The Limnology and Oceanography

Bulletin

The American Society of Limnology and Oceanography is a membership-driven scientific society (501(c)(3)) that promotes the interests of limnology (the study of inland waters), oceanography and related aquatic science disciplines by fostering the exchange of information and furthering investigations through research and education. ASLO also strives to link knowledge in the aquatic sciences to the identification and solution of problems generated by human interactions with the environment.

Editor: Greg Cutter, Old Dominion University, Norfolk, VA 23529-0276 USA, Tel: 757-683-4929, gcutter@odu.edu

Associate Editor: Fred C. Dobbs, Old Dominion University, Norfolk, VA 23529-0276 USA, Tel: 757-683-5329, fdobbs@odu.edu

ASLO Business Manager: Helen Schneider Lemay, ASLO Business Office, Waco, TX 76710 USA, Tel: 254-399-9635 or 800-929-2756, Fax: 254-776-3767, business@aslo.org http://www.sgmeet.com/aslo

Advertising: Helen Schneider Lemay, ASLO Business Manager, Tel: 254-399-9635 or 800-929-2756; business@aslo.org

The *L&O Bulletin* is published quarterly by the American Society of Limnology and Oceanography, 5400 Bosque Blvd., Suite 680, Waco, TX 76710 USA. Postage paid at Waco, Texas. POSTMASTER: Send address changes to ASLO Business Office, 5400 Bosque Blvd., Suite 680, Waco, TX 76710 USA.

Subscription price to regular members is included in annual dues. Information on institutional subscriptions is available upon request from the ASLO Business Office.

Views expressed in this publication do not necessarily reflect official positions of the American Society of Limnology and Oceanography unless expressly stated.

The *L&O Bulletin* publishes brief, peer-reviewed articles of broad interest to the ASLO membership, Letters to the *Bulletin* (typically responses to articles), as well as ASLO News on a quarterly basis. Information on the preparation and submission of articles and letters can be found on the ASLO web site (www.aslo.org). It is recommended that you contact the editor before preparing an article or letter.

ml^{-1} or ~200 body lengths apart, is difficult to visualize, so their density is related to a human scale—people standing ~0.5 km apart. Also, some marine ecological concepts are compared to concepts in terrestrial ecology—again, these exercises are illuminating.

Adding to the text's accessibility, the chapters are well organized owing to a number of features. Chapters begin with an overview paragraph, page margins are bulleted with important points and weblinks, and chapters end with a list of summary points and a "Further Reading" section. Finally, an extensive list of weblinks and their descriptions is found at the back of the book. In lieu of a glossary, the reader is directed to a comprehensive website. In addition to the electronic dictionary, I would have liked a glossary at the end of the book, but given the text's length, it may have been prohibitive to add more pages.

The concepts are well supported by numerous graphs, illustrations, color photos, and photomicrographs. I wondered if images having superimposed scale bars—all but absent from the book—would help students interpret the photomicrographs. A lack of scale bars is not uncommon among scientific texts, nonetheless, I frequently find myself wishing for them. Another distraction is the occasional legend that does not fully describe all attributes of the accompanying graphic or table; however, these issues can be addressed easily in subsequent editions.

The text is sprinkled with discussions of bygone hypotheses or methods. Each discussion further impresses upon the reader science's fluid nature. Good! Texts of all levels should reinforce the idea that knowledge is dynamic. As science and scientists move away from the ivory tower and become more engaged in policy making, it is gratifying to see ecology texts such as this one with a heavy emphasis on environmental impacts; as it should be, fully 20% of the book is devoted to human imprints in the marine environment. No longer can marine ecology merely describe trends in distributions of organisms or interactions among them and their environment without also seriously considering the consequences of human activities.

REFERENCE

Pauly, D., V. Christensen, J. Dalsgaard, R. Froese, and F. Torres Jr. 1998. Fishing down marine food webs. Science 279: 860-863.

SARMIENTO, JORGE L., and NICOLAS GRUBER. 2006. **Ocean Biogeochemical Dynamics.** Princeton University Press. ISBN 0-691-01707-7 (cloth). xii + 503 p. US $75.

Reviewed by ***David M. Karl,*** *Department of Oceanography, 1000 Pope Road, University of Hawaii at Manoa, Honolulu, Hawaii 96822 USA; dkarl@hawaii.edu*

Professors Sarmiento and Gruber have produced a textbook that provides a comprehensive treatment of processes controlling the distribution of carbon and associated biophilic elements in the sea. This book is not a collection of independent chapters prepared by recognized experts in the respective subdisciplines, but a "real" textbook beautifully illustrated with both conceptual diagrams and oceanic data, complete with an extensive and largely up-to-date bibliography, and featuring problem sets following each of the ten major chapters. This new text is based on classroom lectures the two have delivered to upper-level undergraduate and graduate students, primarily at Princeton University (JS) and the University of California at Los Angeles (NG). It incorporates and synthesizes many recent advances in our understanding of marine biogeochemical processes resulting from the nearly two-decade long Joint Global Ocean Flux Study (JGOFS) program and associated global modeling efforts. In many respects, this book is modeled after Broecker and Peng's textbook, *Tracers in the Sea,* that set out to summarize and synthesize our then-extant (circa 1982) knowledge of related topics following the successful Geochemical Ocean Sections (GEOSECS) program. *Ocean Biogeochemical Dynamics* is an ambitious undertaking given the breadth of subject matter and the complexity of the biogeochemical cycles under investigation. For the most part, the authors have achieved their stated goals. This is truly a majestic monograph.

A book with this title could assume any one of several organizational structures and major foci, and the one selected will not be a perfect match for all purposes. In this case, the authors have built a fundamental framework, using a quantitative and mathematical approach, to formulate hypotheses and construct meaningful models. The book's title could have been *Ocean*

Dynamics and Biogeochemistry, since there is not a unique focus on biogeochemical dynamics (i.e., microbiological rates and processes) *per se.*

The book begins with several "tutorial" chapters that provide the foundation necessary for the more detailed presentations that follow. As a starting point, the authors assume kinetic processes mostly controlled by marine microorganisms determine the chemical composition of the sea. Chapter 1 deals primarily with ocean chemistry and—to a lesser extent—biology, and provides a useful primer on box modeling, an analytical tool used throughout the book. It concludes with an explicit statement about the intent of the book (p. 15): "to understand the processes that control the mean oceanic concentration as well as the spatial and temporal variations of chemicals that are influenced by biological processes." Chapter 2 provides a primer on physical dynamics, including topics such as circulation, equations of motion, mass conservation, and climate forcing. Chapter 3 presents a comprehensive discussion of air-sea processes, including a discussion of the importance and the complexity of gas-transfer processes based on both models and field data. I learned quite a bit in these 30 pages.

Chapters 4–10 comprise the pièce de résistance of the book, mostly focused on the ocean's carbon cycle from organic-matter production to remineralization, including anthropogenic perturbations and climate impacts. Chapter 4, entitled "Organic Matter Production" develops the new- and export-production paradigms, and stresses the role of the biological pump, perhaps at the expense of the many other biological processes and dynamics that reside in the sea. For example, merely three short paragraphs of this book's 460 pages of text were devoted to "Bacteria" (p. 137–138), now known to be the most abundant forms of life, the largest pool of living carbon, and the largest contributors to biodynamics in the sea. This chapter also introduces several ecosystem-modeling approaches with relevant case-study applications. Chapter 5 is the most interesting one in the book, in my opinion. It presents, in a concise and comprehensive manner, the stated goal of the text—namely, the biological controls of the chemical composition of the sea. In this chapter, the important links between transport and remineralization of organic matter and N-P-O_2 distributions are presented and discussed. There is a very nice subsection on "Dissolved Organic Matter" (p. 211–215), but much more could have been offered about what is essentially one of the planet's largest reservoirs of exchangeable carbon. The chapter ends with an excellent presentation of ocean general-circulation models (OGCMs), which have been used to integrate these data sets and our extant knowledge about pathways and processes into coupled systems that can be used to simulate parameter distributions and fluxes. Chapter 6 deals exclusively with benthic processes, namely the deposition, remineralization, and burial of organic matter in coastal and deep-ocean sediments. This chapter seemed out of place but was nonetheless interesting. Chapters 7–9 were dedicated to the independent cycles of silicate (mostly opal), carbon (mostly dissolved inorganic carbon and carbonate alkalinity), and calcium carbonate-production processes, dynamics, and model applications. These are important components of "ocean biogeochemical dynamics" for sure, but I would have considered the oceanic N, P, and S cycles as deserving of their own separate chapters as well. The final chapter is an integration of the carbon cycle, CO_2, and climate, but includes only five paragraphs on "The Role of Biology." This lack of attention to biological processes results from the authors' conclusion, demonstrated by models, that they have essentially no role to play in the uptake of anthropogenic CO_2 at the present time. Future climate variations may alter the balance between physical and biological pathways, and much more research needs to be done to fully understand and model all the potential consequences.

In summary, this textbook is a monumental and masterful achievement, and the authors should be congratulated both for taking on this important task and for the end result. As a microbial oceanographer, I would have liked to see more detail on the nature of oceanic life, its diversity of form and of function, and a more detailed treatment of energy-flow pathways that sustain the elemental cycles discussed in this book. Admittedly, these latter topics are works in progress since we are still very much in the discovery phase of this research. But these are relatively minor, biocentric criticisms of what is likely to become a biogeochemical blockbuster—the "must read" of this decade. Every serious student and post-doc in this discipline, and all senior practitioners, should purchase or borrow a copy of this book and read it from cover to cover.

ASLO NEWS

MESSAGE FROM THE PRESIDENT

Sybil P. Seitzinger, *Rutgers University, Institute of Marine and Coastal Sciences, Rutgers/NOAA CMER Program, 71 Dudley Rd, New Brunswick, NJ, USA, 08901; president@aslo.org*

YOUR BOARD

The terms for several Board members have been completed (Pete Jumars 6-year cycle as President-elect, President, and Past-President; Robert Sterner, Daniel Conley and Deborah Bronk as Members-at-Large; Letisse Houser as Student Representative). Next time you see them at ASLO meetings, don't forget to thank them for their contributions to the success of ASLO through their dedicated service on the Board. I'm glad to report that each of these individualswill continue to serve ASLO through their work on various ASLO committees.

I would like to welcome our newly elected Board members: Carlos Duarte (President-elect); Robin Anderson (Secretary);