Psychrophilic bacteria in sub-ice communities of Lake Baikal

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A special ecotope is formed under the ice of Lake Baikal that includes microalgae, protozoa and bacteria. Bacteria along with the microalgae are an important member of the community and play a major role in turnover of the organic components. Despite the low temperature, bacteria show high enzymatic activity [1] [2] and their total abundance is several orders of magnitude higher than that in the free ice period [3] [4]. This work aims to study bacteria isolated from the ice/water interface under the ice cover of Lake Baikal.

The bacteria were sampled from 3 sites located in Southern Baikal during March/April of 2011. Total bacterial abundance (TBA) was estimated by direct counting of cells collected on 0.2 μm polycarbonate filters and stained with a fluorochrome DAPI (4′,6-diamidino-2-phenylindole). TBA varied from 0.6×10^6 cells/mL to 2.1×10^6 cells/mL. We isolated 120 stains by cultivation on original medium with the algal extract (DA) and tenfold diluted fish peptone agar (FPA/10) at 4°C. The abundance of bacteria grew in DA medium varied from 2 to 12584 CFU/mL; in case of FPA the range was 2 – 20176 CFU/mL. Cultured bacteria differed morphologically: they were represented by rod-shaped, cocci and ovoid-shaped cells. The isolates were analyzed by sequencing of the fragment for 16S rRNA gene. The sequences obtained were identified against the GeneBank using BLAST search. The majority of strains were shown to belong to the genus *Pseudomonas*. Enzymatic activity was estimated qualitatively in 35 strains: 11% of them showed amylolityc, 49 % - phospholipase and 63% - casein activity, 57% strains were able to liquefaction of gelatin. About 63 % of studied strains demonstrated multiple enzymatic activities. Our data suggest that the psychrophilic bacteria of under-ice community of Lake Baikal demonstrated multiple enzymatic activities, are highly abundant and mostly belong to taxa of the genus *Pseudomonas* known to be able to survive at low temperatures.

[1] McConville et al. (1983) *J Phycol* **19**, 431–439. [2] Bowman et al. (1997) *Appl Environ Microb* **63**, 3068–3078. [3] Bunch et al. (1990) *Can J Aquat Sci* **47**, 1986–1995. [4] Smith et al. (1989) *Microb Ecol* **17**, 63–76.