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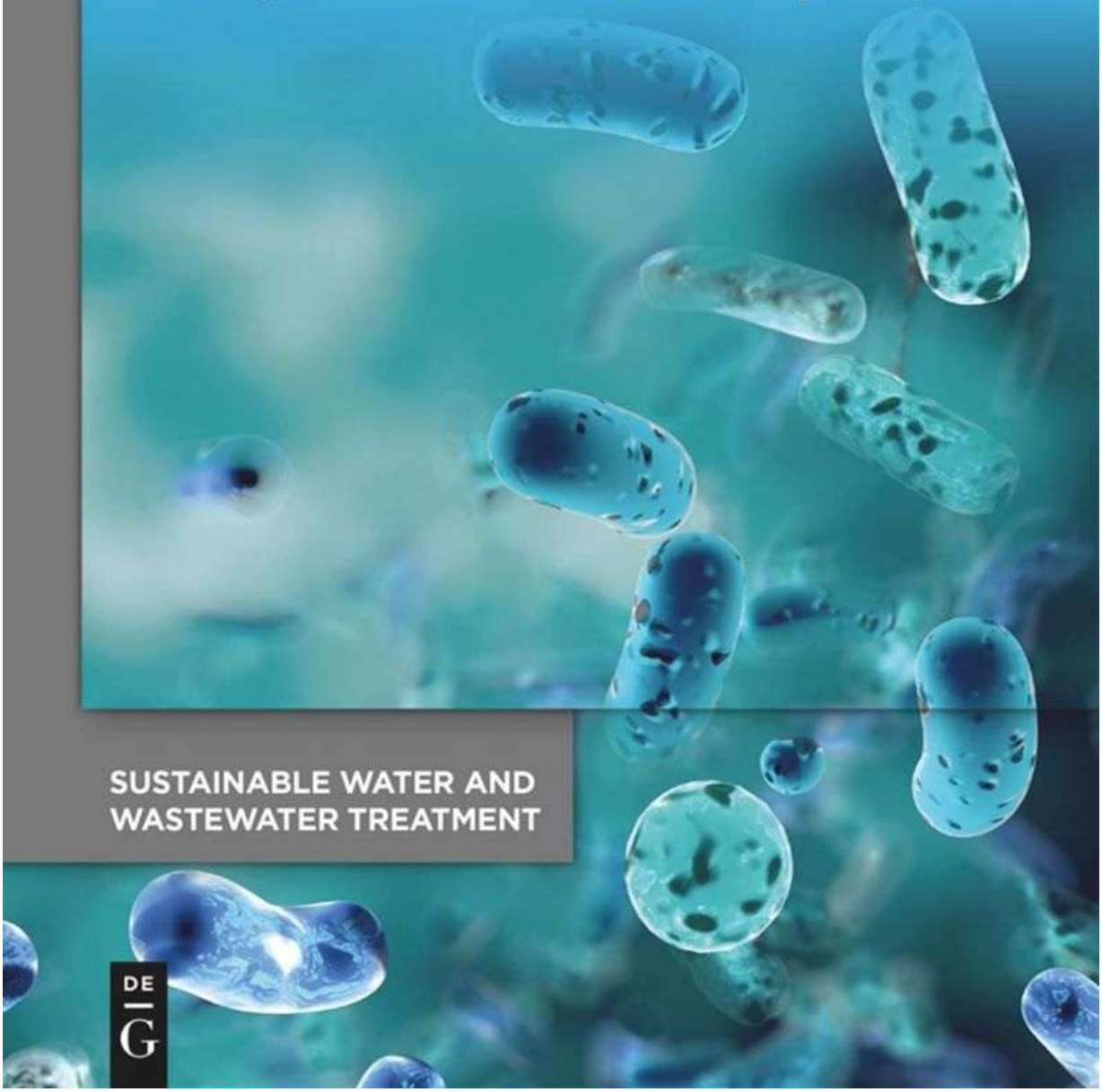
EXTREMOPHILES

A PARADOX OF NATURE WITH BIOTECHNOLOGICAL IMPLICATIONS

Edited by Maulin P. Shah and Satarupa Dey



SUSTAINABLE WATER AND WASTEWATER TREATMENT

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Deep-sea extremophiles and their diversity in the Indian Ocean

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Abstract

The oceans cover a major portion of the planet Earth in terms of area as well as volume. These vast bodies of water sustain diverse life forms and in conjunction are considered as the largest habitat on this planet. The deep oceanic environments covering the profound depths of the Earth's biosphere are a home to a number of dynamic ecosystems comprising unusual and unique forms of life on earth. These are known as extremophiles or polyextremophiles as they are able to withstand one or more extreme parameters of the deep-sea environments, some of which still remain largely unexplored due to the intense extremities at such great depths. However, modern sequencing tools as well as recent scientific and technological advancements in deep-sea research have helped mankind to unveil numerous mysteries of the deep ocean realm. Out of the five oceanic divisions on earth, until recently, limited insights had been available on the deep Indian Ocean from a biological perspective as compared to the other four. This has drawn attention of various researchers across the globe to explore and undertake research investigations in this region. Insights of these deep-sea extremophilic microorganisms thriving at the ocean's bottom may prove to be of far-reaching biotechnological significance, lead to life-altering discoveries, and open new avenues of study and research in future. The Indian Ocean being the third largest ocean is of global importance because of the presence of rich natural resources, unique geomorphological features, diverse marine life, and its role in global biogeochemical cycles. Thus this chapter aims to review and summarize the important findings in terms of the microbial diversity of the deep Indian Ocean realm. The chapter elaborates about the deep-sea extremophiles and introduces us to the characteristics of the deep marine environments followed by considering the various extremities of the deep-sea biosphere and distinctively gives an account of some of the investigations carried out concerning the Bacterial, Archaeal, Fungal, Viral, and Protists diversity in the deep marine environment of the Indian Ocean. The chapter concludes by elucidating the relevance of the deep-sea extremophiles in various fields of study.