

## **Understanding the biogeochemical roles of uncultivated archaea in marine sediments**

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Marine sediments contain large number and versatile groups of archaeal lineages such as Marine benthic group B (MBG-B), MBG-D, Miscellaneous Crenarchaeota Group (MCG, recently proposed as a novel archaeal phylum named as 'Bathyarchaeota'). As majority of these archaea are still uncultivated in laboratory and have no closely related cultures, it is becoming a big challenge to link the microbial diversity with the physiology, functioning and biogeochemical roles of these microorganisms. Here I report our recent efforts using combined approaches including utilization of new molecular techniques such as single cell separation and sequencing, isotope analysis of single cells, and next generation "omics" approaches (metagenomics, metatranscriptomics, metaproteomics) to understand the ecological roles of these important, yet uncultivated archaea. We propose that many of these uncultivated sedimentary archaea utilize fermentation as the main energy producing strategy, take part in the degradation of recalcitrant organic matter in the marine sediments.