lation. This volume assembles by quasi-systematic group accounts of the responses of aquatic invertebrates (Vernberg and Vernberg), terrestrial invertebrates (Cloudsley-Thompson), fish (Fry and Hochachka), amphibians (Brattstrom), reptiles (Templeton), and birds (Dawson and Hudson). The contributors have avoided a review format and have generally written authoritative statements reflecting the status of understanding of the temperature responses of nonmammalian organisms. Their procedure is a familiar one. The authors cast descriptions of the responsiveness of organisms to temperature, sometimes teleologically, into an ecological or energetic-cost context. In this setting we are shown the variety of adaptation to temperature and the remarkable suitability of an organism to its environment. This volume will serve, as the editor hoped, as a useful comprehensive reference.

In a broader perspective, I find a disconnectedness general in the field of thermoregulation that is uncharacteristic of surveys of other animal functions. There seems to be no unifying theme—no consistent basis for comparison of the thermal responses of organisms. The unanswered central question is, How do organisms, from motile microorganisms to mammals, recognize predetermined temperature levels? The thermal selectivity of *Paramecium* and the functioning of the mammalian thermostat depend upon this ability. Yet we seem no closer to understanding the mechanism underlying thermal responsiveness than Herter or Crozier and many others of a generation or two ago. Meanwhile, the present authors have managed thoughtful essays on their subjects without consensus on first principles.

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Plant Compounds

Chemistry of the Alkaloids. S. W. PELLETIER, Ed. Van Nostrand Reinhold, New York, 1970. xxii, 796 pp., illus. $24.95.

I brought to this book my usual skepticism about multiauthored textbooks but came away from it convinced that most of the usual defects in such productions had been avoided. The dividing line between text and reference is not a sharp one, but I would classify this book as an advanced text in that it is selective rather than encyclopedic and balanced rather than indiscriminately inclusive. In level and length it falls between the treatise of Manske and Holmes and the shorter text of Swan.

Aside from two chapters on, respectively, biosynthesis and taxonomy of alkaloids, this is a book of organic chemistry dealing in separate chapters with the different structural classes of alkaloids, their characterization and synthesis. Two aspects that are neglected are procedures for the separation and the analysis of alkaloids. Although specific alkaloids are chosen, there is usually excellent attention paid to the generality of synthetic and degradative methods. One learns not merely that such and such a reaction has been applied to a particular compound but also that it is useful for certain structural types and fails with some that appear similar. The structural formulas are well placed with regard to the text and used unstintingly. In a marked improvement over Manske and Holmes, compounds are identified by Arabic rather than Roman numerals, and the correct structure of an alkaloid is given at its first mention rather than after presentation of all the data and arguments used in establishing it. The reading is enlivened by brief historical remarks about some of the best-known alkaloids.

If the text is well planned and executed, the greatest praise is reserved for the indexes, which I must describe enthusiastically as the finest I have seen in any comparable book. In addition to author and subject indexes that are as thorough as one could ask, there is also a unique "Reaction and Reagent Index" which masterfully gathers together scattered information; so that, for instance, one can look up "Hofmann degradation" or "sodium borohydride reduction" and find a list of applications of these methods with their relevant page numbers.

In most chapters there are references to some literature as late as 1969, although one chapter lists nothing later than 1964. Any errors I found were trivial. It is too bad that the editor was unable to reconcile opposing views about which way up the morphine structure should be drawn, but that discrepancy only makes evident his attention to integration of approach that otherwise welds the book together. Libraries must have Manske and Holmes available for consultation; beginning students of alkaloids will probably be happier with Swan's book; but serious workers in the field of alkaloids will want Pelletier's book on their desks.

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Shellfish Phylum

Living and Fossil Brachiopods. M. J. S. RUDWICK. Hutchinson University Library, London, 1970, and Humanities Press, New York, 1971. 200 pp., illus. Cloth, $6; paper, $2.50. Biological Sciences.

Each of the shellfish phyla has its unique mode of life, attachment, and feeding, reflected by and dependent on the morphology of the shell. The ways in which morphology functions are a natural part of neontological studies of bivalves, gastropods, and echinoderms, but are more difficult to grasp for extinct or relict phyla such as the Brachiopoda, in which many structures have no modern analogues. There is no way of witnessing how such structures work. As a consequence, the reason for the structures tends to get overlooked by paleontologists eager to find the age or evolutionary meaning of fossil species.

Martin Rudwick has filled this gap in knowledge by making a special study of functional morphology in fossil and living brachiopods. His series of unique and excellent papers is crowned and summarized in this text, which relates the biology and evolution of brachiopods to their functional morphology. It is an exquisite work, concise and clearly written, logical, and coherent. Text figures are numerous, and adequate. Perhaps the most impressive aspect is the way the author deals with the entire phylum, smoothly changing the focus of attention from Ordovician to Permian to Recent genera to knit the brachiopods into a closely related unity.

Naturally there are a few mistakes—the Strophalosiaceans did not all lose their teeth after the earliest Devonian (p. 54), for example. Some might cavil at the simplified treatment which discusses only one viewpoint, especially over debatable questions of function, but those with better ideas are free to write their own texts. In fact they would be well advised to do so, for it is difficult to agree with Rudwick's interpretation of Lyttoniacea, for example.

A more serious criticism lies in the restricted nature of the coverage and perhaps a more restricted title would have been more informative. There is little of time sequence, little of ecology, and certainly nothing of the new paleogeography that relates brachiopods so significantly to continental drift and evolution of the tectosphere. Nor do we see thorough enquiry into the fascinating interplay between climate, environment, biota, time, and morphology that comprises the essence of evolution. These subjects are not the concern of the text. Rudwick's work provides the basis for such study, and is warmly recommended as a model biology of brachiopods.

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Historical Geology

Adventures in Earth History. Being a Volume of Significant Writing from Original Sources, on Cosmology, Geology, Climatology, Oceanography, Organic Evolution, and Related Topics of Interest to Students of Earth History, from the Time of Nicolaus Steno to the Present. PRESTON CLOUD, Ed. Freeman, San Francisco, 1970. xx, 996 pp., illus. Cloth, $17.50; paper, $8.95.

This anthology of 83 papers is intended "(1) to be a source of . . . supplemental reading . . . for the introductory course in historical geology, and (2) to provide the core reading for an advanced course or seminar on problems in earth history. . . ." Part 1 deals with principles and is arranged in sections on ordering principles; the origin of the universe; records of geologic time; air, water, and climate; and differentiation of solid earth. Part 2 is The Geologic Record, which includes sections on the primitive earth; Phanerozoic earth; Phanerozoic life; evolution, extinction, and paleoclimatology; and the rise of man, the Recent, and the future. The editor's essays introducing each section constitute a brief review of historical geology in its broadest terms.

The selections have freshness and currency. Only seven of the papers are earlier than 1921 (these are "classics" from 1669 to 1886), and 65 are after 1948, of which 51 are after 1958 and 35 after 1963. Of the authors, 65 are from the United States and the others, with two or three exceptions, are from other English-speaking countries.

The book is actually one on "the state of the art," rather than a stratigraphic and paleontologic catalog as so many textbooks of historical geology have been until recently. It can therefore be recommended not only to university students but to others who want to be informed about current areas of interest and discovery in the history of the earth, especially its early history to the study of which the editor himself has made such important contributions. As a textbook this is an interesting experiment.

One of the pleasures of reading an anthology is the opportunity to agree or disagree with the editor's choice of men and articles. Cloud has been unusually successful in including some articles which are summaries in themselves and which do bring in, sometimes at some length, the work of others not otherwise included. The paper on uniformitarianism by Hubbert is an excellent example of inclusion of historical material in proper context in a way that makes the paper not only a critique of uniformitarianism but also one of the best brief summaries available of the history of geology. Similarly the paper by Gilbert on scientific method covers the ground that one might have expected to be represented by the famous Chamberlin paper, as well as material on the Grand Canyon that one might have expected to have been represented by Powell.

This reviewer found the quality of the last section somewhat below the general high standard of the rest of the book. The material on the Pleistocene deals almost entirely with the causes of glaciation, temperature changes, and similar matters. The only material on Pleistocene glacial deposits is in a few paragraphs in a somewhat captious review of a large book on the Quaternary, rather than through selections from the book reviewed or from summary material in the outstanding American monographic textbook. It is curious that Permian glacial deposits are more adequately treated than are Pleistocene glacial deposits.

The book is well printed and the illustrations are especially well produced. The illustrations on the endpapers are convenient for reference concerning the geologic time scale, the development of life forms, the solar system and members, and the periodic chart of the elements.

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Books Received

Activation of Energy. Pierre Teilhard de Chardin. Translated from the French edition (Paris, 1963) by René Hague. Harcourt Brace Jovanovich, New York, 1971. 416 pp., illus. $7.50. A Helen and Kurt Wolff Book.

Annual Review of Nuclear Science. Vol. 20. Emilio Segrè, J. Robb Grover, and H. Pierre Noyes, Eds. Annual Reviews, Palo Alto, Calif., 1970. viii, 614 pp., illus. $10.

Atoms and Molecules. An Introduction for Students of Physical Chemistry. Martin Karplus and Richard N. Porter. Benjamin, New York, 1970. xiv, 620 pp., illus. Cloth, $17.50; paper, $7.95.

Australian Crustaceans in Colour. Anthony Healy and John Yaldwyn. Reed, Sydney, Australia, 1970. 112 pp., illus. $3.95.

A Biographical History of Medicine. Excerpts and Essays on the Men and Their Work. John H. Talbott. Grune and Stratton, New York, 1970. xii, 1212 pp., illus. $60.

Biology. A Search for Order in Complexity. Prepared by the Textbook Committee of the Creation Research Society. John N. Moore and Harold Schultz Slusher, Eds. Zondervan, Grand Rapids, Mich., 1970. xxviii, 548 pp., illus. $7.95.

The Biology of the Blastocyst. R. J. Blandau, Ed. University of Chicago Press, Chicago, 1971. xiv, 560 pp., illus. $27.50.

Capillary Permeability. The Transfer of Molecules and Ions between Capillary Blood and Tissue. Proceedings of the Alfred Benzon Symposium 2, Copenhagen, June 1969. Christian Crone and Niels A. Lassen, Eds. Munksgaard, Copenhagen; Academic Press, New York, 1970. 682 pp., illus. $20.

Cardiomyopathy, Pulmonary Emphysema. A conference, Jerusalem, November 1969. J. R. Rüttner, Ed. Karger, New York, 1970. 230 pp., illus. Paper, $16.30. Reprinted from *Pathologia et Microbiologia* **35**, Nos. 1–3 (1970).

Cavitation. Robert T. Knapp, James W. Daily, and Frederick G. Hammitt, McGraw-Hill, New York, 1970. xxii, 578 pp., illus. $25. Engineering Societies Monographs.

Change in Alaska. People, Petroleum, and Politics. George W. Rogers, Ed. University of Alaska Press, College; University of Washington Press, Seattle, 1971. xvi, 214 pp. + plates. $7.95.

Computers in Electrocardiography. Josef Wartak. Thomas, Springfield, Ill., 1970. xii, 250 pp., illus. $19.50.

Dinosaurs. W. E. Swinton. British Museum (Natural History), London, ed. 4, 1969. xiv, 46 pp., illus. Paper, 5s. Publication No. 542.

Electromagnetic Theory. Problems and Solutions. K. Foster and R. Anderson. St. Martin's, New York, 1970. Vol. 1, viii, 212 pp., illus; vol. 2, viii, 240 pp., illus. Each volume, paper, $3.95.

Environment and Man. A Bibliography. Robert W. Durrenberger. National Press Books, Palo Alto, Calif., 1970. x, 118 pp. Paper, $2.50.

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