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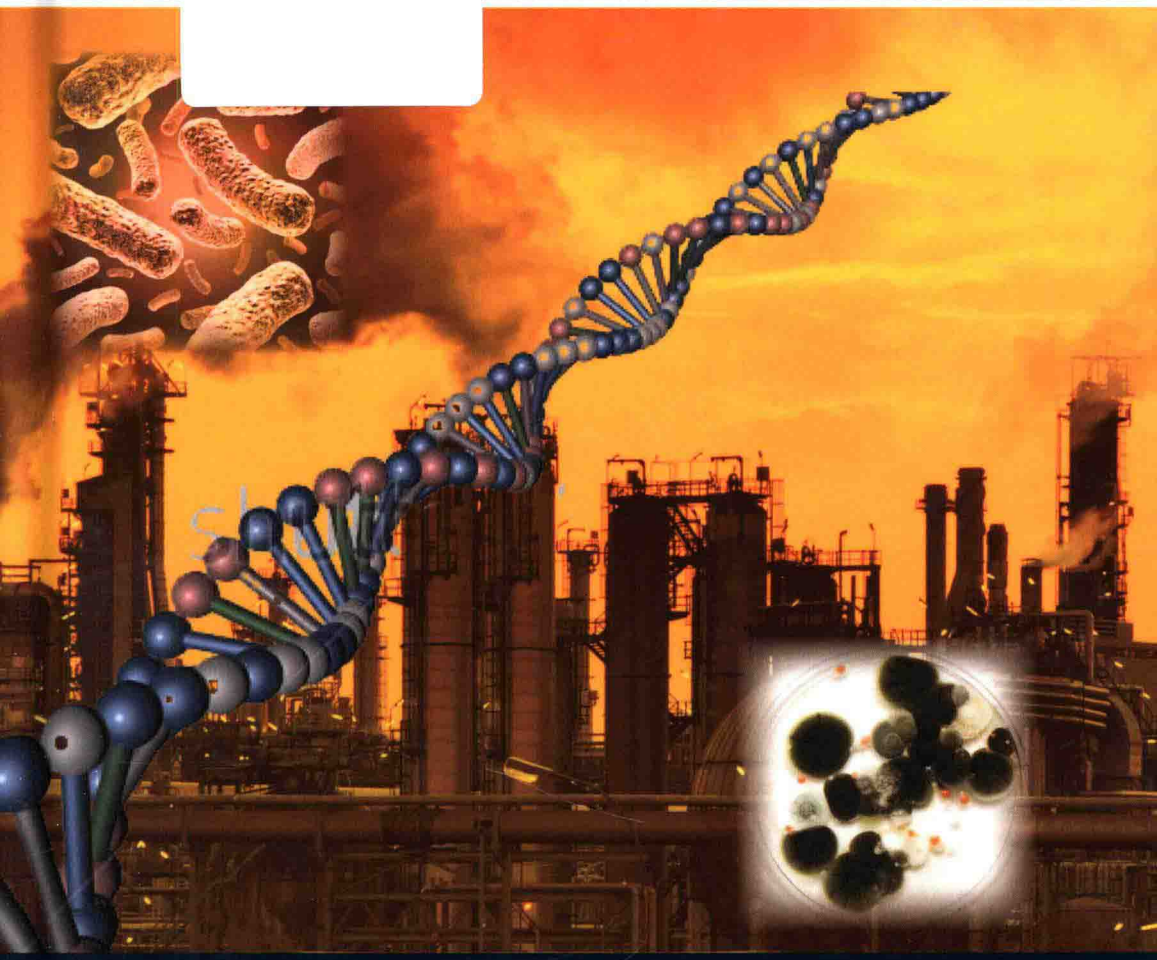

MICROBIAL BIODEGRADATION AND BIOREMEDIATION

Edited by

SURAJIT DAS

Microbial Biodegradation and Bioremediation

Edited by

Surajit Das
Laboratory of Environmental Microbiology and Ecology (LEnME)
Department of Life Science
National Institute of Technology
Rourkela Odisha, India

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Microbial Biodegradation and Bioremediation

Preface

The evolution of environment into its components of atmosphere, hydrosphere, and troposphere took place 600 million years ago. Due to rapid urbanization and emerging anthropogenic activities, the natural biodiversity of our environment is becoming disturbed. The introduction of contaminants into an environment causing disorder, unsteadiness, and distress to the physical and chemical systems, including living organisms, is called pollution. The intrusion of humans and their activities has placed a major pressure on our environment, possibly threatening the dynamics of nature, by producing certain xenobiotics. These compounds have a detrimental effect on the existing flora and fauna, alarming the natural ecosystem throughout our biosphere. Therefore, there is an immediate global demand for diminution of environmental pollution produced by local, national, and global processes. We should have a wide awareness and knowledge of the detrimental effects of these xenobiotic compounds and approaches to their remediation. Advanced techniques for the disposal and treatment of these xenobiotic compounds are the major concern but the recently developed treatment strategies are very costly and lead to production of toxic intermediates which can adversely affect the living organisms.

Over time, microbial remediation processes have been accelerated to produce better, more eco-friendly, safer, and more biodegradable measures for complete dissemination of these toxic xenobiotic compounds. Bioremediation is the process of the usage of living organisms such as plants (phytoremediation) and microbes such as bacteria, algae, and fungi (microbial remediation) and their enzymes to detoxify toxic xenobiotic compounds. Some toxic xenobiotics include synthetic organochlorides, such as plastics and pesticides, and naturally occurring organic chemicals, such as polyaromatic hydrocarbons (PAHs), and some fractions of crude oil and coal. The evolution of new metabolic pathways from natural metabolic cycles has enabled the microorganisms to degrade almost all the different complex and resistant xenobiotics found on Earth. This is an imperative, efficient, green, and economical new alternative to conventional treatment technologies.

The present book, *Microbial Biodegradation and Bioremediation*, comprises chapters dealing with various bioremediation strategies with the help of different groups of microorganisms, along with detailed diagrammatic representations. This book will be useful both for novices and experts in the field of microbial bioremediation. We hope to instill the present status, practicality, and implications of microbial bioremediation to academicians, students, teachers, researchers, environmentalists, agriculturalists, industrialists, and professional engineers, as well as

to other enthusiastic people who are wholeheartedly devoted to conserving nature. I thank all the contributors who have expertise in this field of research for their advanced, timely chapters and their help in making this a successful endeavor.

Dr. Surajit Das
Laboratory of Environmental Microbiology and Ecology (LEnME),
Department of Life Science, National Institute of Technology,
Rourkela, Odisha, India

Biography

Dr. Surajit Das is an Assistant Professor at the Department of Life Science, National Institute of Technology, Rourkela, Odisha, India, where he has been on the faculty since 2009. Earlier he served at Amity Institute of Biotechnology, Amity University Uttar Pradesh, Noida, India as Lecturer. He received his PhD in Marine Biology (Microbiology) from the Centre of Advanced Study in Marine Biology, Annamalai University, Tamil Nadu, India. He is the recipient of the Australian Government's Endeavour Research Award for postdoctoral research on marine microbial technology at the University of Tasmania. This research paved the way for using marine actinobacteria as the biocontrol agent in aquaculture.

He has multiple research interests with the core research program on marine microbiology and is currently conducting research as the group leader of the Laboratory of Environmental Microbiology and Ecology (LEnME) on biofilm-based bioremediation of heavy metals and PAHs by marine bacteria; nanoparticle-based drug delivery and bioremediation; and the metagenomic approach for exploring the diversity of catabolic gene and immunoglobulins in the Indian Major Carps, with the help of research grants from the Ministry of Science and Technology and the Indian Council of Agricultural Research, Government of India.

In recognition of his work, the National Environmental Science Academy, New Delhi presented him with the 2007 Junior Scientist of the Year Award for his research on marine microbial diversity. He is also the recipient of the 2002–2003 Ramasamy Padayatchiar Endowment Merit Award, given by the Government of Tamil Nadu from Annamalai University, Tamil Nadu, India. He is a member of the IUCN Commission on Ecosystem Management (CEM), South Asia and a life member of the Association of Microbiologists of India, the Indian Science Congress Association, the National Academy of Biological Sciences, and the National Environmental Science Academy, New Delhi. He is also a member of the International Association for Ecology.

In addition to his research, Dr. Das is the reviewer of many scientific journals published by reputed publishers. He has written and edited three books, and authored more than 50 research publications in leading national and international journals as well as 11 book chapters and several popular articles on different aspects of microbiology.

List of Contributors

Devin Alvarez Environmental Biotechnology Laboratory, School of the Environment, Florida A&M University, Tallahassee, FL, USA

María Julia Amoroso Planta Piloto de Procesos Industriales y Microbiológicos (PROIMI), CONICET. Av. Belgrano y Pasaje Caseros. 4000. Tucumán, Argentina; Universidad del Norte Santo Tomás de Aquino (UNSTA). 4000. Tucumán, Argentina; Universidad Nacional de Tucumán (UNT). 4000. Tucumán, Argentina

Juan Daniel Aparicio Planta Piloto de Procesos Industriales y Microbiológicos (PROIMI), CONICET. Av. Belgrano y Pasaje Caseros. 4000. Tucumán, Argentina

Bastos A.C. Department of Biology and Centre for Environmental and Marine Studies (CESAM), University of Aveiro, Aveiro, Portugal

Claudia S. Benimeli Centro Científico Tecnológico (CCT). Tucumán, Argentina; Universidad Nacional de Catamarca (UNCA). 4700. Catamarca, Argentina; Universidad del Norte Santo Tomás de Aquino (UNSTA). 4000. Tucumán, Argentina

Beyer A. Friedrich Schiller University, Institute of Microbiology, Jena, Germany

Punyasloke Bhadury Integrative Taxonomy and Microbial Ecology Research Group, Department of Biological Sciences, Indian Institute of Science Education and Research Kolkata, Nadia, West Bengal, India

Chiranjib Bhattacharjee Chemical Engineering Department, Jadavpur University, Kolkata, West Bengal, India

Sutapa Bose Department of Earth Sciences, Indian Institute of Science Education and Research Kolkata, Mohanpur, Nadia, West Bengal, India

Brangsch H. Friedrich Schiller University, Institute of Microbiology, Jena, Germany

Anirban Chakraborty Department of Life Science and Biotechnology, Jadavpur University, Kolkata, India

Jaya Chakraborty Laboratory of Environmental Microbiology and Ecology (LEnME), Department of Life Science, National Institute of Technology, Rourkela, Odisha, India

Sudip Chakraborty Chemical Engineering Department, Jadavpur University, Kolkata, West Bengal, India; Department of Chemical Engineering and Materials, University of Calabria, Cubo-42a,87036 Rende(CS), Rende (CS), Italy

Ashvini Chauhan Environmental Biotechnology Laboratory, School of the Environment, Florida A&M University, Tallahassee, FL, USA

Archana Chuahan The University of Tennessee, The Center for Environmental Biotechnology, The Joint Institute for Biological Sciences, Knoxville, TN

Lowell Collins Environmental Biotechnology Laboratory, School of the Environment, Florida A&M University, Tallahassee, FL, USA

Chanchal K. DasGupta Department of Life Science and Biotechnology, Jadavpur University, Kolkata, India

Surajit Das Laboratory of Environmental Microbiology and Ecology (LEnME), Department of Life Science, National Institute of Technology, Rourkela, Odisha, India

Hirak R. Dash Laboratory of Environmental Microbiology and Ecology (LEnME), Department of Life Science, National Institute of Technology, Rourkela, Odisha, India

Jaysankar De Department of Biotechnology, UNESCO Chair—Life Sciences International Postgraduate Educational Center, Yerevan, Armenia

Kashyap Kumar Dubey Microbial Biotechnology Laboratory, Department of Biotechnology, University Institute of Engineering and Technology, Maharshi Dayanand University, Rohtak, Haryana, India

Nelson Duran Center of Natural and Human Sciences, Universidade Federal do ABC, SP, Brazil; Institute of Chemistry, Biological Chemistry Laboratory, Universidade Estadual de Campinas, Campinas, SP, Brazil

Paul H. Fallgren Advanced Environmental Technologies, LLC, Fort Collins, CO 80525, USA

Fragoeiro S. MSD Animal Health, Walton Manor, Milton Keynes, UK

Supratim Giri Department of Chemistry, National Institute of Technology, Rourkela, Odisha, India

Gouma S. School of Agricultural Technology, Technical Educational Institute of Crete, Stavromenos, Heraklion, Crete

Paramasamy Gunasekaran Thiruvalluvar University, Vellore, India

Neelam Gurung Department of Earth Sciences, Indian Institute of Science Education and Research Kolkata, Mohanpur, Nadia, West Bengal, India

Jahangir Imam Central Rainfed Upland Rice Research Station (CRRI), Hazaribag, Jharkhand, India; Enzyme Technology and Protein Bioinformatics Laboratory, Department of Microbiology, Maharshi Dayanand University, Rohtak, Haryana, India

Avinash P. Ingle Department of Biotechnology, Sant Gadge Baba Amravati University, Amravati, Maharashtra, India

Sathyanarayanan Jayashree Department of Genetics, Centre for Excellence in Genomic Sciences, School of Biological Sciences, Madurai Kamaraj University, Madurai, India

Song Jin Department of Civil and Architectural Engineering, University of Wyoming, Laramie, WY 82071, USA; Advanced Environmental Technologies, LLC, Fort Collins, CO 80525, USA

Rashmi Kataria Department of Forests Biomaterials and Technology, Swedish University of Agricultural Science (SLU), Umea, Sweden

Kothe E. Friedrich Schiller University, Institute of Microbiology, Jena, Germany

Punit Kumar Microbial Biotechnology Laboratory, Department of Biotechnology, University Institute of Engineering and Technology, Maharshi Dayanand University, Rohtak, Haryana, India

Jose Antonio Lopez-Elias Departamento de Investigaciones Científicas y Tecnológicas de la Universidad de Sonora, Hermosillo, Sonora, México

Madhu Priya Department of Environmental Science, Central University of Rajasthan, Bandar Sindri, Ajmeer, India; Department of Earth Sciences, Indian Institute of Science Education and Research Kolkata, Mohanpur, Nadia, West Bengal, India

Magan N. Applied Mycology Group, Cranfield Soil and AgriFood Institute, Cranfield University, Bedford, UK

Neelam Mangwani Laboratory of Environmental Microbiology and Ecology (LEnME), Department of Life Science, National Institute of Technology, Rourkela, Odisha, India

Luis Rafael Martinez-Cordova Departamento de Investigaciones Científicas y Tecnológicas de la Universidad de Sonora, Hermosillo, Sonora, México

Marcel Martinez-Porchas Centro de Investigacion en Alimentacion y Desarrollo, Hermosillo, Sonora, Mexico

Bibhuti Bhusan Mishra Department of Microbiology, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Anindita Mitra Faculty of Arts and Science (FAS), Harvard University, Cambridge, MA 02138, USA

Swati Mohapatra Department of Microbiology, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Koninika Mukherjee Department of Earth Sciences, Indian Institute of Science Education and Research Kolkata, Mohanpur, Nadia, West Bengal, India; KIIT School of Biotechnology, Patia, Bhubaneswar, Odisha, India

Arijit Nath Chemical Engineering Department, Jadavpur University, Kolkata, West Bengal, India

Tonya L. Peeples Department of Chemical and Biochemical Engineering, Seamans Center, The University of Iowa, Iowa City, IA

Nicole Perry Department of Biology, Wittenberg University, Springfield, OH

Marta A. Polti Planta Piloto de Procesos Industriales y Microbiológicos (PROIMI), CONICET. Av. Belgrano y Pasaje Caseros. 4000. Tucumán, Argentina; Universidad Nacional de Tucumán (UNT). 4000. Tucumán, Argentina

Marco Antonio Porchas-Cornejo Centro de Investigaciones Biológicas del Noroeste, Guaymas, Sonora, México

Muthuirulan Pushpanathan Department of Genetics, Centre for Excellence in Genomic Sciences, School of Biological Sciences, Madurai Kamaraj University, Madurai, India

Mahendra Rai Department of Biotechnology, Sant Gadge Baba Amravati University, Amravati, Maharashtra, India; Institute of Chemistry, Biological Chemistry Laboratory, Universidade Estadual de Campinas, Campinas, SP, Brazil

Ritu Raj Laboratory of Environmental Microbiology and Ecology (LEnME), Department of Life Science, National Institute of Technology, Rourkela, Odisha, India

Jeyaprakash Rajendhran Department of Genetics, Centre for Excellence in Genomic Sciences, School of Biological Sciences, Madurai Kamaraj University, Madurai, India

T. Subba Rao Biofouling and Biofilm Processes Section, Water and Steam Chemistry Division, BARC Facilities, Kalpakkam, India

Sujata Ray Department of Earth Sciences, Indian Institute of Science Education and Research, Kolkata, Mohanpur, West Bengal, India

Steven Ripp The University of Tennessee, The Center for Environmental Biotechnology, The Joint Institute for Biological Sciences, Knoxville, TN

Rohit Ruhal Department of Chemistry, Umea University, Sweden

Deviprasad Samantaray Department of Microbiology, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Gary Sayler The University of Tennessee, The Center for Environmental Biotechnology, The Joint Institute for Biological Sciences, Knoxville, TN

Amedea B. Seabra Universidade Federal de São Paulo—Unifesp, Diadema, SP, Brazil

Pratyoosh Shukla Enzyme Technology and Protein Bioinformatics Laboratory, Department of Microbiology, Maharshi Dayanand University, Rohtak, Haryana, India

Sudhir K. Shukla Biofouling and Biofilm Processes Section, Water and Steam Chemistry Division, BARC Facilities, Kalpakkam, India

Puneet Kumar Singh Enzyme Technology and Protein Bioinformatics Laboratory, Department of Microbiology, Maharshi Dayanand University, Rohtak, Haryana, India

Stoiber-Lipp J. Friedrich Schiller University, Institute of Microbiology, Jena, Germany

Suneetha S. Department of Botany, Andhra University, Visakhapatnam, Andhra Pradesh, India

Swapna G. Department of Botany, Andhra University, Visakhapatnam, Andhra Pradesh, India

K. Uma Devi Department of Botany, Andhra University, Visakhapatnam, Andhra Pradesh, India

Weist A. Friedrich Schiller University, Institute of Microbiology, Jena, Germany

Tingting Xu The University of Tennessee, The Center for Environmental Biotechnology, The Joint Institute for Biological Sciences, Knoxville, TN

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