

Diatom and silicoflagellate response to the hyperthermal events of Late Paleocene-Early Eocene in biosiliceous deposits of West Siberia and adjacent areas

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Late Paleocene-Early Eocene (58–50 Ma) is one of the warmest interval of the Cenozoic with episodes of short-term hyperthermal events identified by isotopic data. The most long-term and best documented event is the climatic optimum on the Paleocene-Eocene transition (PETM; 55,5 million years), followed by a series of brief hyperthermals of smaller magnitude. In the area of Pechora depression to Turgay strait and North Kazakhstan, including West Siberia and the eastern slope of the Urals, this period corresponds to the maximum development of marine transgression with high biosiliceous production. Detailed diatom and silicoflagellate records in the most representative sections (Khanty-Mansiysk, Kamyshlov, Korkino, Chumlyak, Baka, Sokolovsky, Emba and Kyrgyzskoe) and boreholes (228 -Inta, 19A-Ust'-Manya, 8, and 10 (Omsk depression)) demonstrate the reaction of siliceous microbiota to paleoenvironmental changes. In the *Trinacria ventriculosa* - *Hemiaulus proteus* - *Coscinodiscus uralensis* - *Coscinodiscus payeri* - *Pyxilla gracilis* diatom Zones there are two levels of biodiversity increase caused by warm water masses from Tethys.

The first level is related to the Thermal Maximum at the Paleocene-Eocene transition (PETM). The *Trinacria ventriculosa* (top) and *Hemiaulus proteus* Zones are characterized by high taxonomic diversity, manifested in the appearance of some new taxa – genera *Fenestrella*, *Craspedodiscus*, *Podosira*, *Moisseevia*, *Pseudotriceratium*, *Soleum*, radiation of *Anaulus*, *Hemiaulus*, *Trinacria* s.l. *Grunowiella*. Silicoflagellates demonstrate appearance of extreme morphotypes. In particular, new taxon *Dictyopsis sibirica*, referred to a new genus is described. Specific features of Trans-Uralian diatom assemblages of PETM – higher than in Middle Volga species diversity and abundance of *Anaulus*, *Fenestrella*, *Coscinodiscus*. Occurrence of *Trinacria* s.l., *Hemiaulus*, *Stephanopyxis*, *Eunotogramma* is limited, no typical PETM markers of the Middle Volga region – *Trinacria cancellata*, *Gyrocyllindrus antiqua*, *Navicula*-like species. Endemic for the Trans-Urals basins are *Grunowiella* sp. A, *Pseudostictodiscus novozelandicus*, *Pseudotriceratium fallax*, *P. chenevieri*, *Fenestrella rossica*, *F. barbadense*, the above-mentioned silicoflagellates *Dictyopsis sibirica*. Established differences make questionable the existence of a stable connection between West Siberian sea-strait and “Russian sea” of the Middle Volga at this time.

The second level of the appearance of thermophil assemblages tentatively assigned to the upper part of the zone *Pyxilla gracilis* (Nannoplankton zone NP12) and correlates with the isotopic events of the second half of Ypresian. Recorded bioevent is associated with the re-invasion of the PETM markers (*Craspedodiscus moellleri*, *Fenestrella antiqua*, *Thalassiosira wittiana*), predominance of *Grunowiella* species, first occurrence of two new genera - *Brightwellia* and *Golovenkinia* and new species - *Triceratium basilica*, *Pyxilla* sp. 1. The most taxonomically diverse complex is found in the North Kazakhstan (Kyrgyzskoe, Emba). In Pechora basin (borehole 228), similar changes are less pronounced. In the south-east part of Western Siberia (wells 8, 10, Omsk depression), this episode is stressed by the appearance of transgressive biosiliceous clays (thickness 4–6 m) with similar diatom assemblage.