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Book reviews

Antarctic Science: Global Concerns

Edited by *Gotthilf Hempel*
Springer Verlag, Berlin (1994).
287 pages. £17.00. ISBN 3 540 57559 6

This slim, well bound, soft covered volume surprised me. There is a deceptively comprehensive wealth of information contained between the covers which will be of interest to almost every polar researcher and to the science world in general. As indicated by the title, the emphasis in the book is on the global significance of the international work currently being carried out in Antarctica. Although many of the papers in the book stem from the SCAR conference of the same name in 1991, the references in the papers run through to 1993, providing an excellent update on topics ranging from the atmosphere, the ice sheets, the sea-ice - ocean interface, through the ocean water masses to the sea bed. The short preface by R.M. Laws and the Introduction by G Hempel provide the background to SCAR and the setting for international science that makes Antarctica unique as a global research laboratory.

There are 18 chapters in the book, all well illustrated (including many coloured figures and maps) and referenced. The first two by W N Bonner and D J Drewry are concerned with environmental protection and conflicts of use. Drewry makes the point that as the Antarctic Treaty becomes more complex (an example might be the 1991 Madrid Protocol), science will be increasingly marginalised. An excellent overview by M J Rycroft on "Antarctica-where space meets Planet earth" provides a physical setting for the continent and the processes which affect it. Several chapters have strong links between Antarctic and Arctic research, particularly in the fields of sea-ice structure and global change. H Oeschger's synthesis of polar ice sheets is an example of several well written chapters of wide interest. As the book progresses from ice through to the oceans, the intensity and complexity of the international research effort in Antarctica becomes increasingly evident. The number of acronyms reflecting international programmes is certainly thought provoking!

The difficulties of detecting real change over a huge system with high temporal variability are well presented in H. Zwally's chapter "Detection of Change in Antarctica". The major changes in our understanding of krill resulting from research over the last decade are well reviewed, together with chapters on ocean physics and geology and evolutionary history. The final three chapters on the Antarctic marine ecosystem and ocean – atmosphere interactions speculate on the future. Increasingly complex international programmes (more acronyms!) particularly under the auspices of the IGBP will have a polar, and especially Antarctic focus. This heralds the process which will drive Antarctic science. I warmly recommend this wide-ranging book to polar researchers who would like to broaden their knowledge. Do not be deceived by the size of the book when you get it.

CLIVE HOWARD-WILLIAMS

History and atlas of the fishes of the Antarctic Ocean

Robert Gordon Miller
Foresta Institute for Ocean and Mountain Studies, Carson City, Nevada (1993).
792 pages, £95.00. ISBN 0 9634436 0 7.

Until recently there were no widely available authoritative books devoted to the unique and highly endemic Antarctic fish fauna. This need was recognised and now there are six useful review publications. *Fishes of the Southern Ocean* (Gon & Heestra 1990) and the *FAO species identification sheets for fisheries purposes* (Fischer & Hureau 1985) have become field-guides to Antarctic fish. *Antarctic fish and fisheries* (Kock 1992) describes the extensive but little publicised commercial fisheries of the region while *Antarctic fish biology* (Eastman 1993) is an account of present knowledge about the adaptations and evolution of Antarctic fish. *Biology of Antarctic fish* edited by di Prisco, Maresca & Tota (1991) draws together much of the information about the physiology and biochemistry of the fish fauna. Richard Miller's recently published book contributes something to all of these topics but complements them rather than duplicates the themes and therefore deserves a wide readership.

The book reflects Richard Miller's life-long interest in Antarctic fish and conservation issues; from his early fieldwork days trawling in the Ross Sea during the 1950's to his enthusiastic work for the Foresta Institute in the USA. The volume is divided into two main sections. The first is devoted to general topics; a description of the Antarctic Ocean, the evolution of the Antarctic ichthyofauna, a history of Antarctic ichthyology, the development and demise of Antarctic fisheries, and then finally, Antarctic conservation politics. This section is very readable and extensively illustrated. Any reader will quickly gain an overview of the Antarctic marine ecosystem and the role that fish have played in this remote part of the world as well as be entertained by exposure to Richard Miller's 'fire-side' style of writing.

The second and main section comprises a descriptive account of the families (58), genera (139) and species (297) of the fish known to occur in the Southern Ocean. Helpfully, the second section starts with a short "how to use this book" guide and diagrams of the characters used to describe Antarctic fish. A fully classification is given to families, genera and endemic species of Antarctic fish while summary descriptions are given for species of a further 28 families whose distributions extend into the Southern Ocean.

Identification keys are given where necessary. Descriptions begin with whole animal illustrations for each species, after which there are paragraphs devoted to: distinctive recognition features, a full description, size range, geographical distribution, depth range, remarks, origin of the species name, local occurrence and finally, the first published illustration. A synonymy to the Notothenioidei, comprehensive index and bibliography (to 1990) complete the second section.

The Antarctic fish fauna is under active revision using both traditional systematic methods and new molecular techniques to resolve the phylogeny. This is recognized here by the inclusion of a short contribution by Philip Hastings on the use of molecular methods to deduce the affinities of Antarctic fish.

This is well produced and solidly bound volume. The A4 landscape format lends itself to presentation of the excellent illustrations by Josette Gourley and the authoritative narrative of Richard Miller. Purists may be irritated by the occasional inconsistency, labelling error, miss-spelling or resuscitated taxon; such features are inevitable in a substantial publication by one author. However, Richard Miller's publication is not a dry dusty academic tome but a book to dip into for both pleasure and information, and it deserves a place on both library and personal bookshelves.

MARTIN WHITE

The Ross Orogen of the Transantarctic Mountains

Edmund Stump
Cambridge University Press (1995).
284 pages. £60.00. ISBN 0 521 43314 2.

The Transantarctic Mountains are one of the great mountain ranges in the world, and it is not surprising that they have become the subject of a superbly illustrated geological book. The mountains extend for approximately 3500 km, rise to heights in excess of 4000 m, and separate the ancient cratonic rocks of East Antarctica from the collage of microplates that make up West Antarctica. Although the mountain range is currently intracontinental extending, as the name implies, across the Antarctic continent, it has not always been so, and this book by Ed Stump describes a period from the Neoproterozoic (*c.* 750 Ma) to Early Palaeozoic (*c.* 450 Ma) when the Transantarctic Mountains formed the active subducting margin of an early Pacific Ocean, a period known as the Ross Orogeny. It was a very important time in Earth's history, as it corresponded to the dawn of the Phanerozoic era, a time when there was a major diversification of life forms, and significant changes in the distribution of the major continents. In fact, during the production of this book, the new and controversial SWEAT hypothesis, linking South West North America and East Antarctica in a Proterozoic supercontinent, was first proposed by Eldridge Moores from the University of California. In some ways, this created a problem for the author, but he has managed, in the final synthesis chapter, to successfully reinterpret some of the geology of the Transantarctic Mountains within the framework of the SWEAT hypothesis.

With an unparalleled breadth and depth of information, based on ten field seasons by the author, this book provides a detailed synthesis of the history of the Ross Orogen. The author has chosen to divide the Transantarctic Mountains into six geographical regions making up six chapters of the book. The geology of each region is systematically described within each chapter together with a useful summary. The chapters are very well illustrated with maps (all produced in the same style) and photographs (one of Ed Stump's specialities). The photographs alone should inspire many young geologists to go and work in this magnificent mountain range. Each chapter also contains an extremely useful section on the history of exploration. This makes for dry reading, but the author has deliberately set out to make this as comprehensive as possible lest younger generations lose sight of those who preceded them. Although I am not in a position to judge if he has been successful here, I very much suspect that he has, and for this reason alone, the book should stand as a very useful reference book for many years to come. The author has also chosen to describe the geology in a very traditional way. He has resisted the temptation to overinterpret the tectonic significance of the rock units, and the basic descriptions of the rock units should stand the test of time and serve as a useful reference for future generations.

It is perhaps unfair to even consider a criticism of a book like this as authors who set out on such major tasks, and produce attractive and useful books like this one, need to be congratulated. However, it would have been useful for the book to contain, in the synthesis chapter, a summary geological map of the whole of the Transantarctic Mountains and a more comprehensive correlation of the different rock units along the length of the Ross Orogen. This would have been useful in drawing together and making correlations between the different units described in each of the regional chapters. The author also stops short of the Shackleton Range, geographically part of the Transantarctic Mountains, only going as far as the Pensacola Mountains. There are obvious reasons for this in that the geology of the Shackleton Range is different in many aspects to the rest of the Transantarctic Mountains but it is part of the mountain range, and it does contain structures and sedimentary rocks that formed during an equivalent time to the Ross Orogen. Nevertheless, despite these omissions, this review book will be very valuable to all geologists interested both in the Transantarctic Mountains in particular and in orogenic belts in general. I am sure it will stimulate many new proposals for work in the Transantarctic Mountains.

BRYAN C. STOREY