Materials of Conferences

PALAEOENVIRONMENTAL INVESTIGATIONS AND RECONSTRUCTIONS IN NORTHERN RUSSIA USING SUB-FOSSIL CLADOCERA (BRANCHIOPODA, CRUSTACEA)

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We study subfossil remains Cladocera (Branchiopoda, Crustacea) from lakes, located in different regions of Russia (Northern Karelia and Northern-eastern Siberia). According to the Cladocera abundance in the lake sediments, they were divided into three groups: Dominant taxa (> 50 % in each sample), Subdominant (from 25–50 %) and Seldom (< 25 %) taxa. Determined their biotopic and zoogeographic accessory, calculation of indexes of species diversity, community evenness, also statistical analysis with identification preferences species for hydrological parameters. Our analysis allows to obtain a more complete picture of the species composition cladocerans community, unlike regular sampling over several vegetative seasons using standard hydrobiological methods, as in the sediments are species living at different times of the year.

The purpose of our study is to analyze Sub-Fossil Cladocera community, typical for conditions in the region of White sea, Central Yakutia and the lake sediments of reservoirs along the coast of the Laptev Sea.

This goal was achieved by follows:

1. Comparison of ecological and limnological conditions of the studied regions, based on hydrochemical parameters.

2. Determination of species composition and selection of dominant species Cladocera community.

3. Determination of indexes of species diversity, community evenness, zoogeographic, habitat characterization, statistical analysis.

4. The reconstruction of palaeoecological conditions on the basis of Cladocera. Comparison of the obtained data with the reconstructed parameters of the other paleoecologiests.

The material for this study submitted by surface sediment samples from 18 lakes in Bolshoy Lyakhovsky island, soil sample from the slope of Oyogos Yar, sediments from 24 Central Yakutia lakes and 55 lakes on White sea region.

Results

In general, most of the lakes are small, shallow and were formed by thermokarst processes with maximal depths of about 4 m. Ion concentrations show that cation compositions for lake waters are dominated by Ca^{2+} and Mg^{2+}. We found differences in hydrochemical composition. So in the Central Yakutia lakes observed high salinity, while in the northern meltwater ponds observed decline in salinity. Al ion content higher in waters of the B. Lyakhovsky island, compared with those in C. Yakutia. Reservoirs in B. Lyakhovsky island also have high rates of Fe, compared with reservoirs C. Yakutia.

Among the leading species, common to all sampling sites in the region of northern-eastern Siberia, it should be noted Chydorus sphaericus, Alona guttata, Bosmina longirostris. We saw, that the composition of the dominants was similar, but it was replenished in reservoirs of C. Yakutia by species such as: Alonella nana, Bosmina longispina. In taxonomic terms Cladocera highest species diversity typical for lakes in C. Yakutia (34 taxa). While in the waters along the coast of the Laptev Sea, 20 species – in the lakes of the B. Lyakhovsky island and 9 – in Oyogos Yar.

According to zoogeographic zoning, the bulk of the cladocera community, typical of present-day conditions, were types, characterized by universally geographical habitat distribution, except for lakes on White sea region, where exists Northern species.

After analyzing the zooplankton belonging to certain biotopic zones, it should be noted, that the major part of found species, belonged to the littoral, but for the lakes on White Sea region typically presence of littoral-planktonic taxa.

The values of Shannon's index (H) range from 0,90 to 2,75 in samples from the island of B. Lyakhovsky and from 2,64 to 2,7 in Central Yakutia waters, and for the lakes on White Sea region: 2,04–2,97. It indicates the presence of relative diversity of the cladocerans community and characterizes the investigated waters as contaminated. The values of Pielou's index range from 0,35 to 0,87 in samples from the Laptev Sea coast lakes and from 0,6 to 1,0 in samples from Central Yakutia waters, and for the lakes on White Sea region: 0,41–0,91, indicating an equable distribution of species in the cladocerans community.

We revealed significant differences between the preferences of species for certain environ-

mental conditions using an analysis of variance (ANOVA). The data for this analysis was abundance of fossilized remains each taxon found in investigated waters from northeast of Yakutia. Using statistical analysis we revealed significant differences between the selected groups in abundance of certain species and values of the hydrochemical parameters corresponding to the species-specific preferences for abiotic conditions of hydrobionts.

We have found evidence of paleoclimatic changes in the investigated northern-eastern Siberia region, based on our own results and on the data of hironomids, pollen, radio-magnetic and other tests.

Among the distinctive features, that characterize the fossil lake, situated on a hillside of the Oyogos Yar, the most interesting findings are the fossilized remains of genus Bosmina, which were not found in modern sediments of the region. The boundary of genus Bosmina distribution area at present lies just southward and is located on the boundary of the tundra-forest-tundra. According to chironomid analysis the reconstructed July temperature exceeded 13 °C. The modern July temperature in the Oyogos Yar is approximately 9 °C. Due to data, obtained from Oyogos Yar investigators Russian-German expedition Lena 2002: the change in temperature indicators led to the displacement of the distribution boundary of woody vegetation about 270 km compared with the modern situation. According to our own data and other palaeoecologists data, we can conclude that there was open areas of tundra interspersed with patches of steppe and grasslands in the Oyogos Yar 150–300 thousand years ago.

Thus it confirms the need to use palaeoindicators to create reconstructions of paleoclimatic changes in the Russian North.