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MICROBIOLOGY
A LABORATORY MANUAL

Edited by
Dr. R. Vinodhini | Dr. T. Punitha
Dr. A. S. Saranya | Dr. K. Revathi

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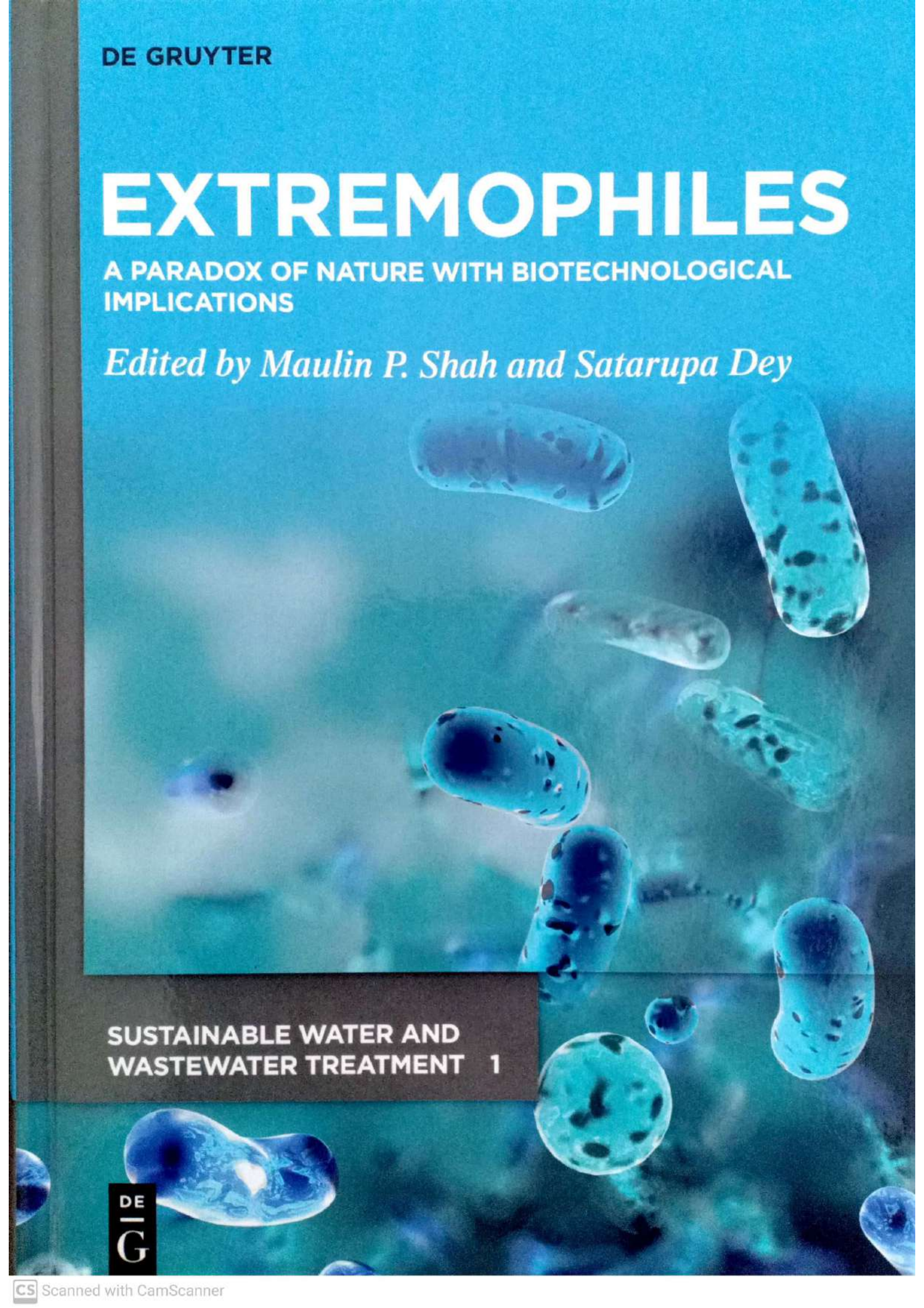
EXTREMOPHILES

A PARADOX OF NATURE WITH BIOTECHNOLOGICAL IMPLICATIONS

Edited by Maulin P. Shah and Satarupa Dey



SUSTAINABLE WATER AND WASTEWATER TREATMENT 1

DE G

Maghimaa Mathanmohun*, Nivedhitha Kabeerdass

Use of extremophiles in nanotechnology

Abstract: Extremophiles are microorganisms that were present since the evolutionary era of the Earth. The habitat of extremophiles has extreme characteristics when accommodated with fauna where other lives cannot survive : pH, salt, aqueous, thermal, cold, and so on. These microorganisms are also capable of synthesizing microparticles but their traditional way of biosynthesis is not advisable as they are hazardous. The advisable way of nanoparticle biosynthesis with the help of these microorganisms which are inorganic can yield, at our expectations, based on the structure, morphology, and genealogy. Extremophiles are more suitable microorganisms for utilization purposes, where the nanoparticle biosynthesis of the following extremophiles are beneficial microbes: thermophiles, acidophiles, halophiles, psychrophiles, anaerobes, bacteria, fungi, yeast, and archaea. These beneficial products with favorable characteristics are ready for application in the following biotechnological process due to their valuable economic importance in agriculture, pharmaceuticals, and food industry. Thermophiles, hyperthermophiles, psychrophiles, eubacteria, and archaea exhibit distinct characteristics. Hence, they are very useful to produce microparticles that resist the toxic nature of metallic ions in petroleum and coal sediments. By binding with metallic cations, the nanoparticles reduce the structure of metallic ions. Halophiles are salt lovers that are present in salt-saturated fauna by degradation of organic pollutants, which not only provides hydrolases but also very helpful in resisting metals to produce metallic microparticles, and these are utilized in pharmaceuticals and in various industries. These acidophiles and alkalophiles possess stability-bearing precursors, yielding not only metal microparticles but also proteins and peptides, and can be utilized for trade values.

1 Introduction

The microparticles and their role in science-related research methodology is a known modern trend. MIcroparticles preparations and utilization achieve the expectational benefits of distinct varieties in technical branches. It possesses light-related visions, catalyst properties, related conventional medicines, artificers access, alluring's,

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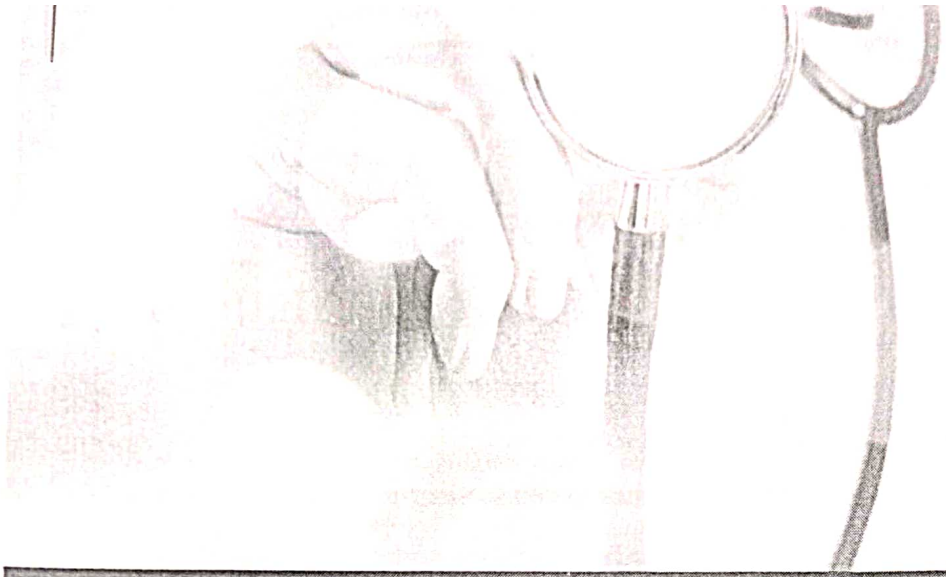

Wastewater Treatment and Research

PHYCOREMEDIATION PROCESSES IN INDUSTRIAL WASTEWATER TREATMENT

Edited by
Maulin P. Shah

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Phycoremediation Processes in Industrial Wastewater Treatment

Increasing population and industrialization are the key pollutant contributors in water bodies. The wastes generated by industries are highly hazardous for humans and the ecosystem and require a comprehensive and effective treatment before being discharged into water bodies. Over the years, many up gradations have been introduced in traditional water treatment methods which were expensive and ineffective especially for removal of toxic pollutants. Phycoremediation has been gaining attention due to its mutual benefit in wastewater treatment and for valuable algae biomass production. Wastewater, especially sewage and industrial effluents, is rich in pathogenic organisms, organic and inorganic compounds and heavy metals that adversely affect human and aquatic life. Microalgae use these inorganic compounds and heavy metals for their growth. In addition, they also reduce pathogenic organisms and release oxygen to be used by bacteria for decomposition of organic compounds in a secondary treatment. In this book, the potential of microalgae in wastewater treatment, their benefits, strategies, and challenges are discussed. The increasing need of finding innovative, low-cost, low-energy, sustainable and eco-friendly solutions for wastewater treatment makes the publication of a book on phycoremediation timely and appropriate.

Features:

1. Deals with the most emerging aspects of algal research with special reference to phycoremediation.
2. Studies in depth diversity, mutations, genomics and metagenomics study
3. An eco-physiology, culturing, microalgae for food and feed, biofuel production, harvesting of microalgae, separation and purification of biochemicals.

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