

## Peculiar pollen grains found in *Schidolepium* Heer cones from the Middle Jurassic of East Siberia

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We have studied pollen grains from cones of *Schidolepium gracile* Heer from the Irkutsk Basin in East Siberia of Russia with application of light microscopy as well as scanning and transmission electron microscopy, in aim to understand their morphology and exine ultrastructure and clarify the botanical affinity of the parent conifer (Zavialova and Nosova, 2021). The pollen grains show an unusual combination of morphological and ultrastructural traits, so that we did not find a suitable taxon among pollen dispersae or similar enough pollen grains known from reproductive organs. In pollen masses, they appear circular, asaccate, and flattened in a polar position. Detached monads show a polar and equatorial position equally often; the outlines are rounded, oval, and irregular. An indistinct equatorial-distal saccus was revealed. A small trilete scar is occasionally present. The surface is fossulate. The ectexine is formed by structural elements that fused with each other by their lateral surfaces partially or completely. The element is a solid elongated cylinder with a rounded external end and narrowing internal end/ends. The elements are arranged along their length, perpendicular to the pollen surface. The endexine is more electron dense than the ectexine, and it is prominent and appears homogeneous. We revealed variations in the pollen morphology that we consider preservational, although the existence of two species of *Schidolepium* is not excluded. The exine ultrastructure excludes an araucariaceous affinity, with its characteristically granulate ectexine, in spite of a relatively close general morphology. Certain similarities to *Cerebropollenites* were found in the exine ultrastructure, but this pollen type is characterized by a distal aperture and proximal saccus-like extensions by contrast to the occasional proximal scar and equatorial-distal saccus of the pollen grains under study. Although the pollen cones have something in common with the Taxodiaceae and Voltziales, the palynological data do not support this relationship. The pollen grains under study show a combination of characters that forces us to seek for the relatives of their parent plant in several groups of conifers, and we cannot choose only one of them. The plant apparently represents an early member of an evolutionary line within conifers; this is why it does not show a complete assemblage of features that we can use to consider as characteristics of one of the groups but a mixture of them. One of the cones was contaminated by *Cycadopites* pollen grains, which showed the ginkgoalean exine ultrastructure and might have been brought by a nonspecialized animal pollinator. The results contribute to our ongoing study of Middle Jurassic localities of Siberia, which are rich sources of sufficiently well-preserved reproductive remains of gymnosperms with in situ pollen as well as other types of plant fossils. The study was supported by the Russian Foundation for Basic Research, no. 20-04-99355A.

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