on evolutionary processes, followed by a classification of the vertebrates and an index. The book is well edited and is virtually free of typographical errors. There is even at least one joke (p. 487). The illustrations are good, copious, and apposite, although I wish that some drawn by the stipple technique could have done more justice to foramina, to sutures between bones, and to details of dental patterns. Translucence of the pages is occasionally an annoyance: illustrations and text sometimes show through and can be confusing.

Vertebrate Paleontology and Evolution is a worthy successor to Romer's textbook. We need books like Carroll's in order to keep track of an explosively expanding subject and to serve as introductory texts for courses on vertebrate evolution.

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Oceanic Island Evolution

Islands. H. W. MENARD. Scientific American Books, New York, 1987. xvi, 230 pp., illus. $32.95. Scientific American Library, vol. 17.

This book, H. W. Menard's last to be published, presents a lifetime of observations and research on oceanic islands, including their discovery and exploration, their geologic, economic, and political histories, and the adaptation of their plants and animals to life on (as Menard terms it) "a down escalator." The book clearly departs from a dispassionate view of the subject, with frequent references to the impact of humans (Polynesian and European) on the idyllic island setting during periods ranging from the time of first population through World War II and its destructive battles to the recent era of selective annihilation by nuclear testing. Menard was ahead of his time (or perhaps old-fashioned) in believing that scientists need a social conscience.

The emphasis of the book is on the subject that Menard knew best: the geologic evolution of oceanic islands and the theories about why it occurred as it did. He presents many topics central to earth science, such as the drifting of plates, subduction of oceanic lithosphere, and eustatic changes in sea level, in terms accessible to nonspecialists before explaining their relevance to the study of oceanic islands. The point is well made that islands are major departures from the otherwise fairly uniform process of oceanic crust and lithosphere production and therefore may figure prominently in unexplained phenomena such as the segmentation of downgoing slabs and the formation of accreted terranes. Particular attention is paid to vertical motions of islands and the various processes contributing to them that Menard documented, such as cooling of the oceanic lithosphere, thermal rejuvenation of midplate swells, erosion and reef development, and flexural warping of the sea floor. I noted only a few inaccurate statements in the book: for example, the San Andreas Fault is described (p. 33) as a ridge-ridge transform instead of a ridge-transform transform (since the Mendocino Ridge is actually a transform fault), and one of the figure captions indicates that the oceanic crust (rather than *lithosphere*) thickens with age.

Most readers will appreciate this book for its breathtaking photographs, lavish illustrations, absence of jargon, and lively narrative style. The text is punctuated by Menard's wit, with its tendency toward understatement. For example, in explaining how the European discovery of various island groups was influenced by the distribution of the trade winds, he writes of Magellan: "After beating his way through the straits that bear his name, it could hardly have escaped his attention that he was in the wrong latitude to sail west" (p. 8).

But in my opinion, the book's principal value stems from the author's ability to distinguish facts based on observation from currently accepted models and untested hypotheses. It represents a unique resource of new ideas concerning geologic evolution of the ocean basins from an island perspective as well as of suggestions about where to test them. It is a book that only Menard, whose encyclopedic knowledge of the oceans inspired so much of the work of his students and colleagues, could have written. For those who never had the opportunity to work with him, and those who miss that interaction now, this book carries on the Menard tradition.

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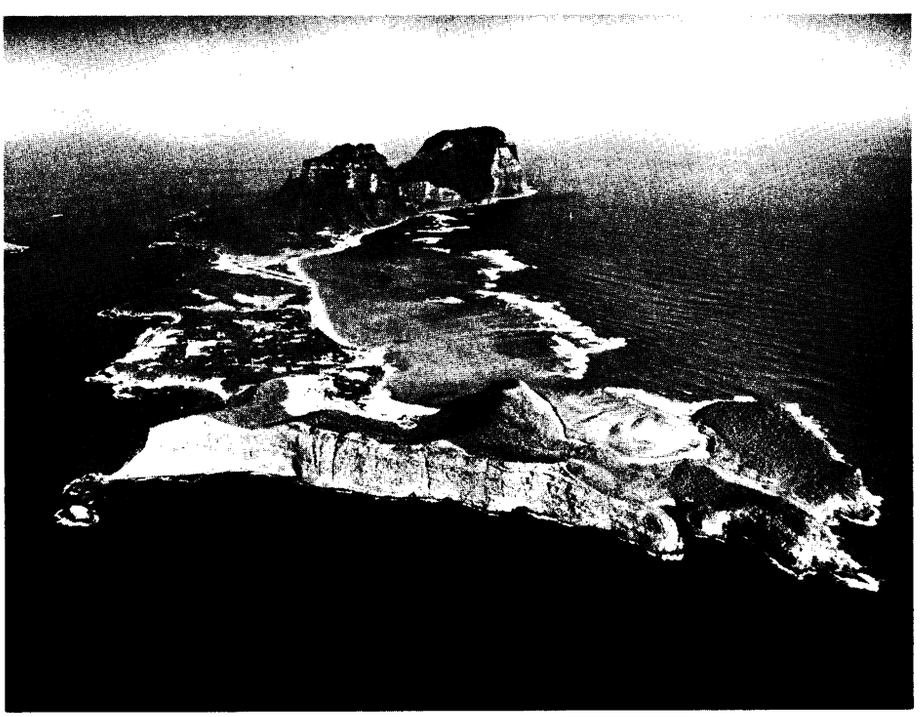
Microbial Metabolism

Phosphate Metabolism and Cellular Regulation in Microorganisms. ANNAMARIA TORRIANI-GORINI, FRANK G. ROTHMAN, SIMON SILVER, ANDREW WRIGHT, and EZRA YAGIL, Eds. American Society for Microbiology, Washington, DC, 1987. xii, 316 pp., illus. $49; to ASM members, $39. From a symposium, Concarneau, France, 1986.

Unlike many volumes of symposium proceedings, this book reads as an engrossing whole. The timing of the symposium from which it derives was adroit—a number of areas in the large and active field of phosphate metabolism are now on the verge of major advances; the symposium was well planned, with an outstanding selection of



"Lord Howe Island, east of Australia, sits well off center on its shelf. The isolated pinnacle in the distance is Ball's Pyramid." [Promotion Australia; from *Islands*]

participants; and its proceedings are beautifully produced—admirably organized, impeccably edited, and published in the very useful American Society for Microbiology format, with full titles of literature cited.

There is the right amount of historical background, including accounts of the discovery of *Escherichia coli* alkaline phosphatase in 1960 (A. Torriani-Gorini) and its early exploitation in gene-enzyme studies (F. G. Rothman), the unfolding of the complexity of the phosphate starvation global response in *E. coli* (more than 80 proteins are made at higher rates when cells are stressed by phosphate starvation), and the key role of alkaline phosphatase as the first periplasmic enzyme shown to be made as a cytoplasmic precursor with a signal sequence (by Hirushi Inouye and Jon Beckwith in 1977). The volume is dedicated to Inouye, who died in 1986, and Beckwith provides the introduction to the section on protein secretion. Each of the nine sections is introduced briefly and its content put into historical perspective.

The volume contains a satisfying balance of reports of new results in specific areas of phosphate metabolism and excellent short review papers that provide the context for future advances. There are sections on phosphate regulation in *E. coli* (Shinagawa *et al.* use nucleotide sequence analysis of the *pho* regulatory genes to move this system from formal genetics to direct models for molecular and physiological function) and in other bacteria and yeast; a section on protein secretion and the use of alkaline phosphatase in its study; a section on the molecular structure and function of *E. coli* alkaline phosphatase; sections on transport of inorganic and organic phosphates in *E. coli* and other microorganisms, including an excellent series of papers on the five systems for organic phosphate transport in *E. coli* and provocative general papers on anion exchange (Maloney *et al.*) and transport energetics (Konings and Poolman); and sections on the fascinating topic of the roles of inorganic polyphosphate and pyrophosphate in cellular energy metabolism. (Do you still believe that PP_i is hydrolyzed to make synthetic reactions energetically favorable? Read section 8.) The last section of the book is a collection of excellent, succinct reviews on global regulatory systems in enteric bacteria that provide possible parallels for understanding the regulation of phosphate metabolism. There are papers on carbon metabolism, nitrogen assimilation, stable RNA transcription, alarmones, and DNA damage control, and there is a characteristically provocative and uncategorizable contribution from Arthur Koch, "Why *Escherichia coli* should be renamed *Escherichia ilei*."

The title of this volume includes "in Microorganisms" honestly. Although the student of *E. coli* will perhaps find the most to interest him or her (30 of the 47 full papers), there are at least seven papers on a variety of nonenteric bacteria, six on yeast systems, one concerned with a protozoan—and one on plants. Phosphate is an essential nutrient, and because much of it is tied up in insoluble salts it is often limiting. Since mechanisms for assuring a supply of phosphate are important for every organism, this volume should be of high interest to all cell biologists. Moreover, the phosphate starvation response in enteric bacteria is another paradigm of a vital global stress response and will guide the thinking of cell biologists studying stress in the same way that bacterial heat-shock and DNA damage responses have.

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Reprints of Books Previously Reviewed

The Beginnings of the Nobel Institution. The Science Prizes, 1901–1915. Elisabeth Crawford. Cambridge University Press, New York, and Editions de la Maison des Sciences de l'Homme, Paris, 1987. Paper, $16.95. *Reviewed* **228**, 841 (1985).

Spinors and Space-Time. Vol. 1, Two-Spinor Calculus and Relativistic Fields. R. Penrose and W. Rindler. Cambridge University Press, New York, 1987. Paper, $29.95. *Reviewed* **228**, 1422 (1985).

The Toltecs. Until the Fall of Tula. Nigel Davies. University of Oklahoma Press, Norman, OK, 1987. Paper, $16.95. *Reviewed* **201**, 1006 (1978).

Books Received

Auks. An Ornithologist's Guide. Ron Freethy. Facts on File, New York, 1987. 208 pp., illus. $24.95.

Birding Around the World. A Guide to Observing Birds Everywhere You Travel. Aileen R. Lotz. Dodd, Mead, New York, 1987. xvi, 266 pp., illus. $18.95; paper, $10.95.

A Catalogue of Southern Peculiar Galaxies and Associations. Two volumes. Vol. 1, Positions and Descriptions. vi, 208 pp. Vol. 2, Selected Photographs. Variously paged. $125.

Changing Conceptions of Conspiracy. Carl F. Graumann and Serge Moscovici, Eds. Springer-Verlag, New York, 1987. xvi, 264 pp., illus. $36.50. Springer Series in Social Psychology.

Chondrichthyes II. Mesozoic and Cenozoic Elasmobranchii. Henri Cappetta. Fischer, Stuttgart, 1987 (U.S. distributor, VCH, New York). iv, 193 pp., illus. $150. Handbook of Paleoichthyology, vol. 3B.

CODATA Thermodynamic Tables. Selections for Some Compounds of Calcium and Related Mixtures. D. Garvin, V. B. Parker, and H. J. White, Jr., Eds. Hemisphere (Harper and Row), New York, 1987. xx, 356 pp. $69.95. CODATA Series on Thermodynamic Properties.

Escherichia coli and Salmonella typhimurium. Cellular and Molecular Biology. Frederick C. Neidhardt *et al.*, Eds. American Society for Microbiology, Washington, D.C., 1987. Two volumes. xxvi, 1654 pp., illus. + index. $85; paper, $75; to ASM members, $61; paper, $51.

Evaluation and Accountability in Clinical Training. Barry A. Edelstein and Ellen S. Berler. Plenum, New York, 1987. xxvi 374 pp. $45. Fourteen papers having to do with standards for clinical psych.

The Fourth World. The Heritage of the Arctic and its Destruction. Sam Hall, Knopf, New York, 1987. xiv, 240 pp., illus. $17.95.

Gas Chromatography. John Willett. Wiley, New York, 1987. xviii, 253 pp., illus. Paper, $19.95. Analytical Chemistry by Open Learning.

Geohistory. Global Evolution of the Earth. Minoru Ozima. Springer-Verlag, New York, 1987. viii, 165 pp., illus. Paper, $26.50. Translated from the Japanese by Judy Wakabayashi.

Good Farmers. Traditional Agricultural Resource Management in Mexico and Central America. Gene C. Wilken. University of California Press, Berkeley, CA, 1987. x, 302 pp., illus. $45.

Information Systems Education. Recommendations and Implementation. Richard A. Buckingham *et al.*, Eds. Published for the British Computer Society by Cambridge University Press, New York, 1987. x, 256 pp., illus. Paper, $39.50. British Computer Society Monographs in Informatics.

Interstellar Magnetic Fields. Observation and Theory. R. Beck and R. Grave, Eds. Springer-Verlag, New York, 1987. xii, 273 pp., illus. $45.50. From a workshop, Tegernsee, F.R.G., Sept. 1986.

Introduction to Nuclear Power. John G. Collier and Geoffrey F. Hewitt. Hemisphere (Harper and Row), New York, 1987. xiv, 231 pp., illus. $49.95.

Introduction to Plant Population Ecology. Jonathan W. Silvertown. 2nd ed. Longman Scientific, Harlow, U.K., and Wiley, New York, 1987. xii, 229 pp., illus. Paper, $19.95.

An Introduction to the Historiography of Science. Helge Kragh. Cambridge University Press, New York, 1987. viii, 235 pp., $32.50.

Inverse Problem Theory. Methods for Data Fitting and Model Parameter Estimation. Albert Tarantola. Elsevier, New York, 1987. xvi, 613 pp., illus. $80.

Lehrbuch der theoretischen Physik. Vol. 2, Klassische Feldtheorie. L. D. Landau and E. M. Lifschitz. Akademie-Verlag, Berlin, D.D.R., 1987. xiv, 481 pp., illus. DM 26. Translated from the Russian edition (Moscow, 1972).

Measure Theory and Integration. M. M. Rao. Wiley-Interscience, New York, 1987. xiv, 540 pp. $59.95. Pure and Applied Mathematics.

Mechanisms of Inorganic Reactions. Dimitris Katakis and Gilbert Gordon. Wiley-Interscience, New York, 1987. xxiv, 384 pp., illus. $39.95.

Microbiological Applications of High-Performance Liquid Chromatography. D. B. Brucker. Cambridge University Press, New York, 1987. xii, 354 pp., illus. $59.50.

The Microbiology of Terrestrial Ecosystems. B. N. Richards. Longman Scientific, Harlow, U.K., and Wiley, New York, 1987. xvi, 399 pp., illus. Paper, $44.95.

Molecular Approaches to Developmental Biology. Richard A. Firtel and Eric H. Davidson, Eds. Liss, New York, 1987. xxiv, 695 pp., illus. $126. UCLA Symposia on Molecular and Cellular Biology, vol. 41. From a symposium, Keystone, CO, March–April 1986.

Molecular Basis of Virus Disease. W. C. Russell and J. W. Almond, Eds. Cambridge University Press, New York, 1987. x, 344 pp., illus. $69.50. Symposia of the Society for General Microbiology, vol. 40. From a symposium, University of St. Andrews, U.K., April 1987.

New Directions in the Philosophy of Mathematics. Thomas Tymoczko, Ed. Birkhaüser Boston, Cambridge, MA, 1986. xviii, 323 pp., illus. $57.50.

Organogenesis of the Kidney. Lauri Saxén. Cambridge University Press, New York, 1987. viii, 173 pp., illus. $42.50. Developmental and Cell Biology Series.

Origins of Igneous Layering. Ian Parsons, Ed. Reidel, Dordrecht, 1987 (U.S. distributor, Kluwer, Norwell, MA). xxiv, 666 pp., illus. $124. NATO Advanced Science Institutes Series C, vol. 196. From a workshop, Narsarsuaq, South Greenland, Aug. 1985.

Palaeo-Oncology. The Antiquity of Cancer. Spyros Retsas, Ed. Farrand, London, 1986. 58 pp., illus. £9.50. Based on a symposium, Rhodes, Greece, Oct. 1984.

The Papovaviridae. Vol. 2, The Papillomaviruses. Norman P. Salzman and Peter M. Howley, Eds. Plenum, New York, 1987. xvi, 392 pp., illus. $65. The Viruses.

Pathophysiological Aspects of Sickle Cell Vasoocclusion. Ronald L. Nagel, Ed. Liss, New York, 1987. xxii, 465 pp., illus. $85. Progress in Clinical and Biological Research, vol. 240. From a symposium, Tarrytown, NY, April–May 1986.

Perspectives in Turbulence Studies. H. U. Meier and P. Bradshaw, Eds. Springer-Verlag, New York, 1987. x, 503 pp., illus. $71.50. From a symposium, Göttingen, F.R.G., May 1987.