PERGAMON

Phytochemistry 61 (2002) 217–218

PHYTOCHEMISTRY

www.elsevier.com/locate/phytochem

Book review

Protocols in Lichenology. Culturing, Biochemistry, Ecophysiology and Use in Biomonitoring. (Springer Lab Manual)

I. Kranner, R.P. Beckett and A.K. Varma (Eds.); Springer Verlag, Berlin, 2002, 580 pp, ISBN 3–540–41139–9, $109.00

Lichenology is a branch of biology dealing with the study of lichens, which are formed through a symbiotic and mutually dependent association between algae and fungi. The discipline covers multiple aspects relating to these unique organisms, including taxonomy, cellular structure, basic metabolism, mycobiont–photobiont relationships, physiology, biosynthesis and chemistry of secondary metabolites, ecology and biodiversity. Well-deserved tribute is paid to the science of lichenology with the publication of this excellent book and it is a welcome contribution to the generally sparse selection of literature in this field. The book is extremely well edited and the chapters are homogenous in setup and often cross-referenced. Literature coverage is included at the end of each chapter, occasionally extending into 2001.

The 32 chapters are arranged into seven sections, the first of which concerns ''Culture and cultivation''. The intricate nature of the symbiosis and sensitive equilibrium between the symbionts have made cultivation of lichens a complex issue. Progress has however been made, this being depicted by the techniques presented for isolation and culture of symbionts, re-synthesis of lichen thalli, culture from thallus fragments and vegetative diaspores and transplantation of thalli. Designed as a laboratory manual, step by step protocols for each procedure follow introductory summaries in these and following chapters of the book. Details of essential materials and equipment are included, as are suggestions for troubleshooting.

The section on ''Ultrastructure'' presents protocols for conventional as well as new preparative techniques for microscopical study of cellular structures and physiology of lichen symbionts. Here, as elsewhere in the book, most of the methods are adaptations of general techniques to meet particular requirements of lichenology. The largest section of the book is devoted to ''Physiology and ecophysiology'', covering methods for studying basic lichen growth and development through parameters such as photosynthesis, respiration, hormonal activity, etc. The relevance of lichens to environmental research is highlighted in this section, e.g. the use of lichens as biomonitors due to their sensitivity towards air pollutants, and the study of lichen response to elevated CO_2 in predicting effects of global environmental changes. The poikilohydric nature of lichens, that is the capacity to survive in a desiccated state and ability to recover metabolic activity after re-hydration, is discussed and methods presented for measuring water content and water potential.

In the section ''Lichen compounds'' secondary metabolites are portrayed in a single chapter in which methods for taxonomic identification through TLC, HPTLC and HPLC analysis of constituents are conveyed. Analyses of enzymes, lipids, chitin, ergosterol, chlorophylls, carotenoids and tocopherols are related to the metabolic role of these compounds and their importance in response to environmental factors. This reviewer felt that the approach towards secondary metabolites was somewhat narrow, owing to the omission of chemical details and preparative techniques, as well as coverage of biological activity from pharmacological, agricultural and ecological viewpoints. These dimensions have clearly been regarded as being outside the scope of the book, but compensation through literature referral would have been advantageous.

The section ''Nucleic acids'' highlights problems particular to nucleic acid extraction from lichens, as well as the use of polymerase chain reaction (PCR) and randomly amplified polymorphic DNA (RAPD)-PCR techniques for studying phylogeny and genetic variation. The section on ''Bioindication and biomonitoring'' features discussions on the advantages and disadvantages of using lichens as bioindicators of environmental conditions as compared to instrumental monitoring and features sampling techniques for biomonitoring pollution from radionuclides, heavy metals and sulphur dioxide. In addition to guidelines for macrophotography and management of lichen herbaria, the last section, ''Biodiversity and information systems'', describes database systems for herbarium management, specimen identification and biodiversity documentation.

This book emphasizes the use of modern techniques in lichenology and is highly recommended to anyone interested in this field of science. On a broader basis, it should also appeal to many biologists and ecologists. For teaching purposes the eloquently presented protocols could provide an excellent basis for laboratory practicals. As mentioned, the book is not chemical in nature, but serves to deepen understanding of the biological and physiological basis of lichen chemistry. Furthermore, heightened awareness of advances in areas such as cultivation and molecular techniques is of obvious consequence in the search for ways to acquire lichen compounds on a large scale for research and economic purposes.

Kristín Ingólfsdóttir
Faculty of Pharmacy
University of Iceland
107 Reykjavik
Iceland
E-mail address: kring@hi.is

PII: S0031-9422(02)00238-8