



## Cladoceran assemblages of the Last Interglacial obtained from permafrost lacustrine deposits exposed at the Laptev Sea coast

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The cladoceran assemblages of the lacustrine deposits of the Krest-Yuryakh sequence (Marine Isotope Stage 5e, MIS5e; Last Interglacial, LIG) exposed at the southern coast of Bol'shoy Lyakhovsky Island and the Oyogos Yar mainland coast along the Dmitry Laptev Strait (Yakutia, Siberia, Russia) were investigated. Field studies on both sides of the Laptev Strait were conducted in the 2002, 2007 and 2014. The vegetation of the study area is currently represented by Arctic tundra. The mean air temperature of the warmest month of the year (MTWA) is 3.5 °C for the studied sites on Bol'shoy Lyakhovsky Island and 6.9 °C for Oyogos Yar (<https://www.worldclim.org>; Fick and Hijmans, 2017). Age information of the Krest-Yuryakh lacustrine deposits is based on infrared-stimulated luminescence (IRSL) (Schirrmeister et al., submitted). Cladocera were studied in profile L7-11 on Bol'shoy Lyakhovsky Island and in profiles Oya-3-11, Oy7-01, Oy7-08, Oya 5-1 on Oyogos Yar.

The studied fossil cladocera remains of Krest-Yuryakh deposits are exceptionally well preserved. The overall cladocera record comprises 13 taxa. The most common species are *Chydorus* cf. *sphaericus*, *Bosmina* sp. and *Daphnia pulex* gr. The cladoceran assemblages are dominated by littoral shallow-water taxa, such as *Chydorus* cf. *sphaericus*, *Alona guttata* / *Coronatella rectangula*. However, profile L7-11 on Bol'shoy Lyakhovsky had very low concentrations of specimens of which *Chydorus* cf. *sphaericus* is the most common species.

The cladoceran records on Oyogos Yar are more diverse and had much higher concentrations than those on Bol'shoy Lyakhovsky. Most of the cladoceran remains on Oyogos Yar belong to littoral phytophilous species, associated with macrophytes. In the cladoceran communities of Oyogos Yar, along with cold-water taxa, also more thermophilic taxa were found. In particular, the findings of remains of the species *L. leidigi* indicate much warmer conditions in the past than today. According to Flößner (2000), this species is absent nowadays in the arctic-subarctic zones, but present in the boreal zone. Thus, the modern distribution of *L. leidigi* is located considerably further south today. The northernmost known discovery of this species in Yakutia (northern Russia) is located in the basin of the Omoloy River (MTWA of +11.5 °C, Frolova & Nigmatullin, unpublished data). We conclude that the climatic conditions were more favorable for cladocerans

on Oyogos Yar than on Bol'shoy Lyakhovsky in the Last Interglacial (LIG) sub-stage. The cladoceran assemblages of Oyogos Yar indicate lacustrine habitats with a well-developed vegetated littoral zone as well pelagic open-water zones in the paleo-lakes. Discoveries of cladoceran taxa significantly north of their modern ranges allow the reconstruction of warmer climatic conditions during LIG. Presumably, on Oyogos Yar, the mean temperature of the warmest month (MTWA) was at least  $\sim 4.5^{\circ}\text{C}$  higher than today, which is supported by independent proxy-based temperature reconstructions such as plant macro-fossils, pollen and chironomids (Kienast et al., 2011) as well as by climate modelling simulations (Schirrmeister et al., submitted). The funding of the work of LF has been provided by the Russian Science Foundation (RSF) (grant No. 24-17-00192).