

standardized official nomenclature now adopted by "Chemical Abstracts" and leading scientific journals.

The authors have chosen to present their exposition without "footnotes, tables or other distracting ancillary material," and to append a list of 774 references, classified as to general subjects, from which the majority of the information presumably is derived. Although this absence of specific documentation may facilitate reading for the beginner, it constitutes a serious limitation of the usefulness of the book for the worker in the field. Not only is one unable to take full advantage of the many novel and interesting facts presented, but in the few instances where statements in the text are at variance with the impression of this reviewer (for example, that 2 α -methylcortisone is an active corticoid in any species or that androstenedione is reduced to dehydroepiandrosterone by *Pseudomonas testosteroni*), it is difficult to check the source to resolve the discrepancy.

In presenting an orientation for beginners, this reviewer has some reservation about the pedagogical tactics of the authors. The text often does not provide the neophyte with a clear picture of the more important points. For example, Chapter 5 begins with the statement that certain plants contain glycosides of C₂₇-steroids with potent "cardiac activity," but, except for scattered mention of toxicity, the meaning of cardiac activity is buried late in the chapter in a paragraph beginning "Cardiac glycosides have a bitter taste." In the chapter on estrogens, a definitive initial impression of the biological importance of these hormones is obscured by an immediate discussion of the non-steroidal substances with estrogenic activity found in certain plants. The important mammalian hormone, estradiol-17 β , is not included among the examples of estrogens given nor even mentioned until the sixth chart of the chapter where it is merely shown to be in metabolic equilibrium with estrone. In Chapter 4 one finds statements that "another interesting sapogenin is digitogenin" and that "the glycoside digitonin contains 2 glucose, 2 galactose and 1 xylose units," but, unless he consults another text, the reader does not know for sure that digitonin contains digitogenin as its aglycone.

In spite of these points of criticism, and no attempt to condense steroid biochemistry into 169 pages could possibly please everyone in every detail, "Biochemistry of Steroids" is a valuable contribution to the steroid literature.

BEN MAY LABORATORY
UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

ELWOOD V. JENSEN

Comparative Biochemistry. A Comprehensive Treatise. Volume I. Sources of Free Energy. Edited by MARCEL FLORKIN, Department of Biochemistry, University of Liège, Liège, Belgium, and HOWARD S. MASON, University of Oregon Medical School, Portland, Oregon. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. xxv + 590 pp. 16 X 23 cm. Price, \$18.00.

Volume I of this series initiates a long needed integration of the vast store of facts and theories that have been derived from a multitude of investigations on diverse biochemical systems in the past few decades. The historical role and contemporary importance of a comparative approach to biology and biochemistry is presented very elegantly in an introductory chapter. The theme that thermodynamics constitutes a common denominator for biochemical reactions is developed in the first chapter. General concepts are explained with great clarity. The thermodynamical analysis of open systems is especially welcome since few biologists or biochemists have access to a readable account of this recently developed branch of science. The reviewer would have welcomed also some additional applications to specific biochemical systems as well as a more extensive treatment of entropy changes in chemical reactions and the relationship between entropy and information content. In subsequent chapters considerable attention is given to the energy-yielding reactions which are ubiquitous in nature. These are grouped into chapters on glycolysis, terminal electron transport, fatty acid oxidation and oxidation of inorganic substrates. The complex metabolic pathways are thoroughly analyzed and integrated into the scope of a comparative treatise. The photosynthetic reactions obviously belong here too but these are to appear in a subsequent volume. The chapters on energy-rich and onium compounds are exceptionally thorough and lucid and complement the path-

way analyses perfectly. The remaining material of the book diverges from the main theme. Although superbly discussed, the subjects of phototropism and phototaxis, vision and thermal energy utilization seem rather unrelated to free energy sources. The reactions involved in these phenomena would more appropriately be considered as triggering or control devices rather than as sources or transformers of free energy.

The reviewer feels that this volume is one of the most valuable additions to the review bookshelf and strongly recommends it to all students, teachers and research workers in biology and biochemistry.

DEPARTMENT OF BIOCHEMISTRY
DARTMOUTH MEDICAL SCHOOL
HANOVER, N. H.

EARL E. JACOBS

Field Emission and Field Ionization. Harvard Monographs in Applied Science Number 9. By ROBERT GOMER. Harvard University Press, Cambridge, Mass. 1961. 195 pp. 14.5 X 21 cm. Price, \$6.75.

A glance through the references in this monograph quickly indicates that the relevant literature is widely scattered throughout the journals of physics, chemistry and metallurgy. It seems therefore appropriate that a review be published and, according to the dust jacket, this monograph is "believed to be the first book in English" on the subjects named in its title. The first chapter is devoted to the theory of field emission, comparable in level to but considerably more detailed than treatments found in standard solid state physics texts. Chapter 2 deals with characteristics of field emission microscopes and especially the experimental aspects of attaining suitable emission tips; this useful lore for the practicing microscopist is supplemented by an appendix on the technical details of screens, tip assemblies, vacuum systems, and electronic equipment. Chapter 3 contains a discussion of field ionization ("... field emission in reverse, ... the tunneling of electrons from molecules into the tip ..."), field desorption, and their applications, such as in microscopy, investigation of potential curves in adsorption processes, and tip cleaning. Chapters 4 and 5 return to field emission for a fairly thorough discussion of the following applications: gas-solid adsorption; surface diffusion; properties of dielectric layers; molecular images; whisker growth and structure. The book closes with a second appendix on "recent work," a list of footnote references, and a complete index. It is well supplied with photographs of emission patterns, tables of relevant data, and useful working equations, and appears to be a book useful to workers involved in, or contemplating, research in the areas of field emission and ionization.

DEPARTMENT OF PHYSICS
UNIVERSITY OF ROCHESTER
ROCHESTER 20, N. Y.

R. S. KNOX

The Chemistry of the Terpenes. By A. R. PINDER, B.Sc., Ph.D., D. Phil., Senior Lecturer in Organic Chemistry, University College, Cardiff, University of Wales. John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1960. vii + 223 pp. 16 X 25 cm. Price, \$8.25.

The decision as what to include in a single volume devoted to the chemistry of terpenoids must, to a certain extent, be arbitrary. The present volume devotes 27 pages to essential oils and the general determination of structure, 86 to monoterpenoids, 33 to sesquiterpenoids, with 29, 39 and 11 pages for the di-, tri- and tetraterpenoids, respectively. There are two final smaller sections on rubber and the biogenesis of terpenoids. This seems, on the whole, an acceptable balance.

The date of the preface is May, 1960, but no reference later than 1958 appears and those of 1956 and later constitute a very small proportion (about 4%) of the whole. In the space at his disposal the author covers adequately what may be described as classical terpenoid chemistry. The structural determination of the simpler, and some of the more complex members, and their related syntheses are clearly presented. The determination of stereochemistry receives, except with the monoterpenoids, a smaller place.