

Extreme Ecosystems of Astrobiological Interest: Acidic Environment of Tinto River and Alaskan Permafrost

Felipe Gómez-Gómez
David Fernández-Remolar
Olga Prieto-Ballesteros
Centro de Astrobiología
Instituto Nacional de Técnica Aeroespacial
SPAIN
gomezgf@inta.es

Ricardo Amils
Centro de Astrobiología
Universidad Autónoma de Madrid
SPAIN

Extreme ecosystems have recently attracted considerable interest, not only because they are the proof for life's robustness and adaptability, but also because they are the scenario for studying the possibilities for life elsewhere on the Universe. Most of the best characterized extreme habitats on Earth correspond to geophysical constraints (temperature, ionic strength, radiation or pressure). Some of them are Mars analogs due to similarities on environmental parameters (dryness, radiation, ionic strength, temperature). The first one that we will present on this work is an extreme acidic environment unique because it is the result of the biological activity (chemolithotrophy) named Rio Tinto. Tinto river is a 100 km long river located at South-West of Spain. The pH value of the water along the river has a mean of 2.3 containing a high concentration of heavy metals (Fe, Cu, Zn, As and Cr among others). Geomicrobiological analysis of the Tinto ecosystem strongly suggest that these conditions are the results of the metabolic activity of chemolithotrophic bacteria (mainly iron and sulfur oxidizers). In spite of the harsh conditions of its waters Tinto river has a wide biodiversity (eukaryotes, bacteria and archaea) López-Archilla et al., 2001; Amaral-Zettler et al., 2002).

The second studied extreme ecosystem is the Alaskan permafrost. The low temperature (most of the year completely frozen soil) and anoxic conditions transform the tundra ecosystem in an extreme habitat. Gradient of bacteria in the permafrost column till 6 m deep and biodiversity will be presented.

Amaral Zettler, L. A., Gómez, F., Zettler, E., Keenan, G. B., Amils, R. and Sogin, M. L. (2002) Eukaryotic diversity in Spain's river of fire. *Nature* **417**, 9 May.

López-Archilla, A. I., Marín, I. And Amils, R. (2001) Microbial community composition and ecology of an acidic aquatic environment: the Tinto river, Spain. *Microb. Ecol.* **41**, 20-35.