Diversity of microbial communities in sites of discharges gas-and-oil containing mineralized fluids in Lake Baikal

A.V. LOMAKINA[1*], T.V. POGODAEVA[1], I.V. MOROZOV[2] AND T.I. ZEMSKAYA[1]

[1]Limnological Institute, Siberian Branch of the Russian Academy of Sciences, Ulan-Batorskaya Street 3, Irkutsk, 664033, Russia (*correspondence: lomakina@lin.irk.ru)

[2]Institute of Chemical Biology and Fundamental Medicine SB RAS, 8, Lavrentiev Ave., Novosibirsk, 630090, Russia.

Natural discharges gas-and-oil containing mineralized fluids have been identified in different parts of the South and Central Baikal using different methods (De Batist *et al*.., 2002; Klerkx *et al*.., 2003; Khlystov 2006; Khlystov *et al*.., 2007; Kontorovich *et al*.., 2007; Granin *et al*.., 2010) have been found in. We study microbiol community in deep-water sediments of sites with high concentration of ammonium (up to 20 mg/L), bicarbonate ions (up to 183 mg/L), total Fe (4.7 mg/L) and methane. For detection representatives *Planctomycetes*, ANAMMOX group, methanotrophs bacteria and methanogenic archaea, and other bacteria dergading oil in surface and deep-water sediments of cold seeps with different hydrocarbon structure we using methods of molecular biology (PCR analysis, FISH, pyrosequsing). Comparative analysis of nucleotide sequences of Bacteria and Archaea of 16S rRNA gene fragments from the site of natural oil discharge, Gorevoi Utes (Central Baikal), has indicated different microbial composition in the studied samples. We have identified representatives of the phyla *Bacteroidetes, Proteobacteria* (β, γ, and δ), *Verrucomicrobia*, *Nitrospirae*, *Chloroflexi*, *Planctomycetes*, *Acidobacteria*, *Chlorobi*, and *Actinobacteria*. Using *Planctomycetes*-specific primers, we have obtained various representatives of the phylum, including the ANAMMOX group in sites of discharge gas-and-oil containing mineralized fluid: cape Gorevoi Utes and Posolskaya Shoal (South Baikal). Fluorescent in situ hybridization (FISH) with labeled oligonucleotide probes has confirmed the presence in the microbial community site of Posolskaya Shoal of *Planctomycetes* and the ANAMMOX group. Using *pmoA*-gene specific primers was obtaned in surface sediments representatives of types I, II methanotrophs.

Therefore, at the sites with cold seeps in Lake Baikal we have detected bacteria participating in methane (methanotrophs) and oil oxidation, and utilize ammonium.

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Molecular scale speciation of U(VI) association with clay bacterial isolates

M. LÓPEZ-FERNÁNDEZ[1], I. SÁNCHEZ-CASTRO[1], A. AMADOR-GARCÍA[1], M. ROMERO GONZALEZ[2] AND M.L. MERROUN[1]*

[1]Department of Microbiology, University of Granada, Spain (*correspondence: merroun@ugr.es)

[2]Department of Civil and Structural Engineering, University of Sheffield, Sheffield, UK

Clay deposits have been studied in recent years as potentially host rock for deep geological disposal of radioactive wastes. A reliable performance assessment of these systems depends on better knowledge on the interactions of actinides with host rock natural microorganisms. The present work aims to characterize the speciation of U(VI) associated with highly U resistant bacteria isolated from Spanish clay deposits. The U(VI) bacterial interaction experiments were performed under physiological conditions. The speciation of U(VI) in U-loaded culture medium is complex and dominated by $(UO_2)_2CO_3(OH)_3^-$. Several spectroscopic and microscopic techniques indicated that the speciation of U(VI) changed drastically upon the addition of bacterial cells to U-loaded culture medium. Infrared spectroscopy analysis revealed that bacterial phosphate groups are involved in the coordination of U(VI) at these neutral conditions. X-ray absorption spectroscopy and time resolved laser induced fluorescence spectroscopy showed that U phosphate precipitation is the main interaction process. The U precipitates are localized at the cell surface as was demonstrated by TEM analysis. The biomineralization of U(VI) phosphates is seen as a detoxification mechanism of the cells to overcome the toxicity of this radionuclide. The results of this work will help in understanding the role of microbiological process in the chemical behavior of actinides in geological and environmental context for future nuclear waste disposals.

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