individual chapters. The goal of elucidating mechanisms of northern adaptation is brought closer to fulfillment by the excellent critical summations of the technical literature of these disciplines. Unfortunately, each chapter discusses only one aspect of human biology, and little attempt has been made to assess the interaction of biological parameters. Nor was a chapter assessing the adaptive status of circumpolar populations attempted. The lack of comparable data for all populations, particularly the northern peoples of the Soviet Union, precludes assessment of the total range of northern adaptations.

The Human Biology of Circumpolar Populations records the biological status of northern native peoples at one point in time. The topical syntheses make the volume an important reference for those concerned with environmental adaptation, the health of northern peoples, and the impact of culture change on human biology.

CHARLES J. UTERMOHLE
Department of Anthropology,
Smithsonian Institution,
Washington, D.C. 20560

Pollution Biology

Pollution Ecology of Estuarine Invertebrates. C. W. HART, JR., and SAMUEL L. H. FULLER, Eds. Academic Press, New York, 1979. xvi, 406 pp., illus. $28.50. Water Pollution.

Pollution biologists generally adopt one of two alternative approaches to their task. On the one hand, there are those who believe in the regulation of waste disposal according to criteria of toxicity established by laboratory studies of selected organisms. This method allows the regulator to make decisions based on strictly controlled data on relative toxicities of materials to standard test organisms, such as rainbow trout, but it is possible to challenge the relevance of this scale to effects of wastes in nature. One way of attempting to overcome this difficulty is by "in situ" toxicological testing using species found in the environment under consideration, but this may still only demonstrate acute toxicity to adult animals and miss sublethal effects on behavior, feeding, and reproduction and the many possible interactions among species that shape communities.

Field biologists, on the other hand, often prefer to try and detect the impact of effluents on whole communities, though they are sometimes forced to focus much of their attention on a single group because of deficiencies in the taxonomic literature for many groups for large parts of the world. These biologists have progressed from an "indicator species" to an "indicator community" concept, and in this they have been aided by shifting from a simple diversity index to more flexible classification and ordination statistics that enable reasonably objective data plots to be made that can have immediate visual impact—an improvement over the original data matrices of relative abundance by station number of species with unfamiliar names.

Books on pollution biology usually take one or the other of these two approaches, and some attempt to review the field. The present volume might be expected to be aimed at the field-biology approach because it is organized on a taxonomic basis. Several of the authors (those writing on nematodes, bryozoans, polychaetes, and crabs) provide sketches of the general biology of the group in question, some (those writing on nematodes, polychaetes, crabs, and amphipods) indicate the best sources of taxonomic assistance, and all of these authors then provide the sort of information that is necessary to the interpretation of the results of field surveys carried out by nonspecialists. Although all 17 contributors to the book are from the United States, the literature coverage is global.

One might expect the level of effort in such a book to vary depending upon the state of knowledge of any one group at this arbitrary instant, but this volume shows considerably greater inconsistency than might have been expected on those grounds alone. I suspect, judging from the contents of the companion volume on freshwater invertebrates published in 1974, that the editors intended the book to be based largely on field studies, with reference to the toxicological literature where relevant, yet different authors have taken different approaches. The chapters on nematodes and bryozoans bring recent statistical methods to bear on field data and those on polychaetes and ostracods take a somewhat anecdotal "indicator" approach, but the chapters on shrimp and larval decapods are almost exclusively toxicological. The greatest value would have been achieved by having representatives of both the field-biology and the toxicological approach present work on each taxonomic group; alternatively, better focus would have been achieved if only one approach had been adopted.

The selection of taxonomic groups could also be criticized, on grounds both of inclusion and exclusion. For instance, there is a chapter devoted to *Cyathura*, which does not merit detailed treatment in this context, whereas there are none dealing with representatives of the Protozoa, Porifera, Coelenterata, Ctenophora, Platyhelminthes, Nemertinea, and Echinodermata.

In short, the book is a valuable source of a wide variety of opinion and information but would have benefitted from a more stringent editorial policy or some attempt at a summary.

R. O. BRINKHURST
Institute of Ocean Sciences,
Patricia Bay, Sidney,
British Columbia V8L 4B2 Canada

Anaerobiosis

Living without Oxygen. Closed and Open Systems in Hypoxia Tolerance. PETER W. HOCHACHKA. Harvard University Press, Cambridge, Mass., 1980. xiv, 182 pp., illus. $17.50.

This book arose from a series of lectures presented by the author, a comparative biochemist, to a medical audience. Having encountered limited awareness of metabolic plasticity, he expanded his lectures into a simple account of the diverse mechanisms that permit animal life in the absence of oxygen. The zoological approach was chosen to distinguish the fixed from the adaptable components, a traditional goal of the comparative method, in hopes of yielding medically useful information, a far less conventional goal. As Hochachka points out, only clinical experience will test the usefulness of his approach in the latter respect; but the attempt to illustrate both the strict metabolic requirements of anaerobiosis and the various mechanisms evolved to fulfill them is a success.

Nine chapters range fearlessly over the animal kingdom, from parasitic helminths through the bivalve and cephalopod mollusks, water- and air-breathing fish, and diving mammals. The treatment is based largely on work done on particular members of these groups by Hochachka and his students. The chapters are followed by lists of representative publications from various laboratories. Unpublished findings of studies still in progress are frequently cited. Thus the coverage is quite current, if at times more speculative than it appears to be.

We learn about metabolic relationships, not always obvious, that demonstrate the importance of adaptability.