TAXACEAE

The affinity of *Taxaceae* has been much debated, with many authors favouring a separate order, *Taxales*, for it, a position with which I tend to agree. Further questions are raised concerning the grouping of other families with *Taxaceae*, as against the other conifer families, based on the lack of seed cones, fleshiness of the mature fruit, or lack of a fertile seed scale. *Cephalotaxaceae* (not in Malesia) has a reduced seed cone structurally organized quite differently from other conifers and vegetatively strongly resembling *Taxaceae*, so I would group these two together. All other conifer families show seed structures easily derivable from a compound cone with ovules produced on the upper face of a fertile scale which grows in the axil of a bract. Although *Taxaceae*, perhaps joined by

Cephalotaxaceae, can be set apart from the conifers proper, all can agree that taxads and conifers are more closely related to one another than to any other recognized group.

Distribution. Of the five genera recognized for the *Taxaceae*, only *Taxus* reaches Malesia. Four are distinctly Holarctic in distribution, including *Taxus*, which is much the most widespread and reaches into tropical highlands. The fifth, monotypic *Austrotaxus*, appears on the other side of Malesia in New Caledonia, a distinct fragment of Gondwanaland, obviously a most curious relict on the southern hemisphere (FLORIN, Acta Horti Berg. 20 (4), 1963, 260, f. 61: map).

1. TAXUS

LINNÉ, Gen. Pl. ed. 5 (1754) 462; Sp. Pl. 2 (1753) 1040; PILGER, Pfl. R. IV, 5, Heft 18 (1903) 110; in E. & P. Nat. Pfl. Fam. ed. 2, 13 (1926) 208; FLORIN, Acta Horti Berg. 14 (1948) 378; GAUSSEN, Gymn. Act. & Foss. fasc. 15, ch. 25 (1979) 2. — **Fig. 2, 3.**

Evergreen trees or (prostrate) shrubs. Bark thin, smooth, purple-red, peeling in large thin flakes. *Leaves* spirally placed (but usually twisted into a single plane), linear to linear-lanceolate, acute, distinctly constricted at the base where the leaf twists into a horizontal position and then widening again in the decurrent part, penetrated by a single vascular strand marked on the lower surface by a blunt ridge which separates two bands of stomata and on the upper stomata-free surface by a sharp narrow ridge. Foliage and fertile buds small and globular, formed by several small keeled overlapping scales, the lower ones of which remain small while the higher ones expand with growth to become round and membranous. Usually dioecious. The *fertile structures* produced in the axils of ordinary leaves. *Pollen cone* solitary above a basal cluster of sterile scales, each peltate microsporophyll with a symmetrical whorl of 6–8 inverted pollen sacs, one microsporophyll in a terminal position and up to a dozen spirally placed lateral microsporophylls. *Seed-bearing structure* compound with one or more short ovule-bearing shoots produced subterminally on a very short fertile axis covered by minute keeled spirally arranged scales, each fertile shoot consisting of several decussate pairs of keeled scales which expand as the seed matures into a broad membranous oval shape and together cover the base of the ripened fruit. A small *basal aril* gradually grows to cup the single erect terminal seed, finally becoming fleshy and bright red. *Mature seed* flask-shaped, slightly wider than thick with the wider margin slightly keeled.

Distr. Seven species on the northern hemisphere middle latitudes and some tropical highlands, almost completely allopatric, but possibly some overlap between two species in the eastern Himalayas; one species in *Malesia*, and that one more common in subtropical parts of China. The genus has a predominantly northern hemisphere distribution, Central America and S. Celebes being the stations at lowest latitude. Fig. 1.

Fossil remains are known from Europe (middle Jurassic to Pliocene) and eastern Asia (Miocene to Pliocene).

Ecol. Understory or canopy plants of moist temperate or tropical mountain forest. From near sea-level in their northernmost occurrence in Norway they reach to nearly 3000 m in subtropical and tropical mountains

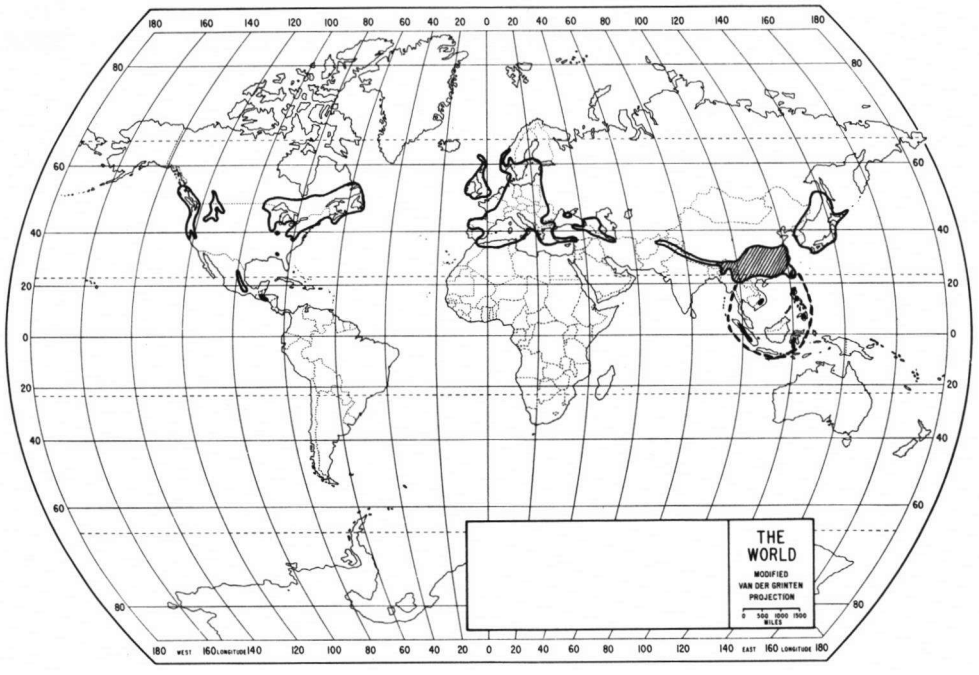

Fig. 1. Range of the genus *Taxus L.* (solid line) and *T. sumatrana* (MIQ.) DE LAUB. (broken line and hatched).

and do not go below 1200 m in tropical latitudes. As an undershrub they can be locally quite common, but the trees in this genus rarely take a dominant canopy role. Growth is generally quite slow but dense and specimens are often prized as ornamentals. Even the forms which are capable of becoming immense trees usually appear as shrubs or at best as small trees when under cultivation.

Pollination is strictly by wind dispersal. Fruits are taken by birds and probably other animals. The seeds are bitter and poisonous when broken into, so that the seeds are normally ingested intact and efficiently dispersed in animal droppings. Seeds germinate readily in moist shady places.

Seedling foliage is essentially similar to that of the adult. Vigorous young plants tend to have leaves larger than those of fully mature specimens, up to two and three times as large and sometimes more lanceolate and falcate.

Taxon. All seven species are closely related and some, at least, hybridize readily. As a result some authors such as PILGER prefer to recognize but one species with several subspecies. I would need to know more about the relationships between the taxa before I could take a strong position in this case.

Uses. The tough, dense wood has excellent qualities and has been in demand for many uses. Best known is its service for bows and decorative woodwork such as chests and coffins. It is also desirable for fence posts, flooring, and mallots. The well-marked reddish brown heartwood contrasts pleasingly with the pale yellowish sapwood.

1. Taxus sumatrana (MIQ.) DE LAUB. Kalikasan 7 (1978) 151. — *Cephalotaxus sumatrana* MIQ. Fl. Ind. Bat. 2 (1859) 1076. — *Podocarpus celebicus* HEMSL. Kew Bull. (1896) 39. — *Cephalotaxus celebica* WARB. Monsunia 1 (1900) 194. — *Cephalotaxus mannii* (*non* HOOK.*f.*) PRITZEL *ex* DIELS, Bot. Jahrb. 29 (1900) 214; WILSON, J. Arn. Arb. 7 (1926) 40. — *T. baccata* (*non* L.) MASTERS, J. Linn. Soc. Bot. 26 (1902) 546, p.p. — *T. baccata ssp. cuspidata var. chinensis* PILGER, Pfl. R. IV, 5, Heft 18 (1903) 112; in E. & P. Nat. Pfl. Fam. ed. 2, 13 (1926) 210. — *T. baccata ssp. wallichiana* (*non* ZUCC.) PILGER, Pfl. R. IV, 5, Heft 18 (1903) 112; BÜNNEMEIJER, Trop. Natuur 10 (1921) 55, f. 8; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 194; STEUP, Trop. Natuur Jub. no. (1936) 41, f. 1. — *T. baccata var. sinensis* HENRY in Elwes & Henry, Trees Gr. Brit. & Irel. 1 (1906) 100. — *T. wallichiana* (*non* ZUCC.) Foxw. Philip. J. Sc.

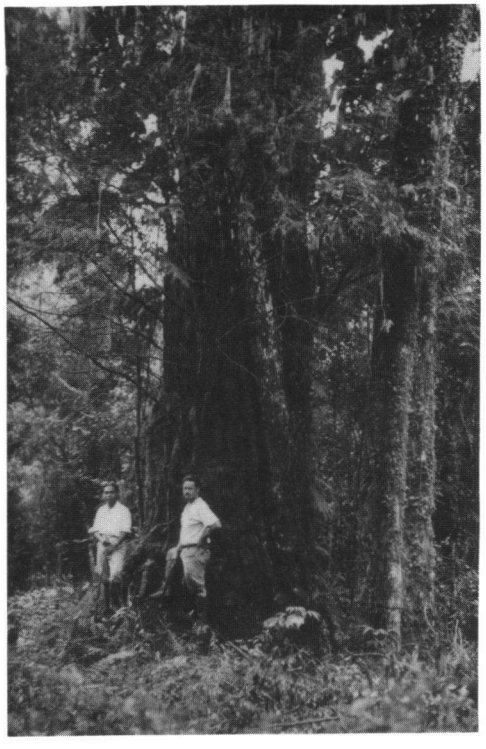

Fig. 2. *Taxus sumatrana* (MIQ.) DE LAUB. on the peak of Mt Bonthain, Celebes, 1700 m alt. (Photogr. J.VAN ZIJLL DE JONG, 1933).

6 (1911) Bot. 166; MERR. En. Philip. Fl. Pl. 1 (1923) 5; YAMAMOTO, J. Soc. Trop. Agric. 10 (1938) 182, f. 42. — *Tsuga mairei* LEMÉE & LÉVEILLÉ, Le Monde des Plantes, année 16 (2me sér.) *n.* 88 (May 1914) 20; Bull. Acad. Int. Geog. Bot. 16 (1914) 20. — *T. cuspidata var. chinensis* (PILGER) REHDER & WILSON in Sargent, Pl. Wils. 2 (1914) 8, *p.p.* — *T. cuspidata* (*non* SIEB. & SUCC.) KANEH. Formos. Trees (1917) 616. — *T. chinensis* (PILGER) REHDER, J. Arn. Arb. 1 (1919) 51; *ibid.* 4 (1923) 119; DALLIMORE & JACKSON, Handb. Conif. (1923) 71; WILSON, J. Arn. Arb. 7 (1926) 41; *ibid.* 8 (1927) 88; HAND.-MAZZ. Symb. Sin. 7 (1929) 2; HU & CHUN, Icon. Pl. Sin. 2, 8 (1929) pl. 53; BEAN, Trees & Shrubs Brit. Is. 3 (1933) 476; ORR, Not. R. Bot. Gard. Edinb. 18 (1933) 124; *ibid.* 19 (1937) 261; KANEH. Formos. Trees rev. ed. (1936) 31; REHDER, Man. Cult. Trees & Shrubs 2 (1940) 3; METCALF, Fl. Fukien 1 (1942) 23; FANG, Icon. Pl. Omeiens. II, 2 (1946) t. 190; LAW, Bot. Bull. Acad. Sin. I, 2 (1947) 143. — *T. wallichiana var. chinensis* (PILGER) FLORIN, Acta Horti Berg. 14 (1948) 378, pl. 5; GAUSSEN, Gymn. Act. & Foss. fasc. 15, ch. 25 (1979) 16. — *T. speciosa* FLORIN, Acta Horti Berg. 14 (1948) 382, pl. 6; LI & KENG, Taiwania 1 (1954) 29, pl. 2. — *T. mairei* (LEMÉE & LÉVEILLÉ) HU & LIU, Illus. Nat. & Introd. Lign. Pl. Taiwan 1 (1960) 16; GAUSSEN, Gymn. Act. & Foss. fasc. 15, ch. 25 (1979) 16, f. 858. — *T. celebica* (WALL.) LI, Woody Fl. Taiwan (1963) 34; HARRISON, Handb. Conif. & Ginkgo (1967) 598. — *T. yunnanensis* CHENG, CHENG & FU, Acta Phytotax. Sin. 13 (4) (1975) 86. — **Fig. 2, 3.**

Fig. 3. *Taxus sumatrana* (MIQ.) DE LAUB. Habit, female, with fruit, ×1 (DE LAUBENFELS P668).

Large, slow-growing tree to as much as 45 m high and over 1 m diam., but considerably shorter on exposed ridges. *Leaves* on juvenile specimens or on vigorous shoots linear lanceolate and often falcate with a prominent bend near the base and also sometimes with a slight reverse curve near the apex which is narrowly acute and often slightly spiculate, 2–4 cm long by 2–2.5 mm wide at the widest part below the centre of the leaf. Leaves on older specimens or from exposed positions more nearly linear and straight and abruptly narrowed at the apex, 1.5–2.5 cm by 1.5–2 mm, with slightly recurved margins. *Pollen cones*

globular on a short stalk, about 4 mm in diameter. Mature *seed c.* 6 by 5 mm, and 4 mm thick.

Distr. Eastern Himalayas, N. Burma, SE. China, Taiwan, South Vietnam; in *Malesia*: Sumatra (from Karoland southwards to Benkulen), Philippines (Luzon: Lepanto, Benguet, Laguna, Tayabas; Mindanao; Davao), Celebes (Central and SW.: Bonthain Peak). Fig. 1, 4.

Ecol. Moist subtropical forests and tropical highland ridges and mossy forests in the canopy and locally dominant; 1400–2300 m.

Uses. A magnificent timber tree, but occurring too locally to be of importance and too slow-growing for cultivation.

Vern. *Tampinur batu*, Karo, *kaju tadji*, Mt Dempo.

Note. The extensive synonymy partly stems from the discontinuous distribution, but several authors insist that two types exist in China. Whereas immense trees are seen in undisturbed forests of Taiwan and in Malesia, on the mainland only smaller trees are normally seen with one type reported mostly at lower elevation and another at higher elevation. Both types, however, often appear from the same collection area and I was able to collect both from a single large Formosan tree, part from low on the tree and part from high up. It appears that trees rarely get beyond their early stages of growth in lowland China, while highland trees, as is usual elsewhere, are of much reduced stature.

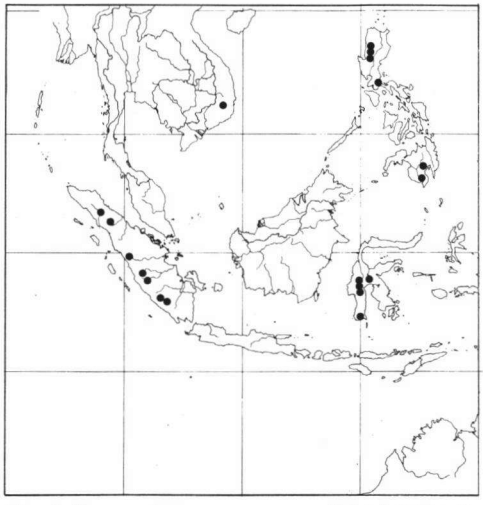

Fig. 4. Range of (MIQ.) DE LAUB.