The Ecology of Snow and Ice Environments

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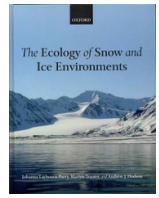

The Ecology of Snow and Ice Environments is an excellent overview of alpine and polar ecosystems. The book gives a framework for environmental scientists to understand the biological functioning of extreme cold environments. For biologists, the book provides an oportunity to gain an overview of the nature of the cryosphere. The cryosphere is the domain of organisms that live in harsh cold conditions, *e.g.* extremophiles. This book is concerned with glaciology, which represents an interdisciplinary approach involving microbiology, geochemistry, glaciology and modelling. The Bristol Glaciology Centre, an institution at which the authors work, is a good example of this approach. It is true that many books take an interest in specific components of cryosphere biology, but the fact remains that there is no single volume that covers a wide range of ice and snow environments. The book fills the gap and represents a multidisciplinary issue.

The book is divided into seven chapters. The first one focuses on the basics of the nature of ice environments and their biology. The reader learns for example that the ice in Antarctica contains 75% of the world's fresh water. The next chapter deals with snow as an environment of autotrophic and heterotrophic organisms. The authors deal with snow algae, bacteria and their biological activities under the snow at low temperature. The third chapter discusses glaciers and ice sheets, among other matters. Special attention is given to debris and cryoconite. Cryoconite holes are often formed by fine, windblown particles cemented together into an aggregate by microbial filaments and their exudates. The reader discovers that after ice shelves the biology of cryoconite is perhaps the most understood component of supraglacial environments. In this part of the book, a great attention is devoted to biology of ice shelf lakes. Composition of cyanobacterial mats and physiological mechanisms of their high resistance to photosynthetically active, and ultraviolet radiation, respectively, is described in the chapter.

The subsequent two chapters deal with the sea and lake ice and subglacial environments. The reader can find information on the rates of primary production and chlorophyll *a* concentrations in sea ice from the Arctic and Antarctic there. Chapter number six is the most interesting in my opinion. It deals with astrobiology. The reader learns about the Viking 1976 mission, which applied life detection tests on Mars. The final conclusion was that there was no life because the results from gas chromatography and mass spectrometry tests of Martian soil did not detect any organic molecules. The last chapter deals with future directions of research in the polar regions covered by snow and ice. The authors underline the importance of further development of ice drilling for

detailed analyses of ice cores and access to subglacial lakes. They also support the idea of further continuation of remote sensing in polar regions since recently emerging technologies and sensor development are very promising for future research. Last but not least, the authors expect rapid involvement of molecular biology techniques into the research of extremophilic organisms inhabiting snow and ice environments.

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