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The first finding of diatoms from the Early Miocene lacustrine deposits of the Barguzin Valley (Baikal Rift Zone)

Usoltseva M.V.^{1*}, Hassan A.², Rodionova E.V.¹, Titova L.A.¹, Chuvashova I.S.^{2,3}, Rasskazov S.V.^{2,3}¹ Limnological Institute Siberian Branch of the Russian Academy of Sciences, Ulan-Batorskaya Str., 3, 664 033 Irkutsk, Russia² Irkutsk State University, Irkutsk, Russia³ Institute of the Earth's Crust Siberian Branch of the Russian Academy of Sciences, Irkutsk, Russia

ABSTRACT. Using light and scanning electron microscopy, we studied the species composition of diatoms and their distribution in the core hole 545 of the Barguzin Valley. We determined two local diatom zones that reflected the stages of the flora development in the Barguzin Valley during the Early Miocene.

Keywords: diatoms, Baikal Rift Zone, Barguzin, Early Miocene

The Barguzin Valley belongs to the central part of the Baikal Rift Zone. It is located northwest of the Svyatoy Nos Peninsula and Barguzin Bay; the Barguzin Range detaches it from Lake Baikal. From east and southeast, the slope of the Ikat mountain ridges surrounds the basin (Fig. 1).

We first published the data on the fossil diatom flora of the Barguzin Valley in (Hassan et al., 2019), where the results of the investigation of diatoms from the cores 532 and 531 revealed four local diatom zones that reflected the development stages of flora in the southern part of the Barguzin Valley from the end of the Middle Miocene to the beginning of the Pliocene.

This work presents the results of the study diatoms from the core 545, which was obtained in 2012 near the Uro settlement (southwestern part of the valley) by the Baikal Branch of Joint Stock Company "Urangologorazvedka". The study aimed to search for the most ancient diatoms in the Baikal region.

Using light and scanning electron microscopy, we investigated species diversity of diatoms and their distribution in the core. In total, we identified 36 species, among which 8 were extinct. Planktonic diatoms dominated along the entire section. Their species composition has changed. Based on the appearance or disappearance of indicator species, we determined two local diatom zones (Fig. 2).

Diatom zone 1 was determined from the dominance of the oval *Alveolophora* sp. 1 valves in the depth interval (170.0–160.0 m). This is a planktonic species with an unidentified taxonomic status, which will be described as novel to science. It was 90-99% of the total number of diatoms. The maximum number of

valves of this species was recorded in the lower part of the core (169 m), accounting for 228 million valves/g. Above, in the interval of 168–161 m, the number of valves varied from 1.5 to 65 million valves/g. Accompanying species were *Alveolophora baicalensis* Khursevich et Fedenya (1–1.9%) and *Alveolophora antiqua* (Moiseeva) (0.01%). Another planktonic species, *Actinocyclus styliferum* Khursevich et Fedenya, was found together with *Alveolophora* sp. 1 at 163 and 161 m, amounting to 6.5 and 0.8 million valves/g, respectively.

Among the littoral species, there were single specimens of *Ellerbekia kochii* (Pant.) Moiss. The species *Skabitschewskia oestrupii* (Cleve) Kuliskovskiy et Lange-Bertalot, *Staurosira subsalina* (Hustedt) Lange-Bertalot,

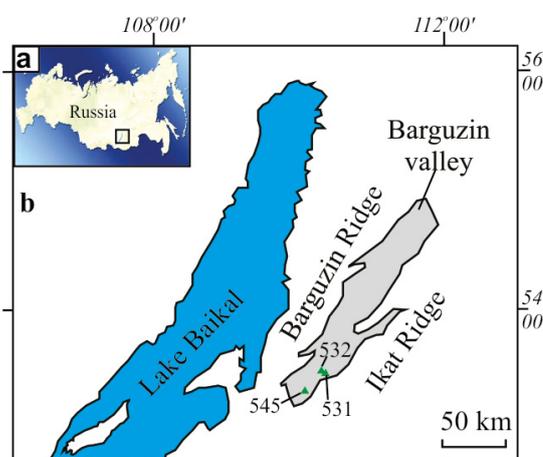


Fig. 1. Location of the Barguzin Valley and cores 545, 532 and 531.

*Corresponding author.

E-mail address: usmarina@inbox.ru (M.V. Usoltseva)

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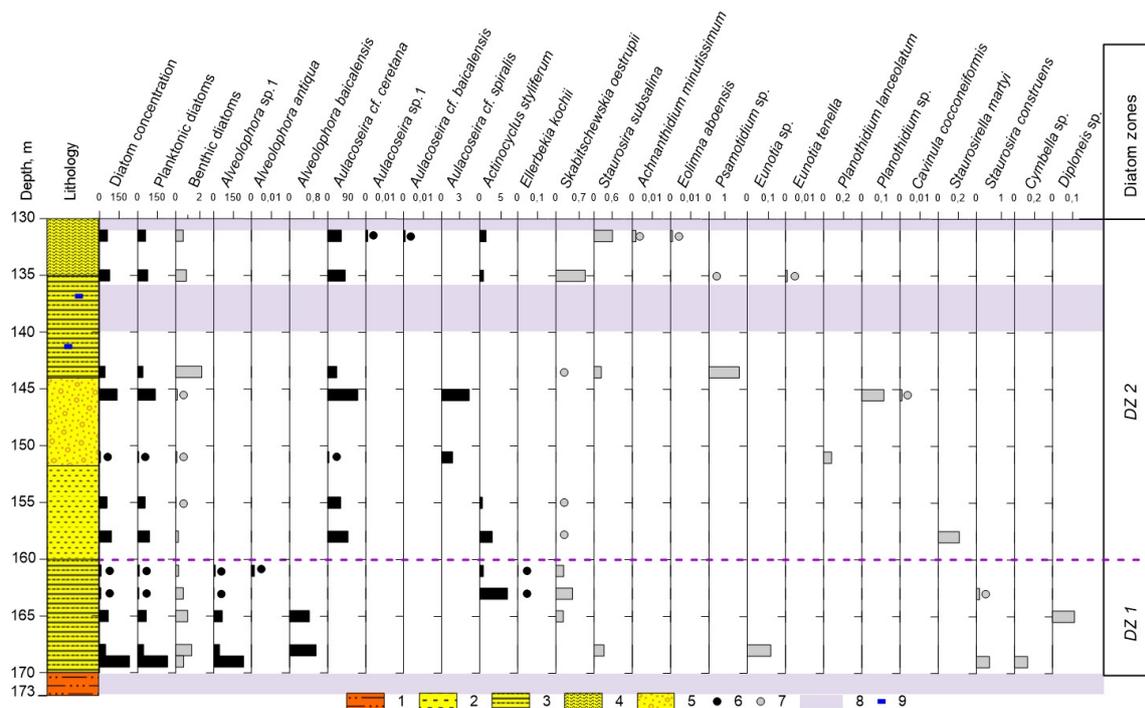


Fig.2. Distribution of diatoms in lacustrine sediments of the core 545. Relative abundances of the main diatom species are concentrations of valves (millions) in 1 g of dry sediment. 1 – pre-Tankhoy unit; 2–5– lacustrine unit of Tankhoy formation: 2 – mudstone, 3 – silty mudstone, 4 – siltstone, 5 – sandstone; 6–7 – small amount: 6 – planktonic diatoms, 7 – benthic diatoms; 8 – no diatoms; 9 – vivianite.

Staurosira construens Ehrenberg, *Tetracyclus glans* (Ehrenberg) Mills, *Eunotia* sp., *Cymbella* sp., *Diploneis* sp., etc. represented benthic diatoms in a small amount (up to 7.2%).

Diatom zone 2 was determined from the disappearance of *Alveolophora* and appearance of *Aulacoseira* in the depth interval of 160.0–130.0 m. *Aulacoseira* cf. *ceretana* E.Y. Haworth et Sabater was the dominant species in this zone. Its number varied from 5 to 130 million valves/g, which was 8.9–72% of the total number of diatoms. Other species, *Aulacoseira* cf. *spiralis* (Ehrenberg) Houk et Klee, *Aulacoseira* sp.1 and *Aulacoseira* cf. *baicalensis* (Wislouch) Simonsen, were found in separate layers in a small amount. The number of *Actinocyclus styliferum* in this zone was 0.01–9.3 million valves/g.

Benthic diatoms were less than 5.2% of the total number of diatoms. They were represented by the following species: *S. oestrupii*, *Eunotia tenella* (Grunow) Husted, *S. subsalina*, *Achnanthyidium minutissimum* (Kützing) Czarnecki, *Eolimna aboensis* (Cleve) Genkal, *Planothidium lanceolatum* (Brébisson ex Kützing) Lange-Bertalot, *Psamotidium* sp., *Gomphosphenia grovei* var. *lingulata* (Hustedt) Lange-Bertalot, *Punctastriata lancettula* (Schumann) Hamilton et Siver, *Ensyonema silesiacum* (Bleisch) Mann, *Cavinula cocconeiformis* (Gregory ex Greville) Mann et Stickler, and *Staurosirella martyi* (Héribaud-Joseph) Morales et Manoylov.

Comparison of the obtained species complexes with the published data on the Baikal region (Rasskazov et al., 2007; Kuzmin et al., 2009; Usoltseva et al., 2019) revealed that the species composition of the core 545 differs from those investigated previously and is more

ancient, the Early Miocene. The greater wall thickness of the frustule, the deep annular diaphragm of the *Aulacoseira* species and oval valves of *Alveolophora* sp. 1 indicate this fact. The latter ones are known from the Early Miocene deposits of the Far East, Japan and Oregon in the USA (Usoltseva et al., 2013). Such an estimate of the age corresponds to deposit dating based on palynological data (Rasskazov et al., 2019) and the low stratigraphic position of the layers in the section.

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