BOOK REVIEWS

Limnol. Oceanogr., 40(3), 1995, 644

MARGALEF, R. [ED.]. 1994. **Limnology now: A paradigm of planetary problems.** Elsevier Sci., New York. 553 p. $194.50. ISBN 0-444-89826-3.

This wide-ranging, informative, and at times reflective text is the culmination of efforts organized under the Mediterranean Agronomic Institute at Zaragoza, Spain, which has sponsored a series of courses in limnology since 1977 that featured the participation of limnologists from many countries. The expressed aim of the text is to stress the role of inland waters as a vital part of the biosphere, with an emphasis on practical problems. The 22 contributors from four continents provide an expansive review of selected topics, and the individual contributions are well referenced.

Contributions include regional treatises about arctic and subarctic limnology (D. Planas), tropical (J. G. Tundisi) and austral (A. A. Bonetto) freshwater systems of South America, and dry land aquatic ecosystems (F. A. Comín and W. D. Williams), plus a focused review of Spanish reservoirs (A. Armengol, J. Toja, and A. Vidal). Rivers receive expansive treatments both in some of the regional reviews and also from contributions by J. V. Ward and by N. Prat and J. V. Ward. There is a thoughtful discussion of the chemical evolution of epicontinental waters (R. Psenner and J. Catalan) that includes treatment of acidification and lake alkalization. The text also features chapters with fresh biological perspectives about phytoplankton (J. Capblancq and J. Catalan), bacteria (C. Pedrós-Alió and R. Guerrero), and macrophytes (C. M. Duarte, D. Planas, and J. Peñuelas).

One chapter in particular could potentially provide intellectual fodder for a seminar course in lake processes. J. Imberger provides a mini-monograph with nearly 100 pages devoted to physical limnology, including more than 200 equations useful for characterizing transport processes in lakes. Readers are best advised of the 3-page list of symbols at the end of the chapter so that, unlike me, they don't fall temporarily clueless when new variables arise without explanation. Needless to say, it is not all light reading, but the formulations and references are an invaluable entree to subject matter that is poorly represented in most limnology curricula.

The text also includes a set of contributions that are more in the form of essays than scientific reports, and they are natural philosophical companions to the rest of the volume. Ramon Margalef describes his view of the role of epicontinental waters in global perspective, and Jack Vallentyne expands vintage socio-political arguments about the biosphere that anyone who talks with nonecologists should have at the ready. One thought-provoking piece, by J. Catalan and E. J. Fee, discusses interannual variability in lake ecosystems and decries the use of terms "new" and "regenerated" production borrowed from ocean science in favor of terms and perspectives that permit the rich variability of lake processes to be credited.

The capstone of the volume is the concluding essay by W. T. Edmondson ("What is limnology?") that seeks to answer a question first made so daunting by the publication of Forel's monographs and the subsequent growth and differentiation of their scientific substance. Arrayed against a host of basic and practical problems linked by their common involvement with aquatic environments, limnology has experienced different disciplinary ontogenies in the work of geologists, biologists, chemists, fishery scientists, and engineers. Faced by the breadth of the basic sciences that practitioners must bring to bear on problems in the natural world, Edmondson concludes this text with the discerning view that limnologists may not practice a mere multidisciplinary science at all. Limnology, he argues, is a superscience.

John T. Lehman

Department of Biology and Center for
Great Lakes and Aquatic Sciences
Natural Science Building
University of Michigan
Ann Arbor 48109

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LATHJA, K., AND R. H. MICHENER [EDS.]. 1994. **Stable isotopes in ecology and environmental science.** Blackwell Sci. Publ., Oxford. 316 p. [softcover] $32.95. ISBN 0632-03154-9.

The first gravimetric estimation of the (absence of) fractionation of stable isotopes at the natural abundance level in a biological process is probably the report of Washburn and Smith (1934). The use of enrichment (tracer) methods in laboratory studies on aquatic organisms goes back over 50 yr (Ruben et al. 1941). The modern era of natural abundance isotope work in biology started with the work of Craig (1954) on terrestrial plants. From these beginnings the use of stable isotopes at both enrichment and, especially, the natural abundance levels has become a widely used technique in ecology and environmental science.

The enrichment made is analogous to the use of radioactive tracers but is free of the specific health and safety regulations associated with the use of ionizing radiation. However, the techniques involved in the analysis of enrichment levels of stable isotopes are commonly regarded as less convenient than those for radioactive tracers. A further consideration which one hesitates to mention in a highly regarded journal is that any spillage of enriched stable isotope in the laboratory, or poorly controlled use in the field, can compromise any natural abundance work involving the same isotope in the laboratory or habitat.

Natural abundance level studies contrast with enrichment studies in being noninvasive until the time of sampling from the natural environment. Such investigations have provided otherwise inaccessible information on food webs, and on the mechanism of C, N, and S acquisition and of O_2 and H_2O uptake and handling. When the pathway of acquisition is known, the discrimination expressed in the field can be used to make quan-