Carmack and M. A. Spielman; 3, "Preparation of Ketenes and Ketene Dimers," W. E. Hanford and John C. Sauer; 4, "Direct Sulfonation of Aromatic Hydrocarbons and Their Halogen Derivatives," C. M. Suter and Arthur W. Weston; 5, "Azlactones," H. E. Carter; 6, "Substitution and Addition Reactions of Thiocyanogen," John L. Wood; 7, "The Hofmann Reaction," Everett S. Wallis and John F. Lane; 8, "The Schmidt Reaction," Hans Wolff; and 9, "The Curtius Reaction," Peter A. S. Smith.

Of particular interest to the reviewer was the chapter on the Willgerodt reaction and the Kindler variation of it. This is the reaction by which a ketone is converted to an amide by the reaction of ammonium polysulfide. It is an unusual reaction in the sense that a ketone such as ethyl phenylketone is converted into β-phenylpropionamide by this procedure, and there is considerable speculation as to the mechanism.

The chapter on "Azlactones" contains a large amount of interesting material which is not commonly discussed.

The material given in the chapter on the Schmidt reaction (reaction of hydrazoic acid and carbonyl compounds in the presence of strong mineral acid) will be found useful to those interested in the synthesis of amines, amides, and their derivatives.

J. G. ASTON
Department of Chemistry, The Pennsylvania State College

Smith's college chemistry. (6th ed.) William F. Ehret. New York-London: D. Appleton-Century, 1946. Pp. xii + 677. (Illustrated.) $4.75.

This revision is written under new authorship and from a fresh viewpoint, which sets it apart from the other editions; the author deserves more credit than the title would imply.

The text content is quite comprehensive and up to date. The sequence of topics is classical and seems to be well integrated, even though several times the author appears to be grasping for a connecting link. The method of presentation and quality of material indicates, however, that this edition is intended for the better student who has already had a course in chemistry in high school.

A feature well worth mentioning is the use of boldface print for new terms, for definitions, and for general emphasis.

Such topics as atomic structure, equilibria, and ionization seem to be adequately treated. A chapter on "Energy and Chemical Change" and another on "Electromotive Chemistry and Voltaic Cells" are well placed.

In general, however, the figures and pictures are very poorly executed, as demonstrated in Figs. 7, 11, 13, and 14 (which would not be recognized as a balance arm). This fact and the lack of sufficient pictorial material to break up the large pages give the book an unfortunately dull and drab effect. This is particularly true of the early chapters, which are already quite dull because of the subject matter contained in them.

Among items that can be listed as unfortunate are the use of the phrases "throw light on" and "sealed up the mouth" (p. 7); the statement, "Two substances can come together in two different ways" (p. 8); the definition of chemical property as a chemical reaction (p. 8); the verb in the sentence "The negative radicals stem from chlorine atoms . . ." (p. 71); and the use of double dots to show ratios (p. 111). Also, the periodic table (p. 178) contains elements 93, 94, 95, and 96 in positions not justified by their chemical properties.

A. B. GARRETT
Department of Chemistry, The Ohio State University

Practical physiological chemistry. (12th ed.) P. B. Hawk, B. L. Oser, and W. H. Summerson. Philadelphia: Blakiston, 1947. Pp. xiv + 1323. (Illustrated.) $10.00.

The 12th edition of this work appears on the 40th anniversary of the publication of the first under the signature of the senior author. The several revisions form a running commentary on the tremendous growth of physiological chemistry in this first half of the century. Inasmuch as 10 years have elapsed since the appearance of the 11th edition, revision for the 12th is considerably greater than for most of the earlier issues. The coverage of subjects is broader than ever, including tissues, foods, enzyme action, digestion, absorption, putrefaction, excretion, respiration, metabolism, hormones, vitamins, and antibiotics. It is up to date enough to include brief mention of the synthesis of penicillin G and production of isotopes by controlled nuclear fission. The table of atomic weights includes neptunium; however, virginium and alabamine likewise are there.

As in previous editions, laboratory procedures are given in sufficient detail to be followed easily. Presumably the authors are aware that their text is frequently used as a reference work as well as a teaching text. For these reasons the sharpening of certain minor points would be desirable. For example, the first experiments on dialysis include no recommendation for testing the membranes for leaks (p. 9); and perhaps it should be emphasized (p. 516) that, even with the improved Brown procedure, uric acid cannot be added to blood and satisfactorily recovered. In spite of these very minor criticisms, this revision will be welcomed by its friends and will undoubtedly win many new ones.

The text is handsomely bound, and the printing is unusually clean.

BENTON B. WESTFALL
Boyds, Maryland

Advances in carbohydrate chemistry. (Vol. 2.) W. W. Pigman and M. L. Wolfrom. (Eds.) New York: Academic Press, 1946. Pp. xiv + 323. $6.60.

The second volume of this series is again a valuable contribution to the field of carbohydrate chemistry. In contrast to reviews published during the war years, it is, as the preface states, international in scope: four reviews are presented by English authors, one by a French author, one by Canadian reviewers, and, in addition, there are four contributions by Americans.

Melezitose and turanose are the subjects discussed by Hudson. Evidence is presented to prove the structure of both the disaccharide and the trisaccharide. A thorough discussion of the anhydro sugars, presented by Peat, includes a comprehensive table of the properties of the anhydro sugars and their derivatives which should prove very valuable. Analogues of ascorbic acid is the topic discussed by F. Smith. Various syntheses are given, and the correlation between physiological activity and structure is presented. Lespieau describes the synthesis of hexitols and pentitols, giving rather detailed

procedures for the preparation of the alcohols and some of their derivatives. The interrelation of carbohydrate and fat metabolism is reviewed by Deuel and Morehouse, who not only present evidence for the conversion of carbohydrate to fat and the alleged reverse transformation but also include a rather complete discussion of ketolysis versus antiketogenesis. In the review of mucopolysaccharides and mucoproteins, by Stacy, an excellent classification of the various complexes is presented. Evans and Hibbert, in their review of bacterial polysaccharides, emphasize the complexity of the problems, although indicating that definite progress is being made in this difficult field. The chemistry of the pectic materials is reviewed by Hirst and Jones, while McDonald discusses polyfructosans and difructose anhydrides. Many properties of these sugars and their derivatives are listed. The final review, contributed by Haskins, concerns cellulose ethers of industrial interest.

The book is especially valuable because the authors are actively working in the fields concerned. Each reviewer gives an historical background in the subject discussed. Such information is, of course, available in the literature, but a concise summary is always to be desired. The volume is well edited and contains a wealth of material essential to anyone interested in the field of carbohydrate chemistry.

JOSEPH S. BUTTS
Department of Chemistry, Oregon State College

Advances in enzymology and related subjects of biochemistry. (Vol. VI.) F. F. Nord. (Ed.) New York: Interscience Publishers, 1946. Pp. x + 563. (Illustrated.) $6.50.

Like its predecessors, this volume contains critical documented summaries of the advances in the borderland between physical and biological chemistry, physiology and microbiology.

In "The Bacterial Amino Acid Decarboxylases," E. F. Gale discusses the conditions necessary for their formation, the cell-free preparation of them, their properties, and their resolution into apo- and coenzymes. Pyridoxal phosphate appears to act as coenzyme for the four known decarboxylases; in acid solution it may have a protective function. M. G. Sevag reviews "Enzyme Problems in Relation to Chemotherapy, 'Adaptation,' Mutations, Resistance, and Immunity." "Adaptive" enzymes do not exist; unfavorable metabolic environment merely reduces the activity of enzymes already present. The biochemical changes in increased resistance to unfavorable conditions appear genetically to be regressive processes; the development of new strains implies acquisition, by a recessive cell, of genetic factors from cells of a higher order. D. W. Wooley, writing on "Biological Antagonisms Between Structurally Related Compounds," states that these can in most cases be explained by the displacement hypothesis.

"Adenosine Triphosphate Properties of Myosin" is the contribution of V. A. Engelhardt. These are such that all of the ATP in muscle could be split by myosin in one second. Conditions responsible for the inaccessibility of ATP are considered, and a tentative scheme for the sequence of events is proposed. In "States of Altered Metabolism in Diseases of Muscle," by C. L. Hoagland, are included atrophy, hypertrophy, and diseases of voluntary muscle in man. "Acetyl Phosphate," discussed by F. Lipmann, plays a role in the metabolism of bacteria and of animal tissues; the chemical and energetic relations are surveyed. In "Microbial Assimilations" C. E. Clifton includes those of carbon, carbon dioxide, and nitrogen, as well as the influence of poisons and of genetic factors. W. G. Frankenburg writes on "Chemical Changes in the Harvested Tobacco Leaf." In the curing process these changes affect the static, nitrogen, and dynamic groups in the leaf and are the result of the action of the leaf enzymes. "The Actions of the Amylases," by R. H. Hopkins, and "The Amylases of Wheat and Their Significance in Milling and Baking Technology," by W. F. Geddes, survey the properties of the amylases, their occurrence and assay, and their significance in breadmaking. K. C. D. Hickman and P. L. Harris, in "Topocopherol Interrelationships," suggest a general shortage in the American diet, as well as many synergistic relations which warrant greater consideration, but it is difficult to disentangle fact from theory and vitamin from covitamin.

An author index (22 pp.) and a subject index (13 pp.) add to the usefulness of the book.

H. A. MATTILL
Department of Biochemistry, State University of Iowa

Vitamins and hormones: advances in research and applications. (Vol. IV.) Robert S. Harris and Kenneth V. Thimann. (Eds.) New York: Academic Press, 1946. Pp. xvii + 406. (Illustrated.) $6.80.

This volume will undoubtedly enjoy the same wide acceptance and use as have the preceding volumes. It is not a review in the usual sense, since only a limited number of subjects are treated. However, each subject is covered comprehensively, aiming to give both detail and a broad understanding of the subject. Cross indexing and extensive bibliographies increase its value as a reference book.

Many of the subjects treated are quite timely because of widespread interest in their practical applications. The section on "The Newer Hematopoietic Factors of the Vitamin B Complex" is especially timely because of the recent demonstration that pteroylglutamic acid (folic acid, *L. casei* factor, etc.) has antianemic activity in man. It is unfortunate that this review was written before many of the clinical results became available. However, the authors were able to append a few paragraphs summarizing these recent developments.

The section on "Thyroactive Iodinated Proteins" is also quite timely, since the use of these substances to increase yields of milk and eggs is receiving considerable attention in agricultural circles. Details as to methods of preparation, properties, and methods of assay are given.

To those who have been confused by the many apparently conflicting results the section on "Nutrition and Resistance to Infection" should be of help. The author has reviewed the available evidence in a critical fashion and has indicated certain basic considerations important to a general understanding of the problem.

The volume includes a unique article on "Manifestations of Nutritional Deficiency in Infants." The author has apparently had unusual opportunities to study this subject and has collected information which should be useful to both nutritionists and pediatricians.