listings of 25 physics journals programmed into the computer memory of the M.I.T. Technical Information Project. References from papers in these 25 journals raised to 850 the total number of journals available for citation.

Approximately 450 diagrams convey the essential information to the reader, with a minimum of distracting text. References to the original literature accompany each figure, making it easy to look up details concerning experimental methods if the reader so desires.

The present volume is a complete revision of Brown's 1959 volume of similar purpose, bringing the data up-to-date as of 1965. Most of the descriptive text in the earlier edition has been eliminated, leaving only the barest minimum of theory necessary to define the symbols used in the diagrams. Unfortunately, in the course of the revision a large number of typographical errors have crept in, making it necessary for the reader to verify each equation and numerical factor. Some of the sentences have been chopped so that one must guess at their meaning. There has been an apparent neglect of editing and proofreading at some stage in the manufacture of this book.

Reading a book like this makes me wonder if education by computer will leave the next generation of children indifferent to the beauties of English style and sentence construction. Or will we, as suggested in the recent science-fiction story "Babel-17," learn to think in computer language?

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Cellular Structures

Regulation of Metabolic Processes in Mitochondria. Proceedings of a symposium held in Bari, Italy, April–May 1965. J. M. TAGER, S. PAPA, E. QUAGLIARIELLO, and E. C. SLATER, Eds. Elsevier, New York, 1966. 594 pp., illus. $27.50.

This collection of papers by European biochemists includes accounts of experimental work and discussions of most of the major known functions of mitochondria. The gathering together of a large number of papers in this field in a single volume not only serves to highlight areas in which there is essential agreement among different investigators, but also reveals that in other areas there is a lack of unanimity and basic understanding of the mechanisms controlling metabolic reactions in mitochondria. The concluding panel discussions on selected topics are particularly valuable and should provide a stimulus to investigators in their search for new approaches and tools to resolve such problems as the mechanism of energy conservation, the nature of energy-rich intermediates of oxidative phosphorylation, and the metabolic significance of ion uptake and swelling in mitochondria.

Among the more interesting papers are P. Mitchell's defense of his recently developed chemi-osmotic theory of energy conservation against the more conventional chemical theory, and E. C. Slater's summary of evidence in favor of the existence of high-energy chemical compounds as intermediaries in respiratory-chain phosphorylation. Proposals for new mechanisms of fatty acid activation are presented by several authors, and concepts on the control of glutamate oxidation and competition between substrates for oxidation are also reported.

G. D. Greville presents a fine review of the control of utilization of substrates by mitochondria, which focuses attention on the multiplicity of possible control sites and their interaction. It reveals clearly that a deeper understanding of the intramitochondrial location of enzymes and permeability barriers to substrates and cofactors is necessary before observed metabolic events can be interpreted unambiguously. An experimental approach to this difficult problem is described by M. Klingenberg and E. Pfaff, who present data, based on analytical measurements principally of isotopic nucleotide exchange, that formalize functional compartments. V. P. Whittaker discusses the morphological compartments seen in the electron microscope. Once functional compartments are defined in relation to the mitochondrial ultrastructure, it may be expected that basic problems involving mitochondrial control mechanisms will be solved. This book provides examples of profitable, as well as unprofitable, approaches.

Although *Regulation of Metabolic Processes in Mitochondria* contains a large body of experimental facts, it would have been more authoritative had the editors been more selective. The impression exists that some of the reported findings may be inconsequential, essentially unrelated to the broader issues of metabolic control. This may confuse the nonspecialist seeking a background in mitochondriology and makes the specialist pay an unnecessarily high price for the dozen or more excellent articles. A major defect in many of the papers themselves is an insufficiency of detail in the description of the experimental procedures. This makes it difficult to judge the data on such controversial subjects as the mechanism of action of atractyloside, carnitine, and thyroid hormone, where discrepancies between observations reported by various laboratories may, in large part, reside in the different experimental procedures used.

However, the extensive bibliographies, excellent indexing, and the presence of previously unpublished data in most of the contributions, make this volume a useful reference work well worth the initial investment.

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Physicochemical Phenomenon

Ion Exchange. A Series of Advances. Vol. 1. JACOB A. MARINSKY, Ed. Dekker, New York, 1966. 436 pp., illus. $16.75.

This is the first volume of a series of Advances initiated, according to the editor, to satisfy the need "for examination and evaluation of ion-exchange theory and experiment as they evolve."

The first chapter, on transport processes in membranes (Caplan and Mikulecky), stresses the application of nonequilibrium thermodynamics. I found the material quite difficult to follow, apparently as a result of the desire of these authors to present a complete and rather detailed treatment in a limited space. A review restricted to fewer phenomena and less detail would have made this section more useful. The treatment of ion-exchange kinetics (Helfferich) gives a good summary of recent experiments and results, followed by an excellent review of recent theoretical treatments, largely those of the author. The study of complex formation in ion exchangers (Y. Marcus) is detailed and complete, but of interest probably limited to those concerned with this rather narrow application. The chapter on theory and experi-