

Permafrost soil protist communities – a snapshot of evolution.

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The permanently frozen soil in the Arctic date back from few thousand to one million years. Generally, no active life is possible inside there, yet it contains cells of microorganisms – up to 10^7 – 10^8 per gram.

At least some of those cells are actually alive. Using specially developed drilling technique preventing contamination, the Lab of Soil Cryology sampled permafrost sediments and isolated from the cores different kinds of viable microorganisms, including bacteria, fungi, and protists. The age of microorganisms corresponds to the age of the last freezing.

Molecular phylogeny of the studied protist strains suggests they are mostly new species (and some are already described as such). In the case of *Acanthamoeba* sp., samples from two different horizons of the same borehole gave different strains – which may result from either the distribution shift or evolution. In the case of *Flamella pleistocenica* and *F. beringiana*, strains with almost identical sequences were isolated from the sediments of the same age formed thousands kilometers from each other, supporting the idea of relative stability of genetic structure in space. These results indicate that evolutionary studies may benefit from the information obtained for “ancient” strains, if only the firm relation of the strains is established.

The image of the whole community may be obtained by metagenomics. Previously, we have shown that the composition of methanogens’ sequences in a metagenome allows to distinguish between the sediments of lacustrine and terrestrial formation. In this work, we obtained similar results basing on the protists’ sequences.

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