Marine Geology

The Oceanic Lithosphere. CESARE EMILIANI, Ed. Wiley-Interscience, New York, 1981. xiv, 1738 pp., illus. $175. The Sea, vol. 7.

Even a quick scan of this book is enough to reveal the enormous advances in marine geology and geophysics that have taken place since the publication almost 20 years ago of its ancestor in this series, volume 3, *The Earth Beneath the Sea*. Sea floor spreading and plate tectonics, subjects that were brand new in 1963, are now so entrenched that they appear in virtually every marine geology article. Paleoceanography is another subject that barely existed 20 years ago but now looms large in studies of marine sediments.

How successful is the book in capturing the essence of the geologic revolution of the past two decades? Overall, I would award it a solid B. Its strengths lie in a number of outstanding papers. I was most impressed with those on plutonic rocks by Fox and Stroup, helium-3 by Craig and Lupton, authigenic silicates by Kastner, and paleoceanography by Berger. Overall, 21 of the 35 papers are good enough to serve as basic references for incoming graduate students or for professionals seeking an awareness of specialties other than their own. I rated only two papers as poor.

The weaknesses of the book lie in its long gestation period and in the topics that are inadequately covered. An inordinate delay in publication means that most of the papers have a slightly dated aura. Very few references more recent than 1978 are cited, and even the "Recent Literature Added in Proof," in 11 papers, covers references only through 1979 in some cases.

That some topics are slighted may, in part, result from this delay. For example, high temperature hydrothermal systems, first observed in 1979, are having a profound influence on ideas about oceanic chemistry, ore genesis (see, for example, the recent 75th anniversary volume of *Economic Geology*), and crustal alteration. Yet a chapter on ocean floor hydrothermal activity makes no mention of the 350°C springs and reproduces none of the spectacular *Alvin* photographs that have graced innumerable journals and magazines for the past three years. Instead, the paper contains some pedestrian photographs taken from a remotely guided deep-towed camera and a text seemingly designed to establish (fallaciously) the pivotal role of P. Lonsdale in developing this area of research. Fortunately, Craig and Lupton and Bonatti do treat some of the implications of the 350°C springs in their papers.

One also looks in vain for a synthesis of the enormous amount of research on deep-sea manganese nodules carried out during the 1970's by investigators from France, Germany, and the United States or for a comprehensive review of the CLIMAP program by one of the participants (although Berger's synopsis is accurate given the limited space he could assign to this topic).

The final section of the book is devoted to Emiliani's view of the new global geology. The portion on ocean, atmosphere, and ice caps will fascinate Quaternary geologists and future historians of science. My recollections of some of the tableaus mentioned by Emiliani do not exactly coincide with his. Nevertheless, the section is a charming look at one man's view of his role in history. I hope Emiliani's contemporaries take the time to prepare equally detailed recollections.

Finally, I must confess some irritation with the number of typographical errors in the book. For $175, one expects competent proofreading at the very least.

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Crustaceans

Fossil and Recent Ostracods. R. H. BATE, E. ROBINSON, and L. M. SHEPPARD, Eds. Published for the British Micropalaeontological Society by Horwood, Chichester, England, 1982 (U.S. distributor, Halsted [Wiley], New York). 494 pp., illus. $105. British Micropalaeontological Society Series. Ellis Horwood Series in Geology.

This book honors Peter Sylvester-Bradley, professor of geology at the University of Leicester, who died in 1978. He was an internationally known paleontologist with a wide range of interests including Ostracoda, which he considered to be ideal for demonstrating evolutionary and paleoecological concepts because of their long geological history and ever-changing morphology. He was a man with enthusiasm and stimulating ideas, a combination that attracted to his laboratory students from many countries. The editors invited contributions from specialists who "might be said to sustain a Bradleyan touch." About a third of the contributions are from scientists from England, Wales, and Scotland, five from Germany, three from France, two from the United States, and one each from Australia, Israel, Russia, and Sweden.

The 24 papers in the book are grouped into six categories: Structure (four papers); Experimentation and Techniques (six papers); Systematic Reviews (six papers); Recent Distribution and Ecology (four papers); Concepts (two papers); History (one paper); and a Postscript.

Sylvester-Bradley was an early enthusiast of the use of the scanning electron microscope for the study of ostracods, and the popularity and usefulness of the SEM today are evident in the profuse illustrations in this book. Its usefulness is enhanced when it is used in conjunction with other instruments such as the transmission electron microscope, as exemplified in the study by R. H. Bate and L. M. Sheppard of the shell structure of *Halocypris inflata*. Although the authors may be challenged for their interpretation of "rigid plates" as building blocks in the formation of the shell, rather than as decomposition products, the multidimensional approach should eventually lead to a better understanding of the process of shell formation. Amnon Rosenfeld's work on the secretion process forming the ostracod carapace includes scanning and transmission electron microscopes, an electron probe analyzer, and an x-ray diffractometer, a more diverse array of instruments than has previously been used in a single study of the subject. Some significant details of the secretion process are elucidated, but the major impression is that studies of the subject are in a very preliminary state; this important paper should certainly stimulate additional research.

A microscope is described by T. R. Empson in which laser holography is used to project replicas of the ostracod shell. This technique has not been previously reported but apparently needs much additional development to produce a perfect image. Another paper presents results by R. C. Whatley, K. Trier, and P. M. Dingwall of engineering-type tests designed to measure resistance to impact and compressional loading of empty ostracod valves and carapaces. One of the results of the tests suggests that certain structures (such as reticulations) that have been widely believed to strengthen the valves of some ostracods do not have that effect. This should stimulate animated discussion and additional experimentation.

A contribution of obvious importance is that of Richard Reyment, in which the morphological variation in time of a Pa-

leocene species of *Cytherella* from two boreholes in western Nigeria is analyzed by means of quantitative genetic formulas. The methodology will probably serve as a model for future studies of this type.

At least eight papers dealing with taxa ranging from the Upper Cambrian to the Recent are of value to the traditional systematist, but the spectacular SEM micrographs of the appendages and body of the Upper Cambrian *Hesslandona unisulcata* by K. J. Müller should be of interest to all zoologists. Although Müller has previously published SEM micrographs of appendages of Cambrian ostracods, none have shown the detail visible in the present specimens.

It is fitting that in the Postscript, entitled "From conversations with Peter: Reminiscences of the philosophy of P. C. Sylvester-Bradley," R. H. Benson provides an insight into the philosophy of this inspiring teacher, a theme that is included less particularly in some of the preceding chapters.

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A Biochemical Pioneer

Experiences in Biochemical Perception. L. NICHOLAS ORNSTON and STEPHEN G. SLIGAR, Eds. Academic Press, New York, 1982. xx, 382 pp., illus. $47.

This book is meant to teach us something about the perception and style of I. C. Gunsalus. Gunsalus was one of a rather small, remarkably talented group of young scientists who collectively shaped biochemistry as a discipline in the 1940's. Their fundamental discoveries and ability to pass on their enthusiasm for the still fledgling field to their students launched the explosive advance that continues unabated today. Gunsalus's interactions with colleagues are always extreme and decidedly nonuniform. This kind of behavior, which is at the root of his success, makes it difficult for one or two of his colleagues to capture the spirit of the man and his research. Wisely, the editors of *Experiences in Biochemical Perception* decided to solicit papers from a broad cross section of Gunsalus's colleagues and former students. The only charge to them was to recount the history of a line of research that can be traced to an insight gained through interactions with Gunsalus. The resulting decidedly nonuniform but candid and skillfully prepared collection of 27 papers was presented to Gunsalus at a symposium held in honor of his 70th birthday this year.

The papers included in the volume range from histories of life in the Gunsalus laboratory during the times of discovery to primary research reports presenting new data that had their roots in interactions with Gunsalus. The histories, especially those by W. W. Umbreit and D. J. O'Kane describing the discovery of the coenzyme forms of pyridoxal and lipoate, are particularly informative. They convey the sense of excitement and urgency that accompanied the discoveries as well as the retrospective despair at missed opportunities. They also give the reader a sense of the "total abandon" with which Gunsalus attacked problems while at the same time retaining perspective and waiting, almost patiently, for the true answer to emerge in response to a well-mounted experiment. A remarkable paper by R. Y. Stanier detailing a collaboration with Gunsalus in the early 1950's contains a collection of letters written by Gunsalus about the ongoing research as well as about the state of science at the time. The letters are at one level undecipherable and at a second level eminently clear, a quality Gunsalus would later bring to perfection.

Histories of later discoveries reveal Gunsalus as a mature scientist with broad influence, expanding his research interests in many directions. In order to answer the questions that interested him, he simultaneously established groups in genetics, chemistry, and physics, each dominated by his demand for quality and his remarkable hunches. One such hunch, that bacteria gain their enormous nutritional diversity through transfer of plasmid DNA, is documented by A. M. Chakrabarty. In another paper S. G. Sligar shows how a second hunch, that bacterial metabolism of camphor might hold some interesting stories, led to the first homogeneous preparation of cytochrome P-450 and subsequently to the revelation of many details of the chemistry and physics of its mechanism.

Clearly this collection of papers will be most meaningful to the numerous students and colleagues of Gunsalus who can call upon their own impressions and experiences to complete the glimpse of the man presented in the contributions of others. Nevertheless there are important lessons here, particularly about the intensity required to promote discovery, the importance of learning how to listen to what nature returns in response to meaningful experiments, and the rewards for enthusiastic pursuit of what one enjoys doing. Young scientists embarking on a career in research will find it particularly valuable. The entire volume is written for the nonspecialist and should have wide appeal.

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Current Topics in Membranes and Transport. Felix Bronner and Arnost Kleinzeller, Eds. Vol. 17, Membrane Lipids of Prokaryotes. Shmuel Razin and Shlomo Rottem, Eds. Academic Press, New York, 1982. xxviii, 384 pp., illus. $45.

Darwinism and Human Affairs. Richard D. Alexander. University of Washington Press, Seattle, 1982. xxiv, 318 pp., illus. Paper, $9.95. The Jessie and John Danz Lectures. Reprint of the 1980 edition.

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