

Abstract for an Oral presentation held by H. Bolhuis for the 2003 spring meeting of the Dutch Society for Microbiology; April 15th –16th, 2003 Arnhem, The Netherlands.

Novel Archaeal and Bacterial Divisions from Mediterranean Deep Hypersaline Anoxic Basins.

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Recent survey of the Eastern Mediterranean seafloor revealed the presence of several (brine lakes). These brines are most likely developed by the dissolution of 5- to 8- million year old Messinian evaporites. They are well described geochemically, but little is known about the microflora present and their ecological role in these environments. As part of the EC project “BIOTEchnologies from the DEEP” (BIODEEP) the microflora in the brine and the brine/seawater interface of four different brine lakes (L’Atalante, Bannock, Discovery and Urania) was studied by sequencing of 16s rRNA genes. Clone libraries of bacterial and archaeal 16S rDNA were constructed and 96 clones from the brine/seawater interface were sequenced.

Analysis of the sequence data revealed a relatively high bacterial diversity in the interfaces (~ 30 operational taxonomic units, OTU, >97% sequence homology) and brines (~ 40 OTU’s). In addition, each brine lake had its own specific bacterial community with approximately 50% of the OTU’s that were not found in any of the other brine lakes. Only one sequence was found that was present in all four brines. The archaeal diversity in the brine and brine/seawater interface was much lower (~14 OTU’s) and most sequences could be found in all of the four brines although different sequences dominated the different brines. A phylogenetic survey with closest known relatives revealed sulfate reducing bacteria, sulfur oxidizing bacteria and methanogenic archaea suggesting that these prokaryotes play an important role in these extreme environments, contributing to sulfur speciation as well as methane production. However, the most exciting finding is the discovery of large number of unique and yet unknown bacterial and archaeal sequences that show very low homology (<90% sequence similarity) with known sequences from the GenBank database. This finding opens possibilities for the discovery of novel biotechnological and medical applications the major aim of the BIODEEP programme.