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Enrichment of extremophilic bacteria from the Atlantis ii brine pool

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The Atlantis II Deep is the most studied and largest brine pool in the Red Sea. It is an active hydrothermal habitat with unique physical conditions. Its unique characteristics (70°C temperature, 26% salinity, pH 5.2) caused it to be a very attractive marine ecosystem for microbiological and metagenomics studies. Sediments of Atlantis II Deep have the highest metal content compared to any known brines' sediments. In this study, we report the first successful enrichment for anaerobic, polyextremophilic bacteria from the Atlantis II Deep sediments using a variety of cultivation approaches combined with phylogenetic analysis. A *Pseudomonas*-like species was chemolithoautotrophically enriched by coupling the oxidation of lactate to the reduction of arsenate under anaerobic conditions. The bacterium demonstrated slow growth under conditions of extreme hypersalinity and high temperature (60°C). The growth of a heterotroph was also demonstrated in two anoxic enrichment cultures amended with sulfide and sulfate independently. The enriched heterotroph was found to belong to uncultured *Cytophaga-Flavobacterium* group, whose members are well-known for their sulfur-oxidation capability. The growth occurred at high temperature (60°C) and high pressure (41 MPa). Marine isolates from this group have the ability to degrade organic matter and biopolymers such as cellulose and chitin. Subsequently, they can have many biotechnological and industrial applications. In conclusion, our preliminary cultivation-based analysis presents potential polyextremophilic bacteria that are able to thrive under several abiotic stresses. These bacteria might contribute to the anaerobic degradation of organic substrates, in addition to reducing the arsenate enriched at the seafloor sediments.

Biography

Nelly Abdelghany Abu Alkheir obtained her BSc in Biotechnology from the Faculty of Biotechnology, Misr University for Science & Technology, Egypt in 2009 with excellent grade. She won a full scholarship to study as exchange student for spring 2008 at University of Eastern Finland. She received training in the field of molecular biology in the A. I. Virtanen Institute for molecular sciences. In 2010, she received a research assistant fellowship (that covers the master study tuition) by the biology department, American University in Cairo. She received a fellowship to conduct her thesis research work in University of California, San Diego.

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