

TAXONOMIC TREATMENT OF FAMILIES

Key to the families

This Handbook recognizes eight families within the conifers (currently with 70 genera and 614 species); some of their diagnostic characters are here used in the key to families. If the family to which a species has been assigned is not known to the user, it is necessary to start with this key and then proceed to the key to genera under the family determined. If the family is known, one can proceed directly to the latter key to determine the genus. Keys to species within genera are provided under each genus; the species are arranged in alphabetical order (A-Z) throughout using the Latin binomials, which enables the user to find the genus determined using the keys with ease.

- 1a. Seed cones with seed scales in the axils of bracts (bracts can be much reduced in mature, woody cones but are conspicuous in immature cones at early stages of development); i.e. cones clearly compound and never reduced; seeds two on the adaxial (upper) side of each fertile scale; adult green leaves acicular-linear *Pinaceae*
- 1b. Seed cones with seed scales fused with bracts (bracts make up the bulk of the cone), or with bracts only (which may be much enlarged, swollen and/or woody at maturity), or with scales obscure, much reduced or absent; seeds either single or more than two per fertile scale; adult green leaves scale-like, or acicular, or with a distinct lamina, or replaced by phylloclades (phyllodes) 2
- 2a. Seed cones with seed scales fused with bracts, or with bracts only which are much enlarged and often swollen at maturity and may then form a compact, globose cone 3
- 2b. Seed cones with seed scales fused with bracts; bracts forming the largest part of the cone scales; a single inverted seed per scale
Araucariaceae
- 3a. Seed cones consisting of bracts forming the cone scales only (sometimes with rudimentary seed scales only visible at very early stages of development); seeds 1-many, axillary or on the

base of each bract (rarely only a single seed per cone) 4

- 3b. Seed cones either with much reduced, obscure scales (whether bracts or seed scales, in a few instances with many very small bracts) or lacking any kind of scales and reduced to a single, terminal seed with a surrounding epimatium or arillus 5
- 4a. True leaves scale-like or acicular (needle-like), cataphylls absent, phyllodes absent

Cupressaceae

- 4b. True leaves reduced to tiny cataphylls (usually brown scales); phyllodes (pseudo-leaves) in the axils of these green, needle-like, growing rhythmically in pseudo-whorls on shoots

Sciadopityaceae

- 5a. Seed cones reduced to a single seed; seed terminally placed at a scaly dwarf shoot, partly or completely surrounded by a succulent or fleshy aril

Taxaceae

- 5b. Seed cones apparent, with much reduced, obscure scales (usually bracts; if these are seemingly absent, seed on a stout or fleshy 'peduncle') or in a few instances with many, very small bracts 6

- 6a. Pollen cones aggregated in more or less globose capitulae ('heads'); bracts of (reduced) seed cones decussate

Cephalotaxaceae

- 6b. Pollen cones solitary or clustered but not in globose capitulae; bracts of (reduced) seed cones alternate or helically arranged (but sometimes seemingly absent being enveloped by a swollen receptacle) 7

- 7a. True leaves scale-like, acicular or with a distinct lamina, always simple; cataphylls absent; phylloclades absent; cones arising in the axils of leaves

Podocarpaceae

- 7b. True leaves reduced to tiny cataphylls, usually soon deciduous; phylloclades (pseudo-leaves) leaf-like, green, simple or compound; cones arising on the edges of phylloclades or on separate determinate shoots (axillary to bracts)

Phyllocladaceae

Descriptions of families and keys to genera

Araucariaceae Henkel & W. Hochst., Syn. Nadelhölz.: xvii, 1. 1865. (*nom. cons.*). Type: *Araucaria* Juss.

Description

44 Dioecious or monoecious evergreen, highly resinous trees. Tree architecture according to Massart's and Rauh's models. Resin canals in bark, leaves and seed cones. Bark hard and smooth, exfoliating with rounded or irregular flakes (*Agathis*), rough and exfoliating in horizontal strips and eventually deeply fissured (*Araucaria*), or forming many irregular pustules (*Wollemia*). Branches in rhythmic pseudo-whorls, spreading and plagiotropic (Massart's model) or ascending to become orthotropic (Rauh's model), sometimes profusely reiterating or sprouting from dormant buds in roots near the base of stems. Foliage branchlets with or without terminal buds. Leaves spirally arranged or subopposite, scale-like and adnate or laminar and sessile or short petiolate, imbricately covering the shoot or free and more or less distichously spreading, sometimes forming 4 ranks (*Wollemia*), more or less coriaceous, with numerous parallel veins originating from basal dichotomies and few to numerous resin canals. Pollen cones axillary to leaves, solitary or in small clusters, small or large, much elongating after anthesis and becoming cylindrical; microsporophylls numerous, helically inserted, crowded, with imbricate or tessellate heads, each with 4–20 oblong pollen sacs containing non-saccate pollen. Seed cones terminal on long shoots (*Wollemia*) or lateral on short, pedunculate, leafy shoots, solitary, erect, ovoid or subglobose, sometimes massive (*Araucaria bidwillii* has the heaviest cones of all conifers), usually disintegrating leaving the rachis on the tree. Bracts helically inserted on the rachis, much developed, flattened, with a thickened distal margin and with or without a terminal elongated cusp, forming the bulk of the cone. Seed scales much reduced, axillary to and almost entirely fused with the bract, with or without a small, free apical ligule, more or less enclosing a single, inverted seed, concrescent with the seed scale or free, wingless or with a single wing or 2 unequal wings. Seedlings with 2, sometimes deeply divided, cotyledons. Number of chromosomes (diploid) $2n = 26$.

Three genera: *Agathis* (17 spp.), *Araucaria* (19 spp.) and *Wollemia* (1 sp.); total 37 species.

Distribution

Malesia: all major islands except Jawa and Lesser Sunda Islands; Australia: New South Wales, Queensland. SW Pacific: New Caledonia, Vanuatu, Fiji, Norfolk Island, New Zealand (North Island). South America: SE Brazil, NE Argentina; S Chile, SW Argentina (Andes).

Key to the genera

- 1a. Bark hard and smooth, exfoliating with rounded or irregular flakes; leaves distinctly petiolate; seed cones globose, with imbricate scales lacking an extended apex *Agathis*
- 1b. Bark rough, exfoliating in horizontal strips or forming many irregular pustules; leaves sessile; seed cones ovoid-globose to globose; cone scales with an extended, free apex 2
- 2a. Bark forming many irregular pustules in mature trees; leaves opposite or subopposite, mostly linear, distichous or tetrastichous (in 2 or 4 ranks); pollen and seed cones terminal on first-order branches *Wollemia*
- 2b. Bark exfoliating in horizontal strips; leaves spirally arranged, scale-like or triangular to lanceolate, mostly equally divided around the shoot; pollen and seed cones lateral on higher order foliage branches *Araucaria*

Cephalotaxaceae Neger, Nadelhölzer: 23, 30. 1907 (*nom. cons.*). Type: *Cephalotaxus* Siebold & Zucc. ex Endl.

Description

See the genus description.

One genus: *Cephalotaxus*, with 8 species.

Distribution

As for the genus.