

BOOK REVIEW

Rajakaruna N., Boyd R. S., Harris T. B. (Eds.): PLANT ECOLOGY AND EVOLUTION IN HARSH ENVIRONMENTS. – Nova Science Publishers, New York. Paperback, 2016, 426 p., ISBN 978-1-63484-575-5.

We reviewed here several books connected with the harsh environments in cultural landscapes, mainly through metal-contaminated settings, saline soils of industrial waste products or power station's deposits of ashes - all this in the context of restoration ecology of ecosystems (e. g., Kovář, 2013a, b, c). In numerous cases these special environments stand out as "islands" of unique landscape fragments and principles of the island biogeographical theory can be applied in such cases as well as principles of ecological succession in subsequent biotic communities in relation to biodiversity (Kovář, 2004). What strategies and adaptations do plants use to survive in these habitats? How did they occupy these habitats in the past - under evolution and/or speciation? How can these extremophiles be exploited for phytoremediation within extreme environments? The book demonstrates these questions and many others. It will be a key reference for students and researchers searching for limits of plant life in changing world.

Content of themes is illustrated by the following overview:

Chapter 1. Bedrock and Geochemical Controls on Extremophile Habitats
(Dawn Cardace, D'Arcy R. Meyer-Dombard, Amanda A. Olsen and M. Niki Parenteau)

Chapter 2. The Ecology and Evolution of Mycorrhizal Fungi in Extreme Soils
(Shannon Schechter and Sara Branco)

Chapter 3. Lichens on Metal-Rich Substrates
(Sergio Enrico Favero-Longo, Università di Torino)

Chapter 4. Evolution of Salt Tolerance in Angiosperms: A Phylogenetic Approach
(C. Haris Saslis-Lagoudakis, Camile Moray and Lindell Bromham)

Chapter 5. The Ecology, Assembly and Evolution of Gypsophile Floras
(Michael J. Moore, Juan F. Mota, Norman A. Douglas, Hilda Flores Olvera and Helga Ochoterena)

Chapter 6. Physiological Adaptations of Plants to Serpentine Soil
(Emily R. Palm and Elizabeth Van Volkenburgh)

Chapter 7. Ecology and Evolution of Plants in Arctic and Alpine Environments
(Amy L. Breen, David F. Murray, Martha K. Reynolds, Ina Timling and Donald A. Walker)

Chapter 8. Drivers of Diversity in Evergreen Woody Plant Lineages Experiencing Canopy Fire Regimes in Mediterranean-Type Climate Regions
(Michael C. Vasey and V. Thomas Parker)

Chapter 9. The Evolutionary Ecology and Genetics of Stress Resistance Syndrome (SRS) Traits: Revisiting Chapin, Autumn and Pugnaire (1993)
(Eric J. B. von Wettberg, Jayanti Ray-Mukherjee, Nathan D'Adesky, Damian Nesbeth and Seeta Sistla)

Chapter 10. Ecology and Evolution of Metal-Hyperaccumulating Plants
(Robert S. Boyd)

Chapter 11. Methods and Discoveries in the Pursuit of Understanding the Genetic Basis of Adaptation to Harsh Environments in *Mimulus*
(Jessica P. Selby, Annie L. Jeong, Katherine Toll, Kevin M. Wright and David B. Lowry)

Chapter 12. Bryophytes: Survival in a Dry World through Tolerance and Avoidance
(Dale H. Vitt, Barbara Crandall-Stotler and Andrew Wood)

Chapter 13. Climate Change and the Future of Edaphic Floras
(Barbara Fernandez-Going)

Chapter 14. Conservation and Restoration of Chemically Extreme Edaphic Endemic Flora in the Western US
(Ryan E. O'Dell)

Chapter 15. Phytoremediation and Phytomining: Using Plants to Remediate Contaminated or Mineralized Environments
(Rufus L. Chaney, Roger D. Reeves, Ilya A. Baklanov, Tiziana Centofanti, C. Leigh Broadhurst, Alan J. M. Baker, Antony van der Ent and Richard J. Roseberg,)

Chapter 16. Synthesis and Future Directions: What Have Harsh Environments Taught Us about Ecology, Evolution, Conservation, and Restoration?
(Nishanta Rajakaruna, Robert S. Boyd and Tanner B. Harris)

General subject matter is framed by Preface and Index.

Highly integrative approach prevails in many partial topics and the latest findings compose possibilities to conserve botanical life in extreme terrestrial habitats in all their diversification and assembly. Mechanisms of selectivity and creation of endemism by harsh life conditions is related to the Earth surface mosaic of diverse ecotopes. Thematic trajectory from the habitat position in alpine summits or inland deserts, habitats frequently disturbed by fire or floods to edaphic islands created by unique geologies or anthropogenic contamination is presented through the book. The role of bedrock geochemistry (serpentine outcrops, gypsum soils, metal-rich mine tailings, saline substrates) and soil evolutionary processes in generating extreme habitats is treated in the context of biology, ecology, and evolution of non-vascular and vascular plants, lichens, herbivores and pathogens, mycorrhizal fungi, and other beneficial microbes found in ecological extremes. The threat of climate change and other anthropogenic impacts as well as efforts to restore and protect extreme habitats with the unique organisms are included. Discussion of the uses of plant species found in extreme environments for agriculture and biotechnology is an interesting passage of the book. In spite of non-evenly covered subjects (based mainly on the roadmap into the scientific literature) anyone interested in how the world's terrestrial environments contribute to biological envelope of the Earth will find much to enrich their knowledge.

*Pavel Kovář**

REFERENCES

- Kovář P. (Ed.) (2004). *Natural Recovery of Human-Made Deposits in Landscape* (Biotic Interactions and Ore/Ash-Slag Artificial Ecosystems) - Academia, Prague, 358 p.
- Kovář P. (2013a). D. J. Tongway, J. A. Ludwig: Restoring disturbed landscapes. Putting principles into practice. Island Press, Washington, Covelo, London, 2011, 189 p., ISBN-978-1-59726-580-5. *Journal of Landscape Ecology*, 6(1): 85-86.
- Kovář P. (2013b). D.Egan, E. E. Hjerpe, J. Abrams (Eds.): Human dimensions of ecological restoration. Integrating science, nature, and culture. Island Press, Washington, Covelo, London, 2011, 410 p., ISBN.978-1-59726-689-5. *Journal of Landscape Ecology*, 6(3): 80-91.
- Kovář P. (2013c). W. R. Jordan III, G. M. Lubick: Making nature whole. A history of ecological restoration. Island Press, Washington, Covelo, London, 2011, 256 p., ISBN-13: 978-1-59726-513-3. *Journal of Landscape Ecology*, 6(3): 139-140.

* Charles University in Prague, Faculty of Science, Benátská 2, 128 01 Prague 2, Czech Republic, e-mail: kovar@natur.cuni.cz

