counted with a windowless flow counter. As shown in Table I, a new radioactive spot appeared which has a very low R_f value (0.1) and separates cleanly from MVA (R_f 0.7). Since this compound is formed from both 1-C^{14} and 2-C^{14}-labeled MVA, it must still contain the carboxyl group of MVA. When incubations were carried out with limiting amounts of 2-C^{14}-MVA, half of the MVA added was recovered even after prolonged incubation (Table II). When the remaining MVA was eluted and re-incubated with the complete yeast system[6] no squalene was formed, thus indicating that only one of the two enantiomorphs of MVA was converted into the new intermediate. When the eluted intermediate was incubated with the complete system, efficient conversion to squalene was obtained.

Examination of a chromatogram with a short wave length Mineralight revealed that the radioactive zone was free of nucleotides. The compound was thus separated from the nucleotides which remained at the origin but not from inorganic phosphate which has the same R_f value. The presence of phosphorus was established by the use of P^{32}-labeled ATP.[8] Two samples of the compound, one containing C^{14} and the other P^{32}, were isolated by chromatography and re-chromatographed with methanol–ammonia–water.[9]

(8) The P^{32}-labeled ATP was kindly prepared by Dr. Alvah H. Phillips by oxidative phosphorylation with rat liver mitochondria.

(9) R. S. Bandurski and B. Axelrod, *J. Biol. Chem.*, **193**, 405 (1951).

The C^{14}-labeled sample gave a single spot with an R_f value of 0.75. The P^{32}-labeled sample gave two spots, one corresponding to inorganic phosphate, and the other to the new compound. Comparison of its electrophoretic behavior with that of ATP and ADP[10] indicated that the compound is a monophosphorylated derivative of MVA. The chromatographic behavior of this compound was not changed by heating for 10 minutes at 100° with 1 *N* HCl or NaOH. The stability of the phosphate shows that it is not a carboxyl phosphate. The exact location of the phosphate, whether it is on C_3 or C_5, has not been ascertained.

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(10) H. Hilz and F. Lipmann, *Proc. Natl. Acad. Sci.*, **41**, 880 (1955).

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BOOK REVIEWS

Light Vegetation and Chlorophyll. By J. TERRIEN, G. TRUFFAUT and J. CARLES. Translated by MADGE E. THOMPSON. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y. 1957. 228 pp. 12.5 × 19 cm. Price, $6.00.

This book is divided into two sections, the first based on "Lumière et Végétation" by Terrien and Truffaut, the second on "L'Énergie Chlorophyllienne" by Carles. The first section contains a thorough description of solar radiation, natural light fields and light absorption by leaves, and following this, eight chapters concerning the various effects of light on plants, including photosynthesis, phototropism and photoperiodism. The second section, by Carles, is an essay on photosynthesis which is in part a duplication of some of the material in the first section.

The authors "have tried to give the reader an idea of what is known of the relationship between light and vegetation," and in this they have succeeded fairly well. The introductory chapters are complete and contain quite a bit of useful reference material, and the chapter entitled "Photosynthesis and Photography" is a good, elementary description of electron conduction in crystals, a subject which is currently of great interest in the field of photosynthesis.

On the other hand, since the range of topics covered is very broad, the treatment is necessarily too sketchy in some places, particularly in the chapters on photoperiodism and phototropism. Furthermore, the style is diffuse, the translation is rough in places and there are a number of errors and omissions.

The major criticism of this book, however, is that it is badly out of date. This is largely due to the fact that the two original works on which it is based are six and four years old, respectively, and evidently were not rewritten before being combined in this edition. Chiefly for this reason, the book will be of limited value to the research worker in the field, or to the chemist who is interested in a short authoritative monograph.

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Amino Acid Handbook. Methods and Results of Protein Analysis. By RICHARD J. BLOCK, Ph.D., Boyce Thompson Institute for Plant Research, Inc., Yonkers, New York, and Department of Biochemistry, New York Medical College, New York, with the cooperation of Kathryn W. Weiss, A.B., The Borden Company, Yonkers, New York. Charles C Thomas, 301–327 East Lawrence Avenue, Springfield, Illinois, 1956. xiii + 386 pp. 16 × 23.5 cm. Price, $10.50.

1. This monograph has a twofold objective of describing "tried and proven examples of the three most widely used methods of amino acid analysis, *i.e.*, by microörganisms, by column chromatography and by paper chromatography," in sufficient detail "without the need of recourse to the original literature," and to tabulate "the amino acid composition of proteins, biologically active polypeptides and foods."

2. The first objective is set forth in 167 pages, followed by a short chapter on Protein and Amino Acid Consumption in the United States and concluded with a 66 page bibliography, listing approximately 1200 or more references. The reviewer feels that the first objective, though laudable is ambitious almost beyond attainment, for it is probably true that the clearest exposition of a method is usually to be found

only in the original writings of the original author. Aside from this inescapable limitation, the text does give great assistance to those who approach these difficult methods for the first time. In many instances, it would have been of greater assistance to the new-comer to have had the methods described as a single complete exposition, relegating alternative procedures and variants of technique to discursive sections at the end of the method. Of the three major techniques discussed, the section on paper chromatography appears to be the most authoritative, that on ion-exchange chromatography the least, but all three sections encompass much useful detail in well condensed form.

3. The second objective appears to be very ably accomplished in 97 pages of tabulated material provided with table of contents and concluded with 12 summary tables. Comparison of the figures in these tables with those published originally in the "Amino Acid Composition of Protein and Foods" by Block and Bolling (Thomas, Springfield, Ill., 1951, 2nd ed.) shows that the tables in the publication under review have been revised and greatly expanded. All data have been calculated as grams of amino acid per 16 grams of nitrogen, a feature which is helpful for comparative purposes, but which has not been accepted as standard practice. This section should prove useful for quick reference and comparative purposes.

In summary, this text is to be recommended, and with the minor limitations noted above, should fulfill the general aims and objectives of the authors.

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Synthetic Methods of Organic Chemistry. Vol. 11. By W. THEILHEIMER. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. xvi + 494 pp. 16 × 23.5 cm. Price, $20.00.

The purpose of the series is to make available to the chemist brief abstracts of new synthetic methods, or application of older procedures to new problems. Yields and brief experimental details are given with the references, enabling the reader to evaluate a contemplated procedure before consulting original literature.

As in preceding volumes, a section "Trends in Synthetic Organic Chemistry" precedes the body of the book, and is intended to summarize such important synthetic advances as were published between the literature closing date and delivery of the manuscript to the printer.

The organization of the series and other aspects have been extensively discussed by various reviewers including the present writer (THIS JOURNAL (1946) and following years). In addition to a unique system of classification, readers will find an excellent subject index along conventional lines.

The series has become a well-established and much appreciated library tool, and the new volume will be welcomed by all who have benefited from the use of the work.

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BOOKS RECEIVED

October 10, 1957—November 10, 1957

G. ASCOLI, G. FELDMAN, L. J. KOESTER, JR., R. NEWTON, W. RIESENFELD, M. ROSS, AND R. G. SACHS, Compiled and Edited by. "High Energy Nuclear Physics." Proceedings of the Seventh Annual Rochester Conference, April 15–19, 1957. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 486 pp. $4.50.

K. W. BENTLEY. "The Chemistry of Natural Products." Volume I. "The Alkaloids." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 237 pp. $4.00.

JAMES CASON, Editor-in-Chief. "Organic Syntheses." Volume 37. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. 109 pp. $4.00.

SIDNEY P. COLOWICK AND NATHAN O. KAPLAN, Edited by. "Methods in Enzymology." Volume IV. "Special Techniques for the Enzymologist." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 979 pp. $24.00.

A. J. DE VRIES. "Foam Stability. A fundamental investigation of the factors controlling the stability of foams." Rubber-Stichting, Oostsingel 178, Delft, The Netherlands. 1957. 88 pp. hfl. 6.

G. J. DIENES AND G. H. VINEYARD. "Interscience Monographs in Physics and Astronomy." Volume II. "Radiation Effects in Solids." Edited by R. E. Marshak. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 226 pp. $6.50.

PAUL H. EMMETT, Edited by. "Catalysis." Volume V. "Hydrogenation, Oxo-Synthesis, Hydrocracking, Hydrodesulfurization, Hydrogen Isotope Exchange and Related Catalytic Reactions." Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1957. 542 pp. $15.00.

F. H. FIELD AND J. L. FRANKLIN. "Pure and Applied Physics." Volume 1. "Electron Impact Phenomena and the Properties of Gaseous Ions." H. S. W. Massey, Consulting Editor. Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 349 pp. $8.50.

SIDNEY W. FOX AND JOSEPH F. FOSTER. "Introduction to Protein Chemistry," John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. 459 pp. $9.50.

A. G. GAYDON. "The Spectroscopy of Flames." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. 279 pp. $9.00.

LEWIS F. HATCH. "Higher Oxo Alcohols." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. 120 pp. $4.50.

GUSTAV KORTÜM. "Lehrbuch der Elektrochemie." Verlag Chemie, G.m.b.H., 17 a Weinheim/Bergstr., Pappelallee 3, Germany. 1957. 564 pp. DM 35.80.

A. L. MNDJOIAN, Editor. "Synthesis of Heterocyclic Compounds." Issue I. Publishing House of the Academy of Sciences of the Armenian SSR, Ulitsa Abovyana, No. 124, Erevan, Armenian SSR, USSR. 1956. 84 pp. 5 rubles (with binding).

KURT SCHMEISER. "Radioaktive Isotope ihre Herstellung und Anwendung." Springer-Verlag, Berlin W 35, Reichpietschufer 20, Germany. 1957. 246 pp. DM 48.60.

GEROLD SCHWARZENBACH. "Complexometric Titrations." Translated and revised in collaboration with the author by HARRY IRVING. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 132 pp. $3.75.

G. A. SWAN AND D. G. I. FELTON. "Phenazines." The Chemistry of Heterocyclic Compounds. A Series of Monographs. Arnold Weissberger, Consulting Editor. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 693 pp. $21.00 (Subscription price); $22.50 (Single copy price).

UNITED STATES ATOMIC ENERGY COMMISSION. "Atomic Energy Facts. A Summary of Atomic Activities of Interest to Industry." Nuclear Technology Series. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 1957. 216 pp. $2.00.

LÉON VELLUZ, Editor. "Cahiers de Synthèse Organique. Méthodes et Tableaux D'Application." Volume II. "Elaboration des structures. 3. Alcoylation en série aliphatique. 4. Alcoylation en série aromatique. 5. Arylation en série aromatique." By JEAN MATHIEU ET ANDRÉ ALLAIS. Masson et Cie., 120 Boulevard Saint-Germain, Paris VI^e, France. 1957. 322 pp. Broché: 4.000 frs.; Cartonné toile: 4.400 frs.

K. L. WOLF "Physik und Chemie der Grenzflächen." Erster Band. "Die Phänomene im Allgemeinen." Springer-Verlag, Reichpietschufer 20, Berlin W 35, Germany. 1957. 262 pp. DM 36.00.