

ence that one might use to check on an occasional item without having to trek over to the library. Although the individual articles vary somewhat with the skill and competence of the more than 150 contributors, the articles show a regularity of editorial style that makes the encyclopedia pleasingly uniform. Anyone who wishes to have a convenient, readable, and brief reference work at hand should find this book quite satisfactory.

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Thermobiology

Molecular Mechanisms of Temperature Adaptation. A symposium, Berkeley, Calif., Dec. 1965. C. LADD PROSSER, Ed. AAAS, Washington, D.C., 1967. viii + 390 pp., illus. \$12.50; to members, \$10.50. AAAS Publication No. 84.

In a symposium designed to explore molecular mechanisms of temperature adaptation in the broad range of organismic responses to heat and cold, one must, as the walrus said, "speak of many things." The phyletic materials introduced by the contributors to these proceedings range from thermophilic and cold-sensitive bacteria to spermatophytes and the poikilothermic animal phyla. Lest the homoiothermists turn aside, the primary mechanisms are developed both generally and specifically in several excellent papers relating to the informational macromolecules, concerning which many of us tend to remain ignorant.

The emphasis of the symposium is mainly on the molecular and subcellular levels, but some attention is given to the intact organism. Awaiting the reader, whether generalist or specialist, are various scientific vignettes relating to new concepts of adaptive mechanisms, such as modes of induction, development, feedback control, and the roles of these in speciation. To many it may be exciting to find that, in response to seasonal cold, living things, from trees to earthworms, tend to synthesize both proteins and RNA which are variously accumulated in nuclear, mitochondrial, and microsomal components. Similarly, lipids are selectively accumulated either prehibernally or, in animals, during cold acclimation. A common property of these changes is the increased potential for respiratory exchange and the at-

tending capacity for evolution of heat, as in cambium tissue of tree bark. Conversely, in warm environments most of these responses are reduced or even reversed.

As the order of activation and control of the adaptive responses to thermal change must be referable to the cell and its enzymes, the complexities of regulation increase as the structure. Whatever the overlay, however, the ultimate kinetics of stimulus to the sensorium must be at least a function of the temperature, and hence subject to representation by the Arrhenius plot. That some biological systems deviate significantly from the predictions of the Arrhenius law is emphasized in an especially interesting paper, by J. L. Ingraham and Ole Maaaløe, on cold-sensitive mutants and minimum temperature of bacterial growth. The implications of their work clearly suggest the value of an exact model and the theoretical power which it may give to the interpretation of temperature adaptation and to the biological meaning of the "temperature characteristic."

Perhaps the keystone of the conference is to be found in Roger Milkman's closing statement: "To conclude, observations of a process of adaptation and observations of the behavior of a protein combine to suggest that conformational change in protein may be a molecular mechanism of temperature adaptation." The volume is well rounded off by Prosser's extended summarization, in which he draws attention to the significance of adaptive molecular events in relation to speciation.

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Mollusks

The Invertebrates. Vol. 6, Mollusca I, Aplacophora, Polyplacophora, Monoplacophora, Gastropoda: The Coelomate Bilateria. LIBBIE HENRIETTA HYMAN. McGraw-Hill, New York, 1967. viii + 792 pp., illus. \$17.50.

Malacologists have long looked forward to the publication of Libbie Hyman's volume on the Mollusca, and they should not be disappointed in the fulfillment. In an exhaustive review of the phylum, Hyman has assembled information which will serve as an important reference on Mollusca for a

vast audience ranging from scientist to informed layman.

Mollusca I treats four classes: Aplacophora, Polyplacophora, Monoplacophora, and Gastropoda. It will be noted that Hyman has taken the obvious but long avoided step of treating the Aplacophora (solenogasters) as a class distinct from the Polyplacophora (chitons). Although the two groups evidence characteristics in common, the former is considered to have evolved much more slowly and the latter to have diverged from it early in geological time. This change is well balanced by the conservative handling of the subclasses of Gastropoda, in which Hyman retains Prosobranchia, Opisthobranchia, and Pulmonata in spite of a recent trend to combine the last two as Euthyneura.

One wonders how the author was able to deal with the large amount of information she synthesizes in this work, but she gained much practice in the first five volumes, and the fact emerges that once again she has done a fine job. The reference-laden paragraphs flow with a remarkable readability. The characteristics of each group are discussed under as many as two dozen subject headings. The author readily admits at the outset that the book is a compilation from the literature. Nevertheless, she occasionally includes interpretations of her own. Topics such as tissue morphology, regeneration, habits and behavior, and biological relationships are seldom mentioned in textbook treatments of the phylum. One can glean such cryptic information as a report on a rotifer's attacking the egg masses of pulmonate snails and such important information as a review of literature on chemoreception in the prosobranchs. In areas of one's specialization it is to be expected that one will encounter omissions of recent research; the author notes in the preface that this is a hazard of the long-term nature of her work.

A bibliography of 120 pages forms an extremely valuable part of the book, although the user may soon question the wisdom of its arrangement. The alphabet is repeated with the references for each of the several sections, and severe difficulties were experienced in locating a number of citations. A vast amount of page turning sometimes located the reference in another section, seemingly there by error, but in a few cases the search was fruitless and the reviewer had to resort to the *Zoological*

Record or his memory, neither of which is infallible. A single alphabet would appear to be the best remedy for these difficulties.

The book is liberally illustrated with line drawings, a large percentage of which have been excellently reproduced from other publications. Many of them, however, are the original work of Anthony d'Attilio.

This is the largest phylum that Hyman has attempted to cover in *The Invertebrates*, and there were those who criticized her for attempting it; indeed, it required ten years to complete more than half the group. *Mollusca II* and subsequent volumes are to be edited by Joel Hedgpeth. Libbie Hyman is retiring from the field, in her own words, "satisfied that I have accomplished my original purpose—to stimulate the study of invertebrates."

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Chemistry Series

Advances in High Temperature Chemistry. Vol. 1. LEROY EYRING, Ed. Academic Press, New York, 1967. xiv + 334 pp., illus. \$14.50.

This volume is the first of a contemplated series in which established investigators in high-temperature chemistry are to present topical reviews of emerging areas of knowledge in the field.

Volume 1 consists of nine articles written by 16 contributors and is concerned primarily with the properties and reactions of chemical species existing at high temperature. Fundamental and theoretical aspects of the subject are given about equal space with the experimental and practical. This publication will be of interest to physicists, metallurgists, and ceramists as well as to chemists who are concerned with the atomic and molecular aspects of high-temperature reactions.

The contributors to this volume are R. F. Barrow, Joan B. Berkowitz-Mattuck, Alfred Büchler, K. Douglas Carlson, C. J. Cheetham, Charles R. Claydon, J. B. Ezell, Paul Goldfinger, D. L. Hildenbrand, J. L. Margrave, Thomas B. Reed, J. C. Thompson, R. J. Thorn, P. L. Timms, Edgar F. Westrum, Jr., and G. H. Winslow. The diverse subjects discussed include (in high-temperature context) the spectroscopy, elec-

tronic structure, and valence states of molecules, including primarily transition element molecules; alkali metal halide molecules and their bond relationships; some unique possibilities for chemical syntheses; adiabatic calorimetry; and plasmas. An extended definition of high-temperature chemistry is also given.

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Mineral Analysis

Atlas of Electron Microscopy of Clay Minerals and Their Admixtures. A Picture Atlas. H. BEUTELSPACHER and H. W. VANDER MAREL. Elsevier, New York, 1967. xii + 333 pp., illus. \$40.

This book is a collection of about 250 electron micrographs of clay minerals and associated materials, with short descriptions of the minerals and of the principal features of the micrographs. An introductory section describes briefly the operation of electron microscopes and methods of sample preparation, but is too brief to add to what is readily available elsewhere. A final section gives comprehensive lists of references. A novel feature is the presentation of the text in English and in German in parallel columns; the English text has very few mistakes and these are of no consequence. The book is handsome, large (20- by 30-centimeter pages), heavy with glossy paper, and expensive.

The greater part of the book is devoted to micrographs and descriptions. Taken by itself, it is not much more than an elaborate picture book, but the preface indicates that three parallel volumes will appear in which the same materials will be examined by x-ray diffraction, infrared, and differential thermal methods of analysis. This ambitious project cannot be assessed until it is seen how the total information is integrated, but the reviewer has considerable misgivings as to whether it is a good policy to subdivide the information on the basis of experimental techniques. A subdivision on the basis of mineral groups, with all physical methods of analysis brought together and the results contrasted, would have enabled the authors to discuss many subtleties of structure and composition and how they are revealed by this or that method. It seems now that the investigator will

have to surround himself with four massive volumes and make such comparisons for himself. The quality of the electron micrographs is generally good but not exceptionally so. The reviewer regrets that the authors did not include at least some of the outstanding micrographs obtained by other workers in their more specialized studies; the reader could then go to the literature and obtain additional information. Admittedly, this additional information is promised in the future volumes, but one wonders just how much can be achieved by the two authors and their assistants, however industrious they may be. In the present volume, there often seems to be a tiresome repetition of similar micrographs, but this may be justified later by the other data to be given. The reviewer greatly deplores the complete omission of electron diffraction data from this book, since electron diffraction and microscopy go together experimentally and together form a powerful method of investigating both form and structure. Will this be covered by a fifth volume? Taken by itself the present volume does not add greatly to what is already available. One hopes that the authors will eventually give a comprehensive integration of the whole subject matter and that the publishers will find it possible to produce the subsequent volumes less expensively.

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Books Received

Advanced Propulsion Concepts. Proceedings of the 4th symposium, Palo Alto, Calif., April 1965, sponsored by the U.S. Air Force Office of Scientific Research and United Aircraft Corp. Gordon and Breach, New York, 1967. xx + 295 pp., illus. \$31.50.

Advances in Carbohydrate Chemistry. Vol. 22. Melville L. Wolfrom and R. Stuart Tipson, Eds. Academic Press, New York, 1967. xiv + 576 pp., illus. \$21.50.

Advances in Clinical Chemistry. Vol. 10. Oscar Bodansky and C. P. Stewart, Eds. Academic Press, New York, 1967. xx + 401 pp., illus. \$17.

Advances in Drug Research. Vol. 4. N. J. Harper and Alma B. Simmonds, Eds. Academic Press, New York, 1967. viii + 274 pp., illus. \$12.50.

Advances in Immunology. Vol. 7. F. J. Dixon, Jr., and Henry G. Kunkel, Eds. Academic Press, New York, 1967. xvi + 349 pp., illus. \$15.

(Continued on page 104)