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Trends in Biotechnology of Polyextremophiles

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Trends in Biotechnology of Polyextremophiles

Maulin P. Shah • Satarupa Dey
Editors

Trends in Biotechnology of Polyextremophiles

 Springer

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ISBN 978-3-031-55031-7 ISBN 978-3-031-55032-4 (eBook)
<https://doi.org/10.1007/978-3-031-55032-4>

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*We dedicate this book to our parents, family,
and teachers for giving us the guidance and
motivation to complete this book*

Preface

Polyextremophiles are versatile organisms which can tolerate multiple stress in the surrounding environment. The advent of metagenomics and transcriptomics has provided us with better understanding of the diversity of these microorganisms in nature and provided us a detailed insight into their different metabolic activity. A continuous change in environment, rise in temperature, and melting of polar caps are jeopardizing the existence of these extremophilic microorganisms and leading to loss of their diversity. This loss of diversity may lead to the loss of wide range of commercially important bioactive compounds and metabolites obtained from them. This aspect of impact of rapid environmental changes on their diversity needs more attention. This current book deals with the latest development in the study of the diversity of the extremophiles and impact of environmental changes on them.

This book comprises a total of 19 chapters which address in detail the aspects of polyextremophiles and their mechanism to tolerate multiple stress in environment. Few other aspects such as bio-prospecting and bio-product development, bioremediation using extremophilic microbes are also discussed in brief. The various aspects of polyextremophiles can serve as a valuable source of information for scientists and students in a number of disciplines, including geology, chemistry, microbiology, pharmaceutical industry, environmental, and agricultural sectors. Moreover, their impact and importance in newly developing fields like astrobiology is also discussed.

We are grateful and acknowledge our deepest gratitude to all the contributing authors and the reviewers who supported immensely in shaping this book. We wholeheartedly express our thanks to all the authors for their efforts in writing wonderful chapters for this book. We also express our thanks to all the reviewers who have given their vital input to improve the chapters. We sincerely hope that people will share our pride in this work. We would also like to thank Springer Nature and all the team members for giving us this opportunity to edit this book. We would like to express our gratitude to our mentors, teachers, and students who have always guided and motivated us. We are thankful to them for providing us the assurance

and strength to complete our assignment. We also want to thank our coworkers, family, and friends for their encouragement and support during the preparation of this book.

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Acknowledgment

We are grateful and acknowledge our in-depth gratitude to all the contributors and the reviewers who trusted us and supported immensely in shaping this book. This book would not have been a success without vital contributions from the authors. We wholeheartedly express our thanks to all the authors for their efforts in writing wonderful chapters for this book. I also express my thanks to all the reviewers who have given their vital input to improve the chapters. We hope that they will be as proud of this book as we are. We would also like to thank Springer Nature and all the team members for giving us this opportunity to edit this book. We would like to express our gratitude to our mentors, teachers, and students who have always guided and motivated us. We convey our thanks to them for giving us the confidence and strength to accomplish this task. Also, we would like to thank our colleagues, family, and friends who provided encouragement and support during the work on this book.

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Contents

Overview of the Genes Associated with Polyextremophiles	1
Purbita Sikdar, Mahima Saha, Rounak Saha, and Debanjan Ghosh	
Genetics and Proteomics of Polyextremophiles Existing in High Temperature	33
Komal Imran, Aqsa Majgaonkar, Rameesha Abid, Somya Bhandari, Bushra Khan, Syeda Quratulain Gillani, Shakira Ghazanfar, Minakshi Baruah, Suchhanda Ghosh, Dwaipayan Sinha, Adrija Ray, and Parbany Duary	
Applications of Genome Editing in Extremophiles	63
Saikat Mandal, Koushik Ganguli, and Anjalika Roy	
Extremophiles: How Smart Are the Cells to Cope with the Environment?	77
Riddhi Chakraborty, Sarah Diwan, and Arup Kumar Mitra	
Impact of Climate Change on Polar Polyextremophilic Diversity, with a Focus on Genetics and Proteomics.	103
Manpreet Kaur, Jatin Kumar, Chanika Mandal, Toni Arya Dharma, Deepak K, Anupama T. K., Pallabi Das, and Felix Bast	
Implications of Polyextremophiles in Astrobiology Research.	119
Gaurav Yadav, Sahaj Bharindwal, Anchal Mehrotra, Surati Kumari, Roohi, and Renitta Jobby	
The Biocatalytic Potential of Extremozymes Isolated from Extremophiles	151
Suchismita Nivedita, Subhransu Sekhar Behera, Jagatjeet Nayak, Sreeparna Mondal, and Lopamudra Ray	
Secondary Metabolites from Extremophiles	177
Koustubh Diwakar Mashakhetri, C. S. Aishwarya, Tapanwita Prusty, and Felix Bast	

Salting Up Our Knowledge: The Fascinating Halophiles and Their Bioactive Metabolites with Biomedical Implications.	203
Prathamesh P. Shetgaonkar, A. Bharath Reddy, Tareeka Sonawane, Vinothkannan Ravichandran, and Renitta Jobby	
Applications of Extremophiles in Therapeutics	231
Amruta P. Uppar, Gulamnabi L. Vanti, Naresh Poondla, Veeresh S, Ram S. Kaulgud, and Mahantesh M. Kurjogi	
Extremophilic Algae-Based Wastewater Treatment, Nutrient Recovery, and Animal Feed Production	243
Sevilay Öztürk and Gour Gopal Satpati	
Potentiality of Polyextremophilic Organisms in Bioremediation of Aromatic Hydrocarbons and Persistent Organic Pollutants: A Biotechnological Approach.	267
Adrija Mukherjee, Debraj Chakraborty, Shreyansi Das, Nilasish Pal, and Nirmalendu Das	
Role of Extremophilic Microbes in Removal of Microplastics	301
Orkun Pinar and Susana Rodríguez-Couto	
Indigenous Microbiota of Acid Mine Environment and Their Role in the Bioremediation of Abandoned Mining Sites	345
Shivashis Bikram Banerjee and Satarupa Dey	
Role of Extremophiles in the Removal of Heavy Metal and E-Waste	361
C. S. Aishwarya, Tapanwita Prusty, Koustubh Diwakar Mashakhetri, and Felix Bast	
Exploitation of Potential Extremophiles for Bioremediation of Microplastics: A Biotechnological Approach	377
Rakesh Goswami, Bidyut Bandyopadhyay, and Sanjoy Sadhukhan	
Lignin Valorisation Using Lignolytic Microbes and Enzymes: Challenges and Opportunities	395
Satarupa Dey and Riddhi Basu	
Biotechnology of Extremophiles: Advances and Challenges.	417
Sonia Sethi and Gokulendra Singh Bhatti	
Role of Extremophiles in the Treatment of Industrial Waste, Pharmaceuticals, and Personal Care Products	441
Sanchita Seal, Minakshi Baruah, Aqsa Majgaonkar, Muhammad Altaf, Pratyusha De, Muhammad Umair, Mohamad Sohail, and Dwaipayan Sinha	
Index.	485

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Implications of Polyextremophiles in Astrobiology Research



Gaurav Yadav, Sahaj Bharindwal, Anchal Mehrotra, Surati Kumari, Roohi, and Renitta Jobby

Abstract Astrobiology seeks to expand our knowledge of life by investigating how microorganisms survive and thrive in extreme environments, allowing us to better assess the potential habitability of distant worlds. Recent developments in the study of extremophiles, solar system planetary exploration, and exoplanet discovery and analysis are providing fresh insights into astrobiology and the possible distribution of life on other planets. Extraterrestrial environments frequently feature extreme conditions spanning multiple factors simultaneously. In order to survive in such complex and extreme conditions organisms need to develop adaptations that enable them to withstand a wide range of challenges. Therefore, a critical next step toward understanding the true limits of habitability is the study of polyextremophiles, or microorganisms that can survive under multiple extreme conditions simultaneously. This chapter outlines various extreme environments on Earth and the types of extremophiles found in these conditions. This chapter also

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