Kranner, I., Beckett, R.P., Varma, A.K. (ed.): **Protocols in Lichenology: Culturing, Biochemistry, Ecophysiology and Use in Biomonitoring.** – Springer-Verlag, Berlin – Heidelberg – New York 2002. ISBN 3-540-41139-9. 580 pp., € 99.95.

Lichens are rather strange symbiotic organisms widely distributed in all terrestrial biomes from tropical rain forests to polar deserts. Their important role in primary succession on bare inorganic substrates, as well as their contribution to carbon and mineral cycling in many types of more complex ecosystems is considered. Nevertheless, many aspects of lichen biology are obscure, because of methodical problems connected with their study. The basic physiological processes in lichens are not much different from those in other organisms, but the dual nature of their body (mycobiont+ photobiont) with many internal interactions, slow growth rate, and presence of wide array of highly specific secondary metabolites make their study rather difficult. The aim of the reviewed book is to facilitate the experimental study of lichens by providing detail protocols of analytical methods well-tested in specialised laboratories.

The methods are described in 32 chapters divided into seven sections. The first section is devoted to protocols for isolating and culturing of lichen parts *in vitro*. Lichen symbionts, as well as the thallus fragments, are usually very difficult to culture, and the description of several proven techniques is indispensable for all interested. Preparative techniques for ultrastructural study of lichens using scanning electron or laser confocal microscopy are presented in two separate chapters.

The section focused on measurements of physiological processes in lichens belongs to the most valuable part of the book. Much attention is devoted to measurements of chlorophyll fluorescence, carbon fixation and respiration (from gas exchange), growth rate, and determination of the parameters of lichen water relations. In addition to these principal physiological processes, analysis of antioxidative activity and ethylene production is also described.

The following section is devoted to the biochemical analysis of lichen compounds, which are partly connected with primary carbon metabolism (chlorophylls, carotenoids), but vast majority of them belongs to the secondary metabolites (chitin, lipids, phenolic substances, *etc.*). The identification of secondary lichen products is in many cases a necessity for the correct determination of lichens. Similarly important are nowadays modern molecular techniques (DNA extraction, PRC amplification, automated sequencing of DNA), which often require substantial modification before they can be applied in lichens.

The last two sections deal with use of lichens for biomonitoring of pollutants in the air (sulphur dioxide, heavy metals, radionuclides), and in biodiversity studies. The most suitable methods of photographic and computer aided documentation in lichen taxonomy, phytogeography, and biodiversity are described in a very practical way. Each chapter of the book is accompanied by a list of important references. An attached glossary of morphological terms and subject index are also helpful for a potential user.

The reviewed book represents an invaluable and unique collection of the most recent methodical approaches to the experimental study of lichens, presented in the form of laboratory protocols. I am convinced that the published protocols will stimulate further research in this field, and, eventually, contribute substantially to the better understanding of this fascinating and important group of terrestrial organisms.

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