O14.2

Community diversity and geomicrobial role of sulphate reducing bacteria in two tropical coastal lake sediments

Salom Gnana Thanga Vincent, Syama Sunil, Panchami Shaji, Sreelekshmi Sreevalsan, AnandKrishnan Pulickal, Aswathy Devi

University of Kerala, India

Abstract

Sulphate reduction is a key biogeochemical process driven by sulphate reducing bacteria (SRB) composed of diverse taxa of anaerobic microorganisms that use oxidized sulphur compounds as terminal electron acceptors. However, the structural and functional diversity of SRB in tropical coastal environments are largely unknown. Hence this study aims to explore the taxonomic diversity of SRB for the first time and compare the diversity and sulphate reduction activity of two coastal lakes, Ashtamudi and Vembanad, which are designated as Ramsar sites.

Microbial biogeochemistry studies of the two lakes revealed that the lakes are contrasting in terms of their predominant biogeochemical functions, with sulphate reduction in Ashtamudi and methanogenesis in Vembanad lake. To verify the diversity and dominant taxa of SRB, microbiome profiling of SRB was done by New Generation Sequencing (NGS) methods (Illumina sequencing) based on gene amplification of dissimilatory sulphate reductase (dsr) enzyme.

Sulphate reduction potential of Ashtamudi was nearly two fold than that of Vembanad lake. In Ashtamudi, SRB was represented by a diverse population than Vembanad and the marine zone of Vembanad harboured more diversity than freshwater zone. SRB in Ashtamudi was represented by more diverse and less abundant taxa. This is evident from the alpha diversity index, which was high in Ashtamudi (6.55) with 3295 observed species, compared to the freshwater zone (1.825) and marine zone of Vembanad (4.069). The differential diversity of SRB has implications not only on sulphate reduction, but also on methane production during organic matter degradation. As SRB are versatile in their metabolism, their role in biodegradation of pollutants in the sediments are also explored. *Desulfovibrio*, which has a pivotal role in degradation of contaminants was found to be the predominant genus in both lakes; however, the variation in its species between lakes is probably a result of selective predominance rather than endemism.

Keywords

sulphate reduction, structural diversity, functional diversity, organic matter degradation