Book Reviews

Currents in Biochemical Research 1956. David E. Green, Ed. Interscience, New York, 1956. 697 pp. Illus. $10.

The first volume of CBR was published 10 years ago, and this collection of 27 essays follows in the pattern set by that volume. The object of the book, according to the editor, is "to communicate to non-specialists an over-all impression of the present status of the significant problems in each field, to point up the broad strategy of current research, and . . . to speculate on the likely paths of future research." The authors "have been asked to write as simply and as lucidly as the requirements of scholarship tend to permit." Certainly, most of these objectives have been realized in many of the papers in the current collection.

By far the largest number of papers are concerned with various aspects of the chemistry and biochemistry of enzymes. Racker writes on enzymes as reagents, Mahler on enzyme complexes, Greenberg on multiple enzyme systems, and Chance on electron transfer and enzyme substrate compounds. The kinetics of enzyme reactions are discussed by Alberty, and Theorell is concerned with the relations between prosthetic groups, coenzymes, and enzymes. The role of nucleotides and coenzymes in enzymic processes is considered by Huennekens, while George discusses the nature of the reactions involving hemo proteins.

A second group of essays may be considered as primarily concerned with problems in intermediary metabolism. Cori discusses the integration of our information concerning enzymic activities with specific details of cellular organization, with particular reference to certain aspects of carbohydrate metabolism. Lipmann contributes a short paper on the basic biochemical aspects of the biological problems of "duplication, reproduction, and individualization" brought together under the term *patternization*. Steroid biosynthesis is discussed by Bloch, and the recent information in regard to the biosynthesis of the porphyrin molecule by Shemin. Leloir writes on the interconversion of sugars in various living systems.

Three papers are concerned primarily with microbiological subjects: that of Barker on bacterial fermentation, that of Snell on the role that the study of bacterial nutrition has played in our understanding of the nutritional requirements of higher animals, and an extended paper of Spiegelman and Campbell on the formation of induced enzymes in microorganisms. Current ideas concerning protein structure are discussed by Low and Edsall, while the specific problem of the structure of insulin is reported on by Sanger.

In addition to these, Morales and Botts present a theory for the primary events in muscular activity, and Nachmansohn and Wilson discuss recent work in the biochemistry of nervous activity. A new concept for the role of the ribonucleic acids is the subject of the essay by Cohn, and there are papers on photosynthesis by Bassham and Calvin and on viral growth by Hershey. Last, but not of least importance, are a number of papers concerned with the biochemical aspects of human disease, notably, a discussion of certain anomalies in carbohydrate metabolism by Stetten, of the hormones by Pincus, of the nature and function of blood by Surgenor, and the outline of an integrated concept of carcinogenesis by Rusch.

All of these papers have been prepared by experts in their various fields, although in some instances numerous details and turbid rhetoric make difficult going for the nonspecialist. However, most of the articles are stimulating as well as informative, and the book should have value, especially in affording the orientation toward a given field that is engendered by experienced guidance.

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Handbuch der Physik. vol. XIV, *Low Temperature Physics*, 1. S. Flugge, Ed. Springer, Berlin, 1956. 349 pp. Illus.

Volume XIV of the new *Handbuch der Physik* is the first of two volumes dealing with low-temperature physics. It comprises two articles on liquefiers and associated topics, together with one each on electrical conductivity, thermal conductivity, and specific heats.

The first chapter, "The production of low temperatures down to hydrogen temperatures" by J. G. Daunt, is an impressively exhaustive summary of the principal cryogenic devices that have been developed, with much detail on design and performance. The theory of liquefiers, regenerators, and heat exchangers is outlined with the maximum thoroughness permissible under the necessary limitations of space. It is, incidentally, the longest chapter, with more than 100 pages and 101 figures. Each section is fully supplemented by references to the original articles, some of which are quite obscure and indicative of the great effort that has been put into achieving a thorough coverage of the subject. A minor criticism can be leveled at the numerous printing errors. In addition, the author obviously has divided loyalties in the matter of Anglo-American spelling, a problem that arouses my deepest sympathy.

Complementary to the first, the second chapter, by S. C. Collins, deals with "Helium liquefiers and carriers." The author discusses in turn the principles of refrigeration, heat exchangers, representative liquefiers, and transfer and storage vessels. The section on liquefiers suffers from overcondensation in the closing stages and tends to degenerate thereupon into a brief recitation of performance figures for the better-known liquefiers throughout the world. Viewed as a whole, however, the article is a valuable contribution to the volume and is amply provided with diagrams and references.

The subject of "Electrical conductivity of metals and alloys at low temperatures" is expertly dealt with by D. K. C. MacDonald. The style is refreshingly lucid and articulate, and indeed the author permits himself to become positively lighthearted on occasion. The opening section proceeds from the early history to a quick survey of theoretical developments and a discussion of the effects of impurities, lattice defects, and so on. The second part is concerned with experimental methods and techniques, especially recent developments for greater precision of measurement. The galvanometer amplifier, in the development of which the author has played an active part, is described at considerable length; other topics are measurements with bridges and potentiometers; the superconducting galvanometer, modulator, and reversing switch; and the preparation of specimens. Finally, the author returns to a discussion of the adequacy (or otherwise) of theory in the light of experimental data, concentrating on the monovalent metals, which are his principal personal interest, and ranging over the Bloch-Gruneisen formula, electron screening effects, magneto-resistance, size effects, low-temperature resistance minima and thermoelectricity, and the

anomalous skin-effect. The phenomenon of superconductivity is brought up in the discussion of electron-lattice interaction at various stages of the article but is not discussed in detail.

There are few fields of physical research in which the observations are so critically dependent on the precise state and composition of the subject material as the "Thermal conductivity of solids at low temperatures," the topic handled in this volume by P. G. Klemens in a monumental treatise. As the author so aptly states at one point, "these observations yield a conflicting picture. . . ."! But this is not to disparage the article, which, although lengthy (more than 80 pages) and hard to digest at one sitting, is rendered so mainly by the complicated nature of the subject. The latter is graphically demonstrated.

Methods of measurement are disposed of rapidly in a brief introduction. The theoretical coverage is much more extensive than is the case for the companion chapters, and most (if not all) of the available experimental data are brought into the subsequent discussion. Separate sections are devoted to dielectric solids, the electronic component and the lattice component for metals and alloys, and superconductors. In the dielectrics section, the discussion ranges over lattice waves and the phonon gas, anharmonicity effects, scattering by static imperfections, paramagnetic solids, and liquids. For the metallic state, the major difficulty lies in the separation of the electronic and lattice contributions, each component playing a dual role of carrying and scattering agent. The author ably demonstrates both the substantial advances that have been made toward, and the difficulties that remain to limit, a full understanding of the problem. Although the situation for superconductors appears at first sight to involve only additional complications, it is probable that experiments in this area will go some way toward providing a means of achieving the desirable separation of factors.

The value of the references has been enhanced by a subject title for each one. This has been carried a stage further, namely, by supplying a brief abstract, in the "General references" at the end of the ensuing article by P. H. Keesom and N. Pearlman on "Low temperature heat capacity of solids." These authors favor the alternative style (also adopted by MacDonald) of achieving greater "readability" through less detailed (but quite adequate) coverage of theory and greater over-all brevity. (A full theoretical discussion appears in volume VII of the *Handbuch.*)

A useful section on experimental techniques precedes that on experimental results, which constitutes the major portion of the article. The lattice and electronic specific heats of the elements are dealt with in the framework of the groups of the Periodic Table, including a short discussion of the transition metals and their alloys. A section on "other sources of heat capacity" deals with superconductivity (fairly detailed), excitation modes (Schottky anomalies), cooperative phenomena, and size effects (surface contribution).

The volume as a whole will be of great value to all physicists engaged in solid-state research, and it is therefore most unfortunate that the price (about $18) is so prohibitively—even unreasonably—high. One hopes, too, that the many typographic errors will be eliminated from subsequent printings. If the long-suffering English language is subjected to occasional violations throughout, this is only the modern expectation. At least one new word—*definitory*—has been boldly invented; its discovery we leave as an exercise for the reader.

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Eléments de Mécanique Quantique. Ph. Pluvinage. Masson, Paris, 1955. 547 pp. Illus. Cloth, F. 4600; paper, F. 4000.

This is a first course in quantum mechanics, which might be compared with a recent American book like Schiff's or one of more ancient vintage, such as Pauling and Wilson. The author does not go into any detailed exposition of the more fundamental and more philosophic aspects of quantum theory such as might be found in Bohm's book. His intent is rather to present the formal and technical aspects of the theory as clearly as possible.

On the whole, the treatment is traditional and does not contain many of the more recent methodological developments, although there is a short section on effective range theory and the Schwartz theory of the delta function. On the other hand, every discussion does contain nontrivial physical examples of modern interest. Each new area to be considered is prefaced by a discussion of its classical limit, a technique that makes for a very clear exposition.

The material covered includes one-dimensional motion, wherein the usual concepts of quantum theory, such as energy levels and reflection coefficients, are introduced and applied to the traditional examples—that is, harmonic oscillator, square well, and so on. Matrix methods and approximate procedures then follow. Three-dimensional problems involve energy-level problems, such as the hydrogen atom and scattering problems, spin, and the Zeeman effect. The final sections of the book are devoted to the many-body problem, being devoted principally to the theory of atomic spectra and diatomic molecules. The last chapter discusses radiative effects determined by correspondence-principle methods.

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Faster, Faster. A simple description of a giant electronic calculator and the problems it solves. W. J. Eckert and Rebecca Jones. McGraw-Hill, New York, 1955. 160 pp. Illus. $3.75.

This excellent book which, as its subtitle states, is "a simple description of a giant electronic calculator and the problems it solves" should be of interest both to those familiar with computers and to those who would like to learn something about them. It describes the Naval Ordnance Research Calculator at Dahlgren, Virginia, in detail and in terms that should be understandable even to those not in the computer field. The book describes the logical and arithmetic structure of the NORC, its auxiliary units, built-in mathematical checks, maintenance, and how to program for it; there is also an excellent chapter on why such large and fast computers are needed.

The authors only once used the generally preferred word *computer* instead of *calculator* in referring to "the first large-capacity electronic computer" as the SSEC instead of the ENIAC! A second minor flaw is the omission of a bibliography for those who become interested in learning more about electronic computers.

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Cryptococcosis. Torulosis or European blastomycosis. M. L. Littman and Lorenz E. Zimmerman. Grune & Stratton, New York and London, 1956. 205 pp. Illus. $8.50.

This is a comprehensive review of what is known about cryptococcosis and its etiologic agent. The carefully edited text covers in a very readable manner all aspects of the disease in man and animals, with special emphasis on clinical matters and pathology. Also, the cultural and morphologic characteristics of the fungus, *Cryptococcus neoformans,* are presented in detail, with a clear treatment of laboratory identification and differentiation of the pathologic species.