

"O. Squaliformes" (p. 568) is undoubtedly a lapsus for Lamniformes, since all the taxa listed are lamniforms, and the definition states that an anal fin is present (absence of the anal fin is a characteristic of squaliforms). Chaetodontids and pomacanthids are given as examples of fishes that spend their entire life cycle on coral reefs (p. 572), yet both have pelagic eggs and larvae that spend several months at sea. Once in a while typographical errors appear—there are two on p. 577 (B[O]HLKE for BÖHLKE, Heptocephalus for Leptocephalus). I have never heard of a hypomaxilla (p. 579), but a literature search indicates that this must be what everyone else calls a palatine. The genus *Ogilbia* was removed from the family Brotulidae (p. 588) to the Bythitidae in 1978. *Tylosaurus* (p. 590) should read *Tylosurus*; *Adioryx* (p. 592) is a junior synonym of *Sargocentron*; Echeneidae (p. 603) should be Echeneididae and Pempheridae (p. 614) should be Pempherididae. Some of the figures in this section are below the generally excellent standard of the book [e.g., the scales on the juvenile *Chaetodon striatus* and *C. ocellatus* (pl. 209, p. 615) are far too large; the dorsal and anal fins of *Hemipteronotus* (pl. 212, p. 623) look as if they are composed entirely of spines].

But all in all, this is an excellent reference work for Bermudian and northern Caribbean marine life, especially as a teaching tool for school and university students taking marine science field courses. I feel that the audience will be somewhat limited (many of the plants and animals have to be viewed under compound or dissecting microscopes to be identified), and the book is too bulky and beautiful to encourage one to take it to the tidepool or on a cruise. However, the wealth of information, superb figures and stunning color plates are more than enough to offset these minor quibbles.

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has been founded on solid field data, and this volume greatly advances our knowledge of the life-at-sea of these creatures.

There are 15 chapters in this book, by a total of 14 authors. The editors had much more impact than is usual on the initial writing of most chapters, with 7 chapters co-authored by Gentry, and 9 by Kooyman. Probably largely as a result of this direct involvement, the book reads well as a single unified effort, with a more logical progression of ideas than is seen in most edited compilations. Northern, Antarctic, South African, South American, and Galapagos fur seals—and the Galapagos sea lion—are discussed in turn, with attendance behavior on shore addressed before diving behavior for each species. From this treatment emerges a general synthesis of the adaptive responses of attendance and feeding of female seals in different environments. Although much more is presented, one generality stands out: subpolar seals which face harsh but predictable environments make long-duration foraging trips involving many dives in order to feed their young with milk of high fat content, and wean them rapidly. Resource levels are high, there are no mass starvations, and populations can grow rapidly. Tropical or near-tropical seals, on the other hand, face a generally less seasonal variation of the environment, but they also face periodic massive food failures in some years. Females make frequent and brief trips to sea, and feed the young on low-fat milk for a long period of time. Periodic mass starvation of young (and some adults) is common, and populations grow slowly.

The literature cited section is combined for all chapters, author and subject indexes are comprehensive. The book is a "must" for marine mammal investigators and students.

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FUR SEALS. *Maternal Strategies on Land and at Sea.*

Edited by Roger L. Gentry and Gerald L. Kooyman.

Princeton University Press, Princeton (New Jersey).

\$40.00 (hardcover); \$14.50 (paper). xviii + 291 p.; ill.; author and subject indexes. 1986.

Gerald Kooyman greatly enhanced the study of behavior and physiology of free-living pinnipeds when he introduced a mechanical time-depth recorder (TDR) in the 1960's to study Weddell Seals as they dived for food below the Antarctic ice. In the 1970's, he teamed with Roger Gentry to use a redesigned TDR on fur seals. The new device reliably gave detailed glimpses into the feeding biology of these land-based sea-feeding marine mammals, and the present volume is the commendable result of much of this TDR-based work. It is the first time that a detailed comparison of several species of a major group of marine mammals, the otariid pinnipeds,



ENVIRONMENTAL SCIENCES

INTRODUCTION TO ENVIRONMENTAL SCIENCE. *Second Edition.*

By Joseph M. Moran, Michael D. Morgan, and James H. Wiersma. W. H. Freeman, New York. \$29.95. xiv + 709 p.; ill.; index. 1986.

This textbook is appropriate for college-level courses for which there are no prerequisites. Part I consists of five chapters on the concepts of ecology that focus on ecosystem structure and function and on population growth and regulation. The coverage is diverse and broad, but lacks the rigor and depth characteristic of biological science textbooks.

Part II, making up over one-half of the text, treats

environmental quality and management. Three chapters discuss the water cycle, water pollution, and managing of aquatic resources. In similar fashion, a chapter on the atmosphere, weather, and climate is followed by chapters on air pollution and air-quality management. The final four chapters treat the resources of the earth's crust, waste management, endangered species, and land-use problems. This section presents a well-balanced integration of basic science principles, pollution problems, political and economic considerations, and management possibilities.

The human population problem and its relationship to food and energy are presented in five chapters in Part III. A survey of human population growth and related issues is followed by chapters on food resources, energy issues and alternatives, and a final chapter that discusses the problems and prospects for a sustainable environment and provides suggestions for individual action. What is missing is a discussion of nuclear war, what many people believe to be the greatest environmental problem of all. Surely the recent controversy over nuclear winter and the general environmental and medical consequences of nuclear war demand that this topic become incorporated into an environmental science program.

The book concludes with a useful glossary and helpful appendixes on converting measurements between the English and metric systems, the geological time scale, and expressing numbers as powers of ten. Throughout the text are box essays of various lengths that present special case histories and additional information on a topic—in brief, material that enhances the quality and usefulness of the text. Illustrations are profuse and well chosen and consist of graphs, tables, diagrams, charts, maps, and photographs. Each chapter ends with a statement of conclusions, a set of summary statements, review questions, and selected readings.

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ENVIRONMENTAL SCIENCE: THE STUDY OF INTER-RELATIONSHIPS. *Second Edition.*

By Eldon D. Enger, J. Richard Kormelink, Bradley F. Smith, and Rodney J. Smith. Wm. C. Brown, Dubuque (Iowa). \$21.00 (paper). xi + 537 p.; ill.; index. 1986.

The environmental science textbook genre is evolving slowly. This book, like many of its clones, covers the habitual ground from ecology to ethics, without finding any new perspectives or paradigms. The truly laudable purpose of textbooks such as this one is to alert young minds, usually without any background in science at the college level, to the environmental ramifications of everything. To accomplish

this ambitious goal the authors, like others before them, have confined themselves to brief, often very superficial, accounts of any given topic. This is especially true of the many case studies which, although used extensively and skillfully to illuminate major issues, often leave the skeptical reader with more questions than answers. For such readers the authors have rarely provided sources or references; the citations provided are drawn almost entirely from the 1970's and earlier.

The major strengths of this book are its historical perspective, its careful organization and production, and its objective presentation of issues without polemics or advocacy. Students without the motivation, opportunity or time to pursue a more sophisticated and more interdisciplinary study of environmental issues could benefit from using this book.

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ECOLOGICAL KNOWLEDGE AND ENVIRONMENTAL PROBLEM-SOLVING: CONCEPTS AND CASE STUDIES.

Committee on the Applications of Ecological Theory to Environmental Problems; Commission on Life Sciences; National Research Council. National Academy Press, Washington, D.C. \$24.50 (paper). xi + 388 p.; ill.; index. 1986.

Applications of ecological knowledge to environmental problem-solving have often been ineffectual. Although ecological disasters have been forestalled because of timely and expert advice by ecologists, there are numerous examples where the advice came too late, or was ignored, or was based, regrettably, on inadequate or inappropriate information. This excellent book addresses the issue of how ecological concepts and methodologies can be applied most effectively to environmental problems.

The book is divided into two major sections, plus an Introduction that provides a concise overview of the major recommendations. The first section includes ten chapters which deal with the current state of ecological knowledge as it applies to environmental management, impact assessment and monitoring. The second section, comprising two-thirds of the book, includes thirteen chapters, each devoted to a synopsis and critique of a selected case study. The editors have thoughtfully provided a guide to the case studies in the Introduction, which allows readers untrained in ecology to find cases most applicable to their interests. The topics discussed in the first section are ecological concepts applicable to renewable resource management, species conservation and control, impact assessment, preservation and restoration of ecosystems, and the special problems of uncertainty and cumulative effects of environmental perturbations. A realistic