

Extremophiles

Microbiology and Biotechnology



Edited by: **Roberto Paul Anitori**

Oregon Health and Science University, Beaverton, Oregon, USA

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The vast majority of extremophiles are microbes, mainly archaea and bacteria but also some eukaryotes. These microbes live under chemical and physical extremes that are usually lethal to cellular molecules, yet they manage to survive and even thrive. Extremophiles have important practical uses. They are a valuable source of industrially important enzymes and recent research has revealed novel mechanisms and biomolecular structures with a broad range of potential applications in biotechnology, biomining and bioremediation. It is likely that biotechnology has only scratched the surface in its search for new organisms of practical use.

This book highlights the current and topical areas of research in this rapidly growing field. Expert authors from around the world provide the latest insights into the mechanisms these fascinating organisms use to survive. The topics covered include the ability of acidophiles to maintain a neutral intracellular pH, the way that psychrophiles 'loosen up' their proteins at low temperatures, and other equally ingenious adaptations and metabolic strategies that extremophiles use to survive and flourish under extreme conditions. The book also covers the established biotechnological uses of extremophiles and the most recent and novel applications including the exploitation of these organisms for enzyme production, their potential use in the generation of sustainable energy and in the oil industry.

Aimed at research scientists, students, microbiologists and biotechnologists this book is essential reading for scientists working with extremophiles and a recommended reference text for anyone interested in the microbiology of these organisms, as well as bioprospecting, biomining, biofuels and extremozymes.

Chapter 1. Extremophiles and Biotechnology: How Far Have We Come?. *Mark Paul Taylor, Lonnie Van Zyl, Marla Tuffin and Don Cowan*

Chapter 2. Ionizing Radiation Resistant Microorganisms. *Kelley R. Gwin and John R. Battista*

Chapter 3. Psychrophiles: Life in the Cold. *Corien Bakermans*

Chapter 4. SM1: a Cold-loving Archaeon with Powerful Nano-grappling Hooks. *Christine Moissl-Eichinger, Ruth Henneberger and Robert Huber*

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Chapter 8. Extreme to the 4th Power! Oil-, High Temperature-, Salt- and Pressure - Tolerant Microorganisms in Oil Reservoirs. What Secrets Can They Reveal?. *Hans Kristian Kotlar*

Chapter 9. Hyperthermophiles: Metabolic Diversity and Biotechnological Applications. *Kazem Kashefi*

Chapter 10. Microbiology of Piezophiles in Deep-sea Environments. *Chiaki Kato*

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