

3. NAGEIA Gaertner, Fruct. Sem. Pl. 1: 191. 1788.

竹柏属 zhu bai shu

Trees evergreen, dioecious or rarely monoecious; crown columnar. Leaves spirally arranged or in decussate, opposite pairs on leading shoots, opposite or subopposite on lateral shoots, ± monomorphic, adult leaves similar to juvenile leaves but often larger or wider (although juvenile leaves larger in *Nageia wallichiana*), more than 5 mm; petiole twisted through 90°; blade broadly ovate-elliptic to oblong-lanceolate, without obvious midvein but with many, slender, parallel, longitudinal veins converging toward base and apex, stomatal lines abaxial or rarely on all surfaces. Pollen cones axillary, solitary or clustered in small, spikelike groups of 3–6, borne on naked peduncles, ovoid-cylindric, with basal sterile scales; pollen 2-saccate. Seed-bearing structures terminal on short, scaly, axillary branchlets, solitary or occasionally paired; bracts usually obsolete, scarcely thicker than peduncle, rarely succulent and thicker than peduncle; ovule inverted. Epimatium wholly enveloping seed, leathery, with bluish black bloom when ripe. Seed drupelike, globose.

Five to seven species: Bangladesh, Cambodia, China, India, Indonesia, Japan (including Ryukyu Islands), Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam; three species in China.

The leaves of *Nageia* strongly differ from those of *Podocarpus* in their numerous, parallel veins and absence of a midvein, and are superficially much more similar to those of *Agathis* (Araucariaceae). The Chinese species of *Nageia* were treated in FRPS under *Podocarpus*. D. Z. Fu (Acta Phytotax. Sin. 30: 515–528. 1991) placed the genus in its own family, Nageiaceae, but this view has since been refuted by several workers using different lines of evidence.

- 1a. Leaf blade with stomatal lines present on both surfaces; receptacle thick, very succulent 1. *N. wallichiana*
- 1b. Leaf blade with stomatal lines present on abaxial surface only, sometimes scarcely visible; receptacle obsolete or absent.
 - 2a. Leaf blade usually 8–18 cm; receptacle absent; seed 1.5–1.8 cm in diam. 2. *N. fleuryi*
 - 2b. Leaf blade to 9 cm; receptacle obsolete; seed 1–1.5 cm in diam. 3. *N. nagi*

1. *Nageia wallichiana* (C. Presl) Kuntze, Revis. Gen. Pl. 2: 800. 1891.

肉托竹柏 rou tuo zhu bai

Podocarpus wallichianus C. Presl, Abh. Königl. Böhm. Ges. Wiss., ser. 5, 3: 540. 1846; *Decussocarpus wallichianus* (C. Presl) de Laubenfels; *Nageia blumei* (Endlicher) Gordon; *Podocarpus blumei* Endlicher; *P. latifolius* Blume (1827) and Wallich (1830), not (Thunberg) R. Brown ex Mirbel (1825).

Trees to 50 m tall; trunk to at least 1 m d.b.h.; bark smooth, dark brown or gray-brown, tan or brown within, peeling in large, irregular flakes. Leaves decussate, 2-ranked, turned so that those on 1 side of branch have adaxial surface uppermost, those on the other side abaxial surface uppermost; petiole 5–10 mm; blade dark green adaxially, paler or grayish green abaxially, elliptic or lanceolate-elliptic, (6–)9–14 × (2–)3–5 cm in adult leaves, or to 23 × 7 cm in juvenile leaves, thick and leathery, stomatal lines present on both surfaces, base cuneate to attenuate, apex acuminate. Bracts of pollen- and seed-cone peduncles deciduous. Pollen cones axillary, in clusters of (1–)3–5 (–7) on peduncle 0.2–1 cm, 1 cone terminal, others decussate, cylindric, 0.8–1.8 cm × 4–5 mm; microsporophylls lanceolate, 2–3 mm. Seed-bearing structures axillary, solitary or rarely paired; peduncle (0.5–)1.2–1.7(–2) cm.

Receptacle of 4–7 sterile scales and 1 or 2 fertile, subterminal scales, green initially, blackish when ripe, very succulent. Epimatium bluish purple or purplish red when ripe. Seed globose, 1.5–1.8 cm in diam., with small, proximal beak.

Evergreen subtropical forests on hillsides. S Yunnan (Xishuangbanna Daizu Zizhizhou) [Bangladesh, Cambodia, NE and SE India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam].

2. *Nageia fleuryi* (Hickel) de Laubenfels, Blumea 32: 210. 1987.

长叶竹柏 chang ye zhu bai

Podocarpus fleuryi Hickel, Bull. Soc. Dendrol. France 76: 75. 1930; *Decussocarpus fleuryi* (Hickel) de Laubenfels.

Trees to 30 m tall; trunk to 70 cm d.b.h.; bark brownish purple, smooth, peeling in thin flakes. Leaves opposite, decussate, held with abaxial surface always uppermost; petiole 2–5 (–10) mm, usually rather indistinct, rotation not continuing along internode; blade dark green and shining abaxially, elliptic or broadly lanceolate, 8–18 × 2.2–5 cm, leathery, stomatal lines present on abaxial surface only, base cuneate, apex abruptly acuminate. Bracts deciduous. Pollen cones axillary, in clusters of 3–6, sessile, elongate-cylindric, 1.5–6.5 cm × ca. 4 cm; microsporophylls triangular. Seed-bearing structures axillary; peduncle scaly, not enlarged, 2–2.8 cm at seed maturity; ovules 1 or 2(or 3), sessile in axils of subterminal bracts, only 1 ovule maturing. Receptacle absent. Epimatium green, turning bluish purple when ripe. Seed globose, 1.5–1.8 cm in diam. Pollination Mar–Apr, seed maturity Oct–Nov. $2n = 26^*$.

Montane rainforests, evergreen broad-leaved forests, on neutral or slightly acid, lateritic or yellow-earth soils in shade or semishade; 800–900 m. Guangdong (Gaoyao Xian, Longmen Xian, Zengchong Xian), Guangxi (Daxin Xian, Hepu Xian), Hainan (Wuzhi Shan),

Taiwan (Taibei), SE Yunnan (Dawei Shan, Mengzi Xian, Pingbian Miaozi Zizhixian) [Cambodia, Laos, Vietnam].

A vulnerable species in China.

3. *Nageia nagi* (Thunberg) Kuntze, Revis. Gen. Pl. 2: 798. 1891.

竹柏 zhu bai

Myrica nagi Thunberg in Murray, Syst. Veg., ed. 14, 884. 1784; *Decussocarpus nagi* (Thunberg) de Laubenfels; *D. nagi* var. *formosensis* (Dummer) Silba; *Nageia formosensis* (Dummer) C. N. Page; *N. nagi* var. *formosensis* (Dummer) Silba; *N. nankoensis* (Hayata) R. R. Mill; *Podocarpus formosensis* Dummer; *P. japonicus* J. Nelson (1866), not Siebold ex Endlicher (1847); *P. koshunensis* (Kanehira) Kanehira; *P. nageia* R. Brown ex Endlicher; *P. nagi* (Thunberg) Pilger; *P. nagi* var. *koshunensis* Kanehira; *P. nankoensis* Hayata. Trees or shrubs to 20 m tall; trunk to 50 cm d.b.h.; bark reddish brown, dark purplish red, or light or dark gray, peeling in small, thin flakes; branches and branchlets erect, ascending, spreading, or \pm pendulous, grayish to dark brown, slender, semiterete, stout; branchlets opposite, rarely alternate, compressed-tetragonal, rigid, glabrous, densely leafy. Leaves opposite, decussate; petiole strongly twisted at base, rotation continuing along whole length of internode; blade dark green and glossy adaxially, pale green abaxially, ovate-lanceolate, lanceolate, elliptic-lanceolate, or narrowly elliptic, 2–9 \times 0.7–3 cm, leathery, parallel veins indistinct, stomatal lines present on abaxial surface only, sometimes scarcely visible, base cuneate or cuneate-attenuate into widened, flattened petiole, apex truncate, broadly obtuse, acute, or acuminate, sometimes blackened. Pollen cones axillary, solitary or in clusters of up to 10, pedunculate or sessile, cylindrical, ovoid-cylindrical, or subglobose, 0.5–2.5 cm; peduncle (when present) short, thick, with a few basal bracts. Seed-bearing structures axillary, solitary rarely paired; peduncle stout, or slightly thickened only distally, 4.5–13 mm, with several deciduous bracts leaving scars. Receptacle obsolete, consisting of few bracts. Epimatium green with white bloom when young, dark purple with sparser white bloom when ripe. Seed globose to pyriform, 1–1.5 cm in diam., with dense punctiform depressions, base pointed, apex rounded. Pollination Mar–May, seed maturity Aug–Nov. $2n = 26^*$, 29^* .

Evergreen broad-leaved and *Quercus* forests, forests on dry mountainsides, thickets, along streams; 200–1200(–1600) m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Zhejiang; also cultivated as an ornamental [Japan (including Ryukyu Islands)].

A broad concept of *Nageia nagi* is adopted here. However, R. R. Mill indicates that the plants occurring in Taiwan should be treated as two separate species: those from S Taiwan (Hengchun Peninsula area) as *N. formosensis*, and those from N Taiwan (Nanko, Tanshui) as *N. nankoensis*. The taxonomy of this group of taxa is still not fully

understood; field observations and cultivation experiments would be desirable.

The wood is used for constructing houses and bridges, making furniture, utensils, and handicraft articles. The seeds yield an edible oil which is also used in industry.

