

### Argentine relief expedition

So it goes on: there are all the major, classical voyages of exploration and all the minor ones, with and all the support and relief ships involved; so much we would expect for our money. But that is not the half of it. There are all the sealing voyages of the 18th and 19th centuries and the whaling voyages from 1904 onward. There are the annual visits to castaway depots on the southern islands of New Zealand and Australia, the voyages of the Discovery Investigations ships in the 1920s and '30s, British and German naval operations in World War II, the station-relieving voyages of all the modern expeditions, individual oceanographic cruises and, most recently, the tourist ship cruises. Who discovered Campbell Island? How far south did James Weddell penetrate, and what were the names of his ships? What took the Earl of Crawford to Tristan da Cunha in 1906? Who were the first women to visit Antarctica? When did the Australians start operations on Heard Island? When did the French fish-cannery start on Ile St. Paul, and when did it end? How many tourist ships have visited Antarctica since 1949? I do not know, but I think I could turn up answers to any these questions in about 10 minutes, with the help of this book.

I have left no room to enlarge on the 105-page index, the bibliography, the line-maps, the historic illustrations, the fifty-odd pages of introductory matter including information on SCAR, the Antarctic Treaty System, statistical information on ships and stations, the southern islands and... This is a good, solid reference book, strongly recommended for libraries, institutes, and as a retirement present for polar buffs from all disciplines. (Bernard Stonehouse, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER UK.)

### SOUTHERN OCEAN RESOURCES

ANTARCTIC OCEAN AND RESOURCES VARIABILITY. Sahrhage, D. (editor). Berlin, Springer-Verlag. 304 p, illustrated, hard cover. ISBN 3-540-19294-8. DM 198.

Published late in 1988, sponsored by IOC and CCAMLR and supported by SCAR and SCOR, this volume is the report of a seminar held in Paris in June 1987. The theme was variability in the circulation of the Southern Ocean and its consequences for the ocean biota. This volume embodies 25 research papers plus the editor's summary and conclusions.

The papers are grouped in four sections: Meso/large-scale variability in the environment; Meso/large scale variability in the biota (related to the environment; krill variability in relation to the environment, and krill variability detected from predator studies. The first section includes discussions of variations in atmospheric circulation (Van Loon, Shea, Kaufeld) and ocean circulation (Gordon, Sievers, Nowlin, Stein, Nagata and others). The remaining sections include paper on variations in phytoplankton production in the open ocean (El-Sayed) and in such special areas as the marginal ice zone (Smith and

others) and pack ice (Ainley and others), and many on variations in krill population, estimated and measured in different ways.

Sympathies go out to the editor of such a volume, faced with so massive and heterogeneous a bunch of papers. Sahrhage's summing-up can only draw attention to the large range of variability in the Southern Ocean — seasonal, annual, local, regional, long-term and short-term — to the mass of data being collected, and the need to relate data more precisely to the needs of organisms. Climatic and oceanographic variations are large; so too are variations in biomass of krill; over most of the ocean these occur for reasons that we do not understand, though intensive work in the southwest Atlantic sector and around Antarctic Peninsula is offering glimmers of light. Lack of reliable methods of assessing krill stocks makes much of the modelling uncertain. Biological methods of monitoring, for example noting the performance of established krill predators, offer some hopes of accuracy, though results are puzzling and key elements of understanding seem still to be missing.

The problems these papers present are familiar to all ecologists the world over; what is the norm for the ecosystem we are trying to model, what the normal range of variation, and how reliable are our sampling methods? Working on titmice in nest boxes in an Oxfordshire woodland, David Lack concluded after more than a quarter of a century that he had not yet encountered a 'normal' year. What hope have ecologists to establish norms among widely-varying resource populations in a widely-varying Southern Ocean? By the evidence of this volume, the problem will keep many good folk out of mischief for a very long time. It is a worthy collection, full of good concepts both familiar and new, and probably representing fairly how Southern Ocean ecologists feel at present. (Bernard Stonehouse, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER UK.)

### PERIGLACIAL MORPHOLOGY

ADVANCES IN PERIGLACIAL MORPHOLOGY. M. J. Clark (editor). 1988. Chichester, John Wiley. 481 p, illustrated, hard cover.. ISBN 0-471-90981-5. £70.00.

This international collection of papers by 'periglacial' specialists is informative and authoritative. Editorially the contributions are well-presented and easily read. In his introduction M. J. Clark seems unduly concerned with the inevitable limitations of such a compendium — the uneven coverage of the subject, a degree of overlap and, indeed, some contradiction. But these characteristics follow from bringing specialists together and should be seen positively, in fact as the essence of an account of 'advances' in research. The book will be of most value to those keeping abreast of the subject; in any case, the price of £70.00 militates against the book as a general or classroom text.

In Part 1 J-P. Lautridou gives a sound precise account of experiments on cryogenic weathering. Priesnitz writing