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Edited by Thomas H. Nash
Frontmatter
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Lichen Biology

Lichens are symbiotic organisms in which fungi and algae and/or cyanobacteria form an intimate biological union. This diverse group is found in almost all terrestrial habitats from the tropics to polar regions. In this second edition, four completely new chapters cover recent developments in the study of these fascinating organisms, including lichen genetics and sexual reproduction, stress physiology and symbiosis, and the carbon economy and environmental role of lichens. The whole text has been fully updated, with chapters covering anatomical, morphological and developmental aspects; the chemistry of the unique secondary metabolites produced by lichens and the contribution of these substances to medicine and the pharmaceutical industry; patterns of lichen photosynthesis and respiration in relation to different environmental conditions; the role of lichens in nitrogen fixation and mineral cycling; geographical patterns exhibited by these widespread symbionts; and the use of lichens as indicators of air pollution. This is a valuable reference for both students and researchers interested in lichenology.

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THOMAS H. NASH III
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Preface to the second edition

Twelve years ago the first edition of *Lichen Biology* was published, and brought a new synthesis to the field of lichenology. In the meantime, rapid advances in many areas, particularly in molecular biology, have expanded our horizons and added depth to our knowledge of areas already under investigation. Consequently, it is appropriate that a second edition has now been consummated.

The original edition had 13 chapters, but this edition has 17 chapters and has added an appendix on lichen culturing, which is becoming prominent in the expanding biotechnology area. New chapters include one on sexual reproduction (Chapter 6), summarizing knowledge not available in 1996. As prominent examples of stress-tolerant organisms, lichens have developed a variety of strategies that allow them to occupy both extremely cold and hot environments; consequently, these investigations were meritorious of a chapter of their own (Chapter 8). In addition, a chapter on growth (Chapter 10), a topic briefly covered in the original photosynthesis chapter, is now expanded to cover much new information and the major advances over the past decade. Although many aspects of the ecology of lichens were covered in the first edition, a number of important areas were omitted. This has been rectified in Chapter 14. Of the remaining chapters, the chapter titles remain the same from the first edition, but all chapters have been revised to a greater or lesser degree. For example, the chapter on the individual (Chapter 13) and air pollution (Chapter 15) bear little resemblance to their original counterparts. Altogether 13 additional people have contributed substantially to this edition.

As with the first edition, this book should be of interest to the specialist, whether amateur or professional lichenologist. Furthermore, the book will provide an essential reference for many other people, such as anyone interested in the phenomenon of symbiosis, ecologists interested in the role of lichens in ecosystems, or a land manager charged with assessing the effects of air pollution on natural systems. We also hope it will stimulate the next generation of students and young scientists to advance our knowledge of these wonderful organisms.