

SYNOPSIS OF FAMILIES AND GENERA

This synopsis gives brief character sketches of taxa in the ranks of genus to family. Only those characters are mentioned which together would suffice to identify the taxon; these are not necessarily the same for all taxa, and comparisons between them are therefore limited to those necessary for identification. In this Handbook 8 families and 70 genera are recognized within the order *Coniferales*, or conifers. The families are here given in alphabetical order, as no satisfactory classification at this level based on all necessary evidence seems possible (Farjon, 2007, 2008). The hypothetical relationships of genera within families are indicated by their groupings; some of these groupings have been named at the rank of subfamily, others are here presented as informal and separated from each other by a double space only. The relationships in *Podocarpaceae* are most tentative, as they are based on phylogenies derived from recent cladistic analyses of molecular and morphological data, which are not in agreement for several clades. The DNA-based analyses tend to place *Phyllocladaceae* within *Podocarpaceae*. Perhaps it could be assumed that the former arose from the latter. The names of families and genera are given with their abbreviated authorities following Brummitt & Powell (1992). For more detailed recent classifications down to species see for *Cupressaceae* Farjon (2005a), for *Pinaceae* excluding *Pinus* Farjon (1990), for *Pinus* Richardson (ed., 1998) and Farjon (2005b) and for *Taxaceae* Cope (1998).

Araucariaceae Henkel & W. Hochst.

Dioecious or monoecious evergreen, highly resinous trees. Tree architecture according to Massart's and Rauh's models. Leaves in helical arrangement or subopposite to opposite; lamina broad and flat, or scale-like. Pollen cones catkin-like, sometimes large. Seed cones large, globose, mostly disintegrating. Seed cone scales predominantly consisting of the bract, but with a fused seed scale bearing a single seed.

Agathis Salisb.

Monoecious trees. Leaves subopposite to opposite, leaf lamina broad and flat, with distinct petiole. Pollen cones solitary, relatively small. Seed cone scales with an imbricate, rounded margin. Seeds with a single broad wing, becoming detached from the scale.

Wollemia W. G. Jones *et al.*

Monoecious trees. Leaves helically attached, sessile, adult leaves arranged in 4 rows (tetrastichous), linear. Pollen and seed cones terminal on primary branches, relatively small. Seed cone scales with an apical free extension. Seeds circumferentially winged, remaining attached to the scale; wing(s) narrow.

Araucaria Juss.

Dioecious or monoecious trees. Leaves in helical arrangement, sessile, lamina broad and flat, or scale-like, persistent on falling branches. Pollen cones solitary or in small clusters, relatively small to very large. Seed cone scales with an apical free extension. Seeds without wings, remaining attached to the scale.

Cephalotaxaceae Neger

Cephalotaxus Siebold & Zucc. *ex* Endl.

Dioecious evergreen shrubs or small trees. Leaves pectinately arranged becoming subopposite, linear-lanceolate, with two prominent stomatal bands on the abaxial side. Pollen cones aggregated in capitulae. Seed cones reduced, with opposite fertile bracts. Seeds 1–2 per cone, exposed, large, completely surrounded by a fleshy aril.

Cupressaceae Gray

Aromatic, evergreen or deciduous, monoecious or dioecious shrubs or trees. Leaves on (pen)ultimate branchlets linear, needle- or scale-like, spirally arranged, ternate or decussate (rarely quadrate) in mature plants. Pollen cones small, terminal, rarely

axillary, solitary or sometimes clustered in groups of 2–7. Seed cones terminal, simple or semi-compound, globose, ovoid or conical. Seed cone scales consisting of transformed bracts, true seed scales absent or sometimes rudimentary. Seeds 1–many axillary to each cone scale, with or without wings.

***Cunninghamioideae* (Zucc. ex Endl.) Quinn**

***Cunninghamia* R. Br.**

Evergreen, monoecious trees, capacity to coppice profound. Leaves helically arranged, linear-lanceolate; leaf margin serrulate. Pollen cones numerous in clusters. Seed cones subterminal, persistent (falling with foliage branches), with thin, coriaceous scales. Seeds 2–3 per fertile scale, with 2 marginal wings 1 mm wide.

***Taiwanioideae* L. C. Li**

***Taiwania* Hayata**

Evergreen, monoecious trees. Leaves helically arranged, imbricate, in young trees falcate-subulate, ultimately scale-like. Pollen cones in terminal clusters on branchlets with scale leaves. Seed cones terminal, solitary, small, with thin, coriaceous scales. Seeds usually 2 per fertile scale, each with 2 small wings.

***Athrotaxoideae* L. C. Li**

***Athrotaxis* D. Don**

Evergreen, monoecious trees. Leaves helically arranged, small and appressed or longer than 6 mm and spreading gradually or abruptly. Pollen cones solitary, small. Seed cones terminal, solitary, globose or subglobose when opened, with clavate-peltate, thin or thick woody scales. Seeds with two slightly unequal wings.

***Sequoioideae* Saxton**

Deciduous or evergreen, monoecious trees. Leaves helically arranged or opposite, linear or scale-like. Pollen cones solitary or numerous in spike-like shoot systems. Seed cones barrel-shaped or ovoid, with peltate bract-scale complexes. Seeds axillary to cone scales, with 2 marginal wings.

***Metasequoia* Hu & W.C. Cheng**

Deciduous, monoecious trees, dropping foliage branchlets, not individual leaves. Leaves opposite, linear, spreading at nearly right angles to the shoot. Pollen cones numerous in spike-like shoot systems. Seed cones terminal on 2–5 cm long, scale-leaved shoots, subglobose, barrel-shaped or fusiform. Seeds numerous, with 2 marginal wings.

***Sequoia* Endl.**

Evergreen, monoecious (very tall) trees, often sprouting from lignotubers. Leaves alternate, mostly linear, pectinate on shaded shoots. Pollen cones on the same branches as seed cones, solitary. Seed cones terminal on short branchlets, more or less ovoid, 15–30 mm long. Bract-scale complexes helically arranged, parting to release the marginally winged seeds.

***Sequoiadendron* J. Buchholz**

Evergreen, monoecious (giant) trees. Leaves helically arranged in 3 ranks, imbricate, scale-like. Pollen cones on the same branches as seed cones but well above them, solitary. Seed cones terminal on short branchlets, 30–70(–95) cm long. Bract-scale complexes helically arranged, parting to release the flattened, unequally winged seeds.

***Taxodioideae* Endl. ex K. Koch**

Deciduous or evergreen, monoecious trees. Leaves alternate to helically arranged, of various types but linear leaves present. Pollen cones crowded or arranged in spike-like to paniculate systems, solitary. Seed cones terminal, solitary or clustered; bract-scale complexes with or without small teeth below the apex. Seeds with 1–2 wings, or almost wingless.

***Cryptomeria* D. Don**

Evergreen, monoecious trees. Leaves helically arranged in 5 ranks, decurrent, free for 1/2–3/4 of leaf length, linear-subulate. Pollen cones numerous, axillary and crowded towards the ends of branchlets. Seed cones terminal, often aggregated; bract-scale complexes helically arranged, spreading, with a number of small teeth below the bract apex. Seeds with 2 narrow, unequal wings.