Statistical trends in culture methods of endolithic bacteria extracted from Quartz, K-Feldspar (Jurassic) and Calcite (Quaternary) in semi-arid areas in Colombia

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Abstract

Microbial endolithic communities are ubiquitous in many deserts around the globe. They have been found in many different lithologies, including quartz, plagioclase and calcite. The use of culture methods in geomicrobiology is important because most bacteria are non-cultivable, which makes it very difficult to characterize and describe them. In this study, endolithic bacteria and yeast were cultured in three rock-forming minerals (quartz, K-feldspar and calcite) with standard culture methodologies. It was demonstrated that these endolithic microorganisms could grow in noble agar enriched with a mineral different from the one they were extracted. Microbes were also cultured in a nutritive broth under some physicochemical factors (sugar, salt, pH and temperature) to study their possible tolerance to different ecological conditions. These results were combined with Multiple Factorial Analysis to identify statistical trends between their morphologies (pigment, size and Gram stain), chemical elements and their tolerance to physicochemical factors. Our results show that it might exist a relationship between pigments in microbial colonies,their tolerance to pH9, salinity and temperature conditions; and that Gram-negative bacillus might have a high adaptive ability to different enriched minimum media. Characterizing microbial communities associated with lithic substrates in the laboratory could be helpful for future planning in the search for life on Mars.

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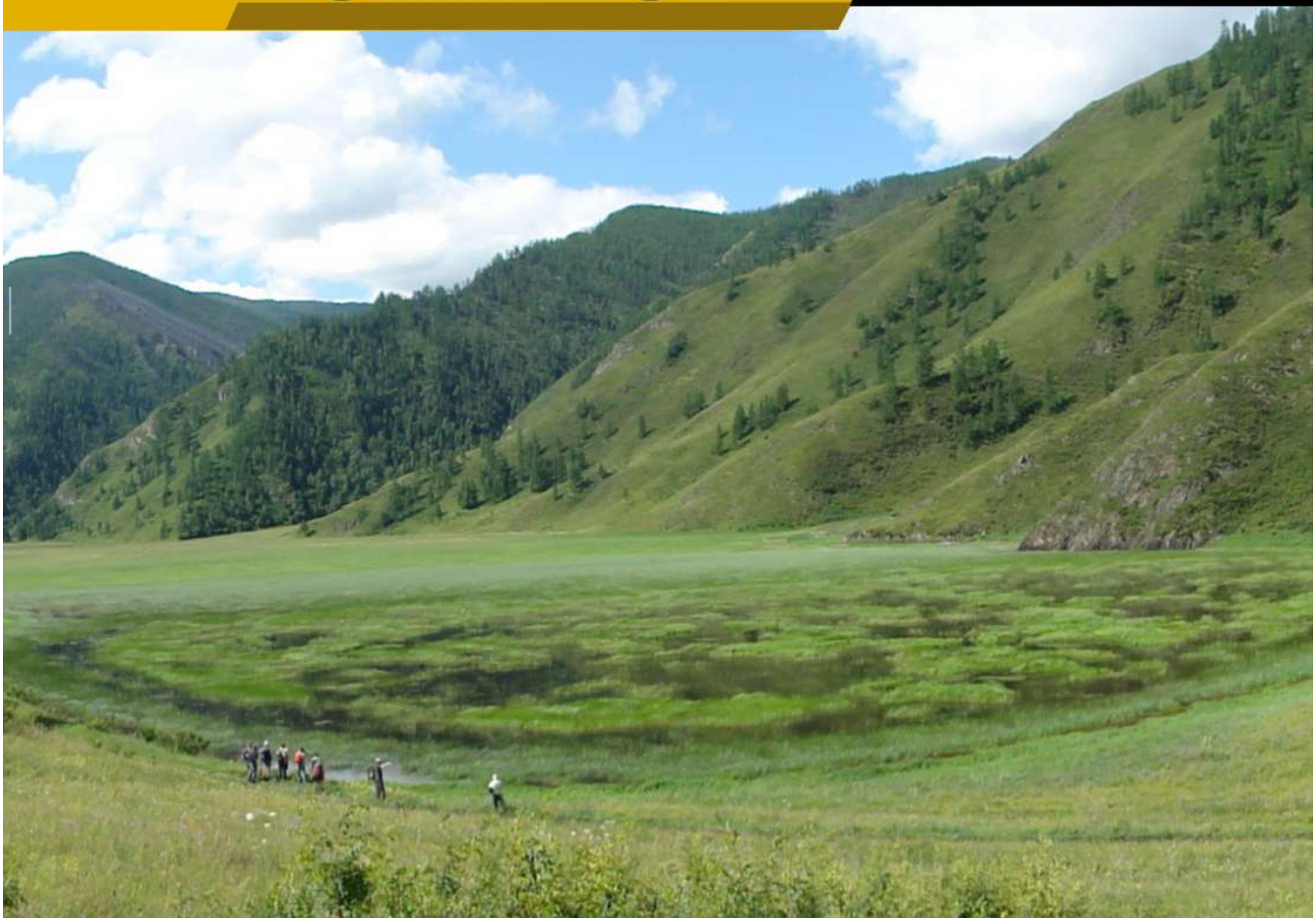

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A lake formed by the blockage of a small river during the Altay megaflood, about 10,000 years ago. One of the largest floods documented in Earth's history occurred along the Chuya River, which runs parallel to this view behind the gravel megabar in the right. Many bars like this were deposited along the Chuya R. during the high waters of the flood, constraining the peak water discharge above 10 million cubic meters per second.

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