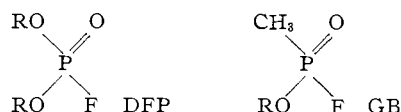


these restricted fields, however, Dr. Saunders has done an excellent job in putting together pieces of information not hitherto available in textbook literature.

The text comprises a little over 200 pages, three-fourths of which is devoted to phosphorofluoridates and related problems, and one-fourth to the fluoroacetates. There is a chapter on the mammalian nervous system, and a chapter on the medical aspects of the esterases, to assist the reader in the evaluation of the biochemical importance of the phosphorus compounds. These chapters are a distinct asset to the book because most chemists find it difficult to obtain easily comprehended explanations of these biochemical matters in the presently available reference works.

The discussion in the phosphorus section of the book is centered around the synthesis and properties (chemical and biochemical) of diisopropyl phosphorofluoridate (DFP) and related compounds. These compounds do not have a military importance which the novice in this field may ascribe to them from a reading of this book. As a result of the work by Saunders, the DFP series and their anticholinesterase activity were studied in the U.S.A. but the compounds were not seriously regarded as chemical warfare agents. Military interest was only fully aroused with the discovery of tabun (GA) and sarin (GB) by the investigating teams in Germany after World War II; these compounds are given only a few pages in the Saunders book.

In the structures of DFP and of GB (where R = isopropyl), it will be seen that GB has a C-P link, which a



purist in nomenclature would say is a requisite to classifying it as an organo-phosphorus compound. Saunders (and the literature in general) include DFP in that category, whereas they are perhaps more properly organic compounds containing phosphorus.

The DFP type of compound is much less toxic and therefore easier to handle than the GB type in the laboratory. Since most of the properties of DFP are similar to those of GB, and since they could be described in the open literature when studies of GB were still under military secrecy, a rather extensive *open* literature on DFP has developed, which is clearly and thoroughly summarized in the book by Saunders. He has rounded out the text by reviewing recent literature on the properties of some of the more important phosphorus compounds and applications of such principles as phosphorylation, and alkylation with phosphorus-containing esters.

The chapters in that part of the book devoted to fluorine compounds are concerned mostly with the chemical and biochemical activities of the fluoroacetates, fluoroethanol and related compounds. Dr. Saunders has done some impressive work in helping to elucidate the nature of β -oxidation in its relation to the toxicity of ω -fluoro chain compounds, and it is well described in this book. There is a helpful diagram of the Krebs cycle, to serve as a background for the discussion, similar to the esterase essay which supplements the DFP chemistry.

The book is well printed. The relatively few typographical errors are mostly in the names of references. Toxicity by inhalation is given in terms of LC50 instead of the now more usual LCt50, and in a number of cases the author has neglected to cite the exposure time, which makes the LC50 meaningless. On pp. 49-50 it should have been stated that the m.p. of mustard is for a plant-grade sample, since the pure compound melts at 14.5° rather than 11.5°. This reviewer's biochemical colleagues have consistently deplored the use of the pI50 concept (p. 66) with irreversible cholinesterase inhibitors like DFP; provided the inhibitor is not hydrolyzed and the reaction is allowed to go to completion, the I50 is simply one-half the molar enzyme concentration, and the Lineweaver equation (p. 65) is not applicable.

In the interest of historical accuracy, this reviewer deprecates the total absence of credit to Dr. Schrader of Germany for prior research. In the fields of phosphorus and fluorine chemistry it has been rather difficult to determine prior accomplishment because technical papers have been withheld from publication due to military secrecy. In the areas covered by this book such a situation does not now

apply; the Saunders work is cited from Ministry of Supply reports since 1941, and corresponding work by Schrader (*ca.* 1935-1939) is in the B. I. O. S. Final Report 714 listed in the bibliography of this book. The book refers to "independent wartime studies by Dr. Saunders in England and Dr. Schrader in Germany." The studies were independent, but Schrader completed the most significant parts of his work *before* the war. Dates of accomplishment are now available.

This book is highly recommended as an addition to the library of phosphorus and fluorine chemistry.

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The Chemistry of Organometallic Compounds. By EUGENE G. ROCHOW, Department of Chemistry, Harvard University, DALLAS T. HURD, Lamp Division, General Electric Company and RICHARD N. LEWIS, Olin Mathieson Chemical Corporation. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, New York. 1957. vi + 344 pp. 23.5 × 16 cm. Price \$8.50.

The authors set out to prepare a comprehensive, unified coverage of the theoretical, factual and practical aspects of organometallic compounds in brief, readable form. This they have accomplished most successfully.

The general properties of organometallic compounds are reviewed briefly, after which the theory of the carbon-metal bond and types of bonding are discussed in some detail, including the newly discovered "sandwich" type exemplified by the biscyclopentadienyl-metal complexes. General methods for the preparation of organometallic compounds are described and the compounds are then discussed by major metal groups. Separate chapters are devoted to compounds of the transition metals, special types of organometallic compounds (*e.g.*, fluorinated derivatives, complexes of metals and olefins, metal carbides, hydrides and carbonyls), and the use of organometallic compounds in organic synthesis.

The concepts of electronegativity, bond polarity, covalent and multiple covalent bonding are discussed and utilized to explain the relative stability of various organometallic structures. The distinctive bonding between carbon and the transition metals is described briefly and lucidly. Data for many of the groups are brought up-to-date, particularly the compounds of aluminum, silicon, germanium and the transition metals.

The book is well written, its typography is good and it contains numerous references to the original literature and review texts. It should be especially useful and stimulating to graduate students in inorganic-organic chemistry and to research workers who want a brief, readable, up-to-date review of the fascinating field of organometallic compounds.

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Symposia of the Society of Experimental Biology. Number XI. The Biological Action of Growth Substances. H. K. PORTER, Editor. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. vii + 344 pp. 16 × 25.5 cm. Price, \$9.50.

Number XI in the series of "Symposia of the Society of Experimental Biology" of Great Britain deals with the biological effects attributable to substances—commonly designated growth substances or growth regulators—which exhibit a regulatory effect even when all the normal nutrient requirements for growth are satisfied. This volume is a worthy addition to a series which has attained a recognized place in the biological literature, for its authoritative analytical accounts of important current biological questions.

In this volume, as the title implies, the objective is to present evidence that such chemically induced growth responses occur, rather than to deal primarily with the isolation, purification and chemical characterization of the causative agents, for much of this work is still in the future. To this extent the volume presents a challenge to chemists and biochemists, who will, by its aid, be able to acquaint

themselves with the more morphological evidence through which the chemical problems may be comprehended.

As in the previous volumes, the Symposium included chapters that deal with work on both plants and animals. For plants a wide range of topics is discussed. These concern the growth of buds and the problem of apical dominance; germination of seeds and its control by inhibitors; the growth of roots, largely by elongation, and the factors which stimulate cell enlargement; fruit development and the means by which it may be naturally and artificially induced; phototropic responses of the cylindrical sheath within which the shoot of the grasses emerges after germination, *i.e.*, the coleoptile, and the responses of this organ to electrical stimulation; growth and organ formation in cultured plant tissues; neoplastic growth in plants; and lastly the development of sexuality in certain fungi. This range of topics, each ably presented by an authority in the field in question, testifies to the great variety of effects in the normal and abnormal growth of plants which may be brought about by chemical stimuli over and above the accepted nutrients, organic and inorganic; and these chapters emphasize how much more biochemical work than hitherto can be done to interpret the responses of plants.

For animals the topics include the growth hormone of the pituitary gland; growth hormones in insects; hormonal stimuli to the growth of the fetus; the localized responses due to growth by renewed cell division that may occur in an otherwise adult mammal; the effect of antibiotics on normal growth; growth factors in cultures of animal tissues and in explanted embryonic organs; the emergence in tumor-forming cells of independence from the limitations that normally control their growth as they occur in differentiated tissues; and lastly the hormonal regulation of enzyme secretion.

This review can only indicate the scope of the chapters and commend their quality, while it points to the value of this volume in the delineation of one of the outstanding problems of the day, namely, the understanding of the chemical regulation of normal growth in differentiated tissue systems and of growth induction in otherwise mature, non-growing cells and tissues. In this great area of scientific inquiry the combined efforts of chemists and biologists are needed; by so clearly defining the morphological bases of these problems this volume should greatly help toward this end.

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BOOKS RECEIVED

November 10, 1957—December 10, 1957

ERNEST BALDWIN. "Dynamic Aspects of Biochemistry." Third Edition. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1957. 526 pp. \$5.50.

JOHN G. BURR, JR. "Tracer Applications for the Study of Organic Reactions." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 291 pp. \$7.50.

E. RICHARD COHEN, KENNETH M. CROWE AND JESSE W. M. DUMOND. "Interscience Monographs in Physics and Astronomy." Volume I: "The Fundamental Constants of Physics." Edited by R. E. MARSHAK. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 287 pp. \$7.50.

H. GAFFRON, A. H. BROWN, C. S. FRENCH, R. LIVINGSTON, E. I. RABINOWITZ, B. L. STREHLER, AND N. E. TOLBERT, Editors. "Research in Photosynthesis." Papers and discussions presented at the Gatlinburg Conference October 25-29, 1955, sponsored by the Committee on Photobiology of the National Academy of Sciences, National Research Council and supported by the National Science Foundation. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 524 pp. \$12.00.

ALAN F. GIBSON, General Editor, R. E. BURGESS, American Editor, AND P. AIGRAIN, European Editor. "Progress in Semiconductors." Volume 1. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1956. 220 pp. \$8.00.

ALAN F. GIBSON, General Editor, R. E. BURGESS, American Editor, AND P. AIGRAIN, European Editor. "Progress in Semiconductors." Volume 2. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. 280 pp. \$10.50.

H. L. GREEN AND W. R. LANE. "Particulate Clouds: Dusts, Smokes and Mists. Their physics and physical chemistry and industrial and environmental aspects." D. Van Nostrand Company, Inc., 126 Alexander Street, Princeton, New Jersey. 1957. 436 pp. \$11.25.

R. H. GRIFFITH AND J. D. F. MARSH. "Contact Catalysis." Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. 1957. 299 pp. \$8.00.

I. M. KOLTHOFF AND R. BELCHER with the cooperation of V. A. STENGER AND G. MATSUYAMA. "Volumetric Analysis." Volume III. "Titration Methods: Oxidation-Reduction Reactions." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 714 pp. \$15.00.

ALAN H. MEHLER. "Introduction to Enzymology." Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 425 pp. \$10.80.

THOMAS MOELLER, Editor-in-Chief. "Inorganic Syntheses." Volume V. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1957. 265 pp. \$6.00.

G. L. MILLER. "Metallurgy of the Rarer Metals." No. 2. "Zirconium." H. M. FINNISTON, General Editor of the Series. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 548 pp. \$12.50.

LÉON VELLUZ, Editor. "Cahiers de Synthèse Organique. Méthodes et Tableaux D'Application." Volume III. By JEAN MATHIEU AND ANDRÉ ALLAIS. Masson et Cie., 120, Boulevard Saint-Germain, Paris VI^e, France. 1957. 266 pp. Broché: 4.200 frs.; Cartonné toile: 4.600 frs.

W. A. WOOSTER. "Experimental Crystal Physics." Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. 115 pp. \$2.90.