Arsenolipids in sediments from Great Salt Lake

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Arsenic-containing lipids (arsenolipids) are newly discovered natural products of currently unknown function. They have so far been identified only in marine animals and algae. Sediment samples collected from various extreme environments (hot springs, hydrothermal vents and hypersaline lakes) have previously been analysed to determine their lipid profiles. Some of the samples contained high arsenic concentrations, which raised the question of the arsenic being present as arsenolipids. In the current study, the lipids were extracted from the sediments by a modified Bligh and Dyer extraction and analyzed by HPLC/elemental mass spectrometry (inductively coupled plasma mass spectrometry, ICPMS). Of the 27 samples analysed, only those from the high saline region of Great Salt Lake contained appreciable quantities of arsenolipids, mainly arsenic-containing hydrocarbons (example shown below).

The presence of unique non-arsenic containing archaeal lipids like isoprenoidal cardiolipins and archaeols with sulfated sugars is indicative of halophilic microbial populations, which is confirmed by 454 pyrosequencing data. Since the life in these sediments is mainly microbial, we assume that the observed arsenolipids also have a microbial origin.