ter 2, and is frequently alluded to elsewhere. The general restriction of the text to chemical propulsion is stated in the preface, in chapter 2, and in chapter 5. Redundancy hits a peak when the structural formula of B_2O_3 is repeated, with only ten pages separating the two.

Despite these and other minor faults, the authors present a worthwhile summary of the principles that are important in chemical propulsion, supplemented by numerous tables of properties and derived performance characteristics of propellant systems. The discussions on the role of bond energies in defining the behavior of propellant gases will be particularly helpful to beginning students of propellant technology. Extensive tables of combustion product compositions for many systems, computed under both frozen and shifting equilibrium conditions, facilitate the calculation of performance characteristics for instructional purposes. Equilibrium dissociation data as a function of temperature for a wide variety of products is presented on graphs in the chapter on working fluid properties. The authors emphasize many propellant components—for example, fluorine, boron, and beryllium and their compounds—that represent active developmental efforts at this time; thus, the text is commendably current in areas not limited by security requirements.

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Pharmacology

Introduction to Molecular Pharmacology. William C. Holland, Richard L. Klein, and Arthur E. Briggs. Macmillan, New York, 1964. vi + 250 pp. Illus. $7.50.

Molecular pharmacology is an exciting research field which demands that those who read about it have a considerable depth of knowledge of the physical sciences.

The authors of this "textbook" are to be commended for recognizing that descriptions of the mechanisms of action of pharmacologically active compounds must go far beyond the concept of identifying the physiological functions altered, no matter how useful such descriptions may be in a clinical realm. However, after careful scrutiny of the material included, I have concluded that the field of molecular pharmacology is not yet ready to be compressed into the brief statement presented here.

The book is divided into three sections, called "Chemo-morphologic Basis of Molecular Pharmacology," "Free Energy Transformation in Living Systems," and, finally, "Molecular Pharmacology." The general idea seems to be that the latter section will be crystal clear if the first two are read and understood.

It appears that the authors have, in 160 of the 250 pages, condensed some of the modern, and many not so modern, concepts of physical chemistry, electronic organic chemistry, macromolecular chemistry, cellular morphology, and other sciences basic to modern pharmacology. The serious student of molecular pharmacology will necessarily have studied most of these fields in some depth; thus the sketchy extracts included here will be of little value to him. The student with a casual interest in the subject and no depth of experience from which to approach it will probably find that the presentations are not easy to comprehend. In any event, the topics are not yet clearly enough related to pharmacologic phenomena to warrant bringing this particular collection together in a book in such a brief fashion.

Some examples of specific criticisms are the following: (i) the brief one-page treatment of the work of many who have approached the interesting field of drug-induced alterations of enzyme activity or concentration of activity; (ii) the limited seven-page treatment of biotransformation, covering the extensive, but early work (before 1960) of Brodie, Fouts, Remmer, Burns, Conney, R. T. Williams, and others; (iii) the citation of out-dated references on reserpine (1959) and ATP (1941!); (iv) the statement that very small molecules do not have odors; (v) the elementary interpretations of Michaelis theory, which lacks mention of modifiers, nonideal multienzymes, and the like; and (vi) the lack of an analytical approach in distinguishing between theories (of anesthesia, for example) and solid knowledge of molecular interactions.

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Electrical Engineering

Fundamentals of Microwave Electronics. Marvin Chodorow and Charles Susskind. McGraw-Hill, New York, 1964. xiv + 297 pp. Illus. $12.50.

This book, based on graduate courses in microwave electronics taught at Stanford University and the University of California (Berkeley), attempts to present the basic principles on which microwave devices operate, without tying the presentation to particular circuits or tubes. The authors direct the reader's attention to the simultaneous requirements and solutions of Newton's and Maxwell's equations for simple geometric configurations at the expense of circuit design details and laboriously derived field solutions for cases of complex geometry. Thus, the use of the word "fundamentals" in the title is not a misnomer, and the authors have succeeded well in their objective.

The first two chapters present a brief summary of the types and properties of microwave tubes and of the production and maintenance of electron beams. Chapters 3 and 4 deal with velocity modulation, energy exchange between the electron beam and the radio-frequency field, and the effects of interaction between electrons—that is, space charge effects. Chapter 5 derives Llewellyn's equations by considering the detailed electron motion, including space charge, for the case of the plane-parallel diode. Chapters 6 and 7 consider the interactions between the electron beam and forward-moving and backward-moving traveling waves, using first a transmission line approach and then the method of normal modes to obtain the conditions of wave propagation and amplification. In the final three chapters the authors evaluate the significance of two-dimensional motion of the electrons in the beam, coupling between the beam and the traveling electromagnetic field, electron motion in crossed-field devices, and amplification in the small-signal approximation for planar crossed-field tubes.

The book is not without its flaws, but they are relatively minor in nature. For example, Poisson's equation is introduced without defining all the symbols. This is hardly likely to cause confusion to graduate engineers, but all other symbols used throughout the book are appropriately defined when first used. Another example, which will

cause confusion for some readers, is the failure (in chapter 4) to distinguish clearly between the time- and frequency-domain representations of the field quantities.

The above shortcomings notwithstanding, *Fundamentals of Microwave Electronics* provides a clear introduction to the basic physical phenomena of microwave electronics and will be a valuable addition to the library of those who wish a knowledge of the fundamentals of the subject without extreme mathematical rigor.

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Mathematics

The Treasury of Mathematics. A collection of source material in mathematics, edited and presented with introductory biographical and historical sketches. Henrietta O. Midonick, Ed. Philosophical Library, New York, 1965. xxiv + 820 pp. Illus. $15.

It has been said, with good reason, that the real history of mathematics lies in the technical papers and publications of mathematicians. This leads one to conceive the possibility of giving some sort of true and connected picture of the development of mathematics by a well-chosen sequence of original, pivotal, and significant papers in the subject. This is essentially the idea behind Henrietta Midonick's work. Her *Treasury* is a 54-piece collection of source material, each piece carefully edited and prefaced with an appropriate biographical and historical sketch. The 54 papers span a wide range of time, running from Babylonian cuneiform tablet texts and the Moscow papyrus to papers by Boole, Cayley, Cantor, and others.

The problem of selecting material is a difficult one, and undoubtedly lists chosen by almost any two competent editors would differ greatly. The present selection is very good, although one might be surprised to find, on the one hand, Geoffrey Chaucer's *Treatise on the Astrolabe*, but, on the other hand, no excerpt of Bernhard Riemann's famous probationary lecture of 1854.

One cannot resist comparing Midonick's "treasury" with the items similarly gathered earlier by David Eugene Smith in *A Source Book in Mathematics* (McGraw-Hill, New York, 1929). This earlier work contains 96 selections, all chosen from the four and a half centuries running from the invention of printing to the year 1900. Smith classified his selections into the fields of numbers, algebra, geometry, probability, and calculus, and then arranged those in each field chronologically. Midonick has arranged her 54 selections in an alphabetical order by author. It is interesting that there is an overlap of only a half dozen (or less) selections in the two collections! Even the illustrations are different, for Midonick has reproduced pages and parts of original sources, whereas Smith inserted portraits of some of the eminent mathematicians. In general, Midonick's historical sketches are longer, more detailed, and more serviceable than Smith's. In both works, all selections appear in English, with meritorious translations where required. Smith's book contains 701 pages, including an index; Midonick's work contains 820 pages, but no index.

All who are interested in mathematics per se, its teaching or its history, are indebted to Midonick, and will be very pleased to add her source collection to Smith's. Finally, the publisher is to be congratulated on having produced a fine-looking book.

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Biological Systems

The Structure and Properties of Biomolecules and Biological Systems. J. Duchesne, Ed. Interscience (Wiley), New York, 1964. xii + 754 pp. Illus. $27.50.

This book, volume 7 in the series Advances in Chemical Physics, continues the pattern set in the previous issues by presenting a series of timely articles in which each author discusses largely his own views of a subject, rather than attempting a comprehensive literature review. (Among the 18 articles in the present volume there are only a few exceptions that might more properly be classified as general reviews.) However, whereas in the earlier volumes no attempt was made to correlate the articles in a given volume, the latest addition, which is almost twice as long as most of its predecessors, is given over entirely to biological systems. It is not clear whether the decision to devote an entire volume to one class of systems heralds a new trend for this series or represents an expression of the view that biological systems must be considered apart from the general area of chemical physics. Some readers may prefer this more unified approach; it is my feeling, however, that the volume as a whole suffers in comparison with earlier ones in the series because too many articles are included in an apparent attempt to give a comprehensive treatment of biological systems.

One other minor annoyance is the deletion of the dates on which the manuscripts were received. In the previous volumes I found this feature helpful in placing the articles in perspective.

Despite these criticisms as to format, most of the articles are interesting and well written. Space precludes detailed reviews, or even a listing of all titles. There is a brief introduction (Szent-Györgyi); one article on quantum mechanical methods (Fernandez-Alonso); four dealing mainly with the theoretical aspects of nucleic acids (Hoffmann and Ladik), electronic properties (Douzou and Sadron), infrared spectra (Shimanouchi and others), and photoprotection (Jagger); three articles on metal porphyrins and hemoproteins (Braterman, Davies, and Williams; Kotani; and Schoffa); four dealing primarily with applications of magnetic resonance (Jardetzky, Smaller, Ehrenberg, and Nicolau); and one each on thermal effects (Pollard), water adsorption on proteins (Eley and Leslie), radiation of proteins (Braams and Van Herpen), electronic conduction (Kearns), infrared spectroscopy (Lecomte), and enzyme action (Walter).

There is remarkably little duplication among these articles, and the editor has provided a comprehensive author and subject index. I noted few typographical errors; except for an incomprehensible table on page 205, most of these are minor. The high price will preclude many individual purchases of this book, but the volume is clearly worthy of inclusion in any science library.

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