Archaeal communities at gas-venting shallow basins in the northern Gulf of California (Wagner and Consag Basins)

F. PÉREZ-VILLATORO[1], S. DÁVILA[1], R.M. PROL-LEDESMA[2], K. JUÁREZ[1]

[1] Instituto de Biotecnología, Universidad Nacional Autónoma de México, Av. Universidad 2001, Cuernavaca, Morelos. 62210, México

[2] Instituto de Geofísica, Universidad Nacional Autónoma de México, Ciudad Universitaria, Cd. México, 04510. México

The occurrence of intense gas venting (mostly CO_2) is linked to very high heat flow (more than 10 W·m-2) in shallow basins (<200m depth) in the northern Gulf of California. However, no evident hydrothermal manifestations occur, other than diffuse gas venting. Mixing of CO_2 with the sea water lowers the pH and the high heat flow increases the bottom sediment temperature creating the conditions for the appearance of a distinct microbial echo system. This study focuses on the archaeal communities on 7 different sites along the Wagner and Consag Basins, using amplification and sequencing of 16S rDNA.

The diversity of analyzed 16S rDNA sequences corresponds to similar groups of archaea found in marine sediments distributed worldwide; however, the presence of some classes indicates a close relationship with the geochemical environment. 20% of the identified sequences correspond to the class Methanobacteria and 4% of an unknown class that belongs to the phylum Euryarchaeota, 24% of the class Thermoprotei (Phylum Crenarchaeota) and 2 % as possible Korarchaeotas.

Euryarchaeotas match the class Thermoplasmata and Halobacteriales, which have been identified in high temperature hydrothermal sediments from Middle Valley vent field, on the Juan de Fuca Ridge and marine methane seep sediments. The identified Thaumarchaeota correspond to the class Marine Benthic Group B (also known as Deep-Sea Archaeal Group or Lokiarchaeota), Miscellaneous Crenarchaeotic Group (MCG) and Group C3 that have been found previously associated with hydrothermal vents.

The presence of the identified archaea is consistent with the occurrence of intense hydrothermal activity, which has been concealed by the low permeability of the thick sediment cover. Detailed geophysical surveys have shed light on the presence of a deep hydrothermal system that has been evidenced on the sea bottom by high heat flow, CO_2 venting and the microbial community.