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4. GLYPTOSTROBUS Endlicher, Syn. Conif. 69. 1847.

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Trees semievergreen, monoecious; winter buds small; branchlets dimorphic: perennial and annual; perennial branchlets remaining green for several years, with white lines of stomatal dots, becoming ridged and grooved with decurrent leaf bases; annual branchlets deciduous, short, never developing scars or buds. Leaves spirally arranged, sessile, trimorphic: leaves on main branches, perennial branchlets (after 1st year), and fertile branchlets radially spreading, scalelike, relatively thick (resembling leaves of *Cupressus* but spirally arranged), persistent for 2 or 3 years; leaves on annual branchlets of mature trees in 3 rows, radially spreading, subulate, quadrangular in cross section (resembling leaves of *Cryptomeria*), deciduous with branchlet as a unit; leaves of annual branchlets of young trees and seedlings often 2-ranked, sessile, linear, flat, thin, deciduous (resembling leaves of *Taxodium*). Pollen cones terminal on short, erect branchlets bearing scalelike leaves, solitary, ellipsoid; microsporophylls 15–20, spirally arranged, sessile; pollen sacs (2–)5–7(–9). Seed cones terminal, shortly pedunculate, erect when mature, ± pyriform; bracts of mature cones ± completely connate with cone scales (free only at apex), triangular, recurved, borne on central or middle distal part of abaxial side of cone scales; ovules 2 per bract axil; cone scales 20–22, spirally arranged, sessile, woody, basal scales sterile, median scales 2-seeded, with 6–10 triangular, acute teeth at distal margin, distal scales ligulate, multiangular, sterile. Seeds ellipsoid, slightly flattened, small, with a single, terminal, recurved wing. Cotyledons 4 or 5. Germination epigeal. $2n = 22$*.

One species: China, extinct in the wild in N Vietnam.

A Tertiary relict species, the only surviving member of a genus formerly widespread prior to the Quaternary glaciations. Resembling the American genus *Taxodium* (which is introduced in China) in its vegetative characters, and occurring in similar habitats.

1. Glyptostrobus pensilis (Staunton ex D. Don) K. Koch, Dendrologie 2 (2): 191. 1873.

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Thuja pensilis Staunton ex D. Don in Lambert, Descr. Pinus, ed. 2, 2: 115. 1828; *Glyptostrobus aquaticus* (Antoine) R. Parker; *G. heterophyllus* (Brongniart) Endlicher; *G. sinensis* A. Henry ex Loder; *Sabina aquatica* Antoine; *Taxodium japonicum* (Thunberg ex Linnaeus f.) Brongniart var. *heterophyllum* Brongniart; *T. sinense* J. Forbes.

Trees to 15(–25) m tall; trunk to 1.2 m d.b.h., basal part (ca. 0.7 m) buttressed; bark brown or grayish white with brown tinge, cracking into long, irregular strips; main branches spreading horizontally; lateral branchlets in 2 rows, those of older branches often very dense and broomlike. Scale leaves on mature branchlets appressed, 1.5–3 × 0.4–0.6 mm, with scattered, white, stomatal spots, adaxial surface convex, base decurrent, apex incurved, slightly hooked. Leaves of 1st year branchlets erect-spreading at 40–45° to axis, 1.5–2 mm apart, forming a narrowly oblong-lanceolate branchlet outline, subulate, slightly falcately recurved distally, 2–7 × 0.4–0.6 mm, with stomatal lines along all surfaces and on branchlet axis, trailing edge with narrow, membranous wing decurrent onto branchlet axis. Seed cones obovoid, 1.4–2.5 × 0.9–1.5 cm; bracts ± connate with cone scales except for triangular apex located in middle or distal middle part of cone scale; cone scales flattened, median scales obovate, 1–1.3 cm × 3–5.5 mm, base cuneate, apical margin with 6–10 triangular, outwardly curved teeth adaxially. Seeds brown, elliptic, slightly flattened, 5–7 × 3–4 mm, with a basal wing 4–7 mm. Pollination Jan–Mar, seed maturity Sep–Oct(–Nov), persisting until following spring.

River deltas, etc., on flooded or waterlogged soil in full sun; near sea level. Fujian, S Guangdong, S Guangxi, Hainan, E Jiangxi, E Sichuan, SE Yunnan (Pingbian Miaozu Zizhixian), Zhejiang [N Vietnam (extinct in the wild)].

May no longer exist in the wild anywhere in China; rare in all provinces except Guangdong. Most frequent along the Zhu Jiang delta, in Guangdong, and along the lower reaches of the Min Jiang in Fujian, but possibly not native in the latter province. Somewhat similar in vegetative features to the introduced *Taxodium distichum* var. *imbricatum*, which is planted in similar habitats within the range of *Glyptostrobus pensilis*. The former differs in its flat leaves (of young branchlets), which lack a narrow wing along their trailing edges, and in its subulate, spreading leaves (of 1st year branchlets on older trees), which are softer, with incurved (not recurved) apices.

Wind-felled trees are used in constructing buildings, bridges and furniture. The roots have high buoyancy and are used to make life buoys, bottle corks, etc. Tannins extracted from the bark and the cone scales are used in tanning, dyeing, and fishing nets. Often planted in wet places for erosion control, as a windbreak, and because it is believed to bring good luck; consequently the tree is not normally deliberately felled by villagers.

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