Book Reviews

Quantum Mechanics. International Series in Pure and Applied Physics. Leonard I. Schiff. McGraw-Hill, New York–London, ed. 2, 1955. xii + 417 pp. Illus. $6.50.

The revision of this standard textbook and reference work has been accomplished mainly by the addition of topics that either provide further illustrations of general principles or introduce new methods that have been developed since the publication of the first edition in 1949. Among the more important of these are a discussion of a diffraction experiment in connection with the interpretation of the uncertainty principle, an introduction to the use of variational principles in the theory of scattering, and a brief but very clear exposition (following Bethe) of the "effective range" approximation in the treatment of the two-nucleon system. The sections dealing with fundamental particles have been brought up to date by the insertion of brief references to the properties of mesons; a number of references to recent research papers have been added.

It is my opinion that the book's usefulness as a text might have been enhanced further by amplification of some of the sections dealing with fundamental concepts and methods. This is especially the case in the chapter on the matrix formulation of quantum mechanics. The student who has not had an introduction to matrix algebra is likely to feel that the subject is inadequately treated. The discussion of unitary transformations would have been improved, for example, by addition of a short section on the concept of change of basis in a vector space, and the important theorem on simultaneous diagonalization of commuting matrices might well have received further attention. The treatment of angular momentum has been improved by addition of a section on the definition in terms of infinitesimal rotations, but little further use is made of this important concept in the sequel. The section on addition of angular momenta is a description of the general procedure; it would have been improved if an example had been added. Additions of this kind might have been compensated for by abbreviating other detailed mathematical parts of the book that illustrate relatively less important points. The discussion of representations of the hydrogen wave functions in parabolic coordinates and of the classical theory of the Cerenkov effect are examples.

The book is remarkably accurate, both in detail and in exposition of general principles. It continues, in the second edition, to be an excellent text for courses in quantum mechanics at the graduate level.

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Cardiovascular Renal Problems. Hans Popper and Daniel S. Kushner, Eds. Blakiston Div., McGraw-Hill, New York, 1954. xviii + 325 pp. Illus. $5.

This is the first volume of a projected series of reproductions of clinical-pathologic conferences held at Cook County Hospital from 1946 to 1953, and it deals with selected problems in the field of cardiovascular-renal medicine from the standpoint of clinical-pathologic correlation. The editors have attempted to "select the clinical problems which are representative of the majority of patients with cardiovascular renal disease encountered in the wards . . ." and present them in the form of transactions of the hospital conferences.

The introduction is a short informative history of the development of clinical-pathologic correlation, from the first coordinated attempts by Benvieni and Morgagni to relate the findings at the autopsy table to clinical observations, through Cabot's introduction of clinical-pathologic conferences as an adjunct to medical education, to the present-day philosophy and practice of this teaching exercise.

Under three main headings entitled "Cardiac problems," "Vascular problems," and "Renal problems," 26 conferences are reproduced, covering such specific problems as "Chronic pulmonary insufficiency in sandblaster," "Complication of coronary artery disease," "Deforming arthritis and edema," and "Differential diagnosis of uremia." Each conference has a brief clinical history followed by the usual sections of clinical discussion, pathologic observations, pathologic discussion, and final pathologic diagnosis. Pertinent references to published work related to the particular problem conclude each conference. In a number of instances, additional, more didactic discussion is included under the heading of "Editors' notes."

The pathologic discussions are uniformly thorough and instructive in contrast to rather sketchy clinical discussions in some sections. There is an abundance of illustrations of pathologic material, both gross and microscopic. However, for a book purporting to stress the correlation between ante- and post-mortem findings there is a surprising dearth of illustrations of clinical material. For example, only three x-rays and no electrocardiograms are reproduced in the entire book.

The purpose of a book such as this is not entirely clear. A clinical-pathologic conference is an important part of medical training, both for medical students and graduates. However, a C.P.C. is inherently a "live performance" where questions, comments, and even arguments can add to the interest. Although the editors state in the preface, "It has been our intention to maintain the spirit of each original conference," in my opinion much of the spirit of a C.P.C. is lost in print, and we are left with a "post-mortem." For the busy physician, this book may warrant an evening's reading but probably is not worth inclusion in his permanent library.

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Principles of Meteorological Analysis. Walter J. Saucier. Univ. of Chicago Press, Chicago, 1955. xvi + 438 pp. Illus. $10.

This book represents an attempt to narrow the gap between the theoretical material that is covered in basic courses of meteorology and the applied material that is covered in weather analysis courses. Integration of these two broad phases of training stems from the author's connection with the Chicago school of meteorology and the underlying educational philosophies that were developed by Carl-Gustaf Rossby and continued under the direction of Horace R. Byers.

Beginning with an introductory chapter defining atmospheric variables, the book describes the various meteorological charts and diagrams in Chapter 2. An interesting and valuable feature is the discussion of map projections, map scales, measurement of geodetic distances and directions from a map, and great-circle arcs. Ensuing chapters cover hydro-

statics and static stability, scalar and graphical analysis, cross-section analysis, isobaric analysis, and a short treatment of isentropic analysis. The chapter "Analysis of the surface chart" appears to be rather brief but, as pointed out by the author, most of the concepts of surface analysis have been covered in earlier sections. The chapter is devoted to pressure patterns, pressure tendencies, and fronts and associated weather. Chapter 10 presents kinematic analysis in a comprehensive manner, covering streamlines, air trajectories, and the properties of motion of a wind field. The book concludes with short chapters on analysis of large-scale weather patterns in middle and high latitudes, of local weather, and of tropical weather.

The book is well illustrated, although a few of the maps suffer from too great a reduction in size. An appendix contains several useful tables and charts. Reading references in standard meteorological works, which are listed at the end of each chapter, are supplemented by extensive footnote references to the literature. The double-column format permits a large manuscript to be published in a compact volume without reduction of readability.

Saucier has successfully combined into one volume both meteorological fundamentals and practical aspects of synoptic weather analysis. This book should prove useful as a textbook for students of meteorology, whereas those who seek a ready reference on how to draw a weather map would do well to look elsewhere.

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Solar Energy Research. Farrington Daniels and John A. Duffie, Eds. Univ. of Wisconsin Press, Madison, 1955. xv + 290 pp. Illus. + plates. $4.

This book, the first in the United States, may also be a milestone in accelerated efforts to utilize solar energy. It is not an organized textbook but a compendium of articles presented at a symposium on solar energy in Madison, Wisconsin, in September 1953. About 30 scientists participated, exchanging informal talks about the possibilities of using solar energy. Their papers cover most of the possible fields including: expected world energy demands, the nature and availability of solar energy, space heating and domestic uses of solar energy, solar power, solar evaporation and distillation, atmospheric phenomena, conversion of solar to electric energy, solar furnaces, photosynthetic utilization of solar energy, photochemical utilization of solar energy, a British viewpoint, miscellaneous applications of solar energy, and suggestions for further research.

The presentation is not homogeneous. Some of the articles are merely short abstracts. Others are highly technical. A few are interesting reading for the layman. There is a general trend that is shared by most authors; they all stress the need for further research and for funds that will make research possible. Relatively few articles express pessimism about the technical or economical limitations of the use of solar energy.

The book is a "must" reader for all those who are attracted to the pioneering prospect of capturing the sun's energy. There is ample reference to the scattered literature of the subject and a list of patents that have been issued in the United States. The book is a storehouse of ideas that may be developed through research, which it will doubtless stimulate.

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Determination of Organic Structures by Physical Methods. E. A. Braude and F. C. Nachod, Eds. Academic Press, New York, 1955. xiii + 810 pp. Illus. $15.

The ever-increasing use of physical methods for the determination of the molecular structures of organic substances has greatly altered the character of organic chemical research during the past two decades. The present book is intended to be an authoritative and comprehensible survey of the various physical methods of structural analysis, each given in sufficient theoretical and practical detail to acquaint a nonspecialist with its scope and limitations. Seven of the book's 22 authors are British, one is Swedish, and the remainder are American. The 16 chapters comprising the book are grouped into three parts: part I is concerned with the determination of molecular size, part II with molecular pattern, and part III with molecular fine structure.

In Chapter 1, entitled "Phase properties of small molecules," H. F. Herbrandson and F. C. Nachod discuss various correlations of melting point, boiling point, molar volume, and parachor with molecular size and structure. Their discussion of mixed melting points is especially good. Chapter 2 by P. Johnson deals with the determination of molecular weights, dimensions and shapes of macromolecules by techniques involving the measurement of osmotic pressure, sedimentation equilibrium and velocity, diffusion rate, and viscosity. The omission of the more recently developed light-scattering technique from this otherwise excellent chapter is to be regretted.

Part II begins with a chapter by W. Klyne on the use of optical rotation in the determination of molecular configuration. The present treatment of this topic is considerably more detailed than another given by the same author in collaboration with J. A. Mills that has very recently appeared elsewhere [*Progress in Stereochemistry,* vol. *1,* W. Klyne, Ed. (Academic Press, New York, 1954), pp. 204–215], although a good deal of repetition is inevitable. Chapter 4 by Braude deals with absorption spectroscopy in the ultraviolet and visible regions. I question the value (and validity) of the grossly oversimplified explanations of electronic transitions with valence bond notation. (For example, the B_{2u} excitation of benzene is explained as a transition between Kekulé structures.)

In Chapter 5, R. C. Gore discusses the instrumentation, theory, and application of infrared spectroscopy to micromolecular substances. A special section of this chapter by E. S. Waight is concerned with the infrared spectroscopy of macromolecular substances. The chapter is distinguished by the emphasis that it places on the uses of polarized radiation. There has existed for some time a need for a substantial yet comprehensible exposition of the theory and uses of Raman spectroscopy and magnetic susceptibility. Chapter 6 by F. F. Cleveland and Chapter 7 by C. A. Hutchison, Jr., are devoted to these topics, but in my opinion they do not fulfill the need. Admittedly, the subjects are highly complex, but skillful writers with due regard for the limitations of their readers should do more than leave one with an impression of the complexities of their subjects.

Part III is introduced with a chapter by E. Stenhagen on the use of surface films in the elucidation of molecular structures. This is followed by a chapter written by L. E. Sutton on the theory and application of dipole moment measurements. Sutton is to be commended for the freshness and clarity he brings to the subject. Chapter 10 by J. Karle and I. L. Karle deals with electron diffraction, while Chapter 11 by J. M. Robertson deals with x-ray diffraction. Both of these chapters achieve their objectives. In the ensuing chapter, E. B. Wilson, Jr., and D. R. Lide, Jr., present a very welcome discussion of the newest spectroscopy—microwave spectroscopy. Then follows a chapter by J. G. Aston on thermodynamic properties and their use in the investigation of molecular structure. Aston has taken serious liberties with the term *isomer* and uses it interchangeably with the term *conformation* or, as he sometimes prefers, *conformer!*