

As an analysis of Law before his Antarctic days, the book is first class. However, the volume considers only the expeditions in the pre-International Geophysical Year (IGY) period. This fails either to give a full picture of Law or to do justice to his achievements in laying firm foundations for Australia's contributions to Antarctic science in the years of international cooperation that followed the IGY and the Antarctic Treaty. (Gordon Robin, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

SOUTHERN OCEAN ECOLOGY: A BIOMASS PERSPECTIVE. Sayed Z. El-Sayed (Editor). 1994. Cambridge: Cambridge University Press. xxi + 399 p, illustrated, hard cover. ISBN 0-521-44332-6. £45.00; US\$59.95.

This book is the culmination of an interdisciplinary, large-scale, long-term international research program that began in the early 1970s. The program, called BIOMASS (Biological Investigations of Marine Antarctic Systems and Stocks), was finalized by a colloquium held in Bremerhaven, Germany, in September 1991. The book consists of 22 chapters, which are organized into six sections encompassing physical oceanography, phytoplankton and zooplankton, Antarctic krill, fish and birds, Antarctic marine systems, with a final section considering future developments, including relations and contributions of the BIOMASS to ongoing and future studies.

The book begins with a history of the organization and accomplishments of BIOMASS by the editor, who served as Convenor of the SCAR Group of Specialists on Southern Ocean Ecosystems and Their Living Resources. El-Sayed and the Group of Specialists provided the leadership for this program and mobilized many scientists into an organizational structure that involved technical groups, working parties, and *ad hoc* working groups. As the program developed there was coordination of research efforts by the Group of Specialists, and the organization of a BIOMASS Data Center. The BIOMASS program organized two large international, multi-disciplinary experiments labeled with the acronyms FIBEX (First International Biological Experiment) and SIBEX (Second International Biological Experiment). Data from these experiments, which reside in the BIOMASS Data Center (now at the British Antarctic Survey, Cambridge), will be invaluable as baseline information for future studies of the Southern Ocean.

This book is focused on the final analysis and summary of the BIOMASS data (mostly data derived from the FIBEX and SIBEX seasons). Many of the contributed papers also include an update of data that have been obtained since the BIOMASS field programs were completed. For example, the chapter on krill energetics by Quinton, Ross, and Clark is a fairly complete summary, bringing together BIOMASS data as well as recent advances. Thus, the book not only includes analyses and summaries of studies under the BIOMASS program, it includes an updating for the work done subsequently in

most of the six discipline areas.

As I read through the book, I could not help but be struck by the diversity that is contained therein. This is a reflection of the BIOMASS program, where interdisciplinary work was a primary objective. The structure of the book, where each of the main sections is summarized by a discussant, gives insightful views into the BIOMASS program. These are views held by individuals, both at the end of the program and during its implementation.

In general, the book reflects the specific focus of the BIOMASS program. That is, it was intent upon assessing and studying Antarctic krill (*Euphausia superba*). Oceanographic and other measurements were taken in concert with cruises with the objective that physical and biological data would be necessary for understanding krill distribution and abundance patterns. A major effort was made to quantify abundance of krill, both through electronic sensing and net sampling. Oceanographic stations and measures in primary production were then taken during all the cruises. Counts of seabirds were also carried out. Noticeably lacking from BIOMASS was work in pack ice. The reason, of course, was that many of the oceanographic ships involved did not have ice-breaking capabilities. Thus the scope of the studies and the general dimension of the data with respect to Southern Ocean ecosystems was in the region north of floating ice during the austral summer. As a result, the seals and some of the penguins were not well represented in BIOMASS and are, hence, not well represented within this symposium.

In addition to the papers presenting syntheses of discipline areas, the latter sections include discussions of the development and operation of the database, and the role that BIOMASS has played in ongoing and proposed programs. I feel that the chapter on the development of the database is particularly useful for those planning future international, multi-disciplinary programs. Mistakes were made as the BIOMASS program developed, but they were generally overcome. Thus, the BIOMASS data stand as a great resource for future scientific endeavors, as many of the discussants and contributors to this volume attest in their writings. The discussants' report by R.M. Laws on Antarctic marine systems again echoes the need for integrated studies across trophic levels and the need to focus on higher trophic level predators. This is being met to some extent by the Ecosystem Monitoring Program within the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) and is discussed in the paper by John Croxall on the relation of BIOMASS to CCAMLR. I found Croxall's perspective on the contribution of BIOMASS to the overall CCAMLR program particularly insightful. He gives brief summaries of fisheries information on krill, observations about declines in fish stocks, and his perspectives about interactions between fisheries and various Antarctic species.

The article by Gerd Hubold, looking at the relationship of BIOMASS to the sea-ice zone, again points out the emphasis of the program to ice-free areas during the summer. He continues by discussing the need to develop

a more encompassing ecological approach to the sea-ice zone and suggests that BIOMASS was the precursor of studies being developed to consider the Antarctic sea-ice zone system.

The final chapter, by Fogg, gives a critical appraisal of the program and discusses BIOMASS' shortcomings as well as its advances. He considers the advantages and disadvantages of cooperative, integrative, interdisciplinary research and comments on the major contributions for future studies that exist within the BIOMASS Data Center. I found particularly compelling his suggestion that the data in the BIOMASS Data Center will be useful in the future for exploring not only hypotheses about the dynamics of krill populations but also about the functioning of the Antarctic marine ecosystem. Further, he suggests that the BIOMASS data could be used in structuring some type of a global model on the production of krill. Clearly, the data are not of that extent, but I do agree with his conclusions that beginning to think about the structure of such a model perhaps would let us gain a better notion about how the Antarctic ecosystem compares to other world systems in temperate and tropical regions.

Finally, I cannot complete this review without acknowledging the great contribution of the editor of this volume, both in completing the BIOMASS project through this final book, but also as he toiled to keep the BIOMASS program afloat as criticism abounded on many sides, and controversy within the BIOMASS community was ever-present. The leadership, diligence, and creativity shown by El-Sayed throughout the entire BIOMASS program, with the final conclusion resulting in this outstanding volume, was indeed remarkable. In my view, the greatest contribution of the BIOMASS program has been its documentation of the need for interdisciplinary research if we are to have any hope of understanding the functioning of marine ecosystems. This volume is indeed a major contribution and should be within reach of all scientists studying marine systems. (Donald B. Siniff, Department of Ecology, Evolution and Behavior, University of Minnesota, 1987 Upper Buford Circle, St Paul, MN 55108, USA.)

REMARKS AND OBSERVATIONS ON A VOYAGE ROUND THE WORLD FROM 1803 TO 1807. Georg Heinrich von Langsdorff. Translated by Victoria Joan Moessner. Edited by Richard A. Pierce. 1993. Fairbanks and Kingston, Ontario: Limestone Press. Two volumes in one: xxxviii + 239 p; xvi + 281 p, illustrated, hard cover. ISBN 1-895901-00-6. US\$30.00.

Georg Heinrich von Langsdorff, physician, scientist, naturalist, was one of those well-educated German travellers who feature prominently in the 100 years of Asian and Pacific exploration that followed the Bering–Chirikov expedition of 1741. Steller, Pallas, and the Forsters are among his predecessors. Langsdorff served as doctor and naturalist on the first Russian voyage around the world. This was a disputatious affair, in which an expedition supposedly commanded by Captain Krusenstern and bound for the northwest coast of America turned into one led by

Nicolai Petrovich Rezanov, an official of the Russian-American Company, with instructions to open trade and diplomatic relations with Japan. Langsdorff's narrative of the voyage was published in Frankfurt in 1812, with an English translation in 1814, one year after the more readable translation of Krusenstern's published account. The translation of Langsdorff's *Bemerkungen* has long been recognized as defective — 'translated anonymously and indifferently' one authority has recently written of it — and it is good to have a new, unbowdlerized one that, despite the odd jarring note ('gotten,' 'happenstance,' and so on), for the most part reads well.

On the various quarrels of the voyage, Langsdorff's account is almost silent. As Victoria Moessner points out in a perceptive note, the conventions of the time 'required the narrator not to be self-centred, but rather to suppress most personal feelings and reactions and to report objectively.' The two volumes cover different stages of the voyage, different voyages in effect. The first describes the long voyage of *Nadezhda* and *Neva* from Kronstadt into the South Atlantic, round Cape Horn, and into the Pacific. There the expedition stayed for 10 days at Nukahiva in the Marquesas, long enough for Langsdorff to meet two beachcombers, one English, one French, and to make some observations, many of them second-hand, on the islanders. The ships then headed northwest to Kamchatka, and then to Nagasaki, where they arrived in October 1804. There the expedition spent six months in vain attempts to establish trading links, but predictably were unable to persuade Japanese officialdom of the desirability of these. Langsdorff's increasingly irritated description of events, and non-events, from these months forms the centrepiece of the first volume, and affords a rare glimpse into the closed world of Japan in the early nineteenth century.

On its return to Kamchatka, by way of the little-known western route around Japan and into the Sea of Okhotsk, the expedition split up. While Krusenstern sailed back to Europe by way of Canton and the Cape of Good Hope, Langsdorff accompanied Rezanov to the settlements of the Russian-American Company in the Aleutians and along the northwest coast of America. Rezanov wanted the German along as a personal physician; for Langsdorff the lure was the chance to collect and observe: 'A blind zeal for natural history and repeated promises, both written and oral, of all possible support, for scientific research.' But it was not to be, and scientific investigation made little headway against the pressing day-to-day demands of Rezanov's mission. In Russian America, Langsdorff abandoned the reticence of his earlier pages as he recoiled in horror from the exploitation and depopulation of the Aleuts, Tlingits, and others by agents of the Company — 'the scum of Siberian criminals and adventurers of all kinds...in this miserable, God-forsaken part of the world.' The exploiters were also the exploited; and Langsdorff has vivid descriptions of the desolation at the starving, scurvy-stricken Russian settlements at New Archangel and elsewhere. From Alaska, Langsdorff accompanied Rezanov to San Francisco in an attempt to open up a flow of food-