

also apparent in sea otters. In chapter 8, Geraci and Thomas D. Williams cite research that suggests that captive sea otters became 'nervous and curious' when oil was introduced into one side of their pool, but in the wild were observed diving in contaminated water and walking along the beach making no attempt to avoid oil patches. Data for the ability of polar bears and manatees to detect and avoid oil is scarce, although St Aubin (chapter 10) cites research indicating that polar bears are able to detect oil and prefer to avoid contact with it. However, both polar bears and manatees inhabit areas where there have not yet been major spills, and there is no anecdotal evidence to suggest what their response might be.

Sea mammals are a difficult group to study at the best of times, and so it is not surprising that we know very little about their behavioural or physiological responses to environmental contamination. In the case of pinnipeds and cetaceans, only a few carcasses or dying animals have been found that have enabled biologists to study the toxic effects of oil, but even if these cases can be attributed to oil, they only tell us about those most severely affected, and not about those that recover or that die at sea. Sea otters and polar bears, because of their need to maintain a well-groomed coat to protect them from the cold, are those sea mammals most at risk from oil spills, as the recent *Exxon Valdez* incident showed, where an estimated 1000 animals died as a direct result of oil fouling. As Geraci and Williams point out: 'the sea otter's vital commitment to grooming predetermines its fate once it has contacted oil' (page 216). (E. Cruwys, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER.)

GLOBAL ENVIRONMENTAL CHANGE: UNDERSTANDING THE HUMAN DIMENSION. P.C. Stern, O.R. Young, and D. Druckman (editors). Washington: National Academy Press. 308 p, hard cover. ISBN 0-309-04494-4.

Polar researchers take global change in their stride. The ice-sheets that determine our research fields are recent developments in the history of the world: of course they are changing — whoever said they were not? The editors of this book are less blasé and, as social scientists, more directly anthropocentric. The earth, they tell us, has entered a period of hydrological, climatological, and biological change that differs from previous episodes of change in the extent to which it is human in origin. To explain or predict current changes one must understand the human sources, consequences, and responses, some of which can alter the course of global change. Not all would agree immediately with this premise: the role of the meddlesome ape has indeed grown, but that of cosmic forces has not declined. Nevertheless the world continues to change, and man is involved in both causes and consequences.

Global change has become a study in itself. Alarming overtones — that polar ice is melting, or the sky falling in — have stimulated public interest and opened the public purse. The natural scientists learned long ago the advan-

tages of featuring global change in their research proposals. Have social scientists been slower off the mark? If so they are catching up, at least in the United States. In 1989 the US National Research Council and related bodies established the Committee on the Human Dimensions of Global Change, charging it with the task of promoting the social and behavioural sciences in this research field. Nationwide they assessed current research and determined how best to evaluate data resources, encourage collaborative research, and develop a US research agenda for global change studies. This book represents the committee's deliberations.

Following a summary and prologue, the editors present chapters on global change and social science, human causes of global change, human consequences and responses, problems of theory and method, data needs, and human resources and organizational structures. The book ends with five recommendations for a US national research program: that national funding should more readily flow for research on human dimensions of global change; that funding bodies should establish programmes of targeted research; that federal funding should help to establish data sets and make them readily available; that a national fellowship programme in human-based studies should be set up; and that a number of national centres should be dedicated to this research. If the findings are predictable, the case is germane and well-argued. Global change exists and has profound social repercussions: give the social scientists their share of US research funds. Polar researchers in the humanities, seeking funds in any other country, might find this a useful sourcebook of ideas and objectives. (Bernard Stonehouse, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

THE HISTORY OF SIBERIA FROM RUSSIAN CONQUEST TO REVOLUTION. Alan Wood (editor). 1991. London: Routledge. xiv + 192 p, maps, hard cover. ISBN 0-415-05873-2. £35.00.

This volume is the third to result from a meeting of the British Universities Siberian Studies Seminar, in this case one held in London in 1986. Its editor, Alan Wood, has been the driving force behind the seminar since its inception in 1981, and he has done an excellent job in bringing together papers on very diverse aspects of Siberian history. He himself contributes an introduction, an afterword (bringing the story into the twentieth century), and a chapter on his own special subject of exile and crime in nineteenth-century Siberia. He also includes a useful glossary of terms that he compiled. His easy style hides some very thorough research.

Wood's contributors are no less well versed in their subjects. Basil Dmytryshyn, a veteran Siberiologist, sorts out the complicated administrative apparatus in the seventeenth century. David Collins has thorough documentation for his study of subjugation and settlement. J.L. Black is concerned with Russian emergence on the Pacific.

James Forsyth displays very detailed knowledge of the native situation at first white contact. James Gibson covers the remarkable episode of Russian America. Leonid Goryushkin, the only contributor from Russia, studies the peasant economy. Finally, John Channon outlines the tangled situation of revolution and civil war in the first quarter of the twentieth century.

Most of the material concerns Siberia as a whole. The north is part of that whole, but not the most important part. It is specifically mentioned only in Black's chapter on the Pacific, Forsyth on the natives, and Gibson on Alaska. An event that might have found a place here was the armed and organised resistance to the Bolsheviks as late as 1923, in Yakutia. But a line has to be drawn somewhere, and knowledge of the broader picture is, of course, always relevant to those interested in northern affairs. (Terence Armstrong, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER.)

THE PETRELS: THEIR ECOLOGY AND BREEDING SYSTEMS. John Warham. 1992. London: Academic Press. viii + 440 p, illustrated with maps, tables, figures, and photographs, hard cover. ISBN 0-12-735420-4. £28.50 or \$59.95 (US).

Superlatives cling easily to the petrels. The oldest documented wild bird is a royal albatross that attained an age of at least 58 years. The order of birds whose members span the greatest size range is the procellariiformes or petrels, encompassing 25 g storm petrels and 12 kg great albatrosses. And the petrels nest over an enormous latitudinal range, from fulmars around 80°N to Antarctic petrels at 80°S. (Incidentally, that last fact means that I could as well have written this review for *Tropical Record*, were there such a journal.)

Because the petrels are a monophyletic group, because all are seabirds, and because (despite the great size differences between species) they are rather conservative structurally, they have proved exceptionally useful in comparative ecological studies. What is the allometric scaling between the size of the single egg and body size? How is chick growth-rate dependent of feeding niche, be it offshore or inshore? A further factor facilitating such studies, and it is probably not a trivial factor, is that the number of petrel species is, at 93 (give or take a little taxonomic uncertainty), neither so small as to render interspecific comparisons uninformative nor so large as to be unwieldy.

The information needed for such studies has been accruing steadily over the past 60-odd years, as researchers have visited the remote headlands and islands where petrels breed. The time to pull together that information has now arrived, and nobody is better qualified to do the job than John Warham. After a lifetime of seabird research, he has now used his chronological gifts — as the politically correct would have it — to write this treatise, and I believe he has succeeded marvellously. There can be no higher praise than for a reviewer to say: 'I wish I could have written that.'

After an introductory chapter, the book devotes chapters to descriptions of the morphology, habits, and distri-

bution of the various petrel groups. Then follow chapters on the various stages of the breeding cycle, from the pre-egg stage with, in many species, the intriguing pre-laying exodus, through incubation, to fledging. This mine of information is as nearly comprehensive as anything between two hard covers ever can be. I cannot wait for the second volume, which will cover such topics as vocalisations, foods and feeding, and petrel conservation.

Throughout, Warham's reporting of the literature is deliberately factual. By that I mean he has attempted to state honestly what earlier authors have written, and he has tended to eschew interpretation and synthesis. This restraint makes the book very useful as a compendium of information, and I suspect that the second volume will contain a little more speculation.

There is only one area where I would take issue with Warham's approach, and this is in his reluctance to quote from unpublished theses. I know how frustratingly difficult it can be to acquire such theses, but the fact is that an awful lot of invaluable information is locked up in their pages. When someone with Warham's breadth of knowledge does not quote from theses about which he certainly knows, it places an unnecessary burden on future generations. It increases the chance that those generations will have to re-invent the wheel.

The overall standard of presentation is extremely high. Of course, there are errors. These range from the substantive (puffinosis, the Manx Shearwater disease, is not known to be a bacterial disease), to the careless (the equation on page 280), to simple typographic errors. In respect of the last, I enjoyed Warham's cheek in inserting a *sic* in his reference list against the title of an earlier work where the author had been careless enough to use the word *Ruffinus*, instead of the correct *Puffinus*, in his paper's title. I suspect such cheek sets a dangerous precedent. It invites retaliation!

The utility of a treatise of this ilk is not only as a summary of past endeavours but as a springboard for future research. Does *The petrels* succeed in this latter respect? Yes, but.... Questions for the future are mentioned but perhaps not highlighted with sufficient force. With body temperatures some 2°C lower than other birds, petrels develop as eggs and chicks more slowly. But what exactly is the sequence of cause and effect? Is it significant that petrel and placental mammal embryos develop at the same speed when the adult animals have similar body temperatures? Will radio-tracking allow someone to demonstrate for the first time what has hitherto been only a guess, that petrel chicks attain a high fat weight in order that the parents can desert them and migrate earlier than if they had to remain on duty at the nest?

The last question addresses what petrels do at sea. This remains largely a mystery. But with satellite surveillance and increasingly sophisticated devices for recording whether a bird is flying or swimming or diving, answers are in prospect. As they emerge, they will be based on the land-bound studies so solidly, documented in *The petrels*. (M. de L. Brooke, Department of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ.)