

Isolation and Characterization of Anaerobes from Hot Lake, WA

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Abstract: The presence of sulfate salts and limited subsurface water (ice) on Mars suggests that any liquid water on Mars today will occur as (magnesium) sulfate-rich brines. It is not clear whether terrestrial organisms would be able to survive under the salinity and environmental conditions found on Mars. Hot Lake near Oroville, Washington, is a hypersaline terrestrial analogue site, which possesses chemical and physical properties similar to those observed on Mars. The main focus of this project is to characterize anaerobic microbial isolates from this meromictic athalassohaline epsomite lake that contains precipitating concentrations of MgSO₄ (Epsom salt). The salinities of soil samples from Hot Lake margins ranged from 4 to 32%. Hot Lake soils were used to inoculate growth media specific for fermentative organisms and sulfate-reducers. The cultures were maintained anaerobically at room temperature as well as at 7 °C. Microbial isolates from these enrichment cultures will be obtained by repetitive streak plating. The isolates will be characterized phenetically and phylogenetically. Tolerance to NaCl and MgSO₄ appears broad in aerobic Hot Lake isolates, but halophilic or epsophilic organisms do not appear to be abundant. The Hot Lake microbial community is dominated by bacteria often associated with hypersaline environments rich in NaCl and MgSO₄ rather than common soil organisms, novel phyla, or archaea. The isolated microbes have potential biotechnological as sources for enzymes and bioactive compounds. The results of this study will help to inform NASA's planetary protection group and has significant relevance to the origin of life on Earth.

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