

environmental activist groups.

Subsequent chapters divide on the lines of scientific disciplines; oceanography, geology, glaciology, atmospheric, and biology are treated in order. While a portion of this restates earlier chapters, it is a useful approach as often an understanding of modern science is efficiently derived from an appreciation of its evolution. Particular problems — such as conservation becoming sequestered from biology into politics, the proliferation of redundant national stations on King George Island for political rather than scientific reasons, and several other recent anomalies — are discussed. A quote from Georg von Neumayer addressing the Royal Society in 1898 — ‘Understanding of the importance of Antarctic research requires an unusual amount of knowledge, and not in one branch of science only, but in the whole complex of natural philosophy and natural science’ — is given in a most appropriate note on an indispensable feature of Antarctic science.

The last chapter is a postscript giving the author’s thoughts on current developments. His last sentence, ‘Mankind cannot afford an estrangement of science and politics in Antarctica,’ emphasises a major theme in the history of Antarctic science.

The book is well illustrated throughout, showing much careful pictorial research, past and present. A comprehensive bibliography is a most useful compilation. The index is also comprehensive, but arranged in an unusual manner with some very large headings covering entries that would normally be found independently. The book is a good companion to *The explorations of Antarctica: the last unspoilt continent*. (Robert K. Headland, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

POLLUTION OF THE ARCTIC ATMOSPHERE.

W.T. Sturges (editor). 1991. London and New York: Elsevier Science Publishers. xii + 334 p, diagrams, hard cover. ISBN 1-85166-619-2. £70.00.

In 1956 haze observed in the Arctic indicated that that region was no longer an untouched, non-polluted area. However, it took many more years before it could be confirmed that this haze originated in industrial atmospheric pollutants transported to the Arctic from lower latitudes. Only about 10–15 years ago, several intensive international research campaigns about the Arctic atmosphere were started by circumpolar countries. The effort has considerably increased our knowledge about the sources of Arctic atmospheric pollution and about atmospheric transport mechanisms.

W.T. Sturges invited leading scientists in the field of atmospheric studies to contribute to *Pollution of the Arctic atmosphere*, which gives a survey about our knowledge and the research results obtained thus far. It is a comprehensive examination of our understanding of Arctic meteorology, atmospheric chemistry, and long-range transport to this region. I have been involved in the study of organic atmospheric pollutants in the Arctic for many years. I found the book extremely useful, because it summarises the research results spread over a great number of scientific

articles. Furthermore, it gives an introduction into the climatology and meteorology of the Arctic.

The book is divided into 10 chapters, and starts with a survey about international research policies and co-operation in the Arctic. Chapter 2 is a well-written article by W.E. Raatz, which discusses special meteorological aspects of the Arctic. The next three chapters deal with inorganic pollutants, starting with the analysis and presence of such compounds in snow and ice cores. In addition, a short summary is given about the concentration changes of trace gases trapped in ice. It is followed by a chapter about important industrial source areas for heavy metals and other inorganic pollutants in the Arctic atmosphere, including a description of the physical properties and reaction mechanisms of aerosols in the Arctic regions. Chapter 6, which is about sulphur and nitrogen pollutants, takes us back to the beginning of the studies of Arctic haze, then gives a survey about the atmospheric reactions of such compounds in the Arctic atmosphere, and, finally, summarises the results concerning seasonal changes, spatial distribution, and total fluxes in the Arctic.

Chapter 7, about Arctic ozone chemistry, deals with stratospheric atmospheric aspects and reaction mechanisms. Although it summarises our knowledge up to 1990, it is perhaps the only part of the book that might become outdated relatively soon, due to recent results of the intensified stratospheric ozone measuring campaigns. Chapter 8 is about persistent organic pollutants and pesticides, and includes information on their presence in the Arctic atmosphere, in precipitation, and in the northern freshwater system. Furthermore, it includes a survey about sources, distribution between particles and vapour phase, and deposition mechanisms. This chapter examines the different behaviour of organic and inorganic pollutants in the atmosphere. It also underlines the threat to the Arctic ecosphere caused by persistent organochlorines, due to their efficient long-range transport properties and their bioaccumulation in the food chain.

Chapter 9 discusses the problems originated by human activities in the Arctic, such as oil, natural gas, and mining operations, which led to substantial local atmospheric pollution in Alaska and some regions in western Siberia. It also includes other emissions, such as car traffic and residential heating. The last chapter gives an outlook concerning climate changes related to Arctic aerosol pollution. Unfortunately, it is not followed up by a survey about climate changes caused by radiatively active trace gases in the atmosphere.

In conclusion, this book can be highly recommended both as a text book and a reference about our present knowledge of Arctic atmospheric pollution. The chapters can be read independently, and there is very little overlap of information. The book is generally free of printing errors, and I could not find any seriously weak scientific aspects. The literature cited in most chapters is up-to-date and covers the period up to 1990, the year before the book appeared. However, as so often with books where the chapters were written by different authors, the index is a

weak point; it appears to me as if no one has taken care of this important facet of the book. For example, the compound heptachloro epoxide is independently listed as heptachlor epoxide and as hepta-chloroepoxide, each with additional entries. The same is true of the keyword hexachlorocyclohexanes. It seems to me that every author has prepared his own index, which then was merged in one without further editing. This weak point should be eliminated in the next edition. (Michael Oehme, Norwegian Institute for Air Research, N-2001 Lillestrøm, Norway.)

ANTARCTICA: BOTH HEAVEN AND HELL. Reinhold Messner. 1991. Marlborough, Wiltshire: Crowood Press. 381 p, illustrated with maps and photographs, hard cover. ISBN 1-85223-704X. £19.95.

This book tells the story of Reinhold Messner's 1989/90 crossing of the Antarctic continent with Arved Fuchs as his sole companion. The expedition travelled 2800 km in only 92 days, from the Ronne Ice Shelf to the American base at McMurdo, the two men pulling and sailing their sledges without the aid of dogs or mechanical means, and with the 'minimum' of air support (such details seem very important to Messner). The book is divided between the telling of the story of the crossing and several short chapters dealing with the Antarctic Treaty, a chronology of Antarctic expeditions, and the ideal of 'World Park Antarctica,' which Messner supports and which he states the expedition was to publicise.

However, the book's real story is the tale of a dispute (essentially over the presentation of the crossing in 'environmental' terms) that arose between Fuchs and Messner at the end of the trip. At times the book reads like the prosecutor's notes at a trial, each event seemingly being described to the reader for its place in Fuchs' supposedly scheming plan to misrepresent everything for which Messner stands. One of Messner's friends is quoted as saying, 'You, the star, are only taken advantage of' (page 47), and one suspects that this is the feeling he has about this trip. This is perhaps a feeling for which the reader will have little sympathy. No attempt is made to allow the reader to develop his own appreciation of what is happening between the two men — everything is presented in the perfect vision of hindsight.

The book does little justice to the quite amazing achievement of the two men and even less to the environment in which they found themselves. Messner writes, '...my knowledge of the Antarctic consisted of clichés: sterile, unimaginably big, cold' (page 26), but he does nothing to change one's perception of this with his own writing. He makes much use of quotations from the earlier explorers of the continent — Amundsen, Scott, Shackleton — giving entire pages on occasion. They are well chosen and interesting, although they unfortunately serve to show the poverty of Messner's own writing and to leave the reader wishing he had spent his money (for at £19.95 this is not a cheap book) on a copy of *The worst journey in the world* or *South*. When the next book about such a venture is written, the quotations from such early works will appear, not from this — a classic it is not! Antarctica deserves

better than this. (Stephen Wells, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

THE GEOGRAPHY OF THE CANADIAN NORTH. Robert M. Bone. 1992. Oxford: Oxford University Press. 284 p, illustrated, soft cover. ISBN 0-19-540772-5. £17.50.

There are so few good texts on the geography of Arctic Canada that any new one is to be welcomed. In this book, the 'Canadian North' is treated generously, with its southern limit the edge of the northern boreal forest where trees give way to prairie grasslands (excepting the southern part of the mountain forest of British Columbia and Alberta, and the black spruce forest of the Gaspé and much of Newfoundland). This results in a survey of approximately three-quarters of the land and sea areas of Canada. The north is sensibly split into the Arctic and the sub-Arctic macro-regions, the division between the two being considered as the treeline, which follows generally the mean monthly 10°C isotherm for July. Thus, this is a treatment in terms of the natural, rather than the administrative, regions of Canada, and one familiar to geographers, but the author prefers within this framework a systematic rather than a traditional regional approach. Whilst this creates difficulties in the non-correspondence between the statistics available for the natural — as distinct from the political — divisions, it makes for a more readable and lively text.

After introductory chapters on the perception of 'nordicity' and on the physical background to the north, the book concentrates primarily on resources and economic development. This allows the author to present his very detailed knowledge of the difficulties of resource exploitation — physical, political, legal, and environmental — in a multi-cultural society. He deals with the mega-projects of James Bay, the Arctic Pilot Project, and the Mackenzie Pipeline with admirable clarity. The book concludes with chapters on the problems of native land claims and regional self-determination, and the geographical realities of present times in these northern lands.

Each chapter of the book contains in appropriate places short vignettes that serve to highlight the main points for discussion; it is a device that exemplifies the essentially didactic purpose of the work. The book should prove to be invaluable for undergraduate courses on the geography of the Canadian north. (Peter Speak, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

BRIEF REVIEWS

EXPLORATION OF ALASKA 1865–1900. 1992. Morgan B. Sherwood. Fairbanks: University of Alaska Press. xxii + 207 p, illustrated, soft cover. ISBN 0-912006-62-5. US\$15.00.

This is a reprint of Sherwood's already classic 1965 study of the exploration of Alaska, including its political, scientific, and military components. Beginning with the Russian American Telegraph Expedition of 1865 and the purchase of 'Seward's Folly' from Russia in 1867, it covers three and a half decades during which the US Army,