

### 3. CRYPTOMERIA D. Don, Ann. Nat. Hist. 1: 233. 1838.

柳杉属 liu shan shu

Trees evergreen, monoecious; trunk straight; bark reddish brown to dark gray, fibrous, peeling off into long shreds; crown pyramidal or ovoid; branches ± whorled, horizontal or erect-spreading; winter buds small. Leaves persisting 4 or 5 years, spirally 5-ranked, spreading or directed forward, subulate, straight or incurved at apex, adaxial and abaxial surfaces convex, lateral surfaces slightly flattened, keeled, stomatal bands present on all 4 surfaces, base decurrent, apex acute. Pollen cones axillary toward apex of 2nd year branchlets, usually crowded into a short, terminal, sessile, oblong raceme, plum red turning yellow when mature; microsporophylls many, spirally arranged; pollen sacs (3 or)4 or 5(or 6). Seed cones terminal, solitary or occasionally aggregated, nodding, sessile, ± globose, rosettelike and resembling opening buds, ripening in 1st year, persisting 1–2 years longer with branchlet growth often temporarily continuing through cone; bracts and cone scales connate; bracts borne on middle or proximal middle part of abaxial surface of cone scales, triangular, small; ovules 2–5 per bract axil; cone scales persistent, shield-shaped, cuneate, thickened distally, woody, umbo with a central spine and 4 or 5(–7) toothlike projections on distal margin; apical scales small and sterile. Seeds irregularly compressed-ellipsoid or -triangular-ellipsoid, very narrowly winged. Cotyledons (2 or)3(or 4). Germination epigeal.  $2n = 22^*$ .

One species: China, Japan.

**1. Cryptomeria japonica** (Thunberg ex Linnaeus f.) D. Don, Trans. Linn. Soc. London 18: 167. 1839.

日本柳杉 ri ben liu shan

Trees to 40 m tall; trunk to at least 2 m d.b.h.; bark reddish brown, fibrous, peeling off in strips; crown pyramidal; main branches whorled, horizontally spreading or slightly pendulous; branchlets usually pendulous, those of 1st year green. Leaves on leader branchlets borne at 15–45° to axis, those on short (fertile) branchlets at 30–55° to axis, subulate to linear, ± straight or strongly incurved, (0.4–)0.7–1.4(–2) cm × 0.8–1.2 mm (width measured near base of two wider surfaces), rigid, stomatal bands with 2–8 rows of stomata on each surface. Cones borne from 5th year onward. Pollen cones borne in racemes of 6–35, ovoid or ovoid-ellipsoid, (2–)2.5–5(–8) × (1.3–)2–3(–4) mm, each cone (except basal and apical) subtended by a leaf shorter than to 1.5 × length of cone. Seed cones borne in groups of 1–6, globose or subglobose, 0.9–1.6(–2.5) × 1–2(–2.5) cm; cone scales 20–30, proximal 2 margins often convex in outline, or all 4 margins ± concave in outline, middle part with or without distinct shoulders at widest point, apex usually recurved, umbo rhombic, distally with 4 or 5(–7) toothlike projections 1–3.5 mm. Seeds 2–5 per cone scale, brown or dark brown, irregularly ellipsoid or multiangular and ± compressed, 4–6.5 × 2–3.5 mm; wings 0.2–0.25 mm wide.

Pollination Feb–Apr, seed maturity Oct.  $2n = 22$ .

Forests on deep, well-drained soils subject to warm, moist conditions, also cultivated as an ornamental and planted for timber; below 1100 m to 2500 m. Native in Fujian, Jiangxi, Sichuan, Yunnan, Zhejiang; introduced in Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan].

Fast-growing on deep, well-drained soils in montane areas with a warm, moist climate, but intolerant of poor soils and cold, drier climates. The wood is strongly rot resistant, easily worked, and is used for buildings, bridges, ships, lamp posts, furniture, utensils, and paper manufacture. The species is also cultivated as an ornamental tree.

1a. Leaves ± straight at least in proximal 1/2, often recurved apically on leader branchlets, arising at 35–45° to axis on leader branchlets, 45–55° on fertile branchlets, rigid and hard; most pollen cones longer than their subtending leaf; cone scales 20–30, each bearing 2–5 seeds; distal projections of bracts and cone scales 2–3.5 mm ..... 1a. var. *japonica*

1b. Leaves usually strongly incurved throughout, arising at 15–30° to axis on leader branchlets, 30–40° on fertile branchlets, rigid but relatively soft; most pollen cones shorter than their subtending leaf; cone scales ca. 20, each bearing 2 seeds; distal projections of bracts and cone scales 1–2 mm ..... 1b. var. *sinensis*

**1a. Cryptomeria japonica var. japonica**

日本柳杉(原变种) ri ben liu shan (yuan bian zhong)  
*Cupressus japonica* Thunberg ex Linnaeus f., Suppl. Pl. 421. 1782; *Taxodium japonicum* (Thunberg ex Linnaeus f.) Brongniart.

Leaves ± straight at in least proximal 1/2, often recurved apically on leader branchlets, arising at 35–45° to axis on leader branchlets, 45–55° on fertile branchlets, rigid and hard. Most pollen cones longer than their subtending leaf. Cone scales 20–30, each bearing 2–5 seeds; distal projections of bracts and cone scales 2–3.5 mm.

Cultivated as an ornamental and planted for timber. Anhui, Fujian, Gansu, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [native to Japan].

**1b. Cryptomeria japonica var. sinensis** Miquel in Siebold & Zuccarini, Fl. Jap. 2: 52. 1870.

柳杉 liu shan

*Cryptomeria kawaii* Hayata; *C. mairei* (H. Léveillé) Nakai; *Cupressus mairei* H. Léveillé.

Leaves usually strongly incurved throughout, arising at 15–30° to axis on leader branchlets, 30–40° on fertile branchlets, rigid but relatively soft. Most pollen cones shorter than their subtending leaf. Cone scales ca. 20, each bearing 2 seeds; distal projections of bracts and cone scales 1–2 mm.

- Forests on deep, well-drained soils subject to warm, moist conditions; below 1100 m in native range, but ascending to 2500 m in Yunnan as a cultivated tree. Native in Fujian (Nanping Shi), Jiangxi (Lu Shan), Sichuan, Yunnan, NW Zhejiang (Tianmu Shan); introduced in S Anhui, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, S Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang.

This variety has been treated at species rank by some authors, under the invalid name *Cryptomeria fortunei* Hooibrenk.

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