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## A new class of coniferophytes and its system based on the structure of the female reproductive organs

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On the basis of studies of the female reproductive structures of all recent representatives of araucariads, cupressads and taxodiads, a new phylogenetic system of conifers has been proposed. The groups of conifers with exosarcotestal seeds and simple megastrobili are separated as the new class *Araucariopsida*. *Araucariopsida* are not phylogenetically allied with the evolutionary line *Cordaitaceae–Utrechtiaceae–Voltziaceae* s. l. – *Pinaceae–Sciadopityaceae*, the representatives of which are characterized by mesosarcotestal seeds and complex megastrobili. Three evolutionary lines with different morphology of the cone scales (bracts) are revealed within *Araucariopsida*: bifacial imbricate (*Araucaria*-type), peltate valvular (*Cupressus*-type) and bifacial valvate (*Thuja*-type). A new system of the studied groups of conifers is proposed. The extinct order *Callistophytales*, characterized by seeds with originally a massive exotestal sarcotesta, is presumably ancestral for *Araucariopsida*. The extinct *Ferugliocladaceae* is considered as connecting *Callistophytales* with recent *Araucariopsida*. The *Buriadiaceae*, also derived from the *Callistophytales*, are treated as the sister group of araucariads, cupressads and taxodiads.

### *Brief overview of the history of systematics of conifers*

The conifers are the largest group of recent gymnosperms. At present, there is a tendency to broad treatment and continuous broadening of suprageneric taxa in the systems of recent conifers. Most recent publications treat the conifers as a single order *Coniferales* (= *Pinales* s. l.) with 6–9 families (van Gelderen & van Hoey Smith 1986, 1996; Silba 1986; Page 1990; Farjon 1998). If the groups of fossil conifers (walchians, voltzians and some others) are taken into consideration, they are usually recognized as distinct families within the *Coniferales* s. l. (Meyen 1987; Stewart & Rothwell 1993; Taylor & Taylor 1993; LePage 1999). In the first part of the 20<sup>th</sup> century the segregation of some more coniferous orders was proposed (Heintze 1927; Pulle 1937, 1938a, b); later these segregates were accepted

Order II. *Voltziales* Zimmermann 1930 (syn. *Lebachiales* Emberger 1960).

Fam. 1. *Walchiaceae* Schimper 1870–1872 (syn. *Utrechtiaceae* Mapes & Rothwell 1991, *Lebachiaceae* Florin 1938, *Lebachiellaceae* S.Meyen 1987).

Fam. 2. *Majoniaceae* Clement-Westerhof 1987.

Fam. 3. *Voltziaceae* Arnold 1947, s. l. (incl. *Aethophyllaceae* Grauvogel-Stamm 1978).

Fam. 4. *Ulmanniaceae* Zimmermann 1959.

Fam. 5. *Thucydiaceae* Hernandez-Castillo, Rothwell & Mapes 2001.

Fam. 6. *Cycadocarpidiaceae* Chadefaud 1941 (syn. *Podozamitaceae* Nemějc & Zimmermann 1959).

Fam. 7. *Palysziaceae* Florin 1958 (syn. *Stachyotaxaceae* Nemějc 1950, nom. nud.).

Fam. 8. *Cheirolepidiaceae* Hirmer & Hörhammer 1934 (syn. *Hirmeriellaceae* T.M.Harris 1979).

Order III. *Sciadopityales* Takht. ex Reveal 1993.

Fam. 1. *Sciadopityaceae* (Strasb.) Luerss. 1877. — Tribe *Sciadopityeae* Strasb. 1872.

Order IV. *Pinales* Dumort. 1829, s. str. (= *Coniferales* s. str.).

Fam. 1. *Pinaceae* Adans. 1763, s. l. (incl. *Abietaceae* Gray 1821; *Cedraceae* Vest 1818; *Piceaceae* Gorozh. 1904).

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