ers have turned toward the study of living planktonic foraminifera. In *Modern Planktonic Foraminifera*, Hemleben, Spindler, and Anderson provide a synthesis of over two decades of field and laboratory research on these organisms. The authors introduce the subject with an excellent review of the planktonic foraminiferal species found in today's oceans. Current knowledge of morphology, ontogeny, nutrition, and habitat distribution is presented for each species, along with excellent scanning electron micrographs. The second chapter reviews the collection and culturing of planktonic foraminifera for laboratory study.

By far the strongest focus is on biological aspects of these marine protozoans. Hemleben *et al.* provide an excellent review of shell ontogeny and aspects of chamber formation and calcite secretion. Researchers studying biomineralization will find these chapters enlightening. Foraminiferal ultrastructure is examined in detail, and a sense of the complexity of these organisms is conveyed. The section on symbiotic associations points out that different foraminiferal species may be obligate or facultative hosts of either dinoflagellate or chrysophyte algae. Planktonic foraminiferal ecology and trophodynamics are covered in detail. An interesting finding is that a number of species may reproduce on a lunar cycle. Since reproduction results in the termination of the life of the foraminiferan and subsequent settling of the empty shell to the sediment, this observation may have significant implications for studies examining carbonate flux in the ocean.

Hemleben *et al.* conclude their synthesis with a summary chapter that relates the subject matter to questions of paleoceanographic importance. Given the impetus for the book, it is disappointing that this chapter is so short.

Overall, the book is well written, well referenced, and relatively easy to read. Figures from the primary literature have been included throughout the text, and many of the chapters cite "in press" articles as well as unpublished data collected by the authors. Sufficient detail is provided in each section to give the reader a broad background on the subject matter. Paleoceanographers and micropaleontologists will find *Modern Planktonic Foraminifera* a valuable reference to consult when interpreting fossil foraminiferal data. In addition, biologists will find a large body of information on a range of subjects as diverse as biomineralization, protozoan cell biology, and zooplankton trophic interactions.

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Information Issues

Biomolecular Data. A Resource in Transition. RITA R. COLWELL, DAVID G. SWARTZ, and MICHAEL T. MACDONELL, Eds. Oxford University Press, New York, 1989. xiv, 367 pp., illus. Paper, $64. Based on a workshop, Gaithersburg, MD, May 1987.

Biotechnology is now an important part of virtually all biological fields from agriculture to medicine, from basic research to industry. The field as a whole is moving into the "big science" mode with the advent of the Human Genome Project. With this dramatic growth in both scope and size is coming an equally dramatic explosion in information. The Committee on Data for Science and Technology (CODATA) of the International Council of Scientific Unions recognized the urgency of addressing this phenomenon by helping sponsor the First CODATA Workshop on Nucleic Acid and Protein Sequencing Data in May 1987. *Biomolecular Data: A Resource in Transition* is a result of the workshop. The papers it contains were clearly written independently and vary widely in length, style, breadth of view, and subject, but the editors have managed a reasonable organization of them and have provided introduction and summary sections that aid considerably in extracting the general issues.

The subtitle, "A Resource in Transition," accurately portrays the situation of biotechnology information. Unfortunately this transitional character also makes many of the specifics given in the book out of date already. The BIONET resource described in one paper no longer exists. The lag time for sequence entry into the GenBank database has been greatly decreased from the lag times quoted in the book. The three papers from the National Library of Medicine make no mention of the large National Center for Biotechnology Information created at the library by Congress in 1988. Several papers discuss the possibility of journal editors' encouraging submission of sequence data to the databases as part of the publication process when, in fact, dramatic progress in this direction has been recently achieved.

However, the more general themes raised in the book are still very much issues today. There is still no generally accepted format for sequence data exchange. The difficult sociological issues raised by public scientific databases are still very much with us. Should scientists who publish articles interpreting their research data be required to make the data themselves available in a public database? How could meeting of such a requirement be facilitated or enforced? How can standards for data exchange be established when the structures of the data themselves are still changing? Who is responsible for controlling scientific vocabularies? If such groups can be identified, how can official nomenclature be distributed and its use enforced? How can scientific software and databases retain their usefulness as the hardware and software platforms on which they were developed become obsolete? How can databases created in diverse disciplines be linked and integrated in a flexible, biologically meaningful way?

The discussions of these issues and the points of view expressed in the papers are still as germane to the current moment as they were in 1987. In order to move into the computer age, the way science is done must change. The notion of what constitutes publication will change. The parts of one's daily work that become open to public scrutiny will change. In return, the world of information at the scientist's fingertips will expand and deepen dramatically. *Biomolecular Data* offers a good opportunity to acquaint oneself with the issues and to share some visions of what the future may hold.

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Books Received

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Ada. The Design Choice. Angel Alvarez, Ed. Cambridge University Press, New York, 1989. x, 275 pp. $39.50. The Ada Companion Series. From a conference, Madrid, June 1989.

The Aharonov-Bohm Effect. M. Peshkin and A. Tonomura. Springer-Verlag, New York, 1989. vi, 152 pp., illus. $21.10. Lecture Notes in Physics, vol. 340.

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