

Outlineoffungi.org - Note 926 *Daohugouthallaceae*

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Daohugouthallaceae X.L. Wei, D. Ren & J.C. Wei

Wang et al. (2010) described a thalloid organism with possible lichen affinity from the Jiulongshan Formation (Callovian-Oxfordian boundary interval, latest Middle Jurassic deposits) exposed near Daohugou village, Shantou Township, Ningcheng County, Inner Mongolia, northeastern China and placed it under a new genus *Daohugouthallus*. The thallus comprises elongate primary axes from which extend lateral and terminal branches that fork once to repeatedly. Extending from all branches are filiform appendages that closely resemble the cilia of certain extant lichens. Some branch tips appear ruptured and covered by minute irregularities, and appear similar to lichen soralia. Specimens of *D. ciliiferus* are associated with a small seed cone and also found growing on an unidentified gymnosperm branch providing direct evidence to consider *D. ciliiferus* as the oldest known epiphytic lichen. Fang et al. (2020) corroborated the lichen affinity of *Daohugouthallus ciliiferus*.

Based on the results from the geometric morphometric analysis (GMA) and molecular clock assessments, Wei, Ren & Wei in Yang et al. (2023), introduced a new monogeneric family *Daohugouthallaceae* and proposed the following diagnosis: "Thallus corticolous, foliose to subfruticose, lobes irregularly branching, lateral black cilia and lobules present. Fungal hyphae thin, photobiont cells small globose, simple." Based on new Jurassic (165 Mya) fossil of *Daohugouthallus ciliiferus*, Yang et al. (2023) demonstrated the hitherto oldest known macrolichen inhabited a gymnosperm branch by applying energy dispersive X-ray spectroscopy and DNA to complementarily verify lichen affinity of *D. ciliiferus* and quantitatively assess the potential relationships with extant lichenized lineages, providing new approaches for study of this lichen adpression fossil. The fossil record and molecular clock studies indicate that gymnosperms diverged around 315 Mya, whereas conifers originated approximately 300 Mya and diversified 190–160 Mya in the Early to Middle Jurassic into the various families recognized today. Therefore, macrolichens may have played a role in Jurassic gymnosperm-dominated forest ecosystems comparable to extant macrolichens in present-day forests. The presence of an epiphytic macrolichen already in the Jurassic indicates that lichens and perhaps other epiphytes may already have contributed to the ecological complexity of paleo-forest ecosystems. Diagnostic features, such as hamathecium, ascus, and ascospore structure, are not known from this fossil, which makes it difficult to establish relationships between fossil and extant lichens, including when taking fossils as calibration points in molecular dating analyses. Type genus for this family is *Daohugouthallus* Wang, Krings & Taylor and also *D. ciliiferus* Wang, Krings & Taylor considered as type species. The Substrate for this fungi was an unidentified gymnosperm branch. The Jurassic macrolichen, however, is most similar to foliose *Parmeliaceae* (Phylum: *Ascomycota*, Class: [Lecanoromycetes](#)).

References

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