Flora of China 4: 81–84. 1999.

4. PODOCARPUS L'Héritier ex Persoon, Syn. Pl. 2: 580. 1807, nom. cons.

罗汉松属 luo han song shu

Margbensonia A. V. Bobrov & Melikyan.

Trees or shrubs evergreen, dioecious. Leaves spirally arranged to subopposite, ± monomorphic, juvenile leaves similar to adult leaves in shape but often larger and/or wider, linear, lanceolate, or ovate-elliptic, more than 5 mm, with single, obvious, often raised midvein on 1 or both surfaces, stomatal lines present on abaxial surface. Pollen cone complexes axillary, solitary or clustered, pedunculate or sessile; microsporophylls numerous, spirally arranged; microsporangia 2; pollen 2-saccate. Seed-bearing structures usually borne in leaf axils (rarely terminal), solitary (rarely more than 1); apical bracts fertile; basal bracts often fused to form a receptacle (obsolete in some species); ovule 1 (rarely few), inverted. Epimatium wholly enveloping seed, sometimes colored and succulent. Seed ripening in 1st year, drupelike, dry, or leathery.

About 100 species: tropical and subtropical regions worldwide, also temperate regions in S hemisphere; seven species (three endemic) in China.

The epiphytic shrub *Podocarpus epiphyticus* de Laubenfels & Silba (Phytologia 64: 290. 1988) was recently described from the Sumprabum region of N Myanmar, at 1800–2600 m, fairly close to the Chinese border. It should be searched for in comparable areas in NW Yunnan.

Podocarpus rumphii Blume (*P. philippinensis* Foxworthy) has been recorded for China, from both Hainan (de Laubenfels, Kalikasan 7: 142. 1978; and in Fl. Malesiana) and Taiwan (in FRPS). The records from Taiwan have been referred to *P. fasciculus* de Laubenfels (Fl. Taiwan, ed. 2), while those from Hainan require confirmation. *Podocarpus rumphii* otherwise occurs in Indonesia, Malaysia, Papua New Guinea, and the Philippines; it has pollen cones borne in clusters of up to 8 and leaf blades linear-lanceolate, with an acute (adult leaves) or acuminate (juvenile leaves) apex.

1a. Shrubs or small trees to 3(–5.5) m.
  2a. Pollen cones always solitary; receptacle 1–1.3 cm; coastal rocks in Taiwan ..... 3. *P. costalis*
  2b. Pollen cones borne in clusters of 3; receptacle ca. 0.3 cm; inland sites on mainland ..... 4. *P. forrestii*
1b. Trees 15–25 m.
  3a. Pollen cones usually borne in clusters of 3–5 ..... 7. *P. macrophyllus*
  3b. Pollen cones solitary, or borne in clusters of 2 or 3.
    4a. Blade of most adult leaves tapered into acuminate apex ..... 2. *P. neriifolius*
    4b. Blade of most or all adult leaves rounded, obtuse, subacute, or acute at apex.
      5a. Blade of most leaves linear-lanceolate or linear, 8–10 × as long as wide ..... 6. *P. annamiensis*
      5b. Blade of most leaves ovate to linear, 3–7 × as long as wide.
        6a. Leaf blade 1.5–3 × 0.5–0.8 cm, 3–6 × as long as wide ..... 1. *P. wangii*
        6b. Leaf blade 5–10.5 × 0.8–1.4 cm, 5–7 × as long as wide ..... 5. *P. nakaii*

1. Podocarpus wangii C. C. Chang, Sunyatsenia 6: 26. 1941.

小叶罗汉松 xiao ye luo han song

Trees to 15 m tall; trunk to 30 cm d.b.h., much branched; branchlets usually opposite or ± whorled, erect-spreading, pale brown, glabrous or puberulent. Foliage buds 1.5–3 × 1.5–2 mm; primary scales lanceolate, ± spreading at apex. Leaves alternate, subopposite, or rarely ± whorled, crowded, dispersed ± evenly on branchlets; blade ± linear (sun leaves) or ovate (shade leaves), 1.5–3 cm × 5–8 mm, 3–6 × as long as wide, base narrowed into a short petiole ca. 2 mm, margin slightly revolute (sun leaves), apex ± acute, midvein narrow abaxially, wider adaxially, base narrowed, margin flat, apex obtuse. Pollen cones axillary, solitary or borne in clusters of 2 or 3, cylindric, 1–3 cm × 1.5–3 mm, with a cluster of ca. 6 small, triangular scales at base; microsporophylls with short, triangular apex to 0.5 mm. Seed-bearing structures solitary; peduncle 0.5–1 cm. Receptacle red when ripe, consisting of 2 bracts, ca. 1 cm, base with 2 sterile, lanceolate bracts ca. 2 mm. Epimatium green and dark violet when ripe, leathery. Seed globose or globose-ellipsoid, ca. 8 × 6 mm, not crested. Pollination Jun, seed maturity Oct.

• Damp, shady places in evergreen broad-leaved forests or subalpine forests, rock crevices; 700–2000 m. S Guangdong, W Guangxi (Jingxi), Hainan (Diaoluo Shan, Limu Ling, Lingshui Xian, Wuzhi Shan), SE Yunnan (Malipo Xian, Xichou Xian).

Podocarpus wangii was identified in FRPS as *P. brevifolius* (Stapf) Foxworthy, which is in fact endemic to Mt. Kinabalu in Malaysia (Sabah). Several authors include *P. wangii* in the synonymy of *P. pilgeri* Foxworthy, from Indonesia, Papua New Guinea, and the Philippines. R. R. Mill has not seen specimens of *P. wangii*, but notes that the description and illustration in the protologue appear to match authentic material of *P. pilgeri*, except that the pollen cones are described as being shorter, and are sometimes borne in clusters of 2, rather than strictly solitary as in *P. pilgeri* throughout the rest of its range. An assessment of the status of *P. wangii* would be desirable. The wood is used for making furniture, utensils, carts, and farm implements.

2. Podocarpus neriifolius D. Don in Lambert, Descr. Pinus 2: [21]. 1824.

百日青 bai ri qing

Margbensonia neriifolia (D. Don) A. V. Bobrov & Melikyan; *Podocarpus discolor* Blume; *P. leptostachyus* Blume; ?*P. macrophyllus* (Thunberg) Sweet var. *acuminatissimus* E. Pritzel; ?*P. neglectus* Blume.

Trees to 25 m tall; trunk usually to 5 cm d.b.h.; bark grayish brown, thin, fibrous, peeling off in longitudinal

flakes; branches spreading or ascending. Foliage bud scales erect, triangular, 1–1.5 mm wide, apex acute. Leaf blade lanceolate, usually slightly curved, (4–)7–15(–20) × (0.5–)0.9–1.3(–2) cm, leathery, midvein raised adaxially, flat or slightly raised abaxially, base cuneate into short petiole, apex long acuminate; juvenile leaves wider, with obtuse, mucronate apex. Pollen cones solitary or in clusters of 2 or 3, normally sessile, 2.5–5 cm, with several spirally arranged, basal bracts. Seed-bearing structures axillary, solitary; peduncle 0.9–2.2 cm. Receptacle orange-red when ripe, obconical-ellipsoid, 8–10 × 5–8 mm, base with 2 subulate bracts 2–6 mm. Epimatium purplish red when ripe. Seed ovoid or ovoid-subglobose, 0.8–1.6 cm, apex rounded or obtuse. Pollination May, seed maturity Aug–Nov. 2*n* = 34.

Evergreen broad-leaved forests; 100–1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, NE India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand, Vietnam; Pacific Islands].

R. R. Mill considers that records of *Podocarpus neriifolius* from Taiwan should be referred in part to *P. nakaii* and in part to *P. fasciculus* de Laubenfels (Blumea 30: 277. 1985), which also occurs in the Ryukyu Islands, Japan (*P. macrophyllus* var. *liukiuensis* Warburg). *Podocarpus fasciculus* has pollen cones solitary or borne in clusters of 2–5 and leaf blades linear-lanceolate, with an acute apex. Mill also considers *P. subtropicalis* de Laubenfels (Blumea 30: 277. 1985), described from C Sichuan (Emei Shan), to be a separate species. D. J. de Laubenfels regards this as the most widely cultivated species of the genus in the warmer parts of the world (probably including many parts of China), and notes that it has often been misidentified as *P. neriifolius*, which is apparently rarely cultivated. It has pollen cones solitary or borne in clusters of 2–10 and leaf blades linear or linear-lanceolate, with an acute apex. However, L. K. Fu and Y. Li consider both *P. fasciculus* and *P. subtropicalis* to be synonymous with *P. neriifolius*. Further collections are needed to resolve the situation.

The wood is used in making furniture, musical instruments, carvings, and paper.

3. Podocarpus costalis C. Presl, Epimel. Bot. 236. 1851.

兰屿罗汉松 lan yu luo han song

Shrubs or small trees to 3 m tall; bark greenish, very smooth; branches spreading horizontally. Foliage buds 2–4 × 2–4 mm, of long, triangular scales with spreading apices. Leaves spirally arranged, crowded at apex of branchlets; blade of adult leaves narrowly oblanceolate or linear-oblanceolate, (2.5–)5–7 × (0.5–)0.8–1.2 cm but juvenile leaves larger, leathery, midvein prominent and raised adaxially, less distinct but more broadly raised abaxially, base tapered into short petiole, margin slightly revolute, apex rounded or obtuse, subacute in juvenile leaves, sometimes mucronate. Pollen cones axillary, always solitary, sessile, cylindric or ovoid-cylindric, 3–3.5 cm × ca. 7 mm, surrounded at base by a cluster of membranous scales ca. 2 mm wide. Seed-bearing structures borne on peduncles ca. 1 cm. Receptacle red when ripe, cylindric, 1–1.3 cm, base with 2 deciduous, lanceolate sterile bracts ca. 1.5 mm. Epimatium dark blue when ripe. Seed ellipsoid, (8–)9–10 × 6–7 mm, apex rounded, shortly mucronate, mucro ca. 1 mm.

Coastal rocks; near sea level. Taiwan (Lan Yu opposite SE coast) [Philippines].

Misidentified as *Podocarpus polystachyus* R. Brown ex Endlicher (from Indonesia, Malaysia, and the Philippines) by several authors dealing with the Chinese flora.

4. Podocarpus forrestii Craib & W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 219. 1920.

大理罗汉松 da li luo han song

Margbensonia forrestii (Craib & W. W. Smith) A. V. Bobrov & Melikyan.

Shrubs to 3 m, to 5.5 m in cultivation; branchlets robust, relatively thick, rather rigid, densely leafy. Leaves densely crowded; petiole 2–4 mm, narrowly winged; blade dark green and matt adaxially, grayish green abaxially, elliptic to linear-elliptic, 2–9 cm × 6–10 mm, rather leathery, midvein prominent, 0.5–1 mm wide, stomatal lines 30–50 on abaxial surface, base cuneate or shortly attenuate, margin thickened abaxially, apex obtuse or subacute. Pollen cones borne in clusters of 3, spikelike, 1.5–2 cm × ca. 2 mm; bracts acute, occasionally irregularly obtuse. Seed-bearing structures axillary, solitary; peduncle ca. 8 cm. Receptacle glaucous blue when immature, cylindric, relatively thin, slightly narrowed distally, ca. 3 mm, base with 2 linear bracts ca. 2 mm. Seed globose, 7–8 mm in diam. Seed maturity Aug.

• Dry or damp, shady places, open thickets, scrub, also cultivated in gardens and school yards; 2400–3000 m. Yunnan (Dali Xian: Diancang Shan).

Perhaps represents no more than the juvenile state of *Podocarpus macrophyllus* var. *macrophyllus*. It was placed in the synonymy of that species by de Laubenfels (Blumea 30: 276. 1985).

5. Podocarpus nakaii Hayata, Icon. Pl. Formos. 6: 66. 1916.

台湾罗汉松 tai wan luo han song

Podocarpus macrophyllus (Thunberg) Sweet var. *nakaii* (Hayata) H. L. Li & H. Keng.

Trees to 18 m tall; trunk to 1.8 m d.b.h.; bark pale gray, fibrous; branches terete, glabrous. Foliage buds globose; scales wholly overlapping, blunt at apex, primary scales triangular, secondary scales rounded. Leaves crowded at apex of branchlets, alternate; blade bright green adaxially, pale green (drying brownish) and glaucous abaxially, linear, linear-lanceolate, or lanceolate, straight or slightly falcate, 5–10.5 × 0.8–1.4 cm, 5–7 × as long as wide, leathery, midvein raised adaxially as a ridge at least 0.5 mm wide, a flat or slightly raised abaxially, base attenuate or cuneate into short petiole ca. 5 mm, margin narrow, slightly raised and thickened abaxially but not revolute, apex subacute or acute. Pollen cones axillary, solitary or in clusters of 2 or 3, sessile, 2–4 cm, with several spirally arranged, basal bracts. Seed-bearing structures axillary, solitary; peduncle 2–12 mm. Receptacle orange or scarlet when ripe, obconical-ellipsoid, 4–9 × 3–6 mm, with 2

inconspicuous, longitudinal grooves. Epimatium greenish. Seed solitary, axillary, ovoid or ellipsoid-ovoid, 1–1.2 cm × 7–8 mm, with a large crest, apex narrow, pointed.

• Evergreen broad-leaved forests; 300–800 m. C Taiwan.

6. Podocarpus annamiensis N. E. Gray, J. Arnold Arbor. 39: 451. 1958.

海南罗汉松 hai nan luo han song

Trees to 16 m tall; trunk to 1 m d.b.h.; bark pale grayish brown. Foliage buds globose; scales wholly overlapping, blunt at apex, primary scales triangular, secondary scales rounded. Leaves radially spreading; petiole 2–4 mm; blade linear-lanceolate or linear, occasionally elliptic-lanceolate, distally tapered, 4–10.5(–18) cm × 5–11(–20) mm, 8–10 × as long as wide, thick, leathery, midvein raised on both surfaces, stomatal bands abaxial, 3.8–4.5 mm wide, base attenuate, apex obtuse or subacute. Pollen cones solitary, occasionally in clusters of 2 or 3, subsessile, pale yellow, spikelike, 3–5 cm. Seed-bearing structures axillary, solitary; peduncle 2–10 mm. Receptacle orange-red when ripe, obconical-ellipsoid, somewhat flattened distally, equaling or slightly longer than seed. Epimatium dark bluish purple and glaucous when ripe. Seed ovoid, 8–10 × ca. 6 mm, not crested. Pollination Mar–Apr, seed maturity Sep–Oct.

Tropical montane rainforests, evergreen broad-leaved forests on laterite and granitic yellow-earth; 600–1600 m. Hainan (Lingshui Xian, Wuzhi Shan) [E Myanmar, Vietnam].

A vulnerable species in China; only a few trees now remain in unexploited forests in S Hainan. The wood is excellent for carving and making writing materials and musical instruments. *Podocarpus annamiensis* has recently been considered a synonym of *P. neriifolius* by N. T. Hiep & J. E. Vidal (Fl. Cambodge, Laos et Vietnam 28: 105. 1996).

7. Podocarpus macrophyllus (Thunberg) Sweet, Hort. Suburb. Londin. 211. 1818.

罗汉松 luo han song

Trees to 20 m tall; trunk to 60 cm d.b.h.; bark gray or grayish brown, peeling off in thin flakes; branches spreading or erect-spreading, rather dense; branchlets glabrous or pubescent. Leaves spirally arranged, sessile; blade dark green and glossy adaxially, grayish green, pale green, or tinged white abaxially, linear-lanceolate, oblanceolate, or oblong-oblanceolate, slightly curved, 1.7–12 cm × 2–10 mm, midvein prominently raised adaxially, slightly raised abaxially, base cuneate, apex mucronate or acute to long acuminate. Pollen cones axillary, usually in clusters of 3–5 on very short peduncle, spikelike, 3–5 cm, with several triangular bracts at base. Seed-bearing structures axillary, solitary, pedunculate, with few basal bracts. Receptacle red or purplish red when ripe, columnar. Epimatium purplish black when ripe, with white powder. Seed ovoid, ca. 1 cm in diam., apex rounded. Pollination Apr–May, seed maturity Aug–Sep. 2*n* = 38.

Forests, open thickets, roadsides; near sea level to 1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, ?Taiwan, Yunnan, Zhejiang; introduced or status uncertain in Shaanxi [Japan, ?N Myanmar].

1a. Branches erect; crown columnar; leaf blade oblanceolate or oblong-oblanceolate 7b. var. *chingii*
1b. Branches spreading or erect-spreading; crown not columnar; leaf blade linear-lanceolate.
  2a. Leaf blade (5–)7–10 mm wide ..... 7a. var. *macrophyllus*
  2b. Leaf blade 2–7 mm wide.
    3a. Leaf blade usually 5–12 cm × 3–6 mm, apex acuminate or subacute ..... 7c. var. *angustifolius*
    3b. Leaf blade 1.7–7 cm × 5–7 mm, apex shortly acuminate, mucronate, or obtuse.
      4a. Branchlets densely blackish brown pubescent 7d. var. *piliramulus*
      4b. Branchlets glabrous ..... 7e. var. *maki*

7a. Podocarpus macrophyllus var. **macrophyllus**

罗汉松(原变种) luo han song (yuan bian zhong)

Taxus macrophylla Thunberg in Murray, Syst. Veg., ed. 14, 895. 1784; *Margbensonia macrophylla* (Thunberg) A. V. Bobrov & Melikyan; *Nageia macrophylla* (Thunberg) F. Mueller.

Crown not columnar; branches spreading or erect-spreading; branchlets glabrous. Leaf blade 7–12 cm × (5–)7–10 mm, apex acute.

Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang [Japan].

The wood is used in making furniture, utensils, paper, and farm implements.

7b. Podocarpus macrophyllus var. **chingii** N. E. Gray, J. Arnold Arbor. 39: 474. 1958.

柱冠罗汉松 zhu guan luo han song

Margbensonia chingiana (S. Y. Hu) A. V. Bobrov & Melikyan; *Podocarpus chingianus* S. Y. Hu.

Crown columnar; branches erect; branchlets covered with dense, prominently projecting, transversely elliptic leaf scars. Leaf blade 0.8–3.5 cm × 1–4 mm, apex obtuse or subacute.

• Forests, open thickets; near sea level to 1000 m. Jiangsu, ?Sichuan, Zhejiang.

This taxon was regarded as a cultivar of *Podocarpus macrophyllus* (cv. Chingii) by S. Y. Zhang in Fl. Zhejiang.

7c. Podocarpus macrophyllus var. **angustifolius** Blume, Rumphia 3: 215. 1847.

狭叶罗汉松 xia ye luo han song

Podocarpus macrophyllus f. *angustifolius* (Blume) Pilger.

Crown not columnar; branches spreading or erect-spreading. Leaf blade usually 5–12 cm × 3–6 mm, apex acuminate or subacute.

Guizhou, Jiangxi, Sichuan [Japan].

Flora of China 4: 81–84. 1999.

Perhaps represents no more than the juvenile state of *Podocarpus macrophyllus* var. *maki*.

7d. Podocarpus macrophyllus var. **piliramulus** Z. X. Chen & Z. Q. Li, Bull. Bot. Res., Harbin 9(3): 69. 1989.

毛枝罗汉松 mao zhi luo han song

Crown not columnar; branches spreading or erect-spreading; branchlets densely blackish brown pubescent. Leaf blade 1.7–7 cm × 2–4.5 mm, apex mucronate.

- Roadsides. NW Hubei (Zhushan Xian).

7e. Podocarpus macrophyllus var. **maki** Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 232. 1846.

短叶罗汉松 duan ye luo han song

Margbensonia maki (Siebold & Zuccarini) A. V. Bobrov & Melikyan; *Myrica esquirolii* H. Léveillé; *Nageia macrophylla* var. *maki* (Siebold & Zuccarini) Voss; *Podocarpus chinensis* Wallich ex J. Forbes; *P. chinensis* var. *maki* (Siebold & Zuccarini) Hao; *P. japonicus* Siebold ex Endlicher (1847), not J. Nelson (1866); *P. macrophyllus* subsp. *maki* (Siebold & Zuccarini) Pilger.

Crown not columnar; branches erect-spreading; branchlets glabrous. Leaf blade (2.5–)3.5–7 cm × 5–7 mm, apex obtuse or shortly acuminate.

Native distribution unclear because of widespread cultivation. Possibly native in Guangdong, Taiwan, Zhejiang; introduced or status uncertain in Anhui, Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan [possibly native in Japan and N Myanmar].

Flora of China 4: 81–84. 1999.