

ARAUCARIACEAE

南洋杉科 nan yang shan ke

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Trees evergreen, dioecious or monoecious, with relatively large pith in trunk and resin in cortex. Leaves spirally arranged or decussate, sessile, decurrent. Cones unisexual. Pollen cones axillary or terminal on branchlets, solitary or clustered; microsporophylls numerous, spirally arranged, sessile; microsporangia 4–20, external, suspended, arranged in 2 rows, filiform; pollen sacs split longitudinally; pollen nonsaccate. Seed cones solitary, terminal on branchlets, maturing in 2nd or 3rd year; bracts numerous, spirally arranged; ovulate scales degenerate or ligulate, connate with bracts on 1 side, each with 1 ovule at base abaxially; ovules connate with ovulate scales or with bracts (when ovulate scales degenerate); bracts of mature cones deciduous, flattened, woody or thickly leathery, bearing 1 seed in basal part (if developed), sometimes adnate with ligulate seed scales in center of adaxial surface, apex triangular or caudate. Seeds connate with bracts or detached, flattened, winged or not. $2n = 26$.

Three genera and 41 species: Indonesia, Malaysia, Papua New Guinea, Philippines; Australia, New Zealand, SW Pacific Islands, South America; two genera and four species (all introduced) in China.

Cheng Wan-chün, Fu Li-kuo, Tsui Hung-pin & Chen Chia-jui. 1978. Araucariaceae. In: Cheng Wan-chün & Fu Li-kuo, eds., Fl. Reipubl. Popularis Sin. 7: 24–31.

- 1a. Seeds connate with bracts, wingless or with 2 lateral wings 1. *Araucaria*
 1b. Seeds detached from bracts, with a lateral wing on 1 side and a small protrusion (occasionally developed into a wing) on other 2. *Agathis*

1. ARAUCARIA Jussieu, Gen. Pl. 413. 1789.

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Trees monoecious, occasionally dioecious; branches whorled or almost so; winter buds small. Leaves spirally arranged, needlelike to broadly ovate or triangular, varied in shape and size even on same tree. Pollen cones axillary or terminal on branchlets, cylindrical, ovoid, or ellipsoid; microsporophylls densely arranged. Seed cones erect, ellipsoid, or ovoid to subglobose; ovulate scales ligulate; bracts of mature cones large, woody, distal part thickened, distal margin sharply and transversely ridged, apex reflexed or upcurved, pointed; seed scales adnate with bracts in basal, seed-bearing part, detached in apical part, sometimes thickened and exposed. Seeds connate with bracts, sometimes with 2 apparent lateral wings formed from bract. Cotyledons usually 2, occasionally 4. Germination hypogeal or epigeal.

Nineteen species: Papua New Guinea; Australia (including Norfolk Island), New Caledonia, South America; three species (introduced) in China.

- 1a. Leaves with numerous, parallel, thin veins but lacking midvein; pollen cones axillary; seeds wingless 1. *A. bidwillii*
 1b. Leaves with ± distinct midvein but no parallel, thin veins; pollen cones terminal; seeds winged.
 2a. Seed cones ovoid or ellipsoid; apex of bracts caudate, thickened, obviously reflexed 2. *A. cunninghamii*
 2b. Seed cones subglobose; apex of bracts triangular, flattened, upcurved 3. *A. heterophylla*

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1. *Araucaria bidwillii* Hooker, London J. Bot. 2: 503. 1843.

大叶南洋杉 da ye nan yang shan

Trees to 50 m tall; trunk to 1 m d.b.h.; bark dark gray-brown, thick, flaking; crown pyramidal; branchlets dense, pendulous, green, glabrous. Leaves radially spreading, bright green, lanceolate, ovate-lanceolate, or triangular-ovate, flattened, slightly incurved, hard, thick, leathery, lacking a midvein but with numerous, parallel, thin veins, stomatal lines abaxial; leaves of same year dimorphic: those of young trees and vegetative branchlets longer (0.7–2.8 cm) and more loosely arranged than those of old trees and cone-bearing branchlets, those at middle of branchlets 2.5–6.5 cm, apex acuminate or acute. Pollen cones axillary, solitary, cylindrical. Seed cones ovoid-subglobose, ca. 30 × 22 cm; bracts oblong-elliptic or oblong-ovate, margin relatively thick, wingless, apex triangular, reflexed; seed scales thickened, exposed at apex. Seeds elongate-elliptic, wingless. Pollination Jun, seed maturity after autumn of 3rd year.

Cultivated. Fujian (Fuzhou Shi), Guangdong, Guangxi (Nanning Shi), S Yunnan (Mengla Xian) [native to NE Australia].

2. *Araucaria cunninghamii* Aiton ex D. Don in Lambert, Descr. Pinus, ed. 2, 3: t. 79. 1837.

南洋杉 nan yang shan

Eutassa cunninghamii (Aiton ex D. Don) Spach.

Trees to 70 m tall; trunk to more than 1 m d.b.h.; bark gray-brown or dark gray, rough, transversely split; crown tower-shaped when young, becoming flat topped with age; lateral branchlets dense, drooping, almost pinnately arranged. Leaves dimorphic: leaves of young trees and lateral branchlets loosely arranged, needlelike, falcate, subulate, or triangular, slightly curved, somewhat tetragonal or ridged (not obviously so abaxially), 0.7–1.7 cm × ca. 2.5 mm wide at base, stomatal lines weakly evident on abaxial surface, apex acute or acuminate; leaves on mature trees and cone-bearing branchlets densely arranged, overlapping, stretching upward, gray-green abaxially, glaucous, ovate to triangular, 6–10 mm, ca. 4 mm wide at base,

ridged or not, midvein obvious or not, distal part of leaf tapering or slightly rounded, apex acute or obtuse. Pollen cones terminal, solitary, ovoid or ellipsoid. Seed cones ovoid or ellipsoid, 6–10 × 4.5–7.5 cm; bracts narrowly obovate, sharply ridged, with thin, lateral wing, apex caudate, thickened, acute, obviously reflexed; seed scales thin at apex. Seeds ellipsoid, with a membranous, lateral wing.

Cultivated. Guangdong (Guangzhou Shi), Hainan, Fujian (Xiamen Shi), S Yunnan (Jinghong Xian, Mengla Xian) [native to Papua New Guinea; NE Australia].

The illustration in FRPS (pl. 7) includes a branchlet (f. 1) of what may be another species cultivated in China, possibly *Araucaria columnaris* (J. R. Forster) Hooker, which is native to S New Caledonia and nearby islands. Indeed, this species has been recorded from extreme SE Xizang as a cultivated ornamental, but no voucher specimen has been seen by the authors.

3. *Araucaria heterophylla* (Salisbury) Franco, Anais Inst. Super. Agron. 19: 11. 1952.

异叶南洋杉 yi ye nan yang shan

Eutassa heterophylla Salisbury, Trans. Linn. Soc. London 8: 316. 1807.

Trees to 50 m tall; trunk to 1.5 m d.b.h.; trunk straight; bark dark gray, flaking; crown tower-shaped; branchlets spreading horizontally or drooping; lateral branchlets usually pinnately arranged, drooping. Leaves dimorphic: those of young trees and lateral branchlets loosely arranged, spreading openly, bright green, glaucous abaxially, subulate, usually laterally depressed, upcurved, 6–12 mm, 3- or 4-ridged; those of mature trees and cone-bearing branchlets densely arranged, slightly openly spreading, broadly ovate or triangular-ovate, ± curved, 5–9 mm, widest at base, midvein obviously raised or not, apex obtuse. Pollen cones terminal, solitary. Seed cones subglobose, 8–12 × 7–11 cm, sometimes wider than long; apex of bracts triangular, flattened, acute, upcurved. Seeds ellipsoid, slightly flattened, with a lateral wing.

Cultivated. Fujian (Fuzhou Shi), Guangdong (Guangzhou Shi), S Yunnan (Jinghong Xian, Mengla Xian) [native to Australia (Norfolk Island)].

2. **AGATHIS** Salisbury, Trans. Linn. Soc. London 8: 311. 1807, nom. cons.

贝壳杉属 bei qiao shan shu

Trees monoecious; branches usually whorled on young trees, becoming irregularly arranged on mature ones, with orbicular scars of deciduous branchlets; winter buds globose, small. Leaves spirally arranged on main branches, opposite or alternate on lateral branchlets, leaving cushion-shaped scars on falling, pinkish or reddish when young, finally dark green, greatly variable in size and shape even on same branchlet, leathery, with numerous, indistinct, parallel, thin veins; petiole flattened, short. Pollen cones axillary, solitary, upright, cylindric, hard; microsporophylls densely arranged. Seed cones globose or broadly ovoid; bracts densely arranged, flabellate, apex thickened. Seeds detached from bracts, with a lateral wing on 1 side and a small protrusion (occasionally developed into a wing) on other. Cotyledons 2.

Twenty-one species: Indonesia, Malaysia, Papua New Guinea, Philippines; Australia, New Zealand, SW Pacific Islands; one species (introduced) in China.

1. *Agathis dammara* (Lambert) Richard & A. Richard in A. Richard, Comm. Bot. Conif. Cycad. 83. 1826.

贝壳杉 bei qiao shan

Pinus dammara Lambert, Descr. Pinus 1: 61. 1803;

Agathis alba Jeffrey; *A. loranthifolia* Salisbury;

Dammara alba Rumphius ex Blume.

Trees to 40 m tall; trunk to 45 cm d.b.h.; bark reddish gray, thick; crown conical; branches slightly drooping; winter buds terminal on branchlets, with a few densely arranged scales. Leaves with petiole 3–8 mm; blade dark green, oblong-lanceolate or elliptic, ± recurved, 5–12 × 1.2–5 cm, usually smaller on cone-bearing branchlets, leathery, margin thickened, apex usually obtuse, occasionally mucronate. Pollen cones 5–7.5 × 1.8–2.5 cm. Seed cones subglobose or broadly ovoid, to 10 cm; bracts 2.5–3 cm, apex reflexed. Seeds obovoid, ca. 1.2 cm × 7 mm; wing developed on 1 side, membranous, almost cuneate-oblong.

Cultivated. Fujian, Guangdong [native to Indonesia, Malaysia].

The trunk richly contains the famous “dammar” resin, which is widely used in industry and medicine. The tree is commonly grown as an ornamental, and also yields timber used for construction.

