

logical clock, is now abundantly clear. Sweeney takes this as a point of departure in her short but authoritative monograph. The book is more explicative than encyclopedic, covering all the basic concepts in the field. Although it deals primarily with plant material, the author does not hesitate to refer to results with animals where it is appropriate. The emphasis throughout is on the mechanism and biological function of clock systems.

The chapters not only cover daily or circadian rhythms but also include tidal, semilunar, lunar, and annual cycles. There is also a valuable chapter on the cell division cycle and its relation to endogenous rhythms.

A final chapter on mechanism, on the "clock" and its "hands," serves to set in good perspective the present knowledge and the speculations. Unfortunately, no good theories are currently available concerning the cellular and biochemical identity of the clock or its functional nature. Sweeney's book provides an uncluttered descriptive background, especially for "the students of the future who will reveal the balance wheel of the biological clock."

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Degenerate Materials

Heavily Doped Semiconductors. VIKTOR I. FISTUL'. Translated from the Russian edition (Moscow, 1967) by Albin Tybulewicz. Plenum, New York, 1969. xii + 420 pp., illus. \$25. Monographs in Semiconductor Physics, vol. 1.

In 1965 (when this book was written) it was still common to equate heavily doped semiconductors with those that are electronically degenerate. Thus they are treated as "poorly conducting metals" throughout this volume. Other topics of recent interest in heavily doped semiconductors—energy band tails and the properties of disordered systems—are barely mentioned.

Within this context, the book is a detailed compilation of relevant formulas and properties for these materials. It is not a textbook so much as a reference for those who are familiar with solid state and semiconductor phenomena. The reader should, in fact, treat with care the first chapter, which

is intended as a summary of semiconductor physics but which is in several places misleading and sometimes simply wrong. The remainder of the book, though short on explanations, contains probably the most extensive treatment of degenerate semiconductors now available. Germanium and silicon get the lion's share of space to such a degree that most of the theoretical relations are extended to include the explicit details of their individual energy-band structures.

One-third of the book consists of the chapter on transport phenomena, which is, in itself, a tour de force. The preceding chapter on semiconductor statistics is also quite detailed and adds to the standard material some not-so-familiar graphical techniques for Fermi-level determination. Optical absorption is given a fair treatment, but other optical effects are somewhat slighted. In addition to a chapter on the preparation of heavily doped semiconductors (written by M. G. Mil'vidskii), the author includes a short chapter on solubility relations for impurities which is evidently largely his own work. A chapter on applications of these materials and a large set of tables of Fermi integrals and transport integrals complete the volume.

The references are very comprehensive through 1963; thereafter, the author's own works appear to outnumber all the rest. The translation reads very fluently. In conclusion, this is a unique book which can be of value to the knowledgeable workers in this field.

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The Magnetosphere

Magnetospheric Physics. Proceedings of a symposium, Washington, D.C., Sept. 1968. DONALD J. WILLIAMS and GILBERT D. MEAD, Eds. American Geophysical Union, Washington, D.C., 1969. iv + 460 pp., illus. Cloth, \$10. Paper, Vol. 7, Nos. 1 and 2, of *Reviews of Geophysics*, available by subscription only.

This book differs from the usual symposium proceedings in that it is very well done. One has become accustomed to the publication of symposium proceedings in expensive volumes with long production times and containing many papers that either advertise work pub-

lished elsewhere or are not good enough to survive the refereeing process of a reputable journal. This book was produced relatively quickly and at a cost of less than half that of the usual symposium proceedings. The symposium was restricted to a single topic: the magnetosphere. The volume contains only the 15 invited review papers presented at the symposium, and these papers, as a collection, constitute good reviews.

The contents of this book have also been published as the first half of volume 7 (1969) of *Reviews of Geophysics*, the interdisciplinary review journal of the American Geophysical Union. This last point has led to some difficulties for the journal. It has been questioned whether an interdisciplinary review journal such as *Reviews of Geophysics* should devote half a year's output to such a narrow topic. This question may have been largely responsible for the motion made in the spring meeting of the Council of the AGU that *Reviews of Geophysics* "be discontinued at the earliest possible date." [See *E&S* 15, No. 6, 465 (1969). It appears that this matter has since been resolved.]

Although this collection may be criticized from the point of view of its publication in *Reviews of Geophysics*, it is a model of what a good symposium proceedings should be. The authors were carefully chosen to cover a wide range of topics and subdisciplines within the general discipline of magnetospheric physics. There is not much overlap among the various papers. What overlap does exist is useful in that it sometimes results in the presentation of divergent views of the same topic. For example, four of the contributions are by Soviet authors. The areas of overlap between these papers and the U.S. papers indicate to me that the Soviet program of magnetospheric research is not operating at the same dynamic level as the U.S. program. Most discoveries and innovative new ideas have come from U.S. research.

The book contains some minor flaws that detract slightly from its overall excellence. The lack of an index is annoying. Some topics of importance are treated lightly; for example, the production of ELF and VLF emissions by trapped radiation and the existence of field-aligned currents in magnetosphere are mentioned only casually.

This conference proceedings provides an excellent benchmark for progress in magnetospheric physics. (The conference was held in observance of the tenth