *Litsea panamanja*** (Buchanan-Hamilton ex Nees) J. D. Hooker, Fl. Brit. India 5: 175. 1886.

香花木姜子 *xiang hua mu jiang zi*

*Tetranthera panamanja* Buchanan-Hamilton ex Nees in Wallich, Pl. Asiat. Rar. 2: 67. 1831.

Evergreen trees, ca. 20 m tall, ca. 60 cm d.b.h. Branchlets pubescent and becoming glabrous. Leaves alternate; petiole ca. 2 cm, glabrous; leaf blade oblong or lanceolate, 10–18 × 3–7 cm, glabrous on both surfaces, pinninerved, lateral veins 7–11 pairs, base cuneate, apex acuminate or shortly acute. Umbels in racemes on short branchlets, pubescent, 5-flowered. Male flowers: pedicel ca. 1.5 mm, pubescent; perianth segments 6, oblong or ovate; fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 shortly stipitate glands at base; rudimentary pistil glabrous. Fruit compressed globose, ca. 6 × 10 mm, seated on cup-shaped perianth tube; fruiting pedicel ca. 8 mm, thickened at apex. Fl. Aug–Sep, fr. Mar of next year.

Evergreen broad-leaved forests; 500–2000 m. SE Guangxi, S Yunnan [Bhutan, India, Nepal, N Vietnam].

**39. *Litsea semecarpifolia*** (Wallich ex Nees) J. D. Hooker, Fl. Brit. India 5: 165. 1886.

玉兰叶木姜子 *yu lan ye mu jiang zi*

*Tetranthera semecarpifolia* Wallich ex Nees in Wallich, Pl. Asiat. Rar. 3: 31. 1832; *Litsea magnoliifolia* Yen C. Yang & P. H. Huang.

Evergreen trees, 12–20 m tall, 20–79 cm d.b.h. Branchlets stout, angulate, densely ferruginous-brown pubescent when young. Leaves alternate; petiole 2–4.5 cm, densely hairy like young branchlets; leaf blade elliptic or obovate-elliptic to obovate, 11–20 × 5–10 cm, densely brown puberulent abaxially when young, along midrib ferruginous pubescent adaxially when young, pinninerved, lateral veins 9–12 pairs, base cuneate or rotund, apex rounded-obtuse or shortly acute. Umbels 8–12 in racemes on short branchlets, 6-flowered; short branchlets 3–6 cm, densely ferruginous pubescent; peduncle 2.5–5 mm. Male flowers: pedicel ca. 2 mm; perianth segments 8, lanceolate or oblanceolate; fertile stamens 12–14, exserted; filaments pubescent, of 3rd and 4th whorls each with 2 subsessile obovoid glands at base; rudimentary pistil ca. 2.5 mm. Fruit compressed globose, ca. 1.2 × 1.6 cm, apiculate, black at maturity, seated on discoid perianth tube; fruiting pedicel 1–1.8 cm, pubescent. Fl. Nov, fr. Sep–Oct of next year.

Evergreen broad-leaved forests, high grasslands; 600–1400 m. S and SW Yunnan [E Bangladesh, Myanmar, N Thailand].

**40. *Litsea martabanica*** (Kurz) J. D. Hooker, Fl. Brit. India 5: 164. 1886.

滇南木姜子 *dian nan mu jiang zi*

*Tetranthera martabanica* Kurz, Forest Fl. Burma 2: 301. 1877, based on *T. calophylla* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 192. 1873, not Miquel (1852); *Litsea garrettii* Gamble.

Evergreen trees, 4–12 m tall. Young branchlets pale yellow

pubescent. Leaves alternate; petiole 1–2 cm, ferruginous tomentose; leaf blade long elliptic, 8–16 × 3.6–6 cm, ferruginous tomentose and becoming subglabrous abaxially, glabrous adaxially, pinninerved, lateral veins 6–8 pairs, reticulate-veined abaxially, base cuneate, apex long acuminate or slightly falcate-acuminate. Umbels 4–8 in racemes on short branchlets, 5-flowered; short branchlets 1.5–4 cm; peduncle 8–10 mm, pubescent. Male flowers: pedicel 6–8 mm; perianth segments 6, yellow, oblong; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 small stipitate reniform glands at base; rudimentary pistil glabrous. Fruit oblong, 10–15 × 5–6 mm, black at maturity, seated on cup-shaped perianth tube; fruiting pedicel 6–8 mm, slightly thickened at apex. Fl. Oct–Nov, fr. Jun–Jul of next year.

Thickets, broad-leaved forests; 500–2500 m. S and SW Yunnan [Myanmar, Thailand].

**41. *Litsea tibetana*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 52. 1978.

西藏木姜子 *xi zang mu jiang zi*

Evergreen shrubs. One-year-old branchlets densely brown pubescent. Leaves alternate; petiole ca. 1 cm, brown pubescent; leaf blade oblong or elliptic-lanceolate, 6–12 × 2.5–4 cm, brown pubescent abaxially, glabrous adaxially, pinninerved, lateral veins 8–12 pairs, transverse veinlets conspicuous abaxially, base broadly cuneate, apex acuminate. Flowers unknown. Fruit oblong, 12–15 × 6–8 mm, seated on shallowly discoid perianth tube; fruiting pedicel ca. 1 cm, slightly thickened at apex. Fr. Aug–Sep.

• Thickets on mountain slopes; ca. 1300 m. SE Xizang.

**42. *Litsea longistaminata*** (H. Liu) Kostermans, Bull. Bot. Surv. India 10: 286. 1968.

长蕊木姜子 *chang rui mu jiang zi*

*Litsea garrettii* Gamble var. *longistaminata* H. Liu, Laurac. Chine & Indochine, 196. 1934; *L. longistaminata* var. *pubescens* H. P. Tsui.

Evergreen trees, up to 10 m tall, ca. 20 cm d.b.h. Branchlets yellow-brown or ferruginous tomentose. Leaves alternate; petiole 1–2 cm, densely ferruginous tomentose; leaf blade obovate to obovate-oblong, 15–25 × 4.6–11.5 cm, pubescent and becoming glabrous abaxially, glabrous adaxially, pinninerved, lateral veins 7–9 pairs, base cuneate or obtuse, apex rounded and with abrupt acumen or acuminate. Umbels 4–6 in racemes on short branchlets, 5- or 6-flowered; peduncle ca. 1 cm, ferruginous. Male flowers: pedicel 2.5–3 mm; perianth segments 6, oblong or ovate-rounded; fertile stamens 9, ca. 7 mm, exserted; filaments pubescent, of 3rd whorls each with 2 stipitate small glands at base; rudimentary pistil small, glabrous. Fruit oblong, ca. 17 × 8 mm, apiculate at apex, seated on discoid perianth tube; fruiting pedicel 3–4 mm, pubescent. Fl. Dec–Jan, fr. Jun–Jul.

Open mountain slopes, valleys, thickets, mixed forests; 800–2000 m. SE Xizang, S Yunnan [Vietnam].

*Litsea dunniana* H. Léveillé (Repert. Spec. Nov. Regni Veg. 9: 460. 1911) was described from Guizhou and characterized by its sessile

inflorescence, long-exserted stamens, and large oblong-lanceolate pinninerved leaves, covered abaxially with long slightly villous hairs. Allen (Ann. Missouri Bot. Gard. 25: 388, 391. 1938) considered Léveillé's taxon to be similar to *L. garrettii* var. *longistaminata*, but the present authors could not ascertain its status because they have seen no material.

**43. *Litsea pedunculata*** (Diels) Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 52. 1978.

红皮木姜子 hong pi mu jiang zi

Evergreen shrubs or small trees, up to 6 m tall. Young branchlets glabrous or densely pubescent. Leaves alternate; petiole 5–10 mm, glabrous or densely pubescent; leaf blade oblong-lanceolate to elliptic, 3.5–7 × 1.5–3 cm, glabrous on both surfaces or sparsely pubescent and along veins villous abaxially and along veins gray-yellow pubescent adaxially, abaxially glaucous, lateral veins 8–12 pairs, base cuneate, obtuse, or rounded, apex acute, acuminate, or caudate-acuminate. Umbels axillary, solitary, 3–5-flowered; peduncle 2–7 mm. Male flowers: pedicel short; perianth segments 6, sometimes 3 or 4, broadly ovate or rotund; fertile stamens 9, sometimes 7 or 12; filaments pubescent, of 3rd whorls each with 2 sessile cordate glands at base; rudimentary pistil ovoid, glabrous. Fruit oblong 6–7 × 4–4.5 mm, seated on discoid perianth tube; fruiting pedicel ca. 2 mm, glabrous or densely pubescent. Fl. May, fr. Jul–Aug.

• Mixed forests on moist mountain slopes or mountaintops; 1300–2300 m. Guangxi, Guizhou, Hubei, Hunan, S Jiangxi, Sichuan, Yunnan.

This species is extremely variable and unstable in the number of stamens and perianth segments.

- 1a. Branchlets, petioles, fruiting pedicels, and peduncles glabrous; leaf blade acute or acuminate at apex, glabrous on both surfaces ..... 43a. var. *pedunculata*  
 1b. Branchlets, petioles, fruiting pedicels, and peduncles densely gray-yellow pubescent; leaf blade caudate-acuminate at apex, along veins gray-yellow pubescent adaxially, sparsely pubescent and along veins villous abaxially ..... 43b. var. *pubescens*

**43a. *Litsea pedunculata* var. *pedunculata***

红皮木姜子(原变种) hong pi mu jiang zi (yuan bian zhong)

*Lindera pedunculata* Diels, Bot. Jahrb. Syst. 29: 350. 1901; *Benzoin pedunculatum* (Diels) Rehder; *Litsea merrilliana* C. K. Allen; *Pseudolitsea tsaii* Yen C. Yang.

Evergreen shrubs or small trees. Branchlets glabrous or subglabrous. Petiole glabrous; leaf blade glabrous on both surfaces, apex acute or acuminate. Fruiting peduncle 5–7 mm, glabrous; fruiting pedicel glabrous.

• Mixed forests on moist mountain slopes or mountaintops; 1300–2300 m. Guangxi, Guizhou, Hubei, Hunan, S Jiangxi, Sichuan, SE Yunnan.

**43b. *Litsea pedunculata* var. *pubescens*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 53. 1978.

毛红皮木姜子 mao hong pi mu jiang zi

Evergreen shrubs. Branchlets, petioles, fruiting pedicels, and peduncles densely gray-yellow pubescent. Leaf blade sparsely pubescent and along veins villous abaxially, along veins gray-yellow pubescent adaxially, apex caudate-acuminate. Fruiting peduncle ca. 2 mm.

• Yunnan.

**44. *Litsea pittosporifolia*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 53. 1978.

海桐叶木姜子 hai tong ye mu jiang zi

Evergreen shrubs, 1.5–3 m tall. Branchlets glabrous. Leaves alternate; petiole 3–8 mm, glabrous; leaf blade elliptic or obovate, 4–7.5 × 2–3.8 cm, glabrous on both surfaces, pinninerved, lateral veins 7–10 pairs, from midrib extending 60°, vanishing near margin, base cuneate or rounded-obtuse, apex rounded-obtuse. Umbels axillary at apex of branchlet, solitary or in cluster of 2 or 3, 3-flowered; peduncle very short. Male flowers: pedicel short, pubescent; perianth segments 6, ovate; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 sessile reniform glands at base; rudimentary pistil lacking. Fruit ellipsoid, 11–14 × 5–6 mm, seated on cup-shaped perianth tube; fruiting pedicel ca. 4 mm, pubescent. Fl. Jul–Aug, fr. Mar–Apr.

• Moist areas of dense forests in valleys; 800–900 m. W Guangdong (Dinghu Shan).

**45. *Litsea hunanensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 53. 1978.

湖南木姜子 hu nan mu jiang zi

Evergreen small trees, ca. 5 m tall. Branchlets glabrous. Leaves alternate; petiole 5–6 mm, glabrous; leaf blade obovate-lanceolate or lanceolate, 5–7 × 1–2.5 cm, glabrous on both surfaces and glaucous abaxially, pinninerved, lateral veins 6–9 pairs, conspicuously reticulate-veined on both surfaces, base cuneate or acute, apex abruptly acute or acuminate. Fruiting inflorescences umbellate, axillary at apex of branchlet; peduncle nearly absent; bracts persistent at fruiting. Fruit ellipsoid, ca. 11 × 6–7 mm, seated on discoid perianth tube; fruiting pedicel 1–2 mm, thickened, gray-yellow pubescent. Fr. Apr–May.

• Dense forests on mountains. S Hunan.

**46. *Litsea kwangtungensis*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 26. 1960.

广东木姜子 guang dong mu jiang zi

Evergreen shrubs, 1.5–3 m tall. Young branchlets gray-brown, glabrous. Leaves alternate; petiole 5–7 mm, glabrous; leaf blade oblong or narrowly oblong, 4–11.5 × 1–3 cm, glabrous on both surfaces, pinninerved, lateral veins 6–9 pairs, base cuneate, apex slightly acute or obtuse. Umbels axillary, solitary, 3- or 4-flowered; peduncle very short, pubescent. Fruit ellipsoid, 7–8 × 4–5 mm, seated on cup-shaped perianth tube; fruiting pedicel ca. 3 mm, puberulent. Fr. Nov.

• Dense forests on mountains; below 100 m. C and S Guangdong.

47. *Litsea suberosa* Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 54. 1978.

栓皮木姜子 shuan pi mu jiang zi

*Litsea elongata* (Nees) J. D. Hooker var. *suberosa* (Yen C. Yang & P. H. Huang) N. Chao & J. S. Liu.

Evergreen small trees, ca. 5 m tall. Old branchlets glabrous, with thin corky bark and conspicuous lenticels; young branchlets glabrous or pilose. Leaves alternate; petiole 5–15 mm, glabrous or pilose on both sides; leaf blade oblanceolate or narrowly long elliptic, 6–17 × 1.5–5 cm, along veins pilose or glabrous abaxially, glabrous adaxially, pinninerved, lateral veins 13–15 pairs, base cuneate, apex abruptly acute. Umbels axillary; male umbel 5-flowered; peduncle very short. Male flowers: pedicel ca. 2 mm; perianth segments 6, ovate-rounded; fertile stamens 9; filaments villous, of 3rd whorls each with 2 rounded small glands at base; rudimentary pistil lacking. Fruit ellipsoid, 10–12 × 5–7 mm, seated on cup-shaped perianth tube; fruiting pedicel 3–4 mm, pubescent. Fl. Jul–Sep, fr. Oct–Nov.

• Forests or thickets on mountain slopes; 800–1500 m. N Guangdong, W Hubei, Hunan, S Sichuan.

48. *Litsea chengshuzhii* H. P. Tsui, Acta Bot. Yunnan. 16: 34. 1994.

树志木姜子 shu zhi mu jiang zi

Evergreen trees, 5–10 m tall. Young branchlets brown-yellow appressed puberulent and becoming glabrous. Leaves alternate; petiole 1.5–2 cm, glabrous; leaf blade elliptic, 10–26 × 5–13 cm, glaucous and densely white appressed pubescent when young, becoming sparsely pubescent abaxially, glabrous adaxially, pinninerved, lateral veins 6–11 pairs, with conspicuous parallel veinlets on both surfaces, base broadly cuneate to rotund, apex acuminate. Umbels axillary, 6-flowered; peduncle 5–12 mm, glabrous. Male flowers: perianth segments 6, long elliptic, yellow, glabrous, subequal; stamens 12(–14), of 1st to 3rd whorls subequal, ca. 3.5 mm, anthers 4-celled, superior 2 cells introrse, inferior 2 cells lateral, of 4th whorls small, ca. 2.2 mm, anthers 2-celled, introrse; filaments slender, pubescent, of 3rd and 4th whorls each with 2 stipitate glands at base; rudimentary pistil small. Female flower and fruit not seen.

• Evergreen broad-leaved forests; ca. 1000 m. SE Xizang.

49. *Litsea depressa* H. P. Tsui, Acta Bot. Yunnan. 16: 31. 1994.

扁果木姜子 bian guo mu jiang zi

Evergreen trees, ca. 15 m tall. Branchlets glabrous, stout. Leaves alternate, congregated toward apex of branchlet; petiole 1.7–3.2 cm; leaf blade yellow-brown abaxially, oblong-lanceolate or oblanceolate, 14–26 × 4.5–8 cm, foveolate adaxially, pinninerved, lateral veins 6–10 pairs, slightly conspicuously reticulate-veined adaxially, base broadly cuneate, apex acute or rounded, apiculate. Flowers not seen. Fruit purple, white-spotted, compressed globose, ca. 2 × 3 cm, seated on cup-shaped entire perianth tube; fruiting pedicel ca. 1 cm.

• Semi-evergreen rain forests; ca. 900 m. SE Xizang.

50. *Litsea garciae* Vidal, Revis. Pl. Vasc. Filip. 228. 1886.

兰屿木姜子 lan yu mu jiang zi

*Cylicodaphne garciae* (Vidal) Nakai; *Lepidadenia kawakamii* (Hayata) Masamune; *Litsea kawakamii* Hayata; *Tetradenia kawakamii* (Hayata) Nemoto.

Evergreen trees. Branchlets stout, subglabrous. Leaves alternate; petiole stout, 1.5–2.5 cm, furrowed, glabrous; leaf blade ovate-lanceolate or obovate-lanceolate to lanceolate, 25–40 × 6–15 cm, glabrous on both surfaces and glaucous abaxially, pinninerved, lateral veins 16–20 pairs, prominently reticulate-veined on both surfaces, base cuneate to narrowly cuneate, apex obtuse. Flowers in axillary umbels. Pedicel stout. Fruit compressed globose, ca. 2.2 × 3 cm, orange-red at maturity, seated on cup-shaped perianth tube; fruiting pedicel ca. 1.5 cm. Fr. Aug–Sep.

Evergreen broad-leaved forests. Taiwan [Philippines].

51. *Litsea lancilimba* Merrill, Philipp. J. Sci. 23: 244. 1923.

大果木姜子 da guo mu jiang zi

Evergreen trees, up to 20 m tall, to 60 cm d.b.h. Branchlets conspicuously angular, glabrous. Leaves alternate; petiole 1.6–3.5 cm, stout, glabrous; leaf blade lanceolate, 10–20(–50) × 3.5–5 cm, glabrous on both surfaces and glaucous abaxially, pinninerved, midrib conspicuously prominent on both surfaces, lateral veins 12–14 pairs, base cuneate, apex acute or acuminate. Umbels axillary, solitary, or in cluster of 2–4, 5-flowered; peduncle stout and short. Male flowers: pedicel ca. 4 mm, white pubescent; perianth segments 6, lanceolate; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 stipitate glands at base. Fruit oblong, 1.5–2.5 × 1–1.4 cm, seated on discoid perianth tube; fruiting pedicel 5–8 mm, stout. Fl. Jun, fr. Nov–Dec.

Dense forests; 900–2500 m. S Fujian, Guangdong, Guangxi, Hainan, Hunan, SE Yunnan [Laos, Vietnam].

The wood is light and brash, but not fissile or resistant to borer insects, and is used for furniture and joinery parts. The seeds may be used for industrial oil.

52. *Litsea subcoriacea* Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 55. 1978.

桂北木姜子 gui bei mu jiang zi

*Litsea subcoriacea* var. *stenophylla* Yen C. Yang & P. H. Huang.

Evergreen trees, 6–7 m tall. Branchlets conspicuously angular, glabrous. Leaves alternate; petiole 0.5–3 cm, glabrous; leaf blade lanceolate or elliptic-lanceolate, 5.5–20 × 1.5–5.5 cm, glaucous and glabrous or along veins pilose when young abaxially, glabrous adaxially, lateral veins 9–13 pairs, conspicuously reticulate-veined abaxially, midrib impressed adaxially, base cuneate, apex acuminate, abruptly acute, or slightly falcate-curved. Umbels clustered on short branchlets, male umbel 5-flowered; peduncle ca. 2 mm, pubescent. Male flowers: pedicel pubescent; perianth segments 6, ovate; fertile stamens 9; filaments pubescent at base, of 3rd whorls each with 2 small rounded glands at base; rudimentary pistil lacking. Fruit ellipsoid, ca. 1.5 × 0.8 cm, seated on cup-shaped perianth tube; peri-

anth tube usually irregularly lobed; fruiting pedicel 4–6 mm, pubescent. Fl. Aug–Sep, fr. Jan–Feb.

• Sparse or dense forests in valleys, roadsides, rocky mountains; 400–2000 m. N Guangdong, N Guangxi, SE Guizhou, W Hunan, NE Zhejiang (Ningbo).

**53. *Litsea greenmaniana*** C. K. Allen, Ann. Missouri Bot. Gard. 25: 394. 1938.

华南木姜子 *hua nan mu jiang zi*

*Litsea greenmaniana* var. *angustifolia* Yen C. Yang & P. H. Huang.

Evergreen small trees, 6–8 m tall. Young branchlets pubescent and becoming glabrous. Leaves alternate; petiole 0.5–1.3 cm, pubescent and becoming subglabrous; leaf blade elliptic, lanceolate, or suboblongate, 4–13.5 × 0.7–3.5 cm, glabrous on both surfaces and glaucous abaxially, lateral veins ca. 10 pairs, conspicuously reticulate-veined abaxially, base cuneate, apex acuminate or falcate-acute. Umbels 1–4 clustered on short branchlets, 3- or 4-flowered per male umbel; peduncle 3–4 mm, pubescent. Male flowers: pedicel short; perianth segments 6, yellow, ovate or elliptic; fertile stamens 9; filaments villous, of 3rd whorls each with 2 sessile cordate glands at base; rudimentary pistil small, glabrous. Fruit ellipsoid, ca. 13 × 8 mm, seated on cup-shaped perianth tube; fruiting pedicel ca. 3 mm. Fl. Jul–Aug, fr. Dec–Mar of next year.

• Weed-tree forests in valleys, dense forests on mountain slopes; below 1200 m. Fujian, Guangdong, Guangxi, S Jiangxi (Quannan).

**54. *Litsea hypophaea*** Hayata, Icon. Pl. Formosan. 5: 167. 1915.

黄肉树 *huang rou shu*

*Actinodaphne pedicellata* Hayata; *Fiwa hypophaea* (Hayata) Nakai; *F. pedicellata* (Hayata) Nakai; *Litsea kostermansii* C. E. Chang; *L. krukovii* Kostermans; *L. pedicellata* (Hayata) Hatusima (1971), not Bartlett (1909); *L. taiwaniana* Kamikotii; *Tetradenia hypophaea* (Hayata) Makino & Nemoto.

Trees, branchlets pubescent. Leaves alternate; petiole 3–6 mm, pubescent; leaf blade obovate or obovate-lanceolate, 3–9 × 1.2–3 cm, glaucous abaxially and pubescent along veins, glabrous adaxially, pinninerved, lateral veins 5–7 pairs, base cuneate, apex obtuse or obtusely acuminate. Umbels clustered or solitary in leaf axils, male umbel 4-flowered; peduncle 4–7 mm. Pedicel densely villous. Perianth segments 6, obovate or ovate, pubescent along midrib outside. Male flowers: fertile stamens 9; filaments villous, of 3rd whorls each with 2 shield-shaped glands at base; rudimentary pistil lacking. Fruit ellipsoid, ca. 8 × 5 mm, seated on shallowly, thinly cup-shaped perianth tube; perianth tube 2–3 × ca. 5 mm, pubescent outside; fruiting pedicel short, ca. 1 mm. Fl. Oct.

• Evergreen broad-leaved forests; low elevations. Taiwan.

This species resembles either *Litsea* or *Actinodaphne* and was treated in FRPS (31: 260. 1982) as *A. pedicellata*. However, it has four decussate involucre bracts, which are characteristic of *Litsea*, and so it should be included in that genus.

The wood may be used for construction and furniture.

**55. *Litsea gongshanensis*** H. W. Li, Acta Phytotax. Sin. 16(4): 56. 1978.

贡山木姜子 *gong shan mu jiang zi*

Evergreen shrubs or small trees, 2.5–6 m tall. Branchlets puberulent or subglabrous. Leaves alternate; petiole 5–8 mm, puberulent, soon becoming glabrous; leaf blade lanceolate, oblanceolate, or oblong, 5–14.5 × 1.4–4 cm, glaucous and glabrous except for sparsely puberulent midrib abaxially, glabrous adaxially, pinninerved, lateral veins 8–10 pairs, transverse veinlets conspicuous abaxially, base cuneate, apex shortly acuminate. Umbels solitary or in cluster of 2 or 3, axillary, male umbel 3- or 4-flowered; peduncle 5–10 mm, sparsely puberulent. Male flowers: pedicel 1.5–2 mm, sericeous-pubescent; perianth segments 6, ovate; fertile stamens 9; filaments sericeous-pubescent, of 3rd whorls each with 2 long stipitate rounded glands at base; rudimentary pistil clavate, glabrous. Fruit ellipsoid, ca. 15 × 8 mm, seated on discoid perianth tube; fruiting pedicel 4–5 mm, thickened at apex. Fl. Nov, fr. Jun–Jul of next year.

• Sparse forests on mountain slopes, broad-leaved forests on riverbanks; 1300–1400 m. Xizang, NW Yunnan.

**56. *Litsea viridis*** H. Liu, Laurac. Chine & Indochine, 188. 1932.

干香柴 *gan xiang chai*

Evergreen small trees, 3–6 m tall. Young branchlets puberulent and becoming glabrous. Leaves alternate; petiole 5–10 mm, puberulent when young; leaf blade elliptic, 8–13 × 2.5–4.5 cm, gray-yellow puberulent abaxially, glabrous adaxially, except sparsely puberulent on midrib, pinninerved, lateral veins 8–10 pairs, conspicuously reticulate-veined on both surfaces, base cuneate, apex acuminate. Umbels often in cluster of 2–5 on short branchlets; short branchlets 2–3 mm. Male flowers: perianth segments 6, ovate-rounded; fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 rounded-cordate small glands at base; rudimentary pistil lacking. Fruit ellipsoid, ca. 15 × 8 mm, apiculate at apex, seated on discoid perianth tube; fruiting pedicel ca. 3 mm, puberulent. Fr. Nov–Dec.

Sparse forests on riverbanks in valleys; 400–1100 m. SE Yunnan [Vietnam].

**57. *Litsea yunnanensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 56. 1978.

云南木姜子 *yun nan mu jiang zi*

*Litsea baviensis* Lecomte var. *venulosa* H. Liu; *L. napoensis* D. Fang.

Evergreen trees, 8–30 m tall, up to 60 cm d.b.h. Young branchlets gray-yellow pubescent and becoming glabrous. Leaves alternate; petiole 1–2 cm, hairy like young branchlets; leaf blade oblong, elliptic, or ovate-elliptic, 12–26 × 4.5–11.5 cm, glaucous and puberulent or along veins pubescent and becoming glabrous abaxially, glabrous or puberulent at base of midrib adaxially, pinninerved, lateral veins 5 pairs, conspicuously reticulate-veined abaxially, base cuneate or rounded-obtuse, apex acuminate, abruptly acute, or obtuse. Umbel in cluster of 2–5 on short branchlets, axillary, male umbel 5- or 6-

flowered; peduncle 6–10 mm, densely pubescent. Male flowers: pedicel ca. 2 mm; perianth segments 6, ovate or broadly ovate; fertile stamens 9–12; filaments densely yellow pubescent, of 3rd whorls each with 2 shortly stipitate rounded-cordate glands at base; rudimentary pistil ovoid, glabrous. Fruit ca. 2.5 × 1.5 cm, almost entirely enclosed in perianth tube when young, exerted from perianth tube at maturity; perianth tube cup-shaped; fruiting pedicel 1–1.5 cm, gradually thickened toward apex. Fl. May, fr. Oct–Nov.

Mountain slopes, roadsides, sparse forests or mixed forests on streamsides; 800–1900 m. Guangxi, SE Yunnan [Vietnam].

**58. *Litsea chinpingensis*** Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 57. 1978.

金平木姜子 jin ping mu jiang zi

Evergreen trees, 10–20 m tall, ca. 20 cm d.b.h. Young branchlets puberulent and becoming glabrous. Leaves alternate; petiole 1–1.8 cm, furrowed, glabrous; leaf blade lanceolate or narrowly elliptic, 8–17 × 2.2–4.2 cm, glabrous on both surfaces, pinninerved, lateral veins 7–11 pairs, conspicuously reticulate-veined on both surfaces, base cuneate, apex acuminate or shortly acute. Umbels in cluster of 3 or 4 on short branchlets, axillary, 4- or 5-flowered; peduncle ca. 8 mm, sparsely pubescent. Female flowers: perianth segments 6, ovate or ovate-rounded; staminodes 9–12; filaments pubescent at base, of 3rd or 4th whorls each with 2 subsessile triangular large glands at base; ovary ovoid-rounded; style stout, short; stigma large, peltate, glabrous. Fruit ellipsoid, ca. 2.2 × 1.5 cm, seated on discoid perianth tube; fruiting pedicel 1.6–2.5 cm, stout. Fr. Aug–Sep.

- Moist broad-leaved forests; 1500–2100 m. NW and S Yunnan.

**59. *Litsea vang*** Lecomte var. *lobata* Lecomte, *Nouv. Arch. Mus. Hist. Nat.*, sér. 5, 5: 84. 1913.

沧源薄托木姜子 cang yuan bao tuo mu jiang zi

*Litsea pierreii* Lecomte var. *lobata* (Lecomte) C. K. Allen.

Evergreen trees, ca. 18 m tall. Young branchlets gray-yellow puberulent and becoming glabrous. Leaves alternate; petiole 1.2–1.5 cm, hairy like branchlets; leaf blade elliptic, 11.5–17 × 4–6 cm, glabrous on both surfaces, lateral veins 5–7 pairs, transverse veinlets conspicuously reticulate on both surfaces, base broadly cuneate or rotund, apex acuminate or shortly acute. Flowers not seen. Fruiting inflorescence umbellate, solitary or 2, lateral; peduncle 1–1.5 cm, very stout, with 1–3 fruits. Fruit ellipsoid, 2–2.5 × 1.3–1.5 cm, black at maturity, seated on deeply cup-shaped perianth tube, with many rotund lenticels outside, margin 3- or 4-lobed, lobes large and irregular; fruiting pedicel 1–1.5 cm, very stout. Fr. May–Jun.

Dense forests in valleys; ca. 800 m. W Yunnan [Cambodia].

*Litsea vang* var. *vang* occurs in Cambodia, Laos, and Vietnam.

**60. *Litsea baviensis*** Lecomte, *Nouv. Arch. Mus. Hist. Nat.*, sér. 5, 5: 87. 1913.

大萼木姜子 da e mu jiang zi

*Litsea maclurei* Merrill.

Evergreen trees, up to 20 m tall, ca. 60 cm d.b.h. Young branchlets covered with pubescence. Leaves alternate; petiole 1–1.6 cm; leaf blade elliptic or oblong-elliptic, 11–24 × 3–7.5 cm, glaucous and puberulent abaxially, glabrous adaxially, pinninerved, lateral veins 7 or 8 pairs, base cuneate, apex shortly acuminate or obtuse. Umbels few in cluster on short branchlets, axillary; short branchlets 2–3 mm, pubescent. Male flowers: pedicel pubescent; perianth segments 6, broadly ovate; fertile stamens 9; filaments sparsely pubescent or subglabrous, of 3rd whorls each with 2 small glands at base. Fruit ellipsoid, 2.5–3 × 1.7–2 cm, shiny and smooth, apex apiculate, purple-black at maturity, seated on thickly woody cupular perianth tube; perianth tube warty outside; fruiting pedicel ca. 3 mm, stout. Fl. May–Jun, fr. Feb–Mar or Sep.

Dense forests, streamsides; 400–2000 m. W Guangxi, Hainan, SE Yunnan [N Thailand, Vietnam].

This species has yellow-green hardwood, which is less fissile and not misshapen in a dried state. It is used for making furniture, joinery parts, pianos, etc.

**61. *Litsea litseifolia*** (C. K. Allen) Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 57. 1978 [*“litseaeifolia”*].

海南木姜子 hai nan mu jiang zi

*Actinodaphne litseifolia* C. K. Allen, *Ann. Missouri Bot. Gard.* 25: 408. 1938 [*“litseaeifolia”*].

Evergreen shrubs or small trees, up to 6 m tall, ca. 10 cm d.b.h. Young branchlets tomentose and becoming glabrous. Leaves alternate; petiole 1–1.5 cm, pubescent when young and becoming glabrous; leaf blade elliptic or oblanceolate-elliptic, 13–18 × 5.5–7.5 cm, glaucous and sparsely pubescent abaxially, with pubescence denser along veins, glabrous adaxially, pinninerved, lateral veins 10–12 pairs, arcuate and connected at apex, base and apex acute. Umbels axillary, solitary or in cluster of 2 or 3, male umbel 7-flowered. Male flowers: pedicel short; perianth segments 6, long elliptic, pale green; fertile stamens 9(–13); filaments below middle villous, of 3rd whorls each with 2 shortly stipitate large glands at base; rudimentary pistil bottle-shaped, glabrous. Fruit ellipsoid, seated on cup-shaped perianth tube; fruiting pedicel stout and short. Fl. May–Sep, fr. Oct–Nov.

- Forests or sparse forests on mountains; above 1400 m. S Hainan.

**62. *Litsea pseudoelongata*** H. Liu, *Laurac. Chine & Indochine*, 179. 1934.

竹叶木姜子 zhu ye mu jiang zi

*Litsea lii* C. E. Chang; *L. lii* var. *nunkaotahangensis* (J. C. Liao) J. C. Liao; *L. morrisonensis* Hayata var. *lii* (C. E. Chang) S. S. Ying; *L. nunkaotahangensis* J. C. Liao.

Evergreen small trees, up to 10 m tall. Branchlets pubescent. Leaves alternate; petiole 5–9 mm, pubescent when young; leaf blade broadly linear, 7–12 × 1–2.5 cm, glaucous and sometimes ferruginous-yellow pubescent abaxially when young, glabrous adaxially, pinninerved, lateral veins 15–20 pairs, base acute and slightly decurrent, apex obtuse-acute. Umbels axillary, usually in cluster of 3–5 on short branchlets, male umbel

4-flowered; short branchlets 5–10 mm. Male flowers: pedicel short, pubescent; perianth segments 6, sometimes 4 or 8, ovate or elliptic; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 subsessile long ellipsoid glands at base; rudimentary pistil lacking. Fruit long ovoid, ca.  $10 \times 7$ –8 mm, acute at apex, seated on shallowly cup-shaped perianth tube; fruiting pedicel ca. 2 mm, pubescent. Fl. May–Jun, fr. Oct–Dec.

• Thickets, forests; 600–2400 m. S Guangdong, Guangxi, Hainan, Taiwan.

According to the original descriptions and photographs of the types of *Litsea lii* and *L. nunkaotahangensis*, the two entities (except for the smaller fruits ca.  $3 \times 2.5$  mm) are quite similar to *L. pseudoelongata*. Therefore, they have been reduced here to synonymy.

**63. *Litsea oligophlebia*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 25. 1960.

少脉木姜子 shao mai mu jiang zi

Evergreen trees, ca. 13 m tall. Young branchlets densely yellow-brown pubescent. Leaves alternate; petiole 5–8 mm, yellow-brown villous; leaf blade oblanceolate or oblong-oblanceolate,  $4$ – $10 \times 1$ –2.5 cm, pubescent abaxially, midrib near base pubescent adaxially, pinninerved, lateral veins 4 or 5 pairs, impressed abaxially, base cuneate, apex acuminate or acute. Umbels solitary or in cluster of 2–4, male umbel 5-flowered; peduncle lacking. Male flowers: pedicel short, pubescent; perianth segments 6, ovate-triangular; fertile stamens 9; filaments pilose at base, of 3rd whorls each with 2 stipitate peltate glands at base; rudimentary pistil lacking. Fruit ovoid-rounded,  $5$ – $7 \times$  ca. 4 mm at immaturity, seated on discoid perianth tube; fruiting pedicel ca. 2 mm, pubescent. Fl. Aug–Sep, fr. May–Jun.

• Sparse forests in valleys; 200–300 m. S Guangxi.

**64. *Litsea yaoshanensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 58. 1978.

瑶山木姜子 yao shan mu jiang zi

Evergreen shrubs. Branchlets covered with dense gray-yellow pubescence. Leaves alternate; petiole 3–7 mm, densely hairy like branchlets; leaf blade lanceolate or oblanceolate,  $5$ – $11.5 \times 1$ –2.5 cm, gray-yellow pubescent and along veins villous abaxially, glabrous adaxially, except for hairy midrib, pinninerved, lateral veins 8–10 pairs, conspicuously reticulate-veined abaxially, slightly prominent or prominent adaxially, base attenuate or slightly obtuse, apex attenuate. Umbel solitary in leaf axils toward apex of branchlet, male umbel 5-flowered; peduncle ca. 3 mm, pubescent. Male flowers: pedicel 1.5–2 mm, pubescent; perianth segments 6, ovate; fertile stamens 9; filaments pubescent below middle, of 3rd whorls each with 2 rounded-cordate small glands at base; rudimentary pistil lacking. Fruit ellipsoid, ca.  $8 \times 5$  mm at immaturity, seated on cup-shaped perianth tube; fruiting pedicel ca. 2 mm, pubescent. Fl. Aug–Sep, fr. Jan–Feb.

• Thickets on mountain slopes; ca. 200 m. N Guangxi.

**65. *Litsea akoensis*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 245. 1911.

屏东木姜子 ping dong mu jiang zi

Evergreen small trees. Young branchlets densely brown pubescent. Leaves alternate; petiole 1–1.5 cm, pubescent or hirsute; leaf blade oblong-obovate, long elliptic, elliptic, or lanceolate, rarely oblanceolate,  $5$ – $15 \times 2$ –4 cm, along veins pubescent or hirsute abaxially, glabrous or only base of midrib pubescent adaxially, pinninerved, lateral veins 5–8 pairs, conspicuously reticulate-veined abaxially, base cuneate, apex obtuse or obtuse-acute. Umbels in cluster of 2 or 3 or solitary, axillary, 4- or 5-flowered; peduncles 6–15 mm, pubescent or hirsute. Male flowers: pedicels short, pubescent or hirsute; perianth segments 5 or 6, sometimes 7 or 8, ovate; fertile stamens 9–16, exserted; filaments pubescent or hirsute, of 3rd and 4th whorls each with 2 shortly stipitate cordate glands at base; rudimentary pistil small or lacking. Fruit oblong, ca.  $10 \times 6$  mm, seated on cup-shaped perianth tube. Fl. Aug–Sep, fr. Mar–Apr.

• Evergreen broad-leaved forests; below 500 m. Taiwan.

- 1a. Petioles, leaf blade along veins abaxially, peduncles of inflorescence, and filaments pubescent; rudimentary pistil small ..... 65a. var. *akoensis*
- 1b. Petioles, leaf blade along veins abaxially, peduncles of inflorescence, and filaments hirsute; rudimentary pistil lacking ..... 65b. var. *sasakii*

**65a. *Litsea akoensis* var. *akoensis***

屏东木姜子(原变种) ping dong mu jiang zi (yuan bian zhong)

*Actinodaphne akoensis* (Hayata) T. S. Liu & J. C. Liao; *Cylicodaphne akoensis* (Hayata) Nakai; *Tetradenia akoensis* (Hayata) Nemoto.

Petiole ca. 1 cm, pubescent; leaf blade oblong-obovate or long elliptic,  $6$ – $10 \times 2$ –4 cm, along veins pubescent abaxially, glabrous adaxially, except pubescent on base of midrib. Peduncles of inflorescence 6–10 mm, pubescent. Male flowers: filaments pubescent; rudimentary pistil small.

• Evergreen broad-leaved forests; below 500 m. Taiwan.

**65b. *Litsea akoensis* var. *sasakii*** (Kamikoti) J. C. Liao, Taxon. Rev. Fam. Lauraceae Taiwan, 84. 1988.

浸水营木姜子 jin shui ying mu jiang zi

*Litsea sasakii* Kamikoti, Trans. Nat. Hist. Soc. Formosa 22: 412. 1932; *Actinodaphne sasakii* (Kamikoti) T. S. Liu & J. C. Liao; *Fiwa sasakii* (Kamikoti) Nakai; *L. linii* C. E. Chang.

Petiole 1–1.5 cm, hirsute; leaf blade elliptic, oblong, or lanceolate, rarely oblanceolate,  $5$ – $15 \times 2$ –3.5 cm, along veins hirsute abaxially, glabrous adaxially. Peduncles of inflorescence 10–15 mm, hirsute. Male flowers: filaments hirsute; rudimentary pistil lacking.

• Evergreen broad-leaved forests; low to medium elevations. Taiwan.

*Litsea linii* and *L. sasakii* were treated in FRPS (31: 334–335. 1982) as insufficiently known species. However, the descriptions and type material show their characters to be quite similar to those of *L. akoensis*. They differ only in their hirsute indumentum and in lacking a rudimentary pistil, which are here considered differences justifying at most varietal rank.

**66. *Litsea kwangsiensis*** Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 58. 1978.

红楠刨 hong nan pao

Evergreen trees, 8–12 m tall, ca. 20 cm d.b.h. Branchlets densely yellow-brown pubescent. Leaves alternate; petiole 1–2 cm, pubescent when young; leaf blade lanceolate or oblong-lanceolate, 7–12 × 1.5–3 cm, glabrous on both surfaces, pinninerved, lateral veins 8–12 pairs, densely reticulate-veined, base broadly cuneate or obtuse-rounded, apex shortly acuminate with obtuse acumen. Umbels 1–3 on short branchlets in leaf axils toward apex of branchlet, male umbel 5-flowered. Male flowers: pedicel villous; perianth segments 6, ovate; fertile stamens 9; filaments villous, of 3rd whorls each with 2 shortly stipitate rounded glands at base; rudimentary pistil lacking. Fruit ellipsoid, ca. 10 × 6–7 mm, seated on cup-shaped perianth tube; fruiting pedicel 3–4 mm, villous. Fl. Aug–Sep, fr. Feb–Mar of next year.

• Broad-leaved forests on mountain slopes, valleys; 300–1200 m. S Guangxi.

The wood is yellow, fine, shiny, and is used for making products such as high-grade furniture.

**67. *Litsea liboshengii*** H. P. Tsui, *Acta Bot. Yunnan.* 16: 3. 1994.

勃生木姜子 bo sheng mu jiang zi

Evergreen trees, ca. 10 m tall. Young branchlets covered with yellow pubescence. Leaves alternate; petiole 0.7–2 cm, densely yellow pubescent; leaf blade long elliptic, 11.6–21 × 3–6.3 cm, covered with gray pubescence on both surfaces, especially along veins, pinninerved, lateral veins 5–7 pairs. Umbels axillary or axillary on short branchlets, ca. 20-flowered; peduncle stouter, 1.5–2 cm, yellow pubescent; involucre bracts decussate, appressed pubescent on both surfaces. Male flowers (bud): pedicel appressed pubescent; perianth segments 6, subequal, appressed pubescent on both surfaces; fertile stamens 9; filaments pubescent, of 3rd whorl each with 2 stipitate glands at base; rudimentary pistil small, glabrous. Female flower and fruit not seen.

• Evergreen broad-leaved forests; ca. 2100 m. SE Xizang.

**68. *Litsea sinoglobosa*** J. Li & H. W. Li, *Acta Bot. Yunnan.* 28: 107. 2006.

圆果木姜子 yuan guo mu jiang zi

*Litsea globosa* Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 58. 1978, not Kostermans (1970).

Evergreen shrubs or small trees, up to 16 m tall. Young branchlets covered with appressed pubescence. Leaves alternate; petiole 6–20 mm, pubescent when young; leaf blade elliptic or obovate-elliptic, 5–14.5 × 2–5 cm, along veins pubescent abaxially, glabrous adaxially, pinninerved, lateral veins 8–12 pairs, conspicuously reticulate-veined, base cuneate, apex acuminate. Umbels solitary or in cluster of 2 on short branchlets, male umbel 4-flowered. Male flowers: pedicel short, pubescent; perianth segments 6, elliptic; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 shortly stipitate reniform large

glands at base; rudimentary pistil lacking. Fruit globose or subglobose, ca. 6 mm in diam., seated on discoid perianth tube; fruiting pedicel ca. 3 mm, pubescent. Fl. Feb–Mar, fr. May–Jun.

• Sparse forests; 100–600 m. N Guangdong, S Hunan.

**69. *Litsea wilsonii*** Gamble in Sargent, *Pl. Wilson.* 2: 78. 1914.

绒叶木姜子 rong ye mu jiang zi

Evergreen trees, up to 10 m tall. Branchlets gray-white tomentose. Leaves alternate; petiole 1–3.5 cm, gray-white tomentose and becoming glabrous; leaf blade obovate, 5.5–18 × 3–9 cm, tomentose on both surfaces when young, tomentose abaxially and glabrous adaxially when old, pinninerved, lateral veins 6–10 pairs, with conspicuous parallel transverse veins abaxially, base cuneate, apex abruptly acute. Umbels solitary or in cluster of 2 or 3 on short branchlets, male umbel 6-flowered; peduncle ca. 1 cm. Male flowers: pedicel ca. 5 mm, tomentose; perianth segments 6; fertile stamens 9; filaments pubescent, of 3rd whorls each with 2 shortly stipitate yellow glands at base. Fruit ellipsoid, ca. 13 × 7–8 mm, seated on cup-shaped perianth tube, red becoming deep purple-black at maturity; fruiting pedicel 6–7 mm. Fl. Aug–Sep, fr. May–Jun.

• Mountain slopes, roadsides, thickets, weed-tree forests; 300–1800 m. Guizhou, Sichuan.

**70. *Litsea hayatae*** Kanehira, *Formos. Trees*, rev. ed. 217. 1936.

台湾木姜子 tai wan mu jiang zi

*Litsea obovata* Hayata, *J. Coll. Sci. Imp. Univ. Tokyo* 30(1): 252. 1911, not (Nees) Nees (1836); *Cylicodaphne hayatae* (Kanehira) Nakai; *L. akoensis* Hayata var. *chitouchiaoensis* J. C. Liao; *L. akoensis* f. *hayatae* (Kanehira) S. S. Ying; *L. akoensis* var. *hayatae* (Kanehira) J. C. Liao; *Tetradenia obovata* Nemoto (1931), not Nees (1831).

Evergreen small trees. Young branchlets gray-brown pubescent. Leaves alternate; petiole 1–2 cm, gray-yellow pubescent; leaf blade obovate to broadly oblong, 15–20 × 8–10 cm, gray-brown pubescent abaxially, glabrous adaxially except for pubescent midrib, pinninerved, lateral veins 6–9 pairs, base narrowly cuneate, apex rounded-obtuse. Umbels axillary, 5-flowered; peduncle ca. 5 mm, pubescent. Male flowers: pedicel short, villous; perianth segments 6, oblong; fertile stamens 9(–12); filaments glabrous, of 3rd (and 4th) whorls each with 2 stipitate cordate glands at base. Fruit ellipsoid, ca. 8 × 6 mm, seated on cup-shaped perianth tube. Fl. Oct–Nov.

• Evergreen broad-leaved forests; 1500–2500 m. Taiwan.

Liao (Taxon. Rev. Fam. Lauraceae Taiwan, ed. 2, 88. 1995) reduced *Litsea hayatae* to the synonymy of *L. akoensis*. However, *L. hayatae* has larger, wider leaves (15–20 × 8–10 cm vs. 5–15 × 2–4 cm), shorter peduncles (ca. 5 mm vs. 6–15 mm), and glabrous (vs. pubescent) filaments. *Litsea akoensis* var. *chitouchiaoensis* was described on the basis of its large broadly obovate leaves, but these characters are quite similar to those of *L. hayatae* and are within the range of variation for that species.

**71. *Litsea kobuskiana*** C. K. Allen, *J. Arnold Arbor.* 18: 290. 1937.

安顺木姜子 an shun mu jiang zi

*Eurya esquirolii* H. Léveillé, Fl. Kouy-Tchéou, 414. 1914–1915; *Litsea esquirolii* (H. Léveillé) C. K. Allen (1936), not H. Léveillé (1911); *L. faberi* Hemsley var. *ganchouensis* H. Liu.

Evergreen small trees, 3–8 m tall, ca. 12 cm d.b.h. Young branchlets densely gray-yellow pilose. Leaves alternate; petiole 8–13 mm, gray-yellow villous; leaf blade lanceolate-elliptic, 6–10 × 1.2–2.5 cm, glaucous and pubescent abaxially, with pubescence denser along midrib, glabrous adaxially, pinninerved, lateral veins 5–8 pairs, conspicuously reticulate-veined adaxially, midrib slightly prominent abaxially, transverse veinlets inconspicuous abaxially, base cuneate, apex acuminate. Umbels 1–3, axillary in upper parts of branchlets, male umbel 3- or 4-flowered; peduncle ca. 2 mm, pubescent. Male flowers: pedicel short, densely pubescent; perianth segments 6; fertile stamens 9; filaments pubescent at base, of 3rd whorls each with 2 rounded glands at base; rudimentary pistil small. Fruit not seen. Fl. Aug.

• Dense forests on mountains; 800–1800 m. N Guangxi, S Guizhou.

**72. *Litsea acutivena*** Hayata, Icon. Pl. Formosan. 5: 163. 1915.

尖叶木姜子 jian ye mu jiang zi

*Actinodaphne acutivena* (Hayata) Nakai; *A. nakaii* (Hayata) T. S. Liu & J. C. Liao; *Litsea elongata* (Nees) J. D. Hooker var. *acutivena* (Hayata) S. S. Ying; *L. nakaii* Hayata; *Tetradenia acutivena* (Hayata) Nemoto; *T. nakaii* (Hayata) Makino & Nemoto.

Evergreen trees, up to 7 m tall. Young branchlets densely yellow-brown villous and becoming subglabrous. Leaves alternate or clustered toward apex of branchlet; petiole 6–12 mm, densely hairy like young branchlets; leaf blade lanceolate, oblanceolate, or oblong-lanceolate, 4–11 × 2–4 cm, yellow-brown pubescent abaxially, more densely so along veins, glabrous adaxially when young, except for hairy midrib, pinninerved, lateral veins 9 or 10 pairs, midrib impressed adaxially, transverse veinlets conspicuous abaxially, base cuneate, apex acute or shortly acuminate. Umbels clustered toward apex of branchlet, male umbel 5- or 6-flowered; peduncle ca. 3 mm. Male flowers: perianth segments 6, long elliptic; fertile stamens 9; filaments hairy, of 3rd whorls each with 2 peltate glands at base; rudimentary pistil small. Fruit ellipsoid, 12–20 × 10–12 mm, black at maturity, seated on cup-shaped perianth tube; fruiting pedicel ca. 1 cm. Fl. Jul–Aug, fr. Dec–Feb.

Dense forests on mountains; 500–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Jiangxi (Dayu), Taiwan [Cambodia, Laos, Vietnam].

**73. *Litsea elongata*** (Nees) J. D. Hooker, Fl. Brit. India 5: 165. 1886.

黄丹木姜子 huang dan mu jiang zi

Evergreen small or medium-sized trees, up to 12 m tall, ca. 40 cm d.b.h. Branchlets densely brown tomentose. Leaves alternate or subverticillate; petiole 2–25 mm, densely brown tomentose; leaf blade oblong, oblong-lanceolate, narrowly lanceolate, or oblanceolate, 5–22 × 1.2–6 cm, pubescent abaxially

and villous along midrib and lateral veins, glabrous adaxially, lateral veins 10–20 pairs, transverse veinlets conspicuously prominent abaxially, base cuneate or rounded, apex obtuse, shortly acuminate, caudate-acute, or long caudate-acute. Umbels solitary, rarely clustered, 4- or 5-flowered per umbel; peduncle absent or to 10 mm. Male flowers: pedicel sericeous-villous; perianth segments 6, ovate; fertile stamens 9–12; filaments villous, of 3rd or 4th whorls each with 2 sessile rounded glands at base; rudimentary pistil glabrous. Fruit oblong, 11–13 × 7–8 mm, seated on cup-shaped perianth tube, black-purple at maturity; fruiting pedicel 2–3 mm. Fl. May–Nov, fr. Feb–Jun.

Roadsides, streamsides, weed-tree forests on mountain slopes, shady moist places, sparse forests, thickets; 500–2300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Xizang, Yunnan, Zhejiang [India, Nepal].

This species is variable in the size and shape of its leaves, especially in repeatedly disturbed secondary forests or dense thickets.

- 1a. Leaves subverticillate; petiole less than 5 mm; peduncle absent or nearly absent ..... 73c. var. *subverticillata*
- 1b. Leaves alternate; petiole more than 10 mm; peduncle 2–10 mm.
  - 2a. Leaf blade obtuse or shortly acuminate at apex; peduncle less than 5 mm ..... 73a. var. *elongata*
  - 2b. Leaf blade caudate or long caudate-acute at apex; peduncle more than 5 mm ..... 73b. var. *faberi*

**73a. *Litsea elongata* var. *elongata***

黄丹木姜子(原变种) huang dan mu jiang zi (yuan bian zhong)

*Daphnidium elongatum* Nees in Wallich, Pl. Asiat. Rar. 2: 63. 1831.

Evergreen small or medium-sized trees. Leaves alternate; petiole 1–2.5 cm; leaf blade oblong or oblong-lanceolate to oblanceolate, 6–22 × 2–6 cm, apex obtuse or shortly acuminate. Peduncle usually stout and short, 2–5 mm, densely brown tomentose.

Roadsides, streamsides, weed-tree forests on mountain slopes; 500–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Xizang, Yunnan, Zhejiang [India, Nepal].

The wood is used for construction, furniture, etc. The seeds may be used for industrial oil.

**73b. *Litsea elongata* var. *faberi*** (Hemsley) Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 59. 1978.

石木姜子 shi mu jiang zi

*Litsea faberi* Hemsley, J. Linn. Soc., Bot. 26: 381. 1891; *L. faberi* f. *dolichophylla* Yen C. Yang.

Evergreen small trees. Leaves alternate; petiole 1–2 cm; leaf blade oblong-lanceolate or narrowly lanceolate, 5–16 × 1.2–3.6 cm, apex caudate-acute or long caudate-acute, midrib and lateral veins impressed adaxially. Peduncle slender, 5–10 mm.

• Shady moist places on mountain slopes, sparse forests; 1500–2300 m. Guizhou, Sichuan, NE Yunnan.

The leaves and fruits are processed for their aromatic oil. The seeds contain oil.

**73c. *Litsea elongata* var. *subverticillata*** (Yen C. Yang) Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 59. 1978.

近轮叶木姜子 jin lun ye mu jiang zi

*Litsea subverticillata* Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 79. 1945.

Evergreen small trees. Leaves subverticillate; petiole shorter, 2–5 mm; leaf blade thinly leathery or membranous, black-green in a dry state. Peduncle absent or nearly absent.

• Roadsides on mountain slopes, thickets; 1200–1900 m. W Guangxi, SW Guizhou, SW Hubei, W Hunan, Sichuan, SE Yunnan.

**74. *Litsea machiloides*** Yen C. Yang & P. H. Huang, *Acta Phytotax. Sin.* 16(4): 60. 1978.

润楠叶木姜子 run nan ye mu jiang zi

Evergreen trees, ca. 13 m tall. Branchlets covered with gray-yellow pubescence. Leaves clustered toward apex of branchlet, subverticillate; petiole ca. 1 cm, gray-yellow pubescent; leaf blade long lanceolate or ovate-long lanceolate, 13–22 × 2.2–3.2 cm, gray pubescent abaxially, glabrous and shiny adaxially, pinninerved, lateral veins 14–19 pairs, transverse veinlets slightly prominent abaxially, base attenuate, apex acuminate or long acuminate and slightly curved. Umbels axillary or lateral, solitary or clustered toward apex of branchlet, male umbel 4-flowered; peduncle lacking. Male flowers: perianth segments 6, long ovate; fertile stamens 9; filaments pubescent at base, of 3rd whorls each with 2 peltate glands at base; rudimentary pistil lacking. Fruit ellipsoid or obovoid-ellipsoid, ca. 13 × 6 mm, seated on discoid perianth tube; fruiting pedicel stout and short, 2–3 mm, pubescent. Fl. Jul–Aug, fr. Dec.

• Shady places in valleys; ca. 500 m. W Guangdong (Gaoyao).

#### 4. DODECADENIA Nees in Wallich, *Pl. Asiat. Rar.* 2: 61, 63. 1831.

单花木姜子属 dan hua mu jiang zi shu

Huang Puhua (黄普华 Huang Pu-hwa), Li Jie (李捷), Li Xiwen (李锡文 Li Hsi-wen); Henk van der Werff

Evergreen trees, dioecious. Leaves alternate, pinninerved. Umbels solitary or clustered in axils of leaf, 1-flowered; peduncles absent or nearly absent; involucre bracts 4 or 5, imbricate. Flowers unisexual; perianth tube short; perianth segments 6 in 2 whorls, spreading, nearly equal. Male flowers: fertile stamens 12 in 4 whorls or 3 each; filaments of 1st and 2nd whorls eglandular, of 3rd and 4th whorls each with 2 glands at base; anthers all introrse, 4-celled; cells opening by lids; rudimentary ovary small. Female flowers: staminodes 12 in 4 whorls of 3 each, 1st and 2nd whorls eglandular, of 3rd and 4th whorls each with 2 glands at base; ovary superior; style elongated; stigma enlarged. Fruit seated on perianth tube.

One species: Bhutan, China, India, Myanmar, Nepal.

**1. *Dodecadenia grandiflora*** Nees in Wallich, *Pl. Asiat. Rar.* 2: 63. 1831.

单花木姜子 dan hua mu jiang zi

Evergreen trees, 10–15 m tall, ca. 30 cm d.b.h. Branchlets covered with dense brown pubescence or glabrous. Leaves alternate; petiole 8–10 mm, covered with pubescence; leaf blade oblong-lanceolate or oblong-oblong-lanceolate, 5–10 × 2–3 cm, glabrous abaxially, along midrib pubescent adaxially, lateral veins 8–12 pairs, conspicuously reticulate-veined on both surfaces, base cuneate, apex acute or acuminate. Umbels 1–3-clustered in leaf axils, 1-flowered. Male flowers: perianth segments 6 in 2 whorls, outer ones broader, inner ones slightly narrow and pubescent outside; fertile stamens 12; filaments pubescent, of 3rd whorls each with 2 large glands at base, of 4th whorls with smaller glands; rudimentary pistil pubescent or glabrous. Female flowers: ovary pubescent or glabrous. Fruit ellipsoid, 10–12 × 7–9 mm, seated on discoid perianth tube; fruiting pedicel ca. 5 mm, stout.

Weed-tree forests in valleys, mixed forests of coniferous and deciduous broad-leaved trees, *Tsuga* forests; 2000–2600 m. W Sichuan, SE Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

Reviewer Colin Pendry (E) notes that among Nepalese specimens the distinction between var. *grandiflora* and var. *griffithii* is unclear. Both glabrous and tomentose twigs can be seen on the same branch in

*Nicolson 2661* (BM), and glabrous ovaries can be seen with tomentose twigs in *Stainton 6181* (BM) and *Proud s.n.* (BM).

1a. Branchlets and ovary pubescent ..... 1a. var. *grandiflora*  
1b. Branchlets and ovary glabrous ..... 1b. var. *griffithii*

**1a. *Dodecadenia grandiflora* var. *grandiflora***

单花木姜子(原变种) dan hua mu jiang zi (yuan bian zhong)

*Actinodaphne monantha* (Yen C. Yang & P. H. Huang) H. P. Tsui; *Litsea monantha* Yen C. Yang & P. H. Huang.

One-year-old branchlets covered with dense brown pubescence; two-year-old branchlets hairy. Ovary pubescent. Fr. Jul–Sep.

Weed-tree forests in valleys, mixed forests of coniferous and deciduous broad-leaved trees, *Tsuga* forests; 2000–2600 m. W Sichuan, SE Xizang, NW Yunnan [Bhutan, India, Myanmar, Nepal].

The wood is soft, light, and used for making plywood, packaging material, mechanical models, agricultural tools, etc. The branchlets and leaves may be processed for their aromatic oil and are used as material for light industry. The seeds contain fat, which is used for making soap and lubricant.

**1b. *Dodecadenia grandiflora* var. *griffithii*** (J. D. Hooker) D. G. Long, *Notes Roy. Bot. Gard. Edinburgh* 41: 507. 1984.

无毛单花木姜子 wu mao dan hua mu jiang zi

*Dodecadenia griffithii* J. D. Hooker, Fl. Brit. India 5: 181.  
1886.

Branchlets and ovary glabrous.

Weed-tree forests in valleys, mixed forests of coniferous and  
deciduous broad-leaved trees, *Tsuga* forests; 2000–2600 m. Yunnan  
[Bhutan, India].

## 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, trinerved, 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,  $\pm$  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  $\pm$  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 funnelliform 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 cylindrical; 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, gla-

brous 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, pinninerved, 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 funnellform, 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 funnellform; 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. *touyimensis* (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; *Ben-zoin 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 funnellform, 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 funnellform, 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 funnellform, 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

*Ben-zoin 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. *tenue* 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) × (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 × 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, exerted 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 cm × 4 mm; bud scales red on exerted parts. Leaves alternate; leaf blade broadly elliptic, elliptic, obovate, or narrowly obovate, 4–9 × 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 pubes-

cent; 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, exserted 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 pu-

bescent; 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 (Mêdog), 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 sub-rounded, 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, sessile; 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 ferrugi-

nous pubescent short branch, ca. 13-flowered; peduncles 0.6–1 cm, densely ferruginous pubescent. Male flowers not seen. Female 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; involucre 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.

绿叶甘橿 lǜ yè gān jiāng

*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.

三椏乌药 sān yā wū yào

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 reniform, 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 branch 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 funnelliform, 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



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 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

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.

## 6. ITEADAPHNE Blume, Mus. Bot. 1: 365. 1851.

单花山胡椒属 dan hua shan hu jiao shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Small trees or shrubs, evergreen, dioecious. Leaves alternate, strongly trinerved or triplinerved. Pseudoumbels 1-flowered, a few together along a slender leafless short shoot with terminal bud, not developing into a leafy shoot after anthesis, each pseudoumbel with 1 bract and 2 involucre bracts; peduncle subsessile or sessile. Flowers unisexual or polygamous. Perianth tube very short; perianth segments 6, subequal. Stamens 6–9; filaments of 1st and 2nd whorls eglandular but those of 3rd whorl or sometimes also of 2nd whorl 2-glandular; glands always orbicular-reniform and subsessile; anthers 2-celled; cells introrse. Ovary ovoid or subglobose; style terete; stigma slightly dilated, peltate or 3-fid. Fruits drupelike; perianth cup discoid.

Three species: China, India, Laos, Malaysia, Myanmar, Thailand, Vietnam; one species in China.

This genus, closely related to *Lindera*, is characterized by the 1-flowered pseudoumbels and 2-celled anthers. It may be an unnatural group if the reduction of multi-flowered pseudoumbels to 1-flowered pseudoumbels in *Lindera* has taken place more than once. Moreover, *Iteadaphne confusa* Blume, nom. illeg. superfl. (the type of *Iteadaphne*), with its opposite or subopposite, pinnately veined leaves, is perhaps not closely related to *I. caudata* and (from Vietnam) *L. spicata* Kostermans, which have alternate, trinerved or triplinerved leaves. See van der Werff (Blumea 46: 137. 2001).

**1. Iteadaphne caudata** (Nees) H. W. Li, Acta Bot. Yunnan. 7: 132. 1985.

香面叶 xiang mian ye

*Daphnidium caudatum* Nees in Wallich, Pl. Asiat. Rar. 2: 63. 1831; *Benzoin caudatum* (Nees) Kuntze; *Lindera caudata* (Nees) J. D. Hooker.

Shrubs or small trees, 2–12(–20) m tall. Bark black-gray. Branchlets slender; young branchlets yellow-brown pubescent, becoming glabrous and black-brown when old, thinly longitudinally striate, lenticellate, lenticels oblong. Terminal bud ovoid, 2–4 mm. Leaves alternate; petiole 5–13 mm, densely yellow-brown pubescent; leaf blade abaxially nearly glaucous when dry, adaxially brown or green-brown, narrowly ovate or oblong-lanceolate, (4.5–)5–13 × (1.5–)2–4 cm, thinly leathery, densely yellow-brown pubescent on both surfaces but more densely so abaxially when young, glabrate except along midrib when old, triplinerved, basal lateral veins arcuate-ascendant toward leaf apex from 1–3 mm above base, midrib and lateral veins concave-convex, base broadly cuneate or rounded, apex caudate-acuminate. Pseudoumbels 1-flowered, sessile, 2–8 together along a slender leafless short shoot, elongate in fruiting stage, each pseudo-umbel with 1 bract and 2 involucre bracts; in-

volucre bracts broadly ovate or suborbicular, yellow-brown pubescent outside; bracts broadly ovate, yellow-brown pubescent, apex acute. Male flowers: pedicels ca. 1.5 mm; perianth segments 6, subequal, narrowly ovate, 2.8–3 × 1.5–2 mm, pubescent at base on both surfaces, apex obtuse; stamens 9, subequal, 4.5–6.5 mm; filaments villous on lower parts, those of 3rd whorl 2-glandular at base; glands orbicular-reniform, subsessile; pistillode ca. 3 mm; ovary oblong; style slender, appressed pubescent at lower part; stigma 3-fid. Female flowers: perianth segments 6, ovate-oblong, ca. 2.5 × 1.5 mm, yellow-brown pubescent on base of both surfaces, apex acute; staminodes 9, fasciated, 1.5–2 mm, densely yellow-brown pubescent, interior 6 shorter and 2-glandular at filament base; glands free, orbicular-reniform; ovary ovoid or subglobose, ca. 2 mm; style slender, ca. 2 mm; stigma peltate, papillose. Fruits globose, 5–6(–7) mm in diam., black-purple at maturity, inserted on persistent perianth tube with 6 perianth segments. Fl. Oct–Apr of next year, fr. Mar–Oct.

Thickets, sparse forests, roadsides, forest margins; 700–2300 m. W Guangxi, S Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

The seed oil is used as a lubricant and for making soap. The branchlets, leaves, and pericarp may yield essential oil.

## 7. SASSAFRAS J. Presl in Berchtold & J. Presl, Pfl. Rostlin 2(2): 30. 1825.

檫木属 cha mu shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

*Pseudosassafras* Lecomte; *Yushunia* Kamikoti.

Deciduous trees, usually dioecious. Terminal buds large, operculate; bud scales suborbicular, densely sericeous. Leaves alternate, clustered at apex of branchlet, papery, pinninerved or triplinerved, dimorphic, unlobed or 2- or 3-lobed. Raceme terminal, few flowered, lax, pendulous, pedunculate, with late deciduous alternate bracts at base; bracts linear to filiform. Perianth yellow; perianth tube short; perianth lobes 6, in 2 series, subequal, deciduous at side above base. Flowers unisexual or bisexual, pedicellate. Male flowers: fertile stamens 9, inserted on throat of perianth tube, in 3 series, subequal; filaments filiform, longer than anthers, campanulate, those of 1st and 2nd whorls eglandular but those of 3rd whorl each with 2 shortly stipitate glands; anthers ovoid-oblong, obtuse but always emarginate at apex, all 4-celled, upper 2 cells smaller, or sometimes anthers of 1st whorl 3-celled (upper cell infertile) or sometimes 2-celled (cells fertile), those of 2nd and 3rd whorls all 2-celled, cells all introrse or lower cells of 3rd whorl

lateral, sometimes those of 3rd whorl extrorse; staminodes 3 or absent, if present in innermost whorl, alternate to stamens of 3rd whorl, triangular-subulate, stipitate. Female flowers: staminodes 6, in 2 series, or 12 in 4 series; ovary ovoid, almost estipitate and inserted in short perianth tube; style slender; stigma discoid-dilated. Fruit dark blue, drupaceous, ovoid, with a shallow perianth cup at base; stalk elongate, gradually dilated toward apex, glabrous. Seeds oblong, apiculate, coat thin; embryo subglobose, erect.

Three species: disjunctly distributed in China and North America; two species (both endemic) in China.

Chung, van der Werff and Peng (Observations on the floral morphology of *Sassafras randaiense* (Lauraceae), Ann. Missouri Bot. Gard., in press) found *S. randaiense* to have bisexual, protogynous flowers. Recent observations on flowers of *S. tzumu* (P. H. Raven, pers. comm.) suggest that this species also has bisexual flowers. Chung et al. (loc. cit.) also found that anthers of the 3rd whorl have extrorse rather than introrse cells.

In the phylogeny of the Lauraceae, unisexual flowers appear only three or four times: in *Hypodaphnis* Stapf, a unispecific genus from W Africa (basal in the family, and with an inferior ovary); in the *Litsea* group (*Actinodaphne*, *Litsea*, *Lindera*, and *Neolitsea*, together 400–500 species); in part of *Ocotea* Aublet and throughout both *Rhodostemonodaphne* Rohwer & Kubitzki and *Endlicheria* Nees (together about 300–400 neotropical species); and finally in one species of *Sassafras*. *Sassafras* is the only genus with species having unisexual and bisexual flowers. Molecular data indicate that *Sassafras* is close to the *Litsea* group but not part of it. One can avoid having species with unisexual and bisexual flowers in *Sassafras*; the two Chinese species are sister to the North American species (fide Nie et al., Pl. Syst. Evol. 267: 191–203. 2007), and one can split *Sassafras* into two genera, one with the North American species (with unisexual flowers), the other with the two Chinese species (with bisexual flowers). That would be in agreement with molecular data. One can also not split *Sassafras*, and that would be supported by molecular data as well.

The two Chinese species differ from the North American one in having perianth puberulent, male flowers each with 3 staminodes and 1 rudimentary pistil, and female flowers each with 12 staminodes.

- 1a. Leaf blade ovate or obovate, unlobed or 2- or 3-lobed; anthers of various whorls all 4-celled, upper 2 cells smaller ..... 1. *S. tzumu*  
 1b. Leaf blade rhombic-ovate, those on infertile branchlets unlobed or 2- or 3-lobed, those on fertile branchlets unlobed; anthers of 1st whorl 3-celled (upper cell infertile) or 2-celled (cells all fertile) but those of 2nd and 3rd whorls all 2-celled ..... 2. *S. randaiense*

**1. *Sassafras tzumu*** (Hemsley) Hemsley, Bull. Misc. Inform. Kew 1907: 55. 1907.

檫木 cha mu

*Lindera tzumu* Hemsley, J. Linn. Soc., Bot. 26: 392. 1891; *L. camphorata* H. Léveillé; *Litsea laxiflora* Hemsley; *Pseudosassafras laxiflorum* (Hemsley) Nakai; *P. tzumu* (Hemsley) Lecomte.

Deciduous trees, up to 35 m tall, 2–5 m d.b.h. Bark yellow-green when young but gray-brown when mature, smooth, irregularly and longitudinally fissured. Branchlets reddish initially but blackish when dry, robust, suberect, ± angled, glabrous. Terminal buds large, ellipsoid, up to 1.3 × 0.9 cm; bud scales suborbicular, densely yellow sericeous outside. Leaves alternate, clustered at apex of branchlet, unlobed or 2- or 3-lobed; petiole always reddish when fresh, slender, (1–)2–7 cm, plano-convex, glabrous or sparsely hirtellous; leaf blade gray-green abaxially, green and opaque or slightly shiny adaxially, ovate or obovate, 9–18 × 6–10 cm, papery, glabrous on both surfaces or sometimes sparsely hirtellous especially on venation abaxially, pinninerved or triplinerved, basal lateral veins opposite, very developed, other lateral veins 5–7 pairs, midrib, lateral veins, and veinlets slightly conspicuous on both surfaces, lateral veins and veinlets anastomosing in arcuate form toward leaf margin, base cuneate, apex acuminate (but apex of lateral leaf lobes slightly obtuse). Raceme terminal, appearing before leaves, 4–5 cm, many flowered, pedunculate; peduncle less than 1 cm; rachis densely brown villous, subtended by late deciduous alternate involucre bracts at base; bracts linear to filiform, 1–8 mm, lowest one longest. Pedicel slender, 4.5–6 mm, densely brown villous. Flowers yellow, ca. 4 mm. Perianth tube very short; perianth lobes 6, lanceolate, subequal, ca. 3.5 mm, sparsely pilose outside, glabrous inside, slightly obtuse at apex.

Fertile stamens 9, in 3 series, subequal, ca. 3 mm; filaments complanate, pilose; anthers ovate-oblong, 4-celled. Staminodes 3, ca. 1.5 mm, triangular-subulate, stipitate. Ovary ovoid, ca. 1 mm, glabrous; style ca. 1.2 mm; stigma discoid. Fruit subglobose, up to 8 mm in diam., blue-black and white waxy when mature, seated on red shallow perianth cup; stalk 1.5–2 cm, glabrous, gradually dilated at apex. Fl. Mar–Apr, fr. May–Sep.

• Always growing in sparse or dense forests; 100–1900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Sichuan, Yunnan, Zhejiang.

The wood is yellowish, finely grained, durable, and used for boat- and furniture-making. The roots and bark are used medicinally for treating traumatic injuries and rheumatic disorders. The fruits, leaves, and roots contain essential oil; the roots contain ca. 1%, and its main component is saffrole.

**2. *Sassafras randaiense*** (Hayata) Rehder, J. Arnold Arbor. 1: 244. 1920.

台湾檫木 tai wan cha mu

*Lindera randaiensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 257. 1911; *Pseudosassafras laxiflorum* (Hemsley) Nakai var. *randaiense* (Hayata) Nakai; *Yushunia randaiensis* (Hayata) Kamikoti.

Deciduous medium-sized trees, up to 70 cm d.b.h. Bark dark brown, longitudinally fissured. Branchlets robust, glabrous, red-brown when dry, lenticellate, with dense semilunar leaf scars. Leaves alternate, those on infertile branchlets unlobed or 2- or 3-lobed, those on fertile branchlets unlobed; petiole ca. 4 cm; leaf blade glaucous abaxially, green adaxially, rhombic-ovate, 10–15(–16) × 3–6(–7.5) cm, lateral veins 7 or 8 pairs, midrib conspicuous on both surfaces, basal lateral veins subparallel to leaf margin, arising from midrib at ca. 40°, base

broadly cuneate, apex acute. Raceme terminal or subterminal, appearing before leaves, ca. 3 cm, pedunculate, 5 or 6 in umbel at apex of branchlet, each subtended by involucre bracts at base; involucre bracts 3 or 4, orbicular, ca. 1.5 cm, pubescent outside, late deciduous; bracts filiform-linear, ca. 1 cm, barbate. Pedicel ca. 6 mm. Perianth tube short, puberulent outside; perianth lobes 6, lanceolate-linear, subequal, ca.  $4 \times 1.25$  mm, sparsely puberulent outside, glabrous inside. Fertile stamens 9, in 3 series, subequal; filaments complanate, those of 3rd whorl

each with 2 sessile glands at base; anthers ovoid-oblong, cells of 1st whorl 3, upper cell infertile, or 2, all fertile, those of 2nd and 3rd whorl 2. Staminodes of innermost whorl triangular-cordate or stamenlike, stipitate. Ovary obovoid, ca. 1 mm; style short, ca. 1 mm; stigma discoid. Fruit globose, ca. 6 mm in diam., seated on shallow perianth cup; stalk 2.5–3 cm, glabrous, gradually dilated toward apex.

• Evergreen broad-leaved forests; 900–2400 m. C and S Taiwan (Ali Shan).

## 8. ACTINODAPHNE Nees in Wallich, Pl. Asiat. Rar. 2: 61, 68. 1831.

黄肉楠属 huang rou nan shu

Huang Puhua (黄普华 Huang Pu-hwa); Henk van der Werff

Evergreen trees or shrubs, dioecious. Leaves usually clustered or nearly verticillate, rarely alternate or opposite, unlobed, pinninerved, rarely triplinerved. Umbels solitary or clustered or arranged in a panicle or raceme; involucre bracts imbricate, caducous. Perianth tube short; perianth segments usually 6 in 2 whorls of 3 each, nearly equal, rarely persistent. Flowers unisexual. Male flowers: fertile stamens usually 9 in 3 whorls of 3 each; filaments of 1st and 2nd whorls eglandular, of 3rd whorls 2-glandular at base; anthers all introrse and 4-celled, cells opening by lids; rudimentary pistil small or lacking. Female flowers: staminodes as many as stamens of male flowers; ovary superior; stigma shield-shaped or dilated. Fruit seated on shallow or deep cup-shaped or discoid perianth tube.

About 100 species: tropical and subtropical regions of Asia; 17 species (13 endemic) in China.

*Actinodaphne sessilifructa* C. J. Qi & K. W. Liu (Guihaia 7: 215. 1987) was described from SW Hunan (Tongdao) but could not be treated here because no material was seen by the present authors.

### 1a. Leaf blade triplinerved.

- 2a. Buds, branchlets, and leaf blade densely ferruginous pubescent; fruit  $2.5\text{--}4.5 \times 1\text{--}2$  cm, fruiting pedicel robust,  $0.5\text{--}0.6 \text{ cm} \times 3\text{--}4 \text{ mm}$  ..... 1. *A. obovata*  
 2b. Buds, branchlets, and leaf blade glabrous; fruit ca.  $2.5 \times 1.5$  cm, fruiting pedicel slender, ca.  $1 \text{ cm} \times 2 \text{ mm}$  ..... 2. *A. menghaiensis*

### 1b. Leaf blade pinninerved.

- 3a. Bud scales persistent, surrounding bases of branchlets.  
 4a. Bud scales smaller,  $3\text{--}8 \times 2\text{--}6$  mm, densely arranged.  
 5a. Leaf blade narrowly lanceolate, thickly leathery, lateral veins 18–26 pairs, obscure or nearly obscure abaxially; fruit glabrous ..... 3. *A. obscurinervia*  
 5b. Leaf blade oblanceolate or oblong, leathery, lateral veins 6–10 pairs, conspicuously prominent abaxially; fruit yellow appressed tomentose ..... 4. *A. trichocarpa*  
 4b. Bud scales larger,  $10\text{--}22 \times 6\text{--}10$  mm, sparsely arranged.  
 6a. Petiole less than 7 mm; lateral veins 7–9 pairs; leaf base rounded or broadly cuneate ..... 5. *A. koshepangii*  
 6b. Petiole more than 11 mm; lateral veins 11–15 pairs; leaf base cuneate.  
 7a. Petiole glabrous; leaf blade glabrous abaxially (only gray puberulent when young, soon glabrous) ..... 6. *A. omeiensis*  
 7b. Petiole and leaf blade abaxially densely tomentose.  
 8a. Leaf blade elliptic, oblong-elliptic, or obovate-elliptic, broader, mostly more than 5 cm in diam.; petiole up to 4 cm; fruit subglobose, fruiting pedicel 4–5 mm ..... 7. *A. kweichowensis*  
 8b. Leaf blade elliptic-lanceolate, narrower, mostly less than 5 cm in diam.; petiole up to 2 cm; fruit oblong, fruiting pedicel 11–15 mm ..... 8. *A. forrestii*

### 3b. Bud scales caducous.

- 9a. Lateral veins 30–40 pairs or more ..... 9. *A. lecomtei*  
 9b. Lateral veins less than 15 pairs.  
 10a. Inflorescence or fruiting inflorescence paniculiform.  
 11a. Branchlets, young leaves, and inflorescence ferruginous tomentose; leaf blade obovate, rarely elliptic; fruiting tube subflat disciform ..... 15. *A. pilosa*  
 11b. Branchlets with dense grayish appressed tomentum, leaf blade pubescent along midrib and veins abaxially, and inflorescence white sericeous; leaf blade lanceolate; fruiting tube shallowly cup-shaped ..... 14. *A. henryi*  
 10b. Inflorescence or fruiting inflorescence umbellate.

- 12a. Young branchlets glabrous ..... 16. *A. acuminata*  
 12b. Young branchlets hairy.  
 13a. Petiole shorter, 3–8 mm.  
 14a. Leaf blade oblanceolate or obovate-lanceolate; filaments longer, ca. 6.5 mm, villous ..... 10. *A. tsaii*  
 14b. Leaf blade not as above; filaments shorter, ca. 4 mm, glabrous.  
 15a. Leaf blade oblong-ovate, base rounded or broadly cuneate, lateral veins 7–9 pairs ..... 5. *A. koshepangii*  
 15b. Leaf blade oblong-lanceolate to oblong, base acuminate or acute, lateral veins 8–13 pairs ..... 11. *A. cupularis*  
 13b. Petiole longer, usually 10–40 mm.  
 16a. Leaf blade oblanceolate, obovate-lanceolate, occasionally oblong, thinner.  
 17a. Leaves 5–7-verticillate, leaf blade 14–20.5 × 3.5–6.5 cm, appressed pubescent abaxially; fertile stamens 9–15, filaments glabrous ..... 12. *A. paotingensis*  
 17b. Leaves scattered, leaf blade 6–12 × 1.8–3 cm, densely gray-yellow villous abaxially; fertile stamens 9, filaments villous ..... 17. *A. mushaensis*  
 16b. Leaf blade long lanceolate, lanceolate, elliptic to oblong-elliptic, thicker.  
 18a. Midrib prominent on both surfaces of leaf blade; fruit globose, smaller ..... 13. *A. glaucina*  
 18b. Midrib concave on leaf blade adaxially; fruit oblong or subglobose.  
 19a. Leaf blade abaxially and petiole glabrous; fruit subglobose, to 20 mm in diam. .... 6. *A. omeiensis*  
 19b. Leaf blade abaxially and petiole hairy; fruit oblong, 6–8 mm in diam. .... 8. *A. forrestii*

**1. *Actinodaphne obovata*** (Nees) Blume, Mus. Bot. 1: 342. 1851.

倒卵叶黄肉楠 *dao luan ye huang rou nan*

*Tetradenia obovata* Nees in Wallich, Pl. Asiat. Rar. 2: 64. 1831; *Litsea obovata* (Nees) Nees (1836), not Hayata (1911).

Trees, 10–18 m tall, ca. 20 cm d.b.h. Branchlets stout, densely ferruginous pubescent. Leaves 3–5-clustered at apex of branchlet, subverticillate; petiole 3–7 cm, yellowish brown pubescent; leaf blade shiny adaxially, obovate, obovate-oblong, or elliptic-oblong, 15–50 × 5.5–22 cm, ferruginous pubescent or glabrate abaxially when old, glabrous adaxially, triplinerved, lateral veins 6 or 7 pairs, lowermost pair arising 1–2 cm from base, base cuneate or rotund, apex acuminate or acute, tip obtuse. Racemes composed of umbels, 5-flowered; peduncle 1.2–2.5 cm. Pedicel ca. 3 mm. Perianth segments 6, yellow, ovate. Male flowers: fertile stamens 9; filaments short, villous at base, of 3rd whorls each with 2 oblate glands at base; rudimentary ovary pilose. Female flowers: ovary subglobose, villous. Fruit oblong or ellipsoid, 2.5–4.5 × 1–2 cm, seated on flat discoid perianth tube. Fl. Apr–May, fr. to Mar of next year.

Valleys, streamsides, moist mixed forests; 1000–2700 m. SE Xizang, S and SE Yunnan [Bhutan, India, Nepal].

This species is characterized by its large fruit. The seeds may be used for their oil. The bark is used medicinally to treat fractures.

**2. *Actinodaphne menghaiensis*** J. Li, Novon 15: 555. 2005.

勐海黄肉楠 *meng hai huang rou nan*

Trees, up to 8 m tall. Branchlets terete, 0.8–1.2 cm thick, glabrous. Terminal buds brownish, subglobose, glabrous. Leaves 5- or 6-verticillate at apex of branchlet; petiole 2–4(–6) cm, glabrous; leaf blade pale green abaxially, shiny adaxially, obovate or elliptic, 15–30(–40) × 6–12(–15) cm, thinly coriaceous, both surfaces glabrous, triplinerved, midrib prominently

raised on both surfaces, lateral veins 7 or 8 pairs, basal lateral veins arising 0.2–1.2(–1.5) cm from base, transverse veins slightly raised abaxially, base cuneate, apex acuminate. Flowers unknown. Inflorescences racemiform, to 4 cm, yellow-brown pubescent. Fruit becoming purple-red when mature, ellipsoid, to 2.5 × 1.5 cm; cupule flat, to 1 cm in diam.; fruiting pedicel slender, to 1 cm × ca. 2 mm. Fr. Sep.

• Dense humid valley forests; ca. 1500 m. S Yunnan (Menghai).

**3. *Actinodaphne obscurinervia*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 61. 1978.

隐脉黄肉楠 *yin mai huang rou nan*

Small trees, up to 3 m tall. Branchlets appressed pubescent when young and becoming glabrous or nearly so. Bud scales ovate, 3–8 × 2–6 mm, persistent, surrounding bases of branchlets. Leaves 3–5-verticillate; petiole ca. 5 mm, brown appressed pubescent; leaf blade green, glaucous abaxially, shiny adaxially, narrowly lanceolate, 6.5–9 × 1.5–2.3 cm, thickly leathery, gray appressed tomentose abaxially, glabrous adaxially, pinninerved, midrib prominent abaxially, impressed adaxially, lateral veins 18–26 pairs, fine, arising ca. 60° from midrib, obscure or nearly so abaxially, slightly prominent adaxially, base rotund, apex acuminate. Fruiting inflorescences umbellate; peduncle lacking. Fruit subglobose, 1–1.2 cm in diam., glabrous, seated on cup-shaped perianth tube; fruiting pedicel ca. 7 mm, slightly enlarged, villous. Fr. Jun–Jul.

• Evergreen broad-leaved forests; ca. 1200 m. E Sichuan.

**4. *Actinodaphne trichocarpa*** C. K. Allen, Ann. Missouri Bot. Gard. 25: 402. 1938.

毛果黄肉楠 *mao guo huang rou nan*

Small trees or shrubs, up to 8 m tall, to 20 cm d.b.h. Young branchlets appressed pubescent. Bud scales persistent, surrounding bases of branchlets. Leaves 3–5-subverticillate; peti-

ole 5–10 mm, appressed pubescent; leaf blade glaucous abaxially, oblanceolate or oblong, 5–14 × 1.4–3 cm, appressed pubescent abaxially, pinninerved, lateral veins 6–10 pairs, prominent abaxially, base cuneate or rotund, apex acuminate or shortly acute. Umbel solitary or clustered, 4-flowered; peduncle lacking. Pedicel villous. Perianth segments ovate, 4–4.5 × ca. 3 mm, pilose. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 reniform stipitate glands near base; rudimentary ovary shortly tomentose. Female flowers: staminodes linear, flat; ovary subglobose, densely shortly tomentose. Fruit globose, 1.2–1.6 cm in diam., densely yellow appressed tomentose, seated on flat shallowly discoid perianth tube. Fl. Mar–Apr, fr. Jul–Aug.

• Mountain slopes, roadsides, thickets; 1000–2600 m. Guizhou, Sichuan, NE Yunnan.

**5. *Actinodaphne koshepangii*** Chun ex Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 24. 1960.

广东黄肉楠 *guang dong huang rou nan*

Small trees, up to 10 m tall, to 20 cm d.b.h. Branchlets grayish brown pubescent. Bud scales sometimes persistent, sparsely surrounding bases of branchlets. Leaves subverticillate; petiole 5–7 mm, grayish brown pubescent; leaf blade oblong-ovate or oblong, 9–13 × 3–5 cm, grayish brown pubescent when young and becoming glabrous abaxially, glabrous adaxially, pinninerved, lateral veins 7–9 pairs, base rounded or broadly cuneate, apex acuminate. Umbels 1–4, axillary or lateral on leafless current year branchlets, sessile, male umbel 4-flowered. Pedicel short. Perianth segments 6–8, oblong-ovate, pubescent on midrib outside. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 stipitate glands at base; rudimentary ovary subglobose, glabrous; style linear; stigma 2-lobed. Female flowers and fruit not seen. Fl. Nov.

• Dense forests, forests of rocky slopes. NW Guangdong, W Hunan.

**6. *Actinodaphne omeiensis*** (H. Liu) C. K. Allen, Ann. Missouri Bot. Gard. 25: 411. 1938.

峨眉黄肉楠 *e mei huang rou nan*

*Actinodaphne reticulata* Meisner var. *omeiensis* H. Liu, Laurac. Chine & Indochine, 158. 1932.

Shrubs or small trees, 3–5 m tall. Young branchlets villous and becoming glabrous. Bud scales sometimes persistent, 11–22 × 6–10 mm, surrounding bases of branchlets. Leaves often 4–6-clustered at apex of branchlet, subverticillate; petiole 11–30 mm, glabrous; leaf blade glaucous abaxially, lanceolate to elliptic, 12–27 × 2.1–6 cm, pubescent soon becoming glabrous abaxially, glabrous adaxially, pinninerved, lateral veins 12–15 pairs, base cuneate, apex acuminate. Umbels solitary or 2 in leaf axils or lateral side of branchlet, sessile, 7- or 8-flowered. Pedicel ca. 5 mm. Perianth segments 6, pubescent outside. Male flowers: fertile stamens 9–12; filaments ca. 4 mm, of 3rd whorls each with 2 shortly stipitate glands at upper middle; rudimentary pistil small, ca. 2.2 mm. Fruit subglobose, ca. 2 cm in diam., apex apiculate, seated on undulate-dentate, shallowly disciform perianth tube; fruiting pedicel slightly stout, pubescent. Fl. Feb–Mar, fr. Aug–Sep.

• Valleys, roadsides, thickets, mixed forests; 500–1700 m. Guizhou, Sichuan.

**7. *Actinodaphne kweichowensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 61. 1978.

黔桂黄肉楠 *qian gui huang rou nan*

Small trees or trees, 3–10 m tall. Branchlets densely tomentose. Bud scales sometimes persistent, 8–12 × 6–10 mm, sparsely surrounding bases of branchlets. Leaves clustered at apex of branchlet, subverticillate; petiole up to 4 cm, stout, densely tomentose; leaf blade elliptic, oblong-elliptic, or obovate-elliptic, 11–27 × 3.2–10 cm, densely gray-yellow tomentose abaxially, glabrous adaxially, pinninerved, lateral veins 6–13 pairs, base broadly cuneate or subrounded, apex shortly acuminate. Umbels solitary or 2 or 3 in leaf axils or lateral side of branchlet, sessile, 5- or 6-flowered. Pedicel ca. 2 mm, densely yellow pubescent. Perianth segments 6. Male flowers: fertile stamens 9; filaments pubescent at base, of 3rd whorls each with 2 long stipitate rounded glands near base; rudimentary pistil clavate, densely pubescent. Fruit subglobose, 1.5–1.7 cm in diam., seated on entire disk-shaped perianth tube; fruiting pedicel 4–5 mm. Fl. May–Jun, fr. Oct.

• Mixed mountain forests; 1000–1300 m. SW Guangxi, SW Guizhou.

**8. *Actinodaphne forrestii*** (C. K. Allen) Kostermans, Reinwardtia 9: 97. 1974.

毛尖树 *mao jian shu*

*Actinodaphne reticulata* Meisner var. *forrestii* C. K. Allen, Ann. Missouri Bot. Gard. 25: 412. 1938.

Trees, 8–15 m tall. Young branchlets yellow-brown appressed tomentose. Bud scales sometimes persistent, sparsely surrounding bases of branchlets. Leaves 6- or 7-clustered at apex of branchlet, subverticillate; petiole up to 2 cm, shortly appressed tomentose; leaf blade elliptic-lanceolate, 9–27 × 2–5 cm, pubescent abaxially when young, glabrous adaxially, pinninerved, lateral veins 11–15 pairs, base attenuate or broadly cuneate, apex acuminate or long acuminate. Umbels clustered on lateral side of branchlet, 5- or 6-flowered. Pedicel ca. 1.5 mm. Perianth segments 6, elliptic. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 stipitate glands at base; rudimentary pistil glabrous. Fruit oblong, 14–16 × 6–8 mm, seated on entire cup-shaped perianth tube; fruiting pedicel 11–15 mm, pilose. Fl. Nov–Mar, fr. Aug–Sep.

• Thickets on calcareous rocks, mixed mountain forests; 1000–2700 m. Guangxi, Guizhou, Yunnan.

**9. *Actinodaphne lecomtei*** C. K. Allen, Ann. Missouri Bot. Gard. 25: 413. 1938.

柳叶黄肉楠 *liu ye huang rou nan*

*Litsea hupehana* Hemsley var. *longifolia* Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 8. 1913.

Trees or small trees, up to 10 m tall. Young branchlets pubescent and becoming glabrous. Leaves subverticillate or alternate; petiole 7–20 mm, pubescent or glabrate; leaf blade glau-

cous abaxially, lanceolate to linear-lanceolate, 10–20 × 1.5–3 cm, appressed pubescent abaxially, glabrous or along midrib pubescent adaxially, pinninerved, lateral veins dense, 30–40 or more pairs, base cuneate, apex acute or narrowly acute. Umbels often 2–5 in leaf axils or lateral side of branchlet, sessile, 4- or 5-flowered. Pedicel villous. Perianth segments 6, oblong or elliptic, ca. 4 × 1.8–2 mm, villous outside. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 shield-shaped stipitate glands at base; rudimentary pistil glabrous. Fruit obovoid, ca. 10 × 8 mm, glabrous, seated on entire or shallowly undulate cup-shaped perianth tube; fruiting pedicel 7–8 mm, slightly enlarged at apex, pubescent. Fl. Aug–Sep, fr. Oct–Nov.

• Mountain slopes, roadsides, streamsides, mixed forests; 600–1800 m. N Guangdong, Guizhou, Sichuan.

The wood is used for furniture. Aromatic oil may be extracted from the branchlets and leaves. Oil may be extracted from the seeds and used in making soap and lubricant.

**10. *Actinodaphne tsaii*** Hu, Bull. Fan Mem. Inst. Biol. 5: 307. 1934.

马关黄肉楠 ma guan huang rou nan

Trees, 8–20 m tall. Young branchlets gray-brown pubescent. Leaves 4–6-crowded at apex of branchlet, subverticillate; leaf blade oblanceolate or obovate-lanceolate, 10–15 × 2–3.5 cm, gray-brown pubescent abaxially, glabrous adaxially, except hairy on midrib, pinninerved, lateral veins 8–10 pairs, base acute, apex acuminate. Umbels in leaf axils, sessile, 6–8-flowered. Pedicel 2–3 mm, densely villous. Perianth segments 6, elliptic, 5–6 × 2–5 mm, densely sericeous outside. Male flowers: fertile stamens 9; filaments ca. 6.5 mm, villous, of 3rd whorls each with 2 shield-shaped stipitate large glands at base; rudimentary pistil glabrous; style slender, pubescent; stigma shield-shaped. Immature fruit oblong, ca. 9 mm, seated on entire shallowly cup-shaped perianth tube; fruiting pedicel 6–8 mm, pubescent. Fl. Mar–Apr, fr. Jun–Jul.

• Evergreen broad-leaved forests, ditch sides; 1300–2000 m. S and SE Yunnan.

This species is closely related to *Actinodaphne sikkimensis* Meisner, from India (Sikkim), but differs in having leaves gray-brown pubescent abaxially, flowers larger, and filaments and style of male flowers villous.

**11. *Actinodaphne cupularis*** (Hemsley) Gamble in Sargent, Pl. Wilson. 2: 75. 1914.

红果黄肉楠 hong guo huang rou nan

*Litsea cupularis* Hemsley, J. Linn. Soc., Bot. 26: 380. 1891; *Fiwa cupularis* (Hemsley) Nakai.

Shrubs or small trees, 2–10 m tall. Young branchlets puberulent. Leaves usually 5- or 6-crowded on top branchlets, subverticillate; petiole 3–8 mm, pubescent; leaf blade oblong to oblong-lanceolate, 5.5–13.5 × 1.5–2.7 cm, pubescent and gradually becoming glabrous abaxially, glabrous adaxially, pinninerved, lateral veins 8–13 pairs, slender, base and apex acuminate or acute. Umbel solitary or numerous in lateral side of branchlet, sessile, male umbel 6- or 7-flowered. Pedicel villous.

Perianth segments 6(–8), ovate, ca. 2 × 1.5 mm. Male flowers: fertile stamens 9; filaments ca. 4 mm, glabrous, of 3rd whorls each with 2 glands at base. Fruit ovoid, 12–14 × ca. 10 mm, apiculate, glabrous, red at maturity, seated on entire or deeply undulate cup-shaped perianth tube. Fl. Oct–Nov, fr. Aug–Sep.

• Mountain slopes, dense forests, streamsides, thickets; 300–1300 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

The seeds may be processed for their oil, which is used for making soap and lubricant. The roots and leaves are used medicinally for curing hemorrhoids, athlete's foot, etc.

**12. *Actinodaphne paotingensis*** Yen C. Yang & P. H. Huang, Acta Phytotax. Sin. 16(4): 63. 1978.

保亭黄肉楠 bao ting huang rou nan

Shrubs or small trees, 4–6 m tall. Young branchlets yellow-brown pubescent and becoming glabrous. Leaves 5–7-verticillate; petiole 1.7–2.5 cm, densely yellow-brown pubescent; leaf blade slightly glaucous abaxially, obovate-lanceolate or oblong, 14–20.5 × 3.5–6.5 cm, gray appressed pubescent abaxially, glabrous adaxially, pinninerved, lateral veins 7–9 pairs, base cuneate or obtusely rounded, apex acute. Umbels in leaf axils, sessile, male umbel 3- or 4-flowered. Pedicel 3–4 mm, densely sericeous-villous. Perianth segments 6–8, oblong or lanceolate, unequal. Flowers 7–8 mm in diam. Male flowers: fertile stamens 9–15; filaments glabrous, of 3rd whorls each with 2 shield-shaped stipitate glands near base; anthers 4-celled, upper 2 cells introrse, lower 2 cells lateral-introrse; rudimentary pistil ca. 4 mm, glabrous. Fruit not seen; fruiting pedicel stout and short, ca. 5 mm, pubescent; perianth tube cup-shaped, entire, ca. 1 cm in diam. Fl. Dec.

• Foot of mountains, mountaintops, shady places in valleys or sparse forests. Hainan.

**13. *Actinodaphne glaucina*** C. K. Allen, Ann. Missouri Bot. Gard. 25: 410. 1938.

白背黄肉楠 bai bei huang rou nan

Trees, up to 10 m tall. Young branchlets ferruginous tomentose and becoming glabrous. Leaves 5–9-crowded at apex of branchlet, nearly verticillate; petiole 12–20 mm, ferruginous tomentose; leaf blade long lanceolate, 13–28(–34) × 2.5–4(–8) cm, pubescent abaxially when young and gradually becoming glabrous, ferruginous tomentose along midrib adaxially when young, pinninerved, midrib prominent on both surfaces, lateral veins 10 pairs, transverse veins slender, base attenuate or acute, apex acute or acuminate. Fruiting inflorescences umbelliform, solitary, with 4 or 5 fruits at each fruiting inflorescence; peduncles 2–6 mm, appressed pubescent. Fruit globose, 7–10 mm in diam., black at maturity, seated on slightly flat shallowly disciform perianth tube; fruiting pedicel ca. 5 mm, slightly enlarged at apex, appressed pubescent. Fr. Oct.

• Mixed forests (rarely collected). Hainan.

**14. *Actinodaphne henryi*** Gamble, Bull. Misc. Inform. Kew 1913: 265. 1913.

思茅黄肉楠 si mao huang rou nan

Trees, up to 25 m tall. Branchlets with grayish appressed tomentum. Leaves 4–6-crowded at apex of branchlet, nearly

verticillate; petiole 2–3 cm, stout, densely tomentose; leaf blade glaucous abaxially, lanceolate, 17–40 × 3.7–13 cm, pubescent along midrib and lateral veins abaxially, glabrous adaxially, pinninerved, lateral veins 9–12 pairs, base cuneate, apex acuminate or long acuminate. Umbels mostly arranged in racemes, white sericeous, 5-flowered; peduncle ca. 1.5 cm. Pedicel 2–3 mm. Perianth tube obconical; perianth segments 6, ovate, 3-nerved. Male flowers: fertile stamens 9; filaments glabrous, of 3rd whorls each with 2 small globose glands at base. Female flowers: staminodes 9; ovary ovoid, glabrous. Fruit subglobose, 6–8 mm in diam., seated on shallowly entire or undulate cup-shaped perianth tube; fruiting pedicel 5–8 mm, pubescent. Fl. Dec–Feb of next year, fr. Jul–Aug.

Evergreen broad-leaved forests; 600–1300 m. S Yunnan [N Thailand].

The wood is used for construction, furniture, and industrial timber.

**15. *Actinodaphne pilosa*** (Loureiro) Merrill, Trans. Amer. Philos. Soc., n.s., 24(2): 165. 1935.

毛黄肉楠 mao huang rou nan

*Laurus pilosa* Loureiro, Fl. Cochinch. 1: 253. 1790; *Actinodaphne cochinchinensis* Meisner; *Machilus hainanensis* Merrill; *M. pilosa* (Loureiro) Nees; *Tetranthera pilosa* (Loureiro) Sprengel.

Trees or shrubs, 4–12 m tall. Young branchlets, bud scales, young leaf blades on both surfaces, and petioles densely ferruginous tomentose. Leaves alternate or in clusters of 3–5; petiole stout, 1.5–3 cm; leaf blade obovate, rarely elliptic, 12–24 × 5–12 cm, pinninerved, lateral veins 5–7(–10) pairs, transverse veins conspicuous abaxially, base cuneate, apex abruptly acute. Umbels clustered in a panicle, 5-flowered; peduncle 1–2 cm. Pedicel ca. 4 mm. Perianth segments 6, elliptic, villous outside. Male flowers: fertile stamens 9; filaments villous, of 3rd whorls each with 2 sessile or shortly stipitate glands at base; rudimentary pistil small or lacking. Female flowers slightly smaller than male flowers; ovary villous; staminodes spatulate, villous at base. Fruit globose, 4–6 mm in diam., seated on subflat disciform perianth tube; fruiting pedicel 3–4 mm, pubescent. Fl. Aug–Dec, fr. Feb–Mar.

Mixed forests, open thickets; ca. 500 m. Guangdong, Guangxi, Hainan [Laos, Vietnam].

Allen (Ann. Missouri Bot. Gard. 25: 404. 1938) recorded this species also from Yunnan, citing *A. Henry 13588*, but neither this gathering nor others from Yunnan have been seen by the present authors.

The wood may be used for making hair and paper glues. The bark and leaves are used medicinally to treat, for example, coughs, furunculosis, rheumatism, and swelling.

**16. *Actinodaphne acuminata*** (Blume) Meisner in A. Candolle, Prodr. 15(1): 211. 1864.

南投黄肉楠 nan tou huang rou nan

*Iozoste acuminata* Blume, Mus. Bot. 1: 364. 1851; *Actinodaphne longifolia* (Blume) Nakai; *A. morrisonensis* (Hayata) Hayata var. *nantoensis* (Hayata) Yamamoto; *A. nantoensis* (Hayata) Hayata; *Fiwa longifolia* (Blume) Nakai; *F. nantoensis*

(Hayata) Nakai; *Litsea acuminata* (Blume) Kurata (1968), not (Teschner) Kostermans (1968); *L. dolichocarpa* Hayata; *L. nantoensis* Hayata; *Machilus longifolia* Blume; *Tetradenia dolichocarpa* (Hayata) Makino & Nemoto.

Trees. Branchlets glabrous. Leaves alternate; petiole 5–20 mm, glabrous; leaf blade lanceolate, 7.5–13 × 1.5–3 cm, pubescent abaxially, glabrous adaxially, pinninerved, lateral veins 12 pairs, reticulate-veined, base acute or broadly cuneate, apex acuminate. Umbels axillary, 3- or 4-flowered; involucre bracts 5, imbricate. Pedicel densely villous. Perianth segments 6, ovate or oblong, ca. 2.5 × 1–1.2 mm. Male flowers: fertile stamens 9; filaments villous at base, of 3rd whorls each with 2 shield-shaped sessile or subsessile glands at base; rudimentary pistil lacking. Female flowers: staminodes 9; ovary ovoid, style, stigma glabrous; style slender; stigma 2-lobed. Fruit ellipsoid, seated on cup-shaped perianth tube. Fl. Feb–Mar.

Evergreen broad-leaved forests; low to medium elevations. Taiwan [Japan].

Liu (Woody Fl. Taiwan, 155. 1972) recorded this species from the forest of Congaing, Yong'an, Fujian Province, at 700 m, but the specimen has not been seen by the present authors.

This species and *Actinodaphne mushaensis* have been treated under both *Actinodaphne* and *Litsea*. However, based on the number and imbricate arrangement of their involucre bracts, they do not belong to *Litsea* and so are retained here under *Actinodaphne*.

The wood is used for construction and furniture.

**17. *Actinodaphne mushaensis*** (Hayata) Hayata, Icon. Pl. Formosan. 5: 171. 1915.

雾社黄肉楠 wu she huang rou nan

*Litsea mushaensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 250. 1911; *Fiwa mushaensis* (Hayata) Nakai; *L. elongata* (Nees) J. D. Hooker var. *mushaensis* (Hayata) J. C. Liao.

Trees. Branchlets densely yellowish brown villous. Leaves alternate; petiole 8–12 mm, yellowish brown villous; leaf blade obovate-lanceolate, oblanceolate, or oblong, 6–12 × 1.8–3 cm, densely gray-yellow villous abaxially, nearly glabrous or pubescent along midrib adaxially, pinninerved, lateral veins 5–7 pairs, base attenuate or cuneate, apex shortly acuminate. Umbel axillary or terminal, 4–6-flowered; peduncle 0.6–1 cm; involucre bracts 5, imbricate. Pedicel ca. 2 mm, densely villous. Perianth segments 6, oblong or ovate, 2.2–3 × 1–2 mm, villous outside, glabrous inside. Male flowers: fertile stamens 9; filaments villous, of 3rd whorls each with 2 shield-shaped or reniform glands at base; rudimentary pistil ca. 1.8 mm. Fruit globose or nearly long ellipsoid, black at maturity, seated on cup-shaped perianth tube. Fl. Sep.

• Evergreen broad-leaved forests; 1300–2300 m. Taiwan.

Liu (Woody Fl. Taiwan, 154. 1972) recorded this species from the forest of Yu-jing mountain, Yong'an, Fujian Province, but the specimen has not been seen by the present authors.

One of the present authors (van der Werff) believes that *Actinodaphne mushaensis* should be treated as a variety of *Litsea elongata*, as was done in Fl. Taiwan, ed. 2 (2: 470. 1996).

The wood may be used for construction and furniture.

## 9. PARASASSAFRAS D. G. Long, Notes Roy. Bot. Gard. Edinburgh 41: 513. 1984.

拟樟木属 ni cha mu shu

Huang Puhua (黄普华 Huang Pu-hwa); Henk van der Werff

Evergreen trees, dioecious. Leaves alternate, triplinerved, young leaves sometimes lobate at apex. Umbels in abbreviated branches; bracts minute, alternate, caducous. Perianth tube short; perianth segments 6 in 2 whorls of 3 each. Flowers unisexual. Male flowers: fertile stamens ca. 9, 3 whorls of 3 each; filaments of 1st and 2nd whorls eglandular, of 3rd whorls each 2-glandular at base; anthers of 1st and 2nd whorls ovoid, 4-celled, all introrse, of 3rd whorls oblong, 4-celled, nearly lateral, all cells opening by lids; rudimentary pistil small. Female flowers: staminodes as many as stamens of male flowers; ovary superior, globose; style stout; stigma shield-shaped. Fruit seated on shallowly discoid perianth tube.

One species: Bhutan, China, India, Myanmar.

**1. Parasassafra confertiflorum** (Meisner) D. G. Long, Notes Roy. Bot. Gard. Edinburgh 41: 513. 1984 [*"confertiflora"*].

拟樟木 ni cha mu

*Actinodaphne confertiflora* Meisner in A. Candolle, Prodr. 15(1): 219. 1864; *Litsea confertiflora* (Meisner) Kostermans; *L. shweliensis* W. W. Smith; *Neocinnamomum confertiflorum* (Meisner) Kostermans.

Trees, 3–15 m tall. Branchlets stout, glabrous or slightly puberulent when young. Leaves alternate; petiole 1.9–3.5 cm; leaf blade ovate or rounded-oblong, 6.5–14.5 × 4.8–10.5 cm,

glabrous on both surfaces, triplinerved, lateral veins 3–5 pairs, lowermost pair arising ca. 3 mm from base, base rounded or broadly cuneate, apex slightly rounded or obtuse, sometimes lobate when young. Umbels axillary, 2–5-clustered, male umbels often 4-flowered. Pedicel ca. 5 mm. Perianth segments broadly ovate. Male flowers: fertile stamens ca. 9; filaments short, glabrous, of 3rd whorls each with 2 subglobose glands at base; rudimentary pistil small. Fruit ovoid or subglobose, ca. 6 × 4 mm, seated on shallowly discoid perianth tube. Fl. Jun–Oct.

Open thickets, mixed forests; 2300–2700 m. SW and W Yunnan [Bhutan, India, Myanmar].

## 10. CINNAMOMUM Schaeffer, Bot. Exped. 74. 1760, nom. cons.

樟属 zhang shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

*Camphora* Fabricius; *Cecidodaphne* Nees; *Parthenoxylon* Blume.

Evergreen trees or shrubs. Bark, branchlets, and leaves very scented. Buds naked or perulate; if perulate, scales distinct or indistinct, imbricate. Leaves alternate, subopposite, or opposite, sometimes clustered at apex of branchlet, leathery, trinerved or triplinerved, also pinninerved. Panicle axillary, subterminal, or terminal, composed of (1–)3- to many-flowered cymes. Flowers yellow or white, small- to medium-sized, bisexual, rarely polygamous. Perianth tube short, cupuliform or campanulate; perianth lobes 6, subequal, entirely deciduous or upper halves deciduous but rarely entirely persistent after anthesis. Fertile stamens 9, rarely less or more, in 3 whorls; filaments of 1st and 2nd whorls eglandular, those of 3rd whorl each with 2 stalked or stalkless glands near base; anthers 4-celled, rarely those of 3rd whorl 2-celled, cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, of innermost whorl, cordate or sagittate, stipitate. Ovary always as long as style; style slender; stigma capitate or discoid, sometimes 3-lobed. Fruit fleshy, subtended by a perianth cup; perianth cup cupuliform, campanulate, or conical, truncate or undulate, irregularly denticulate or sometimes with 6 truncate lobe bases at apex.

About 250 species: tropical and subtropical Asia, Australia, and Pacific islands; 49 species (30 endemic, one introduced) in China.

*Cinnamomum sericans* Hance (J. Bot. 15: 336. 1877) was described from China but could not be treated here because no material was seen by the present authors.

In addition, numerous names in *Cinnamomum* and *Camphora* based on Chinese material were published by Lukmanoff (Nomencl. Icon. Cannel. 1889). They are listed below. Type material needs to be located and identified in order to determine the correct application of these names.

*Camphora*: *C. brongniartii* Lukmanoff (loc. cit.: 23; China and Japan); *C. decandollei* Lukmanoff (loc. cit.: 23; China: Hong Kong); *C. oldhamii* Lukmanoff (loc. cit.: 23; China: Taiwan); and *C. wrightii* Lukmanoff (loc. cit.: 24; China: Hong Kong).

*Cinnamomum*: *C. asa-grayi* Lukmanoff (loc. cit.: 9; China: Hong Kong); *C. baillonii* Lukmanoff (loc. cit.: 10; China); *C. barlowii* Lukmanoff (loc. cit.: 16; China); *C. calleryi* Lukmanoff (loc. cit.: 16; China); *C. goeringii* Lukmanoff (loc. cit.: 16; China and Indonesia: Java); *C. linnei* Lukmanoff (loc. cit.: 15; China); *C. lowii* Lukmanoff (loc. cit.: 15; China); *C. lucienii* Lukmanoff (loc. cit.: 18; China and Japan); *C. lunatum* Lukmanoff (loc. cit.: 11; China); *C. maximoviczii* Lukmanoff (loc. cit.: 19; China); *C. reinwardtii* Lukmanoff (loc. cit.: 19; China); *C. rougieri* Lukmanoff (loc. cit.: 7; China and ?Myanmar); *C. suaveolens* Lukmanoff (loc. cit.: 9; China); and *C. walteri* Lukmanoff (loc. cit.: 18; China).

*Cinnamomum esquirolii* H. Léveillé (Fl. Kouy-Tchéou, 218. 1914–1915) is a synonym of *Cocculus laurifolius* Candolle in the Menispermaceae (see p. 13).

- 1a. Perianth lobes entirely deciduous when in fruit; bud scales distinct, imbricate; leaves alternate, pinninerved or subtriplinerved, rarely trinerved, axils of lateral veins usually dome-shaped abaxially,  $\pm$  conspicuously bullate adaxially.
- 2a. Leaf blade conspicuously hairy on both surfaces or only abaxially when mature (except *C. philippinense* glabrate abaxially).
- 3a. Leaf apex caudate-acuminate or abruptly acuminate.
- 4a. Leaf blade ovate or ovate-oblong, densely villous along midrib adaxially and on whole surface abaxially when young, glabrous adaxially and grayish brown villous abaxially when mature, lateral veins 6–8 pairs; perianth lobes glabrous outside and inside; fruit ovoid, ca. 1 cm in diam. .... 1. *C. foveolatum*
- 4b. Leaf blade ovate-elliptic or lanceolate, glabrous adaxially, pubescent initially but soon glabrate abaxially, lateral veins 5 or 6(or 7) pairs; perianth lobes appressed pubescent outside, hirsute inside; fruit globose, ca. 7 mm in diam. .... 2. *C. philippinense*
- 3b. Leaf apex not caudate-acuminate or abruptly acuminate.
- 5a. Panicle glabrous or subglabrous.
- 6a. Leaf blade sparsely villous initially but very soon glabrate adaxially, very densely yellow villous initially but soon sparsely so abaxially, midrib and lateral veins impressed adaxially, elevated abaxially, axils of lateral veins inconspicuously dome-shaped abaxially; panicle 7–11 cm, 12–16-flowered, peduncle, rachis, and pedicels sparsely villous initially but soon glabrate; perianth densely puberulent outside and inside ..... 7. *C. mollifolium*
- 6b. Leaf blade finely puberulent initially but soon glabrate adaxially, very densely sericeous-puberulent abaxially, midrib and lateral veins slightly conspicuous on both surfaces, axils of lateral veins conspicuously dome-shaped abaxially; panicle (5–)10–15 cm, many flowered, peduncle and rachis glabrous, pedicels sericeous-puberulent; perianth subglabrous outside, white sericeous inside ..... 8. *C. bodinieri*
- 5b. Panicle densely hairy.
- 7a. Buds densely red-brown or gray tomentose.
- 8a. Buds, young branchlets, leaf blade abaxially, and inflorescences densely gray tomentose; axils of lateral veins in leaves inconspicuously bullate adaxially ..... 3. *C. tenuipile*
- 8b. Buds, young branchlets, leaf blade abaxially, and inflorescences densely reddish brown tomentose; axils of lateral veins in leaves conspicuously bullate adaxially ..... 4. *C. rufotomentosum*
- 7b. Panicle densely grayish brown to yellowish brown pubescent or white sericeous.
- 9a. Branchlets, leaf blade abaxially, and inflorescences densely gray-brown to yellowish brown pubescent; veinlets of leaf blade nearly invisible abaxially, axils of lateral veins inconspicuously dome-shaped abaxially; fruit covered with gray-brown or yellowish brown villous hairs ..... 5. *C. platyphyllum*
- 9b. Branchlets, leaf blade abaxially, and inflorescences densely white sericeous; veins of leaf blade  $\pm$  conspicuously visible and somewhat foveolate abaxially, axils of lateral veins shallowly dome-shaped abaxially; fruit glabrous ..... 6. *C. septentrionale*
- 2b. Leaf blade glabrous or subglabrous on both surfaces when mature.
- 10a. Panicle  $\pm$  hairy.
- 11a. Perianth cup crateriform, dilated into a disk; fruit globose ..... 9. *C. migao*
- 11b. Perianth cup shallowly cupuliform or campanulate; fruit obovoid or ovoid but not globose.
- 12a. Leaf blade lateral veins 3–5 pairs, axils always conspicuously dome-shaped abaxially; fruit obovoid, ca. 2 cm; perianth cup campanulate, 1.2–1.8 cm ..... 10. *C. illicioides*
- 12b. Leaf blade lateral veins 5–7 pairs, axils always inconspicuously dome-shaped abaxially; fruit ovoid, 1.5–2 cm; perianth cup shallowly cupuliform, 0.5–1.5 cm.
- 13a. Leaf blade oblong, sometimes ovate-oblong, 5–13  $\times$  2–5 cm, petiole 0.5–1.5 cm; fruit ca. 1.5  $\times$  0.9 cm, perianth cup ca. 0.5 cm and ca. 0.65 cm wide at apex ..... 11. *C. saxatile*
- 13b. Leaf blade ovate, 7–12.5  $\times$  2.8–7.8 cm, petiole 2–4 cm; fruit ca. 2  $\times$  1.7 cm, perianth cup ca. 1.5 cm long and broad ..... 12. *C. longipetiolatum*
- 10b. Panicle glabrous or subglabrous.
- 14a. Panicles terminal, subterminal, or sometimes axillary, very short, (2–)3–5 cm, few flowered.
- 15a. Leaf blade oblong-elliptic or ovate-elliptic, large, 7.5–9.5(–10)  $\times$  4–5(–6) cm, glabrous abaxially, axils of lateral veins dome-shaped and puberulent abaxially; perianth cup in fruit urceolate, 9–10 mm wide at apex, fruit ellipsoid, 1.5–2 cm in diam. .... 13. *C. micranthum*
- 15b. Leaf blade elliptic, smaller, 5–9  $\times$  2–4 cm, white sericeous abaxially, axils of lateral veins not dome-shaped and glabrous; perianth cup in fruit dilated, crateriform, up to 1.3 cm wide at apex, fruit globose, 1–1.5 cm in diam. .... 14. *C. brachythyrsum*
- 14b. Panicles axillary or axillary and terminal,  $\pm$  elongate, ca. 5 cm or more, many flowered.
- 16a. Leaf blade ovate-elliptic, always glaucous abaxially when dry, triplinerved, axils of lateral veins and veins conspicuously dome-shaped abaxially ..... 15. *C. camphora*

- 16b. Leaf blade variable in shape, not or inconspicuously glaucous abaxially when dry, generally pinninerved, axils of lateral veins conspicuously or inconspicuously dome-shaped abaxially, veins not dome-shaped abaxially.
- 17a. Panicle generally many flowered, 9–20 cm; leaf blade mostly ovate, apex always falcate .... 16. *C. longepaniculatum*
- 17b. Panicle rather few flowered and rather short, 4–10 cm; leaf blade variable in shape, generally elliptic-ovate or oblong-ovate.
- 18a. Leaf blade lateral vein axils inconspicuously dome-shaped abaxially and also inconspicuously bullate adaxially ..... 17. *C. parthenoxylon*
- 18b. Leaf blade lateral vein axils conspicuously dome-shaped abaxially and also conspicuously bullate adaxially.
- 19a. Leaf blade leathery, dark green and shiny adaxially, axils of lateral veins only with 1 dome abaxially ..... 18. *C. glanduliferum*
- 19b. Leaf blade papery, green and reddish brownish adaxially, axils of lateral veins with 1 or 2 domes abaxially ..... 19. *C. chartophyllum*
- 1b. Perianth lobes entirely persistent or lower parts persistent when in fruit; buds naked or bud scales indistinct; leaves opposite or subopposite, trinerved or triplinerved, axils of lateral veins not dome-shaped abaxially and not bullate adaxially.
- 20a. Leaf blade conspicuously hairy on both surfaces but especially so abaxially when young, not sparsely hairy or very rarely glabrate on adaxial surface and when mature abaxially.
- 21a. Two lower anther cells lateral; ovary hirsute; fruit ovoid, up to 2.5 cm, apiculate at apex, glabrous except apex slightly villous, exocarp scabrid; inflorescence inserted in leaf axils near apex of young branchlet, always many, clustered and approximate to each other, nearly sessile or shortly pedunculate ..... 37. *C. pittosporoides*
- 21b. Two lower anther cells not lateral; ovary glabrous, if hairy not hirsute; fruit smaller, usually below 1 cm, not distinctly apiculate at apex, glabrous; panicles terminal or axillary, usually remote from each other, distinctly long pedunculate.
- 22a. Basal lateral veins with 4–6 additional veins outside, additional veins slightly impressed adaxially and very elevated abaxially ..... 35. *C. pingbienense*
- 22b. Basal lateral veins usually without additional veins outside, if present veins not conspicuous.
- 23a. Young branchlets, inflorescence, leaf blade abaxially, and petioles covered with fine villous black-chestnut or red-brown hairs ..... 38. *C. kwangtungense*
- 23b. Young branchlets, inflorescence, leaf blade abaxially, and petioles covered with dirty yellow, yellow-brown, rusty, or gray to silver hairs.
- 24a. Plant indumentum dirty yellow, yellow-brown, or rusty pubescent, or tomentose or villous.
- 25a. Leaf blade leathery, elliptic, ovate-elliptic to lanceolate, smaller, old leaves usually below 10 × 5 cm ..... 49. *C. subavenium*
- 25b. Leaf blade leathery to thickly leathery, elliptic-ovate or oblong, larger, old leaves above 10 × 5 cm.
- 26a. Leaf blade transverse veins inconspicuous abaxially ..... 47. *C. cassia*
- 26b. Leaf blade transverse veins parallel and conspicuously elevated abaxially.
- 27a. Leaf blade elliptic or elliptic-ovate, 11–22 × 5–6.5 cm, subtriplinerved, apex caudate, base subrounded; panicle 10–15 cm; panicles, leaf blade abaxially, and petioles densely yellow-brown tomentose ..... 45. *C. javanicum*
- 27b. Leaf blade elliptic, 4.5–11 × 1.5–4 cm, triplinerved, apex abruptly shortly acuminate, base cuneate to subrounded; panicle 4–6.5 cm; panicles, leaf blade abaxially, and petioles dirty yellow hirsute-villous ..... 46. *C. appelianum*
- 24b. Plant indumentum gray to silver villous, puberulent, or sericeous.
- 28a. Pedicels filiform, 6–20 mm ..... 39. *C. wilsonii*
- 28b. Pedicels shorter, all below 6 mm.
- 29a. Perianth lobes in fruit persistent; leaf blade large, 12–35 × 5.5–8.5 cm ..... 41. *C. iners*
- 29b. Perianth lobes in fruit ± deciduous; leaf blade smaller.
- 30a. Leaf blade ovate to broadly ovate, glabrous adaxially, distinctly white sericeous when young but eventually glabrate when mature abaxially ..... 40. *C. contractum*
- 30b. Leaf blade not ovate or broadly ovate, pubescence mostly not deciduous when mature abaxially.
- 31a. Panicles axillary and terminal, several branched from base, branches elongate, inflorescence rachis ± depressed tetragonous; leaf blade oblong to lanceolate-oblong ..... 42. *C. austroyunnanense*

- 31b. Panicle axillary only, pedunculate, peduncle long or slender, inflorescence rachis not depressed tetragonous; leaf blade lanceolate, oblong-lanceolate, or elliptic, generally broader and shorter.
- 32a. Leaf blade elliptic, old ones 14–16 × 6–7.5 cm, twice as long as young ones; panicle elongate, 9–13 cm, branched three times, very patent; panicle and leaf blade abaxially appressed short gray villous ..... 48. *C. austrosinense*
- 32b. Leaf blade lanceolate or oblong-lanceolate, below 11 × 4 cm; panicle shorter, below 9 cm, branched twice, not very patent; panicle and leaf blade abaxially brownish or silver sericeous or sericeous-tomentulose.
- 33a. Leaf blade lanceolate or oblong-lanceolate, 5–10 × 1.5–2.5 cm, silver sericeous on both surfaces when young, glabrous adaxially and brownish sericeous abaxially or glabrate on both surfaces when mature, apex distinctly falcate-acuminate, petiole 0.5–1.2 cm, densely silver sericeous when young; inflorescences cymose, ca. 3 cm, solitary or in cluster, 3–5-flowered, silver sericeous; flowers green-white, 3–4 mm, pedicels ca. 5 mm ..... 43. *C. tsangii*
- 33b. Leaf blade lanceolate, 6–11 × 2.5–4 cm, green and glabrous adaxially, glaucous and densely silver appressed tomentulose when young but glabrate when mature abaxially, apex acuminate, petiole 1–1.5 cm, glabrous; inflorescences paniculate, 4–7(–9) cm, solitary, 5–12-flowered, finely pubescent; flowers white, ca. 5 mm, pedicels 4–8 mm ..... 44. *C. mairei*
- 20b. Leaf blade glabrous or sparsely hairy on both surfaces but especially so abaxially when young, glabrous or glabrate on both surfaces when old.
- 34a. Inflorescence few flowered, always subumbellate or corymbose, (1–)3–5-flowered, generally all short.
- 35a. Leaf blade small, obovate, apex obtuse or rounded, reticulate veins and veinlets conspicuously elevated on both surfaces ..... 20. *C. reticulatum*
- 35b. Leaf blade generally large, ovate, ovate-lanceolate, or lanceolate to oblong-lanceolate, apex shortly acuminate or acute, occasionally obtuse, reticulate veins and veinlets inconspicuous and not elevated on both surfaces, especially so adaxially.
- 36a. Perianth entirely glabrous outside, papillate-ciliolate on margin, sericeous inside ..... 22. *C. jensenianum*
- 36b. Perianth densely gray sericeous on both sides, not papillate-ciliolate on margin.
- 37a. Mature fruit ovoid, larger, up to 20 × 14 mm; perianth cup in fruit ca. 1 cm, up to 1.5 cm wide, truncate at apex, not dentate on margin; fruit stalk ca. 5 mm ..... 25. *C. rigidissimum*
- 37b. Mature fruit ellipsoid, smaller, ca. 11 × 5–5.5 mm; perianth cup in fruit ca. 3 mm, up to 4 mm wide, regularly truncate-dentate on margin; fruit stalk up to 9 mm ..... 21. *C. pauciflorum*
- 34b. Inflorescence subracemose or paniculate, many flowered, with floral branchlets, terminal one being 1–5-flowered cyme.
- 38a. Perianth cup in fruit truncate, undulate or irregularly dentate on margin.
- 39a. Inflorescence glabrous.
- 40a. Leaf blade ovate-oblong or oblong-lanceolate, 7–10 × 3–3.5 cm, acute to acuminate at apex, base broadly cuneate or obtuse, glabrous on both surfaces ..... 23. *C. japonicum*
- 40b. Leaf blade ovate, ovate-oblong, or ovate-lanceolate, 8–12 × (2.5–)3.5–5(–5.5) cm, shortly acuminate at apex, base obtuse to subrounded, glabrous adaxially, sparsely pubescent abaxially ..... 24. *C. osmophloeum*
- 39b. Inflorescence ± hairy.
- 41a. Inflorescence paniculate, trichotomous, many flowered, as long as leaf blade, branchlets divaricate, terminal one being 3-flowered cyme; leaf blade elliptic, reddish and glaucous abaxially, lateral veins and midrib somewhat impressed adaxially, very elevated abaxially ..... 26. *C. validinerve*
- 41b. Inflorescence subracemose or paniculate, but all much shorter than leaf blade, branchlets not divaricate; leaf blade ovate-lanceolate to oblong or elliptic-lanceolate, greenish or whitish green abaxially, lateral veins and midrib somewhat elevated adaxially, conspicuously elevated abaxially.
- 42a. Leaf blade papery; inflorescence sparsely puberulent ..... 27. *C. liangii*
- 42b. Leaf blade leathery; inflorescence sericeous-pubescent or appressed tomentose.
- 43a. Leaf blade ovate-lanceolate to oblong, (6–)8–12(–17) × (2.5–)3–5(–5.5) cm, brown adaxially, white-green or sparsely finely puberulent abaxially when dry; short panicle axillary or subterminal, generally inserted in leaf axils remote from apex of branchlet, gray sericeous-pubescent; perianth cup in fruit leathery ..... 28. *C. tonkinense*
- 43b. Leaf blade elliptic-lanceolate, 7–11 × 1.5–3.5 cm, brown-green adaxially, greenish and sparsely wrinkled pubescent but soon glabrate abaxially when dry; short panicle axillary or subterminal but not inserted in leaf axils remote from apex of branchlet, appressed tomentose; perianth cup in fruit woody ..... 29. *C. tsoi*

- 38b. Perianth cup in fruit regularly dentate on margin, teeth truncate, rounded, or acute at apex.
- 44a. Terminal branchlet of panicle bearing a 3–5-flowered cyme; basal lateral veins evanescent below leaf apex ..... 36. *C. tamala*
- 44b. Terminal branchlet of panicle bearing a 1–3-flowered cyme; basal lateral veins extending to leaf apex or up to 3/4 of leaf blade or evanescent near apex.
- 45a. Panicle short, much shorter than leaf blade; fruit ovoid, ca. 8 mm.
- 46a. Leaf blade linear to lanceolate, (3.8–)4.5–12(–15) × (0.7–)1–2(–4) cm, appressed sericeous-pubescent abaxially especially when young; peduncle slender; pedicels up to 10(–12) cm ..... 30. *C. heyneanum*
- 46b. Leaf blade ovate or oblong to lanceolate, 5.5–10.5 × 2–5 cm, glabrous or subglabrous abaxially when young; peduncle robust; pedicels 4–6 mm ..... 31. *C. burmannii*
- 45b. Panicle large, always as long as leaf blade; fruit ellipsoid or ovoid, 10–15 mm.
- 47a. Leaf blade elliptic-oblong, 12–30 × 4–9 cm, thickly leathery, trinerved or triplinerved, apex obtuse, acute, or acuminate, base subrounded or attenuate, basal lateral veins oblique, basal lateral veins and midrib reaching leaf apex; petiole 1–1.5 cm ..... 32. *C. bejolghota*
- 47b. Leaf blade ovate to oblong-ovate or ovate-lanceolate, smaller, leathery or subleathery to papery, triplinerved, apex acute or rounded but not obtuse, base acute or rounded, basal lateral veins extending up to 3/4 of leaf blade or evanescent near apex; petiole 1.5–2 cm.
- 48a. Leaf blade leathery, ovate or oblong-ovate, 8–11(–14) × 4–5.5(–9) cm, apex acute, base rounded, basal lateral veins extending up to 3/4 of leaf blade, veins and veinlets conspicuously and densely shallowly foveolate abaxially; panicles terminal; teeth of perianth cup in fruit short and rounded; branches, leaves, and bark not scented when dry; wild ... 33. *C. kotoense*
- 48b. Leaf blade leathery or subleathery to papery, ovate or ovate-lanceolate, 11–16 × 4.5–5.5 cm, apex acuminate, base acute, basal lateral veins evanescent near leaf apex, veins and veinlets slightly conspicuous but not shallowly foveolate abaxially; panicles axillary and terminal; teeth of perianth cup in fruit truncate or acute; branches, leaves, and bark strongly scented when dry; cultivated ..... 34. *C. verum*

**1. *Cinnamomum foveolatum* (Merrill) H. W. Li & J. Li, comb. nov.**

尾叶樟 *wei ye zhang*

Basionym: *Beilschmiedia foveolata* Merrill, J. Arnold Arbor. 19: 30. 1938; *Alseodaphne camphorata* (H. Léveillé) C. K. Allen; *A. caudata* Lecomte, nom. illeg. superfl.; *Cinnamomum caudiferum* Kostermans; *Litsea foveolata* (Merrill) Kostermans (1970), not Yen C. Yang & P. H. Huang (1978); *Machilus camphorata* H. Léveillé.

Small trees, up to 5 m tall, to 5 cm d.b.h. Branchlets purplish brown, terete or ± angled, densely villous initially but soon glabrate. Buds small, obconical; bud scales villous, ciliate on margin. Leaves alternate; petiole 1–1.3 cm, concave-convex, densely villous; leaf blade ovate or ovate-oblong, 9–15 × 3–5.5 cm, subleathery, densely villous abaxially and along midrib adaxially when young, villous and gray-brown abaxially and glabrous and somewhat shiny adaxially when mature, midrib and lateral veins elevated abaxially and impressed adaxially, lateral veins 6–8 pairs, arcuate, anastomosing near leaf margin, transverse veins and veinlets ± conspicuous abaxially and inconspicuous adaxially, base broadly cuneate to rounded, apex caudate-acuminate, acumen attenuate, up to 2.5 cm. Panicle axillary on young branchlets, (2.5–)5–8 cm, composed of few flowered cymes; peduncle delicate, 3–5 cm, sparsely villous. Pedicels 1–3 mm, glabrous. Flowers small. Perianth subglabrous outside and inside; perianth tube very short; perianth lobes 6, subequal, outer ones ovate, ca. 2 × 1.1 mm, inner ones broadly ovate, ca. 1.7 × 1.2 mm, all acute. Fertile stamens 9, ca. 1.2 mm (of 1st and 2nd whorls) or ca. 1.4 mm (of 3rd whorl); filaments almost as long as anthers, those of 3rd whorl each

with 2 subsessile orbicular glands at middle, others glandless; anthers 4-celled; cells introrse (of 1st and 2nd whorl) or extrorse (of 3rd whorl). Stamines 3, triangular, ca. 0.7 mm, shortly stalked; stalks villous. Ovary subglobose, ca. 0.8 mm, glabrous; style robust, ca. 0.8 mm; stigma discoid, inconspicuously 3-lobed. Fruit green when fresh, ovoid, ca. 1.3 × 1 cm, glabrous; exocarp cartilaginous, ca. 0.5 mm thick; perianth cup in fruit up to 2 cm, sulcate, corky-spotted, dilated and up to 6 mm wide at apex, undulate on margin. Fl. Apr, fr. Aug.

Valley forests, sunny places on roadsides; 800–1000(–1500) m. S Guizhou, SE Yunnan [N Vietnam].

In FRPS (31: 166. 1982) this species was treated as *Cinnamomum caudiferum* Kostermans (Reinwardtia 8: 35. 1970, “*caudifer*”), which was a nomen novum for *Alseodaphne caudata* Lecomte (Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 97. 1913), not *C. caudatum* Nees (in Wallich, Pl. Asiat. Rar. 2: 76. 1831). However, Lecomte’s name was nomenclaturally superfluous when published, and therefore illegitimate, because it included the type of *Machilus camphorata* H. Léveillé (Repert. Spec. Nov. Regni Veg. 9: 460. 1911), *Cavalerie 1002*. Kostermans was nevertheless correct to publish a nomen novum, rather than a new combination based on *M. camphorata*, because the combination *C. camphoratum* Blume (Bijdr. 571. 1826) already existed. Subsequent to FRPS, one of the present authors (Li Xiwen) has examined the holotype of *Beilschmiedia foveolata* Merrill, *Petelot 5380* (A), which is definitely referable to *C. caudiferum*. Therefore, the earliest name at specific rank, the epithet of which can be legitimately combined with *Cinnamomum*, is *B. foveolata* (1938), not *C. caudiferum* (1970).

**2. *Cinnamomum philippinense* (Merrill) C. E. Chang in H. L. Li et al., Fl. Taiwan 2: 417. 1976.**

菲律宾樟树 *fei lü bin zhang shu*

*Machilus philippinensis* Merrill, Philipp. J. Sci. 1(Suppl.

1): 56. 1906; *Cinnamomum acuminatissimum* Hayata; *C. caudatifolium* Hayata; *M. acuminatissima* (Hayata) Kanehira; *M. acuminatissima* var. *tasulinensis* J. C. Liao; *Persea acuminatissima* (Hayata) Kostermans; *P. philippinensis* (Merrill) Elmer.

Medium-sized trees, 8–15 m tall. Branchlets slender, brown or black-brown when dry; old branchlets glabrous and striate; young branchlets densely pubescent. Leaves alternate, remote; petiole 1–1.5 cm, concave-convex, pubescent initially but soon glabrate; leaf blade  $\pm$  glaucous abaxially, slightly shiny adaxially, ovate-oblong or lanceolate, 6–8.5(–9)  $\times$  2–3 cm, pubescent initially but soon glabrate abaxially, glabrous adaxially, midrib elevated abaxially, slightly impressed adaxially, lateral veins slender, 5 or 6(or 7) pairs, conspicuous abaxially, obscure adaxially, or sometimes inconspicuous on both surfaces, base cuneate, margin  $\pm$  undulate, apex abruptly acuminate or caudate-acuminate, acumen always curved. Cymose panicle subterminal, 6–10 cm, few flowered, branched; branches 3–5 cm, terminal one bearing a 3-flowered cyme; rachis and pedicels up to 4 mm, pubescent. Perianth tube campanulate, ca. 1.5  $\times$  1 mm, appressed pubescent outside, sparsely hirsute inside; perianth lobes oblong or oblong-ovate, 2–2.5  $\times$  ca. 0.8 mm, acute, pubescent like tube. Fertile stamens inserted on base of perianth lobes, those of 1st and 2nd whorls almost as long as perianth lobes; filaments complanate, hirsute at base, those of 3rd whorl each with 2 stalked oblong glands, others stalkless; anthers ovate-oblong, obtuse, 4-celled; cells introrse (of 1st and 2nd whorl) or extrorse (of 3rd whorl). Staminodes sagittate, ca. 0.5 mm, stalked; stalks ca. 0.5 mm, densely hirsute. Ovary ovoid, ca. 1.7  $\times$  0.7 mm, glabrous; style ca. 2 mm, glabrous, slightly dilated or curved at apex. Fruit globose, ca. 7 mm in diam., subtended by a cupuliform perianth cup. Fl. Mar, fr. after Apr.

Secondary forests; below 1000 m. Taiwan (Gaioxiong, Jiayi, Taidong) [Philippines].

**3. *Cinnamomum tenuipile*** Kostermans, Reinwardtia 8: 74. 1970 [*"tenuipilis"*].

细毛樟 xi mao zhang

*Alseodaphne mollis* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 153. 1921.

Small to large trees, 4–16(–25) m tall, 10–50 cm d.b.h. Bark gray. Branchlets slender; old branchlets glabrate, somewhat angled, striate; young branchlets very densely gray tomentose. Leaves alternate, somewhat clustered at apex of branchlet; petiole 1–1.5 cm, concave-convex, densely gray tomentose; leaf blade obovate or subelliptic, 7.5–13.5  $\times$  4.5–7 cm, papery, densely tomentose initially but soon glabrate abaxially, densely villous except tomentose along midrib and lateral veins initially but soon entirely glabrate adaxially, midrib and lateral veins elevated abaxially, impressed adaxially, lateral veins 6 or 7 pairs, arcuate-ascendant, evanescent near leaf margin, transverse veins elevated abaxially, slightly impressed adaxially, veinlets inconspicuous on both surfaces, base broadly cuneate or subrounded, apex rounded or obtuse or shortly acuminate. Panicle axillary or subterminal, 4.5–8.5(–12) cm, slender, 12–20-flowered, branched; branches short, 1–1.5 cm, terminal ones 3-flowered cymes; peduncle slender, ca. as long as 1/3 of inflorescence, peduncle and rachis very densely gray tomentose.

Pedicels 3–5 mm, densely gray tomentose. Flowers yellowish, small, ca. 3 mm. Perianth densely sericeous-puberulent on both sides; perianth tube obconical, ca. 1 mm; perianth lobes 6, ovate or oblong, subequal, ca. 2 mm, inner ones broader. Fertile stamens 9, ca. 1.6 mm (of 1st and 2nd whorls) or ca. 2 mm (of 3rd whorl); filaments longer than anthers, as abaxial side of anther villous, those of 3rd whorl each with 2 stalked orbicular glands, others glandless; anthers of 1st and 2nd whorls oblong-orbicular but those of 3rd whorl oblong, all 4-celled; cells introrse (of 1st and 2nd whorl) or lateral-extrorse (of 3rd whorl). Staminodes 3, ca. 1.5 mm, triangular-lanceolate, long stalked, villous. Ovary ovoid, ca. 1.2 mm, glabrous; style slender, ca. 1.5 mm; stigma discoid. Fruit subglobose, up to 1.5 cm in diam., red-purple when mature; perianth cup in fruit elongate, up to 1.5 cm, dilated into a shallow cup and up to 8 mm wide at apex, truncate or somewhat dentate on margin. Fl. Feb–Apr, fr. Jun–Oct.

• Thickets, sparse or dense forests in valleys; 500–2100 m. S and W Yunnan.

**4. *Cinnamomum rufotomentosum*** K. M. Lan, Fl. Guizhou. 2: 674. 1986.

绒毛樟 rong mao zhang

Trees. Branchlets densely reddish brown tomentose when young but glabrate when mature. Buds densely reddish brown tomentose. Leaves alternate; petiole 2–2.9 cm, reddish brown tomentose when young but glabrate when mature; leaf blade elliptic or obovate-elliptic, 15–16.5  $\times$  4–5 cm, leathery, densely reddish brown tomentose especially on veins abaxially, reddish brown tomentose along midrib when young but glabrate when mature adaxially, pinninerved, lateral veins 4–6 pairs, axils of lateral veins bullate adaxially, base cuneate to broadly cuneate, margin entire, apex acute to acuminate. Panicle terminal or axillary, 5.5–8.5  $\times$  1.5–3.5 cm; peduncle 2.5–4.5 cm, peduncle and rachis reddish brown tomentose. Pedicels 2–2.5 mm, hairy. Flowers small, ca. 4 mm. Perianth densely hairy outside and inside; perianth tube obconical, ca. 1 mm. Fertile stamens 9; filaments villous at base, those of 3rd whorl each with 2 stalked broadly ovate glands, others glandless; anthers all 4-celled; cells introrse (of 1st and 2nd whorls) or lateral-extrorse (of 3rd whorl). Staminodes sagittate, ca. 1 mm, densely yellowish brown sericeous-villous. Ovary narrowly ovoid, ca. 1 mm, glabrous; style ca. 1 mm; stigma discoid. Fl. unknown, fr. May–Jun.

• Forest margins on roadsides. SW Guizhou (Xinyi).

**5. *Cinnamomum platyphyllum*** (Diels) C. K. Allen, J. Arnold Arbor. 20: 46. 1939.

阔叶樟 kuo ye zhang

*Machilus platyphylla* Diels, Bot. Jahrb. Syst. 29: 348. 1900; *Cinnamomum chengkouense* N. Chao.

Trees, ca. 5.5 m tall. Branchlets angled, densely grayish brown or yellowish brown tomentose when young, but glabrate when mature. Buds ovoid or ellipsoid, ca. 4 mm; bud scales broadly ovate, densely gray brown or yellowish brown tomentose, apex acute. Leaves alternate; petiole 1–2.5 cm, concave-convex, grayish brown or yellowish brown tomentose; leaf

blade broadly ovate, 5.5–13 × 2.5–5.5(–7) cm, papery or sub-leathery, densely grayish brown or yellowish brown tomentulose abaxially, shiny and sparsely pubescent or glabrate adaxially, pinninerved, midrib conspicuously elevated abaxially, plane on lower part but slightly elevated on upper part adaxially, lateral veins 4–7 pairs, conspicuously elevated abaxially, slightly elevated adaxially, axils of lateral veins inconspicuously dome-shaped abaxially, slightly bullate adaxially, transverse veins and veinlets slightly conspicuous adaxially but almost invisible abaxially, base cuneate to rounded or sometimes shallowly cordate, apex acuminate or shortly acuminate. Flowers unknown. Infructescence paniculate, axillary, up to 9 cm; rachis densely grayish brown or yellowish brown tomentose. Fruit broadly obovoid or subglobose, ca. 1 cm in diam., gray-brown or yellowish brown villous; perianth cup in fruit shallowly discoid, entire, ca. 3.5 mm in diam.; stalk ca. 3 mm, gradually dilated, ca. 2 mm in diam.

• Mountain slopes; ca. 200 m. Chongqing (Chengkou, Nanchuan), NE Sichuan (Bazhong).

**6. *Cinnamomum septentrionale*** Handel-Mazzetti, Oesterr. Bot. Z. 85: 213. 1936.

银木 yin mu

*Cinnamomum inunctum* (Nees) Meisner var. *albosericum* Gamble.

Medium- to large-sized trees, 16–25 m tall, 0.6–1.5 m d.b.h. Bark gray, smooth. Branchlets slightly robust, angled, white sericeous. Buds ovoid; bud scales white sericeous, apex emarginate and apiculate. Leaves alternate; petiole 2–3 cm, plano-convex, white sericeous initially but soon glabrate; leaf blade elliptic or elliptic-oblongate, 10–15 × 5–7 cm, sub-leathery, white sericeous on whole surface but especially on veins abaxially, pubescent adaxially, pinninerved, lateral veins ca. 4 pairs, arcuate-ascendant, evanescent within leaf margin, lateral veins and midrib elevated on both surfaces, axils of lateral veins shallowly dome-shaped abaxially, slightly bullate adaxially, veins ± conspicuous on both surfaces, veinlets reticulate, shallowly foveolate under lens, base cuneate, apex shortly acuminate. Panicle axillary, up to 15 cm, many flowered, branched; branches slender, up to 6 cm, branches and rachis sericeous. Perianth tube obconical, densely white sericeous outside, ca. 1 mm; perianth lobes 6, subequal, broadly ovate, ca. 1.5 × 1.2 mm, acute, sparsely white sericeous outside but densely so inside, glandular. Fertile stamens 9, ca. 1.2 mm (of 1st and 2nd whorls) or ca. 1.5 mm (of 3rd whorl); filaments almost as long as anthers, those of 3rd whorl each with 2 orbicular-reniform glands, others glandless; anthers broadly ovate (of 1st and 2nd whorls) or ovoid-oblong (of 3rd whorl), all 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, narrowly triangular-subulate, shortly stalked, villous. Ovary ovoid, ca. 0.5 mm; style elongate, ca. 1.1 cm; stigma discoid, inconspicuous. Fruit globose, less than 1 cm in diam., glabrous; perianth cup in fruit ca. 5 mm, dilated into a disk, up to 4 mm wide at apex. Fl. May–Jun, fr. Jul–Sep.

• Valleys, mountain slopes; 600–1000 m. S Gansu, S Shaanxi, Sichuan.

The root wood, called “silver wood,” is used for making sculp-

ture; it contains a large amount of camphor. The timber of the trunk is yellow-brown, finely grained, and used for making cabinets and furniture.

**7. *Cinnamomum mollifolium*** H. W. Li, Acta Phytotax. Sin. 13(4): 45. 1975.

毛叶樟 mao ye zhang

Trees, 5–15 m tall. Bark gray-brown, finely and longitudinally striate. Branchlets slender, finely and longitudinally striate; old branchlets conspicuously compressed, very glabrous; young branchlets subterete, sparsely gray villous. Buds large, ovoid, up to 1 cm; bud scales clustered, broadly ovate to oblong, densely yellowish brown pubescent, margin ciliate, apex emarginate and apiculate. Leaves alternate; petiole 1–2 cm, concave-convex, densely villous when young but very glabrous when mature; leaf blade ovate or oblong-ovate, sometimes obovate, (4.5–)7.5–12(–16) × 3.5–5(–8) cm, leathery, densely gray villous initially soon sparsely so abaxially, sparsely villous initially soon entirely glabrous adaxially, lateral veins 4–6 pairs, ascendant, evanescent within leaf margin, lateral veins and midrib elevated abaxially, impressed adaxially, transverse veins ± conspicuous abaxially, inconspicuous or slightly impressed adaxially, veinlets inconspicuous on both surfaces, base broadly cuneate to subrounded, sometimes unequal on sides, apex acute or shortly acuminate. Panicles axillary from base of young shoot upward, basal one always leafless, all slender, 7–11 cm, 12–16-flowered, branched on upper part; branches short, 0.6–1(–1.5) cm, terminal one bearing a 3-flowered cyme; peduncle slender, 4.5–6.5 cm, sparsely villous but soon glabrate. Pedicels slender, 2.5–5 mm, sparsely villous but soon glabrate. Flowers yellowish, small, ca. 2.5 mm. Perianth densely gray puberulent outside and inside; perianth tube obconical, ca. 1 mm; perianth lobes oblong or oblong-ovate, ca. 1.5 mm, subequal, obtuse or acute at apex, outer ones ca. 1.2 mm wide, inner ones ca. 1.3 mm wide. Fertile stamens 9, ca. 1.4 mm (of 1st and 2nd whorls) or ca. 1.6 mm (of 3rd whorl); filaments complanate, villous, those of 3rd whorl longer than anthers, each with 2 shortly stalked orbicular glands at base, others almost as long as anthers, glandless; anthers broadly ovate (of 1st and 2nd whorls) or oblong (of 3rd whorl), all 4-celled, villous abaxially; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, ca. 1 mm, villous, subulate-triangular at apex, stalked. Ovary subglobose, ca. 1 mm in diam.; style ca. 2.3 mm; stigma discoid, lobed. Fruit subglobose, slightly depressed and oblique, ca. 9 mm in diam. when dry; perianth cup in fruit up to 1 cm, sulcate outside, abruptly dilated into a disk, up to 9 mm in diam. at apex, truncate on margin. Fl. Mar–Apr, fr. Sep.

• Roadsides, sparse or mixed forests; 1100–1300 m. S Yunnan.

The leafy branchlets contain essential oil, which is used for medicine and light industry. The fruit kernel contains oil and fat, which have various uses.

**8. *Cinnamomum bodinieri*** H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 369. 1912.

猴樟 hou zhang

*Cinnamomum bodinieri* var. *hupehanum* (Gamble) G. F.

Tao; *C. glanduliferum* (Wallich) Meisner var. *longipaniculatum* Lecomte; *C. hupehanum* Gamble; *C. inunctum* (Nees) Meisner var. *fulvipilosum* Yen C. Yang.

Trees, up to 16 m tall, 30–80 cm d.b.h. Bark gray-brown. Branchlets purple-brown, terete, glabrous, ± angled when young. Buds small; bud scales sparsely sericeous. Leaves alternate; petiole 2–3 cm, concave-convex, slightly puberulent; leaf blade ovate or elliptic-ovate, 8–17 × 3–10 cm, papery, glaucous and densely sericeous-puberulent abaxially, shiny and finely puberulent when young but glabrate when mature adaxially, midrib elevated abaxially, plane adaxially, lateral veins 4–6 pairs, basal ones subopposite, others alternate, all ascendant, slightly conspicuous on both surfaces, axils of lateral veins conspicuously dome-shaped abaxially, conspicuously bullate adaxially, transverse veins and veinlets reticulate, inconspicuous on both surfaces, base acute, or broadly cuneate to rounded, apex shortly acuminate. Panicles axillary or lateral, also sublateral on young branchlets, sometimes subtended by floral leaves at base, (5–)10–15 cm, several branched; branches dichotomous, angled; peduncle terete, 4–6 cm, peduncle and rachis glabrous. Pedicels filiform, 2–4 mm, sericeous-puberulent. Flowers green-white, ca. 2.5 mm. Perianth tube obconical, subglabrous outside; perianth lobes 6, ovate, ca. 1.2 mm, subglabrous outside, white sericeous inside, reflexed, soon deciduous. Fertile stamens 9, ca. 1 mm (of 1st and 2nd whorls) or a little longer (of 3rd whorl); filaments of 3rd whorl each with 2 large reniform glands near base, others glandless; anthers subglobose, all 4-celled. Staminodes 3, cordate, sessile, ca. 0.5 mm. Ovary ovoid, ca. 1.2 mm, glabrous; style ca. 1 mm; stigma capitate. Fruit green, globose, 7–8 mm in diam., glabrous; perianth cup in fruit shallowly cupuliform, ca. 6 mm wide at apex. Fl. May–Jun, fr. Jul–Aug.

• Roadsides, streamsides, sparse forests, thickets; 700–1500 m. Guizhou, Hubei, W Hunan, E Sichuan, NE and SE Yunnan.

The leafy branchlets contain essential oil. The fruit kernel contains oil and fat.

**9. *Cinnamomum migao*** H. W. Li, Acta Phytotax. Sin. 16(2): 90. 1978.

米槁 mi gao

Evergreen trees, up to 20 m tall. Bark gray-black, fissured, scented. Old branchlets subterete, slender, red-brown when dry, longitudinally striate, glabrous; young branchlets brownish, somewhat compressed, angled, gray puberulent. Buds small, ovoid; bud scales broadly ovate, gray puberulent outside. Leaves alternate; petiole slender, 1.3–3 cm, concave-convex, finely gray puberulent near base; leaf blade gray-green and opaque abaxially, yellow-green and somewhat shiny adaxially, ± reddish along midrib and lateral veins on both surfaces, ovate to ovate-oblong, 4.5–16 × 2.5–7 cm, papery, finely gray puberulent or glabrate when mature abaxially, glabrous adaxially, pinninerved, midrib extending to leaf apex, elevated on both surfaces, lateral veins 4 or 5 pairs, arcuate, evanescent near leaf margin, ± conspicuous on both surfaces, axils of lateral veins inconspicuously dome-shaped abaxially and inconspicuously bullate adaxially, transverse veins and veinlets reticulate, ± visible under lens, base broadly cuneate, subequal on sides, margin

slightly involute, apex acute to shortly acuminate. Flowers unknown. Infructescence paniculate, axillary, inserted on middle part of young branchlet, 3.5–7.5 cm, pedunculate; peduncle 1–4 cm, peduncle and rachis finely gray puberulent. Fruit green when fresh, yellow-brown when dry, globose, 1.2–1.3 cm in diam.; perianth cup in fruit crateriform, ca. 1.2 cm, finely gray puberulent and longitudinally sulcate outside, dilated into a disk, up to 1 cm wide and crenate at apex, base abruptly contracted into a column ca. 1.5 mm wide. Fr. Nov.

• Forests; ca. 500 m. W Guangxi, SE Yunnan.

**10. *Cinnamomum illicioides*** A. Chevalier, Bull. Écon. Indochine, n.s., 21: 855. 1918 [*“illicioides”*].

八角樟 ba jiao zhang

Trees, 5–18 m tall, up to 90 cm d.b.h.; corona globose. Bark brown, longitudinally deeply fissured. Young branchlets greenish; old branchlets terete, black-gray. Leaves alternate; petiole 1.3–2 cm; leaf blade brownish and opaque abaxially, greenish and shiny adaxially, ovate or narrowly ovate-elliptic, 6–11 × (2.5–)3–6 cm, subleathery, pinninerved, lateral veins 3–5 pairs, ascendant but curved near leaf margin, lateral veins and midrib elevated on both surfaces, axils of lateral veins always conspicuously dome-shaped abaxially, transverse veins and veinlets reticulate, inconspicuously foveolate on both surfaces, base broadly cuneate to subrounded, apex acute or shortly acuminate. Flowers unknown. Infructescence paniculate, axillary or subterminal, 6.5–7 cm; peduncle robust, ca. 2.5 cm, peduncle and rachis yellowish brown villous. Fruit purple-black, obovoid, ca. 2 cm; perianth cup in fruit green, campanulate, 1.2–1.8 cm long and broad. Fr. Jun–Jul.

Dense forests, valley forests; ca. 800 m. Guangxi, Hainan [N Thailand, N Vietnam].

**11. *Cinnamomum saxatile*** H. W. Li, Acta Phytotax. Sin. 13(4): 44. 1975.

岩樟 yan zhang

Trees, up to 15 m tall. Branchlets terete, slightly angled, longitudinally finely striate, black-brown when dry, glabrous, few lenticellate, lenticels brownish, orbicular to oblong; young branchlets conspicuously compressed, angled, brownish puberulent. Buds ovoid to narrowly ovoid, 2–5 mm; bud scales very densely yellowish brown tomentose. Leaves alternate or sometimes those on upper part of branchlet subopposite; petiole 0.5–1.5 cm, sulcate adaxially, yellow-brown villous when young but glabrate when mature; leaf blade greenish opaque abaxially, green shiny adaxially, oblong or sometimes ovate-oblong, 5–13 × 2–5 cm, subleathery, sparsely puberulent when young but very glabrous when mature abaxially, glabrous adaxially, pinninerved, midrib extending to leaf apex, slightly elevated adaxially but strongly so abaxially, lateral veins 5–7 pairs, arcuate, anastomosing within leaf margin, ± conspicuous on both surfaces, axils of lateral veins inconspicuously dome-shaped abaxially, transverse veins and veinlets reticulate, foveolate on both surfaces, base truncate to subrounded, always asymmetrical on sides, apex shortly acuminate, acumen obtuse, sometimes acute or irregularly lanceolate. Panicle subterminal, 3–6 cm, 6–15-

flowered, branched; branches ca. 1.5 cm, terminal one bearing a 3-flowered cyme; peduncle 1–3 cm, peduncle and rachis brownish puberulent. Pedicels 3–5 mm, densely brownish puberulent. Flowers green, up to 5 mm. Perianth sparsely brownish puberulent outside but densely so inside; perianth tube obconical, ca. 2 mm; perianth lobes 6, subequal, ovate, ca. 3 mm, acute. Fertile stamens 9, ca. 4 mm (1st and 2nd whorls) or ca. 4.5 mm (of 3rd whorl); filaments villous, those of 3rd whorl each with 2 sessile reniform glands slightly above middle; anthers of 1st and 2nd whorls ovate-oblong, ca. 2 mm, those of 3rd whorl oblong, ca. 1.6 cm, all 4-celled. Staminodes 3, ca. 2 mm, ovate-sagittate, shortly stalked; stalk villous. Ovary ovoid, ca. 1.5 × 9 mm. Fruit ca. 1.5 × 0.9 cm; perianth cup in fruit shallowly cupuliform, ca. 5 mm wide, apex ca. 6.5 mm wide, entire. Fl. Apr–May, fr. Oct.

• Thickets, forests, along water on limestone mountains; 600–1500 m. Guangxi, Guizhou, SE Yunnan.

**12. *Cinnamomum longipetiolatum*** H. W. Li, Acta Phytotax. Sin. 13(4): 47. 1975.

长柄樟 chang bing zhang

Trees, up to 35 m tall, to 60 cm d.b.h. Bark gray-black. Branchlets red-brown, subterete, ± angled, glabrous. Buds large, ovoid, up to 7 × 5 mm; bud scales clustered, ovate to broadly ovate, puberulent abaxially and on margin. Leaves alternate; petiole red-brown when dry, 2–4 cm, plano-convex, glabrous; leaf blade greenish adaxially, green adaxially, ovate, 7–12.5 × 2.8–7.8 cm, thinly leathery, pinninerved, lateral veins ca. 5 pairs, arcuate-ascendant, gradually evanescent within leaf margin, lateral veins and midrib yellow-brown on both surfaces when dry, very elevated abaxially and slightly elevated adaxially, axils of lateral veins inconspicuously dome-shaped abaxially, transverse veins and veinlets reticulate, shallowly and finely foveolate, slightly conspicuous on both surfaces, base subrounded, apex shortly acuminate. Flowers unknown. Infructescence paniculate, lateral, up to 6 cm; rachis sparsely yellow-brown puberulent. Fruit ovoid, ca. 2 × 1.7 cm, apex rounded; perianth cup in fruit shallowly cupuliform, ca. 1.5 cm long and broad, ± woody, reddish brown when dry. Fr. May–Oct.

• Sunny sites on mountain slopes; 1700–2100 m. S Yunnan.

**13. *Cinnamomum micranthum*** (Hayata) Hayata, Icon. Pl. Formosan. 3: 160. 1913.

沉水樟 chen shui zhang

*Machilus micrantha* Hayata, Icon. Pl. Formosan. 2: 130. 1912; *Cinnamomum kanehirae* Hayata; *C. micranthum* f. *kanehirae* (Hayata) S. S. Ying; *C. xanthophyllum* H. W. Li.

Trees, 14–20(–30) m tall, (25–)40–50(–65) cm d.b.h. Bark rigid, up to 4 mm thick, black-brown or reddish brownish gray outside, brown inside, irregularly and longitudinally fissured. Branchlets tea-brown, terete, longitudinally striate when dry, scattered with convex orbicular lenticels, young ones not lenticellate, ± compressed, glabrous. Terminal buds large, ovoid, ca. 6 × 5 mm; bud scales densely imbricate, broadly ovate, brown sericeous-pubescent, apex obtuse or apiculate. Leaves alternate,

always inserted on upper part of young branchlets; petiole tea-brown, 2–3 cm, plano-convex, glabrous; leaf blade yellow-brown abaxially and yellow-green adaxially when dry, oblong-elliptic or ovate-elliptic, 7.5–9.5(–10) × 4–5(–6) cm, papery to subleathery, glabrous on both surfaces, pinninerved, lateral veins 4 or 5 pairs, arcuate-ascendant, anastomosing within leaf margin, lateral veins and midrib conspicuous on both surfaces, axils of lateral veins dome-shaped and puberulent abaxially, bullate adaxially, transverse veins and veinlets reticulate, foveolate on both surfaces, base broadly cuneate to subrounded, ± slightly asymmetric on sides, margin cartilaginous and involute, apex shortly acuminate. Panicles tea-brown when dry, terminal and axillary, short, 3–5 cm, subglabrous or slightly puberulent at base, branched almost from base; branches patent, ca. 2 cm, terminal one bearing a cyme. Pedicels ca. 2 mm, slightly dilated at base, glabrous. Flowers white or purple-red, scented, ca. 2.5 mm. Perianth glabrous outside, densely villous inside; perianth tube campanulate, ca. 1.2 mm; perianth lobes 6, narrowly ovate, ca. 1.3 mm, obtuse at apex. Fertile stamens 9, ca. 1 mm; filaments villous at base, a little longer than anthers, complanate, those of 3rd whorl each with 2 shortly stalked suborbicular-reniform glands near base, others glandless; anthers broadly oblong, 4-celled; cells lateral-introrse (of 1st and 2nd whorl) or lateral-extrorse (of 3rd whorl). Staminodes 3, including stalk ca. 0.8 mm, triangular-subulate; stalk ca. 0.4 mm. Ovary ovoid, ca. 0.6 mm, abruptly attenuate into a ca. 0.6 mm long style; stigma capitate. Fruit shiny, greenish when fresh, ellipsoid, 1.5–2.2 × 1.5–2 cm, maculate, glabrous; perianth cup in fruit urceolate, ca. 9 mm, column base ca. 2 mm long and broad, abruptly dilated into a trumpet toward apex, trumpet ca. 9–10 mm wide, margin entire or undulate. Fl. Jul–Aug(–Oct), fr. Oct.

Dense forests on mountain slopes or in valleys, roadsides, riverbanks; 300–700 m (to 1800 m in Taiwan). Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Taiwan [N Vietnam].

This species is nearly always mixed with *Cinnamomum parthenoxylon* in forests, but it is easily distinguished by its bark and leaf color and short panicle.

**14. *Cinnamomum brachythyrsum*** J. Li, Acta Bot. Yunnan. 18: 53. 1996.

短序樟 duan xu zhang

Trees. Branchlets brown, terete, scattered with longitudinally fissured convex lenticels, glabrous; current year branchlets not lenticellate, longitudinally finely striate. Terminal buds long conical, ca. 5 × 2 mm, white sericeous-pubescent outside. Leaves alternate or subopposite; petiole 6–10 mm, concave-convex, glabrous; leaf blade glaucous and opaque abaxially, yellow-green and shiny adaxially, elliptic, 5–9 × 2–4 cm, leathery, white sericeous abaxially, glabrous adaxially, pinninerved, midrib elevated on both surfaces but conspicuously so abaxially, lateral veins 5–8 pairs, subconspicuous on both surfaces, axils of lateral veins not dome-shaped abaxially, transverse veins and veinlets inconspicuous on both surfaces, base broadly cuneate to subrounded, apex acute to shortly acuminate. Flowers unknown. Infructescence paniculate, subterminal or axillary, 2–3 cm; peduncle short, ca. 2 mm, peduncle and rachis sparsely sericeous-villous. Fruit dark brown, globose, 1–1.5 cm in diam., glabrous; perianth cup in fruit dilated, crateriform, up to 1.3 cm

in diam. at apex; fruit stalk 5–8 mm, sparsely sericeous-villous. Fr. May.

- Mountain slopes. SE Yunnan.

**15. *Cinnamomum camphora*** (Linnaeus) J. Presl in Berchtold & J. Presl, Pfl. Rostlin 2(2): 36. 1825.

樟 zhang

*Laurus camphora* Linnaeus, Sp. Pl. 1: 369. 1753; *Camphora officinarum* Nees; *C. officinarum* var. *glaucescens* A. Braun; *Cinnamomum camphora* var. *glaucescens* (A. Braun) Meisner; *C. camphora* var. *nominale* Hayata; *C. camphoroides* Hayata; *C. nominale* (Hayata) Hayata; *C. simondii* Lecomte; *C. taquetii* H. Léveillé; *Persea camphora* (Linnaeus) Sprengel.

Evergreen large trees, up to 30 m tall, to 3 m d.b.h.; corona broadly ovate; whole plant strongly camphor-scented. Bark yellow-brown, irregularly and longitudinally fissured. Branchlets brownish, terete, glabrous. Terminal buds broadly ovoid; bud scales broadly ovate or suborbicular, sparsely sericeous outside. Leaves alternate; petiole slender, 2–3 cm, concave-convex, glabrous; leaf blade yellow-green or gray-green and glaucous abaxially, green or yellow-green and shiny adaxially, ovate-elliptic, 6–12 × 2.5–5.5 cm, subleathery, glabrous on both surfaces or sparsely puberulent abaxially only when young, triplinerved or sometimes inconspicuously 5-nerved, midrib conspicuous on both surfaces, lateral veins 1–5(–7) pairs, basal veins with a few additional veins outside, axils of lateral veins and veins conspicuously dome-shaped and always villous abaxially, conspicuously bullate adaxially, base broadly cuneate or subrounded, margin cartilaginous, entire or sometimes undulate, apex acute. Panicle axillary, 3.5–7 cm; peduncle 2.5–4.5 cm, peduncle and rachis glabrous or gray- to yellow-brown puberulent especially on node. Pedicels 1–2 mm, glabrous. Flowers green-white or yellowish, ca. 3 mm. Perianth glabrous or puberulent outside, densely pubescent inside; perianth tube obconical, ca. 1 mm; perianth lobes elliptic, ca. 2 mm. Fertile stamens 9, ca. 2 mm; filaments pubescent. Ovary ovoid, ca. 1 mm, glabrous; style ca. 1 mm. Fruit purple-black, ovoid or subglobose, 6–8 mm in diam.; perianth cup in fruit cupuliform, ca. 5 mm, longitudinally sulcate, base ca. 1 mm wide, apex truncate and up to 4 mm wide. Fl. Apr–May, fr. Aug–Nov.

Cultivated in valleys and on mountain slopes. S of Chang Jiang river on mainland, Taiwan [Japan, Korea, Vietnam; introduced or cultivated in many countries around the world].

This species is the main source of camphor, which is derived from chipped wood of the stems and roots and also from branchlets and leaves by steam distillation. It contains a fixed volatile oil. The plant is used medicinally as a stimulant, antispasmodic, antiseptic, and rubefacient. It also is used in the manufacture of celluloid. The wood is beautifully grained, light brownish, easily polished, and used for furniture, cabinets, and interior finish in buildings.

**16. *Cinnamomum longepaniculatum*** (Gamble) N. Chao ex H. W. Li, Acta Phytotax. Sin. 13(4): 48. 1975.

油樟 you zhang

*Cinnamomum inunctum* (Nees) Meisner var. *longepaniculatum* Gamble in Sargent, Pl. Wilson. 2: 69. 1914.

Trees, up to 20 m tall, to 50 cm d.b.h. Bark gray, smooth. Branchlets terete, glabrous; young branchlets slender, ± compressed, glabrous. Buds larger, ovoid, up to 8 mm; bud scales dense, ovate, apiculate, densely gray puberulent. Leaves alternate; petiole greenish red, 2–3.5 cm, plano-convex, glabrous; leaf blade gray-green and opaque abaxially, dark green and shiny adaxially, ovate or elliptic, 6–12 × 3.5–6.5 cm, thinly leathery, glabrous on both surfaces, pinninerved, lateral veins 4 or 5 pairs, basal ones sometimes opposite and becoming triplinerved, lateral veins and midrib elevated on both surfaces, evanescent within margin, axils of lateral veins dome-shaped abaxially, bullate adaxially, transverse veins ± conspicuous on both surfaces, veinlets reticulate and foveolate under lens, base cuneate to subrounded, margin cartilaginous and involute, apex abruptly shortly acuminate to acuminate and sometimes triplinerved, falcate. Panicle axillary, slender, 9–20 cm, branched; branches slender, divaricate, up to 5 cm, dichotomous at top, each branchlet bearing a 3–7-flowered cyme; peduncle slender, 3–10 cm, peduncle and rachis glabrous. Pedicels slender, 2–3 mm, glabrous. Flowers yellowish, scented, ca. 2.5 mm, up to 4 mm in diam. when open. Perianth tube obconical, ca. 1 mm; perianth lobes 6, ovate, ca. 1.5 mm, subequal, acute, glabrous outside, densely white sericeous-villous inside, glandular. Fertile stamens 9, ca. 1.5 mm (of 1st and 2nd whorls) or ca. 1.8 mm (of 3rd whorl); filaments white villous, those of 3rd whorl each with 2 shortly stalked orbicular-reniform glands at base, others glandless; anthers ovate-oblong (of 1st and 2nd whorls) or oblong and slightly shorter than filament (of 3rd whorl), all 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, ca. 1 mm, white villous. Ovary ovoid, ca. 1 mm, glabrous; style slender, ca. 1.5 mm; stigma inconspicuous. Young fruit green, globose, ca. 8 mm in diam.; perianth cup in fruit ca. 5 mm, apex discoid-dilated, up to 4 mm wide. Fl. May–Jun, fr. Jul–Sep.

- Evergreen broad-leaved forests; 600–2000 m. Sichuan.

The branchlets and leaves contain essential oil; the main chemical constituents of the oil are cineole, linalol, and camphor. The fruit kernel contains oil and fat.

**17. *Cinnamomum parthenoxylon*** (Jack) Meisner in A. Candolle, Prodr. 15(1): 26. 1864.

黄樟 huang zhang

*Laurus parthenoxylon* Jack, Malayan Misc. 1: 28. 1820; *Camphora parthenoxylon* (Jack) Nees; *C. porrecta* (Roxburgh) Voigt; *Cinnamomum barbatoaxillatum* N. Chao; *C. porrectum* (Roxburgh) Kostermans; *C. purpureum* H. G. Ye & F. G. Wang; *L. porrecta* Roxburgh; *Parthenoxylon porrectum* (Roxburgh) Blume; *Phoebe latifolia* Champion ex Bentham; *Sassafras parthenoxylon* (Jack) Nees.

Evergreen trees; trunk straight, 10–20 m tall, up to 40 cm d.b.h. Bark dark green-brown, gray-yellow on upper part, longitudinally deeply fissured, peeling off in lamellae, 3–5 mm thick, reddish inside, camphor-scented. Branchlets green-brown, robust, terete; young branchlets gray-green, angled, glabrous. Buds ovoid; bud scales suborbicular, sericeous. Leaves alternate; petiole 1.5–3 cm, concave-convex, glabrous; leaf blade greenish or glaucous green abaxially, dark green and shiny

adaxially, usually elliptic-ovate or narrowly elliptic-ovate, 6–12 × 3–6 cm, those on fertile branchlets smaller, leathery, glabrous on both surfaces, pinninerved, lateral veins 4 or 5 pairs, lateral veins and midrib conspicuous on both surfaces, axils of lateral veins inconspicuously dome-shaped abaxially and inconspicuously bullate adaxially, transverse veins and veinlets reticulate, base cuneate or broadly cuneate, margin entire, apex usually acute or shortly acuminate. Panicle axillary on upper part of branchlet or subterminal, 4.5–8 cm; peduncle 3–5.5 cm, peduncle and rachis glabrous. Pedicels slender, up to 4 mm, glabrous. Flowers green-yellow, small, ca. 3 mm. Perianth glabrous outside, pubescent inside; perianth tube obconical, ca. 1 mm; perianth lobes narrowly elliptic, ca. 2 × 1.2 mm, punctate, obtuse. Fertile stamens 9, ca. 1.5 mm (of 1st and 2nd whorls) or ca. 1.7 mm (of 3rd whorl); filaments pubescent, those of 3rd whorl each with 2 shortly stalked subcordate glands, others glandless; anthers ovate or oblong, ca. 0.7 mm, all 4-celled. Staminodes 3, triangular-cordate, including stalk less than 1 mm; stalk pubescent. Ovary ovoid, ca. 1 mm, glabrous; style curved, ca. 1 mm; stigma discoid, inconspicuously 3-lobed. Fruit black, globose, 6–8 mm in diam.; perianth cup in fruit red, narrowly obconical, ca. 1 cm or less, longitudinally striate, base ca. 1 mm wide. Fl. Mar–May, fr. Apr–Oct.

Evergreen broad-leaved forests, thickets; below 1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

The roots, bark, wood, and leafy branchlets contain volatile oil and camphor. The fruit kernel contains oil and fat (up to 60%), which are used in soap manufacture. The wood is finely grained and used for furniture and cabinets. The leaves are used as feed for the silkworm native to Hainan.

**18. *Cinnamomum glanduliferum*** (Wallich) Meisner in A. Candolle, *Prodr.* 15(1): 25. 1864.

云南樟 yun nan zhang

*Laurus glandulifera* Wallich, *Trans. Med. Soc. Calcutta* 1: 45. 1825; *Camphora glandulifera* (Wallich) Nees; *Cinnamomum cavaleriei* H. Léveillé; *Machilus dominii* H. Léveillé; *M. mekongensis* Diels.

Evergreen trees, 5–15(–20) m tall, up to 30 cm d.b.h. Bark gray-brown, longitudinally deeply fissured, peeling off in lamellae, red-brown inside, camphor-scented. Branchlets green-brown, robust, terete; young branchlets angled. Buds ovoid, large; bud scales suborbicular, densely sericeous. Leaves alternate; petiole 1.5–3(–3.5) cm, robust, concave-convex, subglabrous; leaf blade usually glaucous and greenish abaxially, dark green and shiny adaxially, very variable in shape, elliptic to ovate-elliptic or lanceolate, 6–15 × 4–6.5 cm, those on fertile branchlets smaller, leathery, puberulent abaxially only when young, glabrous on both surfaces or glabrous adaxially and ± puberulent abaxially when mature, pinninerved or occasionally subtriplinerved, lateral veins 4 or 5 pairs, lateral veins and midrib conspicuous on both surfaces, oblique, gradually evanescent within leaf margin, axils of lateral veins dome-shaped and hairy or glabrate abaxially, conspicuously bullate adaxially, transverse veins and veinlets reticulate, fine and inconspicuous, base cuneate or broadly cuneate to subrounded, sometimes unequal

on sides, apex generally acute to shortly acuminate. Panicle axillary, shorter than leaf blade, 4–10 cm; peduncle 2–4 cm, peduncle and rachis glabrous. Pedicels short, 1–2 mm, glabrous. Flowers small, up to 3 mm, yellowish. Perianth sparsely white puberulent outside, pubescent inside; perianth tube obconical, ca. 1 mm; perianth lobes 6, broadly ovate, subequal, ca. 2 × 1.7 mm, acute. Fertile stamens 9, ca. 1.4 mm (of 1st and 2nd whorls) or ca. 1.6 mm (of 3rd whorl); filaments complanate, pubescent, those of 3rd whorl each with 2 shortly stalked cordate glands near base, others glandless; anthers ovate, almost as long as filaments (of 1st and 2nd whorls) or oblong and ca. 1 mm (of 3rd whorl), all 4-celled; cells introrse (of 1st and 2nd whorl) or extrorse (of 3rd whorl). Staminodes 3, narrowly triangular, including stalk less than 1 mm; stalk pubescent. Ovary ovoid, ca. 1.2 mm, glabrous; style slender, ca. 1.2 mm; stigma discoid, inconspicuously 3-lobed. Fruit black, globose, up to 1 cm in diam.; perianth cup in fruit red, narrowly obconical, ca. 1 cm, longitudinally striate, base ca. 1 mm wide, apex up to 6 mm wide and undulate on margin. Fl. Mar–May, fr. Jul–Sep.

Evergreen broad-leaved forests on hilly land; 1500–2500(–3000) m. S Guizhou, S and SW Sichuan, SE Xizang, C and N Yunnan [Bhutan, India, Malaysia, Myanmar, Nepal].

The leafy branchlets contain volatile oil and camphor. The wood is used for furniture. The fruit kernel fat is used for industrial purposes. The bark and roots are used medicinally.

**19. *Cinnamomum chartophyllum*** H. W. Li, *Acta Phytotax. Sin.* 13(4): 49. 1975.

坚叶樟 jian ye zhang

Trees, up to 20 m tall. Bark gray-brown, scented. Branchlets green, terete; young branchlets sometimes red-brown, ± angled, longitudinally striate, very glabrous. Leaves alternate; petiole 1–2 cm, sulcate adaxially, glabrous; leaf blade green, greenish and opaque abaxially and ± reddish brown and shiny adaxially when dry, variable in shape, broadly ovate, ovate-oblong to oblong, or lanceolate, 6–14 × 1.5–7.5 cm, papery, very glabrous on both surfaces, pinninerved, midrib extending to leaf apex, midrib and lateral veins elevated on both surfaces, lateral veins ca. 5 pairs, arcuate, anastomosing within leaf margin, axils of lateral veins glabrous and conspicuously dome-shaped with 1 or 2 domes abaxially, bullate adaxially, transverse veins and veinlets reticulate, conspicuous on both surfaces, base broadly cuneate to subrounded, always unequal on sides, margin entire, apex obtuse or acute to shortly acuminate. Panicle axillary, usually 4–6 cm, 7–11-flowered, branched; branches short, each bearing a 3-flowered cyme; peduncle 2–4 cm, peduncle and rachis glabrous. Pedicels 2–3.5 mm, very glabrous. Flowers yellow, small, ca. 2 mm. Perianth very glabrous outside, densely sericeous-villous inside; perianth tube obconical, ca. 0.5 mm; perianth lobes 6, broadly ovate, subequal, ca. 1.5 × 1.1 mm, obtuse. Fertile stamens 9, ca. 1 mm (of 1st and 2nd whorls) or ca. 1.2 mm (of 3rd whorl); filaments complanate, villous, those of 3rd whorl each with 2 sessile glands near base, others glandless; anthers broadly ovate and almost as long as filaments (of 1st and 2nd whorls) or oblong and slightly shorter than filaments (of 3rd whorl), all obtuse, 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, short, spatulate, ca. 0.6 mm, stalked. Ovary

ovoid, ca. 0.8 mm, glabrous; style short, ca. 0.7 mm; stigma inconspicuous. Fruit subglobose, ca. 8 mm in diam., apiculate; perianth cup in fruit dilated, up to 12 mm, longitudinally sulcate when dry, apex ca. 7 mm wide. Fl. Jun–Aug, fr. Aug–Dec.

• Sparse forests beside ditches on mountain slopes, dense valley forests; 300–600 m. S and SE Yunnan.

**20. *Cinnamomum reticulatum*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 239. 1911.

网脉桂 wang mai gui

Small trees. Branchlets reddish, divaricate, scabrid, glabrous. Terminal bud ovoid; bud scales scarious, glabrous. Leaves subopposite; petiole 1–1.5 cm; leaf blade glaucous and opaque abaxially, dark green and shiny adaxially, obovate, 4–6 × 2–3 cm, subleathery, trinerved or triplinerved, midrib extending to leaf apex, with 2 or 3 additional veins on each side, transverse veins and veinlets conspicuously reticulate and elevated on both surfaces, base attenuate, margin involute, apex obtuse or rounded. Inflorescence axillary, corymbose, (1.5–)2–5 cm, (1–)3–5-flowered, glabrous. Perianth lobes 6, ovate, subequal, ca. 3.5 mm, 5-nerved, few white punctate outside, appressed pubescent inside, obtuse at apex. Fertile stamens 9, subequal, ca. 3 mm; filaments of 1st and 2nd whorls eglandular and spatulate, but those of 3rd whorl each with 2 sessile ovoid ca. 1 mm glands near middle. Staminodes 3, sagittate, ca. 2.5 mm, stalked. Ovary robust; style ca. 3 mm; stigma discoid-dilated, emarginate at apex. Fruit ovoid, ca. 1 × 0.7 cm; perianth cup in fruit dilated, truncate at apex. Fr. Nov.

• Low elevations. Taiwan.

**21. *Cinnamomum pauciflorum*** Nees in Wallich, Pl. Asiat. Rar. 2: 75. 1831.

少花桂 shao hua gui

*Cinnamomum calcareum* Y. K. Li; *C. petrophilum* N. Chao; *C. recurvatum* (Roxburgh) Wight; *Laurus recurvata* Roxburgh.

Trees, 3–14 m tall, up to 30 cm d.b.h. Bark yellow-brown, white lenticellate, scented. Branchlets subterete, longitudinally striate, glabrous; young branchlets ± tetragonus, subglabrous or sparsely fine pubescent. Bud ovoid, small, ca. 2 mm; bud scales rigid, sparsely puberulent outside. Leaves alternate; petiole up to 12 mm, concave-convex, subglabrous; leaf blade glaucous green and opaque abaxially, green and ± shiny adaxially, ovate or ovate-lanceolate, (3.5–)6.5–10.5 × (1.2–)2.5–5 cm, thickly leathery, densely or sparsely gray sericeous when young but glabrate or glabrous when mature abaxially, glabrous adaxially, trinerved or triplinerved, midrib and basal lateral veins elevated on both surfaces, basal lateral veins opposite, arising at or up to 10 mm above leaf base, arcuate-ascendant, evanescent near leaf margin, with few oblique veins outside, these veins interconnected within leaf margin, transverse veins ± conspicuous, veinlets ± reticulate under lens, base broadly cuneate to subrounded, margin involute, apex shortly acuminate. Panicle axillary, always corymbose, 2.5–5(–6.5) cm, usually much shorter than leaf blade, 3–5(–7)-flowered; peduncle 1.5–4 cm, elongate, bilaterally compressed, peduncle and rachis sparsely

gray puberulent. Pedicels 5–7 mm, gray puberulent. Flowers yellow-white, 4–5 mm. Perianth shortly gray sericeous outside and inside; perianth tube obconical, ca. 1 mm; perianth lobes 6, oblong, subequal, 3–4 mm, acute. Fertile stamens 9, ca. 2.5 mm (of 1st and 2nd whorls) or ca. 2.8 mm (of 3rd whorl); filaments sparsely villous, complanate, those of 3rd whorl each with 2 shortly stalked orbicular-reniform glands; anthers ovate-oblong and almost as long as filament (of 1st and 2nd whorls) or oblong and ca. 1/2 as long as filament (of 3rd whorl), all 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, ca. 1.7 mm, long stalked, cordate at apex. Ovary ovoid, ca. 1 mm; style curved, ca. 2 mm; stigma discoid. Fruit ellipsoid, ca. 11 × 5–5.5 mm, purple-black when mature, corky-maculate, obtuse at apex; perianth cup in fruit shallowly cupuliform, ca. 3 × 4 mm, regularly truncate toothed on margin; fruit stalk up to 9 mm, slightly dilated at apex. Fl. Mar–Aug, fr. Sep–Oct.

Sparse or dense forests on hilly land of calcareous or sandy rocks, valley forests; 400–1800(–2200) m. Guangdong, Guangxi, Guizhou, Hubei, W Hunan, Jiangxi, E Sichuan, NE Yunnan [India, Nepal].

The bark and roots are used as medicine for abdominal pain. The leafy branchlets contain volatile oil (ca. 35%), the main chemical constituent of which is safrole (80%–95%).

**22. *Cinnamomum jensenianum*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 58: 63. 1921.

野黄桂 ye huang gui

*Cinnamomum pauciflorum* Chun ex Hung T. Chang (1959), not Nees (1831).

Small trees, less than 6 m tall. Bark gray-brown, cassia-scented. Branchlets flexuous; 2-year-old branchlets brown and densely denticulate; 1-year-old branchlets angled; current year branchlets black when dry, very glabrous. Bud fusiform; bud scales crustaceous, ca. 6 mm, acute, shortly sericeous outside. Leaves always subopposite; leaf blade opaque and waxy but not glaucous when fresh abaxially, green and shiny adaxially, lanceolate or oblong-lanceolate, 5–10(–20) × 1.5–3(–6) cm, thickly leathery, pulverulent-puberulent when young but glabrous when mature abaxially, glabrous adaxially, triplinerved, midrib and basal lateral veins elevated on both surfaces, basal lateral veins arising 2–18 mm above leaf base, excurrent into upper 1/3 along leaf margin and almost reaching leaf apex, very rarely with basal additional veins near leaf margin, transverse veins numerous, arcuate, delicate adaxially and barely elevated abaxially or inconspicuous on both surfaces, base broadly cuneate to subrounded, margin thick and entire, apex caudate-acuminate. Inflorescence corymbose, 2–5-flowered, usually 3–4 cm, always remote, or even 1- or 2-flowered on base of current year branchlet, branchlet not elongate; peduncle usually 1.5–2.5 cm, slender, black when dry, glabrous; bracts and bracteoles ca. 2 mm, caducous. Pedicels 5–10(–20) mm, straight, gradually dilated toward apex, black when dry. Flowers yellow or white, ca. 4(–8) mm. Perianth very glabrous outside, sericeous inside, papillate-ciliolate on margin; perianth tube very short, 1.5(–2) mm; perianth lobes 6, obovate, subequal, 2–5(–6) × 1.7(–2.2) mm, acute. Fertile stamens 9; filaments of 1st and 2nd whorls broad and complanate, pilose at

base, glandless, but those of 3rd whorl slender, pilose, each with 2 discoid glands near middle; anthers of 1st and 2nd whorls ovate-oblong, glabrous, but those of 3rd whorl oblong, ca. 1/2 as long as those of 1st and 2nd whorls, sparsely villous. Staminodes 3, triangular, ca. 1.7 mm, stalked; stalk villous. Ovary ovoid; style twice as long as ovary, glabrous; stigma discoid, irregularly lobed. Fruit ovoid, up to 1(-1.2) × 6(-7) mm, apiculate, glabrous; perianth cup in fruit obovoid, ca. 6 × 8 mm, dentate, teeth truncate at apex. Fl. Apr–Jun, fr. Jul–Aug.

• Evergreen broad-leaved forests or bamboo forests on mountain slopes; 500–1600 m. Fujian, Guangdong, Hubei, W Hunan, Jiangxi, Sichuan.

The bark is sweet and bitter and is used as a medicine similar to cassia bark.

**23. *Cinnamomum japonicum*** Siebold, Verh. Batav. Genootsch. Kunsten 12: 23. 1830.

天竺桂 *tian zhu gui*

*Cinnamomum acuminatifolium* Hayata; *C. chekiangense* Nakai; *C. chenii* Nakai; *C. insularimontanum* Hayata; *C. japonicum* var. *chekiangense* (Nakai) M. B. Deng & G. Yao; *C. macrostemon* Hayata var. *pseudolouirei* (Hayata) Yamamoto; *C. pedunculatum* Nees; *C. pseudolouirei* Hayata.

Evergreen trees, 10–15 m tall, 30–35 cm d.b.h. Branchlets red or red-brown, slender, terete, very glabrous, scented. Leaves subopposite or those on upper part of branchlet alternate; petiole red-brown, robust, concave-convex, glabrous; leaf blade gray-green and opaque abaxially, green and shiny adaxially, ovate-oblong or oblong-lanceolate, 7–10 × 3–3.5 cm, leathery, glabrous on both surfaces, triplinerved, midrib extending to leaf apex, with a few additional veins on upper part of leaf blade, basal lateral veins oblique, arising 1–1.5 cm above leaf base, with a few additional veins outside, sometimes a pair of slightly conspicuous additional veins arising from leaf base, midrib and lateral veins elevated on both surfaces, transverse veins and veinlets finely foveolate abaxially and conspicuously densely reticulate adaxially, base broadly cuneate or obtuse, margin entire, apex acute to acuminate. Panicle axillary, 3–4.5(-10) cm, branched, apex of branch bearing a 3–5-flowered cyme; peduncle 1.5–3 cm, glabrous. Pedicels 5–7 mm, glabrous. Flowers ca. 4.5 mm. Perianth tube obconical, short, ca. 1.5 mm; perianth lobes 6, ovate, ca. 3 × 2 mm, acute, glabrous outside, villous inside. Fertile stamens 9, included; filaments ca. 2 mm, those of 3rd whorl each with 2 orbicular-reniform glands near middle, others glandless; anthers ovate-elliptic, obtuse, 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3. Ovary ovoid, ca. 1 mm, slightly puberulent; style a little longer than ovary; stigma discoid. Fruit oblong, ca. 7 × 5 mm, glabrous; perianth cup in fruit shallowly cupuliform, apex very open and up to 5 mm wide, entire or shallowly dentate on margin, base abruptly contracted into a slender stalk. Fl. Apr–May, fr. Jul–Sep.

Evergreen broad-leaved forests on low hills, near seashores; 300–1000 m. Anhui, Fujian, Jiangsu, Jiangxi, Taiwan, Zhejiang [Japan, Korea].

*Cinnamomum macrostemon* Hayata (Icon. Pl. Formosan. 3: 160. 1913) was described from Taiwan. Although Li (Woody Fl. Taiwan,

204. 1963) regarded it as a synonym of *C. japonicum*, the present authors prefer to leave it unplaced because they have seen no material.

The leafy branchlets and bark contain volatile oil, which is a source of perfume. The fruit kernel contains oil and fat, which are used in soap manufacture. The wood is hard and durable and is used for house construction and furniture.

**24. *Cinnamomum osmophloeum*** Kanehira, Formos. Trees, 428. 1917.

土肉桂 *tu rou gui*

Medium-sized trees. Bark scented. Branchlets slender, glabrous. Leaves alternate or subopposite; petiole ca. 1 cm, complanate, glabrous; leaf blade ovate, ovate-oblong, or ovate-lanceolate, 8–12 × (2.5–)3.5–5(-5.5) cm, thinly leathery, glaucous and pubescent initially but soon glabrate abaxially, glabrous adaxially, subtriplinerved, basal lateral veins extending to ca. 2/3 of leaf blade, other lateral veins ca. 3 pairs, slightly conspicuous abaxially, inconspicuous adaxially, base obtuse to subrounded, apex shortly acuminate. Panicle cymose, few flowered, lax, axillary. Pedicels slender, 8–12 mm, slightly hirsute. Perianth tube campanulate, ca. 1 mm; perianth lobes oblong, ca. 4 mm, obtuse, pubescent outside, villous inside. Fertile stamens 9; filaments of 1st and 2nd whorls ca. 1.5 mm, subglabrous, those of 3rd whorl each with 2 glands at middle, villous at base; anthers 4-celled. Staminodes 3, sagittate, pilose adaxially, stalked; stalks subglabrous. Ovary ovoid, ca. 1 mm, glabrous; style ca. 1.8 mm, glabrous; stigma discoid. Fruit ovoid, ca. 10 × 5 mm, with persistent lobe parts at apex. Fl. Apr–May, fr. Jul–Sep.

• Evergreen broad-leaved forests; 400–1500 m. Taiwan (Gaoxiang, Nantou, Taibei, Taizhong).

**25. *Cinnamomum rigidissimum*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1959(1): 19. 1959.

卵叶桂 *luan ye gui*

*Cinnamomum brevipedunculatum* C. E. Chang; *C. ovatum* C. K. Allen (1939), not Lukmanoff (1889).

Small- to medium-sized trees, 3–22 m tall, ca. 50 cm d.b.h. Bark brown. Branchlets gray-brown or blackish brown, terete, glabrous, resin-scented, slightly compressed, angled especially when young, gray-brown tomentose when young. Leaves opposite; petiole (0.8–)1–2 cm, complanate, slightly sulcate adaxially, glabrous; leaf blade greenish and opaque abaxially, green and shiny adaxially, ovate, broadly ovate, or elliptic, (3.5–)4–7(-8) × (2.2–)2.5–4(-6) cm, leathery or thickly leathery, glabrous on both surfaces or sparsely puberulent initially but soon glabrate abaxially, triplinerved, midrib and basal lateral veins elevated on both surfaces, basal lateral veins arising at or up to 5(-7) mm above leaf base, arcuate, evanescent below leaf apex, with a few inconspicuous additional veins outside, sometimes also with additional delicate short veins from leaf base, transverse veins ± visible on both surfaces, veinlets reticulate and inconspicuous on both surfaces, base broadly cuneate or obtuse to subrounded, apex obtuse or acute. Inflorescence axillary on current year branchlets, subumbellate, 3–6(-8.5) cm, 3–7(-11)-flowered; peduncle 2–4 cm, sparsely appressed pubescent. Flowers unknown. Mature fruit ovoid, ca. 2

× 1.4 cm, cream-yellow; stalk ca. 5 mm, subterete; perianth cup in fruit greenish to green-blue, shallowly cupuliform, ca. 1 cm, apex truncate, ca. 1.5 cm wide.

• Forests by streams; below 1700 m. Guangdong, Guangxi, Hainan, Taiwan, Yunnan.

**26. *Cinnamomum validinerve*** Hance, J. Bot. 20: 80. 1882.

粗脉桂 cu mai gui

Trees. Branchlets angled, blackish when dry, glabrous or finely pubescent toward apex. Petiole up to 1.3 cm; leaf blade reddish and glaucous abaxially, shiny adaxially, elliptic, 4–9.5 × 2–3.5 cm, thickly leathery, triplinerved, midrib and lateral veins very elevated abaxially, slightly impressed adaxially, lateral veins evanescent toward leaf apex, transverse veins entirely inconspicuous abaxially, almost inconspicuous adaxially, base cuneate, apex abruptly shortly acuminate, acumen short and obtuse. Panicle laxly flowered, trichotomous, as long as leaf, branched; branches divaricate, apex of branch bearing a 3-flowered cyme. Pedicel very short. Perianth finely gray sericeous; perianth lobes ovate, slightly obtuse. Fruit unknown. Fl. Jul.

• Forests. Guangdong, Guangxi.

**27. *Cinnamomum liangii*** C. K. Allen, J. Arnold Arbor. 20: 58. 1939.

软皮桂 ruan pi gui

Trees, 4–20 m tall. Branches terete, striate, scented; branchlets glabrous, angled. Leaves opposite or subopposite; petiole dark brown, 0.5–0.7(–1) cm, concave-convex, glabrous; leaf blade opaque and greenish white abaxially, shiny and brownish green when dry adaxially, elliptic-lanceolate, 5.5–11 × 1.6–4(–5) cm, papery, glabrous on both surfaces, triplinerved, midrib and basal lateral veins elevated on both surfaces, basal lateral veins arising at or up to 5 mm above leaf base, arcuate, evanescent under leaf apex, transverse veins undulate and parallel, ± conspicuous on both surfaces, veinlets irregularly reticulate, ± conspicuous abaxially, base acute or subrounded, apex acuminate. Panicle axillary on upper part of branchlet, subracemose, 3–5.5 cm; peduncle short, 2–3(–10) mm, peduncle and rachis sparsely puberulent; bracts ovate, ca. 2 mm, obtuse or acute, densely puberulent outside but sparsely so inside, bracteoles lanceolate-subulate, ca. 1 mm, acute, curved, with same indumentum as bracts. Pedicels 3–5(–7) mm, slender, sparsely pubescent. Flowers yellowish, ca. 5.5 mm, scented. Perianth sparsely gray puberulent outside and inside; perianth tube obconical, ca. 1.5 mm; perianth lobes oblong, subequal, ca. 4 × 2 mm, acute. Fertile stamens 9, ca. 3.5 mm (of 1st and 2nd whorls) or ca. 3.8 mm (of 3rd whorl); filaments villous, those of 3rd whorl each with 2 shortly stalked cordate-reniform glands at middle; anthers of 1st and 2nd whorls oblong, a little shorter than filaments, but those of 3rd whorl ca. 1/2 as long as filaments, all 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, triangular-cordate, ca. 0.8 mm, stalked; stalk ca. 1.2 mm, villous. Ovary ovoid, ca. 1.5 mm, glabrous; style slightly dilated, flexuous, ca. 1.5 mm; stigma discoid, irregularly lobed. Fruit ellipsoid, up to 1.3 ×

0.7–0.8 cm, apiculate, glabrous; perianth cup in fruit ca. 3 mm, irregularly dentate. Fl. Feb–Mar, fr. May.

Valley thickets, evergreen broad-leaved forests. Guangdong, Guangxi, Hainan [N Vietnam].

**28. *Cinnamomum tonkinense*** (Lecomte) A. Chevalier, Bull. Écon. Indochine, n.s., 21: 856. 1918.

假桂皮树 jia gui pi shu

*Cinnamomum albiflorum* Nees var. *tonkinense* Lecomte, Fl. Indo-Chine 5: 115. 1914.

Trees, up to 30 m tall, to 45 cm d.b.h. Bark gray-brown. Two-year-old branchlets dark brown, terete, glabrous; 1-year-old branchlets pubescent initially soon glabrate. Leaves alternate or those on upper part of branchlet subopposite; petiole 0.5–1.5 cm, somewhat sulcate adaxially, glabrous; leaf blade whitish green and opaque abaxially, shiny and green but brownish when dry adaxially, ovate-oblong or ovate-lanceolate to oblong, (6–)8–12(–17) × (2.5–)3–5(–5.5) cm, leathery, sparsely finely pubescent abaxially, glabrous adaxially, triplinerved, midrib and basal lateral veins elevated abaxially, inconspicuous adaxially, extending to leaf apex, basal lateral veins arising 5–10(–15) mm above leaf base, each with 6 or 7 additional veins outside, sometimes also each with 1 additional vein at base near leaf margin, transverse veins undulate, ± conspicuous abaxially and inconspicuous adaxially, base broadly cuneate to subrotund, margin entire, apex shortly acuminate or obtuse. Panicle axillary or subterminal, always axillary in leaf axils remote from apex of branchlet, short, 2.5–6 cm, densely many flowered, branched, apex of branch bearing a 3-flowered cyme; peduncle 0.5–2 cm, peduncle and rachis gray sericeous-pubescent. Pedicels 5–7 mm, gray sericeous-pubescent. Flowers white, up to 5 mm. Perianth sparsely pubescent outside but densely so inside; perianth tube obconical, ca. 2 mm; perianth lobes ovate, acute, ca. 6 mm, outer ones broader, ca. 3.5 mm wide, inner ones ca. 3 mm wide. Fertile stamens 9, ca. 3 mm (of 1st and 2nd whorls) or ca. 4 mm (of 3rd whorl); filaments pubescent, those of 3rd whorl each with 2 sessile reniform glands slightly above middle, others glandless; anthers pubescent abaxially, slightly longer than filaments, ovate (of 1st and 2nd whorls) or oblong (of 3rd whorl), all 4-celled; cells introrse (of 1st and 2nd whorls) or lateral-extrorse (of 3rd whorl). Staminodes 3, sagittate, ca. 2 mm, shortly stalked. Ovary ovoid, ca. 1.5 mm, sparsely puberulent; style ca. 3.5 mm; stigma discoid. Fruit ovoid, ca. 1.3 × 9 mm, apex truncate and entire. Fl. Apr–May, fr. Oct.

Humid sites among evergreen broad-leaved forests; 1000–1800 m. SE Yunnan [N Vietnam].

**29. *Cinnamomum tsoi*** C. K. Allen, J. Arnold Arbor. 20: 57. 1939.

平托桂 ping tuo gui

Trees, ca. 12 m tall, up to 45 cm d.b.h. Bark gray, scented. Branches terete, glabrous, resin-scented; branchlets somewhat compressed, angled, young part brown tomentose and conspicuously angled. Leaves subopposite; petiole 6–10 mm, sulcate adaxially, sparsely tomentose initially but soon glabrate; leaf

blade brownish green and opaque abaxially, brown-green when dry and shiny adaxially, elliptic-lanceolate, 7–11 × 1.5–3.5 cm, leathery, sparsely undulate pubescent initially but soon glabrate abaxially, glabrous adaxially, triplinerved, midrib and basal lateral veins conspicuous abaxially, somewhat elevated adaxially, basal lateral veins with few additional veins outside, transverse veins and veinlets ± conspicuous abaxially, inconspicuous adaxially, base cuneate, margin entire, apex acuminate. Panicle axillary or subterminal, 2–3.5 cm; rachis appressed tomentose. Flowers unknown. Fruit ovoid, ca. 1.5 cm, less than 1 cm wide, apiculate; perianth cup in fruit shallowly cupuliform, ca. 0.5 cm, woody, entire. Fr. Oct–Dec.

• Evergreen broad-leaved forests; below 2400 m. Guangxi (Mengshan), Hainan.

The wood is finely grained, soft, light, and is used for furniture and house construction.

**30. *Cinnamomum heyneanum*** Nees in Wallich, Pl. Asiat. Rar. 2: 76. 1831.

狭叶桂 xia ye gui

*Cinnamomum burmannii* (Nees & T. Nees) Blume var. *angustifolium* (Hemsley) C. K. Allen; *C. burmannii* f. *heyneanum* (Nees) H. W. Li; *C. linearifolium* Lecomte; *C. pedunculatum* Nees var. *angustifolium* Hemsley.

Small trees. Branchlets slender, glabrous. Leaves alternate or subopposite; petiole terete, ca. 1 cm, glabrous; leaf blade glaucous green and opaque abaxially, green and shiny adaxially, linear to linear-lanceolate or lanceolate, (3.8–)4.5–12(–15) × (0.7–)1–2(–4), papery, appressed sericeous-pubescent initially soon glabrate abaxially, glabrous adaxially, triplinerved, midrib extending to leaf apex, with additional veins on upper part, midrib and basal lateral veins very elevated abaxially, conspicuous adaxially, basal lateral veins arising 3–8 mm above leaf base, evanescent toward leaf apex, transverse veins and veinlets slightly elevated on both surfaces, base attenuate, apex acuminate. Panicle axillary, few flowered, shorter than leaf, densely gray pubescent, branched, apex of branch bearing a 3-flowered cyme; peduncle slender, 5–9 cm. Pedicels slender, up to 10(–12) mm. Flowers green-white, ca. 5 mm. Perianth lobes 6, oblong, ca. 3 mm, sparsely villous outside. Fertile stamens 9, ca. 3.5 mm; filaments villous at base, those of 1st and 2nd whorls glandless, those of 3rd whorl each with 2 shortly stalked glands; anthers oblong, all 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Stamines 3, triangular, stalked. Ovary ovoid; style almost as long as ovary; stigma peltate. Fruit unknown. Fl. Apr(–May).

Thickets on mountain slopes along rivers; 100–500 m. Guangxi, SW Guizhou, W Hubei, E Sichuan, SE Yunnan [India].

The leafy branchlets contain volatile oil. Three types of the oil are found in Yunnan: safrole type (safrole 97%–99%), camphor-safrole type (camphor ca. 49%, safrole ca. 21%), and camphor-cineole type (camphor ca. 35%, cineole ca. 34%).

**31. *Cinnamomum burmannii*** (Nees & T. Nees) Blume, Bijdr. 569. 1826.

阴香 yin xiang

*Laurus burmannii* Nees & T. Nees, Cinnam. Disp. [Amoen. Bot. Bonn. Fasc. 1:] 57. 1823; *Cinnamomum chinense* Blume; *C. dulce* (Roxburgh) Sweet; *C. hainanense* Nakai; *C. kiamis* Nees; *C. miaoshanense* S. K. Lee & F. N. Wei; *L. dulcis* Roxburgh.

Trees, up to 14 m tall, to 30 cm d.b.h. Bark smooth, gray-brown to dark brown outside, red inside, cassia-scented. Branchlets green or brown-green, slender, striate, glabrous. Leaves alternate or subopposite, rarely opposite; petiole 0.5–1.2 cm, plano-convex, subglabrous; leaf blade glaucous green and opaque abaxially, green and shiny adaxially, ovate or oblong to lanceolate, 5.5–10.5 × 2–5 cm, leathery, glabrous on both surfaces, triplinerved, midrib and basal lateral veins very elevated abaxially, conspicuous adaxially, basal lateral veins arising 3–8 mm above leaf base, evanescent toward leaf apex, transverse veins and veinlets somewhat elevated on both surfaces, ± reticulate, base broadly cuneate, apex shortly acuminate. Panicle axillary or subterminal, shorter than leaf, (2–)3–6 cm, few flowered, lax, densely gray puberulent, branched, apex of branch bearing a 3-flowered cyme. Pedicels slender, 4–6 mm, gray puberulent. Flowers green-white, ca. 5 mm. Perianth densely gray puberulent outside and inside; perianth tube short, obconical, ca. 2 mm; perianth lobes oblong-ovate, acute. Fertile stamens 9, ca. 2.5 mm (of 1st and 2nd whorls) or ca. 2.7 mm (of 3rd whorl); filaments puberulent, those of 3rd whorl each with 2 subsessile globose glands, others glandless; anthers oblong, 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Stamines 3, narrowly triangular, ca. 1 mm, stalked; stalk ca. 0.7 mm, puberulent. Ovary subglobose, ca. 1.5 mm, somewhat puberulent; style ca. 2 mm, angled, somewhat puberulent; stigma discoid. Fruit ovoid, ca. 8 × 5 mm; perianth cup in fruit ca. 4 mm, apex ca. 3 mm wide, dentate, teeth truncate. Fl. Mar–Apr, fr. Oct–Nov.

Sparse or dense forests and thickets, roadsides along streams; 100–1400 m (to 2100 m in Yunnan). Fujian, Guangdong, Guangxi, Hainan, Yunnan [India, Indonesia, Myanmar, Philippines, Vietnam].

The dried bark is a source of an important spice, which is used as a substitute for cassia bark. The wood is heavy, soft, finely grained, and used for house construction. The leafy branchlets contain volatile oil. Three types of the oil are found in Yunnan: linalol type (linalol ca. 57%), citral type (citral ca. 77%), and cineole type (cineole ca. 47%).

**32. *Cinnamomum bejolghota*** (Buchanan-Hamilton) Sweet, Hort. Brit. 344. 1827.

钝叶桂 dun ye gui

*Laurus bejolghota* Buchanan-Hamilton, Trans. Linn. Soc. London 13: 559. 1822; *Cinnamomum obtusifolium* (Roxburgh) Nees; *L. obtusifolia* Roxburgh.

Small to large trees, 5–25 m tall, up to 30 cm d.b.h. Bark green, scented. Branches always opposite, robust; branchlets terete or obtusely tetragonal, red-brown when dry, puberulent initially soon glabrate. Buds small, ovoid; bud scales densely sericeous. Leaves subopposite; petiole robust, 1–1.5 cm, plano-convex; leaf blade greenish or yellow-green and ± glaucous abaxially, green and shiny adaxially, elliptic-oblong, 12–30 × 4–9 cm, thickly leathery, glabrous on both surfaces, trinerved or triplinerved, basal lateral veins arising 0.5–1.5 cm above leaf

base, oblique, lateral veins and midrib extending to leaf apex, conspicuously elevated abaxially, slightly impressed or elevated adaxially, transverse veins and veinlets reticulate, slightly conspicuous abaxially, inconspicuous adaxially, base subrounded or attenuate, margin entire, apex obtuse, acute, or acuminate. Panicle axillary on upper part of branchlet, 13–16 cm, densely many flowered, much branched; branches ca. 3 cm; peduncle 7–11 cm, peduncle and rachis sparsely gray pubescent. Pedicels 4–6 mm, gray pubescent. Flowers yellow, up to 6 mm. Perianth tube short, obconical, ca. 1 mm; perianth lobes 6, ovate-oblong, ca. 5 × 2.5 mm, acute, gray pubescent except apex subglabrous on both surfaces. Fertile stamens 9, ca. 3.5 mm (of 1st and 2nd whorls) or ca. 3.7 mm (of 3rd whorl); filaments complanate, those of 3rd whorl each with 2 long stalked orbicular-reniform glands, others glandless; anthers of 1st and 2nd whorls ovate-oblong, almost as long as filaments and with introrse cells, those of 3rd whorl narrower, oblong, ca. 1.7 mm, with extrorse cells. Staminodes 3, conspicuous, sagittate-deltoid, ca. 3 mm, long stalked. Ovary oblong, ca. 1.5 mm; style slender, up to 3 mm; stigma discoid. Fruit ellipsoid, ca. 1.3 × 0.8 cm, green when fresh; perianth cup in fruit yellow but purple-red tinged, somewhat dilated, obconical, apex up to 7 mm wide, dentate, teeth truncate; fruit stalk purple, somewhat dilated. Fl. Mar–Apr, fr. May–Jul.

Sparse or dense forests on mountain slopes and in valleys; 600–1800 m. S Guangdong, Hainan, S Yunnan [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

The wood is finely grained, somewhat soft, and used for house construction. Volatile oil is derived from the leafy branchlets, roots, and bark by steam distillation. The bark powder is the source of an important spice, used especially by local people in Hainan.

**33. *Cinnamomum kotoense*** Kanehira & Sasaki, Trans. Nat. Hist. Soc. Formosa 20: 380. 1930.

兰屿肉桂 lan yu rou gui

Evergreen trees, ca. 15 m tall. Dry bark, branches, and leaves almost unscented. Branchlets brown, terete, glabrous. Leaves opposite or subopposite; petiole red-brown or brown, ca. 1.5 cm, concave-convex; leaf blade green when fresh but gray-green when dry, opaque abaxially and shiny adaxially, ovate to oblong-ovate, 8–11(–14) × 4–5.5(–9) cm, leathery, glabrous on both surfaces, triplinerved, basal lateral veins arising ca. 1 cm above leaf base, evanescent at 3/4 of leaf blade or inconspicuously anastomosing, sometimes each with an additional vein outside, veinlets conspicuous on both surfaces, foveolate, base rounded, apex acute. Flowers unknown. Inflorescence 3–5 cm. Fruit ovoid, ca. 1.4 × 1 cm; perianth cup in fruit cupuliform, glabrous, shortly crenate on margin; fruit stalk ca. 1 cm, glabrous. Fr. Aug–Sep.

• Forests. S Taiwan (Lan Yu).

*Cinnamomum kotoense* is very closely related to *C. myrianthum* Merrill, from the Philippines. The latter species differs in the shape of its leaf blade (oblong or elliptic-oblong) and in its longer inflorescence (up to 15 cm), so it is reasonable to regard these as distinct species.

**34. *Cinnamomum verum*** J. Presl in Berchtold & J. Presl, Pfl. Rostlin 2(2): 36. 1825.

锡兰肉桂 xi lan rou gui

*Laurus cinnamomum* Linnaeus, Sp. Pl. 1: 369. 1753;  
*Cinnamomum zeylanicum* Blume.

Evergreen small trees, up to 10 m tall. Bark black-brown, inner bark with cinnamic aldehyde flavor. Young branchlets gray, somewhat tetragonous, white-maculate. Buds sericeous-puberulent. Leaves usually opposite; petiole ca. 2 cm, glabrous; leaf blade greenish white abaxially, green and shiny adaxially, ovate or ovate-lanceolate, 11–16 × 4.5–5.5 cm, leathery or subleathery, glabrous on both surfaces, triplinerved, midrib and lateral veins elevated on both surfaces, transverse veins and veinlets reticulate, conspicuously foveolate abaxially, base acute, margin entire, apex acuminate. Panicle axillary or terminal, 10–12 cm; peduncle and rachis sericeous-puberulent. Flowers yellow, ca. 6 mm. Perianth tube obconical; perianth lobes 6, oblong, subequal, gray puberulent outside. Fertile stamens 9; filaments hairy near base, those of 3rd whorl each with 2 glands, others glandless; anthers 4-celled; cells of 1st and 2nd whorls introrse but those of 3rd whorl extrorse. Ovary ovoid, 10–15 mm, glabrous; style short; stigma discoid. Fruit ovoid, 10–15 mm, black when mature; perianth cup in fruit cupuliform, dilated, dentate, teeth truncate or acute at apex.

Cultivated. Guangdong, Taiwan [native to Sri Lanka; also cultivated in many countries in Asia].

The dried bark is the source of the important spice cinnamon. It is used medicinally to treat stomachache. The bark and leafy branchlets contain volatile oil.

**35. *Cinnamomum pingbienense*** H. W. Li, Acta Phytotax. Sin. 16(2): 91. 1978.

屏边桂 ping bian gui

Trees, 5–10 m tall, 10–25 cm d.b.h. Bark gray. Two-year-old branchlets yellow-brown, terete, ca. 5 mm in diam., sparsely oblong lenticellate; current year branchlets subtetragonous, densely gray puberulent. Buds small, ovoid; bud scales few, broadly ovate, acute, subglabrous or sparsely gray puberulent. Leaves subopposite or opposite; petiole 1–1.5 cm, concave-convex, densely gray sericeous-puberulent when young but glabrous when mature; leaf blade green-white and opaque abaxially, green and shiny adaxially, oblong or oblong-ovate, 12.5–24 × 4.5–8.5(–10.5) cm, thinly leathery, densely gray sericeous-puberulent on both surfaces especially abaxially when young, glabrate on both surfaces when mature, tiny gray puberulent hairs visible under lens abaxially, triplinerved, midrib extending to leaf apex, basal lateral veins arising (2–)5–10(–15) mm above leaf base, obliquely ascendant, evanescent near leaf apex, each with 4–6 additional veins outside, additional veins, midrib, and basal lateral veins very elevated abaxially, plane or slightly impressed adaxially, transverse veins subparallel, indurate, ± conspicuous abaxially and ± visible adaxially, interconnected by veinlets, base broadly cuneate, margin entire, apex acute. Panicle 4.5–6.5(–10.5) cm, always inserted in leaf axils remote from apex of branchlet, branched, apex of branch bearing a 3–5-flowered cyme; peduncle (1–)1.5–3 cm, peduncle and rachis compressed bilaterally, gray sericeous-puberulent. Pedicels slender, 2.5–5 mm, gray sericeous-puberulent. Flowers greenish, ca. 4.5 mm. Perianth sparsely sericeous-puberulent.

ous-puberulent outside but densely so inside; perianth tube obconical, short, ca. 1.5 mm; perianth lobes oblong, subequal, ca.  $3 \times 1-1.2$  mm, obtuse. Fertile stamens 9; filaments villous, those of 3rd whorl each with 2 shortly stalked orbicular-reniform glands, others glandless; anthers of 1st and 2nd whorls a little longer than filaments, ovate-oblong, acute, with introrse cells, those of 3rd whorl as long as filaments, subrectangular, with extrorse cells. Staminodes 3, villous, including stalk ca. 1.5 mm, apex narrowly sagittate-triangular; stalk ca. 0.5 mm. Ovary ovoid, ca. 1 mm, subglabrous; style slender, almost equal to ovary in size; stigma small, inconspicuous. Fruit unknown. Fl. Apr–May.

• Evergreen broad-leaved forests on limestone mountains or in valleys, watersides; 500–1100 m. SW Guangxi, S Guizhou, SE Yunnan.

**36. *Cinnamomum tamala*** (Buchanan-Hamilton) T. Nees & Nees in T. Nees & C. H. Ebermaier, *Handb. Med.-Pharm. Bot.* 2: 426. 1831.

柴桂 *chai gui*

*Laurus tamala* Buchanan-Hamilton, *Trans. Linn. Soc. London* 13: 555. 1822.

Trees, up to 20 m tall, to 20 cm d.b.h. Bark gray-brown, scented. Branchlets tea-brown, terete, glabrous, young ones ± angled, sparsely gray puberulent initially soon glabrate. Leaves alternate or those on young branchlets sometimes subopposite; petiole 0.5–1.3 cm, slightly sulcate adaxially, glabrous; leaf blade green-white and opaque abaxially, green and shiny adaxially, ovate, oblong, or lanceolate,  $7.5-15 \times (2.5-3)-5.5$  cm, thinly leathery, glabrous on both surfaces, triplinerved, midrib extending to leaf apex, basal lateral veins very elevated abaxially, slightly elevated adaxially, transverse veins undulate, veinlets reticulate, ± conspicuous on both surfaces, base acute or broadly cuneate, margin entire, apex long acuminate. Panicle axillary or terminal, 5–10 cm, many flowered, branched, apex of branch bearing a 3–5-flowered cyme; peduncle 1–4 cm, peduncle and rachis sparsely finely gray puberulent. Pedicels 4–6 mm, slender, finely gray puberulent. Flowers white-green, up to 6 mm. Perianth sparsely gray puberulent outside but densely so inside; perianth tube obconical, short, less than 2 mm; perianth lobes obovate-oblong, ca.  $4 \times 1.5$  mm, obtuse. Fertile stamens 9, ca. 3.8 mm (of 1st and 2nd whorls) or ca. 4 mm (of 3rd whorl); filaments gray villous, ca. 2.5 mm, those of 3rd whorl each with 2 finely stalked ovate-cordate glands at lower 1/3, others glandless; anthers of 1st and 2nd whorls ovate-oblong, ca. 1.3 mm, with introrse cells, those of 3rd whorl oblong, ca. 1.5 mm, with extrorse cells. Staminodes 3, ca. 1.7 mm, villous, long stalked, apex triangular-sagittate. Ovary ovoid, ca. 1.2 mm, villous; style slender, ca. 3.6 mm; stigma small, inconspicuous. Fruit obovoid or ellipsoid, 10–14 mm; perianth lobes persistent on rim of cupule. Fl. Apr–May.

Mountain slopes, evergreen broad-leaved forests in valleys, watersides; 1100–2000 m. W Yunnan [Bhutan, India, Nepal].

The dried bark is used medicinally to treat stomachache.

**37. *Cinnamomum pittosporoides*** Handel-Mazzetti, *Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl.* 61: 19. 1925.

刀把木 *dao ba mu*

Trees, up to 25 m tall. Branchlets slender, terete; 1-year-old branchlets glabrous, with large, elongate, and sparse lenticels and cinnamic-aldehyde-flavored bark; current year branchlets angled, covered with dirty yellow tomentose-pubescent hairs. Leaves alternate; petiole 8–12(–16) mm, ca. 1.5 mm in diam., concave-convex, dirty yellow tomentose-pubescent; leaf blade purplish glaucous abaxially, brownish and opaque adaxially, elliptic or lanceolate-elliptic,  $9-13(-16) \times 3-5(-7.5)$  cm, thinly leathery, pubescent abaxially, glabrous except scurfy-pilulose on slightly elevated veins adaxially, triplinerved, basal lateral veins arising 2–6 mm above leaf base, oblique, with few additional veins extending to leaf margin, other lateral veins 2 or 3 pairs, arising from above 1/3 or 1/2 of leaf blade, arcuate, parallel, not interconnected, and not reaching leaf apex, transverse veins dense, curved, conspicuous abaxially and inconspicuous adaxially, base cuneate, apex acuminate. Panicles axillary in leaf axils nearly at apex of branchlet and always densely clustered, short, (2–)3–4 cm, 1–7-flowered, dirty yellow tomentose-pubescent; peduncle 1–1.5 cm or almost absent; bracts and bracteoles triangular or latter always nearly subulate, ca. 1 mm, densely covered with dirty yellow tomentose-pubescent hairs. Pedicels slightly robust, 3–6 mm. Flowers golden yellow, up to 5 mm. Perianth densely dirty yellow tomentulose outside, sericeous inside; perianth tube campanulate, ca. 2 mm; perianth lobes ovate-oblong, obtuse at apex, subequal, ca. 5 mm, outer ones ca. 3 mm wide, inner ones ca. 2.5 mm wide. Fertile stamens 9, a little shorter than perianth; filaments shorter than anthers, villous, those of 3rd whorl each with 2 large reniform glands ca. 1/2 length of filament; anthers oblong, 4-celled, 2 lower cells large and elongate, all lateral, 2 upper cells introrse or extrorse. Staminodes 3, sagittate, shortly stalked. Ovary ovoid, attenuate at apex into a style; style attaining height of stamen, hirsute; stigma dilated, discoid. Fruit ovoid, up to  $2.5 \times 2$  cm, apiculate, attenuate at base; exocarp scabrid, glabrous except sparsely villous at apex; perianth cup in fruit shallowly discoid, ca. 0.5 cm, woody, longitudinally sulcate, sparsely dirty yellow puberulent, apex 1.2–1.4 cm wide, 6-dentate, teeth rounded at apex; fruit stalk ca. 1 cm, apex slightly dilated and up to 2.5 mm in diam. Fl. Feb–May, fr. Jun–Oct.

• Evergreen broad-leaved forests; 1800–2500 m. S Sichuan (Pingshan), C and SE Yunnan.

**38. *Cinnamomum kwangtungense*** Merrill, *Lingnan Sci. J.* 13: 25. 1934.

红辣槁树 *hong la gao shu*

Small trees, 3–9 m tall, ca. 16 cm d.b.h. Branchlets terete, glabrous, young ones ca. 1 mm in diam., dark brown pubescent. Leaves opposite; petiole 1.5–2 cm, brown pubescent when young but blackish pubescent when mature; leaf blade glaucous and shiny adaxially, elliptic to oblong-lanceolate,  $7-9 \times 2.5-4$  cm, rigidly leathery, very densely and evenly finely brown pubescent abaxially, glabrous adaxially, trinerved or inconspicuously triplinerved, midrib and basal veins elevated abaxially, very impressed adaxially, axils of lateral veins dome-shaped abaxially, transverse veins parallel, very fine, base broadly cuneate to subrounded, margin involute, entire, apex conspicuously

acuminate. Panicle terminal, ca. 8 cm, densely and evenly finely brown pubescent, branched from base; branches opposite, lowest one ca. 7 cm, apex of branch bearing a 2- or 3-flowered cyme. Pedicels 2–3 mm. Perianth lobes oblong-elliptic to oblong-ovate, ca. 5 mm, pubescent outside, apex rounded. Fertile stamens 9; filaments 1–1.2 mm, finely pubescent, those of 3rd whorl each with 2 glands, others glandless; anthers ellipsoid, as long as filament, apex rounded, all 4-celled. Stamines 3, ca. 1 mm. Ovary glabrous; style ca. 2 mm. Fruit unknown. Fl. May.

- Shady mountain slopes. C Guangdong.

**39. *Cinnamomum wilsonii*** Gamble in Sargent, Pl. Wilson. 2: 66. 1914.

川桂 chuan gui

*Cinnamomum wilsonii* var. *multiflorum* Gamble.

Trees, ca. 25 m tall, ca. 30 cm d.b.h. Branchlets terete, dark brown or purple-brown when dry. Leaves alternate or opposite; petiole 10–15 mm, slightly sulcate adaxially, glabrous; leaf blade gray-green and opaque abaxially, green and shiny adaxially, ovate or ovate-oblong, 8.5–18 × 3.2–3.5 cm, leathery, white sericeous when young but soon glabrate abaxially, glabrous adaxially, triplinerved, midrib and basal lateral veins elevated on both surfaces, all yellowish when dry, basal lateral veins arising 5–15 mm above leaf base, arcuate and evanescent in leaf apex, sometimes each with 3–10 additional veins outside, additional veins arcuate and connected by rib on leaf margin, transverse veins arcuate, numerous, slender, ± conspicuous abaxially, base attenuate and decurrent into petiole but sometimes subrounded, margin cartilaginous and involute, apex acuminate, acumen obtuse. Panicles axillary, solitary, few flowered, or many and clustered, subracemose or cymose, cymes 2–5-flowered; peduncle slender, 1.5–6 cm, peduncle and rachis glabrous or sparsely pubescent. Pedicels filiform, 6–20 mm, finely puberulent. Flowers white, ca. 6.5 mm. Perianth sericeous-puberulent outside and inside; perianth tube obconical, ca. 1.5 mm; perianth lobes ovate, acute, subequal, 4–5 × ca. 1 mm. Fertile stamens 9, ca. 3 mm (of 1st and 2nd whorls) or ca. 3.5 mm (of 3rd whorl); filaments villous, those of 3rd whorl each with 2 sessile reniform glands at middle, others glandless; anthers of 1st and 2nd whorls ovate-oblong, slightly shorter than filaments, obtuse at apex, each with 4 introrse cells, anthers of 3rd whorl oblong, as long as 2/5 of filaments, each with 4 extrorse cells. Staminodes 3, ovate-cordate, ca. 2.8 mm, acute, stalked. Ovary ovoid, ca. 1 mm; style thick, ca. 3 mm; stigma broad, capitate. Mature fruit unknown. Perianth cup of immature fruit almost truncate but with very short lobes at apex. Fl. Apr–May, fr. after Jun.

- Sparse or dense forests on sunny sites of mountain slopes, watersides, valleys; (near sea level to) 800–2400 m. Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan.

The dried bark is used medicinally to treat, for example, traumatic injuries and abdominal pain. The leafy branchlets and fruit contain essential oil, which is used as a fragrant ingredient in food or soap.

**40. *Cinnamomum contractum*** H. W. Li, Acta Phytotax. Sin. 16(2): 91. 1978.

聚花桂 ju hua gui

Small trees, up to 8 m tall, to 32 cm d.b.h. Bark gray-black, smooth, with cinnamic aldehyde flavor. Old branchlets terete, robust, tea-brown or red-brown when dry, many lenticellate, glabrous, young ones striate, glabrous. Leaves alternate or subopposite; petiole 1–2 cm, plano-convex, glabrous; leaf blade gray-green and opaque abaxially, shiny green adaxially, ovate to broadly ovate, 9–14 × 3.5–7.5 cm, leathery, white sericeous-pubescent when young but eventually glabrate abaxially, glabrous adaxially, triplinerved, midrib extending to leaf apex, midrib and basal lateral veins elevated abaxially, conspicuous adaxially, all yellowish when dry, basal lateral veins subopposite, adaxially arising 5–10 mm from leaf base, arcuate, evanescent at leaf apex, sometimes with 3–5 additional veins outside, additional veins arcuate and interconnected within leaf margin, transverse veins numerous, arcuate, slender, ± conspicuous abaxially, base broadly cuneate to subrounded, margin cartilaginous and involute, apex acuminate, acumen obtuse. Panicles axillary and terminal, many flowered, composed of shortly pedunculate or sessile 2–11-flowered cymes, axillary ones 4–8.5 cm, shortly branched at lower part or subracemose, terminal ones elongate, up to 12 mm, branched almost from base and upward, lowest branches up to 4 cm, other branches gradually shorter upward; peduncles very short, 0.5–1.5 cm, peduncle and rachis densely finely gray puberulent. Pedicels short, 2–4 mm, densely finely gray puberulent. Flowers yellow-green, up to 7 mm. Perianth sericeous-puberulent outside and inside; perianth tube obconical, ca. 1.5 mm; perianth lobes ovate or oblong-ovate, acute, outer ones ca. 5 × 3.8 mm, inner ones ca. 5 × 3 mm. Fertile stamens 9, ca. 3.6 mm (of 1st and 2nd whorls) or ca. 4 mm (of 3rd whorl); filaments of 1st and 2nd whorls slender, up to 2 mm, glandless, those of 3rd whorl robust, complanate, each with 2 shortly stalked reniform glands; anthers of 1st and 2nd whorls oblong-ovate, ca. 1.6 mm, obtuse, each with 4 introrse cells, those of 3rd whorl oblong, ca. 1.8 mm, each with 4 extrorse cells. Staminodes 3, triangular-sagittate, including short stalk ca. 2.5 mm. Ovary ovoid, ca. 1.5 mm, glabrous; style robust, ca. 3.5 mm; stigma dilated, capitate. Fruit unknown. Fl. May.

- Evergreen broad-leaved forests on mountain slopes, valley sides; 1800–2800 m. SE Xizang, NW Yunnan.

**41. *Cinnamomum iners*** Reinwardt ex Blume, Bijdr. 570. 1826.

大叶桂 da ye gui

Trees, up to 20 m tall, to 20 cm d.b.h. Branches always opposite, robust; branchlets terete or obtusely tetragonous, dark brown when dry, densely puberulent initially but soon glabrate. Buds small, ovoid; bud scales densely sericeous. Leaves subopposite; petiole red-brown, robust, 1–3 cm, ± densely pubescent; leaf blade opaque yellow-green abaxially, shiny green adaxially, ovate or elliptic, 12–35 × 5.5–8.5 cm, thickly leathery, densely pubescent initially soon glabrate but not glabrous abaxially, glabrous adaxially, trinerved or triplinerved, basal lateral veins arising at or up to 10 mm above leaf base, basal lateral veins and midrib elevated on both surfaces, transverse veins and veinlets slightly conspicuous on both surfaces or inconspicuous

adaxially and  $\pm$  visible abaxially, base broadly cuneate to subrounded, apex obtuse or emarginate. Panicles axillary or terminal, solitary or ternate, 6–26 cm, several branched; branches 1–2.5(–6) cm, apex bearing a 3–7-flowered cyme; peduncles 3–10(–15) cm, peduncle and rachis densely pubescent. Pedicels 2.5–5 mm, densely gray pubescent. Flowers greenish, 4–5(–6) mm. Perianth densely gray pubescent outside and inside; perianth tube obconical, 1–2 mm; perianth lobes 6, acute, outer ones ovate-oblong, ca.  $4 \times 2$  mm, inner ones oblong, narrower, ca.  $4 \times 1.5$  mm. Fertile stamens 9, ca. 3 mm (of 1st and 2nd whorls) or ca. 3.6 mm (of 3rd whorl); filaments villous, those of 3rd whorl each with 2 orbicular glands near base, others glandless; anthers of 1st and 2nd whorls ovate-oblong, nearly as long as filaments, each with 4 introrse cells, those of 3rd whorl oblong, narrower, ca. 1.5 mm, slightly shorter than filaments, each with 4 extrorse cells. Staminodes 3, conspicuous, sagittate-triangular, ca. 2.3 mm, long stalked. Ovary ovoid, ca. 1.5 mm; style slender, ca. 3 mm; stigma discoid, lobed. Fruit ovoid, 9–10(–12)  $\times$  ca. 7 mm, apiculate, greenish or green when fresh; perianth cup in fruit obconical or bowl-shaped, slightly dilated, up to 8 mm wide, with somewhat dilated or patent persistent lobes at apex; fruit stalk somewhat thickened. Fl. Mar–Apr, fr. May–Jun.

Roadsides in valleys, sparse or dense forests; 100–1000 m. SW Guangxi (Longzhou), SE Xizang (Médog), S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam].

**42. *Cinnamomum austroyunnanense*** H. W. Li, Acta Phytotax. Sin. 16(2): 92. 1978 [*“austro-yunnanense”*].

滇南桂 dian nan gui

Trees, up to 20 m tall, ca. 25 cm d.b.h. Bark gray, smooth. Old branchlets yellow-brown, terete, longitudinally striate, glabrous, divaricate; young branchlets  $\pm$  compressed tetragonous, gray-brown in color due to dense appressed gray puberulent indumentum. Buds small, narrowly ovoid, up to 4 mm; bud scales acute, densely gray puberulent outside. Leaves alternate or those on young branchlets always subopposite; petiole gray-brown, 0.5–1.2 cm, somewhat concave adaxially, densely puberulent; leaf blade greenish or gray-green and opaque abaxially, dark green and shiny adaxially, oblong to lanceolate-oblong, 7–17(–22)  $\times$  2–4.5(–6) cm, thinly leathery,  $\pm$  appressed gray puberulent abaxially, glabrous adaxially, trinerved or triplinerved, midrib extending to leaf apex, midrib and basal lateral veins elevated on both surfaces and yellow-brown, basal lateral veins arising at or up to 6 mm above leaf base, arcuate-ascending, evanescent below leaf apex, transverse veins and veinlets inconspicuous on both surfaces, base subrounded, apex obtuse or acute. Panicles axillary and terminal, 6–12 cm, several branched from base; branches elongate, branches and rachis  $\pm$  compressed tetragonous, densely gray sericeous-puberulent. Pedicels 3–4 mm, densely gray puberulent. Flowers yellowish brown, ca. 4 mm when open. Perianth densely gray sericeous-puberulent outside and inside; perianth tube obconical, ca. 1 mm, longitudinally sulcate when dry; perianth lobes 6, narrowly ovate, subequal, ca.  $3 \times 1.6$  mm, acute. Fertile stamens 9, subequal, ca. 2.5 mm; filaments pilose, those of 3rd whorl each with 2 shortly stalked orbicular-reniform glands near base, others glandless; anthers oblong, almost as long as filaments, 4-

celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, ca. 1.6 mm, stalked, narrowly sagittate-triangular at apex. Ovary ovoid, ca. 1.2 mm; style elongate, ca. 1.8 mm; stigma somewhat discoid. Fruit green when fresh, dark brown when dry, ovoid, ca.  $6 \times 5$  mm, rounded and apiculate at apex, apex brown; perianth cup in fruit dark brown, caplike, up to 6 mm wide, apex truncate or slightly undulate. Fl. Apr, fr. May–Jun.

• Shady sites in tropical forests; 200–600 m. S Yunnan.

**43. *Cinnamomum tsangii*** Merrill, Lingnan Sci. J. 13: 26. 1934.

辣汁树 la zhi shu

*Cinnamomum merrillianum* C. K. Allen.

Small trees. Branchlets terete, glabrous, compressed or angled, ca. 1 mm in diam., densely silver sericeous initially soon glabrate. Petiole 5–12 mm, concave-convex, densely silver sericeous when young but soon glabrate; leaf blade lanceolate or oblong-lanceolate, 5–10  $\times$  1.5–2.5 cm, thinly leathery, silver sericeous on both surfaces when young, densely brownish sericeous abaxially and glabrous adaxially or glabrate on both surfaces when mature, triplinerved, basal lateral veins arising 2–5 mm above leaf base, basal lateral veins and midrib conspicuously elevated abaxially, slightly elevated adaxially, transverse veins and veinlets inconspicuous on both surfaces, base broadly cuneate, apex conspicuously falcate-acuminate. Inflorescences axillary, cymose, ca. 3 cm, solitary or few in cluster, 3–5-flowered,  $\pm$  silver sericeous, long pedunculate. Pedicels up to 5 mm, densely silver sericeous. Flowers green-white, 3–4 mm. Perianth densely silver sericeous outside and inside; perianth tube obconical, ca. 1 mm; perianth lobes 6, ovate, subequal, ca. 2 mm. Fertile stamens 9, ca. 1 mm; filaments villous, those of 3rd whorl each with 2 stalked glands at base, others glandless; anthers of 1st and 2nd whorls ovate, with introrse cells, those of 3rd whorl oblong-ovate, with extrorse cells. Staminodes 3, triangular, ca. 0.6 mm, shortly stalked. Ovary narrowly ellipsoid-ovoid, ca. 1 mm, glabrous; style slender, ca. 1.2 mm; stigma discoid, inconspicuously 3-lobed. Fruit unknown. Fl. Oct.

• Sparse forests on mountaintops, dense mixed forests. Fujian, Guangdong, Hainan, S Jiangxi.

**44. *Cinnamomum mairei*** H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 174. 1914.

银叶桂 yin ye gui

*Cinnamomum argenteum* Gamble.

Trees, 6–16 m tall, 30–80 cm d.b.h. Branchlets purple-brown, terete,  $\pm$  angled. Buds ovoid, ca. 2.5 mm, white sericeous. Leaves alternate or subopposite; petiole 1–1.5 cm, concave-convex, glabrous; leaf blade glaucous and opaque abaxially, green and shiny adaxially, lanceolate, 6–11  $\times$  2.5–4 cm, leathery, densely silver sericeous when young but appressed sericeous-tomentulose when mature abaxially, glabrous adaxially, trinerved or triplinerved, midrib extending to leaf apex, with 1 or 2 pairs of additional veins curving toward leaf apex, midrib and basal lateral veins elevated abaxially, almost incon-

spicuous adaxially, basal lateral veins arising at or up to 5 mm above leaf base, arcuate, evanescent near leaf apex, with a few inconspicuous additional veins outside, sometimes with 2 slender secondary lateral veins along leaf margin from base, transverse veins numerous, arcuate, inconspicuous, base attenuate to subrounded, apex acuminate, acumen obtuse. Panicle 4–7(–9) cm, arising from base of current year branchlet, 5–12-flowered; peduncle slender, subfiliform, 2–4 cm, finely pubescent. Pedicels filiform, 4–8 mm, pubescent. Flowers white, ca. 5 mm. Perianth densely sericeous-pubescent outside and inside; perianth tube very short, obconical, ca. 1.5 mm; perianth lobes obovate, subequal, ca.  $3.5 \times 2$  mm, inner ones slightly narrower, all acute. Fertile stamens 9, ca. 7.5 mm; filaments almost as long as anthers, those of 3rd whorl broad, each with 2 shortly stalked reniform glands, others glandless; anthers of 1st and 2nd whorls broadly ovate, obtuse, with introrse cells, those of 3rd whorl oblong-ovate, with extrorse cells. Staminodes 3, cordate, ca. 1.5 mm, shortly stalked. Ovary ovoid, ca. 1 mm; style robust, ca. 2.3 mm; stigma dilated, capitate. Fruit ovoid, ca.  $13 \times 7$ –8 mm, glabrous; perianth cup in fruit semiglobose, entire and 4–5 mm wide at apex; fruit stalk slender, barely thickened. Fl. Apr–May, fr. Aug–Oct.

- Forests; 700–1800 m. W Sichuan, NE Yunnan.

The bark of the branchlets is used as an aromatic spice. The roots, trunk, and leafy branchlets contain essential oil.

#### 45. *Cinnamomum javanicum* Blume, Bijdr. 570. 1826.

爪哇肉桂 zhua wa rou gui

Evergreen trees, up to 20 m tall, ca. 25 cm d.b.h. Branchlets obtusely tetragonous, red-brown when dry, very densely yellow-brown tomentose when young. Buds small, ovoid, densely yellow-brown tomentose. Leaves opposite; petiole robust, 1–1.2 cm, plano-convex, densely yellow-brown tomentose; leaf blade yellow-green and opaque abaxially, dark green and shiny adaxially, elliptic or elliptic-ovate,  $11$ – $22 \times 5$ – $6.5$  cm, papery or subleathery, very densely yellow-brown tomentose abaxially, glabrous or yellow-brown tomentose only along lower part of veins adaxially, subtriplinerved, midrib and basal lateral veins very elevated abaxially, impressed adaxially, basal lateral veins arising at or up to 6 mm above leaf base, arcuate-ascendant and interconnected up to leaf apex, with a few oblique additional veins outside, transverse veins numerous, conspicuously elevated abaxially, slightly impressed when young but almost invisible with naked eye when mature adaxially, base subrounded, margin involute, apex caudate. Flowers unknown. Inflorescence paniculate, axillary on upper part of branchlet, robust, 10–15 cm; peduncle 5–9 cm,  $\pm$  angled, peduncle and rachis densely yellow-brown tomentose. Fruit ellipsoid, ca.  $1.5 \times 1.2$  cm; perianth cup in fruit obconical or bowl-shaped, ca. 6 mm, truncate and up to 1.2 cm wide at apex, abruptly contracted into ca. 4 mm long stalk at base; fruit stalk densely yellow-brown tomentose.

Dense forests; ca. 1400 m. SE Yunnan (Pingbian) [Indonesia, Malaysia, Vietnam].

The plants from Yunnan are very similar to *Cinnamomum javanicum* var. *neglectum* (Blume) Meisner (*C. neglectum* Blume), from Indonesia, especially in their subtriplinerved leaves and yellow-brown tomentose indumentum.

46. *Cinnamomum appelianum* Schewe, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 20. 1925.

毛桂 mao gui

*Cinnamomum appelianum* var. *tripartitum* Yen C. Yang; *C. szechuanense* Yen C. Yang; *C. taimoshanicum* Chun ex Hung T. Chang; *C. trinervatum* Yen C. Yang; *C. villosulum* S. K. Lee & F. N. Wei.

Small trees, 4–6 m tall, up to 8 cm d.b.h., several branched with branches opposite. Bark gray-brown or olive-green. Branchlets yellow-brown or chestnut-brown, terete, slightly robust, slightly scented, scattered with gray-brown and oblong lenticels; old branchlets glabrous; 1-year-old branchlets glabrate; current year branchlets densely covered with dirty yellow hirsute-tomentose hairs. Buds narrowly ovoid, acute; bud scales brown, imbricate, leathery, densely covered with dirty yellow hirsute-tomentose hairs. Leaves alternate or subopposite; petiole robust, 4–5(–9) mm, plano-convex, densely covered with dirty yellow hirsute-tomentose or villous hairs; leaf blade yellow-brown and opaque abaxially, green-brown and slightly shiny adaxially, elliptic, elliptic-lanceolate to ovate, or ovate-elliptic,  $4.5$ – $11.5 \times 1.5$ – $4$  cm, leathery, densely covered with crisped dirty yellow pilose hairs along veins adaxially and densely so everywhere abaxially when young, glabrous adaxially and densely covered with crisped yellow hairs abaxially when mature, slightly wrinkled on both surfaces, triplinerved, midrib and basal lateral veins extending to leaf apex, basal lateral veins arising 1–3 mm above leaf base, arcuate-ascendant, with a few additional veins outside interconnected within leaf margin, transverse veins and veinlets numerous,  $\pm$  conspicuous abaxially, base cuneate to subrounded, apex abruptly shortly acuminate. Panicle axillary on base of current year branchlet, generally much shorter than leaf, 4–6.5 cm, (3–)5–11-flowered, branched; branches ca. 0.5 mm; peduncle slender, elongate, 1–1.5(–3.5) cm, peduncle and rachis densely covered with yellowish brown hirtellous-villous or villous hairs; bracts linear or lanceolate,  $2.5$ – $3 \times$  ca. 0.7 mm, caducous, villous on both surfaces. Pedicels 2–3 mm, very densely covered with yellow-brown hirtellous-pubescent or villous hairs. Flowers white, 3–5 mm. Perianth covered with yellowish brown sericeous-puberulent or villous hairs outside and inside but hairs longer inside; perianth tube obconical, 1–1.5 mm; perianth lobes broadly obovate to oblong-ovate,  $3$ – $3.5 \times$  ca. 2 mm, acute. Fertile stamens 9, slightly shorter than perianth lobes, 2.5–3.5 mm; filaments pilose, those of 3rd whorl each with 2 sessile cordate-orbicular glands at middle part, others glandless; anthers oblong, 4-celled, those of 1st and 2nd whorls as long as filaments, cells introrse, those of 3rd whorl almost as long as filaments, cells extrorse. Staminodes 3, triangular-sagittate, 1.3–1.7 mm, shortly stalked; stalk villous. Ovary broadly ovoid, ca. 1.2 mm, glabrous; style robust; stigma peltate or capitate, entire or slightly 3-lobed. Immature fruit green, ellipsoid, ca.  $6 \times 4$  mm; perianth cup in fruit dilated, funnellform, up to 1 cm, dentate and 7 mm wide at apex.

- Thickets or sparse forests on mountain slopes or in valleys; (300–)500–1400 m. Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan.

The bark is used medicinally as an astringent.

**47. *Cinnamomum cassia*** (Linnaeus) D. Don, Prodr. Fl. Nepal. 67. 1825.

肉桂 rou gui

*Laurus cassia* Linnaeus, Sp. Pl. 1: 369. 1753; *Cinnamomum aromaticum* Nees; *Persea cassia* (Linnaeus) Sprengel.

Medium-sized trees. Bark gray-brown, up to 13 mm thick when mature. One-year-old branchlets dark brown, terete, longitudinally striate, slightly pubescent; current year branchlets yellow-brown,  $\pm$  tetragonous, longitudinally striate, densely grayish yellow tomentulose. Terminal buds small, ca. 3 mm; bud scales broadly ovate, acuminate, densely grayish yellow tomentulose. Leaves alternate or subopposite; petiole robust, 1.2–2 cm, adaxially plane or slightly sulcate on lower part, yellow tomentulose; leaf blade greenish opaque abaxially, green and shiny adaxially, narrowly elliptic to sublanceolate, 8–16(–34)  $\times$  4–5.5(–9.5) cm, leathery, sparsely yellow tomentulose abaxially, glabrous adaxially, triplinerved, midrib and basal lateral veins very elevated abaxially, conspicuously impressed adaxially, basal lateral veins subopposite, arising 5–10 mm above leaf base, arcuate-ascendant and evanescent below leaf apex, with numerous additional veins outside, these veins arcuately interconnected, transverse veins undulate and subparallel at a distance of 3–4 mm, elevated abaxially, inconspicuous adaxially, connected by veinlets only visible abaxially, base acute, margin cartilaginous and involute, apex slightly acute. Panicle axillary or subterminal, 8–16 cm, triplicate-branched, apex of branch bearing a 3-flowered cyme; peduncle as long as 1/2 of inflorescence, peduncle and rachis yellow tomentose. Pedicels 3–6 mm, yellowish brown tomentulose. Flowers white, ca. 4.5 mm. Perianth densely yellowish brown tomentulose outside and inside; perianth tube obconical, ca. 2 mm; perianth lobes ovate-oblong, subequal, ca. 2.5  $\times$  1.5 mm, obtuse or subacute at apex. Fertile stamens 9, ca. 2.3 mm (of 1st and 2nd whorls) or ca. 2.7 mm (of 3rd whorl); filaments of 1st and 2nd whorls ca. 1.4 mm, complanate, dilated at upper 1/3, those of 3rd whorl ca. 1.9 mm, each with 2 orbicular-reniform glands at upper 1/3; anthers ovate-oblong, 4-celled; cells introrse (of 1st and 2nd whorls) or lateral-extrorse (of 3rd whorl). Staminodes 3, including stalk ca. 2 mm, sagittate-deltoid at apex; stalk slender, complanate, ca. 1.3 mm, villous. Ovary ovoid, ca. 1.7 mm, glabrous; style slender, as large as ovary; stigma small, inconspicuous. Fruit ellipsoid, ca. 10  $\times$  7–8(–9) mm, black-purple when mature, glabrous; perianth cup in fruit shallowly cupuliform, ca. 4 mm, truncate or slightly dentate and up to 7 mm wide at apex. Fl. Jun–Aug, fr. Oct–Dec.

- Evidently originating in S China, now widely cultivated in tropical or subtropical areas of Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, and Yunnan [cultivated in India, Indonesia, Laos, Malaysia, Thailand, and Vietnam].

The dried bark is the source of the important spice cassia. The immature fruits are a source of cassia buds. An essential oil, called oil of cassia or oil of cinnamon, is obtained by steam distillation of the leaves and twigs; it is used as a flavoring agent. The plant is used medicinally as a carminative. It contains cinnamic aldehyde.

**48. *Cinnamomum austrosinense*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1959(1): 20. 1959.

华南桂 hua nan gui

*Cinnamomum cassia* (Linnaeus) D. Don subsp. *pseudomelastoma* J. C. Liao et al.; *C. pseudomelastoma* (J. C. Liao et al.) J. C. Liao.

Trees, 5–8(–16) m tall, up to 40 cm d.b.h. Bark gray-brown. One-year-old branchlets dark brown, terete, ca. 3 mm wide, longitudinally striate, puberulent; current year branchlets  $\pm$  depressed, slightly angled, longitudinally striate and sulcate, shortly gray-brown appressed puberulent. Terminal buds small, ovoid, 3–4 mm; bud scales compact, densely covered with gray-brown short and appressed puberulent hairs. Leaves subopposite or alternate; petiole 1–1.5 mm, plano-convex, densely covered with gray-brown short and appressed puberulent hairs; leaf blade greenish and opaque abaxially, green and opaque or slightly shiny adaxially, elliptic, old leaves on 1-year-old branchlets 14–16  $\times$  6–7.5(–8) cm, new leaves on current year branchlets 6.5–8.5(–12)  $\times$  3–4(–5) cm, all thinly leathery or leathery, densely covered with gray-brown short and appressed puberulent hairs abaxially, grayish brown puberulent when young but glabrate when mature adaxially, trinerved or triplinerved, midrib and basal lateral veins very elevated abaxially, slightly elevated adaxially, basal lateral veins arising at or up to 5 mm above leaf base, slightly arcuate-ascendant and evanescent below leaf apex, always with 8–10 additional veins outside, these veins  $\pm$  conspicuous abaxially, inconspicuous adaxially, arcuately interconnected near leaf margin, transverse veins undulate, subparallel at a distance of 2–3 mm, elevated abaxially, inconspicuous adaxially, base obtuse, margin cartilaginous and involute, apex acute, acumen 5–10(–15) mm. Panicle axillary on current year branchlet, 9–13  $\times$  5–7 cm, triplicate-branched, apex of branchlet generally bearing a 3-flowered cyme; peduncle (3–)6–7.5 cm, peduncle and rachis slightly depressed and densely covered with gray-brown short and appressed puberulent hairs. Pedicels ca. 2 mm, densely grayish brown puberulent. Flowers yellow-green, ca. 4.5 mm. Perianth densely gray-brown puberulent outside and inside; perianth tube obconical, ca. 2 mm; perianth lobes ovate, ca. 2.5 mm, outer ones ca. 1.5 mm wide, inner ones narrower, all acute. Fertile stamens 9; filaments villous, those of 3rd whorl each with 2 sessile suborbicular glands, others glandless; anthers villous abaxially, 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, triangular, ca. 1 mm, stalked, villous. Ovary globose, ca. 1 mm, glabrous; style ca. 1.5 mm; stigma discoid. Fruit ellipsoid, ca. 1  $\times$  0.9 cm; perianth cup in fruit shallowly cupuliform, ca. 2.5 mm and up to 5 mm in diam., shallowly dentate at top margin, teeth truncate. Fl. Jun–Aug, fr. Aug–Oct.

- Evergreen broad-leaved forests, thickets on mountain slopes, along streams; 600–700 m. Fujian, Guangdong, Guangxi, SE Guizhou, Jiangxi, Zhejiang.

*Cinnamomum austrosinense* shares similar uses with *C. cassia* and may represent the wild form of that species.

**49. *Cinnamomum subavenium*** Miquel, Fl. Ned. Ind. 1(1): 902. 1858.

香桂 xiang gui

*Cinnamomum albiflorum* Nees var. *kwangtungense* H.

Liu; *C. bartheifolium* Hayata; *C. chingii* F. P. Metcalf; *C. lioui* C. K. Allen; *C. longicarpum* Kanehira; *C. randaiense* Hayata; *C. validinerve* Hance var. *poilanei* H. Liu.

Trees up to 20 m tall and 50 cm d.b.h. Bark gray, smooth. Branchlets slender, densely covered with yellow appressed sericeous-pubescent hairs. Leaves on young branchlets subopposite, those on old branchlets alternate; petiole 5–15 mm, densely covered with appressed yellow sericeous-pubescent hairs; leaf blade yellow-green and opaque abaxially, dark green and shiny adaxially, elliptic or ovate-elliptic to lanceolate, 4–13.5 × 2–6 cm, leathery, densely appressed yellow sericeous-pubescent but sparsely so when mature abaxially, appressed yellow sericeous-pubescent when young but glabrate to glabrous when mature adaxially, trinerved or triplinerved, midrib and basal lateral veins conspicuously elevated abaxially, impressed adaxially, basal lateral veins arising at or up to 4 mm above leaf base, oblique and extending to leaf apex, axils of basal lateral veins sometimes inconspicuously saccate abaxially and slightly bullate adaxially, transverse veins and veinlets inconspicuous on both surfaces, base cuneate to rounded, apex acuminate or acute. Pedicels 2–3

mm, covered with same hairs as petiole. Flowers yellowish, 3–4 mm. Perianth densely pubescent outside and inside; perianth tube obconical, short, ca. 1 mm; perianth lobes 6, outer ones narrower, oblong-lanceolate or lanceolate, ca. 3 × 1.5 mm, inner ones ovate-oblong, ca. 3 × 1.7 mm. Fertile stamens 9, ca. 2.4 mm (of 1st and 2nd whorls) or ca. 2.7 mm (of 3rd whorl); filaments villous, those of 3rd whorl each with 2 orbicular reniform glands; anthers villous abaxially, 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, ca. 1.2 mm, villous, stalked. Ovary globose, ca. 1 mm in diam., glabrous; style ca. 2.5 mm, slightly curved; stigma dilated, discoid. Fruit ellipsoid, ca. 7 × 5 mm, blue-black when mature; perianth cup in fruit cupuliform, entire and up to 5 mm wide at apex. Fl. Jun–Jul, fr. Aug–Oct.

Evergreen broad-leaved forests on mountain slopes or in valleys; 400–1100(–2500) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, N Thailand, Vietnam].

The leaves are an important spice.

## 11. NEOCINNAMOMUM H. Liu, Laurac. Chine & Indochine, 82, 86. 1932.

新樟属 xin zhang shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Shrubs or small trees. Buds small, conical; bud scales thick and always hairy. Leaves alternate, entire, distichous, papery or subleathery, strongly triplinerved. Inflorescences glomerules, stipitate or rarely estipitate, remotely arranged in an axillary or terminal panicle or solitary in leaf axils. Flowers small, pedicellate. Perianth tube very short; perianth lobes 6, subequal, up to 2 mm, thick and slightly fleshy. Fertile stamens 9, all with filament; filaments of 1st and 2nd whorls glandless, those of 3rd whorl each with 2 glands; anthers 4-celled, upper 2 cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl) or all lateral, lower 2 cells larger and lateral, but sometimes anther cells all arranged in an almost transverse series. Staminodes stipitate, larger. Ovary pearlike, estipitate, gradually attenuate into a short style; stigma discoid. Drupe berrylike, ellipsoid or globose; perianth cup in fruit large and shallow, thickened, crateriform; perianth lobes in fruit persistent and slightly dilated, erect or patent; fruit stalk slender, gradually dilated toward apex.

About seven species: Bhutan, China, India, Indonesia (Sumatra), Myanmar, Nepal, Thailand, Vietnam; five species (three endemic) in China.

- 1a. Leaf blade transverse veins numerous, subhorizontal and subparallel, connected by remote vertical veinlets, forming transversely elongate reticulum; flower glomerules numerous, remote and arranged in an axillary or terminal panicle, panicle with a developed rachis ..... 1. *N. caudatum*  
 1b. Leaf blade reticulate venation regular and fine; flower glomerules solitary and axillary, stipitate or estipitate, not arranged in a panicle.  
 2a. Branchlets glabrous.  
   3a. Perianth slightly puberulent or subglabrous ..... 2. *N. fargesii*  
   3b. Perianth densely rusty sericeous ..... 4. *N. mekongense*  
 2b. Branchlets densely hairy when young.  
   4a. Branchlets and leaf blade abaxially densely rusty pubescent ..... 3. *N. lecomtei*  
   4b. Branchlets and leaf blade abaxially densely rusty or white sericeous ..... 5. *N. delavayi*

**1. Neocinnamomum caudatum** (Nees) Merrill, Contr. Arnold Arbor. 8: 64. 1934.

滇新樟 dian xin zhang

*Cinnamomum caudatum* Nees in Wallich, Pl. Asiat. Rar. 2: 76. 1831; *Neocinnamomum poilanei* H. Liu; *N. yunnanense* H. Liu.

Trees, 5–15(–20) m tall, 25–38 cm d.b.h. Bark gray-black. Branchlets terete, brown when dry, striate, puberulent. Buds

small; bud scales thick and hairy. Leaves alternate; petiole 8–12 mm, subglabrous, slightly sulcate adaxially; leaf blade greenish when fresh or brownish when dry abaxially, green when fresh or brown when dry adaxially, ovate or ovate-oblong, (4–)5–12 × (2–)3–4.5 cm, papery, glabrous on both surfaces, trinerved, midrib and basal lateral veins elevated abaxially, plane or slightly impressed adaxially, transverse veins numerous, slender, subhorizontal and subparallel, connected by remote vertical veinlets, forming transversely elongate reticulum, base cuneate,

broadly cuneate, or subrounded, apex acuminate, acumen obtuse. Glomerules usually 5- or 6-flowered, on 0.5–1 mm stalk, remotely arranged into a panicle, panicle axillary or terminal, up to 10 cm, erect, unbranched or few branched; branches upright, (1.5–)2–4 cm; rachis of panicle rusty pubescent; bracts subulate, less than 1 mm, densely rusty puberulent. Pedicels 2–6 mm. Flowers small, yellow-green, 4–8 mm. Perianth lobes 6, subequal, triangular-ovate, ca. 1.2 mm, slightly thickened, densely rusty puberulent outside and inside. Fertile stamens 9, ca. 1 mm; filaments villous, nearly as long as anthers, those of 3rd whorl each with 2 large stalkless glands at base, others glandless; anthers nearly square, those of 1st and 2nd whorls each with 2 introrse small cells and 2 lower introrse or lateral-introrse larger cells, those of 3rd whorl each narrower, with 2 upper extrorse cells and 2 lower lateral cells or with 4 cells arranged in an almost transverse series. Staminodes small, nearly estipitate. Ovary ellipsoid-ovoid, less than 1 mm; style longer; stigma discoid. Fruit narrowly ellipsoid, 1.5–2 × ca. 1 cm, red when ripe; perianth cup in fruit crateriform, 6–8 mm wide, with wilting persistent lobe at top; fruit stalk 0.5–1 cm, slightly dilated toward apex. Fl. (Jun–)Aug–Oct, fr. Oct–Feb of next year.

Sparse or dense forests along streamsides and roadsides, valleys; 500–1800 m. SW Guangxi, SW Guizhou, C and S Yunnan [Bhutan, India, Myanmar, Nepal, N Thailand, Vietnam].

**2. *Neocinnamomum fargesii* (Lecomte) Kostermans, Reinwardtia 9: 91. 1974.**

川鄂新樟 chuan e xin zhang

*Cinnamomum fargesii* Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 78. 1913; *Neocinnamomum wilsonii* C. K. Allen.

Shrubs or small trees, 2–7 m tall. Branchlets terete, striate, brown-spotted, glabrous. Leaves alternate; petiole 0.6–0.8 cm, concave-convex, glabrous; leaf blade greenish or white-green abaxially, green adaxially, broadly ovate, ovate-lanceolate, or rhombic-ovate, 4–6.5 × 3–4 cm, papery, glabrous on both surfaces, trinerved or subtrinerved, midrib and basal lateral veins elevated abaxially, impressed adaxially, basal lateral veins always with veins outside, transverse veins and veinlets conspicuous on both surfaces, base cuneate or broadly cuneate, margin cartilaginous, involute, and conspicuously undulate on upper part, apex slightly acuminate, acumen subacute. Pedicels 1–4 mm, sparsely puberulent or subglabrous. Flowers greenish, small, ca. 2 mm. Perianth lobes 6, subequal, broadly ovate, ca. 1.3 × 1.2 mm, acute, puberulent outside and inside. Fertile stamens 9, ca. 1 mm, puberulent; filaments as long as anthers, those of 3rd whorl each with 2 glands, others glandless; anthers of 1st and 2nd whorl each with 2 upper introrse cells and 2 lower lateral-introrse cells, those of 3rd whorl narrowly ovate, each with 2 upper lateral-introrse small cells and 2 lower extrorse larger cells. Staminodes small, deltoid, shortly stalked, puberulent. Ovary ellipsoid-ovoid, ca. 1.5 mm; style short; stigma discoid, emarginate at apex. Mature fruit red, subglobose, 1.2–1.5 cm in diam., apiculate; perianth cup in fruit crateriform, 0.5–1.2 cm wide and with wilting persistent lobes at top; fruit stalk 0.5–1.5 cm, slightly dilated toward apex. Fl. Jun–Aug, fr. Sep–Nov.

• Thickets; 600–1300 m. W Hubei, E Sichuan.

**3. *Neocinnamomum lecomtei* H. Liu, Laurac. Chine & Indochine, 93. 1932.**

海南新樟 hai nan xin zhang

*Neocinnamomum complanifructum* S. K. Lee & F. N. Wei; *N. hainaniamum* C. K. Allen.

Shrubs, 3–4 m tall. Branchlets dark brown, terete, striate, densely pubescent initially but soon glabrate. Buds small; bud scales thick, densely rusty strigose. Leaves alternate or sometimes subopposite on young branchlets; petiole (0.5–)1–1.5 cm, concave-convex, densely rusty pubescent; leaf blade brownish abaxially when dry, brown adaxially, ovate to broadly ovate, (5.5–)8–12 × (2.5–)4–7.5 cm, papery, densely rusty pubescent on both surfaces when young and abaxially when mature, subglabrate adaxially except on veins when mature, trinerved, midrib elevated abaxially, impressed adaxially, basal lateral veins opposite and oblique, extending to upper 1/3 or near leaf apex, always with some conspicuous veinlets outside, other lateral veins oblique, arising from upper part of midrib, transverse veins conspicuous, veinlets reticulate, ± conspicuous on both surfaces, base broadly cuneate, subrounded, or subtruncate, apex acuminate, acumen obtuse. Flowers unknown. Infructescence axillary, solitary, pedunculate; peduncle 2–5 mm. Fruit ellipsoid-globose, subglobose, or obovate, 1.5–2(–2.5) × 0.9–1.5(–2) cm; perianth cup in fruit crateriform, 1–1.2 cm wide on top; perianth lobes in fruit persistent, densely rusty pubescent, subequal, thickened, wilting, outer ones ovate, ca. 3 × 2.7 mm, inner ones ovate-oblong, ca. 5 × 4 mm; fruit stalk 1–1.3 cm, dilated toward apex. Fl. Aug, fr. Oct–May of next year.

Dense forests, watersides in valleys; 400–500 m. S Guangxi, SW Guizhou, Hainan, SE Yunnan [N Vietnam].

**4. *Neocinnamomum mekongense* (Handel-Mazzetti) Kostermans, Reinwardtia 9: 93. 1974.**

沧江新樟 cang jiang xin zhang

*Cinnamomum delavayi* Lecomte var. *mekongense* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 218. 1925; *C. delavayi* var. *aromaticum* Lecomte ex S. K. Lee.

Shrubs or small trees, (1.5–)2–5 m tall. Bark dark brown. Branchlets slender, terete, striate, glabrous. Buds small, ovoid; bud scales compact, broadly ovate, slightly thickened, rusty sericeous, acute. Leaves alternate; petiole slender, 1–1.5 cm, concave-convex, glabrous; leaf blade glaucous and opaque abaxially, green and slightly shiny adaxially, ovate to ovate-elliptic, (4.5–)5–10 × (1.7–)2.5–4.5(–5) cm, papery or subleathery, glabrous on both surfaces, trinerved, midrib and lateral veins conspicuous on both surfaces, basal lateral veins extending up to 3/4 of blade, other lateral veins small and short, transverse veins and veinlets reticulate on both surfaces, base cuneate, apex caudate-acuminate, acumen slender, 1.5–2 cm. Glomerules axillary, (1 or)2–5(or 6)-flowered, rusty sericeous; bracts minute, triangular-subulate, less than 1 mm, rusty sericeous, acute. Pedicels slender, 5–8(–10) mm, sulcate, rusty sericeous. Flowers green-yellow, small, ca. 2.5 mm in diam. when open. Perianth tube short, less than 1 mm; perianth lobes

6, triangular ovate, subequal, ca.  $2 \times 1.5$  mm, rusty sericeous on both surfaces, acute. Fertile stamens 9, ca. 1 mm (of 1st and 2nd whorls) or ca. 1.2 mm (of 3rd whorl); filaments of 1st and 2nd whorl as wide as 1/2 of anther, much shorter than anther, all glandless, but those of 3rd whorl as wide as anther, each with 2 orbicular-reniform glands at base; anthers of 1st and 2nd whorls ovate-rectangular, truncate at apex, 4-celled, upper 2 cells small and introrse, lower 2 cells large and extrorse-lateral, but anthers of 3rd whorl oblong, obtuse or subtruncate at apex, 4-celled, upper 2 cells small and extrorse, lower 2 cells large and lateral-extrorse. Staminodes small, triangular, stalked, including stalk ca. 0.5 mm. Ovary ovoid, ca. 1.2 mm, sessile, glabrous, base rounded but attenuate at apex; style short; stigma discoid. Mature fruit red, ovoid, ca.  $12 \times 8.5$ –9 mm, apiculate; perianth cup in fruit crateriform, up to 7 mm wide on top; perianth lobes in fruit persistent, slightly dilated and wilting; fruit stalk slender, ca. 1.2 cm. Fl. Jun–Aug, fr. Nov–May of next year.

• Thickets, sparse forests, roadsides, waterside forest margins; (1400–)1700–2300(–2700) m. SE Xizang, NW and W Yunnan.

**5. *Neocinnamomum delavayi*** (Lecomte) H. Liu, Laurac. Chine & Indochine, 90. 1932.

新樟 xin zhang

*Cinnamomum delavayi* Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 77. 1913; *C. parvifolium* Lecomte; *Neocinnamomum delavayi* var. *pauciflorum* Yen C. Yang; *N. parvifolium* (Lecomte) H. Liu.

Shrubs or small trees, (1.5–)2–5(–10) m tall. Bark dark brown. Branchlets slender, terete, striate, rusty- or white sericeous when young but glabrate when mature. Buds small; bud scales thick, densely rusty- or white sericeous. Leaves alternate; petiole 0.5–1 cm, concave-convex, densely appressed sericeous-pubescent initially but soon sparsely so; leaf blade glaucous and opaque abaxially, green and slightly shiny adaxially, elliptic-lanceolate to ovate or broadly ovate, (4–)5–11  $\times$  (1.5–)2–6

cm, subleathery, densely rusty- or white sericeous on both surfaces when young,  $\pm$  sericeous abaxially and glabrate adaxially when mature, trinerved, midrib and basal lateral veins elevated abaxially, always impressed adaxially, basal lateral veins arcuate-ascendant and up to 1/2–3/4 of leaf blade, axils of basal lateral veins sometimes dome-shaped abaxially and slightly bullate adaxially, other lateral veins all small, reticulate with transverse veins and veinlets, base acute to cuneate and always unequal on both sides, apex acuminate. Glomerules axillary, (1–)4–6(–10)-flowered; bracts triangular-subulate, ca. 0.5 mm, densely rusty sericeous-pubescent. Pedicels slender, ca. 5.8 mm, densely rusty sericeous-pubescent. Flowers small, yellow-green. Perianth tube very short; perianth lobes 6, triangular-ovate, subequal, outer ones ca.  $1.8 \times 1$  mm, inner ones ca.  $2.2 \times 1.4$  mm, all densely sericeous-pubescent outside and inside, acute. Fertile stamens 9, ca. 1.25 mm; filaments of 3rd whorl each with 2 orbicular-reniform glands at base, others glandless; anthers of 1st and 2nd whorls rectangular or ovate-rectangular, somewhat shorter than dilated filament, 4-celled, cells arranged in an almost transverse series, upper 2 introrse, lower 2 lateral-extrorse, anthers of 3rd whorl 4-celled, upper 2 cells small and lateral-extrorse, lower 2 cells large and extrorse. Staminodes subspatulate or ovoid, stalked, including villous stalk 0.6–0.8 mm. Ovary ellipsoid-ovoid, ca. 1 mm, sessile, glabrous, attenuate toward apex; style short; stigma discoid. Mature fruit red, ovoid,  $1-1.5 \times 0.7-1$  cm; perianth cup in fruit crateriform, 5–8 mm wide on top; perianth lobes in fruit persistent, slightly dilated and wilting; fruit stalk slender, 0.7–2 cm, gradually dilated toward apex. Fl. Apr–Sep, fr. Sep–Jan of next year.

• Thickets, forest margins, sparse or dense forests along riverbanks, watersides, limestone hills; 1100–2300 m. S Sichuan, SE Xizang, Yunnan.

Essential oil distilled from the leafy branchlets (0.8%–1.7%) is used for cosmetics or medicine. The drupe contains oil or fat, which is used in soap manufacture. The leaves are used by local people for treating rheumatic disorders.

## 12. PHOEBE Nees, Syst. Laur. 98. 1836.

楠属 nan shu

Wei Fa'nan (韦发南); Henk van der Werff

Evergreen trees or shrubs. Leaves alternate, pinnately veined. Flowers bisexual, cymose paniculate or subracemose. Perianth lobes 6, equal in size or sometimes outer ones slightly short, becoming leathery or woody after flowering. Fertile stamens 9, in 3 series; 1st and 2nd series without glands and with introrse 4-celled anthers; 3rd series with 2 glands and extrorse 4-celled anthers. Staminodes triangular or sagittate. Ovary ovoid or globose; stigma dish-shaped or capitate. Fruit ovoid, ellipsoid, or globose, rarely oblong, base surrounded by persistent and enlarged perianth lobes; fruiting pedicel not thickened or conspicuously thickened.

Up to 100 species: tropical and subtropical Asia; 35 species (27 endemic) in China.

1a. Perianth lobes outside and inflorescences glabrous or appressed puberulent.

2a. Midrib of leaf blade completely elevated adaxially.

3a. Branchlets and leaf blade abaxially glaucous ..... 1. *P. lichuanensis*

3b. Branchlets and leaf blade not as above.

4a. Fruit oblong or ellipsoid.

5a. Leaf blade elliptic, 7–13(–15)  $\times$  2–4 cm, lateral veins 6 or 7 pairs; petiole 1–2 cm;

infructescences 3–7 cm; fruit ellipsoid, 1.1–1.3 cm  $\times$  5–7 mm ..... 5. *P. yaiensis*

5b. Leaf blade broadly oblong-lanceolate or oblong-oblong-lanceolate, 10–28  $\times$  4–8 cm, lateral veins

9–15 pairs; petiole 2–4 cm; infructescences 10–17 cm; fruit oblong, 1.6–1.8 cm  $\times$  ca. 8 mm ..... 6. *P. hainanensis*

- 4b. Fruit ovoid.
- 6a. Leaf blade narrowly lanceolate, usually 15–25 × 1–2.5 cm ..... 2. *P. angustifolia*
- 6b. Leaf blade lanceolate, elliptic, or elliptic-lanceolate, much wider, 3–6.5 cm in diam.
- 7a. Leaf blade thickly papery, veinlets not foveolate on both surfaces; inflorescences slender; pedicel glaucous; fruit beaked at apex ..... 3. *P. lanceolata*
- 7b. Leaf blade leathery, veinlets foveolate on both surfaces; inflorescences thick; pedicel not glaucous; fruit not beaked at apex ..... 4. *P. calcarea*
- 2b. Midrib of leaf blade partly or completely impressed adaxially.
- 8a. Inflorescences mostly slender, much branched, each branch with persistent bracts at base; leaf blade lateral veins and veinlets deeply impressed adaxially ..... 7. *P. kwangsiensis*
- 8b. Inflorescences thick, each branch without persistent bracts at base; leaf blade lateral veins and veinlets not impressed or slightly impressed adaxially.
- 9a. Fruit globose or subglobose.
- 10a. Flowers large, 5–6 mm; petiole to 4 cm, 2–3 mm thick ..... 8. *P. chinensis*
- 10b. Flowers smaller, 2.5–3.5 mm; petiole not more than 2.5 cm, more slender.
- 11a. Leaf blade not lustrous on both surfaces, abaxially not glaucescent ..... 11. *P. minutiflora*
- 11b. Leaf blade lustrous on both surfaces, abaxially glaucescent.
- 12a. Leaf blade leathery, ovate-elliptic or lanceolate, 4–6 × 1–3.5 cm, lateral veins 5–7 pairs ..... 9. *P. microphylla*
- 12b. Leaf blade thickly leathery, oblong-lanceolate or elliptic, 7–12(–15) × 2–4.5 cm, lateral veins 12–15 pairs ..... 10. *P. faberi*
- 9b. Fruit ovoid.
- 13a. Young leaf blade densely appressed sericeous abaxially; perianth lobes conspicuously ciliate ..... 12. *P. hunanensis*
- 13b. Young leaf blade glabrous or sparsely pubescent abaxially; perianth lobes glabrous or somewhat hairy at margins.
- 14a. Leaf blade elliptic, lateral veins 6–9 pairs, inconspicuous on both surfaces, margin revolute; perianth lobes glabrate inside ..... 13. *P. nigrifolia*
- 14b. Leaf blade oblanceolate, lanceolate, pandurate-oblanceolate, or pandurate-obovate, lateral veins 8–13(–17) pairs, conspicuous abaxially, margin not revolute; perianth lobes densely pubescent inside ..... 14. *P. neuranthoides*
- 1b. Perianth lobes outside and inflorescences densely pubescent, villous, or tomentose.
- 15a. Midrib of leaf blade completely elevated adaxially.
- 16a. Panicles usually 9–16 cm; leaf blade 9–22 cm, base attenuate and decurrent, lateral veins 10–15 pairs ..... 15. *P. tavoyana*
- 16b. Panicles 3.5–10 cm; leaf blade 3–12 cm, base obtuse, not decurrent, lateral veins 6–8(–10) pairs.
- 17a. Leaf blade lanceolate or oblanceolate, 8–12 × 3–3.5(–4) cm, veinlets conspicuous abaxially; inflorescences 6–10 cm ..... 16. *P. legendrei*
- 17b. Leaf blade oblong or elliptic-oblong, 3–6 × 1.5–2 cm, veinlets slightly conspicuous abaxially; inflorescences ca. 3.5 cm ..... 17. *P. brachythyrssa*
- 15b. Midrib of leaf blade completely or partly impressed adaxially.
- 18a. Midrib of leaf blade impressed at lower part only adaxially.
- 19a. Leaf blade obovate or oblanceolate, base attenuate and decurrent ..... 18. *P. crassipedicella*
- 19b. Leaf blade lanceolate or elliptic-lanceolate, base cuneate, not decurrent ..... 16. *P. legendrei*
- 18b. Midrib of leaf blade completely impressed adaxially (but elevated distally in *P. neurantha* var. *cavaleriei*).
- 20a. Fruit globose ..... 19. *P. forrestii*
- 20b. Fruit shape not as above.
- 21a. Fruit large, more than 1.8 cm.
- 22a. One-year-old branchlets glabrous or puberulent.
- 23a. Apex of leaf blade shortly acuminate, abaxially puberulent; fruit oblong or ellipsoid, 2–3.2 × 1.1–2 cm ..... 20. *P. rufescens*
- 23b. Apex of leaf blade orbicular or slightly mucronate, abaxially usually glaucous; fruit long ovoid, ca. 1.8 × 1 cm ..... 21. *P. glaucophylla*
- 22b. One-year-old branchlets conspicuously hairy.
- 24a. Branchlets sparsely pubescent; leaf blade 10–20 cm, lateral veins 10–12 pairs ..... 22. *P. yunnanensis*
- 24b. Branchlets densely yellowish brown tomentose or pubescent; leaf blade 15–45 cm, lateral veins more than 20 pairs.

- 25a. Base of leaf blade shallowly cordate, oblique; fruit obovoid-oblong or obovoid; persistent perianth lobes ligneous, ca.  $15 \times 5-6$  mm ..... 23. *P. megacalyx*
- 25b. Base of leaf blade symmetrical; fruit ellipsoid; persistent perianth lobes leathery,  $5-6 \times 3.5-4$  mm.
- 26a. Leaf blade acuminate or shortly acuminate at apex, abaxially sparsely yellowish brown pubescent; fruit  $3.5-3.8(-4.2) \times 1.9-2.2$  cm, apex glabrous ..... 24. *P. macrocarpa*
- 26b. Leaf blade obtuse or mucronate at apex, abaxially densely yellowish brown villous especially along veins; fruit  $2-2.2 \times 1.5-1.6$  cm, apex hairy ..... 25. *P. motuonan*
- 21b. Fruit smaller, below 1.5 cm.
- 27a. One-year-old branchlets very thick, 4.5–6 mm in diam.
- 28a. Leaf blade obovate-lanceolate, elliptic-ob lanceolate, or oblanceolate,  $10-15 \times 2-4.5$  cm, lateral veins 12–14 pairs; branchlets, young leaf blade, petioles, and buds densely reddish brown or ferruginous villous ..... 26. *P. hungmoensis*
- 28b. Leaf blade obovate-elliptic or broadly obovate-lanceolate,  $10-23 \times 5-9$  cm, lateral veins 12–20 pairs; branchlets and petioles densely yellowish brown tomentose ..... 27. *P. puwenensis*
- 27b. One-year-old branchlets slender or very slender, 2–3.5 mm in diam.
- 29a. Leaf blade lateral veins very slender, conspicuous or inconspicuous, veinlets nearly disappearing or completely disappearing abaxially; leaf blade gray-white appressed pubescent abaxially ..... 28. *P. hui*
- 29b. Leaf blade lateral veins thick and veinlets conspicuous or very conspicuous abaxially; leaf blade hairy abaxially but not as above.
- 30a. Fruit larger, 1.1–1.5 cm, ellipsoid-ovoid, ellipsoid, or suboblong; persistent perianth lobes clasping base of fruit.
- 31a. Leaf blade obovate-elliptic or obovate-lanceolate,  $7-17 \times 3-7$  cm; seed with numerous embryos, cotyledons unequal ..... 29. *P. chekiangensis*
- 31b. Leaf blade elliptic, lanceolate, or oblanceolate, smaller; seed with solitary embryo, cotyledons equal.
- 32a. Leaf blade leathery, lanceolate or oblanceolate, veinlets very distinct, reticulate abaxially; branchlets hairy or glabrate; panicles shorter,  $3-7(-10)$  cm, not patent ..... 30. *P. bournei*
- 32b. Leaf blade thinly leathery, elliptic, veinlets indistinct, not reticulate abaxially; branchlets densely yellowish brown or gray-brown pubescent; panicles longer, 7.5–12 cm, patent ..... 31. *P. zhenman*
- 30b. Fruit smaller, not more than 1 cm, ovoid or ellipsoid-ovoid; persistent perianth lobes loose, rarely clasping base of fruit.
- 33a. Older leaf blade abaxially and fruiting pedicel glabrous or sparsely pubescent.
- 34a. Flowers smaller, 2–2.5 mm; persistent perianth lobes ca. 3 mm; leaf blade obovate or obovate-lanceolate,  $9-15(-20) \times 4-6(-8)$  cm, glaucous abaxially ..... 32. *P. formosana*
- 34b. Flowers larger, 4–5 mm; persistent perianth lobes 4–5 mm; leaf blade lanceolate or oblanceolate,  $3-16 \times 1-4$  cm ..... 33. *P. neurantha*
- 33b. Older leaf blade abaxially and fruiting pedicel densely villous or pubescent.
- 35a. Leaf blade densely or sparsely pubescent,  $\pm$  glaucous abaxially; persistent perianth lobes unequal, clasping base of fruit ..... 34. *P. glaucifolia*
- 35b. Leaf blade densely or sparsely gray-brown villous, not glaucous abaxially; persistent perianth lobes subequal, loose, not clasping base of fruit ..... 35. *P. sheareri*

**1. *Phoebe lichuanensis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 57. 1979.

利川楠 *li chuan nan*

Trees, over 10 m tall; trunk 30–40 cm d.b.h., all parts glabrous except for perianth lobes inside. Branchlets glaucous, longitudinally angular when dry. Petiole 1.5–3 cm; leaf blade conspicuously glaucous abaxially, lustrous adaxially, elliptic,

8–10 × 3–4 cm, leathery, midrib elevated or plane adaxially, lateral veins 7 or 8 pairs, conspicuously raised abaxially, veinlets slightly foveolate abaxially, base cuneate, apex acuminate. Panicles arising from middle and lower parts of newly sprouted branchlet, 6–10 cm, branched at top. Pedicel 5–7 mm. Flowers large, 4.5–5 mm. Perianth lobes subequal, ovate or long ovate, 4–4.5 × 2–2.2 mm, apex obtuse or acute, glabrous or glabrate outside, densely gray-yellow pubescent inside. Fertile stamens ca. 3.5 mm; filaments flat, hairy, those of 3rd series with reniform sessile or subsessile glands adnate at middle. Staminodes triangular, ca. 2 mm, with gray-yellow villous stalks. Ovary globose; style slender, erect or slightly curved, glabrous. Fl. May.

- Mountain valleys, mixed forests; ca. 700 m. SW Hubei.

**2. *Phoebe angustifolia*** Meisner in A. Candolle, Prodr. 15(1): 34. 1864.

沼楠 zhao nan

*Phoebe angustifolia* var. *annamensis* H. Liu.

Small shrubs. Branchlets blackish, sometimes older ones yellowish, younger branchlets glabrous or gray-brown puberulent. Terminal buds small; bud scales brownish puberulent outside. Petiole 1–1.5 cm, glabrous or glabrate; leaf blade lanceolate or narrowly lanceolate, (10–)15–25(–37) × 1–2.5(–3.5) cm, leathery, puberulent or glabrous abaxially, glabrous or puberulent along midrib adaxially, midrib elevated on both surfaces, lateral veins 10–16(–20) pairs, abaxially conspicuous, adaxially slightly conspicuous or inconspicuous, base attenuate and decurrent, apex acuminate. Panicles subterminal, numerous, 8–18(–20) cm, branched at above middle of peduncle; peduncle and pedicel outside glabrous. Perianth lobes ovate, ca. 2.5 mm, glabrous outside, pubescent inside. Stamens ca. 2 mm; filaments slightly hairy, those of 3rd series with shortly stalked glands at base. Fruit ovoid, 9–12(–14) × 5–7 mm; fruiting pedicel 6–8 mm, slender; persistent perianth lobes straw-yellow or brownish, leathery, clasping base of fruit. Fl. Apr, fr. May–Jun.

Lowlands, marshlands, streambanks. SE Yunnan [India, Myanmar, Vietnam].

**3. *Phoebe lanceolata*** (Nees) Nees, Syst. Laur. 109. 1836.

披针叶楠 pi zhen ye nan

*Ocotea lanceolata* Nees in Wallich, Pl. Asiat. Rar. 2: 71. 1831; *Laurus lanceolaria* Roxburgh; *O. ligustrina* Nees.

Trees, 4–15(–20) m tall. Bark gray-white. Branchlets slender, older ones gray-brown or brown, young ones glabrous or yellowish brown puberulent and soon caducous. Buds densely yellowish gray tomentose. Petiole 1–2.5 cm, glabrous; leaf blade usually purplish red on both surfaces when young, lanceolate or elliptic-lanceolate, 13–22(–25) × 3–5.5(–6.5) cm, thickly papery, abaxially pubescent when young, glabrous on both surfaces when old, midrib thick, elevated adaxially, lateral veins 9–13(–15) pairs, slender but conspicuous, veinlets invisible on both surfaces or slightly conspicuous abaxially, base attenuate and decurrent, apex acuminate or long acuminate, summit usually falcate. Panicles variable in length, usually 12–15 cm, longer one to 20 cm, shorter one 4–5 cm, branched near top of peduncle; peduncle and pedicel glabrous. Pedicel as long as

perianth, usually glaucous. Flowers pale green or yellowish green, 3–4 mm. Perianth lobes subequal, ovate, 2.5–3 mm, glabrous outside, gray-white pubescent inside. Filaments gray-white pubescent at base, those of 3rd series with sessile glands at base. Ovary glabrous. Fruit ovoid, 9–12 × 6–7 mm, usually with short rostrum at apex; fruiting pedicel slightly thickened; persistent perianth lobes straw-yellow, leathery, clasping base of fruit or lax. Fl. Apr–May, fr. Jul–Sep.

Broad-leaved mountain forests, common; usually below 1500 m. S Yunnan [Bhutan, India, Indonesia, Malaysia, Nepal, Thailand].

**4. *Phoebe calcarea*** S. K. Lee & F. N. Wei, Guihaia 3: 7. 1983.

石山楠 shi shan nan

Trees, up to 13 m tall. Branchlets castaneous, angular, ca. 2.5 mm in diam., glabrous. Petiole 1.5–3 cm, canaliculate adaxially, glabrous; leaf blade shiny adaxially, elliptic, 11–19 × 3.5–6 cm, leathery, glabrous on both surfaces, midrib and lateral veins elevated on both surfaces, lateral veins 9–13 pairs, slender, reticulate veinlets dense, foveolate and usually conspicuous on both surfaces, base attenuate or cuneate, apex long acuminate. Panicles many, terminal, 15–25 cm, glabrous. Pedicel 1–1.3 cm. Perianth lobes ovate, subequal, 3–4 × ca. 2 mm, outer 3 lobes glabrous on both surfaces, inner 3 lobes glabrous outside, densely gray-white villous inside. Filaments of 1st and 2nd series sparsely villous, of 3rd series densely villous, with reniform glands. Staminodes sagittate, ca. 2 mm, stalked. Ovary ovoid; stigma capitate. Fruit ovoid, 8–10 × 5–6 mm; persistent perianth lobes leathery, clasping at base of fruit. Fl. Apr–May, fr. Aug.

• Limestone hills, mixed broad-leaved forests. Guangxi, S Guizhou (Libo).

**5. *Phoebe yaiensis*** S. K. Lee, Acta Phytotax. Sin. 8: 190. 1963.

崖楠 ya nan

*Phoebe cuneata* Blume var. *glabra* H. Liu.

Trees, usually 5–8 m tall. Branchlets glabrous, older branchlets with conspicuous leaf scars and lenticels. Buds glabrous or puberulent. Petiole 1–2 cm, glabrous; leaf blade elliptic, 7–13(–15) × 2–4 cm, leathery, glabrous on both surfaces or puberulent abaxially, midrib and lateral veins more slender, elevated on both surfaces, lateral veins 6 or 7 pairs, veinlets abaxially conspicuous. Flowers not seen. Inflorescences subterminal, 3–7 cm, glabrous. Fruit ellipsoid, 1.1–1.3 cm × 5–7 mm; fruiting pedicel 6–8 mm, slightly thickened; persistent perianth lobes ovate, 3–4 × ca. 2.5 mm, leathery, glabrous outside, gray-brown pubescent inside, apex obtuse, clasping at base of fruit. Fr. Sep–Nov.

Lowlands of mixed forests. SW Guangxi, Hainan [Vietnam].

**6. *Phoebe hainanensis*** Merrill, Philipp. J. Sci. 21: 343. 1922.

茶槁楠 cha gao nan

Trees, glabrous throughout except for perianth lobes inside. Petiole 2–4 cm; leaf blade shiny and tea-colored, broadly oblong-lanceolate or oblong-oblancheolate, 10–25(–28) × 4–8(–10) cm, thinly leathery, midrib and lateral veins elevated on both surfaces, lateral veins distant, 9–15 pairs, veinlets densely

reticulate, slightly conspicuous on both surfaces. Panicles axillary at upper part of newly sprouted branchlet, 10–15(–17) cm, with few flowers. Perianth lobes ovate or elliptic-ovate, ca. 4 mm, brownish sericeous inside, apex obtuse. Ovary glabrous. Fruit oblong, 1.6–1.8 cm × ca. 8 mm; fruiting pedicel ca. 6 mm; persistent perianth lobes elliptic-ovate, clasping at base of fruit. Fr. Nov.

- Mixed forests, rare. Hainan.

**7. *Phoebe kwangsiensis*** H. Liu, Laurac. Chine & Indochine, 70. 1932.

桂楠 *gui nan*

Small trees, 2–8 m tall. Branchlets terete, pubescent. Petiole 6–15 mm, hairy; leaf blade oblanceolate or elliptic-oblanceolate, 9–19(–21) × 2–4 cm, blackish when dry, leathery, abaxially gray-brown pubescent, adaxially glabrous or hairy along midrib, midrib, lateral veins, and veinlets elevated abaxially, impressed into small canals adaxially, lateral veins 10–13 pairs, curved, anastomosing at margin, base cuneate, apex acuminate. Cymose panicles slender, 13–18 cm; peduncle 10–12 cm, sparsely pubescent, much branched at top, each branch with persistent bracts at base. Flowers small, ca. 2.5 mm. Perianth lobes ovate-triangular, glabrous or puberulent outside, canescent villous inside. Filaments of 1st and 2nd series glabrate, those of 3rd series with sessile glands at base. Ovary subovoid; style slender; stigma dish-shaped. Fl. Jun, fr. Sep.

- Limestone hills, mixed forests by streamsides, rare; 700–1000 m. NW Guangxi, SW Guizhou.

**8. *Phoebe chinensis*** Chun, Chinese Econ. Trees, 158. 1921.

山楠 *shan nan*

*Machilus macrophylla* Hemsley (1891), not Blume (1851), nor Nees (1836); *Phoebe macrophylla* Gamble (1914), not Blume (1851).

Large trees, 15–20 m tall; trunk to 70 cm d.b.h. Branchlets terete, glabrous, blackish brown when dry. Terminal buds ovoid or subglobose, 5–8 mm in diam.; bud scales glabrate except for margins, blackish when dry. Petiole thick, 2–3(–4) cm, glabrous, blackish when dry; leaf blade broadly oblanceolate, broadly lanceolate, or oblong-lanceolate, 11–17(–20) × 3–5(–5.5) cm, leathery to thickly leathery, glabrous on both surfaces or abaxially puberulent, midrib thick, abaxially very elevated, adaxially impressed, lateral veins indistinct or sometimes slightly distinct abaxially, veinlets invisible on both surfaces, base cuneate, apex acute or acute-acuminate, rarely mucronate. Panicles thick, subterminal or from base of newly sprouted branchlet, 8–17 cm, glabrous, branched at above middle of peduncle. Flowers yellowish green, 5–6 mm. Perianth lobes ovate-oblong, glabrous or puberulent outside, hairy inside and at margins. Filaments glabrous or hairy at base only, those of 3rd series with long stipitate glands at base. Ovary ovoid; style slender; stigma slightly enlarged. Fruit globose or subglobose, ca. 1 cm in diam.; fruiting pedicel ca. 6 mm, reddish brown when alive; persistent perianth lobes clasping at base of fruit or lax, upper half usually not becoming hard and not caducous, lower half somewhat becoming hard. Fl. Apr–May, fr. Jun–Jul.

- Mountain slopes or valleys, evergreen broad-leaved forests, scattered or pure forests; ca. 1500 m. Gansu, Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

**9. *Phoebe microphylla*** H. W. Li, Acta Phytotax. Sin. 17(2): 57. 1979.

小叶楠 *xiao ye nan*

Trees, ca. 10 m tall. One-year-old branchlets terete, glabrous, conspicuously lenticellate. Leaves congested at apex of branchlet; petiole 1–1.5(–2) cm; leaf blade abaxially conspicuously glaucous, adaxially shiny, ovate-elliptic or lanceolate, rarely oblanceolate, 4–6 × 1–3.5 cm, leathery, glabrous on both surfaces, midrib abaxially elevated, adaxially impressed, lateral veins 5–7 pairs, somewhat distinct on both surfaces, veinlets slightly visible abaxially, base cuneate to broadly cuneate, apex acuminate or subacutely acuminate. Infructescences arising from lower part of newly sprouted branchlet, 4.5–7 cm, branched at upper part; peduncle 2.5–4.5 cm, glabrous. Fruit globose, ca. 9 mm in diam.; fruiting pedicel enlarged, glabrous; persistent perianth lobes slightly thickened, ovate-oblong, equal, 4–5 × ca. 1.8 mm, glabrous outside, pubescent inside, loose or clasping at base of fruit. Fr. May–Jun.

- Mountain valleys, open forests; 400–1800 m. SE Yunnan.

**10. *Phoebe faberi*** (Hemsley) Chun, Contr. Biol. Lab. Sci. Soc. China 1(5): 31. 1925.

竹叶楠 *zhu ye nan*

*Machilus faberi* Hemsley, J. Linn. Soc., Bot. 26: 375. 1891; *Phoebe omeiensis* R. H. Miao.

Trees, usually 10–15 m tall. Branchlets thick, blackish or blackish brown when dry, glabrous. Petiole 1–2.5 cm; leaf blade abaxially glaucous or glaucous-green, adaxially shiny, oblong-lanceolate or elliptic, 7–12(–15) × 2–4.5 cm, thickly leathery or leathery, glabrous on both surfaces or appressed canescent abaxially when young, midrib abaxially elevated, adaxially concave, lateral veins 12–15 pairs, veinlets invisible on both surfaces, revolute at margin, base cuneate or rounded-obtuse, usually oblique, apex obtuse or acute, rarely shortly acuminate. Inflorescences many, axillary at lower part of newly sprouted branchlet, 5–12 cm, glabrous, branched at above middle of peduncle, each umbellule with 3–5 flowers. Pedicel 4–5 mm. Flowers yellowish green, 2.5–3 mm. Perianth lobes ovate, glabrous outside, hairy inside and at margin. Filaments glabrous or only hairy at base, those of 3rd series with shortly stipitate or sessile glands at base. Ovary glabrous; style slender. Fruit globose, 7–9 mm in diam.; fruiting pedicel ca. 8 mm, slightly thickened; persistent perianth lobes ovate, leathery, slightly clasping or lax, apex extrorse. Fl. Apr–May, fr. Jun–Jul.

- Mountain slopes, broad-leaved forests; 800–1500 m. Guizhou, W Hubei, Shaanxi, Sichuan, C and N Yunnan.

**11. *Phoebe minutiflora*** H. W. Li, Acta Phytotax. Sin. 17(2): 57. 1979.

小花楠 *xiao hua nan*

Trees, usually 7–15(–25) m tall; trunk to 35 cm d.b.h. One-year-old branchlets terete, glabrous, older ones usually

with oblong lenticels. Bud scales glabrous outside, ciliate. Petiole 7–15 mm, glabrous; leaf blade oblong or oblong-lanceolate, 6–15 × 2–4.5 cm, leathery, most glabrous on both surfaces, midrib raised abaxially, impressed adaxially, lateral veins 6–10 pairs, slender, curved, somewhat conspicuous on both surfaces, veinlets densely reticulate, base cuneate or subrounded, sides unequal. Cymose panicles numerous, subterminal, slender, (3.5–)6–15 cm, glabrous, many flowered. Pedicel slender, 4–6 mm or more. Flowers yellowish green, small, 2–3 mm. Perianth lobes subequal, ovate-oblong, ciliate, outer ones hairy inside only, inner ones puberulent outside, villous inside. Filaments canescent villous at base, those of 3rd series with shortly stipitate glands at base. Staminodes triangular, long stipitate, villous. Ovary ovoid, glabrous; style slender; stigma subulate. Fruit globose, ca. 8 mm in diam.; fruiting pedicel ca. 6 mm, enlarged; persistent perianth lobes slightly thickened, loose, apex extrorse or patent. Fl. Jan–Mar, fr. Apr.

- Mountain slopes, valley forests; 500–1500 m. S Yunnan.

**12. *Phoebe hunanensis*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 58: 146. 1921.

湘楠 xiang nan

Shrubs or small trees, usually 3–8 m tall. Branchlets reddish brown or reddish black, angular when dry, glabrous. Petiole 7–15(–24) mm, glabrous; leaf blade sometimes reddish purple adaxially when young, glaucous or white-farinoso abaxially when old, broadly oblanceolate, rarely obovate-lanceolate, (7.5–)10–18(–23) × 3–4.5(–6.5) cm, leathery or subleathery, densely appressed silvery sericeous abaxially when young, glabrous or appressed pubescent abaxially and glabrous adaxially when old, midrib thick, abaxially very conspicuous, adaxially impressed, rarely plane, lateral veins 6–14 pairs, usually 10–12, abaxially raised, veinlets abaxially conspicuous, base cuneate or narrowly cuneate, apex shortly acuminate, sometimes summit falcate. Inflorescences from upper part of current year branchlet, slender, 8–14 cm, subracemose or branched at upper part of peduncle, glabrous. Pedicel ca. as long as flower. Flowers 4–5 mm. Perianth lobes slightly unequal, puberulent to glabrous outside, densely canescent inside. Filaments glabrous or hairy at base only, those of 3rd series with sessile glands at base. Ovary compressed globose, glabrous; stigma cap-shaped or somewhat enlarged. Fruit ovoid, 1–1.2 cm × ca. 7 mm; fruiting pedicel slightly thickened; persistent perianth lobes ovate, lax with longitudinal veins, ciliate. Fl. May–Jun, fr. Aug–Sep.

- Mountain valleys, streamsides. Anhui, Gansu, Guizhou, Hubei, C, SE, and W Hunan, Jiangsu, Jiangxi, Shaanxi.

**13. *Phoebe nigrifolia*** S. K. Lee & F. N. Wei, Acta Phytotax. Sin. 17(2): 58. 1979.

黑叶楠 hei ye nan

Shrubs to small trees, 2–6 m tall. Branchlets subterete, blackish when dry, glabrous, lenticellate; older branchlets usually with leaf scars. Buds pubescent. Petiole 5–7 mm, glabrous; leaf blade elliptic, 3.5–9 × 1.5–3.5 cm, leathery, blackish when dry, abaxially glabrous or puberulent, adaxially glabrous and shiny, midrib abaxially raised, adaxially concave or plane, lateral veins 6–9 pairs, inconspicuous on both surfaces, veinlets

dense, inconspicuous or conspicuous, foveolate, base cuneate, margin revolute, apex acuminate or shortly acuminate. Panicles axillary at upper part of newly sprouted branchlet, slender, 2.5–7(–11) cm, glabrous, branched at above middle of peduncle. Pedicel 4–7 mm. Flowers 3–3.5 mm. Perianth lobes ovate, subequal, 2.5–3 × ca. 2 mm, with 5–7 veins, glabrous outside, glabrate inside, apex round or obtuse. Filaments hairy, those of 3rd series with sessile glands at base. Staminodes triangular, stipitate, hairy. Ovary globose, together with style glabrous; stigma capitate. Fruit ovoid, ca. 1 cm × 8 mm; fruiting pedicel slightly thickened; persistent perianth lobes ovate, leathery, clasping base of fruit. Fl. Apr–May, fr. Aug–Sep.

- Limestone hills, thickets. SW Guangxi.

**14. *Phoebe neuranthoides*** S. K. Lee & F. N. Wei, Acta Phytotax. Sin. 17(2): 58. 1979.

光枝楠 guang zhi nan

*Phoebe pandurata* S. K. Lee & F. N. Wei.

Large shrubs to small trees, to 11 m tall. Branchlets blackish brown or brownish, angular, glabrous. Terminal buds ovoid, yellowish brown appressed pubescent. Petiole 1–2 cm, slender, glabrous; leaf blade oblanceolate, lanceolate, or sometimes pandurate-oblanceolate to pandurate-obovate, 8–17 × 2–5.5 cm, thinly leathery, abaxially glabrous, midrib abaxially elevated, adaxially impressed or at least lower part impressed, lateral veins 8–13(–17) pairs, abaxially conspicuous, veinlets abaxially somewhat conspicuous or invisible, base attenuate or cuneate, sometimes pandurate-oblanceolate to decurrent, apex acute-acuminate to acuminate. Inflorescences 6–10(–13) arising from middle of newly sprouted branchlet, subracemose, or branchlet at upper part of peduncle, few flowered; peduncle 3–7 cm, glabrous. Pedicel (4–)7–9 mm, glabrous. Flowers 3–3.5 mm. Perianth lobes subequal or outer ones smaller, glabrous outside, pubescent or villous inside. Filaments ± pubescent, those of 3rd series densely pubescent, with glands at base. Staminodes sagittate, with villous or pubescent stalks. Ovary ovoid, glabrous. Fruit ovoid, 1–1.2 cm × 5–8 mm; fruiting pedicel 8–9 mm, slightly thickened; persistent perianth lobes ovate, lax. Fl. Apr–May, fr. Sep–Oct.

- Mountain slopes, valleys, dense forests; 600–2000 m. N Guangxi, Guizhou, W Hubei, W Hunan, S Shaanxi, NE and S Sichuan.

**15. *Phoebe tavoyana*** (Meisner) J. D. Hooker, Fl. Brit. India 5: 143. 1886.

乌心楠 wu xin nan

*Machilus tavoyana* Meisner in A. Candolle, Prodr. 15(1): 41. 1864; *M. henryi* Hemsley; *Phoebe cuneata* Blume var. *poilanei* H. Liu; *P. henryi* (Hemsley) Merrill.

Trees, usually 8–12 m tall. Two-year-old branchlets sparsely pubescent or glabrate; current year branchlets densely yellow-gray villous. Petiole 1–2 cm, pubescent; leaf blade lanceolate or elliptic-lanceolate, 9–22 × 2.5–5.5 cm, thinly leathery, abaxially densely gray-white or gray-brown villous becoming pubescent, adaxially glabrous, midrib adaxially elevated, lateral veins 10–15 pairs, anastomosing and disappearing near margin, abaxially distinct, adaxially indistinct or slightly

distinct, veinlets somewhat visible, base attenuate, usually decurrent, apex caudate-acuminate. Panicles numerous, axillary at upper part of newly sprouted branchlet, usually 9–16 cm, rarely to 25 cm, branched on top, densely yellowish gray pubescent. Flowers and pedicel 4–5 mm. Perianth yellowish brown, ovate, pubescent on both surfaces, apex obtuse. Filaments hairy, those of 3rd series with sessile or subsessile glands at base. Staminalodes stipitate, densely villous. Ovary subglobose, glabrous or sparsely pubescent at upper part; style filiform, erect or somewhat curved; stigma dish-shaped. Fruit ellipsoid-obovoid or ellipsoid, ca. 1.2 cm; fruiting pedicel short, thickened; persistent perianth hairy on both surfaces. Fl. usually Feb–Mar, fr. May–Aug.

Mixed forests and thickets, very common in Hainan. Guangdong, SE Guangxi, Hainan, Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

**16. *Phoebe legendrei*** Lecomte, *Nouv. Arch. Mus. Hist. Nat.*, sér. 5, 5: 103. 1913.

雅砻江楠 ya long jiang nan

Trees. Branchlets sparsely pubescent, later glabrate. Petiole ca. 1 cm; leaf blade lanceolate or elliptic-lanceolate, rarely obovate, 8–12 × 3–3.5(–4) cm, leathery, abaxially glabrate or pubescent along veins, midrib raised on both surfaces or at least upper part distinctly raised, lateral veins 7 or 8(–10) pairs, abaxially conspicuous. Inflorescences 6–10 cm, few flowered, pubescent; peduncle 3.5–4 cm. Perianth lobes subequal, ovate-oblong, ca. 3 × 2 mm, densely gray-white villous on both surfaces. Filaments sparsely (or densely) villous, those of 3rd series with subsessile glands at base. Staminalodes triangular with villous stalks. Ovary globose, glabrous; stigma capitate. Fruit ovoid, 7–9 mm; persistent perianth lobes lax, apex extrorse; fruiting pedicel distinctly thickened or somewhat thickened, sparsely pubescent. Fl. Jun, fr. Oct.

• Dense mixed forests; higher elevations. SE and W Sichuan, NW Yunnan.

**17. *Phoebe brachythyrso*** H. W. Li, *Acta Phytotax. Sin.* 17(2): 59. 1979.

短序楠 duan xu nan

Small shrubs, ca. 2 m tall. Branchlets slender, 2–3 mm in diam., pubescent. Buds pubescent. Petiole 2–4 mm, pubescent; leaf blade oblong or elliptic-oblong, 3–6 × 1.5–2 cm, leathery, abaxially appressed pubescent, adaxially glabrous, midrib slender, raised on both surfaces, lateral veins 6–8 pairs, very slender, abaxially slightly distinct, adaxially usually inconspicuous, veinlets almost invisible, base cuneate, apex shortly acuminate. Flowers not seen. Inflorescences short, ca. 3.5 cm, subracemose with few fruits, pubescent. Fruit ovoid, ca. 1.1 cm × 7 mm; fruiting pedicel ca. 6 mm; persistent perianth lobes subovate, hard, pubescent, clasping base of fruit. Fr. Sep.

• Thickets of lowland slopes. NE Yunnan.

**18. *Phoebe crassipedicella*** S. K. Lee & F. N. Wei, *Guihaia* 3: 8. 1983.

粗柄楠 cu bing nan

Trees, ca. 8 m. Branchlets angular, glabrous or glabrate.

Petiole 5–15 mm, glabrous or puberulent; leaf blade abaxially pale green or glaucous, obovate or oblanceolate, 8–14 × 2.5–3.5 cm, leathery, abaxially puberulent, adaxially glabrous, midrib adaxially impressed at lower part and raised at upper part, lateral veins ca. 9 pairs, slender, elevated on both surfaces, reticulate veinlets distinct abaxially, base attenuate and decurrent, apex acuminate or obtuse. Inflorescences usually arising from middle of newly sprouted branchlet, 3–9 cm, puberulent or glabrous. Fruit ovoid, ca. 1 cm × 8 mm; persistent perianth lobes equal, ovate, 3–4 × 2.5–3 mm, glabrous or glabrate outside, pubescent inside; fruiting pedicel 3–4 mm, conspicuously thickened, glabrous. Fl. May–Jun, fr. Sep.

• Limestone hills, mixed broad-leaved forests. NW Guangxi, S Guizhou (Libo).

**19. *Phoebe forrestii*** W. W. Smith, *Notes Roy. Bot. Gard. Edinburgh* 13: 176. 1921.

长毛楠 chang mao nan

Trees, to 15 m tall. Bark gray-white. Branchlets slender, terete, densely yellow-brown villous. Petiole 7–15 mm, densely yellow-brown villous; leaf blade narrowly lanceolate or narrowly oblanceolate, 8–14(–20) × 1–3(–3.5) cm, leathery, abaxially densely or sparsely yellow-brown villous, adaxially glabrous or yellow-brown pubescent along midrib, midrib adaxially impressed, rarely plane, lateral veins 7–13 pairs, abaxially distinct, base attenuate, apex acute or obtuse, sometimes rounded. Inflorescences subracemose, slender, axillary at middle and upper part of newly sprouted branchlet, 4–8(–9) cm; peduncle and pedicel densely yellow-brown pubescent. Perianth lobes subequal, ca. 4 mm, yellow-brown pubescent on both surfaces, apex obtuse or subacute. Filaments hairy, at least hairy at base, those of 3rd series with shortly stipitate glands at base. Ovary subglobose; stigma large, usually 3-lobed. Fruit globose, ca. 1.3 × 1 cm; fruiting pedicel slightly thickened; persistent perianth lobes lax, apex somewhat extrorse. Fl. Jun–Jul, fr. Oct–Nov.

• Mixed forests of mountain slopes or valleys; 1700–2500 m. SE Xizang, C and W Yunnan.

**20. *Phoebe rufescens*** H. W. Li, *Acta Phytotax. Sin.* 17(2): 59. 1979.

红梗楠 hong geng nan

Trees, 12–20 m tall; trunk ca. 40 cm d.b.h. Bark grayish brown. Branchlets reddish brown, subterete, puberulent, with distinct leaf scars and lenticels. Buds tomentose. Petiole 1–2 cm, puberulent; leaf blade oblong or lanceolate-oblong, 9.5–17 × 2.5–6 cm, leathery, abaxially puberulent, adaxially glabrous or puberulent along midrib, midrib adaxially impressed, lateral veins 8–15 pairs, veinlets distinct, foveolate on both surfaces, base cuneate or narrowly cuneate, apex obtuse or acute, rarely shortly acuminate. Inflorescences 7.5–18 cm, thick, branched on top of peduncle, yellowish brown puberulent. Fruit long ovoid or ellipsoid, 2–3.2 × 1.1–2 cm, purple-black when mature; fruiting pedicel somewhat thickened; perianth lobes oblong-ovate, conspicuously hairy on both sides, clasping base of fruit. Fr. Sep–Nov.

• Moist mixed broad-leaved forests; 1800–2000 m. SW Yunnan.

**21. *Phoebe glaucophylla*** H. W. Li, Acta Phytotax. Sin. 17(2): 60. 1979.

粉叶楠 fen ye nan

Trees, to 20 m tall. Branchlets subterete, glabrous, with large distinct leaf scars and lenticels. Bud scales pubescent outside. Petiole 1–2.3 cm, stout, hairy; leaf blade broadly obovate-lanceolate or suboblong, 6–18 × 3–9 cm, leathery, abaxially glaucous or not and appressed puberulent, adaxially shiny and glabrous, midrib abaxially elevated, adaxially impressed, lateral veins 7–11 pairs, obliquely extended, disappearing near margin, veinlets usually inconspicuous on both surfaces, base attenuate-cuneate, apex obtuse or slightly mucronate, rarely acute. Cymose panicles 7.5–20 cm, thick, puberulent, branched on top of peduncle, lowest ramification ca. 7.5 cm. Pedicel 4–7 mm, pubescent. Flowers yellowish green, 4–5 mm. Perianth lobes subequal, ovate, 3.5–4 × ca. 2.5 mm, pubescent on both surfaces, apex acute. Filaments hairy, those of 3rd series with shortly stipitate glands at base. Ovary ovoid, upper part hairy; style filiform, glabrous; stigma somewhat enlarged or not. Fruit long ovoid, ca. 1.8 × 1 cm; persistent perianth lobes hard, ca. 5 mm, hairy, clasping fruit. Fl. Jun, fr. Nov.

• Limestone hills, mixed forests; 900–1200 m. SE Yunnan.

**22. *Phoebe yunnanensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 60. 1979.

景东楠 jing dong nan

Trees, 8–14 m tall; trunk ca. 20 cm d.b.h. Bark gray-black. Branchlets robust, pubescent, conspicuously lenticellate. Terminal bud large, reddish brown tomentose. Petiole 1.3–3.5 cm, thick, hairy; leaf blade yellowish brown on both surfaces when dry, obovate-oblong, ovate-round, or oblong, 10–22 × 3.5–12 cm, leathery, abaxially sparsely or densely yellow pubescent, adaxially glabrous, midrib thick, abaxially elevated, adaxially concave, lateral veins 10–12 pairs, obliquely extended, near margin anastomosing, veinlets abaxially reticulate, base cuneate or broadly cuneate, apex shortly acuminate or acute-acuminate. Infructescences 14–27 cm, with fewer fruits, puberulent; peduncle thick to 20 cm. Fruit ovoid, 2–2.2 × ca. 1.3 cm, glabrous or only apex slightly pubescent; fruiting pedicel thickened, very short, densely yellowish brown tomentose; persistent perianth lobes ovate, thickened, 6–7 × 4–5 mm, apex obtuse, hairy on both sides, clasping base of fruit. Fr. Oct.

• Broad-leaved mountain forests; ca. 2000 m. W Yunnan.

**23. *Phoebe megalyx*** H. W. Li, Acta Phytotax. Sin. 17(2): 60. 1979.

大萼楠 da e nan

Small trees, ca. 5 m tall. Bark blackish brown. Branchlets subterete, thick, densely yellowish brown tomentose. Buds yellowish brown tomentose. Petiole thick, 1–2 cm, densely yellowish brown tomentose; leaf blade broadly oblanceolate or oblanceolate, 15–45 × 4.5–11.5 cm, thinly leathery, abaxially densely or sparsely pubescent and extended villous on veins, adaxially first yellowish brown pubescent or only hairy along veins, becoming glabrous after, midrib thick, adaxially impressed, lateral veins 22–28 pairs, curved, abaxially conspicu-

ous, anastomosing near margin, base shallowly cordate, asymmetrical on both sides. Panicles to 23 cm, slightly branched on top of peduncle, patently yellowish brown tomentose; bracts linear-lanceolate, ca. 8 mm, hairy. Filaments hairy, those of 3rd series very compressed at base, to 2 mm broad, glands shortly stipitate. Stamines triangular, stipitate, hairy. Ovary obovoid, apex yellowish brown pubescent. Fruit obovoid-oblong or obovoid, ca. 3.2 × 1.8 cm, apex with mucro, upper part yellowish brown pubescent; fruiting pedicel ca. 6 mm; persistent perianth lobes oblong-ovate, to 1.5 × 0.5–0.6 cm, very thickened ligneous, densely yellowish brown pubescent on both surfaces, clasping at base of fruit. Fl. Apr–May, fr. Jun–Jul.

Mountain valleys, mixed forests; lower elevations. SE Yunnan [N Vietnam].

**24. *Phoebe macrocarpa*** C. Y. Wu, Acta Phytotax. Sin. 6: 211. 1957.

大果楠 da guo nan

*Phoebe poilanei* Kostermans.

Large trees, usually 15–20 m tall; trunk 40–60 cm d.b.h. Bark blackish brown. Branchlets thick, densely yellowish brown tomentose. Terminal buds ovoid, ca. 2 cm, yellowish brown hispidulous. Petiole 1–2 cm, thick, long hairy; leaf blade elliptic-oblanceolate or oblanceolate, 18–30(–38) × 4–7.5(–9) cm, thinly leathery, abaxially sparsely yellowish brown pubescent, patently hispidulous along veins, adaxially glabrous except for midrib, midrib adaxially impressed, lateral veins 23–34 pairs, subparallel, visible on both surfaces, veinlets numerous, conspicuous, subparallel, base attenuate, decurrent, equal on both sides, apex acuminate or shortly acuminate. Panicles 10–21 cm, densely yellowish brown strigose, branched at top; peduncle 7–15 cm. Flowers yellowish green, 4–6 mm. Perianth lobes subequal, ovate-rounded, ca. 4 × 3 mm, yellowish brown strigose on both surfaces. Filaments hairy, those of 3rd series with shortly stipitate or subsessile glands at base. Stamines sagittate, hairy. Ovary globose, all or upper half hairy; style linear, hairy; stigma inconspicuous or somewhat enlarged. Infructescences subligneous. Fruit ellipsoid or suboblong, 3.5–3.8(–4.2) × 1.9–2.2 cm, glabrous; fruiting pedicel ca. 1 cm; persistent perianth lobes ovate or ovate-elliptic, ca. 6 × 4 mm, leathery, hairy on both surfaces, clasping base of fruit. Fl. Apr–May, fr. Oct–Dec.

Mixed broad-leaved forests; 1200–1800 m. SE Yunnan [N Vietnam].

**25. *Phoebe motuanan*** S. K. Lee & F. N. Wei, Acta Phytotax. Sin. 17(2): 61. 1979.

墨脱楠 mo tuo nan

Large trees, ca. 20 m tall; trunk ca. 40 cm d.b.h. Branchlets very thick, 7–8 mm in diam. at middle, densely grayish brown villous. Buds large, appressed ferruginous villous. Petiole very thick and compressed, 1–1.5 cm, to 4.5 mm wide, densely grayish brown villous; leaf blade obovate-lanceolate, 18–32 × 7–10.5 cm, leathery, abaxially densely grayish brown villous, especially at veins, adaxially glabrous or hairy along midrib, midrib very thick, abaxially distinctly elevated, adaxially impressed into canal, lateral veins 18–32 pairs, anastomosing at

margin, veinlets conspicuous, base attenuate, apex obtuse or mucronate. Infructescences 18–24 cm, hairy; peduncle 13–16 cm, ca. 4 mm in diam., very thick, ligneous. Fruit ellipsoid, 2–2.2 × 1.5–1.6 cm, apex hairy; persistent perianth lobes ovate, ca. 6 × 3.5–4 mm, lax, somewhat thickened, grayish brown pubescent on both surfaces, especially outside; fruiting pedicel ca. 3 mm, thickened, 2.5–3 mm in diam.

- Mountain slopes, broad-leaved forests; ca. 1700 m. SE Xizang.

**26. *Phoebe hungmoensis*** S. K. Lee, Acta Phytotax. Sin. 8: 190. 1963.

红毛山楠 hong mao shan nan

Trees, to 25 m tall; trunk ca. 1 m d.b.h. Branchlets, young leaves, petioles, and buds reddish brown or ferruginous villous. Branchlets thick, 4.5–6 mm in diam. at middle. Petiole 8–27 mm; leaf blade blackish or deep castaneous when dry, oblanceolate, obovate-lanceolate, or elliptic-oblanceolate, 10–15 × 2–4.5 cm, leathery, abaxially densely or sparsely pubescent and along veins tomentose, adaxially glabrous and shiny or pubescent along midrib, midrib thick, abaxially raised, adaxially impressed or plane, lateral veins 12–14 pairs, veinlets conspicuous abaxially, base attenuate, apex obtuse, subrounded, or somewhat mucronate. Panicles arising from middle and lower part of current year branchlet, 8–18 cm, pubescent or villous. Flowers 4–6 mm. Perianth lobes oblong or elliptic-ovate, densely yellowish gray pubescent. Filaments hairy, those of 3rd series with sessile glands at base. Stamnodes with broad and compressed short stalks, hairy. Ovary globose, apex gray-white pubescent; style slender, hairy. Fruit ellipsoid, ca. 1 cm × 5–6 mm; fruiting pedicel somewhat thickened; perianth lobe thickly leathery, clasping base of fruit. Fl. Apr, fr. Aug–Sep.

Shady mixed forests. S and SW Guangxi, Hainan [Vietnam].

**27. *Phoebe puwenensis*** W. C. Cheng, Sci. Silvae Sin. 8(1): 3. 1963.

普文楠 pu wen nan

*Phoebe sheareri* (Hemsley) Gamble var. *longepaniculata* H. Liu.

Large trees, to 30 m tall. Bark yellowish gray. Branchlets robust, 5–6 mm in diam. at middle, densely yellowish brown tomentose, older ones with conspicuous leaf scars. Petiole 1–2.5 cm, thick, densely yellowish brown or gray-black tomentose; leaf blade obovate-elliptic or broadly obovate-lanceolate, 10–23 × 5–9 cm, abaxially densely yellowish brown villous, adaxially glabrous or with scattered appressed hairs or hairy along veins only, midrib adaxially concave, lateral veins slender, 12–20 pairs, anastomosing at margin, veinlets abaxially distinct, base narrowly cuneate, apex acute or obtuse-acute. Panicles arising from middle and lower part of newly sprouted branchlet, 4.5–22(–25) cm, branched near top of peduncle, yellowish brown tomentose. Pedicel short, 2–3 mm, hairy. Flowers yellowish, 4–5 mm. Perianth lobes ovate, subequal, ca. 4 mm, apex acute, densely yellowish brown tomentose on both surfaces. Filaments long white tomentose, those of 3rd series with sessile glands at base. Ovary ovoid, upper part hairy; style slender; stigma dish-shaped. Fruit ovoid, to 1.3 cm × ca. 7 mm,

glabrous; fruiting pedicel not enlarged; persistent perianth lobes leathery, clasping base of fruit. Fl. Mar–Apr, fr. Jun–Jul.

- Evergreen broad-leaved forests; usually 800–1500 m. S Yunnan.

**28. *Phoebe hui*** W. C. Cheng ex Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 74. 1945.

细叶楠 xi ye nan

Large trees, to 25 m tall; trunk to 60 cm d.b.h. Bark gray, smooth. Branchlets slender, young branchlets angular, first densely gray-white or gray-brown pubescent, glabrate after. Petiole 6–16 mm, slender, hairy; leaf blade elliptic, elliptic-oblanceolate, or elliptic-lanceolate, 5–8(–10) × 1.5–3 cm, leathery, abaxially densely gray-white appressed pubescent, adaxially glabrous or puberulent along midrib, midrib slender, adaxially impressed, lateral veins fine, 10–12 pairs, abaxially conspicuous, adaxially inconspicuous, veinlets abaxially somewhat visible or invisible, base narrowly cuneate, apex acuminate or caudate-acuminate. Panicles arising from upper part of newly sprouted branchlet, 4–8 cm, very slender, branched on top of peduncle, pubescent. Flowers and pedicel 2.5–3 mm. Perianth lobes ovate, densely gray-white villous. Filaments hairy, those of 3rd series with sessile or subsessile glands at base. Ovary ovoid; style glabrous; stigma dish-shaped. Fruit ellipsoid, 1.2–1.4 cm × 6–9 mm; fruiting pedicel not enlarged; persistent perianth lobes clasping base of fruit. Fl. Apr–May, fr. Aug–Sep.

- Usually in dense forests, sometimes cultivated as an ornamental; below 1500 m. S Shaanxi, Sichuan, NE Yunnan.

**29. *Phoebe chekiangensis*** P. T. Li, J. S. China Agric. Univ. 21(4): 59. 2000.

浙江楠 zhe jiang nan

Large trees, to 20 m tall; trunk straight, to 50 cm d.b.h. Bark yellowish brown with distinct brown lenticels. Branchlets angular, densely yellowish brown or gray blackish pubescent or tomentose. Petiole 1–1.5 cm, densely yellowish brown pubescent or tomentose; leaf blade obovate-elliptic or obovate-lanceolate, rarely lanceolate, 7–17 × 3–7 cm, usually 8–13 × 3.5–5 cm, leathery, abaxially grayish brown pubescent and villous on veins, adaxially hairy, becoming glabrate or glabrous, midrib and lateral veins adaxially impressed, lateral veins 8–10 pairs, veinlets dense, abaxially conspicuous, base cuneate or subrounded, apex acute-acuminate or long acuminate. Panicles 5–10 cm, densely yellowish brown tomentose. Pedicel 2–3 mm. Flowers ca. 4 mm. Perianth lobes ovate, hairy on both surfaces. Filaments gray-white villous. Stamnodes sagittate, hairy. Ovary ovoid, glabrous; style slender; stigma dish-shaped. Fruit ellipsoid-ovoid, 1.2–1.5 cm, white farinose when mature; persistent perianth lobes leathery, clasping base of fruit. Seed with numerous embryos, unequal on both sides. Fl. Apr–May, fr. Sep–Oct.

- Wild or cultivated, former ones growing in broad-leaved mountain forests. N Fujian, E Jiangxi, N Zhejiang.

This name was originally published by C. B. Shang (Acta Phytotax. Sin. 12: 295. 1974) but not validly so because two gatherings were indicated as types (*Vienna Code*, Art. 37.2).

**30. *Phoebe bournei*** (Hemsley) Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 73. 1945.

闽楠 min nan

*Machilus bournei* Hemsley, J. Linn. Soc., Bot. 26: 373. 1891; *Persea bournei* (Hemsley) Kostermans; *Phoebe acuminata* Merrill; *P. blepharopus* Handel-Mazzetti.

Large trees, 15–20 m; trunk straight, few branched. Bark gray-white when old, yellowish brown when young. Branchlets hairy or glabrate. Petiole 5–11(–20) mm; leaf blade lanceolate or oblanceolate, 7–13(–15) × 2–3(–4) cm, leathery, abaxially pubescent and patent villous along veins, adaxially shiny, midrib impressed adaxially, lateral veins 10–14 pairs, abaxially elevated, adaxially plane or impressed, veinlets numerous, dense, conspicuously foveolate abaxially, base attenuate or cuneate, apex acuminate or long acuminate. Panicles arising from middle and lower part of newly sprouted branchlet, 3–7(–10) cm, lowest ramifications 2–2.5 cm, hairy. Perianth lobes ovate, ca. 4 × 3 mm, pubescent on both surfaces. Filaments hairy, those of 3rd series especially hairy, with sessile glands. Staminodes triangular, stipitate, villous. Ovary subglobose, glabrous or upper part sparsely pubescent; style glabrous or partly pubescent; stigma capitate. Fruit ellipsoid or oblong, 1.1–1.5 cm × 6–7 mm; persistent perianth lobes hairy, clasping base of fruit. Fl. Apr, fr. Oct–Nov.

• Wild trees usually in mountain valleys and broad-leaved forests, also cultivated. Fujian, Guangdong, N and NE Guangxi, NE and SE Guizhou, Hainan, Hubei, Jiangxi.

**31. *Phoebe zhennan*** S. K. Lee & F. N. Wei, Acta Phytotax. Sin. 17(2): 61. 1979.

楠木 nan mu

Large trees, up to 30 m or more; trunk straight. Buds densely gray-yellowish appressed villous. Branchlets usually slender, somewhat angular or subterete, gray-yellowish or gray-brown villous or pubescent. Petiole 1–2.2 cm, hairy; leaf blade elliptic, rarely lanceolate or oblanceolate, 7–11(–13) × 2.5–4 cm, thinly leathery, abaxially pubescent and villous at veins, adaxially shiny and glabrous or pubescent along lower part of midrib, midrib abaxially conspicuously raised, adaxially impressed into canal, lateral veins 8–13 pairs, obliquely extended, abaxially distinct, anastomosing near margin and gradually disappearing, veinlets abaxially slightly distinct or invisible. Cymose panicles very patent, branched above middle of peduncle, (6–)7.5–12 cm, lowest ramifications usually 2.5–4 cm, slender, hairy, each cyme with 3–6 flowers. Flowers and pedicel 3–4 mm. Perianth lobes subequal, 3–3.5 × 2–2.5 mm, outer ones ovate, inner ones ovate-oblong, apex obtuse, gray-yellow inside. Filaments subequal in length, hairy, those of 3rd series with sessile glands at base. Staminodes triangular, stipitate, hairy. Ovary glabrous or upper part together with style sparsely pubescent; stigma dish-shaped. Fruit ellipsoid, 1.1–1.4 cm × 6–7 mm; fruiting pedicel somewhat thickened; persistent perianth lobes ovate, leathery, pubescent on both surfaces or puberulent outside, clasping fruit. Fl. Apr–May, fr. Sep–Oct.

• Wild trees usually in mixed broad-leaved forests, also cultivated; below 1500 m. NW Guizhou, W Hubei, Sichuan.

**32. *Phoebe formosana*** (Hayata) Hayata, Icon. Pl. Formosan. 5: 162. 1925.

台楠 tai nan

*Machilus formosana* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 22: 350. 1906; *Phoebe sheareri* (Hemsley) Gamble var. *formosana* (Hayata) Nakai; *P. sheareri* var. *stenophylla* Nakai.

Large trees; trunk to 60 cm d.b.h. Bark gray-brown, slightly rough. Branchlets gray-brown pubescent. Petiole ca. 2 cm, pubescent; leaf blade glaucous abaxially, usually obovate or broadly obovate-lanceolate, rarely elliptic, 9–15(–20) × 4–6(–8) cm, thinly leathery, adaxially glabrous, abaxially gray-white pubescent rarely glabrate when old, midrib thick and lateral veins adaxially impressed, lateral veins 7–10 pairs, veinlets abaxially reticulate, base attenuate or cuneate, apex shortly acuminate or abruptly acute. Inflorescences axillary or subterminal, slender, 7–16 cm, branched near top of peduncle, pubescent. Flowers small, 2–2.5 mm. Perianth lobes ovate, hairy on both surfaces. Filaments glabrate to pubescent, those of 3rd series with subsessile glands at base. Staminodes triangular, stipitate, hairy. Ovary globose; style ca. 2.5 mm; stigma cap-shaped. Fruit ovoid or ovoid-ellipsoid, 8–9 mm; perianth lobes lax. Fl. May, fr. Oct.

• Mixed broad-leaved forests, very common in Taiwan; 100–2000 m. Anhui, Taiwan.

**33. *Phoebe neurantha*** (Hemsley) Gamble in Sargent, Pl. Wilson. 2: 72. 1914.

白楠 bai nan

Large shrubs to trees, usually 3–14 m tall. Bark gray-black. Branchlets first sparsely pubescent or densely villous, glabrate after. Petiole 7–15 mm, pubescent or glabrate; leaf blade narrowly lanceolate, lanceolate, oblanceolate, obovate, or obovate-lanceolate, 3–16 × 1–4(–4.5) cm, leathery to thickly leathery, abaxially sometimes glaucous, first pubescent, gradually glabrate after, adaxially glabrous or hairy when young, midrib adaxially impressed (elevated in var. *cavaleriei*), lateral veins 8–12 pairs, abaxially elevated, veinlets slightly distinct, base attenuate and decurrent, rarely cuneate, apex caudate-acuminate, acuminate, or obtuse. Inflorescences 2–10(–12), paniculate or subracemose, branched near top of peduncle, pubescent to puberulent. Flowers 4–5 mm, hairy. Perianth lobes somewhat unequal, outer ones shorter and narrower, apex obtuse, hairy on both surfaces especially inside. Filaments villous, those of 3rd series with sessile glands at base. Staminodes stipitate, villous. Ovary globose; style elongated; stigma dish-shaped. Fruit ovoid, ca. 1 cm × 7 mm; fruiting pedicel not enlarged or slightly thickened; persistent perianth lobes lax, leathery, longitudinally veined, apex sometimes extrorse. Fl. May, fr. Aug–Oct.

• Mountain slopes or valleys, dense forests, limestone hills, thickets, watersides. Gansu, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan.

1a. Midrib of leaf blade elevated adaxially, blade narrower and shorter, 4.5–7.5 × 1–2 cm; inflorescences subracemose

..... 33b. var. *cavaleriei*

1b. Midrib of leaf blade impressed adaxially,

blade wider and longer, (3–)5–16 × ca. 4.5 cm; inflorescences paniculate.

- 2a. Leaf blade narrowly lanceolate to lanceolate or oblanceolate, 8–16 cm, apex caudate-acuminate or acuminate, not rugose adaxially when dry ..... 33a. var. *neurantha*
- 2b. Leaf blade obovate or obovate-lanceolate, 3–11 cm, apex obtuse, rugose adaxially when dry ..... 33c. var. *brevifolia*

**33a. *Phoebe neurantha* var. *neurantha***

白楠(原变种) bai nan (yuan bian zhong)

*Machilus neurantha* Hemsley, J. Linn. Soc., Bot. 26: 376. 1891.

Leaf blade narrowly lanceolate to lanceolate or oblanceolate, 8–16 cm, base attenuate and decurrent, apex caudate-acuminate or acuminate. Panicles 4–10(–12) cm, pubescent. Persistent perianth lobes with conspicuous longitudinal veins.

• Mountain slopes or valleys, dense forests. Gansu, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan.

**33b. *Phoebe neurantha* var. *cavaleriei* H. Liu, Laurac. Chine & Indochine, 69. 1932.**

兴义白楠 xing yi bai nan

Usually shrubs, 1–2 m tall. Leaf blade 4.5–7.5 × 1–2 cm, midrib elevated distally adaxially. Inflorescences subracemose, all parts sparsely pubescent to puberulent.

• Limestone hills. SW Guizhou (Xingyi).

**33c. *Phoebe neurantha* var. *brevifolia* H. W. Li, Acta Phytotax. Sin. 17(2): 62. 1979.**

短叶白楠 duan ye bai nan

Shrubs, ca. 1 m tall. Leaf blade obovate or obovate-lanceolate, 3–11 × 1.5–4 cm, adaxially rugose when dry, apex obtuse. Panicles short, 2–4 cm.

• Limestone hill forests or watersides, thickets. SE Yunnan.

**34. *Phoebe glaucifolia* S. K. Lee & F. N. Wei, Guihaia 8: 298. 1988.**

白背楠 bai bei nan

Trees, to 30 m tall. Branchlets slightly compressed, longitudinally striate, densely gray or gray-brown pubescent. Petiole thick, 1–2.5 cm, densely gray pubescent; leaf blade abaxially ± glaucous, adaxially shiny, obovate or obovate-lanceolate, 10–18 × 3.5–8 cm, leathery, abaxially densely or sparsely pubescent, adaxially glabrous except for hairs along midrib, midrib thick, abaxially raised, adaxially concave or plane, lateral veins 7–9 pairs, anastomosing near margin, veinlets numerous, only abaxially distinct, base attenuate or cuneate, apex acute or acuminate. Panicles arising from base of newly sprouted branchlet, 6–16 cm, densely gray pubescent. Pedicel ca. 5 mm. Perianth lobes ovate, unequal, 2.5–3.5 × ca. 2 mm, densely pubescent on both surfaces, apex mucronate. Filaments glabrous except for

hairs at base, those of 3rd series with shortly stipitate glands at base. Staminode filaments villous. Ovary glabrous. Infructescences densely gray pubescent, with few fruits. Fruit ovoid, ca. 10 × 5 mm; fruiting pedicel 3–4 mm, densely pubescent; persistent perianth lobes ovate, leathery, gray pubescent on both surfaces, conspicuously unequal, outer ones smaller than inner ones. Fl. May, fr. Oct.

• Mixed mountain forests. SE Xizang (Mêdog), C Yunnan (Xinping).

**35. *Phoebe sheareri* (Hemsley) Gamble in Sargent, Pl. Wilson. 2: 72. 1914.**

紫楠 zi nan

Large to small trees, 5–15 m tall. Bark gray-white. Branchlets, petioles, and inflorescences densely yellowish brown or gray-blackish pubescent to tomentose. Petiole 1–2.5 cm; leaf blade obovate, elliptic-obovate, broadly oblanceolate, or oblanceolate, 8–27 × 2.5–9 cm, leathery, abaxially pubescent to villous, adaxially glabrous or hairy along veins, midrib and lateral veins adaxially impressed, lateral veins 8–13 pairs, curved, anastomosing at margin, veinlets numerous, densely reticulate, base attenuate, apex acute-acuminate or acute-caudate-acuminate. Panicles 7–15(–18) cm, branched at top of peduncle. Flowers 4–5 mm. Perianth subequal, ovate, hairy on both surfaces. Filaments hairy, particularly in 3rd series, those of 3rd series with sessile glands at base. Staminodes hairy. Ovary globose, glabrous; stigma indistinct or dish-shaped. Fruit ovoid, ca. 1 cm × 5–6 mm; fruiting pedicel somewhat or conspicuously thickened, hairy; persistent perianth lobes hairy on both surfaces, loose. Seed with solitary embryo, symmetrical on both sides. Fl. Apr–May, fr. Sep–Oct.

Mixed broad-leaved forests; usually below 1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang [Vietnam].

- 1a. Leaf blade usually obovate to broadly oblanceolate, wider, 8–27 × 3.5–9 cm, abaxially always densely yellowish brown villous; fruiting pedicel somewhat thickened ..... 35a. var. *sheareri*
- 1b. Leaf blade oblanceolate, much narrower, 8–15 × 2.5–4 cm, sparsely pubescent abaxially when older; fruiting pedicel conspicuously thickened ..... 35b. var. *omeiensis*

**35a. *Phoebe sheareri* var. *sheareri***

紫楠(原变种) zi nan (yuan bian zhong)

*Machilus sheareri* Hemsley, J. Linn. Soc., Bot. 26: 377. 1891.

Usually small trees. Branchlets, petioles, inflorescences, and leaf blade abaxially always densely yellowish brown pubescent. Leaf blade usually obovate to broadly oblanceolate, 8–27 × 3.5–9 cm. Fruiting pedicel somewhat thickened.

Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Yunnan, Zhejiang [Vietnam].

**35b. *Phoebe sheareri* var. *omeiensis*** (Yen C. Yang) N. Chao, Acta Phytotax. Sin. 17(2): 62. 1979.

峨眉楠 *e mei nan*

*Phoebe neurantha* (Hemsley) Gamble var. *omeiensis* Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 75. 1945.

Branchlets sparsely pubescent in fruiting stage. Leaf blade oblanceolate, rarely obovate, 8–15 × 2.5–4 cm, abaxially sparsely pubescent when older. Fruiting pedicel distinctly thickened.

• Mixed broad-leaved forests, common in W Sichuan basin; low elevations. Guizhou, Sichuan.

### 13. NOTHAPHOEBE Blume, Mus. Bot. 1: 328. 1851.

赛楠属 *sai nan shu*

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Shrubs or trees. Leaves alternate, petiolate, pinninerved. Cymose panicle axillary or terminal, branched, pedunculate. Flowers bisexual, pedicellate; bracteoles minute. Perianth tube short; perianth lobes 6, unequal, outer 3 much smaller. Fertile stamens 9; filaments villous, those of 3rd whorl each with 2 shortly stalked orbicular-reniform or broadly reniform glands, others glandless; anthers 4-celled, cells of 1st and 2nd whorls all introrse but those of 3rd whorl extrorse or lateral-extrorse. Staminodes 3, of innermost whorl, triangular-cordate, shortly stalked. Ovary ovoid; style slender; stigma capitate. Drupe berrylike, ellipsoid or globose.

About 40 species: SE Asia and North America; two species (both endemic) in China.

One of the present authors (van der Werff) is of the opinion that the two species placed here in *Nothaphoebe* do not belong to this genus and that, instead, *N. cavaleriei* is better placed in *Phoebe*, while *N. konishii* is better placed in *Machilus*. The generic placement of *N. fargesii* H. Liu (Laurac. Chine & Indochine, 78. 1932; see FRPS 31: 82. 1982), described from Chongqing (Chengkou), remains uncertain.

- 1a. Leaves oblanceolate or obovate-lanceolate, 10–18 × 2.5–5 cm, abaxially covered with finely pubescent hairs only visible under lens, lateral veins 8–12 pairs; cymose panicle subglabrous ..... 1. *N. cavaleriei*  
 1b. Leaves oblong-obovate or oblong-lanceolate, smaller, 6.5–8 × (1.8–)2–3 cm, abaxially covered with pubescent hairs visible with naked eye, lateral veins 5–7 pairs; cymose panicle conspicuously villous ..... 2. *N. konishii*

**1. *Nothaphoebe cavaleriei*** (H. Léveillé) Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 75. 1945.

赛楠 *sai nan*

*Lindera cavaleriei* H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 371. 1912; *Alseodaphne omeiensis* Gamble; *Machilus dunniana* H. Léveillé; *M. mairei* H. Léveillé; *Nothaphoebe duclouxii* Lecomte; *N. omeiensis* (Gamble) Chun; *Persea cavaleriei* (H. Léveillé) Kostermans; *Phoebe dunniana* (H. Léveillé) Kostermans; *P. tenuirhachis* R. H. Miao.

Trees, 3–7(–12) m tall. Old branchlets subterete, glabrous, yellow-brown when dry, densely oblong-lenticellate; young branchlets ± angled, subglabrous. Leaves alternate, clustered at apex of branchlet; petiole 1.5–2 cm, sulcate adaxially, glabrous; leaf blade green-white abaxially, dark green adaxially, oblanceolate or obovate-lanceolate, 10–18 × 2.5–5 cm, leathery, finely pubescent abaxially, hairs only visible under lens, glabrous adaxially, midrib very elevated abaxially, impressed adaxially, lateral veins 8–12 pairs, very elevated abaxially, plane adaxially, transverse veins and veinlets ± conspicuous on both surfaces, base cuneate, apex shortly acuminate. Cymose panicle axillary, 9–16 cm, lax, branched, terminal branchlet bearing a 2- or 3-flowered cyme; peduncle (2.5–)6–8 cm, peduncle and rachis subglabrous; bracteoles minute, linear, ca. 1 mm. Pedicels 3–5 mm. Flowers yellowish or yellow-white, ca. 3 mm. Perianth tube short; perianth lobes 6, broadly ovate, inner 3 larger, ca. 3 × 1.6 mm, outer 3 as long as ca. 1/2 of inner ones, all sparsely pubescent outside and densely villous at middle inside. Fertile stamens 9; filaments sparsely villous, those of 3rd whorl each with 2 shortly stalked orbicular-reniform glands

near base, others glandless; anthers 4-celled, cells of 1st and 2nd whorls introrse but those of 3rd whorl extrorse. Staminodes 3, triangular-cordate. Ovary ovoid; style slender; stigma capitate. Fruit globose, 1.2–1.4 cm in diam., glabrous, with persistent unequal perianth lobes at base. Fl. May–Jul, fr. Aug–Sep.

• Always growing in evergreen broad-leaved forests or sparse forests; 900–1700 m. Guizhou, Sichuan, NE Yunnan.

**2. *Nothaphoebe konishii*** (Hayata) Hayata, Icon. Pl. Formosan. 3: 164. 1913.

台湾赛楠 *tai wan sai nan*

*Machilus konishii* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 240. 1911; *Persea konishii* (Hayata) Kostermans.

Medium-sized or large-sized trees, up to 2 m d.b.h. Bark dark brown, smooth. Branchlets brown-red, striate, lenticellate, with orbicular leaf scars; young branchlets red-black. Leaves alternate, petiolate; leaf blade oblong-obovate or oblong-lanceolate, 6.5–8 × (1.8–)2–3 cm, leathery, pubescent abaxially, glabrous adaxially, venation elevated abaxially, impressed adaxially, lateral veins 5–7 pairs, arising from midrib at a 40° angle, transverse veins and veinlets ± conspicuous on both surfaces, base broadly cuneate, apex abruptly acuminate, acumen obtuse and up to 1 cm. Cymose panicle terminal or axillary, yellowish brown villous, several branched; branches divaricate. Perianth tube short; perianth lobes 6, pilose outside but villous inside, unequal, outer 3 smaller, narrowly ovate, ca. 3 × 1.2–1.3 mm, inner 3 larger, ovate, 3.6–4 × 1.8–2.5 mm, obtuse at apex, many nerved, conspicuously valvate. Fertile stamens 9, inserted on throat of perianth tube, almost equal, 3–3.5 mm; filaments 2–3

mm, glabrous except villous at base, complanate, those of 3rd whorl each with 2 dilated glands at base, other filaments glandless; glands broadly reniform, stalked, complanate, ca. 1 mm; anthers of 1st and 2nd whorls ca. 1 mm, obtuse, 4-celled, cells introrse, upper 2 smaller, but anthers of 3rd whorl a little shorter than those of 1st and 2nd whorls, 4-celled, upper 2 cells smaller and introrse, lower 2 cells larger and extrorse. Stamino- nodes subulate, 1.2–1.5 mm. Ovary ovoid, ca. 1 mm; style elongate, ca. 2 mm; stigma truncate. Fruit globose, ca. 7 mm,

ca. 7 mm, with persistent, reflexed, and barely dilated perianth lobes on top. Fl. May–Jul, fr. Aug–Sep.

- Evergreen broad-leaved forests; ca. 2500 m. C and S Taiwan.

Chang (Fl. Taiwan 2: 458. 1972), following Kostermans (Rein- wardtia 6: 192. 1962), regarded this species as a member of the genus *Persea*. However, in the type material, the outer perianth lobes are much smaller than the inner ones, so two of the present authors (Li and Li) believe it is better to regard this species as a member of *Nothaphoebe*.

## 14. MACHILUS Rumphius ex Nees in Wallich, Pl. Asiat. Rar. 2: 61, 70. 1831.

润楠属 *run nan shu*

Wei Fa'nan (韦发南); Henk van der Werff

Evergreen trees or shrubs. Leaves alternate, entire, pinnately veined. Inflorescences usually paniculate, terminal, subterminal, or arising from near base of branchlet, with long peduncles or rarely without peduncles. Flowers bisexual, small or larger. Perianth tubes short; perianth lobes 6 in 2 series, equal, subequal, or occasionally outer ones conspicuously smaller than inner ones, usually persis- tent, rarely deciduous. Fertile stamens 9 in 3 series, anthers 4-celled, 1st and 2nd series of stamens eglandular, anthers introrse, 3rd series of stamens glandular, anthers extrorse or lateral, glands stipitate to sessile. Stamino- nodes in 4th series, sagittate. Ovary sessile; stigmas small, dish-shaped or capitate. Fruit fleshy, globose, rarely ellipsoid or oblong, subtended at base by persistent and reflexed perianth lobes; fruiting pedicel not enlarged or slightly enlarged.

About 100 species: tropical and subtropical S and SE Asia; 82 species (63 endemic) in China; one additional species (endemic) 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:

*Machilus hemsleyi* Nakai (J. Jap. Bot. 16: 122. 1940; *Persea hemsleyi* (Nakai) Kostermans), described from Hubei.

*Machilus tingzhouensis* M. M. Lin et al. (Bull. Bot. Res., Harbin 25: 5. 2005), described from Fujian.

### Key 1

- 1a. Perianth lobes glabrous outside.
  - 2a. Fruit ellipsoid or oblong ..... 1. *M. yunnanensis*
  - 2b. Fruit globose or subglobose.
    - 3a. Fruit smaller, less than 1.5 cm in diam.; flowers smaller, usually 5–7 mm ..... Key 2
    - 3b. Fruit larger, usually more than 1.5 cm in diam.; flowers more than 7 mm ..... Key 3
- 1b. Perianth lobes tomentose, pubescent, or sericeous outside.
  - 4a. Perianth lobes tomentose outside ..... Key 4
  - 4b. Perianth lobes pubescent or sericeous outside.
    - 5a. Fruit smaller, not more than 1.2 cm in diam.; flowers usually 5–7 mm ..... Key 5
    - 5b. Fruit larger, more than 1.3 cm in diam.; flowers usually larger ..... Key 6

### Key 2

- 1a. Inflorescences short, 1–4 cm.
  - 2a. Perianth lobes early deciduous.
    - 3a. Leaf blade abaxially glaucous; fruit usually farinaceous ..... 12. *M. calcicola*
    - 3b. Leaf blade abaxially not glaucous; fruit not farinaceous ..... 13. *M. glabrophylla*
  - 2b. Perianth lobes persistent.
    - 4a. Leaf blade apex usually rounded, blade 4–5 cm, lateral veins 4 or 5 pairs ..... 17. *M. obovatifolia*
    - 4b. Leaf blade apex acuminate or obtuse, blade 6–11.5 cm, lateral veins 6–12 pairs.
      - 5a. Inflorescences terminal or subterminal; leaf blade lateral veins 6 or 7 pairs, blade obovate or elliptic, 6–8(–9) cm ..... 14. *M. nanchuanensis*
      - 5b. Inflorescences arising from base of newly sprouted branchlet; leaf blade lateral veins 9–12 pairs, blade oblong, somewhat rhombic, or lanceolate, 7–11.5 cm.
        - 6a. Leaf blade oblong, somewhat rhombic, apex caudate-acuminate, glabrous on both surfaces ..... 15. *M. gracillima*
        - 6b. Leaf blade lanceolate or oblong, apex obtuse, abaxially densely pubescent when young, pubescent along midrib when old ..... 16. *M. salicoides*
  - 1b. Inflorescences elongate, more than 5 cm.
    - 7a. Midrib elevated adaxially ..... 2. *M. decursinervis*
    - 7b. Midrib concave adaxially.

- 8a. Panicles terminal or subterminal.
- 9a. Leaf blade base obtuse or subrotund ..... 3. *M. phoenicis*
- 9b. Leaf blade base cuneate.
- 10a. Perianth lobes pubescent at base inside; peduncles slender; fruit 5–7 mm in diam.; leaf blade obovate, obovate-lanceolate, or oblong to elliptic ..... 4. *M. microcarpa*
- 10b. Perianth lobes glabrous on both surfaces; peduncles thicker, ca. 3 mm in diam. at base; fruit ca. 1 cm in diam.; leaf blade oblong to oblong-ob lanceolate ..... 5. *M. chayuenis*
- 8b. Panicles arising from base of newly sprouted branchlet, rarely subterminal.
- 11a. Bud scales golden brown or reddish brown, puberulent to tomentose.
- 12a. Leaf blade obovate to obovate-lanceolate, wider, 4.5–9(–13) × 3–6 cm, apex obtuse or abruptly cuspidate ..... 6. *M. thunbergii*
- 12b. Leaf blade lanceolate to oblanceolate, narrower, 7–14.5 × 1.5–3 cm, apex acuminate ..... 7. *M. rehderi*
- 11b. Bud scales not as above, reddish or other colored, pubescent to glabrous.
- 13a. Leaf blade shape variable, oblong-ob lanceolate, ovate-ob lanceolate, oblanceolate, or obovate-lanceolate.
- 14a. Leaf blade base cuneate or attenuate, apex acuminate to shortly caudate, lateral veins 7–15 pairs ..... 8. *M. japonica*
- 14b. Leaf blade base obliquely obtuse, apex obtuse, lateral veins 6–8 pairs ..... 9. *M. litseifolia*
- 13b. Leaf blade oblong.
- 15a. Leaf blade apex caudate-acuminate, blade 11–15.5 × 3.3–4.5 cm; perianth lobes glabrous on both surfaces ..... 10. *M. sichuanensis*
- 15b. Leaf blade apex obtuse or obtuse-acuminate, blade 8.5–12 × 2.7–3.8 cm; perianth lobes sericeous inside ..... 11. *M. chuanchienensis*

**Key 3**

- 1a. Leaf blade lateral veins more than 20 pairs; fruit 2–3 cm in diam.
- 2a. Leaf blade narrowly elliptic to oblanceolate, 12–19 × 2–3.2 cm, lateral veins 20–23 pairs; fruit 2.5–3 cm in diam. .... 18. *M. multinervia*
- 2b. Leaf blade oblong-ob lanceolate or oblong-elliptic, 18–34 × 5–8 cm, lateral veins 24–30 pairs; fruit 2–2.5 cm in diam. .... 19. *M. wangchiana*
- 1b. Leaf blade lateral veins 8–12(–16) pairs; fruit 1.3–2.2 cm in diam.
- 3a. Inflorescences short, 3–5 cm; fruit ca. 2.2 cm in diam.; leaf blade 6–12 × 2.2–4.5 cm ..... 20. *M. chienkweiensis*
- 3b. Inflorescences longer, 5.5–8 cm; fruit 1.3–1.7 cm in diam.; leaf blade 9.5–20 × 1.8–5.5 cm ..... 21. *M. gongshanensis*

**Key 4**

- 1a. Leaf blade villous or pubescent abaxially.
- 2a. Leaf blade oblong or elliptic to oblanceolate-elliptic, apex shortly acuminate, lateral veins 10–12 pairs ..... 26. *M. wenshanensis*
- 2b. Leaf blade obovate-elliptic, apex obtuse or somewhat rounded, lateral veins 6–8 pairs ..... 27. *M. nakao*
- 1b. Leaf blade tomentose abaxially.
- 3a. Petiole 1–2.5 cm; leaf blade lateral veins 8–11 pairs.
- 4a. Leaf blade base cuneate, blade ferruginous tomentose abaxially ..... 22. *M. velutina*
- 4b. Leaf blade base ± rounded, blade yellow-brown tomentose abaxially ..... 23. *M. grijsii*
- 3b. Petiole longer, 2.5–4 cm; leaf blade lateral veins 10–20 pairs.
- 5a. Leaf blade apex cuspidate-acuminate, lateral veins 16–20 pairs ..... 24. *M. platycarpa*
- 5b. Leaf blade apex obtuse or rounded, lateral veins 10–13 pairs ..... 25. *M. dumicola*

**Key 5**

- 1a. Panicles terminal or subterminal.
- 2a. Inflorescences with persistent larger involucre bracts during flowering stage; branchlets, petioles, and leaf blade abaxially yellowish brown puberulent ..... 52. *M. fasciculata*
- 2b. Inflorescences without persistent larger involucre bracts during flowering stage.
- 3a. Inflorescences short, 1–1.5 cm.
- 4a. Leaf blade glaucous or gray-blue abaxially, obovate-elliptic to oblanceolate; trees ..... 53. *M. foonchewii*
- 4b. Leaf blade not glaucous or gray-blue abaxially, castaneous when dry, obovate-oblong or oblong-ob lanceolate; shrubs ..... 54. *M. shiwandashanica*
- 3b. Inflorescences elongate, more than 4 cm.
- 5a. Inflorescences without peduncle ..... 55. *M. pyramidalis*
- 5b. Inflorescences pedunculate.
- 6a. Branchlets glabrous, yellowish or yellowish brown when dry, usually with lenticels ..... 56. *M. versicolora*
- 6b. Branchlets glabrous or pubescent, color not as above when dry.

- 7a. Leaf blade midrib and lateral veins concave adaxially ..... 57. *M. daozenensis*
- 7b. Leaf blade lateral veins elevated or flat adaxially.
- 8a. Panicles 11–18 cm, patent ..... 58. *M. glaucescens*
- 8b. Panicles shorter, usually not more than 8 cm.
- 9a. Leaf blade pubescent to puberulent abaxially.
- 10a. Leaf blade glaucous abaxially ..... 59. *M. glaucifolia*
- 10b. Leaf blade not glaucous abaxially.
- 11a. Winter buds 1–1.5 cm in diam.; leaf blade lateral veins 15–18 pairs ..... 60. *M. submultinervia*
- 11b. Winter buds much smaller, less than 1 cm in diam.; leaf blade lateral veins not more than 14 pairs.
- 12a. Leaf blade 12–20 × 4–7 cm ..... 61. *M. mangdangshanensis*
- 12b. Leaf blade shorter and smaller, 5–10.5 × 1.5–4.5 cm.
- 13a. Leaf blade elliptic to lanceolate, 5–10.5 × 1.5–2.8 cm, lateral veins 12–14 pairs; branchlets with conspicuous bud scars ..... 62. *M. cicatricosa*
- 13b. Leaf blade obovate or elliptic, 6–9 × 3.5–4.5 cm, lateral veins 6–9 pairs; branchlets without conspicuous bud scars ..... 63. *M. miaoshanensis*
- 9b. Leaf blade glabrous on both surfaces.
- 14a. Leaf blade narrowly lanceolate to lanceolate.
- 15a. Leaf blade opaque on both surfaces; perianth lobes equal ..... 64. *M. salicina*
- 15b. Leaf blade shiny on both surfaces; perianth lobes conspicuously unequal ..... 65. *M. parabreviflora*
- 14b. Leaf blade shape not as above.
- 16a. Inflorescences glabrous.
- 17a. Petiole short, 3–5 mm; leaf blade obovate to obovate-lanceolate, 4–5 × 1.5–2 cm; perianth lobes persistent ..... 66. *M. breviflora*
- 17b. Petiole longer, 6–14 mm; leaf blade obovate-oblong to oblong-ob lanceolate, 5–8(–10) × 2–3(–4) cm; perianth lobes deciduous in fruiting stage ..... 67. *M. chinensis*
- 16b. Inflorescences pubescent.
- 18a. Infructescences ca. 4.5 cm, rachis with lenticels ..... 68. *M. lenticellata*
- 18b. Infructescences 4–8(–11) cm, rachis without lenticels.
- 19a. Leaf blade apex acute or obtuse, blade elliptic to oblong; branchlets lenticellate ..... 69. *M. tenuipilis*
- 19b. Leaf blade apex long acuminate, blade oblong to oblong-lanceolate; branchlets without lenticels ..... 70. *M. reticulata*
- 1b. Panicles usually arising from near base of newly sprouted branchlet.
- 20a. Leaf blade glabrous abaxially, occasionally slightly puberulent.
- 21a. Involucral bracts of inflorescences leaflike, 3–3.5 × 1.5–2 cm, densely sericeous outside; leaf blade castaneous when dry ..... 46. *M. grandibracteata*
- 21b. Involucral bracts of inflorescences not as above, much smaller; leaf blade not castaneous when dry.
- 22a. Young shoot puberulent to glabrate; leaf blade lateral veins 7–9 pairs ..... 47. *M. longipes*
- 22b. Young shoot glabrous; leaf blade lateral veins 10–17 pairs.
- 23a. Leaf blade thickly leathery, lustrous on both surfaces, glaucous abaxially ..... 48. *M. austroguizhouensis*
- 23b. Leaf blade leathery, opaque on both surfaces, not glaucous abaxially.
- 24a. Leaf blade lateral veins inconspicuous ..... 49. *M. kurzii*
- 24b. Leaf blade lateral veins conspicuous abaxially.
- 25a. Leaf blade oblanceolate or elliptic to elliptic-lanceolate, apex usually abruptly cuspidate, lateral veins 10–12 pairs; inflorescences variable in length, 7–18 cm, peduncle slender to lignescent ..... 50. *M. chekiangensis*
- 25b. Leaf blade oblong or elliptic-lanceolate to obovate-lanceolate, apex acuminate to long acuminate, lateral veins 12–18 pairs; inflorescences 5–13 cm, peduncle slender ..... 51. *M. duthiei*
- 20b. Leaf blade, at least young blade, hairy abaxially (occasionally young blade glabrous).
- 26a. Leaf blade villous or conspicuously pubescent abaxially, hairs visible with naked eye.
- 27a. Leaf blade densely or sparsely brown villous on both surfaces when young, densely villous along midrib and lateral veins abaxially when old ..... 43. *M. lichuanensis*

- 27b. Leaf blade densely or sparsely pubescent abaxially.
- 28a. Leaf blade obovate or obovate-elliptic, 2.8–6.3 cm in diam.; persistent perianth lobes 5–6 mm ..... 44. *M. minkweiensis*
- 28b. Leaf blade elliptic to narrowly elliptic, 1.7–2.3 cm in diam.; persistent perianth lobes ca. 4 mm ..... 45. *M. fukienensis*
- 26b. Leaf blade pubescent, puberulent, or sericeous, hairs only visible under lens.
- 29a. Branchlets or young shoots hairy.
- 30a. Young shoots puberulent to glabrate; leaf blade lateral veins to 14 pairs; inflorescences to 18 cm ..... 28. *M. zuihoensis*
- 30b. Young shoots conspicuously pubescent, sericeous, or tomentose; leaf blade lateral veins 6–12 pairs; inflorescences shorter, up to 13 cm.
- 31a. Leaf blade apex subrotund or obtuse, lateral veins 6–8 pairs ..... 33. *M. cavaleriei*
- 31b. Leaf blade apex acute or acuminate, lateral veins 8–13 pairs.
- 32a. Leaf blade narrowly lanceolate, (7–)11–18 × (1–)1.5–3 cm; branchlets and petioles tomentose when young ..... 29. *M. oreophila*
- 32b. Leaf blade oblong to obovate or oblanceolate, (5–)6–15 × 1.5–5.5 cm.
- 33a. Leaf blade with dirty yellowish pubescence along midrib abaxially ..... 30. *M. chrysotricha*
- 33b. Leaf blade appressed pubescent abaxially.
- 34a. Young shoots usually patent brown tomentose; leaf blade lateral veins 10–12 pairs; petiole ca. 1 cm; inflorescences and perianth lobes grayish yellow pubescent on both surfaces ..... 31. *M. kwangtungensis*
- 34b. Young shoots with densely appressed gray-yellow pubescence; leaf blade lateral veins 7–10 pairs; petiole 1–2 cm; inflorescences and perianth lobes grayish or gray-white sericeous on both surfaces ..... 32. *M. gamblei*
- 29b. Branchlets and young shoots glabrous (except for bases).
- 35a. Leaf blade apex acute or obtuse, rarely shortly acuminate.
- 36a. Nodes of branchlets swollen; fruit compressed globose ..... 34. *M. minutiloba*
- 36b. Nodes of branchlets not swollen; fruit globose.
- 37a. Leaf blade lateral veins very slender, inconspicuous on both surfaces or only slightly conspicuous abaxially; fruiting pedicel slightly enlarged ..... 37. *M. obscurinervis*
- 37b. Leaf blade lateral veins conspicuous on both surfaces; fruiting pedicel not enlarged.
- 38a. Leaf blade 6–12 cm, brownish abaxially; inflorescences to 10 cm ..... 35. *M. dinganensis*
- 38b. Leaf blade 5–9 cm, usually glaucescent abaxially; inflorescences shorter, 2.5–5 cm ..... 36. *M. lohuiensis*
- 35b. Leaf blade apex acuminate or shortly acuminate.
- 39a. Fruit compressed globose, 7–8 mm in diam. .... 38. *M. nanmu*
- 39b. Fruit globose, ca. 10 mm in diam.
- 40a. Winter buds to 1.5 cm in diam., bud scales minutely sericeous outside except for margin; leaf blade 24–32 cm, lateral veins 14–24 pairs ..... 39. *M. leptophylla*
- 40b. Winter buds less than 1 cm in diam., bud scales completely densely sericeous or pubescent outside; leaf blade 7–24 cm, lateral veins 12–19 pairs.
- 41a. Leaf blade usually blackish when dry, elliptic or narrowly elliptic, sometimes oblanceolate, summit usually falcate; bud scales usually densely brownish sericeous outside ..... 40. *M. pauhoi*
- 41b. Leaf blade not blackish when dry, oblong, obovate-oblong, oblanceolate, or oblong-oblanceolate, summit not falcate; bud scales brownish or grayish white pubescent outside.
- 42a. Bud scales brownish pubescent outside; leaf blade oblong to obovate-oblong, 7–16(–21.5) × 2.3–5(–6.8) cm, lateral veins 9–13 pairs ..... 41. *M. sichourensis*
- 42b. Bud scales grayish white pubescent outside; leaf blade oblong-lanceolate to oblong-oblanceolate, 10–24 × 2–6 cm, lateral veins 12–17 pairs ..... 42. *M. ichangensis*

## Key 6

- 1a. Fruit ovoid to suboblong.  
 2a. Fruit ovoid; leaf blade elliptic, 8–13 × 2.5–5 cm, lateral veins 8–10 pairs ..... 71. *M. melanophylla*  
 2b. Fruit suboblong; leaf blade obovate, oblong, or oblanceolate, 13–24 × 5.5–8(–10) cm, lateral veins 14–16 pairs ..... 72. *M. bonii*
- 1b. Fruit globose or compressed globose.  
 3a. Perianth lobes unequal.  
 4a. Leaf blade puberulent abaxially when mature, densely golden yellow sericeous on both surfaces when young, narrowly lanceolate, 7–17 × 1.8–3.5 cm ..... 73. *M. viridis*  
 4b. Leaf blade glabrous abaxially when mature, glabrous at least adaxially when young, wider, 5–6 cm wide.  
 5a. Flowers large, to 9 mm; leaf blade lateral veins dense, 15–20 pairs ..... 74. *M. rufipes*  
 5b. Flowers smaller; leaf blade lateral veins more sparse, 5–12 pairs.  
 6a. Perianth lobes oblong-elliptic, inner ones ca. 5.5 mm; leaf blade elliptic to oblanceolate or elliptic-lanceolate, 11–16 × 2–4 cm, lateral veins 10–12 pairs ..... 75. *M. oculodracontis*  
 6b. Perianth lobes ovate, inner ones ca. 3.5 mm; leaf blade obovate or obovate-elliptic to elliptic, 6–12.5 × 2–5.6 cm, lateral veins 5–7 pairs ..... 76. *M. monticola*
- 3b. Perianth lobes equal or subequal.  
 7a. Leaf blade abaxially densely gray-brown tomentose; fruit compressed globose ..... 77. *M. velutinoides*  
 7b. Leaf blade glabrous on both surfaces or appressed puberulent abaxially; fruit globose.  
 8a. Involucral bracts persistent in flowering stage; leaf blade lateral veins 16–20 pairs ..... 78. *M. shweliensis*  
 8b. Involucral bracts deciduous in flowering stage; leaf blade lateral veins (5–)9–13 pairs.  
 9a. Leaf apex obtuse or rotund ..... 79. *M. pomifera*  
 9b. Leaf apex subacute to acuminate.  
 10a. Petiole 2.5–5 cm, 2–3.5 mm thick; leaf blade elliptic to obovate-elliptic or suboblong; flowers large, 7–8(–10) mm ..... 80. *M. robusta*  
 10b. Petiole 1–2 cm, more slender; leaf blade elliptic to oblong; flowers smaller, 2.5–3.5 mm.  
 11a. Leaf blade 6–15.5 × 2–4.8 cm; panicles 2.5–5.5 cm, puberulent; perianth lobes puberulent on both surfaces ..... 81. *M. verruculosa*  
 11b. Leaf blade 10.5–20 × 3.5–7 cm; panicles 12–15 cm, subglabrous; perianth lobes glabrous outside ..... 82. *M. ovatiloba*

**1. *Machilus yunnanensis*** Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 100. 1913.

滇润楠 dian run nan

Trees, to 30 m tall; trunk to 80 cm d.b.h. Branchlets greenish when young and brownish when old, cylindric, glabrous. Petiole 1–1.5 cm, glabrous; leaf blade obovate, obovate-elliptic, or oblong to elliptic, 4–15 × 2–5.7 cm, leathery, glabrous on both surfaces, midrib conspicuously elevated abaxially, concave adaxially, lateral veins 7–9 pairs, curved, elevated on both surfaces, base cuneate, margin slightly revolute, apex shortly acuminate, summit obtuse. Panicles at lower part of short branchlet, (2–)3.5–7(–9) cm, glabrous throughout; peduncle (1–)1.5–3.5 cm; bracts 5–8 mm, outer ones smaller, densely ferruginous pubescent outside, subglabrous inside. Pedicel 4–10 mm. Flowers pale green, yellowish green, or yellowish white, 4–5 mm. Perianth lobes oblong, glabrous outside, pubescent inside. Filaments villous at base, those of 3rd series with stipitate glands. Fruit dark blue, glaucescent when mature, ellipsoid or oblong, to 1.8 × 1 cm, glabrous; persistent perianth lobes not thickened, reflexed. Fl. Apr–May, fr. May–Oct.

• Evergreen broad-leaved forests, moist and fertile places on mountain slopes; 1500–2100 m. NW Guangxi, W Sichuan, S Xizang, C, NW, and W Yunnan.

- 1a. Leaf blade obovate or obovate-elliptic, occasionally elliptic, (5–)7–9(–12) ×

(2–)3.5–4(–5) cm; fruit ca. 1.4 cm, less than 1 cm in diam. ....

- 1a. var. *yunnanensis*  
 1b. Leaf blade oblong to elliptic, 4–15 × 2–5.7 cm; fruit to 1.8 cm, ca. 1 cm in diam. .... 1b. var. *tibetana*

**1a. *Machilus yunnanensis* var. *yunnanensis***

滇润楠(原变种) dian run nan (yuan bian zhong)

*Machilus bracteata* Lecomte; *M. ichangensis* Rehder & E. H. Wilson var. *synechothrix* Handel-Mazzetti; *M. longipedicellata* Lecomte; *M. longipedicellata* var. *synechothrix* (Handel-Mazzetti) Handel-Mazzetti; *M. yunnanensis* var. *duclouxii* Lecomte; *Persea bracteata* (Lecomte) Kostermans; *P. longipedicellata* (Lecomte) Kostermans; *P. yunnanensis* (Lecomte) Kostermans.

Trees, up to 30 m tall. Leaf blade pale green or glaucous abaxially when dry, obovate or obovate-elliptic, occasionally elliptic, (5–)7–9(–12) × (2–)3.5–4(–5) cm. Fruit ca. 1.4 cm, less than 1 cm in diam. Fr. Jun–Oct.

• Evergreen broad-leaved forests; 1500–2000 m. NW Guangxi, W Sichuan, C, NW, and W Yunnan.

- 1b. *Machilus yunnanensis* var. *tibetana*** S. K. Lee, Acta Phytotax. Sin. 17(2): 45. 1979.

西藏润楠 xi zang run nan

Medium-sized trees, ca. 10 m tall; trunk 10–15 cm d.b.h. Leaf blade not pale green abaxially when dry, oblong to elliptic, 4–15 × 2–5.7 cm. Fruit to 1.8 × 1 cm. Fr. May–Jun.

- Evergreen mixed broad-leaved forests; 1800–2100 m. S Xizang.

**2. *Machilus decursinervis*** Chun, Acta Phytotax. Sin. 2: 170. 1953.

基脉润楠 *ji mai run nan*

*Persea decursinervis* (Chun) Kostermans.

Trees, 6–13 m tall, rarely up to 20 m; trunk to 27 cm d.b.h. Branchlets thick, dark brown when dry, glabrous. Winter buds broadly ovoid, ca. 1.6 × 1.8 cm; bud scales subrounded, brownish puberulent outside. Petiole thick, 3–4 cm, glabrous; leaf blade glaucous abaxially, broadly elliptic or elliptic, ca. 13.5 × 8.8 cm, leathery, glabrous on both surfaces, midrib thick, prominently elevated adaxially, lateral veins 8–12 pairs, slender, sometimes forked, base broadly cuneate, usually oblique, apex acuminate or acute. Panicles 3–8, subterminal, 6–11 cm, glabrous; peduncle flattened, branched ca. at middle. Perianth lobes subequal, oblong, ca. 6 mm, puberulent inside. Stamens glabrous, those of 3rd series 3.5–4 mm, with slender long stipitate glands at base. Fruit globose, ca. 1.2 cm in diam.; persistent perianth lobes ca. 8 × 3 mm, membranous; fruiting pedicel slightly thickened, 1–1.5 cm.

Mountains, mixed broad-leaved forests; 500–1100 m (to nearly 2000 m in Jinping, Yunnan). Guangxi, SE Guizhou, S and W Hunan, SE Yunnan [Vietnam].

**3. *Machilus phoenicis*** Dunn, Bull. Misc. Inform. Kew 1910: 279. 1910.

凤凰润楠 *feng huang run nan*

*Machilus levinei* Merrill; *Persea phoenicis* (Dunn) Kostermans; *P. levinei* (Merrill) Kostermans.

Medium-sized trees, ca. 5 m tall, glabrous throughout. Bark brown. Branchlets purple-brown, stout. Bud scales glabrous outside, sericeous inside. Petiole thick, 1.3–3.6 cm; leaf blade elliptic or oblong to narrowly oblong, 9.5–18(–21) × 2.5–5.5 cm, thickly leathery, midrib abaxially strongly conspicuously elevated, adaxially slightly concave, lateral veins 8–12(–15) pairs, veinlets slender, inconspicuous on both surfaces, base obtuse to subrounded, apex acuminate, acumen obtuse. Panicles numerous, arising from apex of branchlet, 5–8 cm, branched at upper part of peduncle; peduncle reddish brown. Perianth lobes subequal, oblong or narrowly oblong, 6–10 × ca. 3 mm, green when alive, glabrous outside, puberulent at apex inside, apex obtuse. Stamens glabrous, those of 3rd series with sessile glands at base. Ovary glabrous. Fruit globose, ca. 9 mm in diam.; persistent perianth lobes thinly leathery; fruiting pedicel enlarged.

- Mixed forests. Fujian, Guangdong, Hunan (Manshan), Jiangxi, S Zhejiang.

**4. *Machilus microcarpa*** Hemsley, J. Linn. Soc., Bot. 26: 376. 1891.

小果润楠 *xiao guo run nan*

Trees, up to 8 m tall or more, glabrous. Branchlets slender, glabrous. Terminal buds ovoid; bud scales wide, caducous, densely sericeous. Petiole slender, 8–30 mm, glabrous; leaf blade abaxially glaucous, obovate, oblanceolate to elliptic, or oblong, 5–9 × 3–5 cm, leathery, glabrous on both surfaces, midrib conspicuously elevated abaxially, impressed adaxially, lateral veins 8–10 pairs, slender, slightly conspicuous on both surfaces, veinlets densely reticulate on both surfaces, base cuneate, apex long acuminate. Panicles clustered at apex of branchlet, shorter or longer than leaf blade, 3.5–14 cm. Pedicel equal to length of flowers or longer. Perianth lobes subequal, ovate-oblong, 4–5 mm, glabrous outside, pubescent at base inside with longitudinal veins, apex obtuse. Filaments glabrous, those of 3rd series with stipitate glands; stipe with hairs at base. Ovary subglobose; style slightly curved; stigmas dish-shaped. Fruit globose, 5–7 mm in diam.

- Mountains, mixed broad-leaved forests, thickets; ca. 1500 m. Guizhou, Hubei, Sichuan.

- 1a. Infructescences 3.5–9 cm, ramifications of lower parts short; petiole usually 8–15 mm ..... 4a. var. *microcarpa*
- 1b. Infructescences 12–14 cm, ramifications of lower parts long, (1.5–)2–2.5 cm; petiole usually (15–)20–30 mm ..... 4b. var. *omeiensis*

**4a. *Machilus microcarpa* var. *microcarpa***

小果润楠(原变种) *xiao guo run nan* (yuan bian zhong)

*Persea microcarpa* (Hemsley) Kostermans.

Petiole usually 8–15 mm. Infructescence 3.5–9 cm.

- Mountains, mixed broad-leaved forests. Guizhou, Hubei, Sichuan.

**4b. *Machilus microcarpa* var. *omeiensis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 46. 1979.

峨眉润楠 *e mei run nan*

Petiole usually (1.5–)2–3 cm. Infructescence 12–14 cm.

- Mixed broad-leaved forests, thickets; ca. 1500 m. Sichuan (Emei Shan).

**5. *Machilus chayuensis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 46. 1979.

察隅润楠 *cha yu run nan*

*Persea chayuensis* (S. K. Lee) Kostermans.

Trees, ca. 20 m tall, trunk to 80 cm d.b.h. Bark with lenticels. Branchlets deep brown to brown, glabrous, longitudinally striate. Terminal buds ovoid; bud scales subrounded, leathery, puberulent or pubescent abaxially, margin ciliate, apex acute. Leaves clustered at apex of branchlet; petiole slightly thick, 1.6–2 cm; leaf blade oblong or oblong-oblanceolate, older blades usually 10–13 × 2.6–3.6 cm, sometimes longer and wider, mixed with some smaller ones, ca. 6 × 1.7 cm, leathery, glabrous on both surfaces, midrib elevated abaxially, impressed adaxially, lateral veins 10–13 pairs, abaxially slightly elevated,

adaxially plane, more conspicuous abaxially, obliquely ascendant, veinlets inconspicuous on both surfaces, densely reticulate (observed by lens), base cuneate, slightly decurrent to upper part of petiole. Flowers not seen. Infructescences subterminal, 3.5–7.5 cm, glabrous; peduncle red, somewhat thick, 1–4 cm. Fruit green, globose, ca. 1 cm in diam.; persistent perianth lobes oblong, glabrous on both surfaces; surviving filaments glabrous; fruiting pedicel slightly thick, ca. 5 mm. Fr. Jul.

- Open slopes, evergreen forests; ca. 2000 m. SE Xizang (Zayü).

**6. *Machilus thunbergii*** Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 302. 1846.

红楠 hong nan

*Litsea coreana* H. Léveillé, p.p. (as to *Taquet 1356*); *Machilus arisanensis* (Hayata) Hayata; *M. kwashotensis* Hayata; *M. macrophylla* Hemsley var. *arisanensis* Hayata; *M. nanshoensis* Kanehira; *M. taiwanensis* Kamikoti; *M. thunbergii* var. *kwashotensis* (Hayata) Yamamoto; *M. thunbergii* var. *trochodendroides* Masamune; *Persea arisanensis* (Hayata) Kostermans; *P. thunbergii* (Siebold & Zuccarini) Kostermans.

Evergreen trees, usually 10–15(–20) m tall; trunk 65–130 cm d.b.h. Bark yellowish brown. Older branchlets rough; young branchlets purple-brown when fresh, glabrous. Buds ovoid or oblong-ovoid; bud scales golden brown or reddish brown, sub-orbicular, leathery, ciliate, apex rotund, outer scales puberulent, inner ones tomentose outside. Petiole slender, 1–3.5 cm, reddish when fresh; leaf blade lustrous on both surfaces, abaxially glaucescent, obovate to obovate-lanceolate, 4.5–9(–13) × 3–6 cm, leathery, glabrous on both surfaces, midrib distinctly elevated abaxially, somewhat impressed adaxially, lateral veins 7–12 pairs, slightly straightly ascendant, nearly curved at margin, veinlets obscure, base cuneate, apex obtuse or abruptly cuspidate. Inflorescences arising from base of young shoots, 5–11.8 cm, branched at upper part of peduncle, glabrous, many flowered. Pedicel 6–9 mm. Perianth lobes oblong, ca. 5 mm, outer ones narrower, slightly short, apex acute, glabrous outside, pubescent toward apex inside. Filaments glabrous, those of 3rd series with stipitate glands at base. Stamines hispid at base. Ovary globose, glabrous; style slender; stigma capitate. Fruit green becoming dark purple, compressed globose, 8–10 mm in diam.; peduncle and fruiting pedicel reddish purple. Fl. Feb, fr. Jun–Aug.

Mountain slopes or valleys, broad-leaved forests; below 800 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Shandong, Taiwan, Zhejiang [Japan, Korea].

**7. *Machilus rehderi*** C. K. Allen, J. Arnold Arbor. 17: 326. 1936.

狭叶润楠 xia ye run nan

*Persea rehderi* (C. K. Allen) Kostermans.

Small trees, 4–15 m tall. Branchlets purple-black, glabrous, striate when dry. Leaves clustered at upper part of branchlet; petiole glabrous, 1.5–2 cm; leaf blade shiny, adaxially yellowish green, lanceolate to oblanceolate, 7–14.5 × 1.5–3 cm, leathery, glabrous on both surfaces, midrib slightly impressed, lateral veins 7–9 pairs, inconspicuous, ascendant at ca.

45° angle, veinlets indistinct on both surfaces, base cuneate, apex acuminate, summit obtuse. Inflorescences in panicle or raceme at base of branchlet, 10–11 cm, glabrous; peduncle 3–5 cm, slender; bracts caducous, tomentose. Pedicel 0.7–1.3 cm, glabrous. Flowers 8–9 mm. Perianth lobes 6–7 mm, glabrous outside, outer ones lanceolate, apex obtuse, pubescent inside. Stamens ca. 5 mm, equal or subequal; filaments of 1st and 2nd series ca. 3.5 mm, glabrous, those of 3rd series slightly villous at base, glands reniform, stipitate. Stamines stalked. Ovary subglobose; style shorter than filaments. Fruit globose, 7–8 mm in diam., glabrous with reflexed persistent perianth lobes at base. Fl. Apr, fr. Jun.

- Slope thickets, sparse forests, valleys, streamsides; ca. 1000 m. Guangxi, S Guizhou, Hunan.

**8. *Machilus japonica*** Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 302. 1846.

长叶润楠 chang ye run nan

Evergreen large trees. Branchlets thick. Bud scales imbricate, pubescent, becoming glabrate to glabrous. Petiole thick, 0.8–3 cm; leaf blade lustrous, oblong-oblanceolate, ovate-oblanceolate, or oblanceolate, 10–22 × 2.5–8.5 cm, leathery to thinly leathery, abaxially puberulent to glabrous, adaxially glabrous, midrib elevated abaxially, impressed adaxially, lateral veins 7–15 pairs, veinlets inconspicuous or slightly conspicuous on both surfaces, base cuneate or attenuate, apex acuminate, acutely to shortly caudate. Inflorescences arising from base of branchlet, to 20 cm, glabrous; peduncle 3–15 cm; involucre bracts greenish yellow or light reddish. Pedicel 0.4–1 cm. Perianth lobes glabrous to glabrate outside, pubescent inside. Stamens glabrous; filaments of 3rd series ca. 2.3 mm, glands stipitate; stipe barbate. Ovary and style glabrous; stigma capitate. Fruit compressed globose, ca. 1.2 cm in diam., with persistent and reflexed perianth lobes. Fl. Jan–Apr, fr. Aug–Oct.

Broad-leaved forests; low elevations to 2300 m. Taiwan [S Japan, Korea].

- 1a. Leaf blade 10–13 × 2.5–4 cm, oblong-oblanceolate to oblanceolate; involucre bracts greenish yellow ..... 8a. var. *japonica*
- 1b. Leaf blade longer and wider, 15–22 × 4–8.5 cm, broadly ovate-oblanceolate; involucre bracts light reddish ..... 8b. var. *kusanoi*

**8a. *Machilus japonica* var. *japonica***

长叶润楠(原变种) chang ye run nan (yuan bian zhong)

*Machilus pseudolongifolia* Hayata; *M. thunbergii* var. *japonica* (Siebold & Zuccarini) Yatabe; *Persea japonica* (Siebold & Zuccarini) Kostermans; *P. pseudolongifolia* (Hayata) Kostermans.

Branchlets yellowish when dry. Petiole 0.8–1.8 cm; leaf blade thinly leathery, oblong-oblanceolate to oblanceolate, 10–13 × 2.5–4 cm, abaxially puberulent at first, becoming glaucescent after, lateral veins 9–12 pairs, flattened on both surfaces, veinlets slightly conspicuously reticulate abaxially, inconspicuous adaxially. Involucre bracts greenish yellow. Fr. Aug–Oct.

Broad-leaved forests; 700–2300 m. Taiwan [S Japan, Korea].

**8b. *Machilus japonica* var. *kusanoi*** (Hayata) J. C. Liao, Mem. Coll. Agric. Natl. Taiwan Univ. 22(2): 15. 1982.

大叶润楠 da ye run nan

*Machilus kusanoi* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 241. 1911; *Persea kusanoi* (Hayata) H. L. Li.

Bark grayish. Petiole 2–3 cm; leaf blade leathery, broadly ovate-oblong, 15–22 × 4–8.5 cm, abaxially glabrate to glabrous, adaxially glabrous, lateral veins 7–15 pairs, abaxially elevated, adaxially flattened, veinlets reticulate abaxially, inconspicuous adaxially. Involucral bracts light reddish. Fr. Aug–Sep.

- Broad-leaved forests; low elevations to 1100 m. Taiwan.

**9. *Machilus litseifolia*** S. K. Lee, Acta Phytotax. Sin. 17(2): 46. 1979.

木姜润楠 mu jiang run nan

*Persea litseifolia* (S. K. Lee) Kostermans.

Trees, up to 13 m tall; trunk ca. 18 cm d.b.h. Bark black, black-brown, or brown. Branchlets glabrous. Terminal buds subglobose; bud scales broadly orbicular, subglabrous. Leaves usually clustered at apex of branchlet; petiole slender, 1–2 cm; leaf blade abaxially glaucescent, adaxially shiny, oblanceolate or obovate-lanceolate, 6.5–12 × 2–4.4 cm, leathery, glabrous on both surfaces when older, densely appressed puberulent when young, midrib abaxially conspicuously raised, adaxially impressed, lateral veins 6–8 pairs, abaxially distinct, curved, anastomosing near margin, veinlets slender, densely foveolate on both surfaces, base obliquely obtuse, apex obtuse. Cymose panicles arising from near base of young branchlet or subterminal, 4.5–8 cm, few flowered; peduncle red, somewhat thick. Pedicel slender, 5–7 mm. Flowers ca. 5 mm. Perianth lobes subequal, oblong, ca. 5 × 2 mm, glabrous, rarely sparsely puberulent outside, pubescent inside, apex orbicular or obtuse. Filaments glabrous. Ovary glabrous. Fruit globose, ca. 7 mm in diam., glaucescent when young; persistent perianth lobes ± thickening at lower part; fruiting pedicel ca. 5 mm. Fl. Mar–May, fr. Jun–Jul.

- Mountains, mixed broad-leaved forests, thickets; 800–1500 m. Guangdong, N Guangxi, Guizhou, S Zhejiang.

**10. *Machilus sichuanensis*** N. Chao ex S. K. Lee et al., Acta Phytotax. Sin. 17(2): 47. 1979.

四川润楠 si chuan run nan

*Persea sichuanensis* (N. Chao ex S. K. Lee et al.) Kostermans.

Trees, to 20 m tall, glabrous throughout. Branchlets pale brown. Petiole 1.8–2.2 cm; leaf blade abaxially glaucescent and adaxially green when fresh, abaxially pale brown when dry, oblong, 11–15.5 × 3.3–4.5 cm, leathery, midrib raised abaxially, slightly impressed adaxially, lateral veins ca. 9 pairs, somewhat raised on both surfaces, veinlets densely foveolate, adaxially more conspicuous than abaxially, base cuneate, apex caudate-acuminate. Inflorescences usually at base of young branchlet, 7–11 cm, branched ca. at middle of peduncle; peduncle 3–4.5 cm. Pedicel 7–14 mm. Flowers yellowish, ca. 6 mm. Perianth lobes oblong, ca. 5 × 2 mm, outer ones shorter and more nar-

row. Stamens ca. 5 mm, white villous at base; filaments of 3rd series with stipitate glands at base. Staminodes sagittate, ca. 2 mm. Ovary ovoid; style ca. 3 mm. Fruit unknown. Fl. Apr–May.

- Sichuan (Guanxian).

**11. *Machilus chuanchienensis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 47. 1979.

川黔润楠 chuan qian run nan

*Persea chuanchienensis* (S. K. Lee) Kostermans.

Trees, ca. 5 m tall. Branchlets purple-brown, sometimes with distinctly raised elliptic lenticels, branchlets and young shoots smooth, glabrous. Terminal buds conical, puberulent. Leaves clustered at upper part of branchlet; petiole slender, 1.8–2.2 cm; leaf blade abaxially pale green, adaxially green, oblong, 8.5–12 × 2.7–3.8 cm, thinly leathery, abaxially appressed puberulent when young, midrib abaxially distinctly elevated, adaxially impressed, lateral veins 8 or 9 pairs, abaxially raised, adaxially slightly raised, veinlets densely reticulate, sometimes foveolate on both surfaces, base cuneate, apex obtuse or obtuse-acuminate. Cymose panicles near base of newly sprouted branchlet or sometimes subterminal, 6–10.5 cm, few flowered, branched at upper part of peduncle. Pedicel slender, ca. 7 mm. Flowers ca. 5 mm. Perianth lobes oblong, equal or subequal, glabrous outside, sericeous inside. Fruit unknown. Fl. Jun.

- NE Guizhou, SE Sichuan.

**12. *Machilus calcicola*** C. J. Qi, Bull. Bot. Res., Harbin 1(1–2): 153. 1981.

灰岩润楠 hui yan run nan

Small trees, 5–8 m tall. Branchlets reddish brown, glabrous. Terminal buds ovoid; bud scales reddish brown sericeous. Petiole 1.2–2 cm, glabrous; leaf blade shiny, obovate-oblong or oblong-elliptic, rarely oblong-lanceolate, leathery, glabrous on both surfaces, lateral veins 9–11 pairs, midrib elevated abaxially, plane adaxially, veinlets conspicuous on both surfaces, base cuneate, apex acuminate or shortly cuspidate. Panicles arising from base of newly sprouted branchlet, 3–4 cm, glabrous. Flowers white-green, 3–3.5 mm. Perianth lobes subequal, oblong, glabrous outside. Fruit blue-black, globose, 8–10 mm in diam., somewhat farinaceous; fruiting pedicel ca. 1 cm; perianth lobes caducous in fruiting stage.

- Limestone hills, open forests; 200–300 m. Guangdong, NE Guangxi, Hunan.

**13. *Machilus glabrophylla*** J. F. Zuo, J. Trop. Subtrop. Bot. 3: 34. 1995.

光叶润楠 guang ye run nan

*Machilus reticulata* S. K. Lee & F. N. Wei, Guihaia 8: 306. 1988, not K. M. Lan (1986).

Trees, to 16 m tall. Bark thin, rough. Branchlets glabrous, longitudinally striate. Bud scales densely pubescent outside, subglabrous inside. Petiole ca. 1.5 cm, glabrous; leaf blade elliptic or obovate-elliptic, 7–12 × 2.5–3 cm, thinly leathery,

glabrous on both surfaces, midrib elevated abaxially, concave adaxially, lateral veins slender, 8 or 9 pairs, conspicuous abaxially, slightly conspicuous adaxially, foveolate on both surfaces, base cuneate or attenuate, apex shortly acuminate to acuminate, rarely obtuse. Panicle terminal, 3–4 cm, glabrous. Perianth lobes subequal, 3–4 × 1.2–1.5 mm, glabrous outside, pubescent inside, apex obtuse. Filaments glabrous except base, glands sagittate, long stipitate. Staminode villous below middle. Ovary ovoid; style elongate; stigma inflated. Young fruit globose; perianth lobes usually early deciduous. Fl. Oct.

- Guangdong, SE and W Guangxi.

**14. *Machilus nanchuanensis*** N. Chao ex S. K. Lee et al., Acta Phytotax. Sin. 17(2): 47. 1979.

南川润楠 nan chuan run nan

*Persea nanchuanensis* (N. Chao ex S. K. Lee et al.) Kostermans.

Trees, to 15 m tall. Branchlets slender. Terminal buds subglobose, densely brown tomentose. Leaves clustered at upper part of branchlet; petiole slender, 1.5–2 cm; leaf blade abaxially pale green, adaxially lustrous and green, obovate or elliptic, 6–8(–9) × 2–2.6(–4) cm, leathery, glabrous on both surfaces, midrib abaxially slightly elevated, adaxially impressed, lateral veins 6 or 7 pairs, slender, inconspicuous on both surfaces, veinlets slender, somewhat foveolate on both surfaces, base cuneate, sometimes oblique, apex shortly acuminate or shortly caudate. Panicles slender, fasciculate, terminal or subterminal, 2–3 cm, few flowered, with persistent involucre bracts at base in flowering period; peduncle red. Pedicel red, short, ca. 3 mm. Flowers white, all parts glabrous. Perianth lobes oblong, ca. 3 × 1 mm. Young fruit green, subglobose. Fl. May, fr. Jun.

- Mixed forests. Chongqing.

**15. *Machilus gracillima*** Chun, Acta Phytotax. Sin. 2: 171. 1953.

柔弱润楠 rou ruo run nan

*Persea gracillima* (Chun) Kostermans.

Small trees, to 4 m tall; trunk to 10 cm d.b.h., glabrous throughout. Branchlets slender. Petiole 10–12 mm; leaf blade abaxially grayish brown and glaucous, adaxially grayish green, oblong, somewhat rhombic, 10–11 × 2.5–3.5 cm, thinly leathery, midrib slender, abaxially elevated, adaxially concave, lateral veins 10–12 pairs, together with reticulate veinlets slender on both surfaces but distinctly visible by lens, base cuneate, apex caudate-acuminate. Flowers unknown. Infructescences very short, solitary in leaf axil. Fruit subglobose, ca. 1.3 cm in diam. (immature); persistent perianth lobes yellowish, patent, oblanceolate, subequal, ca. 5 × 1.2 mm, papery; fruiting pedicel shorter than petiole, ca. 5 mm, upper parts slightly thickened.

- Dense broad-leaved forests. N Guangxi.

This is a very rare species apparently known only from the type gathering.

**16. *Machilus salicoides*** S. K. Lee, Acta Phytotax. Sin. 17(2): 48. 1979.

华荃润楠 hua ying run nan

*Persea salicoides* (S. K. Lee) Kostermans.

Trees, to 15 m tall. Bark brownish. Branchlets brownish, glabrous; current year branchlets red-brown, glabrous. Axillary bud small, ovoid; bud scales glabrous outside, densely ciliate. Leaves clustered at apex of branchlet; petiole 8–10 mm; leaf blade abaxially grayish green, lanceolate or oblong, 7–11.5 × 1.5–4.3 cm, thinly leathery, abaxially densely pubescent when young, pubescent along midrib when old, midrib distinctly elevated abaxially, concave adaxially, lateral veins 9 or 10 pairs, abaxially more conspicuous, adaxially slightly elevated, veinlets slender, densely foveolate on both surfaces, base cuneate, apex obtuse or obtuse-acuminate. Panicles subterminal, short, ca. 3 cm, few flowered; involucre bracts caducous, densely yellowish brown tomentose; bracteoles linear, ca. equal to length of pedicel, glabrous. Pedicel slender, ca. 2 mm. Perianth lobes ovate, subequal, ca. 1.5 mm, glabrous outside. Fruit unknown.

- Open slopes. Chongqing and/or E Sichuan (Huaying Shan).

**17. *Machilus obovatifolia*** (Hayata) Kanehira & Sasaki, Trans. Nat. Hist. Soc. Formosa 20: 381. 1930.

倒卵叶润楠 dao luan ye run nan

*Cinnamomum obovatifolium* Hayata, Icon. Pl. Formosan. 3: 161. 1913; *Machilus suffrutescens* Hayata; *Persea obovatifolia* (Hayata) Kostermans.

Small trees. Branchlets glabrous. Bud ovoid-globose; bud scales glabrous or glabrate. Leaves clustered at apex of branchlet; petiole 5–10 mm, glabrous; leaf blade obovate, 4–5 × 1–2.5 cm, thinly leathery, glabrous on both surfaces, midrib flat or slightly elevated abaxially, concave adaxially, lateral veins 4 or 5 pairs, slightly elevated on both surfaces, veinlets distinctly reticulate, base cuneate, apex usually rounded. Inflorescences in few flowered cymose panicles, subterminal, ca. 3 cm, glabrous or glabrate. Pedicel 3–4 mm. Perianth lobes subequal, glabrous outside, puberulent to glabrate inside, outer ones ovate, smaller, ca. 1.6 mm, inner ones larger, 2–2.4 mm. Filaments barbate at base, those of 3rd series longer, glands shortly stipitate. Stamnodes sagittate. Ovary subglobose. Fruit compressed globose, 1–1.5 cm in diam.

- Mixed broad-leaved forests of lowlands. S Taiwan (Hengchun).

**18. *Machilus multinervia*** H. Liu, Laurac. Chine & Indochine, 56. 1932.

多脉润楠 duo mai run nan

*Persea multinervia* (H. Liu) Kostermans.

Small trees, 5–8 m tall. Branchlets reddish brown, slightly thick, with longitudinal striations and 5 or 6 circular scars. Leaves clustered at apex of branchlet; petiole thick, 1–2 cm; leaf blade abaxially glaucous and brownish when dry, adaxially lustrous, narrowly elliptic to oblanceolate, 12–19 × 2–3.2 cm, leathery, abaxially scattered appressed sericeous, midrib abaxially distinctly elevated, thick, reddish, adaxially concave, lateral veins slender, 20–23 pairs, veinlets slender, foveolate, base attenuate, decurrent to petiole, apex acuminate. Panicles 8–10 at

upper part of 1-year-old branchlet, reddish, to 11 cm, glabrous; peduncle laterally compressed. Pedicel 6–8 mm. Flowers yellowish white. Perianth lobes obovate, apex acute, with 5–7 longitudinal veins and hairs at base inside, unequal, inner one longer, ca. 6 mm. Stamens 4–4.5 mm, with hairs at base; filaments of 3rd series with stipitate glands inserted at base. Staminal nodes triangular, shortly stipitate, with hairs at base. Ovary subglobose. Infructescences 11–13 cm. Fruit subglobose, 2.5–3 cm in diam.; fruiting pedicel slightly thick, 8–10 mm. Fr. Sep–Oct.

- Limestone hills, open slopes. Guangxi, Guizhou.

**19. *Machilus wangchiana*** Chun, Acta Phytotax. Sin. 2: 166. 1953.

信宜润楠 xin yi run nan

*Persea kadooriei* Kostermans; *P. wangchiana* (Chun) Kostermans.

Trees, 6–15 m; trunk ca. 35 cm d.b.h. Bark gray. Young shoots glabrous, older branchlets with conspicuous leaf scars and elevated lenticels. Leaves clustered on upper part of branchlet; petiole usually ca. 2 cm; leaf blade greenish brown on both surfaces when dry, abaxially slightly glaucous, oblong-obovate to oblong-elliptic, 18–34 × 5–8 cm, leathery, midrib thick, abaxially elevated, adaxially canaliculate, lateral veins 24–30 pairs, sometimes forked, abaxially conspicuous, veinlets dense, foveolate, base cuneate, decurrent, apex acute-acuminate to acuminate. Inflorescences subracemose at base of newly sprouted branchlet, few flowered, 5–12 cm; peduncle thick, carnosose and purple when fresh. Pedicel ca. 8 mm. Perianth lobes oblong-elliptic, thinly leathery, glabrate to glabrous outside, pubescent inside, unequal, outer one smaller, inner one larger, ca. 7 mm. Stamens 4.2–4.4 mm, glabrous or glabrate, glands of 3rd series clavate, ca. 2 mm, puberulent. Staminal nodes ca. 2 mm, compressed clavate, puberulent. Ovary glabrous. Fruit dark blue, globose, 2–2.5 cm in diam.; fruiting pedicel purple when mature. Fr. Apr–May.

- Dense or open forests in valleys. Guangdong, Guangxi, Guizhou.

**20. *Machilus chienkweiensis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 48. 1979.

黔桂润楠 qian gui run nan

*Persea chienkweiensis* (S. K. Lee) Kostermans.

Trees, 7–11 m tall; trunk to 25 cm d.b.h. Branchlets yellowish green to purplish brown, somewhat thick, with many circular scars of bud scales. Terminal buds compressed globose; bud scales subrounded, wide, outer ones glabrous outside, ciliate, inner ones yellowish brown tomentose. Petiole slender, 1.2–2(–2.5) cm; leaf blade abaxially slightly glaucous-green, adaxially lustrous, elliptic or oblong, usually 6–12(–15) × 2.2–4.5 cm, thinly leathery, glabrous on both surfaces, midrib abaxially elevated, adaxially narrowly canaliculate, lateral veins (8–)10–12 pairs, slightly slender, somewhat raised on both surfaces, veinlets densely reticulate, foveolate on both surfaces. Flowers unknown. Infructescences arising from lower part of newly sprouted branchlet, short, 3–5 cm, glabrous; peduncle reddish. Fruit globose, ca. 2.2 cm in diam., green and slightly

glaucous when immature; perianth lobes glabrous outside; fruiting pedicel reddish, ca. 7 × 2 mm. Fr. Jun–Jul.

- Dense or open mountain forests in valleys or on slopes; 800–1200 m. N Guangxi, SE Guizhou.

**21. *Machilus gongshanensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 48. 1979.

贡山润楠 gong shan run nan

*Persea gongshanensis* (H. W. Li) Kostermans.

Small to medium-sized trees, 3–10 m tall; trunk to 20 cm d.b.h. Bark dark brown. Branchlets brownish, longitudinally striate, glabrous. Terminal buds large, ovoid, to 8 mm; bud scales subrounded, wide, glabrous outside, ciliate. Leaves congested at apex of branchlet; petiole 1–2(–3) cm; leaf blade abaxially pale green or brownish, adaxially greenish, oblong to obovate-elliptic, (6–)9.5–20 × (1.5–)1.8–5.5 cm, leathery, glabrous on both surfaces, midrib abaxially elevated, adaxially concave, lateral veins 8–11(–16) pairs, conspicuous on both surfaces, veinlets somewhat conspicuous, base cuneate, apex acuminate, summit sharp. Cymose panicles arising from lower part of newly sprouted branchlet, (3.5–)5.5–8 cm, branched at upper part of peduncle; peduncle and pedicels somewhat compressed, glabrous. Pedicel 4–5 mm. Flowers yellowish. Perianth lobes oblong, subequal, glabrous outside, pubescent inside, ciliate. Stamens subequal; filaments pubescent at base, glands of 3rd series stipitate, sparsely pubescent at base. Ovary ovoid; style slender, curved. Fruit globose, 1.3–1.7 cm in diam.; fruiting pedicel slightly thickened. Fl. Apr–May, fr. Aug–Oct.

- Mountain slopes or valleys, mixed broad-leaved forests; 1600–2300 m. NW Yunnan.

**22. *Machilus velutina*** Champion ex Benth, Hooker's J. Bot. Kew Gard. Misc. 5: 198. 1853 [“*velutinus*”].

绒毛润楠 rong mao run nan

*Actinodaphne magniflora* C. K. Allen; *Persea velutina* (Champion ex Benth) Kostermans.

Trees, to 18 m tall; trunk ca. 40 cm d.b.h., all parts densely ferruginous tomentose. Petiole 1–2.5(–3) cm; leaf blade lustrous adaxially, narrowly obovate, elliptic, or narrowly ovate, 5–11(–18) × 2–2.5(–5.5) cm, leathery, midrib abaxially raised, slightly concave adaxially, lateral veins 8–11 pairs, abaxially conspicuously raised, veinlets very slender, inconspicuous, base cuneate, apex attenuate or shortly acuminate. Inflorescences terminal, 2–3 cm; peduncle very short. Flowers yellowish, fragrant, densely ferruginous tomentose. Perianth lobes slightly unequal, inner ones ovate, ca. 6 × 3 mm. Stamens ca. 5 mm; filaments of 3rd series tomentose at base, glands cordate, stipitate. Staminal nodes ca. 2 mm, tomentose. Ovary reddish when alive. Fruit purplish red, globose, ca. 4 mm in diam. Fl. Oct–Dec, fr. Feb–Mar.

Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Zhejiang [Cambodia, Laos, Vietnam].

*Machilus velutina* var. *longipedunculata* C. J. Qi (Bull. Bot. Res., Harbin 1(1–2): 154. 1981) was described from Hunan but could not be treated here because no material was seen by the present authors.

**23. *Machilus grijsii*** Hance, Ann. Sci. Nat., Bot., sér. 4, 18: 226. 1863.

黄绒润楠 huang rong run nan

*Persea grijsii* (Hance) Kostermans.

Trees, to 5 m tall. Buds, branchlets, petioles, and leaf blade abaxially yellow-brown velutinous. Petiole somewhat thick, 8–18 mm; leaf blade obovate-oblong, 7.5–14(–18) × 3.7–6.5(–7) cm, leathery, glabrous adaxially, midrib and lateral veins abaxially raised, adaxially concave, lateral veins 8–11 pairs, veinlets slender and indistinct, base ± rounded, apex attenuate. Inflorescence short, fasciculate at apex of branchlet, ca. 3 cm, densely yellowish brown velutinous; peduncle 1–2.5 cm. Pedicel ca. 5 mm. Perianth lobes thin, oblong, subequal, ca. 3.5 mm, outside ones more narrowed, tomentose on both surfaces. Filaments of 3rd series with sessile glands inserted at base. Fruit globose, ca. 1 cm in diam. Fl. Mar, fr. Apr.

• Thickets, dense forests. Fujian, Guangdong, Hainan, Jiangxi, Zhejiang.

**24. *Machilus platycarpa*** Chun, Acta Phytotax. Sin. 2: 164. 1953.

扁果润楠 bian guo run nan

*Persea platycarpa* (Chun) Kostermans.

Large trees, up to 24 m tall; trunk ca. 50 cm d.b.h. Bark yellowish gray, longitudinally striate, ca. 3 mm thick. Branchlets thick, with sparse tomentum and scattered lenticels. Terminal buds large, triangular-ovoid; outer bud scales covered with persistent tomentum. Petiole 3–4 cm, thick, with opaque tomentum; leaf blade oblong-ovate or oblong-oblong, sometimes oblong-elliptic, larger one to 34 × 12 cm, smaller one 15–23 × 6–8 cm, leathery, abaxially ferruginous tomentose, adaxially brownish when dry and only lower part of midrib sometimes opaque tomentose, midrib abaxially elevated, adaxially concave, lateral veins 16–20 pairs, distant, veinlets abaxially distinct, especially along midrib and lateral veins, base broadly cuneate, margin slightly revolute, apex cuspidate-acuminate. Flowers not seen. Withered inflorescences racemose, terminal, ca. 8 cm, ferruginous tomentose, few flowered. Pedicel thick, ca. 8 × 2 mm. Perianth lobes leathery, oblong-elliptic or oblong-ovate, 8–9 × 4–5 mm, outer ones smaller. Stamens 5–6 mm; filaments slightly flattened, gradually wide and hairy toward base, those of 3rd series with ovoid glands ca. 2 mm. Ovary globose with yellowish hairs at base. Fruit compressed globose, ca. 2.2 cm, ca. 4 cm in diam. Fr. Apr–May.

W Guangdong, S Guangxi [Vietnam].

**25. *Machilus dumicola*** (W. W. Smith) H. W. Li, Acta Phytotax. Sin. 17(2): 49. 1979.

灌丛润楠 guan cong run nan

*Alseodaphne dumicola* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 152. 1921; *Persea dumicola* (W. W. Smith) Airy Shaw.

Small trees, ca. 7 m tall. Branchlets thick, to 1 cm in diam., striate, densely pubescent; young shoot thick, to 5 mm in

diam., obtusely angled, densely yellowish ferruginous tomentose. Leaves almost congested at top of young shoot; petiole 2.5–4 cm, 2–3 mm in diam.; leaf blade usually obovate to obovate-oblong, 12–20 × 6–10 cm, abaxially densely ferruginous tomentose, adaxially glabrous, lateral veins 10–13 pairs, apex obtuse or rounded. Inflorescences subterminal to 8.5 cm; peduncle conspicuously flattened, together with pedicels yellowish ferruginous tomentose. Perianth lobes subequal, yellowish ferruginous tomentose on both surfaces. Stamens 5–5.6 mm; filaments pubescent, glands sessile. Ovary ca. 3 mm in diam.; style puberulent. Fruit not seen.

• Valleys, thickets; ca. 2400 m. W Yunnan.

**26. *Machilus wenshanensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 49. 1979.

文山润楠 wen shan run nan

*Persea wenshanensis* (H. W. Li) Kostermans.

Trees, ca. 15 m tall; trunk ca. 30 cm d.b.h. Branchlets robust, ca. 8 mm in diam., longitudinally striate, lenticellate, pubescent or densely dirty yellowish tomentose when young. Bud scales densely dirty yellowish or ferruginous tomentose. Petiole 1.2–2.3 cm, dirty yellowish pubescent; leaf blade oblong or elliptic to oblanceolate-elliptic, ca. 12.5 × 3–4 cm, densely dirty yellowish villous on both surfaces when young, abaxially sparsely dirty yellowish villous and adaxially glabrous when old, midrib abaxially elevated, adaxially concave, lateral veins 10–12 pairs, abaxially raised, adaxially impressed, veinlets somewhat conspicuous on both surfaces, ± foveolate, base cuneate or broadly cuneate, apex acute or acuminate. Inflorescences arising from axillary shortened branchlet, many flowered, densely dirty yellowish pubescent; peduncle (2–)3–6 cm; bracts and bracteoles caducous. Pedicel ca. 1.5 mm. Flowers ca. 6 mm in diam. in flowering period. Perianth lobes dirty yellowish tomentose on both surfaces, slightly unequal, outer ones ca. 4.2 × 2.2 mm, inner ones ca. 4.5 × 2.5 mm. Filaments sparsely pubescent, those of 3rd series with stipitate glands. Stamines sagittate, pubescent. Ovary ovoid, glabrous; style slender, to 2.6 mm. Fruit not seen. Fl. Apr.

• Evergreen broad-leaved forests in valleys or on slopes; ca. 1800 m. NW Guangxi, SW Guizhou (Anlong), SE Yunnan.

**27. *Machilus nakao*** S. K. Lee, Acta Phytotax. Sin. 8: 188. 1963.

纳稿润楠 na gao run nan

*Persea nakao* (S. K. Lee) Kostermans.

Trees, to 20 m; trunk to 1 m d.b.h. Bark gray-brown to blackish gray. Branchlets gray-brown, terete, with longitudinally elevated lenticels and leaf scars; young branchlets brownish, brownish tomentose, becoming glabrate. Leaves scattered on upper part of branchlet; petiole 9–20 mm, tomentose when young, glabrate later; leaf blade obovate-elliptic, 8.5–18 × 2.8–5.8 cm, leathery, abaxially sparsely pubescent especially along veins, brownish red when dry, adaxially glabrous, midrib abaxially conspicuously raised, adaxially concave, lateral veins 6–8(–10) pairs, abaxially distinctly elevated, adaxially flat and slender, veinlets foveolate adaxially, base cu-

neate, apex obtuse or rounded. Inflorescences in patent pleiochasmus, terminal or on upper part of branchlet, 4–17 cm, branched at middle or upper part of peduncle; peduncle up to 1/2 or 2/3 length of inflorescence, densely pubescent. Flowers white or yellowish, ca. 5 mm. Perianth lobes ovate, tomentose on both surfaces, unequal, inner ones ca. 5 mm, outer ones smaller. Stamens shorter than perianth lobes, hairy at base, glands of 3rd series reniform. Staminodes sagittate, shorter than stamens. Ovary globose, glabrous; style longer than ovary, curved. Fruit green, globose, ca. 3 cm in diam.; persistent perianth lobes not thickened. Fl. Jul–Oct, fr. Sep–Apr.

Thickets on slopes, open forests, sometimes in forests by streams. Guangxi (Luchuan), Hainan [Vietnam].

**28. *Machilus zuihoensis*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 244. 1911.

香润楠 *xiang run nan*

Medium-sized or large trees. Branchlets terete, lenticellate, puberulent becoming glabrate, blackish when dry. Bud scales glabrous or yellowish brown pilose. Petiole 1.5–2.5 cm, puberulent to glabrate; leaf blade yellowish green to green or deep green to blue-green when alive, oblong, elliptic, or lanceolate to oblanceolate, 7–22 × 2.5–6 cm, leathery, abaxially hairy, glaucescent, adaxially glabrous, midrib abaxially elevated, adaxially slightly impressed, lateral veins 7–14 pairs, slender, veinlets densely reticulate, inconspicuous on both surfaces, base cuneate or sometimes obtusely cuneate, apex acute to acuminate. Inflorescences in cymose panicles, arising from base of newly sprouted branchlet, to 18 cm, pubescent, branched at upper part of peduncle; involucre bracts caducous. Pedicel 3–4 mm, pubescent. Perianth lobes subequal, oblong to oblanceolate, ca. 3.7 × 1.7 mm, pubescent on both surfaces, apex obtuse. Stamens equal in length, those of 3rd series villous at base with stipitate glands. Staminodes barbate at base. Ovary ovoid, glabrous; style glabrous. Fruit compressed globose, 7–10 mm in diam., black when mature; persistent perianth lobes reflexed. Fl. Dec–Apr, fr. Jul–Aug.

• Broad-leaved and mixed forests, common; 100–1400 m. Taiwan.

- 1a. Leaf blade base cuneate, 7–14 × 2.5–3.5 cm; fruit 7–8 mm in diam. .... 28a. var. *zuihoensis*  
 1b. Leaf blade base obtusely cuneate, blade much larger, 12–22 × 2.5–6 cm; fruit 9–10 mm in diam. .... 28b. var. *mushaensis*

**28a. *Machilus zuihoensis* var. *zuihoensis***

香润楠(原变种) *xiang run nan* (*yuan bian zhong*)

*Machilus longipaniculata* Hayata; *M. longisepala* Hayata; *M. zuihoensis* f. *longipaniculata* (Hayata) T. S. Liu & J. C. Liao; *Persea zuihoensis* (Hayata) H. L. Li.

Medium-sized trees. Petiole ca. 1.5 cm; leaf blade yellowish green to green when alive, 7–14 × 2.5–3.5 cm, base almost cuneate. Fruit 7–8 mm in diam.

• Mixed forests, common; 100–1400 m. Taiwan.

**28b. *Machilus zuihoensis* var. *mushaensis*** (F. Y. Lu) Y. C. Liu, Lign. Pl. Taiwan, 144. 1981.

青叶润楠 *qing ye run nan*

*Machilus mushaensis* F. Y. Lu, Quart. J. Chin. Forest. 2(3): 19. 1969.

Large trees. Petiole 1.5–2.5 cm; leaf blade deep green to blue-green when alive, base obtusely cuneate. Fruit 9–10 mm in diam.

• Broad-leaved forests, common; medium elevations. Taiwan.

**29. *Machilus oreophila*** Hance, Ann. Sci. Nat., Bot., sér. 4, 18: 227. 1863.

建润楠 *jian run nan*

*Persea oreophila* (Hance) Kostermans.

Shrubs to small trees, usually 5–8 m tall. Young branchlets, terminal buds, and young leaf blade abaxially and adaxially along midrib densely yellowish brown tomentose, older branchlets glabrate. Petiole 1–1.5 cm, tomentose initially; leaf blade narrowly lanceolate, (7–)11–18 × (1–)1.5–3 cm, thinly leathery, abaxially pubescent, especially along midrib and veins, adaxially glabrous, midrib abaxially raised, lateral veins 8–10 pairs, veinlets usually conspicuous, base cuneate, apex acuminate. Panicles 3.5–6.5 cm, densely brownish pubescent, branched at top of peduncle. Perianth lobes oblong, subequal, yellowish brown pubescent on both surfaces. Filaments of stamens hairy at base, those of 3rd series with shortly stipitate glands. Fruit globose, 7–10 mm in diam., black-purple when mature; fruiting pedicel 7–8 mm, pubescent. Fl. Mar–Apr, fr. May–Aug.

• Valleys, mixed forests, streamsides, watersides. Fujian, Guangdong, Guangxi, Guizhou, Hunan.

**30. *Machilus chrysotricha*** H. W. Li, Acta Phytotax. Sin. 17(2): 50. 1979.

黄毛润楠 *huang mao run nan*

*Persea chrysotricha* (H. W. Li) Kostermans.

Trees, 5–15 m tall. Young shoots longitudinally striate, somewhat golden yellow pubescent, glabrous when old. Petiole 1.5–2 cm; leaf blade oblong to obovate-oblong, 9–13 × 3.2–4.5 cm, abaxially with dirty yellowish pubescence mainly along midrib and lateral veins, adaxially glabrous, midrib abaxially raised, adaxially concave, lateral veins 8–11 pairs, sometimes forked and ± irregular, anastomosing and disappearing near margin, veinlets reticulate, ± foveolate on both surfaces. Numerous cymose panicles from base of current year branchlet, 4–7 cm, densely dirty yellowish pubescent; peduncle 2–3.5 cm. Pedicel as long as flower. Flowers greenish yellow to white, to 5.5 mm. Perianth densely golden yellow pubescent on both surfaces; perianth lobes oblong, slightly unequal, outer ones ca. 4 mm, inner ones ca. 4.5 mm. Stamens villous at base, those of 1st and 2nd series ca. 4 mm, those of 3rd series somewhat longer, with stipitate glands at base. Staminodes ca. 1.5 mm, villous. Ovary ovoid, glabrous. Fruit not seen. Fl. May–Jul.

• Dry mixed forests; ca. 1900 m. C and NW Yunnan.

**31. *Machilus kwangtungensis*** Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 77. 1945.

广东润楠 *guang dong run nan*

*Machilus cathayensis* Chun ex Hung T. Chang; *M. kwangtungensis* var. *sanduensis* Y. K. Li; *Persea kwangtungensis* (Yen C. Yang) Kostermans.

Trees, to ca. 10 m tall; trunk ca. 18 cm d.b.h. Young shoots densely ferruginous tomentose, 1-year-old and 2-year-old branchlets blackish when dry, glabrous with yellowish brown lenticels and circular scars of bud scales. Petiole ca. 1 cm, pubescent; leaf blade oblong or oblanceolate, 6–11(–15) × 2–4.5 cm, thinly leathery, abaxially appressed pubescent, adaxially glabrate, midrib abaxially elevated, adaxially impressed, lateral veins usually 10–12 pairs, slender, inconspicuous on both surfaces, base attenuate, apex acuminate. Panicles arising from lower part of current year branchlet, 5–10.5 cm, grayish yellow pubescent; peduncle slightly compressed. Pedicel slender, 5–7 mm. Perianth lobes subequal, oblong, ca. 5 mm, grayish yellow pubescent on both surfaces, apex obtuse. Filaments hairy, those of 3rd series with stipitate glands at base. Staminodes sagittate. Ovary glabrous; style slender. Fruit subglobose, slightly compressed, 8–9 mm in diam., blackish when ripe. Fl. Mar–Apr, fr. May–Jul.

• Mountain slopes, broad-leaved forests in valleys, valleys by watersides. Guangdong, NE Guangxi, S Guizhou, S Hunan.

**32. *Machilus gamblei*** King ex J. D. Hooker, Fl. Brit. India 5: 138. 1886.

黄心树 *huang xin shu*

*Machilus bombycina* King ex J. D. Hooker; *M. suaveolens* S. K. Lee; *Persea bombycina* (King ex J. D. Hooker) Kostermans; *P. gamblei* (King ex J. D. Hooker) Kostermans; *P. suaveolens* (S. K. Lee) Kostermans.

Trees, to 25 m tall; trunk to 40 cm d.b.h. Bark blackish brown or brownish. Branchlets slender, terete, with 3–5 circular scars, young shoots with densely gray-yellow pubescence, becoming glabrate. Terminal buds tomentose. Petiole 5–20 mm, sericeous; leaf blade oblong, obovate, or oblanceolate, (5–)6–15 × 1.5–5.5 cm, thinly leathery, ferruginous appressed sericeous on both surfaces when young, abaxially glaucescent-green and minutely pubescent especially along veins and adaxially glabrate when old, midrib abaxially elevated, adaxially concave, lateral veins 7–10 pairs, slightly conspicuous on both surfaces, veinlets inconspicuous. Numerous panicles arising from lower part of young shoots, 4–13 cm; peduncle (2–)4–8.5 cm, densely grayish sericeous. Flowers white or yellowish. Perianth lobes subequal, oblong, ca. 4 × 1.5 mm, densely minutely gray-white sericeous. Stamens ca. 3 mm, barbate at base; glands of 3rd series shortly stipitate. Staminodes sagittate. Ovary subglobose. Fruit globose, 7–8 mm in diam., blackish when ripe. Fl. Mar–Apr, fr. May–Jun.

Slopes, open or dense forests in valleys, lowlands. Guangdong, Guangxi, Guizhou, Hainan, SE Xizang (Médog), Yunnan [Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

**33. *Machilus cavaleriei*** H. Léveillé, Bull. Acad. Int. Géogr. Bot. 24: 142. 1914.

安顺润楠 *an shun run nan*

*Alseodaphne cavaleriei* (H. Léveillé) Kostermans.

Shrubs or small trees, ca. 2.5 m tall. Bark gray. Branchlets yellowish brown, somewhat thick, longitudinally elliptic-lenticellate, young parts grayish white or pale brown pubescent. Leaves scattered on upper part of branchlet; petiole slightly slender, 8–12(–26) mm; leaf blade abaxially slightly glaucescent-green, obovate or oblong, 5–10.5 × 2–3(–4.2) cm, young leaf blade puberulent on both surfaces, becoming glabrous adaxially, midrib abaxially elevated, adaxially slightly impressed, lateral veins 6–8 pairs, slender, veinlets foveolate, somewhat conspicuous on both surfaces. Panicles arising from lower part of young shoot, 3.8–7 cm, gray pubescent; peduncle purple, slender, branched at upper part. Pedicel slender, 3–5 mm, pubescent. Perianth lobes oblong, 3–4 mm, slightly unequal, pubescent on both surfaces, with 5 longitudinal veins, apex obtuse. Filaments villous at base; glands of 3rd series shortly stipitate. Ovary subglobose; stigma dish-shaped. Fruit globose when young; persistent perianth lobes thinly leathery.

• Mountain slopes, open or dense forests; ca. 1300 m. NW Guangxi, S Guizhou.

**34. *Machilus minutiloba*** S. K. Lee, Acta Phytotax. Sin. 17(2): 50. 1979.

雁荡润楠 *yan dang run nan*

*Persea minutiloba* (S. K. Lee) Kostermans.

Small trees. Branchlets blackish brown with small elliptic lenticels, glabrous, conspicuously swollen and densely brown tomentose at nodes. Terminal buds almost brown tomentose. Leaves clustered at apex of branchlet; petiole slender, 8–12 mm; leaf blade oblong, 6–10 × 1.5–2.8 cm, leathery, abaxially puberulent, midrib conspicuously elevated abaxially, slightly concave adaxially, lateral veins slender, 10–14 pairs, veinlets slender, densely reticulate, base cuneate, apex obtuse. Flowers unknown. Inflorescences paniculate, at lower part of current year branchlet, 5.5–9.5 cm, branched at middle of peduncle. Fruit compressed globose, ca. 1.2 cm in diam.; persistent perianth lobes oblong, gray appressed pubescent on both surfaces; fruiting pedicel slender, 6–8 mm. Fr. Jun.

• Mixed forests on mountain slopes. SE Zhejiang (Yandang Shan).

**35. *Machilus dinganensis*** S. K. Lee & F. N. Wei, Guihaia 4: 94. 1984.

定安润楠 *ding an run nan*

*Persea dinganensis* (S. K. Lee & F. N. Wei) Kostermans.

Trees, ca. 8 m tall. Branchlets glabrous when young, blackish when dry. Petiole 1–1.5 cm, glabrous; leaf blade abaxially brownish, adaxially shiny, elliptic or oblanceolate, 6–12 × 2–3.5(–4.5) cm, abaxially puberulent, adaxially glabrous, midrib abaxially elevated, adaxially impressed, lateral veins 9–11 pairs, conspicuous on both surfaces, base cuneate, apex acute or

obtuse, rarely shortly acuminate. Inflorescences arising from base of branchlet, to 10 cm, densely grayish pubescent. Pedicel ca. 5 mm, pubescent. Perianth lobes oblong, gray-white pubescent on both surfaces, unequal, inner ones longer, ca.  $4.8 \times 2$  mm. Stamens hairy at base, ca. 4 mm; glands of 3rd series cordate, stipitate. Staminodes sagittate, ca. 1.6 mm, hairy below middle. Ovary ovoid; style slender; stigma capitate. Fruit globose, 6–7 mm in diam. Fl. Dec, fr. May–Jun.

- Mixed broad-leaved forests. Guangdong, Hainan.

**36. *Machilus lohuiensis*** S. K. Lee, Acta Phytotax. Sin. 8: 184. 1963.

乐会润楠 le hui run nan

*Machilus wenchangensis* G. A. Fu & X. J. Hong; *Persea lohuiensis* (S. K. Lee) Kostermans.

Trees, ca. 7 m tall; trunk ca. 10 cm d.b.h. Bark brown. Branchlets brown or purple-brown, terete; young branchlets dark brown, glabrous. Petiole 1–1.5 cm; leaf blade abaxially glaucescent, oblanceolate, elliptic, or obovate-elliptic to broadly elliptic,  $5-9 \times 2.5-4.5$  cm, subleathery, puberulent when young, midrib elevated abaxially, concave adaxially, lateral veins 8–10 pairs, slender, somewhat elevated on both surfaces, veinlets conspicuous on both surfaces, base broadly cuneate and decurrent, margin slightly revolute, apex acute or obtuse. Cymose panicles at upper part of branchlet, 2.5–5 cm, pubescent, branched at ca. middle or upper part of peduncle, usually 3-flowered per branch. Flowers yellow, aromatic. Perianth lobes subequal, oblong when dry, ca. 3 mm, puberulent on both surfaces, apex obtuse. Stamens somewhat shorter than perianth, hairy at base; glands of 3rd series shortly stipitate. Staminodes sagittate. Ovary globose; style as long as ovary. Infructescences 2.5–9 cm. Fruit globose, ca. 7 mm in diam. Fl. and fr. Aug–Sep.

Open forests. Hainan [Vietnam].

**37. *Machilus obscurinervis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 51. 1979.

隐脉润楠 yin mai run nan

*Persea obscurinervis* (S. K. Lee) Kostermans.

Large trees, 30–40 m tall. Branchlets grayish, longitudinally striate, yellowish brown lenticellate, rough; 1-year-old branchlet somewhat compressed,  $\pm$  angular, glabrous. Terminal buds small, subovoid; bud scales glabrous outside, margin ciliate. Leaves clustered at apex of branchlet; petiole 1–2.4 cm; leaf blade abaxially grayish green, elliptic,  $6-10(-12.5) \times 2.3-4$  cm, thinly leathery, appressed puberulent, midrib elevated abaxially, slightly concave adaxially, lateral veins slender, 10–12 pairs, inconspicuous on both surfaces, veinlets densely reticulate, abaxially inconspicuous, adaxially visible, base cuneate, apex obtusely acute. Flowers not seen. Infructescences paniculate, at lower part of 1-year-old branchlet, 6–10.5 cm; peduncle reddish, compressed. Fruit globose, ca. 1 cm in diam.; persistent perianth lobes reflexed, oblong, ca. 5 mm, puberulent on both surfaces, apex acute; fruiting pedicel ca. 1 cm, red when fresh, puberulent, thickened to 2 mm in diam. Fr. Aug.

- Evergreen mixed broad-leaved forests; ca. 2000 m. SE Xizang.

**38. *Machilus nanmu*** (Oliver) Hemsley, J. Linn. Soc., Bot. 26: 376. 1891.

润楠 run nan

*Persea nanmu* Oliver, Hooker's Icon. Pl. 14: 10, t. 1316. 1880; *Machilus pingii* W. C. Cheng ex Yen C. Yang; *P. pingii* (W. C. Cheng ex Yen C. Yang) Kostermans; *Phoebe nanmu* (Oliver) Gamble.

Large trees, to 40 m tall or more; trunk ca. 40 cm d.b.h. Branchlets glabrous, blackish when dry. Terminal buds ovoid; bud scales densely grayish sericeous outside, glabrous near margin. Petiole somewhat slender, 1–1.5 cm, densely grayish puberulent when young, glabrous when old; leaf blade elliptic or elliptic-oblanceolate,  $5-10(-13.5) \times 2-5$  cm, leathery, abaxially appressed puberulent, adaxially glabrous, young leaf blade abaxially densely grayish yellow puberulent, midrib conspicuously elevated abaxially, concave adaxially, lateral veins 8–10 pairs, inconspicuous on both surfaces, veinlets densely reticulate, foveolate adaxially, base cuneate, apex acuminate or long acuminate. Panicle at base of young branchlet, 5–6.5(–9) cm, grayish yellow puberulent, branched at upper part of peduncle; peduncle 3–5 cm. Pedicels slender, 5–7 mm. Flowers small, ca. 3 mm, 4–5 mm in diam. Perianth lobes oblong, sericeous on both surfaces, with 3–5 longitudinal veins. Stamens subequal; glands of 3rd series hastate, stipitate. Staminodes hairy at base. Ovary glabrous. Fruit black, compressed globose, 7–8 mm in diam. when mature. Fl. Apr–Jun, fr. Jun–Aug.

- Single tree or mixed forests; below 1000 m. Sichuan, NE Yunnan.

**39. *Machilus leptophylla*** Handel-Mazzetti, Symb. Sin. 7: 252. 1931.

薄叶润楠 bao ye run nan

*Persea leptophylla* (Handel-Mazzetti) Kostermans.

Large trees, to 28 m tall. Bark grayish brown. Branchlets thick, deeply brown, glabrous. Terminal buds subglobose; outer bud scales broadly ovate, ca. 2 mm, minutely sericeous except for margin, inner longer, yellowish brown sericeous. Petiole slightly thick, 1–3 cm, glabrous; leaf blade abaxially glaucous, obovate-oblong,  $14-24(-32) \times 3.5-7(-8)$  cm, thinly papery, abaxially densely appressed sericeous when young, sparsely sericeous to glabrate later, adaxially glabrous, midrib impressed abaxially, conspicuously elevated adaxially, lateral veins 14–20(–24) pairs, reddish when fresh, veinlets sparse, inconspicuous, base cuneate, apex shortly acuminate. Panicles many, congested on base of young branchlet, 8–12(–15) cm, slender, many flowered, densely grayish puberulent. Pedicel ca. 5 mm. Flowers ca. 7 mm, white when fresh. Perianth subequal, oblong-elliptic, farinose-pubescent outside, puberulent or glabrous inside, margin ciliate. Stamens with fascicled hairs at base; glands of 3rd series large, orbicular-reniform, shortly stipitate. Fruit globose, ca. 1 cm in diam.; fruiting pedicel 5–10 mm.

- Valleys, mixed forests; 400–1200 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Zhejiang.

**40. *Machilus pauhoi*** Kanehira, Trop. Woods 23: 8. 1930.

刨花润楠 bao hua run nan

*Machilus polyneura* Hung T. Chang; *Persea pauhoi* (Kanehira) Kostermans.

Trees, to 20 m tall; trunk to 30 cm d.b.h. Branchlets glabrous or puberulent at base of young shoot. Terminal buds usually densely brownish sericeous. Leaves usually congested at apex of branchlet; petiole 1.1–1.6(–2.5) cm, glabrous; leaf blade elliptic or narrowly elliptic, sometimes oblanceolate, 7–15(–17) × 2–4(–5) cm, leathery, abaxially appressed sericeous, rarely glabrate, adaxially glabrous, midrib distinctly elevated abaxially, concave adaxially, lateral veins slender, 12–17 pairs, veinlets most slender, inconspicuous on both surfaces, base cuneate, apex acuminate or long acuminate. Cymose panicles on lower part of 1-year-old branchlet, ca. as long as leaf blade, puberulent, with a few flowers, branched ca. at middle or upper part of peduncle. Pedicel slender, 8–13 mm. Perianth lobes ovate-lanceolate, ca. 6 mm, puberulent on both surfaces. Stamens glabrous; glands of 3rd series stipitate. Staminodes ca. as long as glands, ca. 1.5 mm. Ovary subglobose; style longer than ovary. Fruit globose, ca. 1 cm in diam., black when mature.

• Slope thickets, open forests in valleys. Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang.

**41. *Machilus sichouensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 51. 1979.

西畴润楠 xi chou run nan

*Persea sichouensis* (H. W. Li) Kostermans.

Trees, ca. 7 m tall. Branchlets blackish brown, subterete, glabrous. Terminal buds small, ca. 3 mm; bud scales ovate-orbicular to broadly ovate-orbicular, brownish pubescent outside. Petiole 5–15(–20) mm, glabrous; leaf blade oblong to obovate-oblong, 7–16(–21.5) × 2.3–5(–6.8) cm, leathery, abaxially densely yellowish brown puberulent and adaxially subglabrous when young, abaxially ± sericeous-puberulent or glabrate and adaxially glabrous when old, midrib elevated abaxially, concave adaxially, lateral veins 9–13 pairs, conspicuous on both surfaces, veinlets inconspicuous abaxially, ± foveolate adaxially, base cuneate or broadly so, apex long acuminate. Flowers unknown. Infructescences to 12.5 cm, arising from base of 1-year-old branchlet, yellowish brown puberulent; peduncle 7–8 cm, compressed. Fruit globose, less than 1 cm in diam., glabrous; persistent perianth lobes oblong, 3–4 × 2–3 mm, outer ones smaller, densely yellowish brown puberulent, reflexed; fruiting pedicel ca. 1.5 mm thick. Fr. May.

• Evergreen broad-leaved forests. SE Yunnan.

**42. *Machilus ichangensis*** Rehder & E. H. Wilson in Sargent, Pl. Wilson. 2: 621. 1916.

宜昌润楠 yi chang run nan

Trees, 7–15 m tall. Branchlets slender, glabrous. Terminal buds subglobose; bud scales suborbicular, grayish white deciduous pubescent outside, margin usually densely ciliate. Petiole slender, 8–20(–25) mm; leaf blade oblong-lanceolate to oblong-oblanceolate, 10–24 × 2–6 cm, usually ca. 16 × 4 cm, thickly

papery, abaxially appressed sericeous or glabrous, adaxially glabrous, midrib abaxially conspicuously elevated, adaxially concave, lateral veins slender, 12–17 pairs, abaxially more conspicuous than adaxially, veinlets slightly conspicuous on both surfaces, sometimes foveolate adaxially, base cuneate, apex shortly acuminate. Panicles arising at base of 1-year-old branchlet, 5–18 cm, grayish yellow appressed sericeous or glabrate; peduncle 2.2–5 cm, branched ca. at middle. Pedicel 5–7(–9) mm, appressed sericeous. Flowers white, 5–6 mm. Perianth lobes appressed sericeous on both surfaces, outer ones more narrow. Stamens shorter than perianth, glabrous; glands of 3rd series stipitate. Ovary glabrous. Fruit subglobose, ca. 1 cm in diam. Fl. Apr, fr. Aug.

• Mountain slopes, open forests in valleys, mixed broad-leaved forests; 600–1400 m. W Gansu, N Guangxi, SE Guizhou, Hubei, S Hunan, S Shaanxi, Sichuan.

- 1a. Young leaf blade ± hairy abaxially; inflorescences 5–9 cm ..... 42a. var. *ichangensis*  
 1b. Young leaf blade glabrous on both surfaces; inflorescences longer, 11–18 cm ..... 42b. var. *leiophylla*

**42a. *Machilus ichangensis* var. *ichangensis***

宜昌润楠(原变种) yi chang run nan (yuan bian zhong)

*Persea ichangensis* (Rehder & E. H. Wilson) Kostermans.

Young leaf blade ± hairy abaxially. Inflorescences 5–9 cm.

• Mountain slopes, open forests in valleys; 600–1400 m. W Gansu, Hubei, S Shaanxi, Sichuan.

**42b. *Machilus ichangensis* var. *leiophylla*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 58: 146. 1921.

滑叶润楠 hua ye run nan

Young leaf blade glabrous on both surfaces. Inflorescences 11–18 cm.

• Mixed broad-leaved forests; 800–1000 m. N Guangxi, SE Guizhou, S Hunan.

**43. *Machilus lichuanensis*** W. C. Cheng ex S. K. Lee et al., Acta Phytotax. Sin. 17(2): 51. 1979.

利川润楠 li chuan run nan

*Persea lichuanensis* (W. C. Cheng ex S. K. Lee et al.) Kostermans.

Large trees, to 32 m tall; trunk ca. 1.2 m d.b.h. Branchlets lenticellate, branchlets and young shoot densely brownish villous; 1-year-old branchlet ferruginous tomentose. Terminal buds ovoid or ovoid-globose; bud scales ferruginous tomentose. Petiole slender, 1–1.3(–2) cm, densely brownish villous, glabrate later; leaf blade elliptic or narrowly oblanceolate, 7.5–11(–15) × 2–4(–5) cm, leathery, abaxially densely brownish villous initially, sparsely pubescent except for midrib and lateral veins later, adaxially sparsely brownish villous but densely villous along midrib and lateral veins when young, becoming glabrate to glabrous later, midrib elevated abaxially, concave adaxially, lateral veins 8–12 pairs, slightly conspicuous, base cune-

ate, apex shortly acuminate to acute. Cymose panicles on lower part of 1-year-old branchlet, 4–10 cm, branched at middle or upper part of peduncle, densely brownish villous. Perianth lobes equal, ca. 4 mm, densely pubescent on both surfaces. Filaments glabrous. Infructescence 5–10 cm, puberulent. Fruit compressed globose, ca. 7 mm in diam. Fl. May, fr. Sep.

• Mountain slopes, mixed broad-leaved forests; ca. 800 m. Guangdong, N Guizhou, W Hubei, Hunan, Sichuan.

**44. *Machilus minkweiensis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 52. 1979 [*“mikweiensis”*].

闽桂润楠 min gui run nan

*Persea minkweiensis* (S. K. Lee) Kostermans.

Trees, 5–14 m tall. Lower part of 1-year-old branchlet and shortened branchlet puberulent only, with sparse small lenticels. Buds small, densely dirty yellowish pubescent. Leaves congested on upper part of branchlet; petiole slender, 1.2–1.6(–2.2) cm, glabrous; leaf blade abaxially brownish, adaxially shiny, obovate or obovate-elliptic, 8–14 × 2.8–6.3 cm, thinly leathery, abaxially densely or sparsely pubescent, midrib elevated abaxially, concave adaxially, lateral veins 8–10 pairs, adaxially inconspicuous, veinlets slender, foveolate on both surfaces, base cuneate, apex shortly cuspidate or acute-acuminate, summit obtuse. Flowers unknown. Infructescences paniculate, arising from lower part of 1-year-old branchlet, 8–15 cm, puberulent, branched at upper part of peduncle; peduncle 4–8 cm. Fruit deep green when immature, globose, ca. 7 mm in diam.; persistent perianth lobes oblong, ca. 4 mm, outer ones shorter, puberulent on both surfaces; fruiting pedicel 6–8 mm. Fr. May.

Mountain slopes, open forests, mixed forests, valleys, streamsides. Fujian, Guangdong, Guangxi [Vietnam].

The spelling of the specific epithet, which derives from “闽桂” transliterated as “min kwei” (“min gui” in pinyin), meaning Fujian and Guangxi provinces, was corrected from “*mikweiensis*” to “*minkweiensis*” by S. K. Lee in FRPS (31: 48. 1982).

**45. *Machilus fukienensis*** Hung T. Chang ex S. K. Lee et al., Acta Phytotax. Sin. 17(2): 52. 1979.

闽润楠 min run nan

*Persea fukienensis* (Hung T. Chang ex S. K. Lee et al.) Kostermans.

Small trees, ca. 5 m tall. Branchlets pubescent; current year branchlets brownish tomentose. Terminal bud ferruginous tomentose. Leaves congested at apex of branchlet; petiole slender, 8–10 mm, pubescent; leaf blade elliptic to narrowly elliptic, 7–10.5 × 1.7–2.3 cm, thinly leathery, densely pubescent abaxially, puberulent becoming glabrate adaxially, midrib elevated abaxially, concave adaxially, lateral veins slender, 6–8 pairs, slightly conspicuous on both surfaces, veinlets densely reticulate, foveolate on both surfaces. Flowers unknown. Infructescences arising from lower part of 1-year-old branchlet, 7.5–11 cm, gray-white pubescent; peduncle 2.5–5 cm. Fruit 7–10 mm in diam.; persistent perianth lobes subequal, ca. 4 mm, pubescent on both surfaces; fruiting pedicel ca. 6 mm, gray-white pubescent. Fr. Jun.

• Hill slopes, thickets. Fujian.

**46. *Machilus grandibracteata*** S. K. Lee & F. N. Wei, Guihaia 4: 97. 1984.

大苞润楠 da bao run nan

*Persea grandibracteata* (S. K. Lee & F. N. Wei) Kostermans.

Trees, to 15 m tall. Branchlets terete, glabrous, older branchlet with leaf scars. Petiole ca. 1.5 cm, glabrous; leaf blade castaneous when dry, elliptic or obovate, 7–11 × 2–5 cm, thickly leathery, abaxially puberulent, adaxially glabrous, midrib adaxially concave, lateral veins 9–11 pairs, slender, visible on both surfaces, base cuneate, apex acute. Panicles terminal, ca. 6 cm, gray-white pubescent, many flowered; involucre bracts large, boat-shaped, 3–3.5 × 1.5–2 cm, densely appressed sericeous outside. Perianth lobes ovate, ca. 3 mm, sparsely pubescent on both surfaces. Filaments glabrous except for base; glands of 3rd series cordate, stipitate. Staminodes sagittate, puberulent. Ovary ovoid; stigma capitate. Fruit unknown. Fl. Feb.

Mixed forests. SW Guangxi [Vietnam].

**47. *Machilus longipes*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 20. 1960.

东莞润楠 dong guan run nan

*Persea pedicellata* Kostermans.

Shrubs, ca. 2 m tall. Young branchlets puberulent to glabrate. Petiole 6–10 mm; leaf blade abaxially slightly grayish white, oblong or narrowly elliptic, 10–15 × 2.5–4.8 cm, papery or thinly leathery, glabrous on both surfaces, lateral veins 7–9 pairs, visible on both surfaces, veinlets inconspicuous abaxially, somewhat conspicuous adaxially. Panicles on lower part of 1-year-old branchlet, 7–11 cm, hairy, branched at upper part of peduncle; peduncle 5–7 cm. Pedicel 8–12 mm. Flowers yellowish. Perianth lobes lanceolate, 4–5 mm, pubescent on both surfaces. Stamens shorter than perianth; glands of 3rd series stipitate. Staminodes triangular. Ovary ovoid; style shorter than stamens. Fruit unknown. Fl. Mar.

• Guangdong (Dongguan).

**48. *Machilus austroguizhouensis*** S. K. Lee & F. N. Wei, Guihaia 4: 95. 1984 [*“austro-guizhouensis”*].

黔南润楠 qian nan run nan

*Persea austroguizhouensis* (S. K. Lee & F. N. Wei) Kostermans.

Trees, ca. 10 m tall. Branchlets glabrous. Winter buds ovoid; bud scales orbicular or ovate, densely appressed brownish sericeous. Petiole 1.5–3 cm, glabrous; leaf blade shiny on both surfaces, lanceolate or oblanceolate, 10–20 × 2–4(–5) cm, thickly leathery, glabrous on both surfaces, midrib thick, elevated abaxially, impressed adaxially, lateral veins 12–15 pairs, conspicuously elevated abaxially, base cuneate, apex caudate-acuminate. Infructescences arising from base of newly sprouted branchlet, ca. 5 cm. Fruit ovoid, ca. 1.5 cm × 8 mm; persistent perianth lobes subequal, oblong, 5–6 × ca. 2.5

mm, puberulent on both surfaces; fruiting pedicel ca. 8 mm, thickened. Fr. Aug.

- Mountain slopes, mixed forests. Guangxi (Napo), Guizhou.

**49. *Machilus kurzii*** King ex J. D. Hooker, Fl. Brit. India 5: 860. 1890.

秃枝润楠 tu zhi run nan

*Persea kurzii* (King ex J. D. Hooker) Kostermans.

Trees. Branchlets and young leaves glabrous. Petiole slender, 5–15 mm; leaf blade glaucous abaxially, obovate or oblanceolate to oblong, thinly leathery, lateral veins 10–12 pairs, inconspicuous, base cuneate, apex acute to acuminate. Inflorescences densely filiform hairy. Perianth linear-oblong, filiform hairy on both surfaces. Filaments subglabrous. Fruit ca. 1.3 cm in diam.

Mountain slopes, evergreen broad-leaved forests; 1500–2000 m. Yunnan (Gongshan) [N Myanmar].

**50. *Machilus chekiangensis*** S. K. Lee, Acta Phytotax. Sin. 17(2): 53. 1979.

浙江润楠 zhe jiang run nan

*Machilus longipedunculata* S. K. Lee & F. N. Wei; *Persea chekiangensis* (S. K. Lee) Kostermans; *P. longipedunculata* (S. K. Lee & F. N. Wei) Kostermans.

Trees, 4–10 m tall. Bark brownish. Branchlets glabrous. Leaves usually congested at apex of branchlet; petiole 8–15 mm, glabrous; leaf blade oblanceolate or elliptic to elliptic-lanceolate, leathery, abaxially glabrous, rarely appressed puberulent, adaxially glabrous, midrib abaxially elevated, adaxially somewhat impressed, lateral veins 10–12 pairs, veinlets slender, slightly foveolate on both surfaces, base attenuate, apex usually abruptly cuspidate, rarely acuminate, summit obtuse. Panicles arising from base of newly sprouted branchlet, gray pubescent or glabrate, variable in length, 7–18 cm; peduncle (3–)5.5–11 cm, slender to lignescens. Flowers yellowish green, ca. 4 mm. Perianth lobes subequal to equal, oblong (when dry), ca. 4 × 1.2 mm, pubescent on both surfaces. Filaments glabrous or sparsely puberulent at base; glands of 3rd series sessile. Staminodes sagittate, hairy at base. Ovary ovoid. Fruit globose, ca. 7 mm in diam.; persistent perianth gray pubescent on both surfaces; fruiting pedicel together with peduncle purplish red when fresh. Fl. Feb, fr. Apr–May.

- Mixed broad-leaved forests. Fujian, Hong Kong, Zhejiang.

**51. *Machilus duthiei*** King ex J. D. Hooker, Fl. Brit. India 5: 861. 1890.

长梗润楠 chang geng run nan

*Persea duthiei* (King ex J. D. Hooker) Kostermans.

Trees, usually 3–8 m tall, sometimes up to 30 m; trunk 25–30(–50) cm d.b.h. Branchlets glabrous. Petiole 1–2 cm, glabrous; leaf blade oblong or elliptic-lanceolate to obovate-lanceolate, 6.5–20 × 2.5–5 cm, leathery, abaxially slightly sericeous-puberulent when young, glabrous on both surfaces when old, midrib abaxially elevated, adaxially impressed, lateral

veins 12–18 pairs, ± conspicuous on both surfaces, veinlets slightly foveolate on both surfaces, base attenuate, apex acuminate to long acuminate, summit usually falcate. Cymose panicles arising from lower part of current year branchlet, 5–13 cm; peduncle 3–6 cm, sericeous-puberulent. Pedicel 8–12 mm. Flowers yellowish green, 6–7 mm. Perianth lobes oblong, sericeous-puberulent on both surfaces. Filaments of perfect stamens pubescent at base; glands of 3rd series stipitate. Staminodes ca. 2.5 mm, pubescent. Ovary globose, glabrous; style slender, to 3.5 mm. Fruit globose, ca. 7 mm in diam.; fruiting pedicel puberulent. Fl. May–Jun, fr. Aug–Oct.

Mountain valleys, mixed forests. SW Sichuan, S Xizang, C and NW Yunnan [Bhutan, India, Kashmir, Nepal].

This species was misidentified in FRPS (31: 49. 1982) as *Machilus longipedicellata* Lecomte. The present authors treat *M. longipedicellata* as a synonym of *M. yunnanensis* var. *yunnanensis*.

**52. *Machilus fasciculata*** H. W. Li, Acta Phytotax. Sin. 17(2): 53. 1979.

簇序润楠 cu xu run nan

*Persea fasciculata* (H. W. Li) Kostermans.

Shrubs to small trees, 3–10 m tall. Current year branchlets ± angular, longitudinally striate, yellowish brown puberulent. Petiole 0.5–1 cm, slightly yellowish brown puberulent; leaf blade abaxially farinose green, variable in shape, ovate, elliptic to oblong, or sublanceolate, 6–15 × 1.7–5(–6.5) cm, subleathery, abaxially yellowish brown appressed puberulent, midrib abaxially conspicuously elevated, adaxially concave, lateral veins 7–12 pairs, veinlets visible, base cuneate, apex shortly acuminate, sometimes acute or obtuse. Panicles terminal, short, 1.5–3(–6) cm, sericeous-puberulent; involucre bracts usually persistent in flowering stage, broadly ovate or suborbicular, densely yellowish brown sericeous-puberulent, apex obtuse. Pedicel 3–4 mm, yellowish brown puberulent. Flowers light green or yellowish. Perianth lobes subequal, ovate-oblong, hairy on both surfaces. Stamens yellowish brown pubescent at base; glands of 3rd series shortly stipitate. Staminodes hairy. Ovary subglobose; style longer than ovary. Fruit unknown. Fl. Feb.

- Evergreen mixed broad-leaved forests; ca. 1000 m. SW Guangxi, SE Yunnan.

**53. *Machilus foonchewii*** S. K. Lee, Acta Phytotax. Sin. 8: 183. 1963.

琼桂润楠 qiong gui run nan

*Persea foonchewii* (S. K. Lee) Kostermans.

Trees, up to 12 m tall. Bark brownish or brownish red. Branchlets brownish or gray-brown, glabrous. Terminal buds ovoid or globose; bud scales densely puberulent outside, margin ciliate, apex suborbicular. Leaves usually congested at apex of branchlet; petiole slender, 5–10 mm, glabrous; leaf blade abaxially glaucous or gray-blue, obovate-elliptic to oblanceolate, 4–10 × 2–4 cm, leathery, abaxially glabrate, adaxially glabrous, midrib abaxially conspicuously elevated, adaxially concave, lateral veins 8–12 pairs, foveolate on both surfaces, base cuneate, slightly decurrent, apex obtuse or shortly acute-acuminate.

Panicles terminal, ca. 1 cm, sometimes almost fasciculate. Pedicel ca. 5 mm, upper half sericeous. Flowers green or greenish yellow, ca. 3 mm. Perianth lobes subequal, puberulent on both surfaces. Stamens 2–3 mm, those of 1st and 2nd series glabrous, those of 3rd series hairy at base, with shortly stipitate glands. Staminodes sagittate. Ovary glabrous; stigma dishlike. Fruit globose, ca. 1 cm in diam.; persistent perianth slightly enlarged; fruiting pedicel reddish when fresh, sparsely sericeous. Fl. Oct, fr. Oct–Dec.

- Valleys, thickets. Guangxi, Hainan.

**54. *Machilus shiwandashanica*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 19. 1960.

十万大山润楠 shi wan da shan run nan

*Persea shiwandashanica* (Hung T. Chang) Kostermans.

Shrubs, ca. 1.6 m tall. Young branchlets glabrous, older branchlets gray-brown. Petiole compressed, 6–10 mm; leaf blade castaneous when dry, obovate-oblong or oblong-oblancoolate, 5–13 × 2–5.5 cm, leathery, glabrous on both surfaces or abaxially puberulent when young, midrib abaxially elevated, adaxially impressed, lateral veins 7–9(–11) pairs, together with reticulate veinlets most conspicuous, foveolate on both surfaces, base attenuate, apex acuminate. Inflorescences terminal, umbel-like, 1–1.5 cm, glabrous, with 2–7 flowers; peduncle short, 1–4 mm. Pedicel 5–10 mm. Perianth lobes equal, oblong or lanceolate, ca. 4 mm, pubescent on both surfaces. Stamens ca. 3 mm; filaments of 3rd series hairy at base, with shortly stipitate glands. Staminodes triangular, glabrous. Ovary glabrous; style slender; stigma somewhat enlarged. Fruit unknown. Fl. Oct.

- Thickets. SW Guangxi.

This is a rare and endangered species apparently known only from the type gathering.

**55. *Machilus pyramidalis*** H. W. Li, Acta Phytotax. Sin. 17(2): 53. 1979.

塔序润楠 ta xu run nan

*Persea pyramidalis* (H. W. Li) Kostermans.

Shrubs or small trees, to 3 m tall. Terminal bud small, ovoid, ca. 5 mm; bud scales ovate or broadly ovate, golden yellow puberulent outside. Branchlets thick, terete, lenticellate, puberulent, later glabrate. Petiole 1–1.5 cm, slightly puberulent; leaf blade elliptic to oblong, 6–10 × 2–4 cm, leathery, abaxially slightly puberulent along midrib or glabrate, adaxially glabrous, midrib abaxially elevated, adaxially concave, lateral veins 6–8 pairs, conspicuous on both surfaces, veinlets foveolate on both surfaces, base cuneate, apex shortly acute-acuminate. Panicle subterminal, 5–8 cm, composed of 1–3-flowered cymes, pubescent, basal ramifications longest, 3.5–4.5 cm, gradually shorter toward inflorescence apex, pyramid-shaped, without peduncle. Perianth lobes oblong, outer ones smaller, inner ones longer, ca. 5 × 3 mm. Stamens pubescent at base only, those of 1st and 2nd series slightly short, those of 3rd series somewhat longer; glands shortly stipitate, sparsely hairy at base. Ovary subglobose; stigma as long as ovary. Fruit (im-

mature) globose, ca. 5 mm in diam.; fruiting pedicel thickened, summit to 2.5 mm in diam. Fr. Jun–Jul.

- Mountaintops, open forests. SE Yunnan.

**56. *Machilus versicolora*** S. K. Lee & F. N. Wei, Guihaia 4: 98. 1984.

黄枝润楠 huang zhi run nan

*Persea versicolora* (S. K. Lee & F. N. Wei) Kostermans.

Trees, to 30 m tall; trunk to 1 m d.b.h. Branchlets glabrous, yellowish or yellowish brown, conspicuously lenticellate. Petiole 1–2.5 cm, glabrous; leaf blade elliptic, 9–15 × 2.5–4.5 cm, leathery, abaxially appressed pubescent, adaxially glabrous, midrib abaxially elevated, adaxially concave, lateral veins 8–13 pairs, slender, conspicuous abaxially, base narrowly cuneate, apex acuminate. Inflorescences terminal, to 10 cm, usually 5–8 cm, puberulent. Perianth lobes ovate or suboblong, apex obtuse, pubescent on both surfaces, unequal, outer ones somewhat short, ca. 4 × 2 mm, inner ones ca. 5 × 2.2 mm. Filaments of 1st and 2nd series glabrous except for base; glands of 3rd series stipitate, hairy. Staminodes sagittate, hairy. Ovary ovoid; style slender. Fruit compressed globose, ca. 1 cm in diam.; fruiting pedicel slightly thickened, pubescent. Fl. Mar–Apr, fr. Jul–Aug.

- Mountain slopes or valleys, mixed forests. Fujian, Guangdong, Guangxi, Hunan, Jiangxi.

**57. *Machilus daozenensis*** Y. K. Li, Acta Phytotax. Sin. 22: 77. 1984.

道真润楠 dao zhen run nan

Trees, ca. 16 m tall; trunk ca. 80 cm d.b.h. Bark opaque brownish, dehiscent. Branchlets slender, hairy. Petiole 1–2.2 cm, pubescent; leaf blade narrowly lanceolate, 6.5–15 × 1.9–3.5 cm, thinly leathery, abaxially yellowish brown pubescent, adaxially glabrous, midrib abaxially elevated, lateral veins 10–15 pairs, together with veinlets adaxially concave, base cuneate, apex acuminate. Panicles subterminal, 5–12 cm, branched at above middle of peduncle, densely pubescent. Pedicel 5–6 mm. Perianth lobes oblong, 4–5 × ca. 1.6 mm, unequal, inner ones longer, densely pubescent on both surfaces. Stamens 3–3.5 mm; filaments sparsely white pubescent; glands of 3rd series stipitate. Ovary glabrous. Infructescences to 14 cm, pubescent. Fruit purple-black, compressed globose, 9–11 mm in diam.

- Mixed forests. Guizhou (Daozhen).

**58. *Machilus glaucescens*** (Nees) Wight, Icon. Pl. Ind. Orient. 5(2): 12. 1852.

柔毛润楠 rou mao run nan

*Ocotea glaucescens* Nees in Wallich, Pl. Asiat. Rar. 2: 71. 1831; *Laurus villosa* Roxburgh; *Machilus villosa* (Roxburgh) J. D. Hooker, nom. superfl.; *Persea glaucescens* (Nees) D. G. Long; *P. villosa* (Roxburgh) Kostermans; *Phoebe glaucescens* (Nees) Nees; *P. villosa* (Roxburgh) Wight.

Medium-sized to large trees, 8–22 m tall; trunk to 25 cm d.b.h. Branchlets blackish brown, first densely dirty yellowish pubescent, becoming glabrate, longitudinally striate. Petiole

5–20 mm, pubescent; leaf blade elliptic, elliptic-lanceolate to narrowly lanceolate, or oblanceolate, (6–)8.5–16(–21.5) × (1.5–)2.5–5.5 cm, leathery, abaxially densely yellowish brown pubescent and adaxially sparsely pubescent when young, abaxially sparsely pubescent and adaxially glabrate when old, midrib and lateral veins abaxially elevated, adaxially concave, lateral veins 6–8(–10) pairs, veinlets abaxially visible, somewhat foveolate. Cymose panicles subterminal, usually longer than leaf blade, (6.5–)11–18 cm, densely yellowish brown pubescent, branched at upper part of peduncle. Pedicel 3–10 mm. Flowers yellowish. Perianth lobes subequal, ovate or broadly ovate, densely yellowish brown pubescent on both surfaces. Stamens subequal, ca. 3 mm, pubescent; glands of 3rd series stipitate. Staminodes hairy. Ovary subglobose. Fruit globose, to 9 mm in diam.; fruiting pedicel somewhat thickened. Fl. Jan–Feb, fr. Mar.

Mountain valleys or slopes, open or dense forests. W Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal].

**59. *Machilus glaucifolia*** S. K. Lee & F. N. Wei, *Guihaia* 4: 98. 1984.

粉叶润楠 fen ye run nan

*Machilus lipoensis* C. S. Chao ex X. H. Song; *Persea glaucifolia* (S. K. Lee & F. N. Wei) Kostermans.

Trees, ca. 9 m tall. Branchlets slender, pubescent. Petiole 5–12 mm, glabrous; leaf blade abaxially glaucous, elliptic to ovate-elliptic, 8–12 × 2.5–4 cm, leathery, abaxially sparsely pubescent, adaxially glabrous, midrib abaxially elevated, adaxially impressed, lateral veins 8–10 pairs, slender, elevated on both surfaces, veinlets densely foveolate on both surfaces, base attenuate, apex acuminate. Panicles terminal or subterminal, ca. 5 cm, pubescent. Perianth lobes equal, ovate-oblong, ca. 5 × 2.5 mm, sparsely pubescent, apex obtuse. Fruit compressed globose, ca. 1 cm in diam.; fruiting pedicel ca. 6 mm, pubescent. Fr. Jun.

• Mountain slopes, mixed broad-leaved forests. NW Guangxi, SW Guizhou.

**60. *Machilus submultinervia*** Y. K. Li, *Acta Phytotax. Sin.* 22: 78. 1984.

册亨润楠 ce heng run nan

*Machilus pachyclada* D. Fang.

Trees, ca. 15 m tall. Branchlets thick, glabrous. Petiole 2–2.5 cm, glabrous; leaf blade lanceolate to oblong, rarely oblanceolate to elliptic-oblong, (11–)13–19(–29) × 2.5–4.5(–7.5) cm, leathery, abaxially sericeous-puberulent, adaxially glabrous, midrib thick, abaxially elevated, adaxially concave, lateral veins 15–18 pairs, base cuneate, apex acuminate. Flowers unknown. Inflorescences paniculate, subterminal, 4–10 cm; peduncle thick, branched at below middle. Fruit globose, 8–15 mm in diam.; persistent perianth lobes narrowly oblong, subequal, ca. 5 × 2 mm, sericeous-puberulent on both surfaces; fruiting pedicel 5–7 mm.

• Mixed forests. W Guangxi, SW Guizhou.

**61. *Machilus mangdangshanensis*** Q. F. Zheng, *Fl. Fujian.* 2: 393. 1985.

茫荡山润楠 mang dang shan run nan

Shrubs or small trees. One-year-old branchlets purplish brown; older branchlets blackish brown, glabrous. Petiole 1.4–2.6 cm, glabrous; leaf blade obovate-elliptic or oblanceolate-elliptic, 12–20 × 4–7 cm, thinly leathery, abaxially sparsely gray-yellow sericeous-puberulent to glabrate, adaxially glabrous, midrib elevated abaxially, concave adaxially, lateral veins 10–12 pairs, veinlets foveolate on both surfaces. Panicles terminal, 5–8 cm, gray-yellow pubescent, branched nearly at top of peduncle. Pedicel 4–5 mm. Flowers greenish yellow. Perianth lobes oblong, 6–7 × ca. 4 mm, outer ones more narrow, gray-yellow sericeous-puberulent on both surfaces. Stamens glabrous; glands of 3rd series stipitate. Staminodes sagittate. Ovary ovoid-globose; style longer than ovary. Fruit globose, 8–12 mm in diam.; persistent perianth lobes ca. 7 × 4 mm; fruiting pedicel ca. 5 mm.

• Mixed mountain forests. Fujian.

**62. *Machilus cicatricosa*** S. K. Lee, *Acta Phytotax. Sin.* 8: 182. 1963.

刻节润楠 ke jie run nan

*Persea cicatricosa* (S. K. Lee) Kostermans.

Trees, to 15 m tall; trunk to 35 cm d.b.h. Bark gray-brown. Branchlets black-brown, with conspicuous bud scale scars, glabrous. Bud scales gray-brown, sericeous-puberulent on center, glabrous near margin. Petiole slender, 1–1.6 cm; leaf blade elliptic to oblanceolate, 5–10.5 × 1.5–2.8 cm, thinly leathery, abaxially sparsely gray-white sericeous to glabrate, adaxially glabrous, midrib abaxially raised, adaxially concave, lateral veins slender, 12–14 pairs, inconspicuous, reticulate veinlets slender, slightly foveolate, base cuneate, apex acute or shortly acuminate. Panicles 2–4.5 cm, gray puberulent, branched near top of peduncle. Pedicel ca. 3 mm, sericeous-puberulent. Flowers green, fragrant. Perianth lobes subequal, densely gray-white sericeous. Stamens hairy at base; glands of 3rd series subsessile. Staminodes sagittate, hairy. Ovary globose. Fruit oblong, ca. 12 × 8 mm. Fl. May, fr. Jul–Oct.

Mixed broad-leaved forests. Hainan [Vietnam].

**63. *Machilus miaoshanensis*** F. N. Wei & C. Q. Lin, *Guihaia* 8: 305. 1988.

苗山润楠 miao shan run nan

Trees, ca. 15 m tall. Branchlets deeply castaneous, subterete, glabrous or glabrate, longitudinally striate when dry. Buds ovoid, sericeous. Petiole 1–1.5 cm, glabrous; leaf blade obovate or elliptic, 6–9 × 3.5–4.5 cm, thinly leathery, glabrous on both surfaces or pubescent abaxially, midrib elevated abaxially, concave adaxially, lateral veins slender, 6–9 pairs, somewhat conspicuous on both surfaces, veinlets foveolate, visible on both surfaces, base broadly cuneate, apex acute or acuminate. Panicles numerous, terminal or subterminal, 4–5 cm, gray pubescent. Perianth lobes ovate or elliptic, 3–3.5 × ca. 2 mm, inner ones long hairy. Filaments of 3rd series with stipitate

glands. Ovary subovoid. Surviving infructescences ca. 9 cm. Persistent perianth lobe conspicuously reflexed. Fl. Oct.

- Dense mountain forests. N Guangxi.

**64. *Machilus salicina*** Hance, J. Bot. 23: 327. 1885.

柳叶润楠 liu ye run nan

*Machilus salicina* var. *glabra* C. K. Allen ex Tanaka & Odashima; *Persea salicina* (Hance) Kostermans.

Shrubs, usually 3–5 m tall. Branchlets brownish, glabrous. Petiole 7–15 mm, glabrous; leaf blade narrowly lanceolate, 4–12(–16) × 1–2.5(–3.2) cm, thinly leathery, glabrous on both surfaces or abaxially appressed puberulent when young, midrib raised abaxially, plane adaxially, lateral veins 6–8(–11) pairs, inconspicuous or somewhat conspicuous on both surfaces, veinlets slightly foveolate, base attenuate, apex acuminate. Cymose panicles usually 3 cm, glabrous or sometimes puberulent. Pedicel 2–5 mm. Flowers yellowish. Perianth lobes oblong, sericeous on both surfaces. Stamens hairy at base; glands of 3rd series pubescent. Ovary subglobose. Infructescences 3.5–7.5 cm, sometimes to 14 cm, as long as leaf blade. Fruit globose, 7–10 mm in diam., purple-black when mature; fruiting pedicel reddish when fresh. Fl. Feb–Mar, fr. Apr–Jun.

Streamsides and riversides of low elevations. Guangdong, Guangxi, S Guizhou, Hainan, S Yunnan [Cambodia, Laos, Vietnam].

**65. *Machilus parabreviflora*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 17. 1960.

赛短花润楠 sai duan hua run nan

Shrubs, ca. 2 m tall. Branchlets glabrous. Terminal buds ovoid; bud scales densely yellowish brown appressed pubescent outside. Petiole 6–10 mm; leaf blade abaxially gray-white or yellowish brown, adaxially shiny when dry, narrowly oblanceolate, 6–11(–12) × 1–2(–2.7) cm, leathery, glabrous on both surfaces, midrib abaxially elevated, veinlets invisible on both surfaces. Panicles subterminal, 2–4 cm, glabrous or puberulent; peduncle 1–3 cm. Pedicel 3–5 mm. Perianth lobes conspicuously unequal, outer ones much shorter, puberulent on both surfaces. Stamens ca. 2 mm; filaments of 3rd series pubescent, with 2 sessile glands at base. Stamines sagittate, shortly stipitate. Ovary glabrous. Fruit globose, ca. 8 mm in diam.

- Lowland forests. S Guangxi.

**66. *Machilus breviflora*** (Benth) Hemsley, J. Linn. Soc., Bot. 26: 374. 1891.

短序润楠 duan xu run nan

*Alseodaphne breviflora* Benth, Fl. Hongk. 292. 1861; *Persea breviflora* (Benth) Pax.

Trees, ca. 8 m tall. Bark gray-brown. Branchlets glabrous. Terminal buds ovoid, ca. 5 mm; bud scales tomentose. Petiole 3–5 mm or less; leaf blade obovate to obovate-lanceolate, 4–5 × 1.5–2 cm, rarely more, glabrous on both surfaces, midrib raised abaxially, concave adaxially, lateral veins and veinlets slender, almost invisible, base attenuate, apex obtuse. Panicles terminal, 2–5 cm. Flowers green-white, 7–9 mm. Perianth lobes some-

what unequal, outer ones smaller, persistent in fruiting stage. Stamens slightly unequal in length, those of 1st and 2nd series ca. 2 mm, those of 3rd series longer; glands shortly stipitate. Stamines sagittate, stalked; stalk pubescent. Fruit globose, 8–10 mm in diam. Fl. Jul–Aug, fr. Oct–Dec.

- Mountain slopes or valleys, mixed broad-leaved forests, stream-sides. Guangdong, Guangxi, Hainan.

**67. *Machilus chinensis*** (Benth) Hemsley, J. Linn. Soc., Bot. 26: 374. 1891.

华润楠 hua run nan

*Alseodaphne chinensis* Benth, Hooker's J. Bot. Kew Gard. Misc. 5: 198. 1853; *Persea chinensis* (Benth) Pax.

Trees, 8–11 m tall. Branchlets glabrous. Terminal buds small; bud scales glabrous or sometimes with hairs. Petiole 6–14 mm; leaf blade obovate-oblong to oblong-oblanceolate, 5–8(–10) × 2–3(–4) cm, leathery, glabrous on both surfaces, midrib raised abaxially, concave adaxially, lateral veins ca. 8 pairs, reticulate veinlets foveolate on both surfaces, base attenuate, apex obtuse or shortly acuminate. Panicles usually terminal, ca. 3.5 cm, shorter than leaf blade, with 5–10 flowers, branched at upper part of peduncle. Pedicel ca. 3 mm. Flowers white. Perianth lobes slightly unequal, 3.5–4 × 1.8–2.5 mm, puberulent on both surfaces or sometimes glabrate outside. Stamens ca. 3.5 mm; glands of 3rd series almost sessile. Stamines hairy. Ovary globose. Fruit globose, 8–11 mm in diam.; perianth lobes caducous, rarely persistent in fruiting stage. Fl. Sep, fr. Feb.

Mountain slopes, open or dense mixed broad-leaved forests. Guangdong, Guangxi, Hainan [Vietnam].

**68. *Machilus lenticellata*** S. K. Lee & F. N. Wei, Guihaia 4: 97. 1984.

疣序润楠 you xu run nan

*Persea lenticellata* (S. K. Lee & F. N. Wei) Kostermans.

Trees, up to 14 m tall. Branchlets slender, terete, glabrous. Petiole 5–10 mm, glabrous; leaf blade abaxially gray-white, elliptic-oblanceolate, 7–11 × 2–3.5 cm, leathery, glabrous on both surfaces, midrib elevated abaxially, somewhat impressed or flat adaxially, lateral veins 10–13 pairs, thin, slightly visible on both surfaces, base attenuate, slightly decurrent, margin revolute. Infructescences usually terminal, ca. 4.5 cm, sparsely pubescent, conspicuously lenticellate. Fruit globose, 6–7 mm in diam.; persistent perianth lobes oblong, ca. 5 × 2.5 mm, pubescent on both surfaces. Fr. Dec.

- Mountain slopes, mixed broad-leaved forests. Guangxi (Pingnan, Zhaoping).

**69. *Machilus tenuipilis*** H. W. Li, Acta Phytotax. Sin. 17(2): 54. 1979.

细毛润楠 xi mao run nan

*Persea tenuipilis* (H. W. Li) Kostermans.

Trees, 8–20 m tall. One-year-old branchlets terete, gray-brown, with lenticels and large leaf scars, glabrous; current year shoots sparsely puberulent. Petiole 5–15 mm, glabrous; leaf

blade elliptic to oblong, 5.5–15 × 2–4.5 cm, firmly papery, glabrous on both surfaces, midrib raised abaxially, concave adaxially, lateral veins 8–12 pairs, slender, almost invisible on both surfaces, base cuneate, margin revolute, apex shortly acuminate. Panicles subterminal, 5.5–8(–11) cm, few flowered, yellowish puberulent; peduncle 2.5–3.5(–7) cm; bracts and bracteole densely yellowish puberulent. Flowers green-white, ca. 4.5 mm. Perianth lobes subequal, ovate-oblong, pale yellow puberulent on both surfaces, apex obtuse. Stamens sparsely white pubescent; glands of 3rd series shortly stipitate. Staminodes triangular-sagittate; stalks sparsely white pubescent. Ovary subglobose, glabrous. Fruit globose, 7–10 mm in diam., blue-black when mature; persistent perianth lobes membranous; fruiting pedicel thickened, ca. 2 mm in diam. Fl. Mar–Apr, fr. Aug–Sep.

- Mountains, open forests or thickets; 1400–2400 m. SW Yunnan.

**70. *Machilus reticulata*** K. M. Lan, Fl. Guizhou. 2: 674. 1986.

网脉润楠 wang mai run nan

Trees, 5–6 m tall. Branchlets glabrous, black-brown when dry. Petiole 1–2 cm; leaf blade oblong or oblong-lanceolate, 10–15.5 × 3–3.7 cm, rarely to 4 cm wide, leathery, glabrous on both surfaces, midrib elevated abaxially, flat or somewhat impressed adaxially, lateral veins 10 or 11 pairs, raised on both surfaces, veinlets slender, densely foveolate on both surfaces, base cuneate, apex long acuminate. Panicles terminal to subterminal, composed of 3–5-flowered cymes, 4–6.5 cm, yellowish white pubescent. Pedicel 1–2 mm, hairy. Flowers small. Perianth lobes oblong, ca. 2 mm, densely yellowish white pubescent outside, villous inside toward apex. Stamens ca. 2 mm, hairy at base; glands of 3rd series sessile. Staminodes sagittate. Ovary glabrous. Fruit not seen.

- Mountain slopes, broad-leaved forests. SW Guizhou.

**71. *Machilus melanophylla*** H. W. Li, Acta Phytotax. Sin. 17(2): 54. 1979.

暗叶润楠 an ye run nan

*Persea melanophylla* (H. W. Li) Kostermans.

Trees, ca. 15 m tall. Branchlets brownish, usually mixed with black spots, first yellowish brown puberulent, glabrate after. Buds small, densely yellowish brown tomentose. Petiole 1–1.2 cm, somewhat yellowish brown puberulent; leaf blade elliptic, 8–13 × 2.5–5 cm, leathery, sparsely yellowish puberulent abaxially, glabrous adaxially, midrib elevated abaxially, concave adaxially, lateral veins 8–10 pairs, raised abaxially, flat adaxially, veinlets densely reticulate, abaxially conspicuous, adaxially inconspicuous, base cuneate, apex shortly acuminate, summit obtuse. Panicles subterminal, 3.5–9 cm, branched at or above middle of peduncle, densely yellowish brown puberulent; peduncle 2.5–4 cm. Flowers not seen. Fruit ovoid-globose, ca. 2.2 × 1.8 cm; persistent perianth lobes unequal, apex acute, outer ones ca. 5 × 2 mm, inner ca. 8 × 1.8 mm, yellowish brown puberulent; fruiting pedicel thickened, ca. 2 mm in diam.

- Secondary forests, moist places. S Yunnan.

**72. *Machilus bonii*** Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 58, 102. 1913.

枇杷叶润楠 pi pa ye run nan

*Persea bonii* (Lecomte) Kostermans.

Trees, to 20 m tall. Branchlets somewhat angular, ± compressed when young, glabrous. Petiole 1–1.5 cm, glabrous; leaf blade obovate or oblanceolate, rarely narrowly obovate, 13–24 × 5.5–8(–10) cm, subleathery, ± densely yellowish brown pubescent abaxially, glabrous adaxially, midrib elevated abaxially, concave adaxially, lateral veins 14–16 pairs or more, abaxially raised, adaxially subflat, veinlets slightly densely reticulate, base cuneate, apex shortly acuminate. Inflorescences subterminal, 4–10 cm, ± yellowish brown pubescent; peduncle 2.5–4 cm; bracts sublanceolate, 7–10 × 3–4 mm, densely yellowish brown pubescent outside, glabrous inside. Perianth lobes unequal, hairy on both surfaces, outer ones smaller, ca. 5 × 1.5 mm, inner ones ca. 7 × 3 mm. Stamens hairy at base; glands of 3rd series shortly stipitate. Staminodes triangular-sagittate. Ovary glabrous. Fruit suboblong, ca. 2.8 × 1 cm. Fl. Apr, fr. Oct.

Limestone hills or acidic soil in sparse mountain forests; 800–1200 m. NW and SW Guangxi, SW Guizhou, SE Yunnan [Vietnam].

**73. *Machilus viridis*** Handel-Mazzetti, Symb. Sin. 7: 253. 1931.

绿叶润楠 lü ye run nan

*Persea viridis* (Handel-Mazzetti) Kostermans.

Small to large trees, 5–25 m tall; trunk 20 cm d.b.h. or more. Bark blackish gray or blackish gray-brown. Branchlets angular, slightly sericeous, becoming glabrate. Bud scales dirty yellowish sericeous. Petiole slender, 1–1.8 cm, somewhat sericeous; leaf blade glaucous abaxially when old, narrowly lanceolate, 7–17 × 1.8–3.5 cm, thinly leathery, densely golden yellow sericeous on both surfaces when young, becoming puberulent to glabrate, midrib elevated abaxially, slightly concave adaxially, lateral veins 5–10 pairs, veinlets densely foveolate on both surfaces, base cuneate, margin slightly revolute, apex usually long acuminate, occasionally obtuse. Panicles arising from base of young branchlet, 3–5 cm, with 3–6 flowers; peduncle 1.5–2.5(–4.5) cm; bracts and bracteoles sericeous. Pedicel as long as flower. Flowers pale yellow or yellowish green. Perianth lobes oblong, pubescent on both surfaces, outer ones smaller. Stamens subequal, those of 3rd series hairy at base; glands long stipitate. Staminodes villous at base. Ovary ca. 5 mm, glabrous. Fruit globose, 1.3–1.5 cm in diam., black or black-purple when mature; summit of fruiting pedicel ca. 2 mm in diam. Fl. May–Jun, fr. Sep–Nov.

• Mountain slopes or valleys, *Tsuga* forests, mixed broad-leaved forests, thickets; 2500–3000 m. SW Sichuan, NW Yunnan.

**74. *Machilus rufipes*** H. W. Li, Acta Phytotax. Sin. 17(2): 55. 1979.

红梗润楠 hong geng run nan

*Persea rufipes* (H. W. Li) Kostermans.

Trees, 10–25(–30) m tall; trunk to 40 cm d.b.h. Bark brownish. Branchlets gray-brown, thick, glabrous. Buds small, globose, ca. 7 mm wide; bud scales broadly ovate or suborbicular, apex slightly emarginate, densely yellowish brown pubes-

cent outside, margin long ciliate. Petiole 5–15 mm, glabrous; leaf blade abaxially pale green or glaucous, oblong, 8.5–20 × 1.5–4 cm, subleathery, abaxially densely golden yellow villous and adaxially glabrous when young, glabrous on both surfaces when old, midrib elevated abaxially, concave adaxially, lateral veins (15 or) 16–22 pairs, slightly conspicuous on both surfaces, veinlets inconspicuous, base cuneate, apex shortly or nearly long acuminate. Panicles 3.5–10 cm, composed from 1–3-flowered cymes; peduncle 1.5–3.3 cm, glabrous or glabrate. Pedicel to 6 mm. Flowers large, to 9 mm. Perianth lobes oblong, densely yellow-brown pubescent, outer ones smaller, 6–6.5 × ca. 2.5 mm, inner ones larger, ca. 7 × 3 mm. Stamens hairy, 5–5.2 mm; glands of 3rd series stipitate. Staminodes ca. 2 mm. Ovary ovoid, ca. 2 mm, glabrous. Fruit globose, 1.5–2(–2.7) cm, glabrous, purple-black when mature; fruiting pedicel enlarged to 3 mm in diam. Fl. Mar–Apr, fr. May–Sep.

• Mountain ridges, mossy forests, evergreen broad-leaved forests; 1500–2000 m. SE Xizang, S and SE Yunnan.

**75. *Machilus oculodracontis*** Chun, Acta Phytotax. Sin. 2: 168. 1953.

龙眼润楠 long yan run nan

*Persea oculodracontis* (Chun) Kostermans.

Trees, 10–18 m tall. Young branchlets and leaf blade puberulent; current year branchlets with conspicuous lenticels. Petiole 1–1.5 cm; leaf blade elliptic-oblongate or elliptic-lanceolate, 11–16 × 2–4 cm, midrib elevated abaxially, impressed adaxially, lateral veins 10–12 pairs, distant, veinlets densely reticulate, foveolate, base cuneate, decurrent, apex obtuse to broadly acute. Inflorescences arranged at apex of branchlet, sometimes solitary, 3–10.5 cm, farinaceous-puberulent. Pedicel slender, ca. 8 mm. Flowers yellowish green, ca. 6 mm. Perianth lobes oblong-elliptic, slightly unequal, puberulent on both surfaces. Stamens hairy at base; glands of 3rd series stipitate. Staminodes triangular-ovoid. Ovary ovoid, glabrous. Fruit globose, 1.8–2 cm in diam., blue-black when mature; fruiting pedicel ca. 5 mm, slightly enlarged. Fr. Oct–Dec.

• Mixed broad-leaved forests. Guangdong, S Jiangxi.

**76. *Machilus monticola*** S. K. Lee, Acta Phytotax. Sin. 8: 185. 1963.

尖峰润楠 jian feng run nan

*Persea monticola* (S. K. Lee) Kostermans.

Trees, up to 20 m tall. Branchlets gray-brown, glabrous. Leaves subopposite or subverticillate; petiole 1–1.2 cm, glabrous; leaf blade obovate, obovate-elliptic, or elliptic, 6–12.5 × 2–5.6 cm, leathery, glabrous on both surfaces, abaxially slightly glaucous, midrib abaxially raised, concave adaxially, lateral veins 5–7 pairs, veinlets inconspicuous on both surfaces, base attenuate, apex obtuse or subrounded. Panicles terminal, 2–7.5 cm, branched at middle of peduncle. Pedicel slender, 4–6 mm. Flowers white. Perianth lobes unequal, ovate, sparsely puberulent outside, densely pubescent inside. Stamens subequal. Staminodes triangular. Ovary ovoid, ca. 1 mm; style as long as ovary. Fruit globose, ca. 2 cm in diam.; fruiting pedicel ca. 5 mm, slightly enlarged. Fl. Oct, fr. Dec.

• Mountain valleys, mixed broad-leaved forests. Hainan.

**77. *Machilus velutinoides*** S. K. Lee & F. N. Wei, Guihaia 4: 101. 1984.

东兴润楠 dong xing run nan

*Persea velutinoides* (S. K. Lee & F. N. Wei) Kostermans.

Shrubs, ca. 1 m tall. Branchlets blackish, gray-black tomentose. Petiole 3–4 cm, black or gray-brown tomentose; leaf blade oblanceolate, 14–17 × 4–5 cm, abaxially densely gray-brown tomentose, adaxially glabrous, midrib raised abaxially, concave adaxially, lateral veins 11–17 pairs, conspicuously elevated abaxially, veinlets inconspicuous, base cuneate, apex caudate-acuminate. Inflorescences terminal, ca. 2.2 cm, with a few flowers; peduncle 1–1.2 cm. Pedicel 8–10 mm, gray-black tomentose or pubescent. Perianth lobes subequal, oblong, 5–6 × ca. 3 mm, sparsely pubescent on both surfaces. Fruit compressed globose, ca. 3.5 cm in diam.; fruiting pedicel slightly enlarged. Fr. Apr.

• Mountain slopes, mixed broad-leaved forests. S Guangxi.

**78. *Machilus shweliensis*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 170. 1921.

瑞丽润楠 rui li run nan

*Persea shweliensis* (W. W. Smith) Kostermans.

Shrubs to trees, 9–12 m tall. Branchlets blackish, glabrous, longitudinally striate. Petiole 1.5–1.8 cm; leaf blade abaxially glaucous-green, elliptic or elliptic-oblongate, usually 11–18 × 2.5–6 cm, leathery, glabrous on both surfaces, midrib conspicuously raised abaxially, concave adaxially, lateral veins 16–20 pairs, conspicuous on both surfaces, veinlets densely reticulate, slightly conspicuous or not, base cuneate, apex shortly acuminate. Inflorescences 6 or 7 in cymose panicles, 7–9 cm, with densely yellowish brown sericeous involucre bracts at base, branched ca. at middle of peduncle, glabrous or glabrate. Pedicel 3–5 mm. Perianth lobes lanceolate or narrowly elliptic, 4–6 mm, sericeous on both surfaces. Stamens pubescent; glands of 3rd series long stipitate. Ovary subglobose, ca. 1.5 mm in diam. Fruit globose, ca. 2.5 cm in diam.

• Mountain slope thickets or open forests; 1900–2400 m. W Yunnan.

**79. *Machilus pomifera*** (Kostermans) S. K. Lee, Acta Phytotax. Sin. 8: 186. 1963.

梨润楠 li run nan

*Persea pomifera* Kostermans, Reinwardtia 5: 394. 1961.

Trees, to 20 m tall. Branchlets gray-brown, glabrous, lenticellate, young branchlets sericeous. Terminal buds subglobose; bud scales brownish tomentose. Petiole 1–2.5 cm, sericeous to glabrate; leaf blade abaxially glaucous, elliptic, subobovate-elliptic, or oblanceolate, 5–12 × 2–5 cm, glabrous on both surfaces, midrib raised abaxially, slightly concave adaxially, lateral veins ca. 10 pairs, veinlets reticulate, inconspicuous. Panicles subterminal, to 9 cm, sparsely sericeous, with a few flowers. Flowers 3–4 mm. Perianth lobes equal, ca. 2 mm, sparsely sericeous. Stamens hairy; glands of 3rd series large, shortly sti-

tate. Staminodes sagittate, hairy. Ovary glabrous. Fruit globose, ca. 3 cm in diam.; fruiting pedicel somewhat enlarged, ca. 7 mm; persistent perianth lobes patent or reflexed. Fl. Jul–Sep, fr. Sep–Feb.

- Evergreen mixed broad-leaved forests. Hainan.

**80. *Machilus robusta*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 169. 1921.

粗壮润楠 cu zhuang run nan

*Machilus liangkhwangensis* Chun; *Persea liangkhwangensis* (Chun) Kostermans; *P. robusta* (W. W. Smith) Kostermans.

Trees, 15(–20) m tall; trunk to 40 cm d.b.h. Bark blackish gray, rough. Branchlets thick, terete, ± compressed and puberulent when young, becoming glabrate after, lenticellate. Buds small; bud scales light brown, densely puberulent outside. Petiole 2.5–5 cm; leaf blade sometimes slightly glaucous abaxially, elliptic to obovate-elliptic or suboblong, 10–20(–26) × (2.5–)5.5–8.5 cm, leathery, glabrous on both surfaces, midrib raised abaxially, reddish when fresh, concave adaxially, lateral veins (5–)7–9 pairs, distant, abaxially raised, adaxially subflat, veinlets reticulate, foveolate on both surfaces, base subrounded or broadly cuneate, apex subacute, sometimes shortly acuminate. Panicles terminal or subterminal, 4–12(–16) cm, much branched, many flowered; peduncle 2.5–11.5 cm, thick, compressed, reddish when fresh, densely pubescent, becoming glabrate. Pedicel 5–8 mm, pubescent, reddish when fresh. Flowers yellowish green or pale yellow, large, 7–8(–10) mm. Perianth lobes subequal, ovate-lanceolate, 6–7(–9) × 2–3(–3.5) mm, pubescent to glabrate on both surfaces. Stamens 6–7 mm, ± hairy at base; glands of 3rd series shortly stipitate. Staminodes glabrous. Ovary subglobose, ca. 2.5 mm, glabrous. Fruit globose, 2.5–3 cm in diam., blue-black when mature; fruiting pedicel thickened, 1–1.5 cm, to 3 mm in diam. Fl. Jan–Apr, fr. Apr–Jun.

Evergreen mixed broad-leaved forests, especially valleys; 600–2100 m. Guangdong, Guangxi, S Guizhou, Hainan, SE Xizang (Mêdog), S Yunnan [Myanmar].

**81. *Machilus verruculosa*** H. W. Li, Acta Phytotax. Sin. 17(2): 55. 1979.

疣枝润楠 you zhi run nan

*Persea verruculosa* (H. W. Li) Kostermans.

Trees, 4–10 m tall; trunk 6–15 cm d.b.h. One-year-old

branchlets gray-brown, subterete, verruculose, glabrous; current year shoots reddish brown, longitudinally striate, slightly yellowish brown puberulent. Petiole 1–1.5 cm, puberulent; leaf blade abaxially pale reddish brown and glaucous, adaxially reddish brown when dry, elliptic to oblong, 6–15.5 × 2–4.8 cm, firmly papery, abaxially densely yellowish puberulent, adaxially glabrous, midrib abaxially raised, adaxially concave, lateral veins 9–11 pairs, abaxially raised, veinlets reticulate, conspicuous on both surfaces, base cuneate, apex shortly acuminate, summit sharp. Panicles arising from near base of current year branchlet, 2.5–5.5 cm, with (5–)7–12 flowers, branched at or above middle of peduncle, densely yellowish puberulent; peduncle 0.9–4 cm. Flowers white, 2.5–3.5 mm. Perianth lobes subequal, ovate, densely yellowish puberulent on both surfaces. Filaments of 3rd series sparsely white pubescent; glands reniform, stipitate; stipe sparsely pubescent. Staminodes triangular-sagittate; stalks hairy. Ovary ovoid. Fruit globose, ca. 1.5 cm in diam., glabrous; fruiting pedicel ca. 1 mm in diam. Fl. Mar, fr. May–Jun.

Mountain ridges or valleys, evergreen broad-leaved forests; 1400–1800 m. SE Yunnan [Vietnam].

**82. *Machilus ovatiloba*** S. K. Lee, Acta Phytotax. Sin. 17(2): 56. 1979.

糙枝润楠 cao zhi run nan

*Persea ovatiloba* (S. K. Lee) Kostermans.

Trees, 15–20 m tall. Branchlets gray-brown, conspicuously lenticellate, rough; current year branchlets reddish brown, slender, compressed and angular, glabrous. Petiole 1–2 cm, glabrous; leaf blade abaxially ± glaucous, elliptic to oblong, 10.5–20 × 3.5–7 cm, firmly papery, abaxially appressed puberulent, adaxially glabrous, midrib abaxially raised, adaxially impressed, lateral veins 9–13 pairs, slender, veinlets adaxially densely reticulate, foveolate, base broadly cuneate, decurrent, sometimes oblique, apex acuminate, summit occasionally falcate. Flowers not seen. Inflorescences terminal, 12–15 cm, glabrous; peduncle compressed and angular, branched at middle or upper part of peduncle. Fruit globose, 2.3–3 cm in diam.; persistent perianth lobes subequal, ovate, ca. 3 mm, glabrous outside, sericeous inside; fruiting pedicel ca. 5 mm, angular, reddish when fresh.

• Mountain slopes, evergreen mixed forests; ca. 1100 m. SE Xizang (Mêdog).

#### Species incertae sedis

***Machilus holadena*** H. Liu, Laurac. Chine & Indochine, 54. 1932 [*“holadenus”*].

全腺润楠 quan xian run nan

Trees. Branchlets purple-brown, slender, ± angular, subglabrous. Terminal bud small; bud scales 3–5 mm. Leaves subopposite; petiole 1–1.5 cm; leaf blade dull abaxially, shiny adaxially, elliptic, 10–11 × 3.5–4.5 cm, leathery, glabrous on both surfaces, midrib and lateral veins conspicuous on both surfaces, lateral veins ca. 10 pairs, veinlets anastomosing, some-

what visible abaxially, base cuneate, apex acuminate, acumen ca. 1 cm. Cymose panicles few flowered, inserted on short shoots in upper leaf axils or in axils of deciduous bracts; short shoots 2.5–5 mm; peduncles 1.5–4.5 cm. Pedicel 5–10 mm (terminal one longer), glabrous. Flowers yellow. Perianth tube long; lobes (6–)9 or 12, oblong, equal, 3.5–5 mm, glabrous abaxially, pilose adaxially, glandular. Stamens 9 or 12, 3–4 mm, all 2-glandular; glands at middle part of filament, stipitate, sublan-ceolate; filaments pilose; anthers subovoid, 2(or 4)-celled. Staminodes 3, somewhat pilose, apex deltoid. Pistil 4.5–5 mm,

glabrous; ovary subovoid, almost covered by perianth tube, apex attenuate into a style 2.5–3 mm; stigma 3-lobed. Fruit unknown. Fl. May.

- Mountain slopes. Sichuan (Emei Shan), NE Yunnan.

Li Jie and Li Xiwen note that this species has subopposite leaves, a long perianth tube, (6–)9 or 12 perianth lobes, and mostly 2-celled (rarely 4-celled) anthers. They consider that it may perhaps be a species of *Beilschmiedia*, but they have not yet seen its fruit and therefore include it here as a species incertae sedis.

## 15. DEHAASIA Blume in Nees, Syst. Laur. 372. 1836 [*“Haasia”*].

莲桂属 *lian gui shu*

Li Xiwen (李锡文 *Li Hsi-wen*), Li Jie (李捷); Henk van der Werff

*Cyanodaphne* Blume.

Shrubs to small- or medium-sized trees. Bark usually white, smooth, papery, exfoliating easily; xylem yellow. Branchlets white, slender and rigid, with conspicuous leaf scars. Terminal buds small, with 1 or 2 small and acute caducous scales. Leaves clustered at apex of branchlet; leaf blade pinninerved, reticulate veins like those of *Beilschmiedia* but usually very fine and nearly foveolate. Panicle axillary, usually slender, many or few flowered, usually upright and branched at a right angle; bracts and bracteoles deciduous. Flowers small or minute, bisexual. Perianth tube developed; perianth lobes generally unequal, outer ones always smaller. Fertile stamens (3 or)9; filaments of 1st and 2nd whorls all glandless, those of 3rd whorl each with 2 small glands at base; anthers 2-celled, cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse to lateral-extrorse. Staminodes minute, not stalked, triangular, sometimes all absent. Ovary ovoid; style short; stigma subpeltate. Fruit black, shiny, usually ovoid, rarely globose, with fleshy exocarp; fruit stalk generally scarlet or yellow or green, fleshy-dilated, obconical, warty, apex nearly depressed and rarely with persistent perianth lobes.

About 35 species: Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam, with the center of diversity in W Malaysia; three species (two endemic) in China.

1a. Stamens of 1st and 2nd whorls always infertile and reduced to staminodes, only those of 3rd whorl fertile ..... 3. *D. incrassata*  
1b. Stamens of 1st and 2nd whorls all fertile.

- 2a. Leaf blade sublanceolate to oblanceolate-elliptic, 3.5–9 × 1.5–4 cm, apex shortly acuminate or obtuse, base attenuate and acute ..... 1. *D. hainanensis*  
2b. Leaf blade elliptic, 5–10 × 2.5–4.5 cm, apex acuminate, base acute ..... 2. *D. kwangtungensis*

**1. *Dehaasia hainanensis*** Kostermans, Bot. Jahrb. Syst. 93: 439. 1973.

莲桂 *lian gui*

Shrubs or small trees, up to 5 m tall, to 15 cm d.b.h. Branchlets yellow-white initially but soon grayed, slender, glabrous, warty, lenticellate, with distinctive leaf scars; young ones ± angled; innovation covered with long and finely appressed hairs. Leaves alternate; petiole brown, (0.5–)1–2.3 cm, concave-convex, glabrous; leaf blade glaucous abaxially when young but nearly concolorous on both surfaces when mature, shiny adaxially, suboblanceolate to oblanceolate-elliptic, 3.5–9 × 1.5–4 cm, thinly leathery, glabrous on both surfaces, midrib elevated abaxially, impressed on its lower part at least adaxially, lateral veins (7 or)8–10 pairs, oblique-patent, arcuately interconnected near leaf margin, veins and veinlets conspicuous and foveolate on both surfaces, base attenuate and acute, apex shortly acuminate or obtuse. Panicle axillary, up to 2.5 cm before anthesis, very slender, glabrous, few flowered, few branched or nearly unbranched; peduncle slender; bracts and bracteoles subulate, deciduous. Pedicels slender, up to 5 mm. Flowers small, glabrous, up to 1.5 mm. Perianth tube broadly obconical, 0.5–0.8 mm; perianth lobes 6, subequal, broadly ovate, thin, 1.2–1.5 × 1.2–1.3 mm. Fertile stamens 9, densely golden villous, ca. 0.8 mm (of 1st and 2nd whorls) or ca. 0.7 mm (of 3rd whorl); filaments of 3rd whorl each with 2 suborbicular-cordate glands at base, those of 1st and 2nd whorls glandless; anthers of 1st and 2nd whorls broadly ovoid, with 2

introrse cells, those of 3rd whorl ovoid-square, truncate at apex, with extrorse cells. Staminodes deltoid-conical, stalked, including stalk ca. 0.6 mm; stalk densely golden yellow villous. Ovary ovoid, including style ca. 1.2 mm; style slightly slender; stigma small and subpeltate. Fruit ovoid, ca. 1.2 mm; fruit stalk slightly thickened, ca. as long as fruit. Fl. Apr–Jun, fr. Jul–Oct.

- Dense forests, thickets. Hainan.

Records of *Dehaasia cairocan* (S. Vidal) C. K. Allen (*Beilschmiedia cairocan* S. Vidal) from China (e.g., in Fl. Hainan. 1: 275. 1964) are referable to *D. hainanensis*.

**2. *Dehaasia kwangtungensis*** Kostermans, Bot. Jahrb. Syst. 93: 461. 1973.

广东莲桂 *guang dong lian gui*

Trees, up to 6 m tall, to 15–20 cm d.b.h., glabrous on all parts. Branchlets gray-brown, slender, upright, smooth. Leaves alternate, clustered at apex of branchlet; petiole slender, 1–1.5 cm; leaf blade glaucous and opaque abaxially, green and shiny adaxially, elliptic, 5–10 × 2.5–4.5 cm, thinly leathery, midrib and lateral veins elevated on both surfaces, lateral veins 5 or 6 pairs, oblique-patent, base acute, apex acuminate. Panicle axillary, slender, 2.5–6 cm, unbranched or shortly branched. Pedicels slender, 3–5 mm, dilated into a perianth tube ca. 0.75 mm on top. Ovary glabrous. Fruit unknown. Fl. May–Jun, fr. Jul–Oct.

- Valleys. Guangdong.

**3. *Dehaasia incrassata*** (Jack) Kostermans, J. Sci. Res. (Jakarta) 1: 91. 1952.

腰果楠 yao guo nan

*Laurus incrassata* Jack, Malayan Misc. 2(7): 33. 1822; *Dehaasia lanyuensis* (C. E. Chang) Kostermans; *D. triandra* Merrill; *Endiandra lanyuensis* C. E. Chang.

Trees, 7–15 m tall. Branchlets grayish, terete, striate, glabrous. Leaves alternate; petiole ca. 2.5 cm, concave-convex; leaf blade elliptic or ovate-oblong, 10–13 × 5–7 cm, thinly leathery, glabrous on both surfaces, midrib conspicuously elevated abaxially, slightly impressed adaxially, lateral veins 8–10 pairs, elevated on both surfaces, arcuate-ascendant, reticulate veins and veinlets conspicuous, base cuneate or broadly cuneate, apex acute. Panicle axillary, inserted on nearby apex of branchlet, glabrous, blackish when dry; peduncle ca. 7 cm. Pedicels

slightly slender, ca. 3 mm; bracts small. Perianth tube campanulate; perianth lobes broadly ovate, ca. 1.2 × 1.4 mm, leathery, deciduous when in fruit, ciliolate on margin, acute at apex. Stamens adnate to perianth tube, those of 1st and 2nd whorls reduced to staminodes, spatulate, up to 1.1 mm, sparsely puberulent outside but densely tomentose on upper part inside, stamens of 3rd whorl fertile, ca. 1.3 mm, densely villous, each with 2 stalkless glands at base, anthers 2-celled, cells extrorse. Staminodes of innermost whorl subulate, densely tomentose. Ovary ovoid, partly immersed in perianth tube, ca. 1 mm, glabrous; style ca. 1.5 mm. Fruit oblong, ca. 4.5 × 2.5 cm, glabrous, blue-black when mature; fruit stalk dilated, red when mature. Seed large, with an orthotropous embryo. Fl. Feb–Mar, fr. May–Jun.

Thickets. S Taiwan (Lan Yu) [Indonesia, Malaysia, Philippines, Thailand].

## 16. CARYODAPHNOPSIS Airy Shaw, Bull. Misc. Inform. Kew 1940: 74. 1940.

椽果樟属 meng guo zhang shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Shrubs or small- to medium-sized trees. Branchlets terete, sometimes slightly angled and ± compressed tetragonous. Leaves opposite or subopposite, ovate to ovate-oblong, thinly leathery, trinerved or triplinerved, petiolate. Flowers bisexual, arranged into an axillary panicle always transversely oriented, narrow and elongate; bracts and bracteoles minute. Perianth tubes very short or almost absent; perianth lobes 6, deciduous, outer ones small, triangular, patent, inner ones very large, broadly triangular-ovate, valvate. Fertile stamens 9, or anthers clavate-oblong and filaments inconspicuous, or anthers square and filaments conspicuously complanate; anthers 4-celled or occasionally all 2-celled, or 2-celled in 1st and 2nd whorls and 4-celled in 3rd whorl; cells introrse in 1st and 2nd whorls, extrorse or lateral-extrorse in 3rd whorl; filaments of 1st and 2nd whorls glandless, those of 3rd whorl each with 2 subsessile glands at base. Staminodes 3, of innermost whorl, minute, sagittate, shortly stalked. Ovary ovoid; style short; stigma inconspicuously 2- or 3-lobed. Fruit shiny green, large, narrowly ellipsoid-globose or ellipsoid, pearlike, rigid; exocarp membranous; mesocarp fleshy and decayed; endocarp cartilaginous; fruit stalk ± thickened, dilated on top. Seed large, hard, like fruit in shape.

About 14 species: tropical Asia and tropical America; three species (one endemic) in China.

- 1a. Branchlets, petioles, and leaf blade abaxially densely rusty pubescent ..... 1. *C. laotica*  
 1b. Branchlets, petioles, and leaf blade abaxially glabrous or subglabrous.  
 2a. Inflorescence and perianth outside subglabrous or sparsely pubescent when young; flowers small, 2–3 mm in diam.; inner perianth lobes sparsely tomentulose inside ..... 2. *C. henryi*  
 2b. Inflorescence and perianth outside ± conspicuously pubescent or tomentulose; flowers large, (3.5–)4–5(–6) mm in diam.; inner perianth lobes densely tomentulose ..... 3. *C. tonkinensis*

**1. *Caryodaphnopsis laotica*** Airy Shaw, Kew Bull. 14: 250. 1960.

老挝椽果樟 lao wo meng guo zhang

Trees, 5–10 m tall. Branchlets brown, robust, terete, glabrous young ones slender, densely pubescent, striate. Leaves opposite or subopposite; petiole 0.8–2 cm, concave-convex, densely pubescent; leaf blade glaucous abaxially, dark brown adaxially, ovate-oblong, 9–19(–22) × (4.5–)5–10 cm, papery, densely pubescent abaxially, glabrous adaxially, trinerved or triplinerved, midrib slender, elevated abaxially, impressed adaxially, lateral veins 3 or 4 pairs, oblique, except basal ones nearly straight and excurrent into upper 1/2 of leaf blade or above, basal lateral veins arising at or up to 6 mm above leaf base, other lateral veins arising from midrib near middle or above, generally alternate, rarely subopposite, very arcuate and evanescent near leaf margin, transverse veins arising from lateral veins

and interconnected by veinlets, all veins elevated abaxially, base broadly cuneate to subrounded, margin thickened, plane, or slightly involute, apex shortly acuminate or acuminate. Panicle axillary, narrow and slender, (3–)7–14 cm, densely rusty pubescent, shortly branched; branches opposite or subopposite, transversely oriented, terminal branchlet bearing a 3–7-flowered subcorymbose cyme; bracts and bracteoles minute, subulate, 1–2 mm, rusty pubescent. Pedicels slender, 1.5–2 mm, densely rusty pubescent. Flowers yellowish or yellow, ca. 3 mm in diam. when open. Perianth lobes 6, outer ones minute, triangular, less than 1 mm, pubescent outside, glabrous inside, inner ones large, broadly ovate-triangular, 2–2.5 × ca. 2 mm, slightly thickened, subacute, densely rusty appressed pubescent outside and densely rusty tomentulose inside. Fertile stamens 9; filaments villous, those of 3rd whorl each with 2 subsessile glands, others glandless; anthers ellipsoid-clavate or nearly oblong, always all 4-celled but sometimes all 2-celled, or 2-celled in 1st

and 2nd whorls and 4-celled in 3rd whorl; cells introrse in 1st and 2nd whorls and lateral or extrorse in 3rd whorl. Staminodes sagittate-triangular, shortly stalked, hairy. Ovary subglobose, glabrous; style short; stigma inconspicuously 3-lobed. Fruit unknown. Fl. Apr–May.

Secondary mixed forests, open thickets on roadsides; 300–1200 m. SE Yunnan [Laos, N Vietnam].

Records of *Caryodaphnopsis baviensis* (Lecomte) Airy Shaw (*Nothaphoebe baviensis* Lecomte) from Yunnan (e.g., in FRPS 31: 84. 1982) are referable to *C. laotica*.

**2. *Caryodaphnopsis henryi*** Airy Shaw, Bull. Misc. Inform. Kew 1940: 75. 1940.

小花椴果樟 xiao hua meng guo zhang

*Nothaphoebe tonkinensis* Lecomte f. *brevipedicellata* H. Liu; *Persea henryi* (Airy Shaw) Kostermans.

Small trees, 3–4.5 m tall. Branchlets slender, terete or slightly angled, ca. 3.5 mm in diam., sparsely lenticellate. Leaves opposite or subopposite; petiole 1–1.2 cm, ca. 1.5 mm in diam., plano-convex, subglabrous; leaf blade glaucous abaxially, dark brown adaxially, ovate or elliptic-oblong, 9–15 × 4.5–6.5 cm, papery, glabrous on both surfaces, triplinerved, midrib slightly elevated abaxially, subplane adaxially, lateral veins 3 or 4 pairs, basal lateral veins arising from midrib ca. 5 mm above leaf base, oblique and excurrent into upper 1/2 of leaf blade, other lateral veins arising from midrib at first 1/3 of leaf blade or more, arcuate-ascendant and evanescent within leaf margin, transverse veins horizontally arising from lateral veins and interconnected by veinlets, base very rounded, rarely shallowly cordate or subcuneate, margin thickened, plane, or involute, apex shortly acuminate or acute. Panicle axillary, 4–7 cm, slender, branched; branches subopposite, 0.5–6 cm, terminal one bearing a 6–8-flowered cyme; rachis and inflorescence branchlets sparsely rusty pubescent when young but subglabrous when mature; bracts and bracteoles brown, minute, triangular-ovate, ca. 1.4 mm, sparsely rusty pubescent. Pedicels 2–3 mm, sparsely rusty pubescent. Flowers small, 2–3 mm in diam. when open. Perianth lobes 6, outer ones minute, triangular, less than 0.4 mm, inner ones broadly triangular-ovate, ca. 2 × 2 mm, subacute, pubescent outside, sparsely yellowish brown pubescent inside. Fertile stamens 9, ca. 1 mm in 1st and 2nd whorl, ca. 1.5 mm in 3rd whorl; filaments pubescent, those of 3rd whorl each with 2 glands at base. Staminodes sagittate, ca. 0.8 mm, stalked, glabrous except stalk pubescent. Ovary ovoid, glabrous, attenuate at apex into a style, including style ca. 1 mm; stigma small. Fruit unknown. Fl. May.

• Sparse forests on mountain slopes, forest margins; ca. 2100 m. SE Yunnan.

**3. *Caryodaphnopsis tonkinensis*** (Lecomte) Airy Shaw, Bull. Misc. Inform. Kew 1940: 75. 1940.

椴果樟 meng guo zhang

*Nothaphoebe tonkinensis* Lecomte, Nouv. Arch. Mus. Hist. Nat., sér. 5, 5: 106. 1913; *Caryodaphnopsis latifolia* W. T. Wang; *N. pyriformis* (Elmer) Merrill; *Persea pyriformis* Elmer; *P. tonkinensis* (Lecomte) Kostermans.

Small- or medium-sized trees, 3–8(–15) m tall, up to 30 cm d.b.h. Branchlets brownish, terete, glabrous, striate, sometimes angled. Leaves opposite or subopposite; petiole 0.8–2 cm, slender, concave-convex, glabrous or sparsely brown villous; leaf blade glaucous abaxially, dark brown adaxially, ovate-oblong, elliptic, or orbicular-elliptic, rarely oblong, (10–)15–20(–30) × (4.5–)8–10(–17) cm, papery, glabrous on both surfaces, triplinerved, midrib slender, elevated abaxially, impressed adaxially, lateral veins 3 or 4 pairs, basal ones arising from midrib 3–15 mm above leaf base, straight and excurrent into upper 1/2 of leaf blade, other lateral veins arising from midrib at middle of leaf blade or above, always alternate, rarely subopposite, very arcuate and interconnected at ends, transverse veins arising from lateral veins and interconnected by veinlets, all veins slender and elevated abaxially, base attenuate or broadly cuneate to subrounded, margin thickened, plane, or slightly involute, apex obtusely shortly acuminate or acuminate. Panicle narrow and slender, (3–)4–13(–25) cm, axillary or subterminal, shortly branched; branches opposite or subopposite, transversely oriented, 0.6–6 cm, ± yellowish brown pubescent, rebranched or not, terminal branchlet bearing a 3–7-flowered corymbose cyme; bracts and bracteoles subulate, 1–2 mm, yellowish brown pubescent. Pedicels slender, 2–5 mm, sparsely pubescent. Flowers white or white-green, (3.5–)4–5(–6) mm in diam. when open. Perianth lobes 6, pubescent outside, yellow or brown tomentulose inside, outer ones small, triangular, 1–1.2 mm, inner ones large, (1.7–)2.5–3.5 × (2–)2.5–3 mm. Fertile stamens 9, 1.5–1.8 mm in 1st and 2nd whorls and ca. 1.2 mm in 3rd whorl; filaments villous, those of 3rd whorl each with 2 glands, others glandless; anthers of 1st and 2nd whorls clavate-oblong, with 2 upper introrse cells and 2 lower larger and always lateral cells, those of 3rd whorl oblong, with 4 sublateral cells. Staminodes sagittate-triangular, 0.7–1 mm, shortly stalked. Ovary ovoid, ca. 1 mm; style very short; stigma inconspicuous. Fruit narrowly ellipsoid-globose or ellipsoid, ca. 7 × 5 cm, broadly cuneate and abruptly contracted into a short stalk at base, apex rounded; exocarp membranous, ca. 0.5 mm thick; mesocarp fleshy and decayed; endocarp cartilaginous; fruit stalk 2–8 × ca. 2.5 mm. Seed 1, hard, like fruit in shape. Fl. Mar–Jun, fr. Jun–Aug.

Sparse valley forests, roadsides at forest margins; 100–1200 m. S Yunnan [Malaysia, Philippines, N Vietnam].

**17. PERSEA** Miller, Gard. Dict. Abr., ed. 4, [1030]. 1754, nom. cons.

鳄梨属 e li shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Evergreen trees or shrubs. Leaves papery to thickly leathery, pinninerved, ± pubescent. Cymose panicle axillary or subterminal, composed of pedunculate cymes or rarely subumbels, bracteate and bracteolate. Flowers bisexual, pedicellate. Perianth tube short; perianth lobes 6, subequal or outer 3 smaller, hairy, dilated after anthesis, caducous or persistent. Fertile stamens 9, in 3 whorls;

filaments filiform, complanate, pilose, those of 3rd whorl each with 2 glands at base, others glandless; anthers 4-celled, cells introrse in 1st and 2nd whorls, all extrorse or upper 2 cells lateral and lower 2 cells extrorse in 3rd whorl. Staminodes 3, of innermost whorl, sagittate-cordate, stalked; stalk pilose. Ovary ovoid; style slender, hairy; stigma discoid. Drupe fleshy, small and globose, or large and ovoid or pear-shaped; fruit stalk  $\pm$  dilated and fleshy, or terete.

About 50 species: mainly distributed in North and South America, only a few species distributed in SE Asia; one species (introduced) in China.

**1. *Persea americana*** Miller, Gard. Dict., ed. 8, *Persea*. 1768.

鳄梨 e li

*Laurus persea* Linnaeus, Sp. Pl. 1: 130. 1753; *Persea gratissima* C. F. Gaertner.

Evergreen trees, ca. 10 m tall. Bark gray-green, longitudinally fissured. Leaves alternate; petiole 2–5 cm, slightly sulcate adaxially, sparsely pubescent; leaf blade usually somewhat glaucous abaxially, green adaxially, narrowly elliptic, elliptic, ovate, or obovate, 8–20  $\times$  5–12 cm, leathery, sparsely yellowish brown pubescent adaxially but very densely so abaxially when mature, midrib conspicuously elevated abaxially, impressed on lower part but plane on upper part adaxially, lateral veins 5–7 pairs, very elevated abaxially, slightly elevated adaxially, base cuneate or acute to subrounded, apex acute. Cymose panicles 8–14 cm, most of them inserted on lower part of branchlet, pedunculate; peduncle 4.5–7 cm, peduncle and rachis densely yellowish brown pubescent; bracts and bracteoles filiform, ca. 2 mm, densely yellowish brown pubescent. Pedicels up to 6 mm, densely yellowish brown pubescent. Flowers yellow-greenish,

5–6 mm. Perianth densely yellowish brown pubescent outside and inside; perianth tube obconical, ca. 1 mm; perianth lobes 6, oblong, 4–5 mm, obtuse, outer 3 smaller, all dilated after anthesis and caducous. Fertile stamens 9, ca. 4 mm; filaments filiform, complanate, densely pilose, those of 3rd whorl each with 2 complanate ovate and orange glands at base, others glandless; anthers 4-celled; cells introrse in 1st and 2nd whorls, extrorse in 3rd whorl. Staminodes 3, of innermost whorl, sagittate-cordate, ca. 0.6 mm, glabrous, stalked; stalk ca. 1.4 mm, pilose. Ovary ovoid, ca. 1.5 mm, densely pilose; style ca. 2.5 mm, densely pilose; stigma slightly dilated, discoid. Fruit yellow-green or reddish brown, large, usually pear-shaped, sometimes ovoid or globose, 8–18 cm; exocarp corky; mesocarp fleshy and edible. Fl. Feb–Mar, fr. Aug–Sep.

Cultivated on a small scale. Fujian (Fuzhou, Zhangzhou), Guangdong (Guangzhou, Shantou), Hainan (Haikou), Sichuan (Xichang), Taiwan, S Yunnan (Xishuangbanna) [native to tropical America; widely cultivated in tropical to warm-temperate regions elsewhere].

This species is a famous fruit tree (avocado).

**18. ALSEODAPHNE** Nees in Wallich, Pl. Asiat. Rar. 2: 61, 71. 1831.

油丹属 you dan shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Evergreen trees. Terminal buds scaly. Leaves alternate, always clustered near apex of branchlet, pinninerved, often turning black when dry. Inflorescence axillary, paniculate or racemose; bracts and bracteoles deciduous. Flowers bisexual, 3-merous. Perianth tube short; perianth lobes 6, subequal or outer 3 smaller, slightly dilated after anthesis but absent in fruit. Fertile stamens 9, in 3 whorls; filaments of 1st and 2nd whorls glandless, those of 3rd whorl each with 2 glands at base; anthers 4-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse or upper 2 lateral and lower 2 extrorse. Staminodes 3, of innermost whorl, very small, nearly sagittate. Ovary partly immersed into shallow perianth tube; style often as long as ovary; stigma small, inconspicuous, discoid. Fruit black or purplish black when mature, ovoid, oblong, or subglobose; fruit stalk red, green, or yellow, sometimes nearly cylindrical, fleshy, pulpy, always warty, truncate at apex.

Fifty species or more: Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; ten species (seven endemic) in China.

- 1a. Pedicels up to 10 mm; scales of terminal bud imbricate on margin ..... 1. *A. gracilis*  
 1b. Pedicels short, less than 8 mm; scales of terminal bud not imbricate on margin.  
 2a. Terminal bud large, ovoid, up to 2.5 cm; fruit large, oblong, up to 3 cm in diam. .... 2. *A. sichourensis*  
 2b. Terminal bud small, ovoid or globose, ca. 2 mm, usually inconspicuous; fruit oblate, globose, ovoid, or oblong, below 3 cm in diam. when it is oblate, globose, or ovoid, but up to 5 cm in diam. when it is oblong, in latter case terminal bud inconspicuous.  
 3a. Branchlets robust, ca. 7 mm in diam., wrinkled, with dense leaf scars near top; fruit stalk warty; fruit oblate ..... 3. *A. rugosa*  
 3b. Branchlets slender, below 3 mm in diam., not wrinkled; fruit stalk not conspicuously warty; fruit not oblate.  
 4a. Branchlets conspicuously gray when dry.  
 5a. Inflorescence brown pilose, 2–3(–4) cm ..... 6. *A. yunnanensis*  
 5b. Inflorescence glabrous, 3.5–8(–12) cm.  
 6a. Leaf blade narrowly elliptic, 6–10(–16)  $\times$  1.5–3.2(–4.2) cm, leathery, shallowly foveolate adaxially, lateral veins 12–17 pairs; fruiting pedicel 3–8 mm, not verrucose ..... 4. *A. hainanensis*

- 6b. Leaf blade oblong or oblanceolate-oblong, 5–13 × (0.8–)1.2–2.8 cm, papery, hardly foveolate on both surfaces, lateral veins 7 or 8 pairs; fruiting pedicel 5–7 mm, densely grayish linear verrucose ..... 5. *A. huanglianshanensis*
- 4b. Branchlets not gray when dry.
- 7a. Panicle much longer than leaf blade; leaf blade hairy abaxially.
- 8a. Leaf blade oblong or lanceolate-oblong, 6–14 × 2.2–3.8 cm, not foveolate on both surfaces, sparsely yellowish brown pubescent abaxially; fruit globose, up to 2.2 cm in diam. .... 7. *A. marlipoensis*
- 8b. Leaf blade oblong, 12–24 × 6–12 cm, conspicuously foveolate on both surfaces, rusty pubescent abaxially; fruit oblong, ca. 2.8 cm ..... 8. *A. andersonii*
- 7b. Panicle shorter than or as long as leaf blade; leaf blade glabrous abaxially.
- 9a. Branchlets, leaf blades, and panicles all glabrous; leaf blade elliptic to oblong, 10.5–17 × 4–6.5 cm, not green-white abaxially ..... 9. *A. hokouensis*
- 9b. Young part of branchlet as well as panicles densely brown tomentulose; leaf blade obovate-oblong or oblong, 14–26 × 6–15 cm, green-white abaxially when young ..... 10. *A. petiolaris*

**1. *Alseodaphne gracilis*** Kostermans, Candollea 28: 109. 1973.

细梗油丹 xi geng you dan

?Trees. Young branchlets white, shiny, elongate, slender, glabrous, few lenticellate. Scales of terminal bud fimbriate on margin. Leaves alternate, spirally arranged, somewhat clustered; petiole 5–20 mm, sulcate adaxially; leaf blade opaque abaxially, shiny adaxially, obovate to elliptic, 11–15 × 4.5–7.5 cm, densely and finely foveolate on both surfaces, midrib elevated on both surfaces, lateral veins slender, 13–16 pairs, elevated adaxially but slightly so abaxially, oblique and arcuate on margin, base cuneate, apex acuminate, acumen acute. Panicle axillary, up to 3 cm, few flowered, glabrous, unbranched or 2-branched; branches up to 1 cm. Pedicels very slender, up to 10 mm. Perianth tube very short; perianth lobes ovate, equal, ca. 2 mm, gray villous inside, slightly acute at apex. Fertile stamens 1–1.25 mm, sparsely pilose, basal glands of 3rd whorl stamens small; anthers large, ovoid-square, slightly longer than slender filaments. Staminodes slender. Ovary ovoid, glabrous; style short; stigma minute, subpeltate. Fruit unknown.

- Forests. SE Yunnan.

**2. *Alseodaphne sichouensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 70. 1979.

西畴油丹 xi chou you dan

Trees evergreen, up to 30 m tall, to 60 cm d.b.h. One-year-old branchlets red-brown, terete, 5–6 mm in diam., glabrous, with longitudinally fissured elevated corky and oblong lenticels and large suborbicular leaf scars; current year branchlets reddish, subterete, usually short, 4–10 cm, 4–5 mm in diam., glabrous, with densely clustered annular scale scars at base. Terminal buds large, ovoid, up to 2.5 cm; bud scales broadly ovate or suborbicular, apiculate at apex, always glabrous, except basal ones densely yellowish brown pubescent outside and on margin, densely imbricate. Leaves alternate, remote; petiole reddish, (1.7–)2–5 cm, plano-convex, glabrous; leaf blade greenish abaxially, green adaxially, oblong, 9–20 × 2.5–5.7 cm, subleathery, glabrous on both surfaces, midrib straight, extending to leaf apex, very elevated abaxially, slightly impressed on lower part but nearly plane on upper part adaxially, lateral veins ca. 12 pairs, arcuate, interconnected and evanescent near leaf margin, transverse veins and veinlets reticulate, slightly foveolate abaxially,

inconspicuous adaxially, base cuneate or broadly cuneate, sometimes slightly oblique on one side, margin slightly involute, apex shortly acuminate. Flowers unknown. Inflorescence paniculate, short, 5–8.5 cm, inserted on lower part of branchlet, only with 1 well-developed fruit; rachis reddish, glabrous. Fruit red, ellipsoid, up to 5 × 3 cm, glabrous; fruit stalk robust, ca. 5 mm, fleshy, ca. 4 mm in diam. on top, glabrous.

- Evergreen broad-leaved forests on limestone mountains; 1300–1500 m. SE Yunnan.

**3. *Alseodaphne rugosa*** Merrill & Chun, Sunyatsenia 2: 232. 1935.

皱皮油丹 zhou pi you dan

Trees, up to 12 m tall, to 60 cm d.b.h. Branchlets terete, robust, ca. 7 mm in diam., wrinkled, with dense leaf scars near top. Leaves inserted at apex of branchlet, dense and nearly verticillate; petiole robust, 1.5–2.5 cm; leaf blade greenish abaxially when dry, brownish and shiny adaxially, oblong-obovate or oblong-oblanceolate, 15–36 × 4–10 cm, leathery, midrib brownish, conspicuously elevated abaxially, impressed adaxially, veins and veinlets conspicuous, reticulate, base cuneate, apex shortly acuminate. Flowers unknown. Inflorescence subterminal, ca. 12.5 cm, robust; peduncle (6–)8–15 cm, glabrous. Fruit oblate, ca. 2.5 × 3 cm; fruit stalk robust, 1–1.5 cm, 5–8 mm in diam. on top, fleshy, red and warty when fresh. Fr. Jul–Dec.

- Mixed forests in valleys; 1200–1300 m. Hainan.

**4. *Alseodaphne hainanensis*** Merrill, Lingnan Sci. J. 13: 57. 1934.

油丹 you dan

Trees, up to 25 m tall, to 30 cm d.b.h., all except young parts glabrous. Branchlets and young branchlets terete, smallest ones ca. 2 mm in diam., all gray, with few suborbicular leaf scars; young ones with many clustered scale scars at base. Terminal buds small, gray- or rusty sericeous. Leaves many, clustered at apex of branchlet; petiole robust, 1–1.5 cm, concave-convex; leaf blade green-white and opaque abaxially, shiny adaxially, narrowly elliptic, 6–10(–16) × 1.5–3.2(–4.2) cm, leathery, shallowly foveolate adaxially, lateral veins 12–17 pairs, slender, slightly conspicuous on both surfaces, arcuately inter-

connected at ends, base acute, margin revolute, apex rounded. Panicle axillary on upper part of branchlet, 3.5–8(–12) cm, glabrous, black when dry, few branched; peduncle elongate, as pedicel subfleshy. Pedicel slender, 3–8 mm, dilated in fruit, not verrucose. Perianth lobes slightly fleshy, oblong, ca. 4 × 2 mm, slightly acute at apex, glabrous outside, white sericeous inside. Fertile stamens ca. 2.5 mm, pilose; filaments of 3rd whorl each with 2 stalked glands; anthers ellipsoid-square, obtuse at apex, as long as filaments, 4-celled; cells introrse in 1st and 2nd whorls, upper 2 cells lateral and lower 2 cells extrorse in 3rd whorl. Staminodes conspicuous, sagittate, stalked. Ovary ovoid; style slender; stigma inconspicuous. Fruit green when fresh but black when dry, globose or ovoid, 1.2–2 cm, wrinkled. Fl. Jul, fr. Oct–Feb of next year.

Valleys, forests; 1400–1700 m. Hainan [N Vietnam].

The wood is finely grained, heavy, and durable.

**5. *Alseodaphne huanglianshanensis*** H. W. Li & Y. M. Shui, *Acta Phytotax. Sin.* 42: 551. 2004.

黄莲山油丹 huang lian shan you dan

Trees evergreen, up to 10 m tall. Branchlets grayish, glabrous, lenticellate; lenticels oblong, 0.7–1.3 × 0.5–0.7 mm. Leaves alternate, 2–5 mm apart, clustered near apex of branchlet in groups 10.5–14 cm apart; petiole reddish, 0.5–0.9 cm, slightly dilated at base, glabrous; leaf blade grayish abaxially, dark green adaxially, oblong or oblanceolate-oblong, 5–13 × (0.8–)1.2–2.8 cm, papery, glabrous, hardly foveolate on both surfaces, midrib conspicuously elevated abaxially, slightly elevated adaxially, lateral veins 7 or 8 pairs, arcuately ascending, hardly anastomosing near margin, slightly elevated, base cuneate, apex acute or acuminate. Flowers unknown. Infructescences inserted in leaf axils near apex of branchlet, 4.2–5 cm, glabrous; peduncle ca. 2.5 cm, densely grayish verrucose. Pedicel 5–7 mm, densely grayish linear verrucose, apex conspicuously dilated. Fruit purple when mature, ovoid, ca. 2 × 1.2–1.4 cm; exocarp thin. Fr. Nov.

• Evergreen secondary forests on slopes with montane red earth mainly from rock detritus; 800–1300 m. S Yunnan (Lüchun).

**6. *Alseodaphne yunnanensis*** Kostermans, *Candollea* 28: 133. 1973.

云南油丹 yun nan you dan

Trees small. Old branchlets gray, shiny, robust, bark longitudinally fissured, with many brown elliptic lenticels; young branchlets slender, lenticellate. Leaves clustered at apex of branchlet, uppermost ones always subopposite; petiole slightly slender, 1–2 cm, concave-convex; leaf blade slightly shiny, oblong, 11–19 × 4.5–6 cm, papery, glabrous and densely finely foveolate on both surfaces, midrib elevated abaxially, impressed adaxially, lateral veins 9–11 pairs, elevated abaxially, inconspicuous adaxially, oblique, sometimes forked, arcuate and interconnected at ends, base broadly cuneate and attenuate into petiole, apex acute or acuminate. Panicle axillary, 2–3(–4) cm, few flowered, brown pilose, unbranched or shortly branched; peduncle 1–3.5 cm. Pedicel slender, 5–8 mm, glabrous. Perianth lobes 6, glabrous outside, densely brownish pilose inside, outer ones ovate, ca. 3 × 1.5 mm, acute, inner ones broadly ovate, ca.

3.5 × 2 mm, acute. Fertile stamens 9; filaments of 1st and 2nd whorls almost as long as anthers, glandless, those of 3rd whorl each with 2 large glands; anthers of 1st and 2nd whorls broadly elliptic, ca. 0.75 mm, with introrse cells, those of 3rd whorl slightly narrower, truncate at apex, with lateral cells. Staminodes conspicuous, sagittate, ca. 1.3 mm, stalked. Ovary subglobose, ca. 2.5 mm, glabrous; style short, ca. 0.5 mm; stigma discoid, inconspicuous. Fruit unknown. Fl. Apr.

• Shady rocky places in valleys; ca. 800 m. SE Yunnan.

**7. *Alseodaphne marlipoensis*** (H. W. Li) H. W. Li, *Acta Phytotax. Sin.* 17(2): 71. 1979.

麻栗坡油丹 ma li po you dan

*Cinnamomum marlipoense* H. W. Li, *Acta Phytotax. Sin.* 13(4): 48. 1975.

Trees, up to 12 m tall, ca. 30 cm d.b.h. Branchlets gray-brown, terete, slender, 3–5 mm in diam., striate, scattered with longitudinally fissured yellow-brown corky oblong lenticels, sparsely yellowish brown pubescent initially but soon glabrate. Terminal buds small, obconical, less than 2 mm; bud scales compact, sparsely yellowish brown pubescent outside. Leaves alternate, remote; petiole 0.5–2 cm, concave-convex, sparsely puberulent; leaf blade abaxially green-white, adaxially green, oblong or lanceolate-oblong, 6–14 × 2.2–3.8 cm, papery, abaxially sparsely yellowish brown puberulent, adaxially glabrous or sometimes sparsely yellowish brown pubescent on lower part of midrib, midrib extending up to leaf apex, elevated abaxially, impressed adaxially, lateral veins (9–)11–13 pairs, arcuate, inconspicuous on both surfaces, all evanescent near leaf margin, transverse veins and veinlets reticulate, nearly visible on both surfaces, base cuneate or broadly cuneate, margin revolute, apex shortly acuminate. Flowers unknown. Infructescence paniculate, much longer than leaf blade, (8–)11–18 cm, all axillary on upper part of branchlet, few branched on upper part; branches up to 4.5 cm; peduncle elongate, (5–)8–12 cm, peduncle and rachis sparsely yellowish brown pubescent. Immature fruit green, globose, up to 2.2 cm in diam.; fruit stalk fleshy, dilated, up to 1 cm, ca. 3 mm in diam. on top, wrinkled when dry, purple-red when fresh, sparsely yellowish brown pubescent. Fr. Dec.

• Evergreen broad-leaved forests in valleys; below 1400 m. SE Yunnan.

**8. *Alseodaphne andersonii*** (King ex J. D. Hooker) Kostermans, *Reinwardtia* 6: 159. 1962.

毛叶油丹 mao ye you dan

*Cryptocarya andersonii* King ex J. D. Hooker, *Fl. Brit. India* 5: 120. 1886; *Alseodaphne keenanii* Gamble; *A. medogensis* H. P. Tsui.

Trees, up to 25 m tall, 30–45 cm d.b.h. Branchlets blackish, robust, striate, with few inconspicuous brown and oblong lenticels, rusty puberulent when young but glabrate when mature. Petiole robust, (2–)4–5.5 cm, concave-convex, ± rusty puberulent; leaf blade green-white abaxially, opaque adaxially, elliptic, 12–24 × 6–12 cm, subleathery, rusty puberulent when young but glabrate when mature abaxially, glabrous adaxially, midrib elevated abaxially, impressed adaxially, lateral veins 9–

11 pairs, oblique, elevated abaxially, impressed or plane adaxially, evanescent within leaf margin, transverse veins remote, conspicuous, always forked, veinlets reticulate, shallowly foveolate, base acute to broadly cuneate, apex abruptly shortly acuminate. Panicle axillary on upper part of branchlet, 20–35 cm, many branched; terminal branch (3–)5- or 6-flowered; peduncle 10–15 cm, peduncle and rachis densely rusty puberulent. Pedicels slender, ca. 2 mm, dilated in fruit, densely rusty puberulent. Perianth lobes ovate, (1.5–)2–2.5 mm, densely rusty puberulent, outer ones smaller, 3-nerved, inner ones large, 5-nerved, all deciduous when in fruit. Fertile stamens small; filaments villous, those of 3rd whorl each with 2 large and nearly stalkless glands at base, others glandless; anthers of 1st and 2nd whorls oblong, glandular, with introrse cells, those of 3rd whorl rectangular, glandular, with extrorse cells. Staminodes minute, reniform. Ovary ovoid; style short and oblique; stigma capitate. Fruit oblong, up to  $5 \times 2.8$  cm, green when fresh but purple-black when mature; fruit stalk fleshy when fresh, purple-red, ca. 1 cm, ca. 4 mm in diam. on dilated top. Fl. Jul, fr. Oct–Mar of next year.

Evergreen broad-leaved forests from humid valleys to mountaintops; (1000–)1200–1500(–1900) m. SE Xizang, S and SE Yunnan [NE India, Laos, Myanmar, Thailand, Vietnam].

This species is a dominant tree of evergreen broad-leaved forests in the region.

**9. *Alseodaphne hokouensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 71. 1979.

河口油丹 he kou you dan

Trees. Branchlets brownish when dry, striate, glabrous. Terminal buds subglobose, ca. 2 mm in diam.; bud scales brown, broadly ovate, acute at apex, glabrous. Leaves alternate; petiole 1.5–3 cm, concave-convex, glabrous; leaf blade brown abaxially when dry, green-brown adaxially, elliptic to oblong, 10.5–17  $\times$  4–6.5 cm, subleathery, glabrous on both surfaces, midrib elevated abaxially, impressed adaxially, lateral veins 9–13 pairs, slightly elevated on both surfaces, oblique, evanescent and interconnected near leaf margin, transverse veins and veinlets densely reticulate, conspicuous on both surfaces, base broadly cuneate to subrounded, apex abruptly shortly acuminate. Panicle 10.5–15 cm, inserted on lower part of young branchlet; peduncle branched at middle or above, peduncle and rachis glabrous; bracts and bracteoles linear, ca. 1.5 mm, acute, ciliate, caducous. Pedicels 3–4 mm, slightly dilated on top, glabrous. Flowers small, ca. 2.5 mm. Perianth tube short; perianth lobes ovate, subequal, ca.  $2 \times 1.5$  mm, slightly acute, glabrous outside, gray pubescent inside, deciduous. Fertile stamens 9, minute, ca. 1.5 mm in 1st and 2nd whorls, ca. 1.7 mm in 3rd whorl; filaments villous, ca. 0.7 mm in 1st and 2nd whorls, ca. 1 mm in 3rd whorl, those of 3rd whorl each with 2 stalked

orbicular-reniform glands at base, others glandless; anthers of 1st and 2nd whorls oblong, almost as long as filament, with introrse cells, those of 3rd whorl rectangular, with extrorse cells. Ovary ovoid, ca. 1.5 mm, glabrous, attenuate into a ca. 0.5 mm long style; stigma discoid, slightly lobed. Fruit unknown. Fl. May.

• Evergreen broad-leaved forests; ca. 700 m. SE Yunnan.

**10. *Alseodaphne petiolaris*** (Meisner) J. D. Hooker, Fl. Brit. India 5: 145. 1886.

长柄油丹 chang bing you dan

*Nothaphoebe petiolaris* Meisner in A. Candolle, Prodr. 15(1): 59. 1864.

Trees, up to 20 m tall, ca. 10 cm d.b.h. Branchlets brownish, robust, subverticillate, slightly angled, scattered with suborbicular corky lenticels, glabrous except young part. Terminal buds ovoid; bud scales compact, densely brown puberulent. Petiole robust, 1.5–2.5(–5) cm, concave-convex, glabrous; leaf blade brown on both surfaces but green-white abaxially when young, opaque abaxially, shiny adaxially, large, obovate-oblong or oblong, 14–26  $\times$  6–15 cm, thickly leathery, midrib elevated abaxially, impressed adaxially, lateral veins ca. 11 pairs, very conspicuous abaxially, slightly elevated adaxially, oblique, arcuately connected at ends, transverse veins and veinlets reticulate, conspicuously elevated on both surfaces, base cuneate or subrounded and always unequal on sides, apex rounded or obtuse, abruptly shortly acuminate or emarginate. Panicle subterminal, clustered at apex of branchlet, (10–)15–30 cm, many flowered, branched, lowest branches up to 10 cm; peduncle 6–13 cm, rusty pubescent along rachis especially on nodes. Pedicels ca. 2 mm, rusty pubescent. Flowers small, ca. 2.5 mm. Perianth tube broadly conical, ca. 1 mm; perianth lobes 6, orbicular-ovate, obtuse, outer ones ca.  $2 \times 1.8$  mm, inner ones ca.  $2.5 \times 2$  mm, densely rusty pubescent on both surfaces. Fertile stamens 9, ca. 1.2 mm in 1st whorl, ca. 1.8 mm in 2nd whorl, and ca. 2.8 mm in 3rd whorl; filaments complanate, pilose, very short in 1st whorl, almost as long as anther in 2nd and 3rd whorls, those of 3rd whorl each with 2 shortly stalked orbicular-cordate glands, others glandless; anthers of 1st whorl broadly ovate, obtuse, ca. 0.8 mm, with 2 upper smaller cells and 2 lower large cells, cells all introrse, anthers of 2nd whorl broadly ovate-ellipsoid, obtuse, with 4 introrse cells, anthers of 3rd whorl ellipsoid, truncate or slightly emarginate on middle at apex, with 4 extrorse-lateral cells. Staminodes minute. Ovary ovoid, ca. 0.8 mm, glabrous, attenuate into a ca. 1.6 mm long style; stigma peltate, 3-lobed. Fruit oblong-ovoid, ca.  $2.8 \times 1.3$  cm, apex rounded, fleshy; fruit stalk robust, ca. 5 mm, up to 4 mm on dilated top. Fl. Oct–Nov, fr. Dec–Apr or May of next year.

Dry sparse forests, evergreen broad-leaved forests; 600–900 m. S Yunnan [India, Myanmar].

## 19. *SINOSASSAFRAS* H. W. Li, Acta Bot. Yunnan. 7: 134. 1985.

华擦木属 hua cha mu shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Evergreen trees, dioecious. Leaves alternate, not clustered, triplinerved. Pseudombels solitary or 2(or 3) inserted in leaf axils

and always 3 to many inserted on axillary leafless short shoot with a poorly developed terminal bud not developing into a leafy shoot after anthesis; involucre bracts small, alternate, caducous. Flowers unisexual. Perianth tube short; perianth segments 6, in 2 whorls, those of outer whorl smaller. Male flowers: fertile stamens 9, in 3 whorls; filaments of 1st and 2nd whorls eglandular, those of 3rd whorl 2-glandular; anthers 2-celled; cells of 1st and 2nd whorl introrse, those of 3rd whorl lateral; staminodes minute; pistillodes small. Female flowers: staminodes 9, outer 3(or 4) with filaments eglandular and anthers broadly rhomboid-ovoid, inner 5(or 6) with filaments 2-glandular near base; rudimentary anthers minute, clavate; ovary globose; stigma discoid, papillate. Fruits subglobose, with shallow cupule, margin entire.

- One species: China.

**1. *Sinosassafras flavinervium*** (C. K. Allen) H. W. Li, Acta Bot. Yunnan. 7: 134. 1985 [*"flavinervia"*].

华檫木 hua cha mu

*Lindera flavinervia* C. K. Allen, J. Arnold Arbor. 22: 30. 1941.

Trees, 4–15(–25) m tall, 10–30 cm d.b.h. Bark gray-brown, irregularly dehiscent-striate; phloem yellow-brown, more than 5 mm thick. Branchlets green but black-brown when dry, subterete, distinctly angular when young, scabrous, glabrous, sometimes with suborbicular and longitudinally dehiscent lenticels. Terminal bud large, ovoid to oblong, 0.9–1.5 cm; bud scales densely golden sericeous-pubescent outside. Leaves alternate; petiole (1–)1.5–2.5(–3.5) cm, glabrous; leaf blade abaxially gray-green, adaxially green and shiny, broadly elliptic to suborbicular, 6–12 × 3.5–6.5(–10) cm, thinly leathery, tripinnate, lateral veins ca. 6 pairs, basal lateral veins arcuate-ascending 1–5 mm above leaf base, basal veins and midrib distinct and yellow on both surfaces, reticulate veins distinctly elevated on both surfaces, base broadly cuneate, margin revolute, apex shortly acuminate. Pseudoumbels (3–)5- or 6-flowered, solitary or 2(or 3) inserted in leaf axils and always 3 to many inserted on axillary leafless short shoot with a poorly developed terminal bud; peduncles ca. 0.5 mm, pubescent; involucre

bracts caducous. Male flowers green or green-yellow; pedicels (3–)4–5 mm, yellowish pubescent; perianth segments 6, unequal, glabrous; fertile stamens 9, subequal, those of 1st and 2nd whorls ca. 1.5 mm, with filaments ca. 1 mm and broadly rhomboid-ovoid anthers ca. 1.5 mm, those of 3rd whorl somewhat shorter and filaments with 2 shortly stipitate broadly reniform glands near base; rudimentary ovary subglobose, ca. 1.5 mm, glabrous; style terete, ca. 1.5 mm; stigma peltate. Female flowers green; pedicels ca. 2 mm, yellowish pubescent; perianth segments 6, subequal; staminodes 9, ca. 1.5 mm, outer 3(or 4) each with eglandular filament and broadly rhomboid-ovoid anther, inner 5(or 6) each with 2-glandular filament and clavate rudimentary anther; glands subsessile and ovoid-reniform; ovary globose, ca. 1.5 mm in diam., glabrous; style stout, ca. 1.3 mm; stigma peltate, ca. 1.5 mm in diam., papillose. Fruits green when fresh, black when dry, subglobose, up to 8 mm in diam., glabrous; fruiting pedicels up to 8 mm, robust; fruit cupule 2–3 × ca. 4 mm. Fl. and fr. Jun–Nov.

- Secondary evergreen broad-leaved forests, thickets, forest margins or roadsides on mountain slopes or in valleys. SE Xizang, W Yunnan.

The seed oil is used as a lubricant or for making soap; it is also used for lighting by local people.

## 20. ENDIANDRA R. Brown, Prodr. 402. 1810.

土楠属 tu nan shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

*Brassiodendron* C. K. Allen; *Dictyodaphne* Blume.

Trees. Buds small, scaly. Leaves alternate, pinninerved, veins and veinlets always foveolate. Panicle axillary, inserted on base of branchlet, pedunculate, many flowered or almost reduced to a cyme. Flowers bisexual, minute. Perianth tube very short to nearly absent or campanulate; perianth lobes 6, subequal or outer 3 somewhat larger. Fertile stamens 3, of 3rd whorl, anthers slightly thickened, stalkless, 2-celled on middle part or below apex, cells extrorse; stamens of 1st and 2nd whorls absent or 6 undeveloped and reduced to glands, sometimes glands united into a fleshy ring. Staminodes of innermost whorl, absent or rarely 3. Ovary sessile; style short; stigma small. Fruit oblong, cylindrical, or ovoid; fruit stalk not or nearly not dilated; perianth wholly deciduous, or slightly discoid, or nearly persistent and not deformed.

About 30 species: India through SE Asia to Australia and Pacific islands; three species (two endemic) in China.

- 1a. Fruit ovoid, small, ca. 2 × 1 cm; leaf blade thickly leathery, elliptic or obovate; panicle pubescent ..... 1. *E. coriacea*  
 1b. Fruit narrowly ellipsoid or cylindrical, ca. 3.8 × 1.4 cm or more; leaf blade papery or leathery, oblong or oblong-elliptic; panicle gradually glabrate.  
 2a. Leaf blade generally small, largest one up to 15 × 5 cm, papery, midrib and lateral veins slightly elevated abaxially; petiole 1–1.5 cm; rachis of infructescence ca. 2 mm in diam.; fruit stalk slightly dilated at top; fruit narrowly ellipsoid, small, up to 3.8 × 1.4 cm, purple-brown when mature ..... 2. *E. hainanensis*  
 2b. Leaf blade generally larger, ca. 13–25 × (4–)5–7.5 cm, leathery, midrib and lateral veins conspicuously elevated abaxially; petiole robust, up to 2 cm; rachis of infructescence robust, up to 2.5 mm in diam.; fruit stalk up to 5 mm in diam. on top; fruit cylindrical, larger and longer, up to 8 × 2.3 cm, black-brown when mature ..... 3. *E. dolichocarpa*

**1. *Endiandra coriacea*** Merrill, Publ. Bur. Sci. Gov. Lab. 35: 14. 1905.

革叶土楠 ge ye tu nan

Medium-sized trees, up to 25 m tall, to 40 cm d.b.h., with buttressed trunk. Bark gray, smooth or peeling off in lamellae. Branchlets yellow-brown, terete, puberulent, warty, inconspicuously striate. Buds ovoid, densely sericeous initially but later glabrate. Leaves alternate; petiole 1–1.2 cm, puberulent initially but soon glabrate; leaf blade red-brown when dry, elliptic or obovate, 9–12 × 4.5–6 cm, thickly leathery, glabrous on both surfaces, lateral veins 5 or 6 pairs, lateral veins, veins, and veinlets conspicuous and foveolate on both surfaces, base cuneate, apex acute or shortly caudate. Panicle axillary or terminal, up to 8 cm, few flowered, puberulent. Pedicels slender, ca. 5 mm. Flowers white, small. Perianth tube campanulate; perianth lobes unequal, outer ones large, broadly ovate, ca. 4 × 3 mm, pilose near base inside, inner ones smaller, ovate, ca. 4 × 2.5 mm, densely villous inside. Fertile stamens 3, narrowly triangular, ca. 2 mm, eglandular, densely puberulent; anthers thick, stalkless, 2-celled; cells extrorse. Ovary ovoid, ca. 2 mm in diam., stalkless, glabrous. Fruit ovoid, ca. 2 × 1 cm, smooth, glabrous, base subrounded, apex acute. Fl. Jun, fr. Aug.

Dense forests. S Taiwan (Lan Yu) [Philippines].

**2. *Endiandra hainanensis*** Merrill & F. P. Metcalf ex C. K. Allen, J. Arnold Arbor. 23: 461. 1942.

土楠 tu nan

Trees, up to 8 m tall. Bark gray. Branchlets brown, terete but ± angled and striate, glabrous but pubescent when young, warty. Leaves alternate; petiole 1–1.5 cm, concave-convex, glabrous; leaf blade greenish and opaque abaxially, green and shiny adaxially, lanceolate to oblong-elliptic, 9–15 × 3–6 cm, papery, glabrous and densely finely glandular-spotted on both surfaces, midrib elevated on both surfaces but rather conspicuous abaxially, lateral veins 6–8 pairs, slightly elevated abaxially,

conspicuous adaxially, veins and veinlets reticulate, conspicuous and foveolate on both surfaces, base cuneate, always asymmetric on sides, apex acuminate with obtuse acumen or obtuse with acute acumen. Panicle axillary, 2–6 cm, few flowered, glabrate; peduncle up to 1 cm, slender, sparsely puberulent initially but soon glabrate. Pedicels slender, 3–10 mm, thickened after anthesis. Flowers yellowish, scented, ca. 3.5 mm, glabrous. Perianth lobes ovate, fleshy. Fertile stamens 3, triangular, ca. 2 mm, tightly adnate and nearly connate. Ovary ovoid, ca. 1 mm; style short; stigma capitate. Fruit narrowly ellipsoid when dry, up to 3.8 × 1.4 cm, purple-brown when mature, glabrous, obtuse at both ends; fruit stalk gray or black-red, ca. 5 × 2 mm, glabrous. Fl. Jun, fr. Sep.

• Mixed forests in valleys, thickets on open land; ca. 400 m. Hainan.

**3. *Endiandra dolichocarpa*** S. K. Lee & Y. T. Wei, Acta Phytotax. Sin. 17(2): 74. 1979.

长果土楠 chang guo tu nan

Trees. Bark gray. Branchlets brown, terete but ± angled and striate, glabrous, warty; young branchlets glabrous or subglabrous. Leaves alternate; petiole robust, up to 2 cm, concave-convex, glabrous; leaf blade greenish and opaque abaxially, green and shiny adaxially, oblong, 13–25 × (4–)5–7.5 cm, leathery, glabrous and densely finely glandular-spotted on both surfaces, midrib elevated on both surfaces, especially abaxially, lateral veins 6–8 pairs, elevated abaxially, conspicuous adaxially, veins and veinlets reticulate and foveolate, base cuneate or broadly cuneate, rarely subrounded, always asymmetric on sides, apex abruptly shortly acuminate, acumen obtuse. Flowers unknown. Fruit cylindrical when dry, up to 8 × 2.3 cm, black-brown when mature, glabrous, obtuse on both ends; rachis of infructescence robust, up to 2.5 mm in diam.; fruit stalk glabrous, up to 5 mm in diam. at apex. Fr. Aug–Sep.

• Forests; ca. 500 m. W Guangxi (Tianyang), SE Yunnan (Jinping).

## 21. BEILSCHMIEDIA Nees in Wallich, Pl. Asiat. Rar. 2: 61, 69. 1831.

琼楠属 qiong nan shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

*Lauromerrillia* C. K. Allen.

Evergreen trees or shrubs. Terminal buds mostly conspicuous. Leaves opposite, subopposite, or alternate, leathery, thickly leathery, or papery, very rarely membranous, entire, pinninerved, veins usually conspicuous. Flowers small, bisexual. Inflorescences short, mostly cymose-paniculate, sometimes as axillary flower-bundles or subracemose, sometimes covered by imbricate caducous bracts when young; peduncles and pedicels enlarged or not enlarged after anthesis. Perianth tube short; perianth segments 6 (or 8), equal or almost equal. Fertile stamens (6 or 8 or 9); filaments of 1st and 2nd whorls glandless, those of 3rd whorl generally each with 2 stalked or stalkless glands at base, anthers 2-celled, anther cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes of 4th whorl, ovoid, cordate, or deltoid, shortly stalked. Ovary attenuate at apex into a style. Fruits baccate, ellipsoid, ovoid-ellipsoid, cylindrical, obovoid, or subglobose; fruiting pedicels swollen or not swollen; perianth in fruit generally wholly deciduous.

About 300 species: mainly in tropical Africa, SE Asia, Australasia, and America; 39 species (33 endemic) in China.

*Beilschmiedia supraglandulosa* Y. K. Li (Guihaia 5: 344. 1985) was described from SE Guizhou (Sandu) but could not be treated here because no material was seen by the present authors.

1a. Terminal buds glabrous.

2a. Leaf blade abaxially densely glandular-punctate.

- 3a. Leaf blade large, 12.5–40 × 7–21 cm, thickly papery, ovate to ovate-oblong ..... 23. *B. fasciata*
- 3b. Leaf blade smaller, 7–16 × 2.5–5.5 cm, papery or leathery, narrowly elliptic or lanceolate.
- 4a. Leaf blade papery, narrowly elliptic, adaxially gray-brown and abaxially purple-black when dry, apex acuminate or long acuminate, always falcate-curved; terminal buds small; fruits oblong-ellipsoid, 3–4.3 cm ..... 24. *B. pergamentacea*
- 4b. Leaf blade leathery, lanceolate or narrowly elliptic, adaxially green-brown or gray-brown and abaxially dark brown or purple-black when dry, apex obtuse or shortly acuminate; terminal buds large; fruits obovoid or subturbinate, ca. 3 cm ..... 25. *B. robusta*
- 2b. Leaf blade abaxially not glandular-punctate.
- 5a. Midrib adaxially plane or elevated.
- 6a. Leaf apex rounded ..... 26. *B. longepetiolata*
- 6b. Leaf apex not rounded.
- 7a. Leaves alternate, leaf blade ovate or ovate-lanceolate, abaxially powdery green or powdery brown, veins densely reticulate, adaxially foveolate when dry ..... 27. *B. glauca*
- 7b. Leaves opposite or alternate, leaf blade narrowly elliptic or ovate-lanceolate, dark brown and shiny when dry, veins sparsely foveolate on both surfaces when dry ..... 28. *B. erythrophloia*
- 5b. Midrib adaxially impressed (at least near base).
- 8a. Fruits small, ellipsoid or subglobose, less than 2 cm, always verruculose.
- 9a. Leaf blade large, (6–)8–12 × (2.5–)3–4.5 cm; inflorescences axillary ..... 29. *B. fordii*
- 9b. Leaf blade small, 2.5–8 × 1–2.8(–3) cm; inflorescences terminal and/or axillary.
- 10a. Leaf blade longer, 4–8 cm, leathery, adaxially dark brown when dry, lateral veins slightly conspicuous, veins inconspicuous, petiole 1–1.5 cm; fruits ellipsoid, ca. 1.1 cm in diam. .... 30. *B. brevipaniculata*
- 10b. Leaf blade shorter, 2.5–4(–6) cm, thinly leathery, adaxially dark gray when dry, lateral veins and reticulate veins conspicuously elevated, abaxially dark brown, petiole 2–5 mm; fruits subglobose, ca. 1.5 cm in diam. .... 31. *B. brevifolia*
- 8b. Fruits large, more than 2.5 cm, smooth or verruculose.
- 11a. Fruits nearly obovoid-ellipsoid, ovoid, or globose to subglobose; leaf blade veins slender, always slightly conspicuous; petiole 7–15 mm.
- 12a. Leaf blade oblong or oblong-elliptic, 7–14 × 3–6 cm, adaxially opaque, abaxially furfuraceous, apex acute or somewhat obtuse; fruits nearly obovoid-ellipsoid or subglobose, brown, densely furfuraceous, ca. 3.2 × 2 cm; fruiting pedicels ca. 4 mm in diam. .... 32. *B. furfuracea*
- 12b. Leaf blade narrowly elliptic or ovate-elliptic, 5–8(–10) × 2–3.5 cm, adaxially shiny, apex abruptly caudate; fruits ovoid or globose, 2.5–3 × 2.3–2.5 cm; fruiting pedicels ca. 1.5 mm in diam. .... 33. *B. kweichowensis*
- 11b. Fruits ellipsoid or nearly olive-shaped; leaf blade veins mostly conspicuously elevated; petiole 10–30 mm.
- 13a. Leaf base decurrent ..... 34. *B. intermedia*
- 13b. Leaf base not decurrent.
- 14a. Lateral veins 9–13 pairs.
- 15a. Leaf blade elliptic to oblong, 9–21 × 3.5–6 cm; lateral veins 9–13 pairs; fruits 3.3–3.7 × 1.5–2.3 cm, attenuate or subrounded at both ends ..... 38. *B. linociroides*
- 15b. Leaf blade elliptic or lanceolate-elliptic, 7–14 × 2–5 cm; lateral veins generally 10 pairs; fruits ca. 2.8 × 1.6 cm, apex apiculate ..... 39. *B. henghsienensis*
- 14b. Lateral veins 6–9 pairs.
- 16a. Leaf blade ovate to oblong, veins adaxially obscure; fruits ellipsoid, always verruculose ..... 35. *B. sichouensis*
- 16b. Leaf blade elliptic or narrowly so, veins adaxially conspicuously elevated; fruits narrowly ellipsoid or ovoid-oblong, smooth.
- 17a. Fruits narrowly ellipsoid ..... 36. *B. percoriacea*
- 17b. Fruits ovoid-oblong ..... 37. *B. ovoidea*
- 1b. Terminal buds hairy.
- 18a. Midrib adaxially impressed.
- 19a. Terminal buds small, densely yellow-brown tomentose or gray-brown villous.
- 20a. Leaf blade large, obovate, obovate-oblong, or oblong, 15–24 × 7–11 cm; fruits cylindrical, up to 5 cm, scattered verruculose ..... 1. *B. cylindrica*
- 20b. Leaf blade small, elliptic, 4–11 × 1.5–4.5 cm; fruits small, below 2 cm, always verruculose.

- 21a. Terminal buds and branchlets densely yellow-brown tomentose or yellow-brown puberulent; leaf blade elliptic to oblong, 6–9(–14) × 1.5–4.5 cm, apex acute with an obtuse acumen or sometimes round or incised, veins conspicuously and densely reticulate on both surfaces, somewhat laxly foveolate when dry ..... 2. *B. tsangii*
- 21b. Terminal buds and branchlets gray-brown puberulent; leaf blade oblong, 4–7 × 1.5–2.5 cm, apex shortly acuminate or somewhat obtuse, lateral veins and veinlets adaxially inconspicuous but abaxially slightly conspicuous ..... 3. *B. muricata*
- 19b. Terminal buds large, ferruginous tomentose or ferruginous furfuraceous.
- 22a. Branchlets, leaf blade abaxially, and petioles densely ferruginous tomentose ..... 4. *B. obconica*
- 22b. Branchlets, leaf blade abaxially, and petioles glabrous or furfuraceous only.
- 23a. Petiole 1.5–3 cm ..... 7. *B. laevis*
- 23b. Petiole 0.6–1.2 cm.
- 24a. Leaf blade leathery, lanceolate or narrowly elliptic, adaxially green-brown or gray-brown and abaxially always purplish when dry; fruits large, ellipsoid or subglobose, up to 5 × 4 cm, brown-furfuraceous and rugulose; apex of fruiting pedicels and base of infructescence swollen, 7–15 mm in diam. .... 5. *B. macropoda*
- 24b. Leaf blade papery, oblong, abaxially purplish brown and somewhat furfuraceous; fruits ellipsoid, up to 3 × 2.3 cm, narrowed into a stalk at base, ferruginous-furfuraceous when young, dark brown and glabrous when old; fruiting pedicels up to 5 mm in diam. .... 6. *B. purpurascens*
- 18b. Midrib adaxially elevated or plane.
- 25a. Leaf blade abaxially not glandular-punctate.
- 26a. Leaf blade leathery, veins densely reticulate, conspicuously minutely foveolate adaxially or on both surfaces.
- 27a. Leaf blade larger, 8–16(–18) × 4–6(–7.5) cm, adaxially conspicuously foveolate; petiole 1–2.5 cm ..... 18. *B. yunnanensis*
- 27b. Leaf blade smaller, 5–11 × 2–4 cm, adaxially minutely foveolate; petiole 0.6–1.5 cm.
- 28a. Leaf blade oblong or oblong-lanceolate, rarely ovate-lanceolate, 5–11 × 2–4 cm, green-brown when dry; fruits dark brown, densely and minutely furfuraceous; fruiting pedicels ca. 2 mm in diam. .... 16. *B. obscurinervia*
- 28b. Leaf blade elliptic or narrowly elliptic, 6–9(–12) × 2–3(–5) cm, brownish when dry; fruits black-brown, shiny, smooth; fruiting pedicels 3–4 mm in diam. .... 17. *B. tungfangensis*
- 26b. Leaf blade leathery, papery, or submembranous, veins laxly reticulate, not foveolate on both surfaces.
- 29a. Fruits smooth, but slightly furfuraceous or wrinkled when dry.
- 30a. Leaf blade black-brown when dry, oblong to oblong-lanceolate, 7–10 × 2–4 cm, papery or submembranous; fruits slightly furfuraceous when dry ..... 21. *B. ningmingensis*
- 30b. Leaf blade abaxially brownish when dry, narrowly elliptic to oblanceolate, 4.5–8.5 × 1.5–3.5 cm, leathery, adaxially densely glandular-spotted; fruits wrinkled when dry ..... 22. *B. glandulosa*
- 29b. Fruits densely verruculose.
- 31a. Inflorescences 2–6 cm; fruits ellipsoid or obovoid-ellipsoid, 2–3 × 1–2 cm ..... 19. *B. delicata*
- 31b. Inflorescences 1.2–1.5 cm; fruits ellipsoid, ca. 3 × 1.3 cm ..... 20. *B. brachythyrsa*
- 25b. Leaves abaxially (or sometimes adaxially) densely glandular-punctate.
- 32a. Terminal buds densely ferruginous puberulent or ferruginous hirtellous.
- 33a. Terminal buds and inflorescences densely ferruginous hirtellous ..... 8. *B. rufohirtella*
- 33b. Terminal buds and inflorescences densely ferruginous pubescent.
- 34a. Leaf blade broadly elliptic or elliptic-lanceolate, 9–14 × 3.5–7 cm, apex obtuse or shortly acuminate, base subrotund or acute; panicles 4–8 cm, many ramified ..... 9. *B. wangii*
- 34b. Leaf blade lanceolate or narrowly elliptic-lanceolate, 6–13 × 2–4 cm, apex shortly acuminate with an obtuse acumen, base cuneate; panicles ca. 2 cm, few ramified ..... 10. *B. shangsiensis*
- 32b. Terminal buds yellow-brown pubescent or gray-brown pubescent.
- 35a. Leaf blade submembranous or papery to subleathery, black or black-brown when dry.
- 36a. Leaf blade abaxially white glandular-punctate, always alternate, submembranous, oblong to elliptic, apex acuminate, base cuneate or broadly cuneate; petiole 5–13 mm; fruits ovoid, ca. 3.3 × 2.7 cm, fruiting pedicels ca. 2 mm in diam. .... 11. *B. punctilimba*

- 36b. Leaf blade abaxially also with glands but not white in color, opposite or sometimes alternate, papery or subleathery, elliptic to elliptic-lanceolate, apex obtuse, obtusely acuminate, acute, or subrounded, base broadly cuneate or rotund; petiole 15–20 mm; fruits ellipsoid, 4–5 × 2–3 cm, fruiting pedicels up to 7 mm in diam. .... 12. *B. roxburghiana*
- 35b. Leaf blade leathery or thinly leathery, not black or black-brown when dry.
- 37a. Leaf blade large, usually ca. 20 × 6 cm ..... 13. *B. pauciflora*
- 37b. Leaf blade small, 5–11 × 2–4.5 cm.
- 38a. Fruits globose, ca. 1.8 cm in diam., densely brown furfuraceous ..... 14. *B. baotingensis*
- 38b. Fruits ellipsoid or ovoid-ellipsoid, ca. 1 cm in diam., always verruculose ..... 15. *B. appendiculata*

**1. *Beilschmiedia cylindrica*** S. K. Lee & Y. T. Wei, Acta Phytotax. Sin. 17(2): 63. 1979.

柱果琼楠 zhu guo qiong nan

Shrubs to small trees. Branchlets gray, slightly striate; young branchlets and terminal buds densely yellow-brown tomentose. Leaves alternate or subopposite; petiole 7–13 mm, densely yellow-brown tomentose or later glabrate; leaf blade abaxially brownish or purple-brown when dry, adaxially gray-brown, obovate, obovate-oblong, or oblong, 15–24 × 7–11 cm, papery, densely or sparsely yellow-brown puberulent along midrib and veins on both surfaces, densely and minutely whitish punctate and verruculose, midrib abaxially elevated, adaxially impressed, midrib and lateral veins yellow-brown pubescent on both surfaces, lateral veins 12–16 pairs, abaxially more conspicuously elevated than adaxially, interconnected by transverse veins near leaf margin, veins laxly reticulate, slightly elevated on both surfaces, base broadly cuneate to subrounded, apex acute, shortly caudate-acuminate, obtuse, or subrounded. Inflorescences unknown. Infructescences short. Fruits black, cylindrical, up to 5 × 1.5 cm, conspicuously plicate, scattered verruculose; fruiting pedicels thickened, ca. 3 mm in diam. Fr. Jan.

- Valley forests. SE Yunnan (Pingbian).

**2. *Beilschmiedia tsangii*** Merrill, Lingnan Sci. J. 13: 27. 1934.

网脉琼楠 wang mai qiong nan

*Beilschmiedia formosana* C. E. Chang.

Trees, up to 25 m tall, ca. 60 cm d.b.h. Bark gray-brown or gray-black. Branchlets and terminal buds densely yellow-brown tomentose or yellow-brown puberulent. Terminal buds small. Leaves alternate or sometimes subopposite; petiole 5–14 mm, densely brown tomentose; leaf blade abaxially pallid, adaxially gray-brown or green-brown, shiny on both surfaces, elliptic to oblong, 6–9(–14) × 1.5–4.5 cm, leathery, midrib adaxially impressed, lateral veins 7–9 pairs, veins conspicuously and densely reticulate, somewhat laxly foveolate when dry, base acute or subrotund, apex acute with an obtuse acumen or sometimes round or incised. Panicles axillary, 3–5 cm, puberulent. Pedicels 1–2 mm. Flowers white or yellow-green. Perianth segments broadly ovate, puberulent outside. Filaments puberulent, those of 3rd whorl each with 2 stalkless glands near base. Stamens sagittate. Fruits ellipsoid, 1.5–2 cm × 9–15 mm, verruculose; fruiting pedicels 1.5–3.5 mm in diam. Fl. summer, fr. Jul–Dec.

Humid mixed forests on mountain slopes. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Vietnam].

**3. *Beilschmiedia muricata*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 22. 1960.

瘤果琼楠 liu guo qiong nan

Shrubs or small trees. Branchlets gray-brown, lenticellate; young branchlets and small terminal buds gray-brown puberulent. Leaves alternate or subopposite; petiole 7–8 mm, puberulent; leaf blade abaxially gray-brown, adaxially shiny green, oblong, 4–7 × 1.5–2.5 cm, leathery, puberulent when young but soon glabrate, midrib abaxially elevated, adaxially impressed, lateral veins 7 or 8 pairs, inconspicuous, somewhat elevated abaxially, slender, green-brown adaxially, purple-brown abaxially when dry, veinlets slender, densely reticulate, conspicuous abaxially, base cuneate, apex shortly acuminate or somewhat obtuse. Inflorescences unknown. Fruits dark brown, ellipsoid, ca. 1.8 × 1.2 cm, obtuse at both ends, densely and conspicuously verruculose; fruiting pedicels ca. 2 mm in diam.

- Mixed forests. S Guangxi (Shiwan Dashan).

**4. *Beilschmiedia obconica*** C. K. Allen, J. Arnold Arbor. 23: 453. 1942.

锈叶琼楠 xiu ye qiong nan

Trees, up to 20 m tall. Bark grayish brown. Young branchlets and terminal buds ferruginous tomentose. Terminal buds ovoid. Leaves opposite or subopposite; petiole 1.5–2.5 cm, ferruginous tomentulose; leaf blade elliptic or oblong, 7–15 × 3.5–6.5 cm, slightly oblique, papery, abaxially ferruginous tomentulose, adaxially always glabrous, midrib abaxially elevated, adaxially impressed, lateral veins 7–11 pairs, veins elevated on both surfaces, base cuneate or rotund, apex shortly acuminate or acuminate with an obtuse acumen. Panicles subterminal, robust, less than 4 cm, ferruginous tomentulose. Fruits black, globose, minutely verruculose, brownish punctate; fruiting pedicels clavate, somewhat ferruginous tomentose. Fl. Sep, fr. Feb of next year.

- Along streamsides, humid shady places in mixed forests. Hainan (Dongfang).

**5. *Beilschmiedia macropoda*** C. K. Allen, J. Arnold Arbor. 23: 452. 1942.

肉柄琼楠 rou bing qiong nan

Large trees, up to 22 m tall, ca. 60 cm d.b.h. Bark blackish brown. Branchlets always narrowly angled or shallowly sulcate, glabrous, blackish brown and irregularly gray-brown rugose when old. Terminal buds ovoid, ferruginous tomentose. Leaves

opposite or subopposite, clustered at apex of branchlet; petiole 6–10 mm; leaf blade abaxially always purplish, adaxially shiny, green-brown or gray-brown when dry, lanceolate or narrowly elliptic, 8–15 × 1.5–5 cm, leathery, glabrous on both surfaces, midrib abaxially elevated, adaxially somewhat impressed or at least impressed on lower 1/2, lateral veins 8–10 pairs, elevated on both surfaces, veins densely reticulate, slightly elevated on both surfaces, base cuneate or broadly cuneate, margin slightly revolute, apex obtuse or shortly acuminate with an obtuse acumen. Panicles axillary, 2–6 cm, few flowered. Pedicels thickened and swollen at both ends after anthesis. Infructescences robust, swollen at base. Fruits ellipsoid, subglobose, or obovoid, 4–5 × 3–4 cm, pallid ferruginous or black in color, brown furfuraceous, densely plicate and ferruginous punctate when dry; fruiting pedicels enlarged on one end or on both ends, enlarged part 7–15 mm in diam. Fr. Aug–Oct.

- Humid places in mixed forests on mountain slopes. Hainan.

**6. *Beilschmiedia purpurascens*** H. W. Li, Acta Phytotax. Sin. 17(2): 63. 1979.

紫叶琼楠 *zi ye qiong nan*

Trees, 4–20 m tall, up to 50 cm d.b.h. Bark gray. Young branchlets purple-brown, slightly compressed, sulcate, slightly furfuraceous-puberulent or glabrate. Terminal buds ovoid, ferruginous-brown furfuraceous-puberulent. Leaves opposite or alternate; petiole 6–12 mm; leaf blade abaxially purplish brown, adaxially purple-brown, oblong, 9–15 × 2.5–5 cm, papery, somewhat furfuraceous when dry, midrib abaxially conspicuously elevated, adaxially impressed, lateral veins ca. 10 pairs, conspicuous on both surfaces, reticulate veinlets conspicuous on both surfaces, base broadly cuneate or subrotund, apex shortly acuminate with an obtuse acumen. Flowers unknown. Infructescences 3.5–6 cm, paniculate; peduncles 1.2–3 cm, always thickened, peduncles and rachises ferruginous furfuraceous-puberulent. Fruits ellipsoid, up to 3 cm, ca. 2.3 cm in diam., narrowed into a stalk at base, ferruginous furfuraceous-puberulent when young, dark brown and glabrous when old; fruiting pedicels swollen, up to 5 mm in diam. Fl. Feb–Mar, fr. Mar–Apr.

- Dense or sparse forests along humid streamsides or riverbanks; 700–1100 m. S and W Yunnan.

**7. *Beilschmiedia laevis*** C. K. Allen, J. Arnold Arbor. 23: 446. 1942.

红枝琼楠 *hong zhi qiong nan*

Trees, up to 20 m tall. Bark gray-black or gray-brown. Branchlets green, robust, always sulcate, glabrous. Terminal buds ovoid, leathery, always gray-brown tomentulose or subglabrous. Leaves opposite or subopposite; petiole 1.5–3 cm; leaf blade abaxially green, adaxially shiny green, elliptic or broadly elliptic, 7–11(–15) × 4–6 cm, thickly leathery or leathery, chestnut-colored and glabrous on both surfaces when dry, midrib adaxially impressed, lateral veins 6–10 pairs but nearly always 7 pairs, veins laxly reticulate, robust, elevated on both surfaces, base broadly cuneate-decurrent, apex obtuse or shortly acuminate with an obtuse acumen. Inflorescences unknown. Infructescences subterminal. Fruits green when immature, dark brown

when mature, ellipsoid or broadly ellipsoid, 1.7–2.6 × 1.2–2 cm, rotund at both ends, smooth and glabrous; fruiting pedicels robust, 1–3.5 cm × 3–6 mm. Fr. Feb–Dec.

Mountain slopes, dense valley forests; 500–900 m. Guangxi, Hainan [Vietnam].

The wood is hard and used for furniture, farm tools, and house construction.

**8. *Beilschmiedia rufohirtella*** H. W. Li, Acta Phytotax. Sin. 17(2): 63. 1979.

红毛琼楠 *hong mao qiong nan*

Trees, 5–25(–30) m tall. Terminal buds densely ferruginous hirtellous. Young branchlets compressed, angled and finely striate, ferruginous hirtellous. Leaves alternate, opposite, or subopposite; petiole 1–2.5 cm, densely ferruginous hirtellous when young but soon glabrate; leaf blade abaxially tea-brown and adaxially blackish brown when dry, elliptic to oblong, 11–23 × 3.6–10.2 cm, papery, abaxially densely glandular-punctate when dry, densely ferruginous hirtellous on both surfaces when young, ferruginous hirtellous along midrib and veins only or glabrous abaxially and ferruginous hirtellous on reticulate veins when old, midrib and lateral veins abaxially conspicuously elevated, adaxially slightly elevated or plane, lateral veins 9–12 pairs, obliquely patent, reticulate veinlets conspicuous on both surfaces, margin cartilaginous, apex shortly acuminate to acuminate, sometimes acute to subrotund. Cymose panicles axillary or subterminal, 1.8–3 cm; peduncles and rachises densely ferruginous hirtellous; bracts and bracteoles obovate, up to 3 × 2 cm, hirtellous. Pedicels ca. 2.5 mm. Flowers yellow, ca. 3.5 mm. Perianth segments broadly ovate, ca. 2.5 × 2 mm. Fruits ellipsoid-oblong, 4.5–5.5 × 2.5–2.7 cm, attenuate at both ends, apiculate at apex. Fl. and fr. Dec–Mar of next year.

- Thickets or broad-leaved forests along valleys; 1100–1700 m. SE Yunnan.

**9. *Beilschmiedia wangii*** C. K. Allen, J. Arnold Arbor. 23: 452. 1942.

海南琼楠 *hai nan qiong nan*

Trees, up to 10 m tall. Bark gray. Young branchlets compressed. Buds ferruginous pubescent. Leaves opposite; petiole 1.2–2.5 cm, always verruculose; leaf blade elliptic, broadly elliptic, or elliptic-lanceolate, 9–14 × 3.5–7 cm, subleathery or papery, abaxially densely glandular-punctate, pubescent, or subglabrate, adaxially glabrous, midrib adaxially plane, lateral veins 8 or 9 pairs, abaxially robust, adaxially slender, veins slender, densely reticulate, slightly elevated on both surfaces, base subrotund or acute, always asymmetric on sides, apex obtuse or shortly acuminate. Panicles subterminal or axillary, 4–8 cm, ferruginous pubescent, many ramified; lower bracts short, subobovate or lanceolate, ca. 2.5 mm. Pedicels ca. 1 cm. Flowers white, 4–5 mm. Perianth segments elliptic, ca. 3 mm, yellow-brown pubescent and glandular-punctate. Fruits purple-black or black, narrowly ellipsoid, ca. 5.5 × 2.2 cm; fruiting pedicels up to 2.5 cm, ca. 5 mm in diam. Fl. Nov–Mar of next year.

Dense mixed forests or thickets along streams. Guangxi, Hainan, Yunnan [Vietnam].

**10. *Beilschmiedia shangsiensis*** Y. T. Wei, *Guihaia* 4: 196. 1984.

上思琼楠 shang si qiong nan

Trees, up to 24 m tall. Bark dark gray. Branchlets green, glabrous. Terminal buds small, densely ferruginous pubescent. Leaves opposite; petiole slender, 1–3 cm; leaf blade adaxially shiny, lanceolate or narrowly elliptic-lanceolate, 6–13 × 2–4 cm, thinly leathery, glabrous on both surfaces, abaxially glandular-punctate, midrib abaxially elevated, adaxially plane, lateral veins 7–9 pairs, lateral veins and veinlets adaxially inconspicuously or slightly elevated, interconnected near leaf margin, base cuneate, apex shortly acuminate with an obtuse acumen. Panicles terminal, ca. 2 cm, few ramified, wholly ferruginous pubescent. Flowers small. Perianth segments broadly elliptic, pubescent, arranged in 2 whorls. Fertile stamens 9, in 3 whorls; anther cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes subtriangular. Ovary ovoid. Fruits ellipsoid, ca. 5 × 2.5 cm, somewhat oblique, subrotund at both ends, apiculate at apex, black-brown when dry; fruiting pedicels ca. 5 mm in diam. Fr. Oct.

- Forests. Guangxi (Shiwan Dashan).

**11. *Beilschmiedia punctilimba*** H. W. Li, *Acta Phytotax. Sin.* 17(2): 64. 1979.

点叶琼楠 dian ye qiong nan

Small trees, 5–10 m tall. Young branchlets yellow-brown, ± angled, striate, white verruculose, sparsely yellow-brown pubescent; old branchlets gray-brown, terete. Terminal buds small, densely yellow-brown puberulent. Leaves alternate or subopposite; petiole 5–13 mm, always white verruculose, ± pubescent; leaf blade abaxially red-brown when dry, adaxially green-brown or dark purple, oblong to elliptic, 8–13 × 2.5–5 cm, submembranous, ± sparsely pubescent but glabrate on both surfaces when old, abaxially densely and conspicuously white glandular-punctate, midrib adaxially plane or slightly elevated, lateral veins 8–10 pairs, slender, conspicuous on both surfaces, veins conspicuous on both surfaces, base cuneate or broadly cuneate, apex acuminate, always oblique. Cymose panicles axillary, ca. 1.5 cm; rachises yellow-brown pubescent. Pedicels yellow-brown pubescent. Flowers greenish. Perianth segments subequal, oblong, ca. 3.5 × 1–1.2 mm. Fruits yellow-brown, ovoid, ca. 3.3 × 2.7 cm, glabrous, surface uneven, base abruptly narrowed, apex obtuse; fruiting pedicels ca. 2 mm in diam. Fl. May, fr. Oct.

- Sparse or dense forests; 1000–1500 m. SE Yunnan (Pingbian).

**12. *Beilschmiedia roxburghiana*** Nees in Wallich, *Pl. Asiatic Rar.* 2: 69. 1831.

稠琼楠 chou qiong nan

*Beilschmiedia fagifolia* Nees.

Trees, 10–15(–20) m tall. Branchlets blackish brown, compressed, conspicuously angled, sparsely pubescent or subglabrous. Terminal buds small, densely gray-brown pubescent. Leaves opposite, sometimes alternate; petiole 1.5–2 cm, slender; leaf blade elliptic, narrowly elliptic, or elliptic-lanceolate,

9–14 × 3.5–5 cm, papery or subleathery, minutely glandular-punctate on both surfaces, midrib abaxially elevated, adaxially slightly elevated, lateral veins 10–15 pairs, slender, interconnected on leaf margin, abaxially elevated and reddish, reticulate veins slender, always inconspicuous, base broadly cuneate or subrotund, apex obtuse, obtusely acuminate, acute, or subrotund. Cymose panicles or racemes terminal or axillary, short, 5–15 cm, wholly densely gray-yellow pubescent. Pedicels ca. 1 mm. Flowers small. Perianth segments ovate, ca. 1.5 mm. Fertile stamens 9. Fruits ellipsoid, 4–5 × 2–3 cm, smooth, subrounded at both ends, apex mucronate; fruiting pedicels robust, 5–20 mm, up to 7 mm in diam., always brown maculate. Fl. and fr. Aug.

Evergreen broad-leaved forests on mountain slopes. SE Xizang [Bhutan, India, Myanmar, Nepal, Thailand].

Some specimens cited by Allen (*J. Arnold Arbor.* 23: 451. 1942) as *Beilschmiedia roxburghiana* (*S. K. Lau* 3147, A; *S. K. Lau* 27404, A; and *K. Fung* 20123, A, US) are, in fact, *B. percoriacea* (species no. 36), which is characterized by the whole plant being glabrous. Records from Hainan (in *Fl. Hainan.* 1: 278. 1964) are referable to *B. appendiculata* (species no. 15), which was included in the synonymy of *B. roxburghiana* in that work (as *Lauromerrillia appendiculata*).

**13. *Beilschmiedia pauciflora*** H. W. Li, *Acta Phytotax. Sin.* 17(2): 64. 1979.

少花琼楠 shao hua qiong nan

Trees, ca. 14 m tall. Bark gray. Branchlets gray-brown, robust, verrucose, glabrous; young branchlets pubescent. Terminal buds small, pubescent. Leaves opposite or alternate; petiole 5–15 mm; leaf blade abaxially opaque, adaxially gray-brown or green-brown, narrowly elliptic to obovate, usually ca. 20 × 6 cm, thinly leathery, abaxially minutely glandular-punctate, glabrous on both surfaces, midrib adaxially plane or slightly impressed on lower 1/2, lateral veins ca. 11 pairs, oblique, ± conspicuous on both surfaces, veins laxly reticulate, ± conspicuous on both surfaces, base cuneate and attenuate, apex obtuse, rounded, or emarginate, rarely acute to shortly acuminate. Cymes axillary or subterminal, short, 1–2 cm, 1–3-flowered; peduncles ca. 1 cm, yellow-brown pubescent. Pedicels 2–7 mm. Flowers white, up to 5 mm in diam. when open. Perianth segments oblong-lanceolate, ca. 3 × 1 mm, pubescent, transparently punctate. Fertile stamens 6, opposite to perianth segments, ca. 3 mm; filaments pubescent, each with stalkless orbicular-reniform glands near base; anthers oblong, ca. 1 mm, anther cells all introrse. Staminodes orbicular-reniform, shortly stipitate. Ovary subglobose, slightly pubescent. Fruits unknown. Fl. Mar–Apr.

- Sparse or dense forests on mountain slopes or in valleys; 500–1000 m. S Yunnan (Jinghong).

**14. *Beilschmiedia baotingensis*** S. K. Lee & Y. T. Wei, *Acta Phytotax. Sin.* 17(2): 64. 1979.

保亭琼楠 bao ting qiong nan

Small trees, 4–12 m tall. Bark brown. Branchlets gray-brown pubescent or glabrous, densely and minutely lenticellate. Terminal buds small, densely yellow-brown pubescent. Leaves opposite or subopposite; petiole 0.5–1 cm; leaf blade abaxially

purple-black and adaxially gray-brown when dry, elliptic, rarely elliptic-lanceolate,  $\pm$  oblique, 6–10  $\times$  2–4 cm, leathery, abaxially minutely glandular-punctate when dry, midrib adaxially slightly elevated, lateral veins 7 or 8 or rarely more pairs, elevated on both surfaces, veins laxly reticulate, slightly elevated on both surfaces, base cuneate, always asymmetric, apex shortly acuminate, always slightly curved, rarely rounded, obtuse, or emarginate. Inflorescences unknown. Infructescences axillary, 2–3 cm. Fruits globose, ca. 1.8 cm in diam., densely brown furfuraceous; fruiting pedicels 4–7  $\times$  2–3 mm. Fl. Jul.

- Mixed broad-leaved forests in valleys. Hainan.

**15. *Beilschmiedia appendiculata*** (C. K. Allen) S. K. Lee & Y. T. Wei, Acta Phytotax. Sin. 17(2): 65. 1979.

山潺 shan chan

*Lauromerrillia appendiculata* C. K. Allen, J. Arnold Arbor. 23: 460. 1942.

Trees, 6–30 m tall, up to 60 cm d.b.h. Bark gray-yellow. Branchlets glabrous or pubescent, always robust, slightly angled. Terminal buds densely gray-brown tomentulose. Leaves opposite or alternate; petiole 5–18 mm, slender; leaf blade adaxially green-brown to gray-brown, elliptic to narrowly elliptic, rarely obovate, 5–11  $\times$  2–4.5 cm, glabrous on both surfaces, abaxially densely glandular-punctate, adaxially sometimes densely glandular-punctate, midrib adaxially plane or slightly elevated but always slightly impressed on base, lateral veins 7–10 pairs, elevated on both surfaces, veins slender, laxly reticulate, elevated on both surfaces, base cuneate or broadly cuneate, apex obtuse, obtusely acuminate, rounded, or sometimes emarginate. Panicles axillary, 1–2 cm, pubescent. Pedicels ca. 4 mm. Flowers yellow. Perianth segments 6, or sometimes 8, elliptic, ca. 1.8 mm. Fertile stamens 6, or sometimes 8. Staminodes 3(or 4), ca. 1.2 mm. Fruits green, becoming black when mature, ellipsoid or ovoid-ellipsoid, 1–1.8 cm, always verruculose; fruiting pedicels 1.5–2 mm in diam. Fl. Feb–Mar, fr. May–Jul.

- Sparse forests on roadsides in valleys or along streamsides. Hainan.

As in FRPS (31: 135. 1982), the unispecific genus *Lauromerrillia* is treated here as a synonym of *Beilschmiedia*. Its type has a variable number of fertile stamens and perianth segments (6, or sometimes 8).

**16. *Beilschmiedia obscurinervia*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 23. 1960.

隐脉琼楠 yin mai qiong nan

Small trees, ca. 5 m tall. Branchlets terete; young branchlets and terminal buds sparsely pubescent. Terminal buds small. Leaves always clustered at apex of branchlet, alternate or sometimes subopposite; petiole 6–12 mm; leaf blade green-brown when dry, narrowly oblong-lanceolate or oblong, rarely narrowly ovate-lanceolate, 5–11  $\times$  2–4 cm, leathery, glabrous on both surfaces, midrib elevated on both surfaces, lateral veins 6–8 pairs, inconspicuous, veins densely foveolate when dry, base broadly cuneate or subrotund, apex acuminate with an obtuse acumen. Inflorescences unknown. Infructescences paniculate, 3–7 cm. Fruits ellipsoid, 2–3.5  $\times$  1–1.7 cm, smooth, densely

minutely furfuraceous, dark brown when dry, acute at both ends, apex umbonate; fruiting pedicels 5–7  $\times$  ca. 2 mm. Fr. Aug.

- Mixed forests; ca. 900 m. S Guangxi (Shiwan Dashan).

**17. *Beilschmiedia tungfangensis*** S. K. Lee & L. F. Lau, Acta Phytotax. Sin. 8: 194. 1963.

东方琼楠 dong fang qiong nan

Trees, up to 25 m tall, ca. 60 cm d.b.h. Bark red-brown or gray-brown. Branchlets gray-brown, slender, lenticellate, lenticels orbicular, fissured. Terminal buds small, gray-yellow pubescent. Leaves clustered at apex of branchlet, alternate or opposite; petiole slender, 6–15 mm; leaf blade brownish when dry, elliptic or narrowly elliptic, 6–9(–12)  $\times$  2–3(–5) cm, leathery, midrib elevated on both surfaces, lateral veins 4–7 pairs, slightly elevated on both surfaces, always curved and interconnected near leaf margin, veins slender, dense, adaxially minutely foveolate, abaxially always lax and conspicuous when dry, base cuneate, apex acuminate with an obtuse acumen, rarely acuminate or obtuse. Racemes axillary or terminal, ca. 1.5 cm, sparsely gray-yellow pubescent, 3–5-flowered. Pedicels 1.5–3 mm, 1-bracteate at base and 2-bracteolate below perianth tube; bracts lanceolate, villous; bracteoles linear. Flowers yellow. Perianth segments ovate, villous on both surfaces. Fertile stamens 9; filaments villous, those of 3rd whorl 2-glandular at base. Staminodes sagittate. Ovary ovoid, glabrous. Fruits ellipsoid, 2.5–4  $\times$  2–2.5 cm, smooth, shiny, rounded at both ends, black-brown when mature; fruiting pedicels 5–10  $\times$  3–4 mm. Fl. Jul, fr. Sep–Nov.

- Dense forests along streamsides in valleys. SW Hainan (Jianfeng Ling).

**18. *Beilschmiedia yunnanensis*** Hu, Bull. Fan Mem. Inst. Biol. 5: 306. 1934.

滇琼楠 dian qiong nan

Trees, up to 18 m tall, to 1 m d.b.h. Branchlets blackish brown when dry, robust, always angled, striate and conspicuously lenticellate. Terminal buds always small, densely ferruginous-brown tomentose. Leaves alternate, rarely subopposite or opposite; petiole 1–2.5 cm, robust; leaf blade broadly elliptic, rarely elliptic-lanceolate, always oblique, 8–16(–18)  $\times$  4–6(–7.5) cm, glabrous on both surfaces, midrib adaxially plane or elevated, lateral veins 5–9 pairs, conspicuously elevated on both surfaces, veins slender, densely reticulate, gray-brown or dark brown and conspicuously foveolate on both surfaces when dry, base broadly cuneate and decurrent, apex acuminate, slightly oblique. Panicles terminal or axillary, 2–6 cm or rarely longer, few flowered; rachises robust, densely ferruginous tomentose; bracts broadly ovate, up to 5 mm. Pedicels 2–4 mm, densely ferruginous-brown tomentose. Perianth segments ovate or broadly ovate, densely pubescent. Filaments densely pubescent. Fruits broadly ovoid or subglobose, 2–4  $\times$  1.5–2.7 cm, black when mature; fruiting pedicels 3–4  $\times$  2–4 mm. Fl. Jan–Feb, fr. May–Dec.

- Dense forests on hills or along streams; 800–1900 m. Guangdong, S Guangxi, ?Hainan (Danxian), S Yunnan.

**19. *Beilschmiedia delicata*** S. K. Lee & Y. T. Wei, Acta Phytotax. Sin. 17(2): 65. 1979.

美脉琼楠 mei mai qiong nan

*Beilschmiedia tsangii* Merrill var. *delicata* (S. K. Lee & Y. T. Wei) J. Li & H. W. Li.

Shrubs or trees, 4–20 m tall. Bark gray or gray-brown. Branchlets subterete, glabrous or thinly pubescent, always lenticellate. Terminal buds small, densely gray-yellow pubescent or gray-yellow tomentose. Leaves alternate or subopposite; petiole 8–13 mm, glabrous or pubescent; leaf blade 7–12 × 2–4 cm, rarely longer or broader, oblique, leathery, glabrous or adaxially villous, midrib conspicuously elevated on both surfaces, lateral veins 8–12 pairs, veins densely reticulate, slender, conspicuously elevated on both surfaces, base cuneate or broadly cuneate, apex acuminate, rarely acute or sometimes obtuse. Cymose panicles axillary or terminal, 3–6 cm; rachises and other parts pubescent; bracts and bracteoles caducous. Pedicels 2–8 mm. Flowers yellowish. Perianth segments ovate to oblong, 1.5–2.5 mm, pubescent. Fertile stamens 9; filaments pubescent. Staminodes 3, reniform. Fruits green, becoming black when mature, ellipsoid or obovoid-ellipsoid, 2–3 × 1–2 cm, densely and conspicuously verruculose; fruiting pedicels 5–10 × 2–3 mm. Fl. and fr. Jun–Dec.

• Valley roadsides and streamsides, dense and sparse forests. Guangdong, Guangxi, SW Guizhou, NE and SE Yunnan.

*Beilschmiedia delicata* apparently is related closely to *B. tsangii* and has been misidentified as that species in the past.

**20. *Beilschmiedia brachythyrsa*** H. W. Li, Acta Phytotax. Sin. 17(2): 65. 1979.

勐仑琼楠 meng lun qiong nan

Trees, up to 30 m tall, ca. 45 cm d.b.h. Branchlets gray-brown, glabrous, lenticellate, lenticels black-brown; young branchlets yellow-brown pubescent. Terminal buds small, ovoid, ca. 2 mm, densely yellow-brown pubescent outside. Leaves alternate or subopposite at upper part of young branchlets; petiole 1–2 cm, yellow-brown pubescent when young but glabrous when old; leaf blade abaxially greenish, adaxially green and shiny, elliptic or narrowly elliptic, 7–13 × 3–5 cm, subleathery, abaxially somewhat pubescent or subglabrous, adaxially glabrous, midrib adaxially slightly elevated or plane, lateral veins 7–10 pairs, elevated on both surfaces, reticulate veinlets conspicuous on both surfaces, base cuneate, margin slightly revolute, apex shortly acuminate with an obtuse acumen, rarely obtuse. Cymes short, 1.2–1.5 cm, 1–4-flowered; peduncles 2–5 mm, together with rachises yellow-brown pubescent. Pedicels yellow-brown pubescent. Perianth segments subequal, oblong, ca. 3.5 × 1.5 mm, yellow-brown pubescent. Fertile stamens 9; filaments hairy, those of 3rd whorl each with 2 stalkless orbicular-reniform glands at base. Staminodes sagittate-triangular. Ovary subglobose, ca. 1 mm, glabrous; style ca. 1.5 mm. Fruits green, becoming black when mature, ellipsoid, ca. 3 × 1.3 cm, glabrous, densely and conspicuously verruculose, base attenuate, apex obtuse; fruiting pedicels ca. 5 × 2–4 mm, slightly yellow-brown pubescent. Fl. Mar–Apr, fr. Apr–Jul.

• Humid places in thickets or sparse forests; 600–2100 m. S Yunnan (Menglun).

**21. *Beilschmiedia ningmingensis*** S. K. Lee & Y. T. Wei, Acta Phytotax. Sin. 17(2): 66. 1979.

宁明琼楠 ning ming qiong nan

Trees, ca. 12 m tall. Bark gray-black or gray-yellow. Branchlets gray-brown, striate, slender, subterete, slightly angled. Terminal buds small, densely ferruginous-brown tomentulose. Leaves opposite or subopposite, always clustered at apex of branchlet; petiole 5–10 mm, densely furfuraceous-pubescent; leaf blade black-brown when dry, oblong to oblong-lanceolate, 7–10 × 2–4 cm, papery or submembranous, furfuraceous-pubescent on both surfaces, especially abaxially, midrib elevated on both surfaces, lateral veins 8–12 pairs, slender, abaxially slightly elevated, adaxially inconspicuous, veins laxly reticulate, very slender, inconspicuous or slightly conspicuous on both surfaces, base broadly cuneate or subrotund, apex obtuse, rounded, or shortly acuminate. Panicles or racemes terminal, 2–4 cm, wholly densely furfuraceous-pubescent. Pedicels 3–6 mm. Perianth segments ovate, ca. 1.4 mm. Filaments of 3rd whorl each with 2 glands at base. Staminodes sagittate. Ovary ellipsoid, ca. 1.2 mm. Fruits yellow when mature (according to field note) but black when dry, ellipsoid, 2.5–4 × 1.8–2.5 cm, smooth, but slightly furfuraceous when dry; fruiting pedicels 5–10 × ca. 3 mm. Fl. and fr. Nov–Dec.

• Mixed forests on mountain slopes or along streamsides; ca. 1200 m. Guangxi (Ningming).

**22. *Beilschmiedia glandulosa*** N. H. Xia et al., J. Trop. Subtrop. Bot. 14: 78. 2006.

香港琼楠 xiang gang qiong nan

Trees. Branchlets grayish brown pubescent, soon glabrescent. Terminal buds grayish brown pubescent. Leaves subopposite; petiole 5–8 mm, glabrous; leaf blade brownish abaxially when dry, elliptic or narrowly elliptic to oblanceolate, 4.5–8.5 × 1.5–3.5 cm, leathery, glabrous, densely glandular-spotted adaxially, midrib elevated on both surfaces, lateral veins 5–7 pairs, together with veinlets prominent on both surfaces, base attenuate, margin entire, apex obtuse. Inflorescences axillary, shortly pedunculate, racemose or thyrsoid, 1–3-clustered, 1.5–3 cm; bracteoles ovate, ca. 1 × 0.6 mm, pilose. Flowers ca. 4 × 4 mm. Perianth tube short; perianth segments 6(–8), ovate, ca. 2.5 mm, sparsely villous outside, pilose inside. Fertile stamens 9, those of outer 2 whorls opposite to perianth lobes; filaments 0.5–1 mm, densely pilose, those of 3rd whorl each with a pair of shortly stalked orbicular-reniform glands near base; anthers 2-celled, 0.5–0.8 mm, cells introrse. Staminodes ovoid, ca. 0.8 mm. Ovary cylindrical, ca. 2.5 mm, sparsely villous; style ca. 1 mm; stigma capitate. Fruits bluish brown when mature, ellipsoid, 1.5–2.2 × 1–1.5 cm, smooth, but wrinkled when dry, apex apiculate. Seeds ellipsoid, 1.3–2 × 0.8–1.2 cm. Fl. Aug, fr. Jan–Feb.

• Evergreen broad-leaved forests on mountain slopes; below 100 m. Hong Kong.

**23. *Beilschmiedia fasciata*** H. W. Li, Acta Phytotax. Sin. 17(2): 66. 1979.

白柴果 bai chai guo

Trees, 6–25 m tall, ca. 50 cm d.b.h. Branches terete;

branchlets red-brown, conspicuously compressed, longitudinally striate, glabrous. Terminal buds narrowly ovoid, large, up to 1.5 cm, glabrous. Leaves large, opposite or subopposite; petiole 1–2 cm; leaf blade black-brown or red-brown on both surfaces when dry, ovate to ovate-oblong, 12.5–40 × 7–21 cm, thickly papery, glabrous, abaxially densely glandular-punctate, midrib abaxially elevated, adaxially plane or slightly impressed, lateral veins 10–12 pairs, abaxially conspicuous, adaxially inconspicuous, reticulate veinlets conspicuous on both surfaces, base broadly cuneate to subrotund, unequal on sides, apex shortly acuminate, always oblique. Cymose panicles axillary, (2.5–)5–10.5 cm, lax, few flowered; rachises compressed, robust, yellow-brown pubescent; bracts caducous. Pedicels slender, 3–4 mm, yellow-brown pubescent. Flowers yellow-green, ca. 3.5 mm. Perianth segments ovate, ca. 3 mm, subglabrous outside, yellow-brown pubescent inside. Fertile stamens 9, ca. 1.5 mm; filaments pubescent, those of 3rd whorl each with 2 subsessile glands. Staminodes sagittate-triangular. Ovary pyriform, including style ca. 1 mm. Fruits green when immature, subglobose, up to 4 cm in diam., outside ferruginous-brown when dry, glabrous; fruiting pedicels robust, up to 6 mm in diam. at apex. Fl. Mar–Apr, fr. May–Nov.

• Sparse or dense forests along streamsides; 1100–1600 m. SE Yunnan.

**24. *Beilschmiedia pergamentacea*** C. K. Allen, J. Arnold Arbor. 23: 449. 1942.

纸叶琼楠 zhi ye qiong nan

*Beilschmiedia atrata* C. K. Allen.

Trees, 8–20 m tall. Bark gray. Branchlets striate, minutely glandular-punctate. Terminal buds small, glabrous. Leaves opposite or subopposite; petiole 1–2 cm, always glandular-punctate; leaf blade abaxially purple-black, adaxially gray-brown, narrowly elliptic, 10–16 × 3–5.5 cm, papery, glabrous, abaxially densely glandular-punctate when dry, midrib adaxially slightly elevated, lateral veins 7–12 pairs, reticulate veinlets slightly conspicuous, base cuneate or broadly cuneate, apex acuminate or long acuminate with an obtuse acumen, always falcately curved. Racemes or panicles axillary, 3–4 cm, subglabrous; peduncles ca. 1 cm. Pedicels ca. 5 mm. Perianth segments suborbicular, ca. 1.5 mm, gray hairy. Filaments usually pubescent. Staminodes usually pubescent. Infructescences robust. Fruits black or black-purple and always minutely punctate when dry, oblong-ellipsoid, 3–4.3 × 2–2.5 cm, rounded at both ends, apex apiculate; fruiting pedicels gray-brown, 1–2.5 cm × 4–6 mm, rugose. Fl. Aug, fr. Oct–Nov.

• Sparse or dense forests in valleys. Guangxi, Hainan, SE Yunnan.

**25. *Beilschmiedia robusta*** C. K. Allen, J. Arnold Arbor. 23: 447. 1942.

粗壮琼楠 cu zhuang qiong nan

*Beilschmiedia xizangensis* H. P. Tsui.

Trees, up to 25 m tall, whole plant glabrous. Bark gray, smooth. Branchlets red-brown, robust. Terminal buds large, ovoid. Leaves opposite or alternate; petiole 1–2.5 cm; leaf blade abaxially dark brown or purple-black, adaxially green-brown or

gray-brown, lanceolate, elliptic, or narrowly elliptic, slightly oblique, (4.5–)7–13 × 2.5–5 cm, leathery, abaxially always densely glandular-punctate when dry, midrib abaxially elevated, adaxially impressed or at least impressed below lower 1/2, lateral veins 9–13 pairs, slender, veins elevated on both surfaces, generally denser abaxially than adaxially, base cuneate, apex obtuse or shortly acuminate with an obtuse acumen. Panicles axillary or subterminal, up to 6 cm, few flowered. Perianth segments ovate, glandular-punctate. Fruits obovoid or subtrubinate, ca. 3 cm, purple-black when mature; fruiting pedicels robust, 4–6 mm in diam. Fl. Apr–May, fr. Jun–Nov.

• Humid montane valleys, sparse forests or dense forests; 1000–2400 m. Guangxi, SW Guizhou (Ceheng), Xizang, Yunnan.

**26. *Beilschmiedia longepetiolata*** C. K. Allen, J. Arnold Arbor. 23: 450. 1942.

长柄琼楠 chang bing qiong nan

Trees, 10–20 m tall, whole plant glabrous. Bark green-brown. Terminal buds ovoid or subglobose. Leaves always clustered at apex of branchlet, opposite or subopposite; petiole 1–2.5 cm; leaf blade dark brown when dry, shiny adaxially, elliptic to narrowly elliptic, rarely obovate, (5–)8(–14) × 2.5–4.5 cm, leathery or subleathery, midrib adaxially plane or slightly elevated, lateral veins ca. 6 pairs, lateral veins and veinlets elevated on both surfaces, base cuneate to broadly cuneate and decurrent, margin slightly revolute, apex rounded. Panicles terminal, up to 3 cm. Pedicels ca. 3 mm. Flowers white tinged with yellow (according to field note). Perianth segments elliptic, ca. 2 mm, conspicuously glandular-punctate. Fruits ellipsoid or subglobose, 2–4 × 1.5–3 cm, black-brown and always brown-maculate when dry; fruiting pedicels ca. 8 × 3–5 mm. Fl. and fr. Jul–Nov.

• Mixed forests on hill or mountain slopes. Hainan.

**27. *Beilschmiedia glauca*** S. K. Lee & L. F. Lau, Acta Phytotax. Sin. 8: 193. 1963.

粉背琼楠 fen bei qiong nan

Trees, up to 23 m tall, whole plant glabrous. Bark gray-brown, irregularly fissured. Branchlets black-brown or brown, shallowly striate. Terminal buds nearly 1 cm, slender, aristate, slightly curved. Leaves alternate; petiole 1.2–2.7 cm; leaf blade abaxially powdery green or powdery brown, adaxially green and shiny, ovate or ovate-lanceolate or broadly elliptic, 7–15 × 3.5–6.5 cm, papery or subleathery, midrib adaxially plane, lateral veins 6–8 pairs, slender, all elevated and reddish brown on both surfaces, veins densely reticulate, foveolate when dry, base subrotund, symmetric or asymmetric on sides, apex shortly acuminate, acuminate, or obtuse, always oblique. Panicles axillary or terminal, 2–10 cm, narrow or congested or ample and lax, few or several branched, few or many flowered, glabrous or sparsely pubescent on rachises. Flowers white. Perianth segments broadly ovate, glabrous outside, pubescent inside. Filaments of 3rd whorl each with 2 glands at base, hairy. Staminodes sagittate, hairy at base. Fruits ellipsoid, 2.5–3.5 × 1.5–2.3 cm, black and smooth when dry, obtuse at both ends; fruiting pedicels ca. 2 mm in diam. Fl. Feb, fr. Aug–Dec.

• Mixed forests on mountain slopes, forests on limestone mountains; ca. 1300 m. Hainan, SE Yunnan.

- 1a. Panicles axillary, 2–6 cm, narrow and congested, few branched, few flowered, wholly glabrous ..... 27a. var. *glauca*  
 1b. Panicles terminal, up to 10 cm, ample and lax, several branched, many flowered, sparsely pubescent on rachises ..... 27b. var. *glaucoides*

**27a. *Beilschmiedia glauca* var. *glauca***

粉背琼楠(原变种) fen bei qiong nan (yuan bian zhong)

Panicles axillary, 2–6 cm, narrow and congested, few branched, few flowered, wholly glabrous.

• Mixed forests on mountain slopes. Hainan.

**27b. *Beilschmiedia glauca* var. *glaucoides*** H. W. Li, Acta Phytotax. Sin. 17(2): 66. 1979.

顶序琼楠 ding xu qiong nan

*Beilschmiedia glaucoides* (H. W. Li) H. W. Li.

Panicles on young branchlets all terminal, up to 10 cm, ample and lax, several branched, many flowered, sparsely pubescent on rachises.

• Forests on limestone mountains; ca. 1300 m. SE Yunnan (Xichou).

**28. *Beilschmiedia erythrophloia*** Hayata, Icon. Pl. Formosan. 4: 20. 1914.

台琼楠 tai qiong nan

*Beilschmiedia erythrophloia* var. *tanakae* (Hayata) Kanehira; *B. tanakae* Hayata.

Trees, trunk upright, up to 1 m d.b.h. Bark shiny, gray-brown, always irregularly lamellate-fissured. Terminal buds ovoid, glabrous. Leaves opposite or alternate; petiole 1–2 cm; leaf blade dark brown and shiny on both surfaces when dry, narrowly elliptic or ovate-lanceolate, 7–11 × 2.5–4.5 cm, leathery, glabrous on both surfaces, midrib and lateral veins elevated on both surfaces, veins conspicuous, base cuneate, apex caudate or acuminate, sometimes obtuse. Panicles axillary or subterminal, glabrous. Pedicels 2–5 mm. Perianth segments elliptic, ca. 2 × 1.5 mm. Fruits ellipsoid, 1.5–2 × 1–1.2 cm, dark brown when mature, outer layer hard; fruiting pedicels slightly thickened. Fl. summer.

Broad-leaved forests; low elevations. Taiwan [Japan (Ryukyu Islands)].

**29. *Beilschmiedia fordii*** Dunn, J. Bot. 45: 404. 1907.

广东琼楠 guang dong qiong nan

Trees, 6–18 m tall, 15–50 cm d.b.h. Bark green. Terminal buds ovoid or lanceolate, glabrous. Leaves generally opposite; petiole 1–2 cm; leaf blade abaxially greenish, adaxially dark green, lanceolate or narrowly elliptic to broadly elliptic, (6–)8–12 × (2.5–)3–4.5 cm, leathery, glabrous and brown on both surfaces but adaxially generally smooth when dry, midrib abaxially elevated, adaxially impressed, lateral veins slender, 6–10 pairs,

lateral veins and reticulate veins inconspicuous or slightly conspicuous, base cuneate or broadly cuneate, apex shortly acuminate or obtuse. Cymose panicles generally axillary, 1–3 cm, many flowered; bracts caducous, ferruginous pubescent inside. Pedicels 3–6 mm. Flowers yellow-green. Perianth segments ovate to oblong, 1.5–2 mm, glabrous. Fruits ellipsoid, 1.4–1.8 cm, generally verruculose, rotund at both ends; fruiting pedicels 1.5–2 mm in diam. Fl. and fr. Jun–Dec.

Sparse or dense forests on humid hills or in valleys. Guangdong, Guangxi, Hunan, Jiangxi, Sichuan [Vietnam].

**30. *Beilschmiedia brevipaniculata*** C. K. Allen, J. Arnold Arbor. 23: 446. 1942.

短序琼楠 duan xu qiong nan

Small trees, 3–7 m tall, whole plant glabrous. Young branchlets red-brown, slender, slightly compressed. Terminal buds lanceolate or ovoid, 5–10 × ca. 2 mm, glabrous. Leaves opposite or subopposite, always clustered at apex of branchlet; petiole 1–1.5 cm, glabrous; leaf blade dark green, adaxially dark brown, smooth, and shiny when dry, lanceolate, elliptic, or broadly elliptic, rarely ovate-elliptic, 4–8 × 1–2.8 cm, rarely longer or broader, oblique, leathery, midrib adaxially impressed, lateral veins 6–8 pairs, lateral veins and veinlets slender and inconspicuous but abaxially somewhat conspicuous, base cuneate or broadly cuneate, apex broadly acuminate with a short and obtuse acumen. Cymose panicles terminal, rarely axillary. Flowers small. Pedicels 1–2 mm. Perianth segments ovate, ca. 1.5 mm, densely glandular-punctate. Fruits ellipsoid, ca. 1.7 × 1.1 cm. Fl. Jun, fr. Nov–Feb of next year.

• Dense or sparse forests on mountain slopes. Guangdong, Guangxi, Hainan.

**31. *Beilschmiedia brevifolia*** Y. T. Wei, Guihaia 4: 196. 1984.

短叶琼楠 duan ye qiong nan

Trees, ca. 8 m tall. Bark smooth or slightly fissured. Branchlets somewhat robust, glabrous. Terminal buds ovoid, ca. 5 mm in diam., glabrous, apex acute. Leaves opposite, always clustered at apex of branchlet; petiole short, 2–5 mm, glabrous; leaf blade abaxially dark brown and adaxially dark gray when dry, elliptic to narrowly elliptic-lanceolate, 2.5–4(–6) × 1.5–2.5(–3) cm, thinly leathery, glabrous, midrib abaxially elevated, adaxially somewhat impressed, lateral veins ca. 7 pairs, lateral veins and reticulate veins elevated on both surfaces, base subrotund but rarely subcuneate, apex obtuse. Flowers unknown. Infructescences terminal or axillary. Fruits subglobose, ca. 1.5 cm in diam., black when dry; fruiting pedicels 3–4 mm in diam. Fr. Sep–Nov.

• Sparse or dense forests. Hainan.

**32. *Beilschmiedia furfuracea*** Chun ex Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1960(1): 23. 1960.

糠秕琼楠 kang bi qiong nan

Trees, 8–15 m tall. Bark gray. Young branchlets gray-brown, glabrous. Terminal buds ovoid, glabrous. Leaves opposite or subopposite; petiole 8–15 mm; leaf blade abaxially greenish or brown, adaxially green and opaque, then gray-

brown when dry, oblong or oblong-elliptic, 7–14 × 3–6 cm, thinly leathery, abaxially furfuraceous, midrib abaxially elevated, adaxially impressed, lateral veins 7–9 pairs, lateral veins and reticulate veins slightly elevated on both surfaces, base cuneate or subrotund, apex acute or somewhat obtuse. Panicles ca. 2 cm, glabrous, a few clustered at apex of branchlet. Pedicels slender, 3–5 mm. Flowers white but tinged with purple. Perianth segments ovate, ca. 2 mm. Fruits dark brown, nearly obovoid-ellipsoid or subglobose when young, ca. 3.2 × 2 cm, densely furfuraceous; fruiting pedicels ca. 4 mm in diam. Fl. Mar, fr. Jul–Aug.

• Mixed forests in valleys. Guangdong, SW Guangxi (Shiwan Dashan).

**33. *Beilschmiedia kweichowensis*** W. C. Cheng, Res. Notes Forest. Inst. Natl. Centr. Univ. Nanking, Dendrol. Ser. 1: 3. 1947.

贵州琼楠 *gui zhou qiong nan*

Small trees. Branchlets yellow-brown, slender, ca. 2 mm in diam., glabrous. Terminal buds ellipsoid-lanceolate, glabrous. Leaves opposite; petiole slender, 7–10 mm; leaf blade abaxially greenish, adaxially dark green and shiny, brown on both surfaces when dry, narrowly elliptic or ovate-elliptic, 5–8(–10) × 2–3.5 cm, leathery, midrib abaxially elevated, adaxially impressed, lateral veins slender, 8 or 9 pairs, slightly elevated on both surfaces, reticulate veinlets dense and conspicuous, base cuneate or broadly cuneate but rarely subrotund, apex abruptly caudate, slightly oblique, rarely acuminate or obtuse. Inflorescences unknown. Infructescences 1–8.5 cm, glabrous. Fruits brown, ovoid or globose, 2.5–3 × 2.3–2.5 cm, smooth; fruiting pedicels slender, ca. 1.5 mm in diam.

• Dense forests on hills. Guangxi, Guizhou, Sichuan.

**34. *Beilschmiedia intermedia*** C. K. Allen, J. Arnold Arbor. 23: 448. 1942.

琼楠 *qiong nan*

*Beilschmiedia discolor* C. K. Allen; *B. grandiosa* C. K. Allen.

Trees, 9–20 m tall, 60–100 cm d.b.h., whole plant glabrous. Bark gray to gray-brown. Terminal buds mostly ovoid, glabrous. Leaves opposite or subopposite; petiole slender, 1–2 cm; leaf blade abaxially greenish, adaxially shiny green, abaxially purple-brown and adaxially gray-green when dry, elliptic or lanceolate-elliptic, 6.5–8.5(–11) × 2.5–4.5 cm, leathery, midrib adaxially impressed or at least impressed on lower 1/2, lateral veins 6(–8) pairs, lateral veins and veinlets elevated on both surfaces, veinlets reticulate, base cuneate or subrotund and somewhat decurrent, apex obtuse or shortly acuminate with an obtuse acumen. Panicles axillary or terminal, 1.5–2 cm, few flowered. Pedicels 2–3 mm. Flowers green-white. Perianth segments elliptic, ca. 2 mm, conspicuously and densely glandular-striate. Fruits oblong or nearly olive-shaped, 3–4.5(–6) × 1.5–2.5(–3) cm, black or dark brown when mature, minutely verruculose; fruiting pedicels ca. 1 cm × 3–7 mm, not thickened at both ends. Fl. Aug–Nov, fr. Oct–May of next year.

• Dispersed along watersides or streamsides on mountain slopes or in valleys; 400–1300 m. Guangxi, Hainan.

The wood is used for furniture, farm tools, and house construction.

**35. *Beilschmiedia sichourensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 67. 1979.

西畴琼楠 *xi chou qiong nan*

Trees, ca. 7 m tall. Current year branchlets reddish brown on lower part, brownish on upper part, compressed, angled, glabrous. Terminal buds large, ovoid, glabrous. Leaves opposite; petiole 1–1.5 cm; leaf blade abaxially brownish or purple-brown and adaxially yellow-brown when dry, ovate to oblong, 10.5–18 × 4.5–7.2 cm, thickly leathery, glabrous, midrib abaxially conspicuously elevated, adaxially impressed, lateral veins ca. 8 pairs, oblique, lateral veins and reticulate veins abaxially slightly conspicuous, adaxially obscure, base cuneate, apex acute to shortly acuminate. Flowers unknown. Infructescences axillary, ca. 4 cm; rachises red-brown, robust, up to 4 mm in diam., glabrous. Fruits ellipsoid, ca. 3.5 × 1.8 cm, always verruculose; fruiting pedicels red-brown. Fr. Oct.

• Mixed forests; 300–1500 m. SE Yunnan (Xichou).

**36. *Beilschmiedia percoriacea*** C. K. Allen, J. Arnold Arbor. 23: 450. 1942.

厚叶琼楠 *hou ye qiong nan*

Trees, 15–18 m tall, up to 1.5 m d.b.h., whole plant glabrous. Bark gray-brown. Branchlets robust, slightly compressed, striate. Terminal buds ovoid, leathery. Leaves opposite or subopposite; petiole robust, 1.2–2 cm; leaf blade adaxially shiny, dark brown or black-brown when dry, narrowly elliptic or elliptic, 9–15(–19) × 4.5–6(–8) cm, slightly oblique, thickly leathery or leathery, midrib adaxially impressed, lateral veins 6–9 pairs, conspicuously elevated on both surfaces, reticulate veinlets conspicuously elevated, base cuneate, margin undulate and slightly revolute, apex usually shortly acuminate with an obtuse acumen. Panicles or racemes 1.5–5 cm, robust, a few clustered at apex of branchlet. Pedicels 5–10 mm. Perianth segments ovate or ovate-orbicular, 1.5–2 mm, glabrous or somewhat pubescent inside and margin white ciliolate. Fruits green when young, dark red or blackish brown when mature, narrowly ellipsoid, 4–4.5 × 1.5–2.5 cm, sometimes slightly oblique, smooth; fruiting pedicels 5–8 × 3–5 mm, not thickened at both ends. Fl. May, fr. Jun–Dec.

• Dense forests on mountain slopes, humid places in sparse mountain forests; ca. 1000 m. Guangxi, Hainan, Yunnan.

- 1a. Perianth segments glabrous, margin glabrous ..... 36a. var. *percoriacea*
- 1b. Perianth segments somewhat pubescent inside, margin white ciliolate ..... 36b. var. *ciliata*

**36a. *Beilschmiedia percoriacea* var. *percoriacea***

厚叶琼楠(原变种) *hou ye qiong nan* (yuan bian zhong)

Perianth segments glabrous, margin glabrous.

- Dense forests on mountain slopes. Guangxi, Hainan, Yunnan.

**36b. *Beilschmiedia percoriacea* var. *ciliata*** H. W. Li, Acta Phytotax. Sin. 17(2): 67. 1979.

缘毛琼楠 yuan mao qiong nan

Perianth segments somewhat pubescent inside, margin white ciliolate.

- Humid places in sparse mountain forests; ca. 1000 m. SE Yunnan (Jinping).

**37. *Beilschmiedia ovoidea*** F. N. Wei, Guihaia 15: 209. 1995.

卵果琼楠 luan guo qiong nan

Trees, up to 10 m tall. Branchlets chestnut-brown when dry, somewhat angular. Terminal buds glabrous. Leaves subopposite; petiole 1–1.5 cm, glabrous; leaf blade shiny on both surfaces, elliptic, somewhat oblique, 9–13.5 × 2–3.5 cm, leathery, midrib abaxially slightly elevated, adaxially flat, lateral veins 7–9 pairs, conspicuous on both surfaces and anastomosing at margin, reticulate veins visible on both surfaces, base narrowly cuneate, apex acuminate, acumen slightly oblique. Flowers unknown. Inflorescences ca. 4 cm. Fruits ovoid-oblong, ca. 1.8 × 1.4 cm, smooth; fruiting pedicels 1–1.5 cm, glabrous. Fr. Sep.

- Limestone forests; ca. 700 m. N Guangxi (Huanjiang).

**38. *Beilschmiedia linocieroides*** H. W. Li, Acta Phytotax. Sin. 17(2): 67. 1979.

李榄琼楠 li lan qiong nan

Trees, 10–24 m tall, up to 45 cm d.b.h. Branchlets yellow-brown, terete, compressed when young, striate, glabrous. Terminal buds ovoid, glabrous. Leaves subopposite or alternate, always clustered at apex of branchlet; petiole 1–2 cm; leaf blade abaxially greenish, adaxially dark green and shiny then green-

brown or yellow-brown when dry, elliptic to oblong, 9–21 × 3.5–6 cm, leathery, glabrous on both surfaces, midrib abaxially elevated, adaxially impressed, lateral veins 9–13 pairs, obliquely patent, arcuately interconnected at ends, lateral veins and reticulate veins abaxially slightly elevated, adaxially conspicuously elevated, base cuneate or broadly cuneate, margin revolute, apex acute or shortly acuminate, rarely obtuse. Inflorescences (3–)5.5–7.5 cm; rachises robust, up to 4 mm in diam., rugose, glabrous. Fruits green when young, becoming dark brown when mature, ellipsoid or olive-shaped, 3.3–3.7 × 1.5–2.3 cm, attenuate or subrotund at both ends, smooth, glabrous; fruiting pedicels robust, ca. 1 cm × 3–5 mm. Fr. Mar–Apr.

- Mixed forests; 600–1400 m. S Yunnan.

**39. *Beilschmiedia henghsienensis*** S. K. Lee & Y. T. Wei, Acta Phytotax. Sin. 17(2): 68. 1979.

横县琼楠 heng xian qiong nan

Trees. Branchlets subterete, striate, glabrous. Terminal buds ovoid, glabrous. Petiole 7–12 mm, glabrous; leaf blade abaxially greenish, adaxially shiny and dark green, elliptic or lanceolate-elliptic, 7–14 × 2–5 cm, thickly leathery, adaxially glabrous, midrib abaxially conspicuously elevated, adaxially impressed, lateral veins usually 10 pairs, obliquely ascendant, conspicuously elevated on both surfaces, reticulate veinlets conspicuous and tea-brown on both surfaces when dry, adaxially shiny, base attenuate-cuneate, always unequal on sides, apex shortly acuminate, oblique, acumen obtuse. Inflorescences ca. 7 cm; peduncles not swollen at both ends. Fruits ellipsoid, ca. 2.8 × 1.6 cm, black when mature, glabrous, apiculate; fruiting pedicels ca. 1 cm × 3–4 mm, not swollen at both ends, glabrous. Fl. and fr. Jun.

- Forests. Guangxi (Hengxian).

## 22. *SINOPORA* J. Li et al., Novon 18: 199. 2008.

孔药楠属 kong yao nan shu

Li Jie (李捷), Li Xiwen (李锡文 Li Hsi-wen); Henk van der Werff

Trees medium-sized. Bark reddish brown, peeling off in small pieces. Branchlets slender, somewhat angular at apex, glabrescent, lenticellate. Terminal buds not perulate. Leaves alternate. Inflorescence axillary, paniculate, 9- to 12-flowered. Flowers bisexual, 3-merous, small. Perianth tube very short; tepals 6, erect at anthesis, equal, shorter than stamens. Stamens 6, glandular; anthers tubular, 2-celled; cells adjacent to each other, rounded, small, opening by minute apical pores. Staminodes 6, in 3rd and 4th whorls, opposite to stamens, as large as stamens and not extending above them, villous. Ovary ellipsoid, sparsely tomentose, apex narrowed into a very short style; stigma minute. Fruit globose, rough, glabrescent; fruiting pedicel cylindrical.

- One species: China.

**1. *Sinopora hongkongensis*** (N. H. Xia et al.) J. Li et al., Novon 18: 200. 2008.

孔药楠 kong yao nan

*Syndiclis hongkongensis* N. H. Xia et al., J. Trop. Subtrop. Bot. 14: 75. 2006.

Trees up to 16 m tall, ca. 90 cm d.b.h. Branchlets reddish brown. Buds ca. 3 mm, minutely puberulent. Petiole slender, 1–2 cm, flat adaxially; leaf blade abaxially pale green and glau-

cous, adaxially dark green, elliptic, 6–10 × 2.5–4 cm, leathery, glabrescent, pinninerved, midrib and lateral veins brownish, prominent abaxially, flat adaxially, lateral veins in 4 or 5 pairs, reticulate veinlets dense, base cuneate, asymmetric, margin entire, apex acuminate, acumen sharp. Inflorescence shortly pedunculate, slender, 2–3.5 × to 1 cm, tomentose; peduncle to 0.5 cm, tomentose; bracteoles linear to triangular, ca. 3 × 1 mm, rusty tomentose. Pedicel 2–4 mm. Flowers greenish yellow, globose in bud, to 1.5 mm. Tepals 6, densely tomentose. Stamens 6, in 2 whorls, subsessile, slightly exerted, tomentose.

Staminodes 6, ca. 0.5 mm. Style tomentose at base. Fruit yellowish brown, to 4 cm in diam., with persistent accrescent tepals at base when young; pericarp woody, ca. 2 mm thick; fruiting pedicel ca. 2 cm, thickened underneath fruit. Fl. and fr. Oct.

• Evergreen broad-leaved forests; 400–500 m. Hong Kong (Tai Mo Shan).

This species is very rare and its conservation status is Critically Endangered (CR B2ab(v)). It occurs in the Country Park of Hong Kong under statutory protection.

### 23. SYNDICLIS J. D. Hooker, Hooker's Icon. Pl. 16: ad t. 1515. 1886.

油果樟属 you guo zhang shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

Evergreen trees. Leaves subopposite or alternate, or clustered at apex of branchlet, pinninerved. Panicle axillary, pedunculate, bracteate or ebracteate; bracts and bracteoles subulate, minute, caducous. Flowers minute, bisexual, pedicellate, 2-merous. Perianth tube obconical; perianth lobes 4(or 5 or 6), broadly ovate-triangular or transversely oblong, small; perianth wholly deciduous. Fertile stamens 4(or 5 or 6), antitepalous, always exserted, hairy and glandular; filaments short; anthers broadly ovate, dilated, 2-celled or fused into 1 cell; cells introrse. Staminodes 4, minute, linear or lanceolate, densely hairy, enveloping ovary in an arc when in bud. Ovary ovoid-conical, glabrous, attenuate at apex into a style; stigma small. Fruit large, turbinate or oblate or globose; peduncle and pedicel indistinctive when in fruit, all thickened after anthesis.

About ten species: Bhutan, China; nine species (all endemic) in China.

Plants of *Syndiclis* have large oily fruits. The oil is edible and is also used in industry.

- 1a. Young current year branchlets, leaves, and petioles all glabrous or glabrate.
- 2a. Panicle conspicuously with small leaves so whole inflorescence like a floral branchlet of 1.5–4 cm; pedicels short, 1–2 mm ..... 7. *S. sichourensis*
- 2b. Panicle not with small leaves; pedicels slender, more than 2 mm.
- 3a. Leaf blade elliptic to ovate-elliptic, 10–13 × 5–7 cm, glaucous abaxially, apex abruptly shortly acuminate with obtuse acumen up to 2 cm, base cuneate to rounded and subequal on both sides, margin revolute and undulate, lateral veins usually ca. 6 pairs; panicle (2.5–)3–6.5 cm, generally solitary but always collaterally 2 or 3; perianth glabrous on both surfaces ..... 8. *S. kwangsiensis*
- 3b. Leaf blade ovate-elliptic, 6.5–11.5 × 2.7–6.3 cm, not glaucous abaxially, apex shortly acuminate but always obtuse or emarginate, base broadly cuneate, margin revolute but not undulate, lateral veins 3–5 pairs; panicle 2–4 cm, solitary; perianth glabrous outside, yellowish brown puberulent inside ..... 9. *S. pingbienensis*
- 1b. Young current year branchlets, leaves, and petioles all ± rusty pubescent.
- 4a. Fruits rugose when dry, densely rusty brown scurfy ..... 1. *S. furfuracea*
- 4b. Fruits smooth when dry, not scurfy.
- 5a. Leaf blade conspicuously large, midrib, lateral veins, and transverse veins conspicuously elevated abaxially, very impressed adaxially, lateral veins 5–7 pairs ..... 2. *S. marlipoensis*
- 5b. Leaf blade smaller, midrib and lateral veins elevated abaxially, impressed adaxially, but transverse veins always opaque and inconspicuous adaxially.
- 6a. Fruit turbinate, contracted into a short stalk at base ..... 3. *S. chinensis*
- 6b. Fruit globose or suboblate, not contracted into a short stalk at base.
- 7a. Panicle very short, 0.9–1.2 cm; fruit subglobose, subtruncate at apex; leaf blade not foveolate ..... 4. *S. fooningensis*
- 7b. Panicle more elongate, 2–3.5(–4) cm; fruit globose, rounded or apiculate at apex; leaf blade foveolate on both surfaces.
- 8a. Leaf blade glabrous adaxially, sparsely pubescent abaxially; petiole rusty tomentose; lateral veins 4–7 pairs, lateral veins and midrib impressed adaxially, conspicuously elevated abaxially; fruit ca. 4 cm in diam., apiculate, fruit stalk elongate, ca. 4 mm ..... 5. *S. lotungensis*
- 8b. Both surfaces of leaf blade as well as petiole sparsely yellowish brown puberulent when young but glabrate when mature; lateral veins ca. 5 pairs, lateral veins and midrib elevated on both surfaces; fruit up to 5.5 cm in diam., fruit stalk robust, ca. 1.5 cm ..... 6. *S. anlungensis*

1. *Syndiclis furfuracea* H. W. Li, Acta Phytotax. Sin. 17(2): 71. 1979.

鳞秕油果樟 lin bi you guo zhang

Trees, up to 20 m tall. Old branchlets gray-brown, robust, terete, glabrous, densely lenticellate; young branchlets brown, ±

angled, densely rusty pubescent. Leaves alternate; petiole 1.5–2 cm, concave-convex, slightly yellowish brown- to rusty pubescent; leaf blade abaxially greenish and opaque, adaxially green and shiny, elliptic or ovate, 10.5–12 × 4.5–7 cm, papery, abaxially slightly puberulent along veins, adaxially glabrous, lateral veins 5–7 pairs, oblique and anastomosing within leaf margin,

lateral veins and midrib elevated abaxially, impressed adaxially, transverse veins and veinlets reticulate,  $\pm$  conspicuous abaxially, inconspicuous adaxially, foveolate under lens on both surfaces, base broadly cuneate to subrounded, margin somewhat revolute, apex shortly acuminate. Flowers unknown. Fruit globose, ca. 4.5 cm in diam., rugose when dry, densely rusty brown scurfy; fruit stalk rusty brown, robust, including peduncle 2–4 cm, terete, slightly dilated and 4–6 mm wide at apex. Fr. Oct.

- Dense forests; ca. 1200 m. SE Yunnan (Hekou, Pingbian).

Records of *Syndiclis furfuracea* from Hong Kong are referable to *Sinopora hongkongensis* (see p. 243).

**2. *Syndiclis marlipensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 72. 1979.

麻栗坡油果樟 ma li po you guo zhang

Shrubs, ca. 2.5 m tall. One-year-old branchlets purple-brown, subterete, striate, densely corky lenticellate, glabrate; current year branchlets  $\pm$  compressed, very densely rusty pubescent. Terminal buds small, ovoid, ca. 1.5 mm, densely rusty pubescent. Leaves subopposite or alternate; petiole red-brown, 0.8–1.5 cm, plano-convex, densely rusty pubescent; leaf blade purplish brown and opaque abaxially, yellowish brown and shiny adaxially, elliptic to oblong, 13–16.5  $\times$  5.5–8.3 cm, papery, rusty pilose mainly along midrib abaxially, glabrous adaxially, lateral veins 5–7 pairs, arcuate and interconnected by buds, lowest ones always very close to leaf margin, lateral veins, midrib, and transverse veins conspicuously elevated abaxially, very impressed adaxially, veinlets  $\pm$  visible and finely foveolate abaxially, obscure adaxially, base broadly cuneate, margin slightly revolute, apex shortly acuminate or sometimes obtuse. Panicle axillary, ca. 2.5 cm, few flowered; peduncle ca. 1.3 cm, peduncle and rachis densely rusty pubescent. Pedicels ca. 1.5 mm after anthesis, sparsely pubescent. Perianth ca. 1.5 mm after anthesis, glabrous outside, densely yellowish brown pubescent inside; perianth tube obconical, ca. 1 mm; perianth lobes 4(or 5), broadly ovate. Ovary elongate after anthesis, filiform, up to 5 mm, glabrous. Fr. Nov.

- Evergreen broad-leaved forests; 1300–1600 m. SE Yunnan (Malipo).

**3. *Syndiclis chinensis*** C. K. Allen, J. Arnold Arbor. 23: 462. 1942.

油果樟 you guo zhang

*Potameia chinensis* (C. K. Allen) Kostermans.

Trees, up to 20 m tall, to 24 cm d.b.h. Branchlets brownish, striate and lenticellate, rusty tomentulose when young but soon glabrate. Leaves opposite or alternate; petiole brownish, less than 2 cm; leaf blade glaucous abaxially, ovate or elliptic, 6–13.5  $\times$  2.5–8 cm, leathery, finely pubescent abaxially and glabrous adaxially when young, glabrous on both surfaces or glabrate abaxially and glabrous adaxially when mature, midrib brownish, elevated abaxially, impressed adaxially, lateral veins 3–5 pairs, veins and veinlets densely reticulate and finely foveolate on both surfaces, base cuneate but always asymmetrical on sides, apex acuminate, acute, or obtuse. Panicle axillary, up to 4 cm, rusty tomentose, few flowered, shortly

pedunculate. Pedicels short, ca. 1.5 mm. Flowers green-yellow, ca. 1.5 mm, rusty tomentose. Perianth lobes 4, ovate. Fertile stamens 4, slightly exerted, subsessile, outer 2 each with 2 glands at base; anthers 2-celled; cells introrse. Staminodes 4, opposite to fertile stamens, villous. Fruit turbinate, contracted into a short stalk at base, 3.5–4  $\times$  ca. 3 cm, ca. 1 cm in diam. at base, black-red when dry, glabrous; fruit stalk indistinctive from peduncle, including peduncle ca. 4  $\times$  1 cm, rusty striate, glabrous. Fl. Apr–May, fr. Sep–Oct.

- Valleys, evergreen broad-leaved forests; ca. 500 m. S Hainan.

**4. *Syndiclis fooningensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 72. 1979.

富宁油果樟 fu ning you guo zhang

Small trees, 3–8 m tall. One-year-old branchlets brown, terete, ca. 2 mm in diam., striate, glabrous, with corky oblong lenticels; current year branchlets red-brown, slender,  $\pm$  compressed, densely rusty pubescent. Terminal buds small, ovoid, ca. 3 mm; bud scales very densely yellowish brown pubescent outside. Leaves subopposite or alternate; petiole 0.8–1.5 cm, plano-convex, very densely rusty pubescent when young but glabrate when mature; leaf blade yellow-brown adaxially but yellowish brown or brownish when dry, ovate or elliptic, 5.5–10  $\times$  2.5–5 cm, subleathery, rusty pubescent on both surfaces especially along midrib and veins abaxially when young,  $\pm$  rusty pubescent abaxially and glabrate adaxially when mature, midrib and lateral veins conspicuously elevated abaxially, impressed adaxially, lateral veins 3–6 pairs, arcuate and interconnected at ends, basal lateral veins very close to leaf margin, transverse veins  $\pm$  conspicuous abaxially, opaque adaxially, connected by inconspicuous veinlets, base broadly cuneate, margin revolute, apex acute to shortly acuminate and always oblique. Panicle axillary on upper part of branchlet, few flowered, 0.9–1.2 cm before anthesis; peduncle 1–5 mm, peduncle and rachis rusty pilose; bracteoles subulate, less than 1 mm, rusty pubescent. Pedicels slender, up to 1.5 mm, densely rusty pubescent. Flowers green, small, less than 1 mm when in bud. Perianth glabrous outside, pubescent inside; perianth tube obconical; perianth lobes 4, broadly triangular, very short. Fertile stamens 4, in 2 whorls, outer 2 each with 2 glands at base; anthers 2-celled; cells introrse. Staminodes 4, linear, densely villous. Ovary ovoid; style attenuate. Fruit subobovate, ca. 3  $\times$  3.3 cm, smooth, glabrous, yellow-brown when dry, subtruncate at apex. Fl. Apr–May.

- Limestone mountains, dense valley forests; 800–1000 m. SE Yunnan (Funing).

**5. *Syndiclis lotungensis*** S. K. Lee, Acta Phytotax. Sin. 8: 191. 1963.

乐东油果樟 le dong you guo zhang

*Potameia lotungensis* (S. K. Lee) Dao.

Trees, up to 20 m tall, to 20 cm d.b.h. Bark gray and purplish brown, peeling off in lamellae. Branchlets gray and purplish brown, rugose; young branchlets black-red, slightly compressed, striate and lenticellate, densely rusty tomentose when young. Leaves alternate or subopposite; petiole ca. 2 cm,

rusty tomentose; leaf blade slightly glaucous abaxially, green adaxially, broadly ovate or elliptic, 7.5–14 × 4–8 cm, thickly papery, sparsely pubescent abaxially, glabrous adaxially, midrib conspicuously elevated abaxially, impressed adaxially, lateral veins 4–7 pairs, arcuately interconnected at ends, basal lateral veins very close to leaf margin, transverse veins very distinctive abaxially, base broadly cuneate, apex acute. Flowers unknown. Fruit globose, ca. 4 cm in diam., brown when dry, smooth, glabrous, apiculate at apex; fruit stalk robust, including indistinctive peduncle ca. 4 × 1 cm, rugose, slightly curved at apex. Fr. Oct.

• Evergreen forests or tropical rain forests on mountain slopes or in valleys; 400–900 m. SW Hainan (Ledong).

**6. *Syndiclis anlungensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 72. 1979.

安龙油果樟 an long you guo zhang

Trees, ca. 8 m tall, ca. 30 cm d.b.h. One-year-old branchlets black-brown or brown, terete, up to 5 mm in diam., glabrous, densely lenticellate, lenticels broadly oblong and corky; current year branchlets red-brown, slender, ± compressed, sparsely rusty- or yellowish brown puberulent. Terminal buds small, ovoid, ca. 2 mm; bud scales densely yellowish brown pubescent. Leaves alternate; petiole 1–1.5 cm, concave-convex, sparsely yellowish brown puberulent when young but glabrate when mature; leaf blade brownish and slightly glaucous abaxially and red-brown adaxially when dry, ovate-elliptic to elliptic, 6.5–10.5 × 2.5–5.5 cm, subleathery, sparsely yellowish brown puberulent on both surfaces when young, glabrate on both surfaces when mature, midrib and lateral veins conspicuously elevated on both surfaces, lateral veins ca. 5 pairs, arcuately connected at ends, basal lateral veins close to leaf base, veins and veinlets reticulate and slightly foveolate on both surfaces, base broadly cuneate, margin slightly revolute and undulate, apex acute, acumen obtuse. Panicle axillary on current year branchlet, 2–3.5 cm, few flowered; peduncle 1–1.5 cm, peduncle and rachis sparsely yellowish brown puberulent; bracteoles subulate, less than 1 mm, yellowish brown puberulent. Pedicels 1.5–3 mm, sparsely yellowish brown puberulent. Flowers yellow, small, ca. 1.5 mm, up to 2 mm in diam. Perianth lobes broadly ovate, acute, sparsely puberulent outside. Mature fruit brown, globose, up to 5.5 cm in diam., slightly contracted at base, apex rounded, glabrous; fruit stalk black-brown, robust, ca. 1.5 cm × 5–7 mm (broadest at apex), with corky elliptic lenticels. Fl. Jun.

• Mountain slopes; ca. 1300 m. SW Guizhou (Anlong).

**7. *Syndiclis sichourensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 72. 1979.

西畴油果樟 xi chou you guo zhang

Trees, 6–10 m tall. Bark gray or black-gray. One-year-old branchlets gray or gray-brown, terete, irregularly striate, densely lenticellate, glabrous; current year branchlets red-brown, ± angled, striate. Terminal buds small, ca. 1.5 mm; bud scales densely rusty pubescent. Leaves alternate; petiole 0.8–1.5 cm, plano-convex, glabrous; leaf blade yellowish brown on both surfaces when dry, elliptic or ovate-elliptic to oblong, 6–11

× 2–5 cm, subleathery, glabrous on both surfaces, midrib and lateral veins elevated abaxially, impressed adaxially, lateral veins 4–6 pairs, arcuate, evanescent near leaf margin, transverse veins conspicuous abaxially, inconspicuous adaxially, connected by reticulate veinlets, base broadly cuneate or subrounded, always unequal on sides, margin revolute and undulate, apex shortly acuminate, always oblique. Panicle axillary, 1.5–4 cm, many flowered, conspicuously with small leaves so whole inflorescence like a floral branchlet; rachis red-brown, ± compressed, glabrous; bracteoles minute, subulate, ca. 1.5 mm, ciliate, caducous. Pedicels 1–2 mm, glabrous. Flowers green, small, ca. 2 × 2.5 mm. Perianth glabrous outside, pubescent inside and on margin; perianth tube obconical or broadly campanulate, up to 1.5 mm; perianth lobes 4 (or 5), broadly triangular, 0.5–1.5 mm, obtuse. Fertile stamens 4 (or 5), all exserted, ca. 1.5 mm, in 2 whorls, outer 2 each with 2 orbicular-reniform glands; filaments short, pubescent; anthers almost as long as filament, ovoid-deltoid, 2-celled or sometimes fused into 1 cell; cells all introrse. Staminodes 4, opposite to fertile stamens, linear, densely villous, arched and enveloping ovary when in bud. Ovary ovoid-conical, glabrous; style filiform, ca. 1.2 mm; stigma small. Fruit green when immature but red-brown when dry, globose, up to 5 cm in diam., smooth, glabrous, rounded and conspicuously apiculate at apex. Fl. and fr. Sep–Oct.

• Dense humid forests; 1300–1800 m. SE Yunnan (Xichou).

**8. *Syndiclis kwangsiensis*** (Kostermans) H. W. Li, Acta Phytotax. Sin. 17(2): 73. 1979.

广西油果樟 guang xi you guo zhang

*Beilschmiedia kwangsiensis* Kostermans, Reinwardtia 7: 453. 1969; *Potameia kwangsiensis* Kostermans.

Small to large trees, 8–23 m tall, 15–45 cm d.b.h. Bark gray. One-year-old branchlets yellow-brown, terete, striate, densely lenticellate, glabrous; current year branchlets red-brown, ± angled, striate, densely warty, glabrous. Terminal buds small, ovoid; bud scales densely rusty pubescent. Leaves alternate; petiole 1–1.5 cm, plano-convex, glabrous; leaf blade glaucous abaxially and yellow-brown adaxially when dry, elliptic to ovate-elliptic, 10–13 × 5–7 cm, papery when young but subleathery when mature, lateral veins ca. 6 pairs, basal lateral veins oblique, near leaf base and very developed, lateral veins and midrib conspicuously elevated abaxially, impressed adaxially, transverse veins and veinlets reticulate, ± conspicuous and shallowly foveolate on both surfaces when young, obscure abaxially and conspicuous adaxially when mature, base broadly cuneate to subrounded, subequal on sides, margin revolute and undulate, apex abruptly shortly acuminate, acumen obtuse and up to 2 cm. Panicle axillary, (2.5–)3–6.5 cm, usually solitary but always collaterally 2 or 3, few flowered, without floral leaves; peduncle red-brown, (1.5–)2–3 cm, ± compressed, glabrous, branches short, 1–1.5 cm; bracteoles subulate, minute, less than 1 mm, caducous. Pedicels slender, up to 3 mm, glabrous. Flowers yellow, small, ca. 2 × 2 mm. Perianth glabrous outside and inside; perianth tube obconical, ca. 1 mm; perianth lobes 4, broadly triangular-ovate, ca. 1 × 1 mm, obtuse. Fertile stamens 4, slightly exserted; filaments slightly longer than anthers, villous, outer 2 each with 2 glands; anthers broadly tri-

angular, ca. 0.5 mm, acute, 2-celled; cells introrse. Staminodes 4, opposite to fertile stamens, linear, ca. 0.6 mm, glabrous, attenuate at apex. Stigma small, inconspicuous. Mature fruit globose, up to 5 cm in diam., red-brown when dry, smooth, glabrous, rounded and inconspicuously apiculate at apex; pericarp corky. Seed 1, globose. Fl. Apr, fr. Oct.

• Dense valley forests on hilly land; 300–700 m. SW Guangxi (Shiwan Dashan).

When Kostermans described *Beilschmiedia kwangsiensis*, he cited *Tsang 22586* (BO) as the holotype. He later described *Potameia kwangsiensis* (Adansonia, sér. 2, 17: 92. 1977), citing *Tsang 22586* (P) as the holotype. The present authors accept *B. kwangsiensis* and *P. kwangsiensis* as separate names because they have different holotypes (different specimens, although from the same gathering). Li, when making the new combination *Syndiclis kwangsiensis*, cited *B. kwangsiensis* as the basionym and treated *P. kwangsiensis* as a synonym.

**9. *Syndiclis pingbienensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 73. 1979.

屏边油果樟 ping bian you guo zhang

Trees, 10–25 m tall. One-year-old branchlets red-brown, terete, ca. 3.5 mm in diam., striate, densely corky-lenticellate, glabrous; current year branchlets ± compressed, glabrous. Ter-

minal buds small, ovoid, ca. 1.5 mm; bud scales tightly clasped, densely rusty pubescent outside. Leaves alternate; petiole red-brown, 1–1.7 cm, plano-convex, glabrous; leaf blade yellowish brown abaxially when dry, yellow-brown adaxially, ovate-elliptic, 6.5–11.5 × 2.7–6.3 cm, leathery, glabrous on both surfaces, midrib and lateral veins conspicuously elevated abaxially, plane adaxially, lateral veins 3–5 pairs, basal lateral veins very close to leaf margin, transverse veins conspicuous abaxially, obscure adaxially, veinlets obscurely visible abaxially, base broadly cuneate, ± unequal on sides, margin revolute but not undulate, apex shortly acuminate, always obtuse and emarginate. Panicle axillary, 2–4 cm, few flowered; peduncle 0.5–2.2 cm, peduncle and rachis red-brown and glabrous. Pedicels slender, 2–5 mm, glabrous. Flowers small, ca. 1.5 mm. Perianth glabrous outside, yellowish brown puberulent inside; perianth tube obconical, ca. 1 mm; perianth lobes 4(or 5), broadly triangular, ca. 0.5 mm, obtuse. Fertile stamens 4, less than 1 mm; filaments pubescent, outer 2 each with 2 orbicular-reniform glands at base; anthers 2-celled; cells introrse. Staminodes 4, yellow-brown, filiform, densely villous. Ovary ovoid; style attenuate; stigma small, inconspicuous. Fruit green when immature but red-brown when dry, globose, ca. 3.5 cm in diam., smooth, glabrous, apex rounded. Fl. and fr. Sep–Oct.

• Dense humid forests; 1500–1800 m. SE Yunnan (Pingbian).

## 24. CRYPTOCARYA R. Brown, Prodr. 402. 1810, nom. cons.

厚壳桂属 hou ke gui shu

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

*Ravensara* Sonnerat.

Trees or shrubs, evergreen. Bud scales few, leaflike. Leaves alternate, rarely subopposite, usually pinninerved, rarely triplinerved. Flowers bisexual, small, arranged into a subterminal and usually short panicle. Perianth tube turbinate or ovoid, persistent, contracted on top after caducous. Fertile stamens 9, inserted on throat of perianth tube; filaments of 1st and 2nd whorls glandless, those of 3rd whorl each with 2 glands at base; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes of innermost whorl, shortly stalked, glandless. Ovary sessile, enveloped by perianth tube; style sublinear; stigma small, inconspicuous, rarely peltate. Fruit drupelike, globose, ellipsoid, or oblong, wholly enveloped by fleshy or hard and dilated perianth tube but leaving a small mouth on top, smooth or many angled outside.

Between 200 and 250 species: tropical and subtropical regions, absent from C Africa, center of diversity in Malaysia but reaching as far as Australia and Chile; 21 species (15 endemic) in China.

The Chinese species of the genus all belong to *Cryptocarya* subg. *Cryptocarya*, characterized by plants with 9 fertile stamens. The species with 3 or 6 stamens previously placed in *Cryptocarya* are now included in the genus *Aspidostemon* Rohwer & H. G. Richter.

*Cryptocarya austrokwachouensis* X. H. Song (J. Nanjing Inst. Forest. 1984(4): 49. 1984) was described from S Guizhou (Libo) but could not be treated here because no material was seen by the present authors.

1a. Leaves triplinerved.

2a. Fruit oblate, 12–18 × 15–25 mm, inconspicuously angled; leaf blade large, narrowly elliptic to elliptic-ovate, 10–15 × 5–8.5 cm; branchlets, petioles, and leaf blade abaxially usually ± rusty tomentose ..... 1. *C. densiflora*

2b. Fruit globose or oblate, 7.5–9 × 9–12 mm, 12–15-angulate; leaf blade narrowly elliptic, 7–11 × (2–)3.5–5.5 cm; branchlets, petioles, and leaf blade abaxially usually glabrate ..... 2. *C. chinensis*

1b. Leaves pinninerved.

3a. Leaf venation conspicuously elevated, densely reticulate on both surfaces.

4a. Young branchlets pubescent; leaf blade oblong-elliptic or oblong-lanceolate, 4.5–10.2 × 2–4.5 cm, lateral veins 7–9 pairs ..... 3. *C. yaanica*

4b. Young branchlets glabrous; leaf blade ovate or ovate-elliptic, rarely elliptic, 7–13 × 2.5–6 cm, lateral veins 3–6 pairs.

5a. Leaf blade ovate-elliptic, 9–11 × 4.5–6 cm, lateral veins 5 or 6 pairs ..... 4. *C. elliptifolia*

5b. Leaf blade ovate, rarely elliptic, 7–13 × 2.5–5.5 cm, lateral veins 3–5 pairs ..... 5. *C. lyoniifolia*

3b. Leaf venation not densely reticulate on both surfaces.

- 6a. Fruit corky-spotted ..... 6. *C. maculata*  
 6b. Fruit not corky-spotted.  
 7a. Fruit very smooth, not angled.  
 8a. Fruit ovoid, 1.5–1.8 cm; panicle short, much shorter than leaf blade, few branched; leaf blade oblong or oblong-elliptic, 8–26 × 2.5–7.5 cm, purple-green and whitish abaxially ..... 7. *C. brachythyrsa*  
 8b. Fruit ellipsoid or narrowly ellipsoid, 2–2.5 cm; panicle large and several branched; leaf blade elliptic or oblong, 7.5–18 × 5–6.5 cm, gray-brown and opaque abaxially ..... 8. *C. amygdalina*  
 7b. Fruit not smooth, conspicuously or inconspicuously angled.  
 9a. Fruit globose, subglobose, or oblate.  
 10a. Fruit oblate, large, ca. 2.1 × 2.3 cm ..... 9. *C. depauperata*  
 10b. Fruit smaller, less than 1.5 cm.  
 11a. Leaf blade (6.5–)10.5–19 × (3.5–)4.2–8.5 cm, abaxially sparsely yellowish brown pubescent, densely so along midrib and lateral veins, yellow-green, not whitish ..... 10. *C. calcicola*  
 11b. Leaf blade smaller, 5–12 × 2–4.5 cm, abaxially glabrous except hairy along midrib and lateral veins, always whitish.  
 12a. Panicle 5–10 cm ..... 11. *C. maclurei*  
 12b. Panicle short, 2–3 cm ..... 12. *C. kwangtungensis*  
 9b. Fruit narrowly ellipsoid, ellipsoid, or ovoid.  
 13a. Fruit more than 2.5 cm.  
 14a. Fruit ovoid, rugose and warty, inconspicuously angled; leaf blade lanceolate to oblong-lanceolate, 9–13 × 2.5–4.5 cm; branchlets and leaves glabrate; panicle spikelike, 3–8 cm, few flowered ..... 13. *C. hainanensis*  
 14b. Fruit ellipsoid, not rugose and warty, ± conspicuously angled; leaf blade narrowly elliptic, large, (9–)15–28 × (2.5–)5.5–14 cm; branchlets and leaves ± densely rusty pubescent; panicles towerlike, axillary ones (5–)7.5–15 cm, terminal ones up to 19 cm, many flowered ..... 14. *C. acutifolia*  
 13b. Fruit smaller, less than 2.5 cm.  
 15a. Leaf blade transverse veins conspicuously elevated abaxially ..... 20. *C. impressinervia*  
 15b. Leaf blade transverse veins not elevated abaxially.  
 16a. Panicles variable, sometimes few flowered, much shorter than leaf, 2–4 cm, sometimes many flowered, as long as 1/2 of blade or more, 5.5–12 cm ..... 21. *C. yunnanensis*  
 16b. Panicle not variable, ± uniform, less than 10 cm.  
 17a. Leaf blade thickly leathery, very shiny adaxially ..... 17. *C. tsangii*  
 17b. Leaf blade leathery, subleathery, or papery, opaque or slightly shiny adaxially.  
 18a. Panicles ca. 10 cm; leaf blade glabrous on both surfaces ..... 16. *C. metcalfiana*  
 18b. Panicles shorter, less than 8 cm; leaf blade sparsely pubescent abaxially or on both surfaces.  
 19a. Fruit narrowly ellipsoid, 1.5–2 cm; leaf blade usually smaller ..... 15. *C. concinna*  
 19b. Fruit ellipsoid, 1.2–1 cm; leaf blade usually larger.  
 20a. Fruit ca. 1.7 × 1 cm; leaf blade leathery, oblong or elliptic-orbicular, very rarely obovate ..... 18. *C. chingii*  
 20b. Fruit ca. 1.2 × 0.7 cm; leaf blade subleathery, lanceolate, lanceolate-elliptic, or elliptic, very rarely obovate ..... 19. *C. leiana*

**1. *Cryptocarya densiflora*** Blume, Bijdr. 556. 1826.

丛花厚壳桂 cong hua hou ke gui

*Cryptocarya laevigata* Elmer.

Trees, 7–20 m tall, 12–40 cm d.b.h. Branchlets brownish or dark brown, angled, striate, sparsely lenticellate, rusty tomentose. Leaves alternate; petiole 1–2 cm, plano-convex, rusty tomentose or glabrate; leaf blade glaucous and greenish abaxially, shiny and brownish when dry adaxially, narrowly elliptic to elliptic-ovate, 10–15 × 5–8.5 cm, leathery, rusty tomentose initially but soon glabrate abaxially, triplinerved, midrib im-

pressed abaxially, elevated adaxially, basal lateral veins subopposite, arising (2–)5–15 mm above leaf base, arcuate-ascendant, with additional veins outside, other lateral veins 1 or 2 pairs, arising from middle or above lower 1/3 of leaf blade, transverse veins slender, subundulate, rather lax, connected by veinlets, base cuneate, obtuse, or rounded, apex abruptly shortly acuminate. Panicles axillary or terminal, 2.5–8 × 4–5 cm, pedunculate, densely many flowered, brown pubescent. Pedicels short, less than 1 mm, densely brown pubescent. Flowers white, ca. 4 mm. Perianth densely pubescent outside and inside; perianth tube turbinate, short, ca. 2 mm; perianth lobes ovate, ca. 2 mm, acute. Fertile stamens 9; filaments villous, ca. twice as long as

anthers, those of 3rd whorl each with 2 clavate glands at base, others glandless; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes sagittate, long stalked. Ovary clavate, ca. 2 mm; style linear; stigma inconspicuous. Fruit brown-yellow initially but dark black when mature, glaucous, oblate, 1.2–1.8 × 1.5–2.5 cm, smooth, inconspicuously angled, conspicuously apiculate at apex. Fl. Apr–Jun, fr. Jul–Nov.

Valleys, evergreen broad-leaved forests; 600–1600 m. Fujian, Guangdong, Guangxi, Hainan, Yunnan [Indonesia, Laos, Malaysia, Philippines, Vietnam].

The wood is finely grained, more or less heavy and durable, and is used for house construction and furniture.

**2. *Cryptocarya chinensis*** (Hance) Hemsley, J. Linn. Soc., Bot. 26: 370. 1891.

厚壳桂 hou ke gui

*Beilschmiedia chinensis* Hance, J. Bot. 20: 79. 1882.

Trees, up to 20 m tall, to 10 cm d.b.h. Bark dark gray, scabrid. Old branchlets robust, ± angled, brownish sparsely lenticellate; young branchlets terete, striate, grayish brown tomentose initially but soon glabrate. Leaves alternate or opposite; petiole ca. 1 cm, concave-convex; leaf blade glaucous abaxially, shiny adaxially, narrowly elliptic, 7–11 × (2–)3.5–5.5 cm, leathery, grayish brown tomentulose when young, gradually glabrate on both surfaces, triplinerved, midrib elevated abaxially, impressed adaxially, basal lateral veins opposite, arising 2–5 mm above leaf base, upper lateral veins 2 or 3 pairs and alternate, transverse veins slender, subundulate, veinlets reticulate, conspicuous on both surfaces, base broadly cuneate, apex long or shortly acuminate. Panicles axillary and terminal, 1.5–4 cm, yellow tomentulose, pedunculate. Pedicels very short, ca. 0.5 mm, yellow tomentulose. Flowers yellowish, ca. 3 mm. Perianth yellow tomentulose outside and inside; perianth tube turbinate, short, 1–1.5 mm; perianth lobes subobovate, ca. 2 mm, acute. Fertile stamens 9, ca. 1.5 mm in 1st and 2nd whorls, ca. 1.7 mm in 3rd whorl; filaments villous, slightly longer than anthers, those of 3rd whorl each with 2 clavate glands, others glandless; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl lateral-extrorse. Staminodes subulate-sagittate, villous. Ovary clavate, ca. 2 mm; style filiform; stigma inconspicuous. Fruit globose or oblate, 7.5–9 × 9–12 mm, purple-black when mature, 12–15-angulate. Fl. Apr–May, fr. Aug–Dec.

• Evergreen broad-leaved forests in shady valleys; 300–1100 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan.

The wood is finely grained, easily cut, and is used for furniture.

**3. *Cryptocarya yaanica*** N. Chao ex H. W. Li et al., Acta Phytotax. Sin. 17(2): 68. 1979.

雅安厚壳桂 ya an hou ke gui

*Cryptocarya reticulata* Yen C. Yang, J. W. China Border Res. Soc., Ser. B, 15: 70. 1945, not Blume (1851); *Beilschmiedia yaanica* (N. Chao ex H. W. Li et al.) N. Chao.

Trees, ca. 8 m tall. One-year-old branchlets brown-gray,

glabrous, lenticellate; current year branchlets gray-green, striate, pubescent. Leaves alternate; petiole 5–10 mm, glabrous, sulcate adaxially; leaf blade gray-green abaxially, shiny and green adaxially, oblong-elliptic or oblong-lanceolate, 4.5–10.2 × 2–4.5 cm, leathery, glabrous on both surfaces, pinninerved, midrib elevated abaxially, slightly conspicuous adaxially, lateral veins 7–9 pairs, conspicuous on both surfaces, veins and veinlets densely reticulate, base cuneate, apex long acuminate, slightly falcate. Inflorescence paniculate or racemose, axillary, up to 4 × 1.5 cm, pubescent; peduncle 3–12 mm. Pedicels 1–4 mm, densely pubescent. Flowers greenish. Perianth lobes 6, broadly ovate or suborbicular, 2–2.5 × 1.5–2 mm, pubescent outside and inside. Fertile stamens 9; filaments hirsute, those of 3rd whorl each with 2 reniform glands at base, others glandless; anthers hirsute, 2-celled; cells of 1st and 2nd whorls introrse but those of 3rd whorl extrorse. Staminodes 3, sagittate, glabrous, subsessile. Ovary ovoid, glabrous, ca. 0.6 mm in diam.; style 1–1.2 mm; stigma subglobose. Fruit unknown.

• Roadsides. C Sichuan (Ya'an).

With regard to leaf venation, *Cryptocarya yaanica* is very similar to *Beilschmiedia*. Only flowering specimens were seen, so it will be necessary to see fruiting specimens in order to confirm the placement of this species.

**4. *Cryptocarya elliptifolia*** Merrill, Philipp. J. Sci. 14: 396. 1919.

菲岛厚壳桂 fei dao hou ke gui

Trees medium-sized. Branchlets brownish black when dry, glabrous. Buds hirsute. Petiole ca. 1 cm, stout, glabrous; leaf blade ovate-elliptic, 9–11 × 4.5–6 cm, leathery, lateral veins 5 or 6 pairs, reticulate veinlets prominent, base obtuse, apex shortly acuminate. Panicles axillary, 7–8 cm, hirsute. Flowers ca. 1.5 mm. Perianth lobes 6, elliptic-obovate, ca. 1.5 mm, densely hirsute on both surfaces, apex obtuse. Fertile stamens 9; filaments villous; anthers 2-celled. Ovary glabrous. Fruit black when dry, globose, ca. 2 cm in diam., longitudinally ridged. Fl. Apr–May, fr. Jun–Dec.

Coastal forests; below 100 m. Taiwan (Lan Yu) [Philippines].

**5. *Cryptocarya lyoniifolia*** S. K. Lee & F. N. Wei, Guihaia 8: 303. 1988.

南烛厚壳桂 nan zhu hou ke gui

Trees, up to 20 m tall. Branchlets striate, glabrous. Buds brown villous. Petiole ca. 1 cm, glabrous; leaf blade ovate, rarely elliptic, 7–13 × 2.5–5.5 cm, glabrous on both surfaces, pinninerved, midrib elevated abaxially, plane adaxially, lateral veins lax, 3–5 pairs, elevated on both surfaces, veins and veinlets reticulate and foveolate on both surfaces especially abaxially, base cuneate or subrounded, apex long acuminate. Flowers unknown. Inflorescence terminal or axillary, 4–8 cm, pubescent. Fruit globose, 8–9 mm in diam., glabrous, rugose. Fr. Oct–Dec (or Jan of next year).

• Dense forests. SW Guangxi (Jingxi, Longzhou, Tiandeng).

**6. *Cryptocarya maculata*** H. W. Li, Acta Phytotax. Sin. 17(2): 68. 1979.

斑果厚壳桂 ban guo hou ke gui

Trees, ca. 10 m tall. Branchlets red-brown, terete, ca. 3 mm in diam., striate, lenticellate, glabrous. Petiole 0.5–1.3 cm, concave-convex, glabrous; leaf blade greenish and opaque abaxially, green and shiny adaxially, oblong, 9.5–18 × 3–5 cm, leathery, glabrous on both surfaces, midrib conspicuously elevated abaxially, impressed adaxially, lateral veins ca. 9 pairs, elevated abaxially, plane or slightly impressed adaxially, transverse veins and veinlets reticulate, inconspicuous on both surfaces, base broadly cuneate, apex obtuse or acute. Flowers unknown. Fruit ellipsoid-ovoid, 3–3.2 × 1.5–1.6 cm, black-brown when dry, corky-spotted, glabrous, somewhat wrinkled, inconspicuously 12-angulate. Fr. Aug.

• Dense forests; ca. 1000 m. S Guangxi (Shangsi), SE Yunnan (Pingbian).

**7. *Cryptocarya brachythyrsa*** H. W. Li, Acta Phytotax. Sin. 17(2): 68. 1979.

短序厚壳桂 duan xu hou ke gui

Trees, up to 30 m tall, to 40 cm d.b.h. Branchlets red-brown, robust, terete, ± angled, striate, densely lenticellate, glabrous; young ones slightly compressed, densely yellowish brown puberulent. Petiole 1–1.5 cm, concave-convex, densely yellowish brown puberulent; leaf blade whitish purple-green abaxially, yellow-green and shiny adaxially, oblong or oblong-elliptic, 8–26 × 2.5–7.5 cm, thinly leathery, puberulent along midrib only initially, soon glabrate on whole surface adaxially, midrib and lateral veins elevated abaxially, impressed adaxially, lateral veins 6–9 pairs, ascendant, evanescent within leaf margin, transverse veins ± conspicuous on both surfaces, veinlets reticulate. Panicle axillary, short, 2–2.5(–4) cm, densely yellowish brown puberulent, few flowered, few branched; lowest branches, 0.8–1.5 cm; peduncle 1–1.5 cm; bracts and bracteoles ovate-subulate, small. Pedicels 1–2 mm, densely yellowish brown puberulent. Flowers greenish, ca. 4 mm. Perianth yellowish brown puberulent outside; perianth tube turbinate, ca. 2 mm; perianth lobes obovate, ca. 2 mm, acute. Fertile stamens 9, ca. 1.5 mm in 1st and 2nd whorls, ca. 1.4 mm in 3rd whorl; filaments almost as long as anthers, those of 3rd whorl each with 2 stalked reniform glands, others glandless; anthers of 1st and 2nd whorl subcordate, with introrse cells, those of 3rd whorl ovoid, with extrorse cells. Staminodes narrowly sagittate-triangular, ca. 1 mm, stalked. Ovary clavate, ca. 2.5 mm; style slender, ca. 1 mm; stigma capitate. Fruit shiny, ovoid, 1.5–1.8 × 1.1–1.3 cm, glabrous, inconspicuously angled. Fl. Apr–May, fr. Jun–Nov.

• Evergreen broad-leaved forests in valleys; 1000–1800 m. S Yunnan.

**8. *Cryptocarya amygdalina*** Nees in Wallich, Pl. Asiat. Rar. 2: 69. 1831.

杏仁厚壳桂 xing ren hou ke gui

Trees to 25 m tall. Branchlets patent; young ones terete, ca. 3 mm in diam., striate, densely and finely rusty tomentulose. Leaves alternate; petiole 0.6–1.2 cm, finely rusty tomentose; leaf blade gray-brown and opaque abaxially, green and shiny adaxially, elliptic or oblong, 7.5–18 × 5–6.5 cm, subleathery, glabrous on both surfaces except puberulent along midrib adaxially,

midrib slender, lateral veins 6–10 pairs, straight but abruptly curved near leaf margin, veins and veinlets reticulate, fine and dense, base acute or obtuse, apex shortly acuminate. Inflorescences to 14 cm, tomentose. Pedicels ca. 1 mm. Flowers yellow, 3–5 mm, tomentose outside. Perianth lobes narrowly ovate, 1.5–2 mm, tomentose inside. Fertile stamens 9, 1.5–2 mm, inner whorl longest. Staminodes triangular, ca. 1 mm. Ovary ca. 1 mm, glabrous or sparsely hairy at apex; style ca. 1 mm, glabrous. Infructescence paniculate, large and several branched. Fruit green, ellipsoid or narrowly ellipsoid, 2–2.5 cm, glabrous, very smooth, not angled. Fr. Aug.

Evergreen broad-leaved forests on hilly land; ca. 1100 m. SE Xizang (Médog) [Bhutan, India, Nepal].

**9. *Cryptocarya depauperata*** H. W. Li, Acta Phytotax. Sin. 17(2): 69. 1979.

贫花厚壳桂 pin hua hou ke gui

Trees, up to 20 m tall. Branchlets terete, ca. 2.5 mm in diam., sometimes ± angled, striate, densely yellowish brown puberulent, sparsely corky lenticellate on lower part. Leaves alternate; petiole 0.8–1.2 cm, concave-convex, yellowish brown puberulent; leaf blade greenish abaxially, green adaxially, oblong or ovate-oblong, 8–19.5 × 3.3–8 cm, thinly leathery, glabrous on both surfaces or sparsely puberulent only along midrib adaxially, midrib and lateral veins very elevated abaxially, slightly conspicuous adaxially, lateral veins (4 or) 5–7 pairs, arcuate-ascendant, evanescent within margin, veins and veinlets ± conspicuous on both surfaces, veinlets reticulate, base broadly cuneate and asymmetric on sides, apex acuminate or sometimes obtuse but with acute acumen. Panicle axillary and terminal, short, 3–5.5 cm, few flowered, lax, few branched; branches short, less than 4.5 mm; peduncle 0.8–1.5(–2.5) cm, peduncle and rachis densely yellowish brown puberulent; bracts and bracteoles minute, subulate, less than 1 mm, densely yellowish brown puberulent, caducous. Pedicels ca. 1 mm, densely yellowish brown puberulent. Flowers green-yellow, ca. 3.5 mm. Perianth densely yellowish brown puberulent outside but rather sparsely so inside; perianth tube turbinate, ca. 1.5 mm; perianth lobes ovate, ca. 2 mm, acute. Fertile stamens 9, ca. 1.7 mm; filaments villous, those of 3rd whorl each with 2 long-stalked suborbicular glands, others glandless; anthers ca. 1/2 as long as filaments, anthers of 1st and 2nd whorls oblong, with introrse cells, those of 3rd whorl ovoid-oblong, with extrorse cells. Staminodes narrowly sagittate-triangular, ca. 1.3 mm, stalked; stalk ca. 0.7 mm. Ovary clavate, including style ca. 3 mm; style linear; stigma inconspicuous. Fruit shiny, obovate, ca. 2.1 × 2.3 cm, black when mature, nearly smooth, inconspicuously angled. Fl. Apr–May, fr. Jun–Dec.

• Evergreen broad-leaved forests, along streams in valleys; 1300–1400 m. SE Yunnan.

**10. *Cryptocarya calcicola*** H. W. Li, Acta Phytotax. Sin. 17(2): 69. 1979.

岩生厚壳桂 yan sheng hou ke gui

Trees, up to 15 m tall, to 30 cm d.b.h. Young branchlets slender, terete, ca. 3 mm in diam., striate, sometimes ± angled, densely yellowish brown pubescent. Leaves alternate; petiole

0.5–1 cm, plano-convex, densely yellowish brown pubescent; leaf blade abaxially yellow-green, adaxially green, oblong or elliptic-oblong to ovate, (6.5–)10.5–19 × (3.5–)4.2–8.5 cm, thinly leathery, pinninerved, abaxially sparsely yellowish brown pubescent but densely so along midrib and lateral veins, adaxially yellowish brown pubescent along midrib and otherwise glabrous, midrib and lateral veins very elevated abaxially, impressed adaxially, transverse veins and veinlets reticulate, conspicuous abaxially, inconspicuous adaxially, base broadly cuneate to subrounded and ± unequal on sides, apex obtuse, acute, or shortly acuminate, sometimes incised. Panicles axillary and terminal, 5.5–14 cm, densely yellowish brown pubescent, axillary ones generally few branched and nearly spikelike, terminal or subterminal ones many branched and lax, lower branches up to 4 cm; peduncles 1.5–4.5 cm; bracts and bracteoles linear-subulate, ca. 2 mm, densely yellowish brown pubescent. Pedicels 1–2 mm, densely yellowish brown pubescent. Flowers greenish, ca. 5 mm. Perianth densely yellowish brown pubescent outside but sparsely so inside; perianth tube turbinate or suburceolate, ca. 2.5 mm; perianth lobes oblong-ovate, ca. 2.5 mm, acute. Fertile stamens 9, ca. 2.2 mm; filaments ca. 1.2 mm, villous, those of 3rd whorl each with 2 long-stalked suborbicular glands at base, others glandless; anthers ca. 1 mm, those of 1st and 2nd whorls ovoid-triangular, with introrse cells, those of 3rd whorl ovoid, with extrorse cells. Staminodes sagittate-triangular, ca. 1 mm, shortly stalked. Ovary clavate, including filiform style ca. 3.5 mm; stigma inconspicuous. Fruit purple-black, shiny, subglobose, ca. 1.3 × 1–1.1 cm, glabrous or sparsely puberulent on both ends, ± wrinkled, inconspicuously 12-angulate. Fl. Apr–May, fr. May–Oct.

• Evergreen broad-leaved forests, hillsides, streamsides; (500–)700–1000 m. Guangxi, S Guizhou, S and SE Yunnan.

**11. *Cryptocarya maclurei*** Merrill, Philipp. J. Sci. 21: 344. 1922.

白背厚壳桂 bai bei hou ke gui

Trees up to 22 m tall, ca. 15 cm d.b.h. Bark gray-black. Branchlets slender, subterete, ± angled, striate, densely rusty pubescent when young but glabrate and gray-black when mature. Leaves alternate; petiole 1.2–1.5 cm, concave-convex, densely rusty pubescent; leaf blade greenish or whitish and opaque abaxially, olive-green and shiny adaxially, oblong or oblong-ovate, 5–12 × 2–4.5 cm, abaxially rusty pubescent along midrib and lateral veins, adaxially rusty pubescent only along midrib, otherwise glabrous on both surfaces, midrib and lateral veins elevated abaxially, impressed adaxially, lateral veins 5–7 pairs, transverse veins slender, connected by reticulate veinlets, base broadly cuneate to subrounded, apex shortly acuminate. Flowers unknown. Fruit globose or oblate, ca. 1.5 cm in diam., black when mature, glabrous, ca. 15-angulate when young. Fr. Aug–Feb of next year.

• Evergreen broad-leaved forests on hilly land, forested valleys; 600–1000 m. Guangdong, Guangxi, Hainan.

**12. *Cryptocarya kwangtungensis*** Hung T. Chang, Acta Sci. Nat. Univ. Sunyatseni 1963(4): 132. 1963.

广东厚壳桂 guang dong hou ke gui

Trees, 2–6.5 m tall, 5–13 cm d.b.h. Branchlets brown pubescent when young but glabrous when mature. Leaves alternate; petiole 6–10 mm; leaf blade green and shiny adaxially, narrowly elliptic, 9–11.5 × 3–4 cm, leathery, yellowish brown pubescent when young but soon glabrate and whitish abaxially, lateral veins 6 or 7 pairs, slightly elevated abaxially, inconspicuous adaxially, veins and veinlets reticulate, inconspicuous on both surfaces, base broadly cuneate and asymmetric on sides, apex acute or slightly obtuse. Inflorescence paniculate or racemose, terminal and axillary, 2–3 cm, yellowish brown pubescent. Pedicels very short. Flowers small, ca. 2 mm, pubescent. Perianth lobes slightly longer than perianth tube. Stamens included. Ovary puberulent. Immature fruit globose, inconspicuously angled, villous initially but soon glabrate. Fr. Jul.

• Densely forested valleys. N Guangdong.

**13. *Cryptocarya hainanensis*** Merrill, Philipp. J. Sci. 21: 343. 1922.

海南厚壳桂 hai nan hou ke gui

*Cryptocarya rolletii* H. Wang & H. Zhu.

Trees, up to 20 m tall. Old branchlets chestnut-colored or blackish, finely striate, lenticellate and glabrous; young branchlets slender, finely striate, pubescent or glabrate on lower part. Leaves alternate; petiole robust, 5–8 mm, plano-convex, puberulent initially but soon glabrate; leaf blade greenish abaxially, olive-green adaxially when dry, lanceolate to oblong-lanceolate, 9–13 × 2.5–4.5 cm, thinly leathery, puberulent along midrib adaxially and glabrous abaxially when young but glabrous on both surfaces when mature, midrib and lateral veins conspicuously elevated abaxially, always slightly impressed adaxially, lateral veins 5 or 6 pairs, arcuate-ascendant, veins and veinlets slender, reticulate, dense and foveolate, base broadly cuneate, apex acuminate. Panicles spikelike, axillary and terminal, 3–8 mm, densely yellowish brown tomentulose, few flowered, branched; branches slender, up to 2.5 cm; peduncles 0.5–2 cm; bracts and bracteoles lanceolate-linear, ca. 1 mm, densely yellowish brown tomentulose. Pedicels less than 1 mm. Flowers ca. 2.5 mm. Perianth tomentulose outside and inside; perianth tube obconical; perianth lobes almost as long as tube, broadly ovate, acute. Fertile stamens 9, less than 1 mm; filaments villous, those of 3rd whorl each with 2 stalked triangular-ovate glands at base, others glandless; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes sagittate-deltoid, stalked. Ovary ovoid, ca. 0.7 mm; style slender, ca. 0.7 mm; stigma capitate. Fruit shiny, ovoid, 2.5–3 × 1.5–2 cm, wrinkled, papillate, black when mature, inconspicuously angled, slightly apiculate at apex, attenuate into a short stalk at base. Fl. Apr, fr. Aug–Jan of next year.

Evergreen broad-leaved forests, forested valleys; 500–700 m. S Guangxi, Hainan, S Yunnan [Vietnam].

**14. *Cryptocarya acutifolia*** H. W. Li, Acta Phytotax. Sin. 17(2): 69. 1979.

尖叶厚壳桂 jian ye hou ke gui

Trees, up to 25 m tall, to 30 cm d.b.h. Old branchlets robust, ± angled, striate, densely rusty pubescent or sometimes ±

glabrate; young branchlets slender, ca. 4 mm in diam., densely rusty pubescent. Leaves alternate; petiole robust, 1–1.5 cm, plano-convex, very densely rusty pubescent; leaf blade abaxially glaucous green, adaxially yellowish green when dry, opaque or shiny, narrowly elliptic, (9–)15–28 × (2.5–)5.5–14 cm, leathery, abaxially pubescent, adaxially glabrous except rusty pubescent along midrib or sometimes also along lateral veins, midrib and lateral veins conspicuously elevated abaxially, always impressed adaxially, lateral veins (7–)9–11 pairs, transverse veins conspicuous abaxially, ± impressed adaxially, veinlets laxly reticulate, conspicuous abaxially, base broadly cuneate, obtuse to subrounded, apex rounded and abruptly apiculate or sometimes incised but always acute. Panicles axillary and terminal, those arising from upper leaf axils shorter, (5–)7.5–15 cm, terminal ones longer, up to 19 cm, all towerlike, branched, densely rusty pubescent; peduncles (2–)2.5–4.5 cm; bracts and bracteoles ovate, ca. 3 × 2 mm, densely rusty pubescent. Pedicels very short, less than 1 mm, rusty pubescent. Flowers yellowish, ca. 5 mm. Perianth pubescent outside and inside; perianth tube turbinate, ca. 2.5 mm; perianth lobes oblong-ovate, ca. 2.5 mm, acute. Fertile stamens 9, slightly shorter than perianth lobes; filaments villous, those of 3rd whorl each with 2 shortly stalked reniform glands, others glandless; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes narrowly sagittate-triangular, ca. 2 mm, shortly stalked. Ovary clavate, including style ca. 4 mm, attenuate at apex into a style; stigma inconspicuous. Mature fruit black-purple, ellipsoid, up to 3.4 × 2 cm, subglabrous or sparsely pubescent at apex, inconspicuously 12-angulate, obtuse at apex, abruptly contracted into a short stalk at base. Fl. Mar–May, fr. Jun–Dec.

• Evergreen broad-leaved forests on hilly land or in wet places along rivers, dry sparse secondary forests on mountain slopes; 500–700 m. S and SE Yunnan.

**15. *Cryptocarya concinna*** Hance, J. Bot. 20: 79. 1882.

黄果厚壳桂 huang guo hou ke gui

*Cryptocarya konishii* Hayata; *C. lenticellata* Lecomte; *C. microcarpa* F. N. Wei.

Trees, up to 18 m tall, to 35 cm d.b.h. Bark brownish. Branchlets gray-brown, ± angled, finely striate and glabrous; young ones slender, angled, finely striate, densely yellowish brown tomentose. Leaves alternate; petiole yellow-brown, 0.4–1 cm, concave-convex, pubescent; leaf blade green-white abaxially, slightly shiny adaxially, elliptic-oblong or oblong, (3–)5–10 × (1.5–)2–3 cm, papery, slightly pubescent but soon glabrate abaxially, glabrous adaxially, midrib elevated abaxially, impressed adaxially, lateral veins 4–7 pairs, elevated abaxially, inconspicuous adaxially, transverse veins and veinlets irregularly reticulate, ± conspicuous abaxially, inconspicuous adaxially, base cuneate and unequal on sides, apex obtuse, subacute, or shortly acuminate. Panicles axillary and terminal, (2–)4–8 cm, pubescent, several branched toward top; peduncles pubescent; bracts very small, triangular. Pedicels 1–2 mm, pubescent. Flowers up to 3.5 mm. Perianth pubescent outside and inside; perianth tube subcampanulate, ca. 1 mm; perianth lobes oblong, ca. 2.5 mm, obtuse. Fertile stamens 9; filaments 1.4–1.5 mm, villous at base, those of 3rd whorl each with 2 stalked glands,

others glandless; anthers oblong, ca. 1 mm; connective much exerted, exerted part ca. 0.33 mm; anther cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes 3, triangular-lanceolate, 1–1.5 mm. Ovary included in perianth tube, narrowly obovoid, gradually attenuate at apex into a style; stigma obliquely truncate. Fruit dark green when young, black or blue-black when mature, narrowly ellipsoid, 1.5–2 × ca. 0.8 cm, inconspicuously 12-angulate when young, inconspicuously angled when mature. Fl. Mar–May, fr. Jun–Dec.

Evergreen broad-leaved forests on gradual slopes or in valleys; below 600 m. Guangdong, Guangxi, SE Guizhou (Libo, Sandu), Hainan, Jiangxi, Taiwan [N Vietnam].

The wood is finely grained, heavy, durable, and is used for furniture or house construction.

**16. *Cryptocarya metcalfiana*** C. K. Allen, J. Arnold Arbor. 23: 457. 1942.

长序厚壳桂 chang xu hou ke gui

*Cryptocarya howii* C. K. Allen.

Trees, up to 30 m tall, to 30 cm d.b.h. Old branchlets brown, robust, angled, grayish brown lenticellate, glabrous; young branchlets angled, finely striate, sparsely pubescent. Leaves alternate; petiole 1–2 cm, plano-convex, glabrous; leaf blade slightly glaucous green abaxially, shiny adaxially, lanceolate, lanceolate-elliptic, or lanceolate-ovate to ovate, 5–12(–14) × 2.5–4(–5.5) cm, leathery, glabrous on both surfaces, midrib elevated abaxially, impressed adaxially, lateral veins 3–7 pairs, elevated abaxially, slightly impressed adaxially, veins and veinlets reticulate, conspicuous abaxially, inconspicuous adaxially, base cuneate and always asymmetric, apex acute, obtuse, or shortly acuminate. Panicles subracemose, axillary and terminal, many flowered, usually longer than leaf, ca. 10 cm, brown villous, terminal branches short, glaucous, 2- or 3-flowered. Pedicels slender, ca. 1 mm, pubescent. Flowers greenish yellow, ca. 3 mm. Fruit green when young and black when mature, narrowly ellipsoid, 1.4–2.5 × 1–1.1 cm, glabrous, inconspicuously angled; fruit stalk dilated, 2–3 mm. Fl. Mar–May, fr. Jun–Dec.

• Evergreen broad-leaved forests; below 900 m. Hainan.

The wood is finely grained, heavy, durable, and is used for making furniture.

**17. *Cryptocarya tsangii*** Nakai, J. Jap. Bot. 16: 121. 1940.

红柄厚壳桂 hong bing hou ke gui

Trees, ca. 6 m tall, ca. 12 cm d.b.h. Branchlets many lenticellate; floral branchlets angled. Leaves alternate; petiole reddish, 5–13 mm; leaf blade opaque and light rusty when dry abaxially, very shiny adaxially, oblong, elliptic, or ovate, 5.5–12 × 1.5–4.6 cm, thickly leathery, sparsely pubescent abaxially, midrib elevated abaxially, impressed adaxially, always papillate near base, lateral veins 5–7 pairs, slightly elevated abaxially, obscurely visible adaxially, veins and veinlets finely reticulate, inconspicuous adaxially, base obtuse, apex acute or caudate. Flowers unknown. Infructescence axillary or terminal. Fruit black, ellipsoid, 13–15 mm, papillate, inconspicuously 12-angulate. Fr. Aug–Dec.

• Hainan.

Allen (J. Arnold Arbor. 23: 459. 1942) suggested that *Cryptocarya tsangii* may be a form of *C. metcalfiana*. It is treated here temporarily as a distinct species because the present authors have not seen flowering specimens. More material is needed to make a definitive decision.

**18. *Cryptocarya chingii*** W. C. Cheng, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 10: 111. 1936.

硬壳桂 ying ke gui

*Cryptocarya laui* Merrill & F. P. Metcalf; *C. merrilliana* C. K. Allen.

Small trees, up to 12 m tall, to 20 cm d.b.h. Old branchlets gray-brown, glabrous, sparsely oblong-lenticellate, striate; young branchlets densely gray-yellow pubescent. Leaves alternate; petiole 5–10 mm, concave-convex, densely gray-yellow pubescent when young; leaf blade glaucous green and opaque abaxially, olive-green and opaque or shiny adaxially, oblong, elliptic-oblong, very rarely obovate, 6–13 × 2.5–5 cm, leathery, gray-yellow appressed sericeous-pubescent on both surfaces, hairs slightly longer along midrib and lateral veins abaxially, midrib very elevated abaxially, impressed adaxially, lateral veins 5 or 6 pairs, conspicuous abaxially, slightly impressed adaxially, slightly arcuate and evanescent within leaf margin, transverse veins and veinlets reticulate, ± conspicuous abaxially, inconspicuous adaxially, base cuneate, apex abruptly acuminate, sometimes obtuse or emarginate. Panicles axillary and terminal, (3–)3.5–6 cm, ± lax, densely gray-yellow sericeous-pubescent on all parts; peduncles 2–3 mm. Perianth densely sericeous-pubescent outside but sparsely so inside; perianth tube turbinate, ca. 1.5 mm; perianth lobes ovate, ca. 1.5 mm, acute. Fertile stamens 9, less than 1.5 mm; filaments as long as anthers, those of 3rd whorl each with 2 stalked glands at base, others glandless; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Stamines narrowly sagittate-triangular, stalked. Ovary clavate, including filiform style ca. 1.5 mm; stigma inconspicuous. Fruit greenish when young and dirty red when mature, ellipsoid, ca. 17 × 10 mm, glabrous, 12-angulate. Fl. Jun–Oct, fr. Sep–Mar of next year.

Evergreen broad-leaved forests; 300–800 m (but higher in Hainan). Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Zhejiang [N Vietnam].

The wood is heavy and durable and is used for making furniture. A viscid liquid extracted from wood pieces in water is used to paste hairs together. The leafy branchlets contain essential oil.

**19. *Cryptocarya leiana*** C. K. Allen, J. Arnold Arbor. 23: 456. 1942.

鸡卵槁 ji luan gao

Trees, ca. 5 m tall. Young branchlets green-brown, slender, terete, dark yellow pubescent near top. Leaves alternate; petiole brown, 5–10 mm, glabrous, glandular; leaf blade glaucous green abaxially, green adaxially, lanceolate, lanceolate-elliptic, or narrowly elliptic, very rarely obovate, (4–)9–14 × 1.5–4(–5) cm, subleathery, pubescent but soon glabrate on both surfaces, lateral veins ca. 5 pairs, inconspicuous adaxially, veins and veinlets slender, densely reticulate, conspicuous abaxially, base cuneate, apex obtuse or acuminate to obtusely acuminate. Panicles axillary or subterminal, generally shorter than leaf, up

to 6.5 cm, finely pubescent, branches slender, ± upright, terminal branchlets 3-flowered. Flowers yellowish, scented, 2–3 mm, dark yellow pubescent, shortly pedicellate or sessile. Perianth lobes ovate, ca. 2 mm, sparsely pubescent inside. Fruit ellipsoid, ca. 12 × 7 mm, purplish brown and glaucous when dry, glabrous, conspicuously angled, slightly contracted on both ends, apiculate at apex; fruit stalk slightly dilated. Fl. Sep, fr. after Sep.

• Thickets on sandy soil near villages. Hainan.

**20. *Cryptocarya impressinervia*** H. W. Li, Acta Phytotax. Sin. 17(2): 70. 1979.

钝叶厚壳桂 dun ye hou ke gui

*Cryptocarya obtusifolia* Merrill, Philipp. J. Sci. 21: 344. 1922, not F. Mueller ex Meisner (1864).

Trees, up to 18 m tall, to 30 cm d.b.h. Bark brown or gray-brown. Old branchlets slender, striate, lenticellate, densely rusty- or blackish brown pubescent; young branchlets ± angled, ca. 3 mm in diam., densely rusty pubescent. Leaves alternate; petiole robust, 1–1.5 cm, plano-convex, densely rusty pubescent; leaf blade greenish abaxially and yellow-green adaxially when dry, narrowly elliptic, 10–19 × 4.8–8 cm, thickly leathery, glabrous except rusty pubescent on midrib and lateral veins adaxially, pubescent throughout abaxially, lateral veins 7–9 pairs, lateral veins and midrib conspicuously elevated abaxially, slightly impressed adaxially, transverse veins conspicuous abaxially, ± impressed adaxially, veinlets laxly reticulate, conspicuous abaxially, base broadly cuneate, obtuse to subrounded, apex obtuse, mucronate, or incised, rarely acute. Panicles terminal and axillary, up to 14 cm, densely rusty pubescent, many branched, lower branches 5–6 cm; peduncles up to 6 cm; bracts and bracteoles broadly ovate, up to 3 mm, rusty pubescent on both surfaces. Pedicels less than 1 mm, densely rusty pubescent. Flowers yellowish green, ca. 3 mm. Perianth densely rusty pubescent outside but sparsely so inside; perianth tube turbinate, ca. 1.5 mm; perianth lobes ovate, ca. 1.5 mm, acute. Fertile stamens 9, ca. 1.5 mm; filaments villous, those of 3rd whorl each with 2 stalked suborbicular glands at base, others glandless; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Stamines narrowly sagittate-triangular, shortly stalked. Ovary clavate, including filiform style ca. 2.5 mm; stigma inconspicuous. Fruit ellipsoid, 10–12 × 6–8 mm, black when dry, 12-angulate. Fl. Jun–Jul, fr. Aug–Jan of next year.

• Evergreen broad-leaved forests in valleys, streamsides, riverbanks; 200–1100 m. Hainan.

The wood is finely grained, heavy, and durable.

**21. *Cryptocarya yunnanensis*** H. W. Li, Acta Phytotax. Sin. 17(2): 70. 1979.

云南厚壳桂 yun nan hou ke gui

Trees, up to 28 m tall, to 70 cm d.b.h. Bark gray. Old branchlets subterete, finely striate, yellow-brown when dry, glabrous; young branchlets slender, terete, ca. 3 mm in diam., striate, finely yellowish brown pubescent near top but glabrate on lower part. Leaves alternate; petiole 1.5–2.5 cm, concave-

convex, glabrous; leaf blade brownish green abaxially and brown-green adaxially when dry, usually oblong, occasionally ovate or ovate-oblong, 7–19 × 3.2–10 cm, thinly leathery, glabrous and opaque on both surfaces, lateral veins 5–7 pairs, lateral veins and midrib ± conspicuous abaxially, plane adaxially, transverse veins and veinlets reticulate, ± conspicuous on both surfaces, base broadly cuneate to rounded, apex shortly acuminate. Panicles axillary and terminal, sometimes few flowered, much shorter than leaf blade, 2–4 cm, sometimes many flowered, nearly 1/2 as long as leaf blade or more, 5.5–12 cm, in latter case always much branched, branches slender and up to 4 cm; peduncle 1–5.5 cm, peduncle and rachis finely pubescent, always reddish. Pedicels 1–2 mm, densely finely pubescent. Flowers greenish white, ca. 3 mm. Perianth pubescent outside

and inside; perianth tube turbinate, ca. 1.5 mm; perianth lobes oblong-ovate, ca. 1.5 mm. Fertile stamens 9, ca. 1.5 mm; filaments villous, those of 3rd whorl each with 2 long-stalked orbicular-reniform glands at base, others glandless; anthers 2-celled, those of 1st and 2nd whorls oblong, slightly shorter than filaments, with introrse cells, those of 3rd whorl ovate-oblong and with lateral-extrorse cells. Staminodes narrowly sagittate-triangular, shortly stalked. Ovary clavate, including style nearly 3 mm; stigma capitate, inconspicuous. Fruit green when young but black-purple when mature, ovoid, ca. 16 × 12 mm when mature, glabrous, inconspicuously 12-angulate, attenuate at base, apex subrounded. Fl. Mar–Apr, fr. May–Jun.

• Evergreen broad-leaved forests in valleys, sparse secondary forests, mountain slopes, riverbanks; 500–1100 m. S Yunnan.

## 25. CASSYTHA Linnaeus, Sp. Pl. 1: 35. 1753.

无根藤属 *wu gen teng shu*

Li Xiwen (李锡文 Li Hsi-wen), Li Jie (李捷); Henk van der Werff

*Calodium* Loureiro; *Volutella* Forsskål.

Vines twining, viscid, parasitic on various trees and shrubs by means of haustoria. Stem green or gray-brown, filiform, branched. Leaves reduced to minute scales. Flowers small, bisexual (plants rarely dioecious or nearly dioecious due to abortion), inserted in stalked or stalkless scalelike bracts, each with 2 bracteoles adnate to perianth base, all arranged into a spicate, capitate, or racemose inflorescence. Perianth tube turbinate or ovoid, contracted on top after anthesis; perianth lobes 6, in 2 series, outer 3 very small. Fertile stamens 9, rarely those of 2nd whorl reduced to narrow staminodes; filaments of 1st and 2nd whorls eglandular, those of 3rd whorl each with 2 subsessile glands; anthers 2-celled; cells of 1st and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes 3, of innermost whorl, stalkless or stalked. Ovary nearly not included in perianth tube when in flower, wholly included after anthesis due to dilated perianth tube contracted on top; style inconspicuous; stigma small or capitate, subsessile. Fruit included in dilated fleshy perianth tube, free; perianth tube with orifice and persistent lobes on top. Seeds thinly membranous or leathery; cotyledons fleshy, always unequal, ± hardened when mature, appressed, or separated when young but entirely connate when mature.

Between 15 and 20 species: tropical regions, with most species in Australia, a few in Africa, and one pantropical; one species in China.

### 1. *Cassytha filiformis* Linnaeus, Sp. Pl. 1: 35. 1753.

无根藤 *wu gen teng*

Stem green-brown, filiform, slightly woody, rusty pubescent when young but sparsely pubescent or glabrous when mature. Leaves reduced to minute scales. Spike ca. 2.5 cm, densely rusty pubescent; bracts and bracteoles brown, minute, broadly ovate, ca. 1 mm, ciliate. Flowers white, small, less than 2 mm, sessile. Perianth lobes 6, in 2 series, outer 3 small, orbicular, ciliate, inner 3 larger, ovate, all pubescent outside, subglabrous inside. Fertile stamens 9; filaments of 1st whorl subpetaloid, those of 2nd and 3rd whorls filiform, of 3rd whorl each with 2 stalkless glands, others glandless; anthers 2-celled; cells of 1st

and 2nd whorls introrse, those of 3rd whorl extrorse. Staminodes 3, stalked. Ovary ovoid, subglabrous; style short, slightly angled; stigma small, capitate. Fruit small, ovoid, included in dilated and fleshy perianth tube after anthesis, free, with persistent lobes on top. Fl. and fr. May–Dec.

Thickets or sparse forests on mountain slopes; near sea level to 1600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang [tropical regions of Africa, Asia, and Australia].

This pantropical species is harmful to its host plants. The whole plant is used by local people as a diuretic and as a paste for paper-making.