The volume is divided into 12 subject sections, most of which start with a review. One point of immediate interest is the polite but firm anti–plate-tectonic position adopted by certain of the Soviet authors, though other Soviets are as happily "mobilist" as most of the rest of us. Some of the reviews are a mixed blessing, particularly those that take a large topic applicable to all of Antarctica (such as the lower Precambrian, metamorphism, or Cenozoic vulcanism) and dispose of it in six or seven pages. These are indigestible catalogues of data and conclusions with no space left for real discussion of evidence. Other reviews are of greater value. The opening review has a fine historical sense, and in another that particularly appealed to me the author uses such phrases as "for the reasons mentioned above I no longer believe in" and "my current belief is that." This is the profitable way to discuss science.

As for the body of descriptive geoscience that makes up most of the volume, one is constantly reminded that the dating of geological events lies at the heart of many geological problems. Paleontology flourishes as a stratigraphic approach in this part of the world, and included papers range from one on the faunas of Seymour Island to one on the palynostratigraphy of the Transantarctic Mountains. Isotopic dating methods are slowly unraveling the complex evolution of the late-Precambrian to Phanerozoic orogenic events in the Transantarctic Mountains and West Antarctica and are beginning to paint an intriguing picture of circum-Pacific subduction and accretion (unless of course you take the viewpoint of some of the nonmobilist reviewers mentioned above). The picture in the cratonic areas of East Antarctica still seems somewhat cloudy, and one can only hope for more isotopic investigation in the future. One wonders, for example, why the 4000-million-year date published by Sobotovich and others for rocks from Enderby Land tends to be cited only by Soviet authors.

On top of everything is the ice, and several papers consider the age and development of the ice cap, a relative newcomer to the continent. There are also 20 or more papers on geophysics, a substantial fraction of which are concerned with trying to unravel subglacial features of the continent. As one author put it, referring to that particularly enigmatic area, the Byrd subglacial basin, "the difficulties in tectonic classification of this region are caused by an acute lack of information rather than uncertainties in the available data." An understatement, if anything, but one that does highlight the role of geophysics as a discipline that may yet to some extent save the day.

Nevertheless, it is the backbone of solid field geology throughout the volume that I think I enjoyed most. These people see exposures such as the rest of us only dream about. Ninety-five percent of their land surface is ice and snow, but the other 5 percent makes it all worthwhile. The editor and all the contributors are to be congratulated, but especially those who did the fieldwork.

K. G. Cox

Department of Geology and Mineralogy, University of Oxford, Oxford OX1 2JD, England

Processes in the Deep Ocean

The Environment of the Deep Sea. Papers from a colloquium, Los Angeles, April–June 1979. W. G. ERNST and J. G. MORIN, Eds. Prentice-Hall, Englewood Cliffs, N.J., 1982. xii, 372 pp., illus. $36.95. Rubey Volume 2.

Virtually all of what we know about processes in the deep ocean has been learned in the last 20 years or so. The symposium proceedings at hand brings us up to date. There are 14 papers covering aspects of geology, paleoceanography, benthic mixing, oxygen metabolism, pollution, carbonate sedimentation, manganese deposition, bacterial ecology, deep-sea communities (structure and evolution), and physiology of fishes and invertebrates. The papers are divided into a physical-chemical section and a biological section. There are two dozen authors, most of them recognized authorities in their respective subdisciplines. The book has no overview or introduction to the subject, a serious omission in an interdisciplinary book aimed at a wide audience.

The first paper, by Heirtzler, brings out the difficulties involved in making detailed observations in this remote environment and the progress made in the last decade by projects such as FAMOUS. This chapter can be profitably read by an intelligent high school student, but the next one, on isotopic paleoceanography, is strictly for the cognoscenti. The review is competent, for sure, but too much of what is presented is in a state of ferment. A paper by Cochran on radionuclides in benthic mixing and in growth-rate studies succinctly summarizes the important recent contributions on these subjects by Turekian's group at Yale. I found intriguing the differences in mixing rates obtained from different radiotracers. Not enough is known about the chemical behavior of these isotopes to make flat-out statements about mixing depths and mixing rates without reference to supporting evidence from sedimentology and biology.

Following two papers in the style of journal articles (on NO_2 distribution and on $\delta^{34}S$ as a pollution detector) we find two solid reviews of broad topics, by Heath on manganese nodules and by Berner on biogenic matter on the sea floor. The century-old question about the source of the manganese—continents or volcanism—seems on the verge of being resolved: ridgecrest thermal activity may tip the balance in favor of Baron von Gümbel's pet hypothesis. The ramifications of manganese nodule growth for deep-sea ecology are manifold. For one, nodules provide minipatches of hard substrate for deep-sea epifauna over enormous regions otherwise characterized by unlithified sediment. The nodules are much like tiny reefs in an ocean of clay, with all that that implies for habitat diversification. Berner's paper is really four in one; it deals with principles of diagenesis, organic matter decomposition, carbonate dissolution, and silica dissolution. The four sections are a bit brief for depth, but they constitute concise introductions. Berner devotes some space to pushing his hypothesis that 50 percent of the carbonate falling to the deep ocean floor is aragonite. His calculations are based on sediment data in which (I think) winnowed material is systematically overrepresented (winnowing concentrates pteropod shells, in places). Thus, a compilation of recent sediment trap data would have been more convincing.

On the whole, the second section of the book (on the biological environment) seems more balanced than the first. Each of the seven papers is written at roughly the same level, as an in-depth review of the chosen topic. Bacteria, the unseen catalysts of deep-sea chemistry, rate two papers packed with information vital for deep-sea ecologists and sedimentologists ("the total bacterial surface area in seawater is about a factor of 10 greater than that of all other organisms combined," according to Nealson). I would have liked to see more information on the hot topic of bacterial ecology of hydrothermal systems, however.

A chapter on community structure starts out in a somewhat esoteric vein but soon gets down to the familiar business of describing distributional patterns (species, sizes, feeding strategies) and the plethora of hypotheses vying for relevancy in explaining the patterns. Jumars

and Gallagher (I think correctly) stress the importance of understanding physical-chemical conditions before turning to complex biological constructs. They also emphasize that hypothesis guides observation (defending the importance of mathematical community dynamics), but it seems to me that ecological theory played a minor role in two of the more important advances of recent years: the use of the baited cameras of Isaacs and the discovery of the vent communities. Some of the questions raised in this paper come up again in the last one, on the antiquity of the deep-sea fauna. It is written from a paleobiologist's point of view and has much to offer to deep-sea biologists. Papers on in situ respiration and on enzyme adaptations are also highly relevant in this context.

Those interested in the deep-sea environment will want to own this volume and to use it in their graduate classes. They may also wish to consult a somewhat similar volume (*The Dynamic Environment of the Ocean Floor*, K. A. Fanning and F. T. Manheim, Eds., Lexington [Heath], 1982), which treats physical-chemical aspects of the benthic interface more extensively and at a more technical level than the volume at hand.

W. H. BERGER
Scripps Institution of Oceanography, La Jolla, California 92093

Volcanic Processes

The 1980 Eruptions of Mount St. Helens, Washington. PETER W. LIPMAN and DONAL R. MULLINEAUX, Eds. U.S. Geological Survey, Reston, Va., 1982 (also available from Superintendent of Documents, Washington, D.C.). xxviii, 844 pp., illus., + map. $35. Geological Survey Professional Paper 1250.

A good many undeserved superlatives have been used in reference to the recent activity at Mount St. Helens, but it is certainly not an overstatement to say that no other major historic eruption has been as closely observed and thoroughly documented as that of 18 May 1980.

The events are now familiar to every geologist. At precisely 8:32 in the morning, the northern slope of the mountain, which had been bulging at an alarming rate for more that a week, finally failed in a gigantic avalanche when a magnitude-5.1 earthquake shook the mountain. The sudden relief of pressure triggered an explosion of steam and gas-charged magma that swept with hurricane force down the flank and across 150 square miles of one of the most beautiful forests of the Pacific Northwest. More than a cubic kilometer of the mountain, along with glacial ice, uprooted trees, and a torrent of mud, poured down the Toutle and Cowlitz rivers and finally into the Columbia, where it dumped over 34 million cubic meters of sediment and closed the port of Portland to shipping. At least 60 lives were lost, and property losses are estimated to have exceeded a billion dollars.

One can gain a vivid impression of the eruption from the various accounts given in the book under review. The events of 1980 are described and interpreted in more than 60 papers by authors not only from the Geological Survey but from the academic community as well.

Mention of some of the major topics covered may convey the scope of the book. A description of the geological evolution of the volcano is followed by a carefully documented chronology of the eruptive activity of 1980. A notable part of this section is a detailed analysis of the extraordinary sequential photographs taken by witnesses to the eruption of 18 May. This is followed by accounts of seismic activity and deformation, gas emissions, thermal anomalies, and various types of monitoring. A long section is devoted to the pyroclastic eruptions and debris flows and to the early stage of growth of a dome in the huge crater that occupies what was once the summit of the mountain. Preliminary reports are included on the effects of the ash falls and mudflows on the hydrology and vegetation of the region. And finally the problems of assessing and alleviating hazards are discussed, and an effort is made to analyze the implications of the eruption and the possibilities of future activity elsewhere in the Cascade Range.

Each paper is capable of standing on its own, so that the reader need not wade through earlier sections in order to understand later ones. This results in a certain amount of repetition, but it adds immeasurably to the usefulness of the book as a reference. I found no evidence that the editors attempted to achieve uniformity in interpretation. Though there seems to be no serious disagreement about factual evidence, reasoned differences of opinion have been given the full latitude they deserve.

The volume is sure to join the ranks of classic accounts of great eruptions, such as LaCroix's account of the eruption of Mont Pelee in 1902, Taylor's description of the eruption of Mount Lamington in 1951, and Bostok's famous report on the great catastrophe at Agumgijyh in 1928. It differs, of course, in that it is written by a host of authors, but what it lacks in the style and individual character of earlier works it makes up for in depth and detail. It is profusely illustrated with many full-page color photographs and diagrams, and a quadrangle-size geological map is enclosed in a pocket. Given the prices of commercially published books, this volume is the bargain of the year.

ALEXANDER R. MCBIRNEY
Center for Volcanology, University of Oregon, Eugene 97403

Books Received

Cancer-Associated Genodermatoses. Henry T. Lynch and Ramon M. Fusaro, Eds. Van Nostrand Reinhold, New York, 1982. x, 560 pp., illus. $32.

Catastrophe Theory and Applications. D. K. Sinha, Ed. Halsted (Wiley), New York, 1982. xii, 158 pp., illus. $15.95. Mathematics of Mathematical Sciences.

Catastrophe Theory for Scientists and Engineers. Robert Gilmore. Wiley-Interscience, New York, 1981. xx, 666 pp., illus. $45.95.

Evoked Potentials. Papers from a conference, June 1981. Ivan Bodis-Wollner, Ed. New York Academy of Sciences, New York, 1982. xii, 738 pp., illus. Cloth or paper, $157. Annals of the New York Academy of Sciences, vol. 388.

Fetal and Neonatal Pathology. Perspectives for the General Pathologist. Papers from a symposium, Birmingham, England, Apr. 1981. A. J. Barson, Ed. Praeger, New York, 1982. x, 262 pp., illus. $33.

A Field Guide to Mushrooms and Their Relatives. Booth Courtenay and Harold H. Burdsall, Jr. Van Nostrand Reinhold, New York, 1982. 144 pp., illus. $18.95.

The Human Primate. R. E. Passingham. Freeman, San Francisco, 1982. xii, 390 pp., illus. $14.95.

Igneous and Metamorphic Petrology. Myron G. Best. Line drawings by the author. Freeman, San Francisco, 1982. xx, 630 pp. $29.95.

Multicomputers and Image Processing. Algorithms and Programs. Papers from a workshop, Madison, Wis., May 1981. Kendall Preston, Jr., and Leonard Uhr, Eds. Academic Press, New York, 1982. xx, 470 pp., illus. $34. Notes and Reports in Computer Science and Applied Mathematics, 3.

The Nervous System. Peter Nathan. Oxford University Press, New York, ed. 2, 1982. xvi, 298 pp., illus. $24.95.

Outcome Uncertain. Science and the Political Process. Mary E. Ames. Avon, New York, 1982. x, 230 pp. Paper, $3.50. A Discus Book. Reprint of the 1978 edition.

Ozonation in Organic Chemistry. Vol. 2, Nonolefinic Compounds. Philip S. Bailey. Academic Press, New York, 1982. xx, 500 pp., illus. $69.50. Organic Chemistry, vol. 39-II.

The Parasite. Michel Serres. Translated, with notes, from the French by Lawrence R. Schehr. Johns Hopkins University Press, Baltimore, 1982. x, 260 pp., illus. $17.50.

Research Techniques in the Rat. Clayton Petty. Thomas, Springfield, Ill., 1982. xiv, 368 pp. $36.75.

The Research Universities and Their Patrons. Robert M. Rosenzweig with Barbara Turlington. University of California Press, Berkeley, 1982. xiv, 152 pp. $14.50.

Reversed-Phase High-Performance Liquid Chromatography. Theory, Practice, and Biomedical Applications. Ante M. Krstulović and Phyllis R. Brown. Wiley-Interscience, New York, 1982. xiv, 296 pp., illus. $35.

Review of Human Development. Tiffany M. Field, Aletha Huston, Herbert C. Quay, Lillian Troll, and Gordon E. Finley, Eds. Wiley-Interscience, New York, 1982. xxii, 664 pp., illus. $45.

RNA Tumor Viruses. Robin Weiss, Natalie Teich, Harold Varmus, and John Coffin, Eds. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1982. xii, 1396 pp., illus. $110. Second edition of *Molecular Biology of Tumor Viruses*. Cold Spring Harbor Monograph Series, vol. 10C.

The Time of Darkness. Local Legends and Volcanic Reality in Papua, New Guinea. R. J. Blong. University of Washington Press, Seattle, 1982. xii, 258 pp., illus. $25.

Toxicology of the Liver. Papers from a symposium. Gabriel L. Plaa and William R. Hewitt, Eds. Raven, New York, 1982. xii, 338 pp., illus. $41. Target Organ Toxicology Series.