droxylamine reductase, yeast invertase, phosphotransferases, citrulline phosphorylase, and two transaminases.

Jorgensen has discussed a broadened concept of buffers based on Brønsted's acid-base definition. Special mention is also to be made of an article by F. C. Stewart and associates on "Nitrogenous components in plants: recent knowledge derived from paper partition chromatography." This comprehensive review includes diagrams and extensive tables of value to the investigator; R_F values for 160 nitrogenous substances are presented.

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Radioisotope Conference, 1954. vol. II, *Physical Sciences and Industrial Applications.* Proc. Second Conference, Oxford, 19–23, July. J. E. Johnston, Ed. Academic Press, New York; Butterworths, London, 1954. ix + 223 pp. Illus. $7.50; vols. I and II, $16.

This volume is a collection of 24 journal-style papers that were presented at the Radioisotope Conference held at Oxford in July 1954. Almost without exception, these papers will be found to be both interesting and informative to any scientist or engineer who is interested in the applications of radioisotopes to industrial and research problems. However, although a small volume such as this might have been enough 8 years ago to have provided a comprehensive survey of radioisotope applications, for the year 1954 it is only a very limited collection of isolated examples of such applications. None of the papers is of a review type, and most of the work had already been described, or was subsequently described, in the usual journal literature.

Thirteen of the papers deal with the application of radioisotopes to industrial problems. Some of the more generally interesting examples of these papers are (i) determinations of the thicknesses of metal sheets by selectively measuring back-scattered gamma radiation, (ii) the use of ionized air to overcome electrostatic-charge hazards in hospitals and industry, (iii) determinations of the expected life of cutting tools from the rate of disappearance of radioisotopes formed by neutron irradiation, (iv) use of gamma radiation for the sterilization and pasteurization of foods, and (v) the use of radioisotopes in industrial radiography. However, as an example of the noncomprehensive nature of the collection, the fact may be cited that there is not a single paper dealing with any phase of the now very great use of radioisotopes in petroleum exploration and refining.

Eleven of the papers may be regarded as dealing with the use of radioisotopes in chemical and physical research. Outstanding papers among this collection are (i) use of C^{14} in a study of the Wagner-Meerwein rearrangement involving 1,2,2-triphenylethanol and its derivatives, (ii) the application of the catalytic isomerization of cycloalkanes to the synthesis of aromatic compounds randomly labeled with C^{14} in the ring, (iii) a method for measuring the deuterium content of water by the neutrons produced from gamma irradiation of the water, (iv) gas counting (as acetylene in proportional counters) of natural C^{14}, and (v) liquid-scintillation counting of low specific activity C^{14} (as acetylene in toluene solution).

The Radioisotope Conference was undoubtedly very successful, and many of the papers presented there are highly interesting. However, the price for this very limited group of papers is entirely too high to permit my recommending it to individual purchasers.

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Outlines of Enzyme Chemistry. J. B. Neilands and Paul K. Stumpf. Wiley, New York; Chapman & Hall, London, 1955. x + 315 pp. Illus. $6.50.

Enzymology is a rather young and rapidly growing branch of general biochemistry. The beginning student is confronted with a confusing journal literature and several highly specialized books on the properties of enzymes. Moreover, the language in enzymology has become so full of jargon that the beginning student often feels excluded from this field.

Refreshing efforts to change this situation were recently made by E. Baldwin in his stimulating treatise on the *Dynamic Aspects of Biochemistry* and by J. S. Fruton and S. Simmonds in their lucid presentation of *General Biochemistry.* These books have exerted a very stimulating influence on many senior college and graduate students by enabling them to grasp the significance of enzyme studies and subsequently to read more intelligently the complex and specialized literature.

The book *Outlines of Enzyme Chemistry* will undoubtedly contribute further to these efforts to provide a more adequate background for the beginning enzymologist. The volume is divided into four parts. The first two parts, which comprise more than half of the book, are devoted to elementary physical chemical aspects of enzymology, including brief chapters on isolation methods and characterization of proteins. The third part deals with specific coenzymes and enzymes. It includes several tables and a listing of enzymes. The fourth part is entitled "Metabolic patterns" and deals with some selected processes of carbohydrate metabolism and fatty acid oxidation. The book closes with a short but excellent chapter by Roger Y. Stanier on the synthesis of enzymes.

The 24 chapters of the book are well written and are comparatively free of major errors. However, the presentation of the material is somewhat unbalanced with respect to the background of knowledge required of the reader. Since, in the first half of the book very elementary aspects of physical chemistry, such as the ionization of weak acids and bases, are discussed rather extensively, the second half of the book appears very condensed by comparison. For example, alcoholic fermentation is presented by one figure, two tables, and a little more than one page of text. No mention is made of many important and interesting enzyme mechanisms of the urea cycle and nucleic acid and amino acid metabolism.

These and other omissions detract from the value of the book for the beginning student. In spite of these shortcomings, which can be avoided in later editions, the volume represents a very useful contribution to the teaching of enzymology. Taken as a whole, this book may be said to fulfill the aim of the authors to introduce senior undergraduate and beginning graduate students to the general subject of enzymology.

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The Theory of Cohesion. An outline of the cohesive properties of electrons in atoms, molecules, and crystals. M. A. Jaswon. Interscience, New York; Pergamon, London, 1954. viii + 245 pp. Illus. $5.75.

This is the second volume of a new series of monographs on metal physics and physical metallurgy edited by G. V. Raynor. Jaswon's purpose is to convey the mathematical development of the theory of cohesion to readers who are already acquainted with the qualitative aspects of the subject. The first six chapters review the basic ideas of wave mechanics and their application to the study of the helium atom, the hydrogen molecule, and the theory of molecular orbitals. This provides the groundwork for the latter part of the book, in which the theory of metals, the application of the cellular approximation, and covalent structures are discussed.

Jaswon does not cover as wide a field as the title suggests. The illustrative ex-

amples have been chosen almost entirely from the field of metals and alloys; ionic crystals are not considered at all, and the chapter on covalent binding is really too brief to be more than the barest outline of a treatment of molecules. These omissions, however, will not prevent the book from being useful to workers in fields other than metal physics, for it accomplishes successfully its major aim of providing a survey of the theory at an intermediate level. This has been done in a clear and compact manner; the mathematics has been kept as simple as possible; and the author has taken pains to stress the nature of the approximations that are such an unavoidable prerequisite for progress in this area. This monograph fills a definite gap in the literature between advanced and elementary accounts of the subject; with its emphasis on fundamentals, this should be a helpful and useful book to a wide range of readers.

The author and subject indexes are adequate, and the printing and production are good; unfortunately one cannot say the same for the proofreading; trivial errors abound, a figure (8.2) has been inverted, and a section of six pages purported to be on "The oxygen molecule" deals in fact with H_2O!

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Substances Naturelles de Synthèse. Préparations et Méthodes de Laboratoire. vol. X, Comportant la Table Récapitulative des Volumes VI à X. Léon Velluz, Ed. Masson, Paris, 1954. 201 pp. Illus.

This series, begun in 1951 and completed with the present volume, has given methods for making about 80 compounds of significance in nature. The editor's selection has not unduly overlapped comparable collections of recipes published elsewhere, mainly because the latter deal with more commonplace compounds. Earlier volumes in the present series have included descriptions of the synthesis from easily accessible materials of, for example, adenosine, chloramphenicol, hydrocortisone, lyxoflavine, phenylalanine, and thyroxin.

The present volume runs true to form in giving instructions for making DL-arginine, vitamin A_1, L-carnosine, β-carotene, ergothioneine, D-glucosamine, DL-penicillamine, and retinene. It also expatiates typically on these subjects: the text includes descriptions of the compounds, expositions on the synthesis of peptides and compounds containing isoprene chains (with recipes for making intermediates useful for the former purpose), and incidental notes on guanidine derivatives, the haloform reaction, Michael-type additions, and the Lobry de Bruyn-van Eckenstein rearrangement. The two expositions are accompanied by useful tables summarizing the application of the methods mentioned. The book ends less aptly by tabulating some properties of common solvents. Instructions for resolving the two DL-amino acids are not given.

Unfortunately, the discursiveness of the present volume bloats it with excessive detail. As either a textbook or a work of reference, it is overloaded with the minutiae of the syntheses, which are translated almost word for word from easily accessible reports in the literature. A few deft pricks from the editorial poniard could have deflated this otiose repetition while sparing the essential fabric of summaries and references; if the free space had then been filled with appraisals of the methods used, the book would have benefited both in readability and as a source of information.

Notwithstanding these shortcomings, this volume is up-to-date and, except for mistakes in the formulas for bufotoxin (p. 6) and anserine (p. 35) and misleading cyclic formulas for the sugars, it seems clear and accurate. It is a pity that, although it is concocted from the elements of recent successes in synthesis, it cannot be recommended either as a steady *vin ordinaire* to sustain the skills of the laboratory or as the quintessential *digestif* to clear and inspire minds surfeited with the rich bulk of chemical literature.

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Variational Principles in Dynamics and Quantum Theory. Wolfgang Yourgrau and Stanley Mandelstam. Pitman, London, 1955 (U.S. distr.: Pitman, New York). viii + 155 pp. Illus. $5.50.

This short booklet is a semihistorical account of variational principles in classical mechanics and in early wave mechanics. As far as the subject matter is concerned, it includes in classical physics the Hamiltonian formalism and Hamilton-Jacobi theory but not Poisson brackets. In quantum mechanics, there is no discussion of the work of Feynman, Schwinger, or Peierls, or of the possibility of a representation-invariant variational principle. To this extent, the book does not appear to be a useful introduction to the variational principles as they appear in the current literature. For a working knowledge of classical dynamics, at least the introduction of Poisson brackets would have been necessary.

The principal purpose of the authors appears to have been an inquiry into the philosophic significance of variational principles. They show that historically many of the discoverers were motivated by metaphysical considerations. Planck (to whose memory the book is dedicated) attempted to discuss causality in physics in terms of the principle of least action. The authors, in a concluding paragraph of perhaps 20 pages, discuss both positivistic and idealistic interpretations of variational principles and appear to steer a middle course between these extremes. It appears that the discussion is not as penetrating as one might wish.

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New Books

Metals Reference Book. vols. I and II. Colin J. Smithells. Interscience, New York; Butterworths, London, ed. 2, 1955. 965 pp. $25 per set.

Adventuring with Beebe. William Beebe. Duell, Sloan & Pearce, New York; Little, Brown, Boston, 1955. 283 pp. $4.50.

Logique et dynamique du peuplement végétal. Phytogéographie, phytosociologie, biosystématique, applications agronomiques. M. Guinochet. Masson, Paris, 1955. 140 pp.

William Herschel. Explorer of the heavens. J. B. Sidgwick. Faber & Faber, London; Macmillan, New York, 1955. 228 pp. $2.50.

Engineering Metallurgy. L. F. Mondolfo and Otto Zmeskal. McGraw-Hill, New York–London, 1955. 397 pp. $7.50.

The Pharmacopeia of the United States of America. U.S. Pharmacopeial Convention, Inc., New York, rev. ed. 15, 1955. 1178 pp. $10.

Our Backward Children. Karl F. Heiser. Norton, New York, 1955. 240 pp. $3.75.

Neurochemistry. The chemical dynamics of brain and nerve. K. A. C. Elliott, Irvine H. Page, J. H. Quastel, Eds. Thomas, Springfield, Ill., 1955. 900 pp. $19.50.

Discoveries and Inventions of the 20th Century. J. G. Crowther. Dutton, New York, rev. ed. 4, 1955. 432 pp. $6.

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

Plant Taxonomy. Earl L. Core. Prentice-Hall, New York, 1955. 459 pp. $7.50.

Grundriss der Gefriertrocknung. Karlheinz Neumann. Musterschmidt, Berlin, ed. 2, 1955. 256 pp. DM. 24.

The Caves Beyond. The story of the Floyd Collins' Crystal Cave exploration. Joe Lawrence, Jr., and Roger W. Brucker. Funk & Wagnalls, New York, 1955. 283 pp. $4.75.

Radio Astronomy. International Monogr. on Radio. J. L. Pawsey and R. N. Bracewell. Oxford Univ. Press, New York–London, 1955. 361 pp. $8.80.

Le Poumon. Stuctures et mécanismes à l'état normal et pathologique. A. Policard. Masson, Paris, 1955. 262 pp. F. 1500.