

but sets them in a wide economic and political context. The book starts by examining the rich and complex subject of permafrost, and goes on to consider the Alaskan oil pipeline, completed ten years ago, and two Canadian gas pipeline projects, now indefinitely delayed. (Ironically, the companies that dreamed of \$10 per thousand cubic feet of gas, and rushed to invest at a time of high interest rates and enormous construction costs, may now count themselves lucky that the projects were stopped.) It also describes the recently-completed oil pipeline from Norman Wells, a low-profile project which will be watched with great interest.

Peter Williams argues that each project must be seen as part of a whole system, and that engineering questions cannot be disentangled from economic and social factors. His book is a bold and honourable effort to demystify its subject, and to create a wider informed discussion. It would have been far easier to write for a narrow group of specialists, and far less worthwhile.

There are clear and interesting accounts of experiments designed to throw light on basic questions, such as the ability of water to move through frozen soil. Occasionally the book falls short of the highest level of scientific writing for the non-scientist. A reader who has not previously thought about the mechanics of frost heave will find Williams' exposition difficult. In my own view, he could have gone further, and might have argued that frost heave and permafrost engineering in fact depend on rather straightforward phenomena, which are broadly understood.

The author gives an interesting account of the controversy at the Canadian Arctic Gas hearings about the extent to which frost heave movements could be suppressed by a small berm over the pipeline. It seems rather a simple question, which could have been resolved by a modest experiment. He is understandably indignant about short-sighted policies on full-scale trials. The need for trials was apparent in the early seventies: if they had been set up then, with long term funding and continued high-quality scientific support, there would now be accurate data of heave and thaw over 15 years' operation, and the outstanding problems would be resolved. To an outsider, it seems unfortunate that the controversy was conducted in a public enquiry, where the context forces the players into adversarial positions and the search for scientific truth becomes obscured. It was right that it was in public, but wrong that it became a legal game.

The future must depend on the development of the price of gas. Present economics do not begin to justify the grandiose projects that were lightly talked of ten years ago, when a senior oil executive said to this reviewer '... when we're talking about an [Arctic] project like this one, a billion dollars don't amount to a hill of beans'. Gas is such a good fuel, and people use it up so enthusiastically once they are given a chance to do so, that demands for Arctic gas pipelines will resurface soon. When they do, Peter Williams' book will have been a worthy contribution to

informed debate. (A. Palmer, Andrew Palmer and Associates Ltd., 49 Ashley Gardens, Ambrosden Ave., London SW1P 1QF.)

MACQUARIE ISLAND SEAWEEDS

TAXONOMY AND BIOGEOGRAPHY OF MACQUARIE ISLAND SEAWEEDS. Ricker, Robert Wallace 1987. London, British Museum (Natural History). 344 p, illustrated, hard cover. ISBN 0-565-00998-2. £40.00.

This work presents a detailed and comprehensive account of the marine algae of one of the peri-Antarctic islands; it is the only recent work available on the subject for the region. There are 103 species described, forming 81 genera in 43 families. Seventy species are reported from Macquarie Island for the first time and 11 are new. The systematic accounts are well presented and supplemented with a good selection of photographs and drawings. The book includes a history of collections from the island and a concise biogeographical account of the marine algae of other islands in the Southern Ocean. Details of distribution indicate that 41% of Macquarie Island seaweed species are restricted to far southern regions, 17% are bipolar, and 11% are endemic. Approximately 660 bibliographical references, an appendix of collection data, and a key to the species complete this essential contribution to Antarctic phycology. (R. K. Headland, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

SCIENCE IN ANTARCTICA

ANTARCTIC SCIENCE. Walton, D. W. H. (editor). 1987. Cambridge, Cambridge University Press. 280 p, illustrated, hard cover. ISBN 0-521-26233-X. £25.00.

Every so often Antarctic scientists take stock of themselves, summarizing work in their various fields for the interest of the world in general. The tradition began 60 years ago with J. Gordon Hayes's one-man survey *Antarctica, a treatise on the southern continent* (1928). Pioneers now in retirement will cherish well-thumbed copies of Frank Simpson's compilation *The Antarctic today* (1952), Priestley, Adie and Robin's *Antarctic research* (1964), Trevor Hatherton's *Antarctica* (1965), and Louis Quam's *Research in the Antarctic* (1971). Each of these books gave a good picture of the state of the sciences when it was compiled. Editors and contributors alike took pains to be understood by colleagues in other disciplines, and by the tax-payers who stayed home and footed the bills. It is high time for a new survey; David Walton's *Antarctic science* proves a worthy successor.

His contributors are all British and, though far from parochial, tend to concentrate on the British sector they know best. The 18 chapters are grouped under five headings; there are four on the geographical, political and

international scientific background (contributed by Walton himself), five on marine and terrestrial biology (I. Everson), four on ice and rocks (C. S. M. Doakes), four on climate and atmosphere (J. A. Dudeney), and the last chapter is a round-up of science under the Antarctic Treaty, current and future (R. M. Laws).

The scientific work is well and clearly described; Inigo Everson's contributions are a particularly masterly summary of a complex field, but they are all written and illustrated up to the best *Scientific American* standard. I would have been glad to see the sources of many of the diagrams recorded more fully, so that readers could turn up the originals if they wanted to. Well-described too is the international scientific organization, with its awful acronyms familiar to readers of *SCAR Bulletin*, and the Antarctic Treaty Organization, now maturing to solemn middle-age. There is an excellent selection of photographs, both colour and black-and-white. This is a well thought-out, well produced book. The price is daunting for a popular book, but the text is right for school, college and university libraries, for polar and non-polar scientists, for readers of *Polar Record*, favourite nephews and nieces, and for anyone with even a remote interest in what goes on in Antarctica. (Bernard Stonehouse, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER).

SAFETY IN SEA ICE

ICE SEAMANSHIP. G. Q. Parnell. 1986. London, Nautical Institute. 87 p, illustrated, soft cover. ISBN 1-870077-01-6. £17.00.

This monograph of 78 pages is divided into two parts. Part I, 'Ice', describes different types of floating ice, the formation of ice and its changing appearance to help identification. Internationally-accepted ice terminology is explained and well illustrated. Part I concludes with an Ice Summary that warns of the not-readily-apparent perils associated with ice navigation. Part II, 'Ice Seamanship', lists seven Basic General Safety Rules, which form the heart of the treatise. They are elaborated with illustrations, and their prudence is aptly emphasized by reminding the reader of the *Titanic* disaster.

In one of many welcome touches of humour the author suggests that every ship in ice might benefit from a statement, in gold letters on the bridge, of the simple law of physics—that impact varies with the square of speed. Using illustrations, the basic principles of negotiating pack ice unaided and under ice breaker escort are explained. Dangerous situations arising from anchoring and mooring in drift ice, lack of understanding in the use of charts with scanty information, incorrect assumptions on radar targets, are all dealt with. If asked to find fault I would have only two comments. Firstly, in Part II under the sub-heading 'Avoiding and negotiating ice', I would reiterate the warning given in the Ice Summary of Part I, that a major danger of becoming beset is that drifting ice may take the ship toward such unwelcome dangers as the

shore, reefs, or grounded bergs. This is a very real hazard when working pack ice off Antarctic Peninsula. Secondly, where the author deals with radar interpretation, I would add that bergs and bergy bits in pack ice are often most readily identified on radar by the shadow sector they cause.

I strongly recommend this excellent publication to all masters and officers who operate ships where ice is or may be encountered. To shore-side ship managers and superintendents who have authority over ships that may meet these hazards, I recommend that copies be made available on all their ships, and that its reading be backed by Standing Orders. Yachtsmen also who venture to high latitudes would find its advice and knowledge very applicable. The book is simple in style, makes precise statements, is economic in words, uses illustrations admirably, and misses nothing. Humour makes it readable and—most importantly—memorable. It is now on the bridge of my ship, to be read in conjunction with my other Standing Orders, and I have indented for the appropriate law in gold lettering, to be supplied of course at owners' expense. (Capt C. R. Elliott, RRS *John Biscoe*, British Antarctic Survey, Madingley Road, Cambridge CB3 0ET.)

THE ANTARCTIC TREATY SYSTEM

THE ANTARCTIC TREATY SYSTEM: LAW, POLITICS AND DEMOCRACY. Myrhe, J. D. 1986. Boulder, Westview Press. 162 p, soft cover. ISBN 0-8133-7286-0. £17.50.

THE ANTARCTIC TREATY REGIME: LAW, ENVIRONMENT AND RESOURCES. Triggs, G. D. (editor). 1987. Cambridge, Cambridge University Press. 239 p, illustrated, hard cover. ISBN 0-521-32766-0. £30.00, US\$54.00.

These are very different additions to the extensive literature on Antarctica; the first adds to one narrow aspect, the second provides a comprehensive, up-to-date overview of all the issues deriving from the Antarctic Treaty and its related instruments.

Myrhe is a newcomer to this field, now a freelance writer. His slim volume (40 pages consist of documents, etc) is based on his PhD thesis, which made use of the records of the first three months of the Antarctic Treaty Consultation Parties, which have only recently been made available, though explanatory background and a chapter on the current minerals negotiations are included. The issues and positions remain surprisingly familiar and it is interesting to read Myrhe's account of their first appearance. Antarctica watchers will want to acquire this book because it is the first to use this material, but that said, it is not otherwise an outstanding work. The background is merely sketched in. The analysis is superficial, Myrhe has not fully overcome the problem many students find of handling accounts of meetings in a thematic rather than an episodic descriptive manner, and there are several gram-