Cold Climates

Arctic and Alpine Environments. Proceedings of the 7th Congress of the International Association for Quaternary Research (Boulder and Denver, Aug.–Sept. 1965), vol. 10. H. E. WRIGHT, JR., and W. H. OSBURN, Eds. Indiana University Press, Bloomington, 1968. xii + 308 pp., illus. $12.50.

Arctic and Alpine Environments is a collection of papers gathered largely from the symposium on the same topic organized as part of the seventh INQUA Congress. In their introduction the editors point out that, although the arctic and alpine regions have long been regarded as so similar that they are frequently handled as a unit, an arctic-alpine zone, a critical comparison may show as many differences as similarities. The collection of papers certainly proves their point. It does more than this, however; it establishes for the nonspecialist scientific reader the tremendous range of variation within each region. Absence of trees due to cold, paucity of vegetative mass, relative difficulty of access, all tend to render these regions an almost uniform blank on the atlas sheet of the layman.

The book also serves to relate arctic-alpine research to multidisciplinary investigation of the Quaternary Period, defined by the editors as "the last two or three million years." The importance of directing more effort into study of cold-climate processes operating today and their effects, both for its own sake and to facilitate understanding of the interplay of glacial and interglacial fluctuations that characterize the Quaternary Period, is likewise strongly emphasized.

The book is divided into three sections: Climatology and Glaciology; Ecology; and Geology. But the allotment of papers into these sections has curious inconsistencies. The first section consists of only two papers, both dealing with aspects of climatology; what may be most nearly considered as glaciology occur under "ecology" or "geology"; a paper on the *p*H of melting snow and its erosive capacity seems incongruous under "ecology." Collections of papers presented at international meetings are notorious editorial headaches, and this one seems no exception; to the inconsistencies in arrangement must be added a wide spread of both quality and quantity. Some papers may have been abbreviated because of editorial consideration, but it is disappointing to find less than two pages by Gerasimov and Zimina on the recent natural landscapes and ancient glaciation of the Pamir and a similar ration from Katasonov on features formed under permafrost conditions.

To this geomorphologist reviewer, by far the strongest section is that on ecology. Regardless of its unevennesses the book makes a valuable contribution to our awareness of arctic and alpine environments and the great variety of research being undertaken within the "arctic-alpine zone." The editors are to be complimented on making a brave effort with a difficult task.

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Marine Animals

Echinoderm Biology. Proceedings of a symposium, London, May 1966. N. MILLOTT, Ed. Published for the Zoological Society of London by Academic Press, New York, 1967. xiv + 240 pp., illus. $11. Symposia of the Zoological Society of London, No. 20.

This symposium volume is an important addition to the existing literature on echinoderms. The editor most appropriately begins his foreword with the statement, "Few would challenge the view that echinoderms are among the most enigmatic animals. For this reason alone they would be rewarding for study, but there are many other reasons as successive pages will show." And in successive pages the promise is kept. The results presented are of recent studies, many of them appearing in print for the first time here.

The first of the 12 contributions is a long-term ecological study of infaunal echinoderm populations; it is followed by chapters on gamete physiology, echinoderm neuromuscular systems, histomorphology and chemistry of the echinoid axial organ, description and operation of the ophiuroid tube feet, and the functional morphology of an extinct cystoid. Chapters on asteroid locomotion and origin, symmetry and diversity, and evolution and classification follow. A chapter on affinities of fossil chordates with echinoderms and a final chapter on echinoderm origin complete the symposium. The last chapter, indeed, presents a new theory which derives the echinoderms from the Sipunculoidea and will challenge the evolutionary biologists. Each chapter opens with a precise synopsis of the text, and eight of the chapters are followed by transcripts of group discussions. All chapters follow a consistent pattern of organization.

The chapters are well illustrated with line drawings and photographs, and most of the illustrations are of fine quality and are appropriately labeled. The volume is well written, edited, and printed. A complete bibliography, with titles, is given at the end of each chapter. Separate author, systematic, and subject indexes are included.

This volume, indeed, will receive enthusiastic welcome from echinoderm biologists, who will agree with the editor's comment: "Happily there are clear signs of resurgence so that once again echinoderms are being viewed as a diverting group of living animals and not solely as egg batteries or as inconsequential remains in the flesh of a former glory enshrined in stone, vaguely comparable with the coelenterates and linked, at least by the orthodox, with chordates."

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Plasma Kinetics

The Statistical Theory of Non-Equilibrium Process in a Plasma. YU. L. KLIMONTOVICH. Translated from the Russian edition (Moscow, 1964) by H. S. H. Massey and O. M. Blunn. D. ter Haar, Translation Ed. M.I.T. Press, Cambridge, Mass., 1967. xvi + 284 pp., illus. $12.50.

This book, whose author is a professor at Moscow State University, is a very welcome addition to the growing literature in plasma physics. Whereas most of the treatments of plasma kinetic theory are based on the BBGKY (Bogoliubov, Born, Green, Kirkwood, Yvon) hierarchy, the present work is based on explicit uses of the actual density in six-dimensional phase space and its moments. This method not only allows more physical insight into the relationship between correlations and fluctuations, it also leads to great simplifications in constructing solutions to actual problems. In particular, any known solution of the Vlasov equation can be used to obtain information on correlations in a particular ensemble. In addition, a number of theorems concerning superposition of quasi-particles, relationships between test particles and correlation functions, and so on become quite transparent when this formalism

is used. It is something of a drawback to the book that the work of Dupree, which is an extension of the method originally proposed by Klimontovich, is not included. Dupree's procedure allows even further simplification and physical insight.

A pleasant factor of the book is the use and coherent description of "fast" and "slow" scales in both space and time. Many of these motions follow from the pioneering work of Bogoliubov in nonlinear dynamics and fall naturally into the task of constructing various types of kinetic equations.

The latter part of the book is concerned with the inclusion in the theory of plasma radiation in the form of Cerenkov emission of plasma waves from high-velocity particles. This leads naturally to the construction of equations governing quasi-linear theory, and even to the construction of a form of plasma hydrodynamics including these effects. In addition, in many cases, the author includes the effects of static magnetic fields.

The book as a whole is well written, and even though the algebra sometimes becomes a bit formidable, the author continually gives a great deal of physical insight into the processes involved. It should be a necessary purchase for all serious plasma physicists.

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Electronic Properties

Physics and Chemistry of the Organic Solid State. Vol. 3. DAVID FOX, MORTIMER M. LABES, and ARNOLD WEISSBERGER, Eds. Interscience (Wiley), New York, 1967. xiv + 520 pp., illus. $19.95.

This book is a splendid addition to the first two volumes of this series. It presents a critical review of progress, up to early 1966, in the field of exciton and charge-carrier generation and migration in organic solids, as well as that of photosensitization.

The book has four main divisions. The first, written by W. Helfrich, deals with steady-state and transient space-charge-limited and volume-controlled currents in organic solids such as anthracene, the polyphenyls, and the phthalocyanines. It is an excellent exposition of the most significant work that has been done on the flow, recombination, mobility, and trapping of carriers in organic crystals. Single-injection, double-injection, and recombination luminescence are discussed. The explanatory material is useful and clear. If the references are followed, it is possible for a beginner to encompass the entire state of the art in this field.

The second division, written by J. Bourdon and B. Schnuriger, deals with photosensitization of organic solids, and also provides a well-balanced presentation of the chemical and physical effects induced in a host by the addition of guest molecules either at the surface or in the bulk; the guest molecules either absorb light at longer wavelengths than the host can absorb and utilize, or increase the quantum yield of the absorbed light. Polymers and glasses are also included in the discussion. The photosensitization phenomena covered include charge-carrier production and luminescence, oxidation, polymerization and cross-linking, and photochromism. The list of references is especially good and fairly complete (the work done in this laboratory is not cited).

The third division, written by O. LeBlanc, Jr., is what I consider to be the most useful review of dark and photoconductivity in organic crystals available, certainly for the period reviewed, and even to this date. There have been thousands of experiments performed in this field, and there are quite a few that have not been interpreted properly. The author makes a seasoned, and in my view well-founded, selection and discussion of important experiments and in so doing performs a valuable service to those who are just entering this field. The materials covered include homomolecular (a good choice of a word) crystals such as anthracene, and also dyes, charge-transfer complexes, and TCNQ anion-radical salts. The subjects covered include the energetics of carrier generation in the dark and in the presence of light; carrier transport, trapping, and recombination; and electrode contacts.

The fourth division, written by S. A. Rice and J. Jortner, is a small book in itself, although it is entitled merely "Comments on the theory of exciton states in homomolecular crystals." It is a selective and superb review of the literature dealing with the theory of the interaction of a radiation field with a crystal lattice. The authors discuss among other things the nature of the low-lying electronically excited states of crystals of aromatic molecules; exciton transport and decay, interactions with other excitons, and ionization (including a discussion of photoconductivity); the properties of crystal excitations that are intermediate between the Frenkel and the Wannier excitons; and impurity states in molecular crystals, including mixed molecular crystals.

This book is primarily directed toward specialists but is so well written and selective in the material it includes that it can serve as a starting point for anyone who plans to enter the field.

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Radiation and Photochemistry

The Chemistry of Ionization and Excitation. Proceedings of a conference on radiation chemistry and photochemistry, Newcastle upon Tyne, Great Britain, Sept. 1966. G. R. A. JOHNSON and G. SCHOLES, Eds. Taylor and Francis, London, 1967. xvi + 328 pp., illus. $11.50.

For decades radiation chemists have made subtle advances toward photochemistry; the difference between the two disciplines is always apparent, but just what can be achieved by a liaison between the two always remains a golden promise. The conference at Newcastle, England, whose proceedings are published in *The Chemistry of Ionization and Excitation* is the most recent attempt to get photochemists and radiation chemists together. Surprisingly enough, at least a partial success is achieved, as some of the contributors made a genuine attempt to extrapolate their work into the other field.

The first section consists of review papers which present the current viewpoints in radiation chemistry, with appropriate emphasis placed on the role played by excited molecules. This, together with the paper outlining the optical approximation in radiation chemistry, gives the photochemist a clear idea of the role he might play in the chemistry of high-energy radiations.

The subsequent sections deal with the radiolysis of gases, organic liquids, and water. The papers presented are in the mainstream of current research, and in a short space give a reasonably balanced view of these fields. The supporting photochemistry is of great interest to the radiation chemist; in particular, the papers on the photochemistry of water and rigid organic media and on the photoionization of gases are note-