and accuracy of some of the charges.

This division of the text works well. Barr and Williams have been judicious in their selection of documents, while their introductory remarks provide much of the required context and background. This is a book, too, where the footnotes should be read carefully, for a good part of the story emerges in the editors' explanatory and biographical notations. If some documentary excerpts might seem hard to follow, such as Dobbs' 'Memorial' (a treatise largely incomprehensible to those without an intimate knowledge of sea ice, tidal action, and the sometimes quirky nature of eighteenth-century notions of geography and climate), others are accessible and interesting. I particularly enjoyed Middleton's account of life at Churchill during the expedition's 11-month stay at the post, as well as his later paper on climatic conditions on the Bay.

The voyage of Christopher Middleton 1741–1742 has been meticulously researched and edited. Well illustrated with both contemporary and period maps and illustrations, the book is a fitting addition to the publications of the Hakluyt Society, which has been publishing scholarly works on exploration since 1846. A companion volume in the series *Voyages in search of a Northwest Passage 1741–1747*, which deals with the voyage of William Moor in 1746–1747, will soon be published by the Society. Taken together, these two texts should make a significant and scholarly contribution to our understanding of the eighteenth-century search for a Northwest Passage. (Robert Coutts, Heritage Resource Management, Parks Canada, Winnipeg, Manitoba R3B 3E8, Canada.)

ELEPHANT SEALS: POPULATION ECOLOGY, BEHAVIOR, AND PHYSIOLOGY. Burney J. Le Boeuf and Richard M. Laws (Editors). 1994. Berkeley and Los Angeles: University of California Press. xvii + 414 p, illustrated, hard cover. ISBN 0-520-08364-4. $58.00.

In the wake of the excellent *Antarctic seals*, edited by R.M. Laws (see *Polar Record* 30 (173): 141–142 for review), comes another valuable compendium of chapters, this time concentrating on the two species of elephant seal (*Mirounga leonina* and *Mirounga angustirostris*). The volume is again edited by Laws, this time with Burney Le Boeuf of the University of California, Santa Cruz. A book comparing and contrasting these two species is long overdue, and the edited volume will be of value to anyone researching or interested in these fascinating marine mammals.

The book's origins lie in a conference held in 1991 in Santa Cruz, which aimed to draw together experts from all over the world to discuss research into diving physiology and energy expenditure at different stages of the elephant seal's annual cycle. At the same time, concern was expressed that while the northern populations of elephant seals seemed to be expanding, those in the south appeared to be in decline. *Elephant seals* came about as a result of the exchange of ideas and methodologies at the conference, and the product is a book of outstanding quality.

The first chapter, by the editors, is an introduction to the two species, pointing out the similarities and differences, especially in terms of life-cycle events and mating strategies. The chapter serves as an introduction to the more specialist articles that follow. These are divided into four sections: population ecology; behaviour and life history; diving and foraging; and physiological ecology.

The section on population ecology contains five chapters, four of them principally concerned with southern elephant seals. Chapters by Stewart *et al.* and by Laws review the historical and present status of northern and southern elephant-seal populations, respectively, while Hindell *et al.* and Bester and Wilkinson address the decline of numbers in southern elephant-seal populations, and offer explanations of why this might be occurring. While acknowledging that there will be interactions between factors, and that local factors may mask the effects of global ones, Hindell *et al.* advance two main hypotheses: that there are fluctuations in the ocean environment that affect many marine species, and that populations are undergoing an equilibrium process as a direct result of intense sealing since the eighteenth century. Hindell *et al.* examined the evidence of population decline in the Macquarie Island group independently of the populations at Kerguelen and South Georgia, and found that there were distinct differences. They conclude that there are difficulties in the application of both explanations, and that more demographic data are necessary before the precise reasons for both the general decline and the specific patterns of decline within the different breeding stocks can be fully understood. Bester and Wilkinson offer evidence that the most vulnerable group within the Marion Island population is that of recently matured cows, and that their elevated mortality appears to be due to factors that operate at sea, rather than on land.

The second section comprises five chapters on the behaviour and life history of northern elephant seals. Le Boeuf *et al.* assess the survivor rates among juveniles in the Año Nuevo rookery in California, when the colony size increased five fold during the study period. Survivorship was established by resightings of 8362 tagged seals, and by comparing body length and mass at weaning to survivorship over the first two years of life. It was found that body size was positively correlated with survival during the first year, but after that most mortalities occurred at sea. Body size is further assessed by Clinton in a chapter that examines sexual selection and life history in male northern elephant seals. Body size is also a factor considered by Deutsch and others in an analysis of sex- and age-related variation in the reproductive effort (RE) of northern elephant seals. 56 males and 73 females were measured over a period of 11 years. It was found that the RE of males and females was similar, in that both lost on average more than a third of their body weight, although male RE tended to be more variable. Absolute measures of investment in neonates were found to be directly proportional to maternal mass, and maternal investment was similar for male and female offspring. Dominant males inevitably obtained a greater mating success than subordinates, but this was found to be at the expense of a greater proportion of body stores

devoted to breeding. But perhaps the most interesting conclusion is the similarity of the RE of immature breeders to mature breeders, contrary to expectations, given the lower reproductive success of subadults. Deutsch *et al.* propose that there may be an RE threshold below which fitness costs are minimal, or that there are fitness benefits to early-born offspring in an expanding population, or that the early experience of reproduction may confer an advantage in later matings.

The diving and foraging section is the largest, containing seven chapters on subjects as diverse as the geolocation of elephant seals by light levels, and the functional analysis of dive types by female northern elephant seals. Hill's chapter on geolocation takes on board the difficulties in tracking elephant seals, given their long-range foraging strategies. Geolocation is the process whereby the precise position of a seal can be determined by the recording and storing of light levels. The local apparent noon (the moment midway between dawn and dusk) will determine longitude, and the length of the day will determine latitude. Each time a seal surfaces, the time and date can be used in conjunction with light level to determine the location of the seal, using standard navigational equations. There are problems with this method, especially for monitoring southern elephant seals. Longitude obviously cannot be calculated at times of the year when there are no identifiable dawns and dusks, and it is impossible to determine latitude near the vernal and autumnal equinoxes (because the 'circles' of dawn and dusk are close together or overlap). Despite the apparent drawbacks of this technique (although latitude may be fixed by using alternative methods, such as sea-water temperature, during the equinoxes) a geolocation feature is relatively easily fitted into a time-depth recorder, and might provide valuable supporting data for tracking a seal's movements.

The remaining six chapters concentrate on diving behaviour in relation to foraging strategies, swim speed, age, sex, body mass, and reproductive condition of both species. These represent some of the most exciting advances made recently in the study of marine mammals, using state-of-the-art technology, and providing data that fill gaps in the understanding of the biology of diving and marine foraging. Le Boeuf's chapter examines the differences in diving patterns between different cohorts of northern elephant seals, while Slip *et al.* analyse dive types in the southern elephant seals from Macquarie Island. Thorson *et al.* assess diving in northern elephant-seal pups; they found that within 10 weeks there are profound changes in the physiology of these animals, specifically relating to diving. These include an increase in mass specific blood volume, a 46.7% increase in oxygen stores, and a 50% decrease in diving metabolic rate.

The final section contains four papers relating to elephant-seal physiology. Castellini compares the physiology of sleep apnea to the physiology of diving, and suggests that a better understanding of sleep apnea, far more easily studied than diving, might provide valuable insights into the changes that occur during diving. Breeding energetics information about southern elephant seals is assessed by Fedak *et al.* Like the research by Deutsch *et al.*, the data collected by Fedak *et al.* indicate that there is no difference in maternal investment between male and female pups once female size and birth weight are taken into account. Fedak *et al.* also suggest that the long distances travelled by females on foraging expeditions may be due to the advantages conferred by a reliable source of food 'in a long-lived uniparous animal' (page 354). It is also noted that the characteristics of dives change in relation to the depth of the ocean, underwater topography, and the average daily speed of the animal. Kirby and Ortiz review the current information pertaining to the physiology of fasting, specifically referring to hormonal changes, while Bryden's research assesses the changes that occur in the endocrine system in newborn southern elephant seals.

Laws and Le Boeuf have edited an excellent compendium of papers, notable not only for the high quality of research, but for the wide range of topics covered. There is, perhaps, a bias towards the northern elephant seal, but this doubtless reflects the more extensive research that has been conducted on the northern species than the southern, due to the fact that it is more readily accessible. Elephant-seal research began in earnest in the 1940s and 1950s, and continued apace until the early 1980s, when advances in technology meant that these animals could be studied at sea, as well as during the breeding and moulting seasons. Because of the development of new methods of investigation, it was high time a book on recent and on-going research on elephant seals made its appearance. *Elephant seals* more than fulfils this need, not only outlining past research and data, but highlighting questions and problems that still need to be addressed. Throughout the book, there is a feeling that the questions raised will be answered, and that future research needs have already been identified. This makes *Elephant seals* an exciting book to read, and it will undoubtedly prove to be a standard reference text for the study of marine mammals. (E. Cruwys, Department of Zoology, Downing Street, Cambridge CB2 3EJ.)

THE DESTRUCTION OF NIKOLAEVSK-ON-AMUR: AN EPISODE IN THE RUSSIAN CIVIL WAR IN THE FAR EAST, 1920. A.Ya. Gutman. Translated by E.L. Wiswell. Edited by Richard A. Pierce. 1993. Fairbanks and Kingston, Ontario: Limestone Press. xxxiii + 395 p, illustrated, hard cover. ISBN 0-919642-35-7. US$28.00.

This book is a most welcome and timely translation of a work first published in a currently obscure and inaccessible edition, in Berlin in 1924. It concerns the 'Nikolaevsk incident,' which was the ostensible reason for the occupation of northern Sakhalin by Japan from 1920 to 1925. The occupation ended under the Soviet-Japanese Convention of Peking, but the Japanese retained important concessions in the territory, notably coal and oil, and these assisted them in their military build-up during the 1920s and 1930s.

Nikolaevsk is a port situated on the left bank of the