Diversity of microbial communities and degradation of diatoms in the deepwater sediments of Lake Baikal

M. I. KURILKINA*, YU. R. ZAKHAROVA, Y. P. GALACHYANTS, M. V. BASHENKHAEVA, D. P. PETROVA AND YE. V. LIKHOSHWAY

Limnological Institute, SB RAS, Irkutsk, 664033. Russia (*correspondence: maria.kurilkina@gmail.com)

Studies on the diversity of the microbial community colonizing diatoms can provide an insight into the role of microorganisms in degradation of diatoms and turnover of biogenic elements, including Si. Fossil diatom remains from the bottom sediments of Lake Baikal are widely used for paleoclimatic and paleolimnological reconstructions, and deeper insight into the factors responsible for their preservation or destruction may significantly contribute to the accuracy of the results [1-3]. Using microscopic methods, it has been shown that the degree of diatom preservation and the numbers of diatom-associated bacteria in the surface layer of bottom sediments decrease with depth. The total cells enumerated by epifluorescence microscopy after DAPI staining varied from 2.5×10^7 to 3.3×10^7 cells/mL. The structure and diversity of microbial community in the upper layers of deepwater sediments (0–10 cm depth) has been characterized by pyrosequencing of the 16S rRNA genes. A total of 29168 *Bacteria* and 36997 *Archaea* sequences were obtained from ten samples. According to the results of metagenomic analysis, the bacterial community is dominated by representatives of *Acidobacteria* (31.9%), *Firmicutes* (21.6%), *Proteobacteria* (18.4%), *Actinobacteria* (10.7%), *Chloroflexi* (5.7%), *Bacteroidetes* (1.5%), WS3 (2.8%), *Verrucomicrobia* (1%), *Nitrospira* (0.9%); other phylotypes account for less than 1% each. The archaeal community is dominated by representatives of *Crenarcheota* (80.1%) and *Euryarchaeota* (19.9%). Among isolates of the eubacteria genus *Bacillus* (*Firmicutes*) isolated from the sediments on the medium, where the only source of organic matter was hydrolysate from diatoms, the activity of hydrolytic enzymes is revealed. An algicidal effect and degradation of siliceous diatom frustules are recorded in algal–bacterial cultures during the cocultivation of isolates with the axenic diatom *Synedra acus*. These data show that potential degraders of diatoms occur among the vast variety of microorganisms in the deepwater sediments of Lake Baikal.

[1] Grachev et al. (1998) *Quaternary Sci Rev* **17**, 1101-1106. [2] Mackay et al. (2000) *Terra Nostra* **9**, 34-48. [3] Battarbee et al. (2005) *Glob Planet Change* **46**, 75–86.