(2741) Proposal to conserve the name *Protophyllocladoxylon* (fossil *Coniferophyta*: *Coniferales*) with a conserved type

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(2741) ***Protophyllocladoxylon*** Kräusel in Abh. Bayer. Akad. Wiss., Math.-Naturwiss. Abt., ser. 2, 47: 16. 1939 (post Mai), nom. cons. prop.
Typus: *P. dolianitii* Mussa (in Bol. Div. Geol. Mineral. Brasil 182: 17. 1958), typ. cons. prop.

Protophyllocladoxylon was published by Kräusel (in Abh. Bayer. Akad. Wiss., Math.-Naturwiss. Abt., ser. 2, 47: 16. 1939) in an article of 140 pages (and 23 figures) on the fossil flora of Egypt. The genus is an important one with more than 20 species, distributed from the Carboniferous to the late Cretaceous, on all continents including Antarctica. The genus is of phylogenetic (Marguerier in Compt. Rend. Congr. Natl. Soc. Savantes, Sec. Sci. 102: 79–97. 1979) and biogeographical (Fletcher & al. in Rev. Palaeobot. Palynol. 208: 43–49. 2014) significance. Some of the most important Mesozoic species are mentioned towards the end of this proposal.

Kräusel started with a thorough description of the new species *Protophyllocladoxylon leuchsii* ('*leuchsi*'), then he compared it with several genera, and arrived at the conclusion that it should be placed in a new genus, for which he presented this diagnosis (translated from German by us): "Conifer wood without resin canals, tracheid pitting araucarian, crossfield pitting phyllocladoid (oopores)."

Then he compared it with *Mesembrioxylon libanoticum* W.N. Edwards (in Ann. Mag. Nat. Hist., ser. 10, 4: 401. 1929) from the Upper Jurassic or Lower Cretaceous of Syria and stated that "Beyond question this is also a *Protophyllocladoxylon*" (our translation). He even wondered if he should combine these two species – no; then he gave a detailed diagnosis of this species and mentioned its origin.

The type material of *Protophyllocladoxylon leuchsii* was collected in 1911–1912 by the Austrian geologist Kurt Leuchs (1881–1949), who had studied at the Ludwig-Maximilians-Universität in Munich, where after several expeditions he became a "Privatdozent" (private lecturer) from 1919 to 1925. The origin is described as being the foothill of the "Djebel Dabadîb", north of "Charge" (today Djebel Ain Umm El Dababib near El-Kharga), Egypt, and from a geological level known as the Nubian Sandstone. The accession number given by Kräusel is "Mü1020"; the prefix "Mü" stands for "Paläontologische Staatsammlung München". However, the material cannot be traced in the holdings of the SNSB – Bayerische Staatssammlung für Paläontologie und Geologie in Munich (Michael Krings, pers. comm.) and also not in the collections of the Senckenberg Museum in Frankfurt (where Leuchs was a professor in geology from 1925 to 1936). The type material for *P. leuchsii* has to be considered as lost.

It is impossible to check the real taxonomic position of the type material because since then, only *Agathoxylon* and *Metapodocarpoxylon* have been collected from the original type locality (Youssef & al. in Pl. Cell Biol. Developm. 12: 30–39. 2000). Similarly, all the four other *Protophyllocladoxylon* species described from the Mesozoic of northern Africa are now considered as belonging to *Metapodocarpoxylon* Dupéron-Laudoueneix & D. Pons (in Giorn. Bot. Ital. 119: 151–166. 1985).

In 1949 (in Palaeontographica, Abt. B, Paläophytol. 89: 178), Kräusel again gave a diagnosis for *Protophyllocladoxylon*, and at that time he included three species in this genus: *P. leuchsii*, *P. libanoticum* (based on *Mesembrioxylon libanoticum* W.N. Edwards, which he had mentioned in 1939) and *P. capense* (basionym *Phyllocladoxylon capense* J. Walton), without designation of a type species for the generic name. After 1949 Kräusel did not contribute significantly any more about *Protophyllocladoxylon* except that in 1962 (in Trans-Antarctic Expedition 1955–1958 Sci. Rep. 9: 136), he also mentioned *Protophyllocladoxylon dolianitii* Mussa.

Lepekhina & Yatsenko-Khmelevsky (in Taxon 15: 67. 1966) cited *P. leuchsii* Kräusel as the type of *Protophyllocladoxylon*. There has arisen strong suspicion, however, that *P. leuchsii* and *P. libanoticum* are one and the same species, as only the latter has since been collected at the type locality of the former and at coeval localities in the same area (Philippe & al. in J. Biogeogr. 30: 389–400. 2003).

Even though the basionym of *P. libanoticum* was mentioned by Kräusel in 1939, this is not suitable as a replacement type of *Protophyllocladoxylon* because this species was designated as type of a new genus: *Metapodocarpoxylon* Dupéron-Laudoueneix & D. Pons (l.c.: 160) – a genus that is generally accepted nowadays (e.g., by Bamford & al. in Palaeogeogr. Palaeoclimatol. Palaeoecol. 186: 115–126. 2002). In 1985, Dupéron-Laudoueneix & Pons did not provide a full and direct reference to *P. libanoticum*, the intended basionym of the type of *Metapodocarpoxylon*, even though they mentioned its type specimen: "l'espèce-type se définit ainsi […] Holotype: échantillon n° V 20497a–f". Pons (Mésozoïque Colombie: 47. 1988) later on validly published it as *M. libanoticum*.

The third species that Kräusel mentioned in 1949 also no longer belongs to *Protophyllocladoxylon* as presently understood: *Phyllocladoxylon capense* J. Walton constitutes the type of another new genus: *Protocircoporoxylon* Vogell. (in Palaeontographica, Abt. B, Paläophytol. 121: 40. 1967) – also a genus that is generally accepted nowadays (Youssef & al., l.c.; Bamford & al., l.c.; Philippe & al., l.c.; El-Saadawi & al. in Hamimi & al., Geol. Egypt: 495–520. 2020).

Thus, we arrived at the conclusion to propose to conserve *Protophyllocladoxylon* Kräusel with *P. dolianitii* Mussa (in Bol. Div. Geol. Mineral. Brasil. 182: 17. 1958) as its conserved type. This wood has commonly been used for comparisons when discussing *Protophyllocladoxylon* and is also reported from Paraguay (Crisafulli & Herbst in Palaeobiol. Palaeoenvironm. 89: 95–109. 2009) and from Antarctica (Maheshwari in Palaeontographica, Abt. B, Paläophytol. 138: 1–43. 1972). Its type material is in the National Department of Mineral Production, Geology and Mineralogy, in Rio de Janeiro (Brazil), under number 759. The slides are part of the fossil wood sheet collection of the Division of Geology and Mineralogy 451, 452, 453, 454, 566, 567, 568 and 569.

With this solution, most species can remain in *Protophyllocladoxylon*, besides *P. dolianitii* Mussa, among others also *P. derbyi* (E. Oliveira) H.K. Maheshw. (l.c.: 19), *P. franconicum* Vogell. (in Geol. Jahrb. 84: 311, 313. 1966), *P. xenoxyloides* Colette Serra (in Arch. Géol. Vietnam 8: 94, 103. 1966) and *P. quedlinburgense* J. Schultze-Motel (in Monatsber. Deutsch. Akad. Wiss. Berlin 3: 418, 423. 1961). Moreover, several species that originally were published as species of *Protophyllocladoxylon* can then remain in *Metapodocarpoxylon* as taxonomic synonyms of *M. libanoticum* (W.N. Edwards) D. Pons: *P. chudeaui* Batton (in Publ. Centre Rech. Zones Arides, Sér. Géol. 6: 77. 1965), *P. cortaderitaense* C.A. Menéndez (in Revista Asoc. Geol. Argent. 11: 273–280. 1956, as '*cortaderitaensis*'), *P. diphthericum* Batton & Boureau (in Publ. Centre Rech. Zones Arides, Sér. Géol. 6: 112. 1965), *P. maurianum* Gazeau (in Notes Mém. Serv. Géol. (Maroc) 210: 108. 1969), *P. rosaeblancaense* D. Pons (in Rev. Palaeobot. Palynol. 11: 102. 1971) and *P. subdiphthericum* Dupéron-Laudoueneix (in Compt. Rend. Congr. Natl. Soc. Savantes, Sec. Sci. 101: 147. 1978).

An important difference between *Protophyllocladoxylon* and *Metapodocarpoxylon* is the situation that the latter has in the cross fields, besides phyllocladoid oopores, also bordered oculipores.

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