

Book Reviews

Lichens of Antarctica and South Georgia: a guide to their identification and ecology

by D.O. Øvstedal and R.I. Lewis Smith

Studies in Polar Research series. Cambridge University Press, (2001).

ISBN 0521 66241 9. £70.00 (US\$100.00).

The publication of an account of Antarctic lichens is long overdue, particularly in view of the current resurgence of interest in Antarctic science. Lichens are the most abundant and diverse macro photoautotrophs in the region and a comprehensive guide to the species, their identification and biogeography is essential if a fuller understanding of Antarctic terrestrial ecology is to be reached. The only previous work of a comparable scale is C.W. Dodge's *Lichen Flora of the Antarctic Continent and Adjacent Islands*¹ published in 1973. However, Dodge's monograph was widely considered to be seriously flawed and was largely ignored by lichenologists. The authors of the new book have brought together complementary, and probably unique, expertise in Antarctic lichenology to produce a benchmark volume. R.I.L. Smith has worked on the ecology of Antarctic terrestrial plant communities for nearly 40 years and has unrivalled experience of most ice-free regions of the continent. D.O. Øvstedal is a herbarium curator with extensive knowledge of Antarctic lichen taxonomy.

The main body of the book comprises "Systematic and ecological accounts" (chapter 7) of the 126 genera and 427 species of Antarctic (plus South Georgian) lichens of which at least 133 are endemics. Descriptions are given for 13 new species, one new variety and 41 unidentified species. The six chapters preceding the systematic accounts are each comparatively short. The introduction defines the biogeographical zones adopted by the authors; these are broadly similar to those used by R.E. Longton in the earlier volume *Biology of Polar Bryophytes and Lichens*². It is illustrated with clear and simple location maps, gives a brief history of lichenological investigations in the Antarctic and lists locations of the major collections of Antarctic lichens. The second chapter deals with environmental conditions, lichen ecology and biodiversity, and it includes a checklist of species. The third and fourth chapters ("Materials and methods", and "Systematic arrangement") provide explanatory information on the systematic accounts while the sixth chapter comprises "Artificial keys to genera". The keys to foliose and fruticose genera are relatively straightforward and in many instances identification to genus, and subsequently to species, can be made in the field. However, in order to progress through the key to crustose genera it is frequently necessary to

undertake chemical analysis of secondary products by thin layer chromatography or make critical microscopic examination of asci. Thus the initial identification of most species in this book will be a laboratory exercise.

In the systematic accounts genera are arranged alphabetically, as are species within genera, and there are keys to species where two or more occur. Each genus and each species is given a detailed description together with brief ecological and biogeographical notes. Technical terms used in this section and elsewhere are explained in the Glossary (the eighth and final chapter). I noted, however, that several terms in the text for which I sought clarification were not included in the glossary, and usage of the term *umbo* in the text was inconsistent with its glossary definition. Another potential source of confusion is the descriptors used for different biogeographical ranges. "Bipolar" is said to include North America and Europe (Table 8) yet in the systematic accounts several species which occur in both continents are ambiguously described as "Bipolar. N. America" (e.g. *Caloplaca saxicola*) or "Bipolar. Europe" (e.g. *Candelariella vitellina*). The authors decided not to give lichenicolous fungi (i.e. fungi that occur on lichens as saprotrophs or parasymbionts) a comprehensive treatment: where known they are included under the appropriate host while lichenicolous species of certain predominantly lichenized genera are included as lichens.

Thirty six species in the systematic accounts, mostly Antarctic endemics or unidentified species, are illustrated with relatively detailed and sharp black and white photographs. These will prove welcome aids to identification and it is only regrettable that there are not more. There are also a small number of line drawings illustrating anatomical details. In addition there is a centrally bound section of 104 colour plates. Some show the habit of individual species but the majority illustrate lichen habitats and communities. These colourful photographs are likely to immediately catch the attention of anyone casually browsing through the book. Sadly, the quality of reproduction of most of these pictures is poor, details of lichen morphology often being obliterated in a smudge of colour. In recent years lichenologists have become accustomed to an exceptionally high standard of colour image reproduction in publications and I consider that the publishers have let down both authors and customers in this important aspect of the book.

In other respects *Lichens of Antarctica and South Georgia* is produced to the high standard that we have come to expect of the *Studies in Polar Research* series. It is clearly written and typographical errors are infrequent. Despite the minor complaints above there is no question that the book is a major contribution both to lichenology and to Antarctic science. Because of the international complexion of Antarctic research, collections of Antarctic lichens are inevitably widely dispersed

and the logistics of accessing these resources must have presented a significant challenge. Few lichenologists have the privilege of working in Antarctica but most will want to own this volume as a taxonomic and biogeographical reference work. Many with interests in other aspects of polar terrestrial ecology will wish to see it in their institution's library.

P. CRITTENDEN

1. DODGE, C.W. 1973. *Lichen flora of the Antarctic Continent and adjacent islands*. Canaan, NH: Phoenix Publishing, 399 pp.
2. LONGTON, R.E. 1988. *The biology of polar bryophytes and lichens*. Cambridge: Cambridge University Press, 391 pp.

Antarctic ecosystems: models for wider ecological understanding

Edited by *W. Davison, C. Howard-Williams & P. Broady*
Canterbury University, New Zealand (2000)
ISBN 0473 06877 X. NZ\$95. 332 pages.

This volume is essentially the 'book of a symposium' – the 7th Biological Symposium held by the Scientific Committee on Antarctic Research (SCAR) at Christchurch New Zealand in 1998. There are 45 contributions, provided by around 120 contributors. The book is A4 format, well bound and with numerous illustrations. Generally the standard of physical presentation is high, though there are a few cases where subscripts or superscripts in figures are so small that they are virtually illegible. The volume title is something of a misnomer: many of the contributions are physiological or molecular in nature rather than ecological – but reflect the broad remit of the symposium itself.

The book opens with a perceptive and challenging review article by Chown, Gaston and Gremmen ('Including the Antarctic: Insights for Ecologists'), which, *inter alia*, justifies expensive Antarctic ecological research very effectively. The review presents four case histories, the first concerned with hemispherical asymmetry of species richness ('The South is Richer than the North Thought'). The second considers climatic variability and range size, the third sub-Antarctic biogeography, while the last discusses invasive species and global climate change. All are thought-provoking and valuable reading for anyone researching in the relevant areas; they are also useful sources of material for advanced undergraduate teaching.

The rest of the volume is divided into five sections, each introduced by distinguished Antarctic researchers. Section 1, 'Processes at the organism level' is introduced by J. Laybourn-

Parry. Made up of 13 contributions, it is an eclectic mixture of papers on seals, fish, mosses and lagoon nitrogen dynamics. Laybourn-Parry's own group provides an interesting contribution on mixotrophy as a survival strategy in Antarctic lake protists.

Section 2, 'Adaptive Evolution', introduced by W. Davison, is a rather more coherent collection of 13 papers, most with an evolutionary and adaptive focus. Several were concerned with molecular evolution, but one that particularly caught my interest was a contribution by Amler *et al.* This is a re-evaluation of latitudinal hypotheses that predict a low incidence of chemical defence in sessile and sedentary benthic animals at high latitude. The authors show that chemical defences are actually common in Antarctic benthic animals – but are mainly aimed at starfish predators rather than fish (the more usual target at low latitudes). Once again, detailed work is demonstrating that preconceptions about the Antarctic are often wrong!

Section 3. 'Large Scale Patterns & Processes' has an introduction by A.H.L. Huiskes and A.C. Clarke that includes a discussion of the difficulties of sustaining effective large scale and long duration study in a climate of reduced funding duration. It is in this section that the book title is most closely addressed, with a number of impressive contributions, notably by V.H. Marin ('Large-scale Patterns and Processes in Marine Ecosystems: Hypotheses and Methods').

Section 4. 'Long Term Change', introduced by H. Marchant and R.I. Lewis Smith, is made up of seven contributions, most concerned with the effects of climate change and increased U-VB exposure due to the annual development of the 'ozone hole'. P. Convey's review ('Environmental Change and Antarctic Terrestrial Life Histories: Fact and Prediction') is particularly valuable.

Section 5 'Human Impact' has a particularly compelling introduction by W. Davison and is followed by an important review of Antarctic conservation and considerations of environmental impact by M.J. Riddle. The balance of this section is devoted mainly to papers describing environmental impacts and their measurement. A particularly interesting one is that by Summerson & Riddle 'Assessing wilderness and aesthetic values in Antarctica'.

Overall, the book is to be dipped into, rather than to be read from cover to cover. While I found many of the contributions comprehensive and stimulating, others are short and unsatisfying. However, even these have useful reference lists. Who are the likely readers of this book? Primarily they will be professional biological researchers who are particularly interested in the Antarctic. The main market for the volume will undoubtedly be amongst the symposium participants, their co-workers and the libraries of their institutions.

JOHN DAVENPORT