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Microbial Diversity in the Indian Ocean Sediments: An Insight into the Distribution and Associated Factors

Madhav Ambati & Maushmi S. Kumar

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#### Abstract

Indian Ocean is the third largest oceanic division of the world and shelter to a huge microbial diversity. These microbes play an important role in the metabolism of carbon, sulfur, nitrogen, and phosphorus in the ocean water. They are also major contributors of carbon fixing and sequestration, as much as terrestrial plants to achieve CO<sub>2</sub> emissions reduction. The prokaryotic community in the East Indian Ocean primarily comprises of heterotrophic bacteria like Alphaproteobacteria and Gammaproteobacteria, followed by Firmicutes and Actinobacteria. The Arabian Sea and the Bay of Bengal are typically characterized by presence of vast areas of oxygen minimum zones (OMZs) and have been witnessing a shift in the microbial diversity due to the changing conditions in the ocean water. Several canonical correspondence analyses reveal temperature, salinity, and phosphate levels as crucial environmental factors in propelling the distribution of diazotrophs. The viral consortia are dominated by the Caudovirales, an order of tailed bacteriophages. Due to the rapid change in the environmental factors such as topography, temperature, and sunlight contributing toward climate change, their role in sustaining the chemical composition of the ocean can be drastically affected especially with the evidence of several bacterial and fungal communities responding to latitudinal and temperature change. Therefore, we aim to critically review the status of microbial diversity in Indian Ocean to predict their response toward climate change as they are the sentinels of change in marine life and to understand the dynamics of microbial communities in the various locations of Indian Ocean.

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Data Availability

Not applicable.

Code Availability

Not applicable.

Abbreviations

- **DNA:** Deoxynucleic acid
- **RNA:** Ribonucleic acid
- **ATP:** Adenosine triphosphate
- **REY:** Rare-earth elements and yttrium
- **DO:** Dissolved oxygen
- **PAH:** Poly aromatic hydrocarbons
- *OMZ:* Oxygen minimum zone
- **NAB:** Nitrate assimilating bacteria

- **PMN:** Polymetallic nodules
- ANS: Afanasy Nikitin Sea mount
- CIB: Central Indian Basin
- CIOB: Central Indian Ocean Basin
- SWIR: Southwest Indian Ridge
- **SEM:** Scanning Electron Microscopy
- FTIR: Fourier Transform Infrared
- **EDAX:** Energy Dispersive X-ray analysis
- SWIO: South West Indian Ocean
- **EIO:** Eastern Indian Ocean
- ARG: Antibiotic Resistance Gene
- dsDNA: Double stranded DNA
- **UV:** Ultraviolet

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# Author information

Authors and Affiliations

Shobhaben Pratapbhai Patel School of Pharmacy and Technology Management, SVKM's NMIMS, V.L. Mehta Road, Vile Parle (west), Mumbai, 400056, India Madhav Ambati & Maushmi S. Kumar

Contributions

MA drafted the manuscript; MK is responsible for designing the structure and submitting the final version.

Corresponding author

Correspondence to Maushmi S. Kumar.

# Ethics declarations

Conflict of interest

Author declares that he/she has no conflict of interest.

Ethical Approval

This article does not contain any studies with human participants or vertebrates.

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