Short communication

ISSN 2658-3518
LIMNOLOGY FRESHWATER BIOLOGY
www.limnolfwbiol.com

Subfossil records of Cladocera from the tundra Lake Yambeto in the Yamal Peninsula

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ABSTRACT. We performed a paleoecological study of a 124-cm-long sediment core from Lake Yambeto (southern part of the Yamal Peninsula, Yamalo-Nenets Autonomous Okrug, Russia), which consists of a series of lake basins varying in depth (up to 6.9 m) and merged with each other. The species composition of subfossil cladocerans was analyzed: a total of 26 taxa from 5 families were identified; of them, 73% belonged the family Chydoridae, thus ranking it as the most diverse. The cladoceran assemblage was dominated by Holarctic and Palearctic species, with *Bosmina* (*Eubosmina*) *longispina*, *Bosmina longirostris*, and *Chydorus* cf. *sphaericus* as the most abundant. The mean saprobity index (1.52) characterized the lake as β-mesosaprobic.

Keywords: paleoecology, Yamal Peninsula, subfossil Cladocera

1. Introduction

Layer-by-layer sedimentological analysis reveals a lot about the history of lake biocenoses and their inhabitants (Smirnov, 2010). Paleoclimate reconstructions are often based on pollen and diatoms, both valuable bioindicators of environmental change (Nigamatzyanova et al., 2020; Valieva et al., 2020). Another important source of data on past climate trends is subfossil cladoceran remains that accumulate abundantly in lake sediments: their chitinous structures (headshields, carapaces, postabdomens, postabdominal claws, etc.) are typically well-preserved and thus can be relatively easily identified to the species level (Frolova and Ibragimova, 2015; Nigmatullin et al., 2021). Notably, cladocerans are very responsive to environmental changes. In this light, a proper understanding of the natural climate variability during the past and its impact on fresh-water ecosystems is essential for predicting both current and future climate transformations (Nevalainen et al., 2011). This article discusses the results of our study of Lake Yambeto (southern part of the Yamal Peninsula) aimed to model its past environmental conditions and to estimate the species richness of its cladoceran assemblages.

2. Materials and methods

A core of bottom sediments for subsequent paleontological study was sampled at a depth of 6 m from Lake Yambeto (68°11′74.7″N 068°58′42.8″). The obtained core was cut into 1 cm thick segments. Prior treatment of the segments was carried out using the standard method (Korhola and Rautio, 2001). The dry segments (0.5–1.0 g) were heated in 10% KOH at 75°C for 30 min, rinsed through a 50 μm sieve, and examined under an AxioLab A1 light microscope at 100–400× magnification. Cladocerans were identified using special keys for subfossil remains (Szeroczyńska and Sarmaja-Korjonen, 2007) and modern species (Kotov et al., 2010; Korovchinskii et al., 2021).

3. Results and discussion

A total of 26 cladoceran taxa from 15 genera and 5 families (Chydoridae – 73%, Bosminidae – 8%, Daphniidae – 12%, Eurycercidae – 4%, and Sididae – 4%) were identified in the lake zoothanatocenoses. The concentration of subfossil cladoceran remains per 1 g of the dry segment weight varied from 87 to 390 ind./g (249 ind./g on average). *B. (Eubosmina) longispina* was the dominant species (2804 ind., 40.1%). *Ch.* cf. *sphaericus* (1978 ind., 28.3%) and *B. longirostris* (1317 ind., 18.8 %) were the secondary species. *Graptoleberis testudinaria*, *Pleuroxus uncinatus*, and *Eurycercus sp.*, all indicating the overgrowing of some areas in the lake, were also recorded. Pelagic species were the most abundant, but littoral species, mostly from the family Chydoridae, were characterized by a higher taxonomic diversity. A large proportion of taxa included species confined to the Palearctic and Holarctic zones. The Pantle-Buck saprobity index varied from 1.40 to 1.64

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Received: June 08, 2022; ***Accepted:*** August 01, 2022;
Available online: September 02, 2022

(1.52 ± 0.96 on average), which is characteristic of β-mesosaprobic conditions.

4. Conclusions

The sediment core from Lake Yambeto contained 26 subfossil cladoceran taxa. *B. (E.) longispina*, a pelagic species, prevailed. *B. longirostris*, a small-sized species, and *Ch.* cf. *sphaericus*, a littoral dweller, were less abundant. The data obtained show that the species diversity of the lake is determined by littoral taxa and species native to northern regions. The values of the saprobity index suggest that the lake is β-mesosaprobic.

Acknowledgements

The field work that included sediment core sampling was supported by the Russian Science Foundation (project no. 20-17-00135). The analysis of lake sediments and subfossil cladocedrans was funded by the subsidy allocated to Kazan Federal University for state assignment no. 671-2020-0049 in the sphere of scientific activities, as well as by the Kazan Federal University Strategic Academic Leadership Program.

Conflict of interest

The authors declare no conflict of interest.

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