IAA/IAF SPACE LIFE SCIENCES SYMPOSIUM (A1)
Interactive Presentations (IP)

Author: Dr. Sandra Ignacia Ramirez Jimenez
Universidad Autonoma del Estado de Morelos, Mexico, ramirez_sandra@uaem.mx

Mr. Ricardo Miranda Blancas
Universidad Autonoma del Estado de Morelos, Mexico, mirandab@uaem.mx
Ms. Lizbeth Sánchez Ayala
Universidad Autonoma del Estado de Morelos, Mexico, lzbthsan1@gmail.com
Mr. Josué Jesús Vázquez Herrera
Universidad Autonoma del Estado de Morelos, Mexico, josue_vazquez_herrera@hotmail.com
Dr. Lilia Montoya Lorenzana
Universidad Autonoma del Estado de Morelos, Mexico, lilia.montoya@uaem.mx

OSMOADAPTATION STRATEGIES USED BY SALINIBACTER RUBER IN A EUROPAN SCENARIO

Abstract

The organisms thriving at higher salt concentrations than the average salt content on terrestrial oceans (0.6 M NaCl) are considered halophiles. They are a type of extremophile organisms. There is enough evidence to sustain the presence of salty waters on different planetary scenarios such as the ocean of the satellite Europa or the surface of the planet Mars. Due to the particular events that conducted to the formation of these extraterrestrial scenarios, their geology is different from the terrestrial one. Therefore, the chemical nature of the salty compounds proposed to exist in these scenarios is quite different to the most abundant salt in terrestrial oceans. Even when this is a well-recognized fact, a systematic study that helps to understand the stress imposed by salts different from NaCl is still missing. We are particularly interested in the adaptive strategies displayed by *Salinibacter ruber*, an extreme halophile, when exposed to media modified with different MgSO4 concentrations that can be interpreted as possible models for the salinity conditions of Europa's ocean. We determined the growth rate, and the duplication time of *S. ruber* when exposed to media exhibiting different water activities (aw) determined by the presence of distinct contents of NaCl, or MgSO4. An analysis of the protein profile helps to confirm the extreme halophilic character of *S. ruber* as different types of proteins are accumulated at low salt concentrations. We also determined, for the first time and by quantitative proton nuclear magnetic resonance, that *S. ruber* can use not only the salt-in strategy as an osmoprotectant mechanism, but also the salt-out strategy as the bacteria can incorporate compatible solutes as betaine, glutamate and coline when available in the modified media. Our results may help to gain a better understanding of the metabolic pathways used by this bacterial halophile when exposed to representative conditions of an extraterrestrial ocean. And above all, they may help to explore the adaptation capabilities of extremophiles in scenarios of astrobiological importance.