

lays emphasis on the prerequisite links between entomology and palaeontology. He writes with freshness and a sense of wonder. Perhaps this stems from a relatively recent introduction to entomology, or maybe it is an example of that endearing, slightly naive, enthusiasm so often characteristic of American scientists. Either way, it makes for a readable style that compares well with the dull, scientific writing now all too fashionable. Science should surely be human enough to show wonder, for it is wonder that ought to be its driving force.

For the rest, the book is well-researched and well-referenced, with good photographs and excellent drawings. Other workers are given their proper share of credit, a particularly pleasing feature of a pleasing publication. (John Maunder, Medical Entomology Centre, University of Cambridge, Cambridge Road, Fulbourn, Cambridge CB1 5EL.)

THE BIOLOGY OF THE SOUTHERN OCEAN.

George A. Knox. 1994. Cambridge: Cambridge University Press. xiv + 444 p, illustrated, hard cover. ISBN 0-521-32211-1. £85.00.

This large book is one of the latest products in the Cambridge University Press 'Studies in Polar Research' series. George Knox has set out to 'synthesise the available information into a coherent account on one of the most fascinating systems on the globe,' aiming the book at advanced undergraduate or graduate level and at professionals in Antarctic marine research and management. The book contains a considerable amount of information, and falls roughly into two parts. Following an introductory chapter on the Southern Ocean, including its geophysical history, the author takes a fairly conventional promenade through the pelagic ecosystem. This starts with microplankton, including ice-biota, then climbs the trophic structure, visiting zooplankton, nekton, and, finally, arriving at birds, seals, and whales. Each of the 10 chapters provides a general introduction, then goes on to describe species composition and distribution before looking at features of biology and ecology of the different groups. The second part of the book starts with an examination of benthic and ice-associated communities, and the remainder focuses on dynamic aspects, including both classical ecosystem process studies and the more applied aspects of marine living resource exploitation. There is an epilogue that offers comments on recent progress in ecological research in the Southern Ocean and raises some important contemporary issues. This is followed by a single-page appendix on approaches to ecological modelling, a 48-page bibliography, and an index.

In their description of this book in a recent catalogue, Cambridge University Press stated that marine biological studies in the Southern Ocean started with the voyages of discovery of the eighteenth century. Against this background, they noted that there has not yet been a 'comprehensive single-author synthesis of the current state of knowledge.' However, there are several recent books

dealing with either individual components of the Southern Ocean ecosystem or with data from specific expeditions or campaigns (for example BIOMASS and EPOS), which offer access to relevant information within single volumes. Clearly, a single synthesis like this book provides a convenient and relatively cheap reference, but how does the book, and thus the reader, benefit from a compilation by a single author?

On the 'plus' side, the book is readable and has a consistency of both format and writing style that would not be possible in a multi-author volume. Knox writes in a clear manner that makes it possible either to sit down and read the book cover-to-cover (sandwiches and thermos needed here), or to dip into it as a reference work. The book has a 'plot,' and its structure works towards the epilogue, which underlines the changes in perception of the Southern Ocean ecosystem, which have arisen as the result of research during the last 15–20 years. However, there are also some drawbacks in a single-author book such as this. The most worrying is the inescapable fact that no one can be expected to be abreast of modern developments across such a wide subject range. The author of such a book has to rely on the interpretation of data by other people, and, with the best will in the world, it is impossible to avoid errors. Examination of the bibliography is revealing. Knox is right to excuse himself for not covering all of the literature. Every expert would expect to differ in their choice of the seminal papers in their specialist area. However, I perceived some inclusions and omissions that I do not think can be put down solely to my personal preferences and idiosyncrasies. To take an example within my own subject area, I would have expected to see a number of recent (1991–1992) papers on critical depth and its control of phytoplankton growth, alongside Sverdrup's classical work of 1953. There are also some strange misspellings and other errors, often systematic, which suggest either that editing has been less rigorous than it should have been or that the author is working in unfamiliar territory. P.M. Glibert must be one of the most mis-cited authors in biological oceanography (as P.M. Gilbert in this book and countless other publications), but how did J. McN. Sieburth metamorphose into J. McN. Siebruth in each of six citations? There are also factual errors in the text. For instance, if phytoplankton are phosphate-limited at concentrations less than 0.6 g-at l^{-1} (page 25), then they face severe problems because typical concentrations in the Southern Ocean are $0.5\text{--}1.5 \mu\text{g-at l}^{-1}$, about a million times lower. On page 186, it is stated that diving petrels feed in the top few metres — published data show that these birds dive to at least 20 m and may reach more than 40 m. These are isolated mistakes, but do nothing to instil confidence in the reader when he needs to move outside his specialist field.

Similarly, there are some surprising omissions in the subject matter. It is odd that the data from recent applications of remote-sensing techniques receive only scant mention. Thus there is almost no use of synoptic imagery

of sea ice, sea-surface temperature, and chlorophyll based on satellite data, and information on foraging ranges of mammals and birds ignores the exciting information that has been collected using the Argos tracking system. Similarly, there are very few data from the deployment of self-contained instrumentation for monitoring activity, foraging behaviour, and growth rates in a range of predators. Chapters 16 and 17, on marine resource exploitation, examine many of the aspects of ecosystem impacts, including the changes resulting from whaling at the beginning of this century. However, they fail to mention (so far as I could ascertain) any of the incidental effects of the present fishery, such as the impact on vulnerable species as by-catches of targeted fisheries, the effects of pollution and debris, and the significant mortality of some seabird populations as a consequence of long-line fishing. Why does the increase in ultra-violet radiation, potentially one of the most important environmental impacts in the Antarctic marine ecosystem, receive no attention except in the epilogue? No other environmental impacts, including potential climatic change, are discussed.

The book as a whole is attractively presented in a large-page format with clear type. There are relatively few tables, and most are easy to read. However, the figures often do not meet the standards of the remainder of the book. The book is copiously illustrated, but nearly all figures are derived from previously published material. It would be unrealistic to expect a consistency of style. However, the reproduction of previously screened figures has provided a complete catalogue of interference phenomena. Maps of Antarctica appear in every possible orientation. Several figures have been re-drawn, but in many cases this is simply as direct copies, and quality has suffered in some. I consider the index to be barely adequate for a book of this sort, which should function as an easily accessible reference source. There are 13 pages in the index, but the entries are dominated by species and geographic references. Although the provision of a comprehensive set of sub-headings in chapters makes it easy to find major topics, I feel that it would have been helpful to bring some more key words into the index to allow cross-referencing between chapters, and possibly separate indexes for species and sites.

It would be unfair to end this review on a low note. George Knox has produced a magnum opus that draws together a vast amount of useful data in a single, easily read volume, and offers interesting and informed comment. However, it needs to be used with caution, and the serious researcher could not rely on it as a short cut through the current literature on Antarctic marine biology. (Julian Priddle, British Antarctic Survey, High Cross, Madingley Road, Cambridge CB3 0ET.)

FARTHEST NORTH: THE QUEST FOR THE NORTH POLE. Clive Holland (Editor). 1994. London: Robinson Publishing. viii + 305 p, illustrated, hard cover. ISBN 1-85487-282-6. £16.99.

All readers of *Polar Record* will be aware of Clive Hol-

land's important contributions to Arctic history and, in particular, of his monumental encyclopaedia, recently published, entitled *Arctic exploration and development c. 500 BC to 1915*. This is an essential reference book for those seriously interested in the subject. Indeed, this reviewer's copy is already showing signs of overuse!

It is very fitting that, almost contemporaneously with the encyclopaedia, the present book has appeared. This aims to be a popular account, told largely by the participants themselves, of different ventures seeking the North Pole from the sixteenth century to the present. The main title is, of course, the same as that of Nansen's account of the *Fram* expedition, 1893–1896, and on the dust cover there is a different subtitle to that given in the body of the book: 'A history of North Polar exploration in eye-witness accounts.' From the fact that Holland is described as 'Editor,' one might expect that the actual prose written by him would constitute a relatively modest part of the whole. Yet this is not the case. To take one chapter, 'The German and Austrian expeditions: 1868–74,' one finds at the start an account of the dispute between August Petermann and Sherard Osborn relating to the question of the open polar sea and of the most appropriate route to the Pole. This includes a short quotation from Petermann's famous letter to the Royal Geographical Society but otherwise it is pure Holland; and very good it is. The second part of the chapter presents lengthy extracts from Payer's account of his sledge journey to explore the eastern part of Zemlya Frantsa-Iosifa (Franz Josef Land). The chapter concludes with a summing up by Holland of the Weyprecht–Payer expedition and a short account of the later years of Petermann. There is also a brief infill on two relatively little known expeditions by Adolf Erik Nordenskiöld, in which he attempted to approach the Pole, but with very little success.

Holland remarks in his introduction that 'the explorers tell their stories wonderfully well.' From the evidence he presents, this is indeed true, and the integration of original text with comment is an effective method of imparting information on the different expeditions. All the major efforts are covered and there are brief notes on some of the minor ones. Important sections are devoted to the Cook/Peary controversy, with lengthy extracts from the writings of each. Holland comments on the fiction-like prose of the former, which is certainly easier and more congenial reading than that of the latter. Following this episode, emphasis switches to aviation, and Holland covers the work of Amundsen, Byrd, Ellsworth, and Nobile, using that medium of exploration. The *Italia* disaster concludes the classical period of Arctic exploration, and Holland's account of it, with extracts from Nobile, is particularly good. Subsequent chapters are 'From new technology to new adventure, 1931–85' and 'Full circle, 1977–93.' This latter refers to the rise of icebreakers and their recent use in tourism.

The book has deficiencies, although, no doubt, they were occasioned by the need to keep the price down in