

ergotinine. This at once supports the suggestion made by us in this article that certain fragments of the alkaloid molecule may have as their precursors amino acids or substances related to them. The precursor in the molecule responsible for the so-called Base VI, a phenylpropanolamine, may be phenylalanine. Base VI we have shown yields *p*-nitrobenzoic acid on oxidation with nitric acid as in the case of the ergot alkaloids.

In this article other substances which are described are derivatives of a base $C_{10}H_{20}N_2$ (Base IV), of a base $C_{14}H_{20}N_2$ (Base II) and of a hydroxyamine $C_6H_{13}ON$ (Base V). Base IV is probably a substituted piperazine $C_{10}H_{18}N_2$ resulting from the reduction of proline anhydride. Similarly, Base II can be a piperazine resulting from the reduction of propylphenylalanine anhydride. The formula of Base V (a hydroxyamine) should now be revised to $C_7H_{11}ON$ and can result from the reduction of proline or its ester to the carbinol, α -pyrrolidylcarbinol. The procedure employed by us can well be responsible for the production of such bases.

Thus it would now appear that ergotinine and therefore ergotoxine are built up of lysergic acid ($C_{16}H_{16}O_2N_2$) (or ergine, $C_{16}H_{17}ON_3$), proline, phenylalanine and isobutyrylformic acid. When these components are added together with loss of three molecules of water, a substance $C_{35}H_{39}O_5N_3$ would result which is the formula for ergotinine at present accepted. It is suggested that lysergic acid (ergine), the constituent perhaps responsible for the pharmacodynamic action of these alkaloids, is joined to a group consisting of a polypeptide composed of proline and phenylalanine. Lysergic acid may have a biogenetic relationship to tryptophan and isobutyrylformic acid to valine.

The details of this work as well as the results of its logical development will appear later. The alkaloids ergotamine and ergotaminine are also being included in our studies from this standpoint.

LABORATORIES OF
THE ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH
NEW YORK, N. Y.

WALTER A. JACOBS
LYMAN C. CRAIG

RECEIVED JANUARY 21, 1935

NEW BOOKS

Experimental Physical Chemistry. Second Edition. By FARRINGTON DANIELS, J. HOWARD MATHEWS AND JOHN WARREN WILLIAMS, University of Wisconsin. McGraw-Hill Book Company, Inc., 330 West 42d Street, New York, 1934. xix + 499 pp. 140 figs. 14.5 × 21.5 cm. Price, \$3.50.

In this revision of their well-known laboratory text the authors have retained the original organization of material and the thought-provoking style in outlining procedures which characterized the former edition (reviewed in *THIS JOURNAL*, 52, 2585 (1930)). Part I (Laboratory Experiments) is unchanged in length, but 16 of the original 78 experiments have been dropped and 9 new ones added. It is safe to say that few users will find their favorites missing. The additions: molecular films on liquids, electrokinetic phenomena, distribution of particle size, reaction rate from dilatometric measurements, galvanic cells with and without transference, the glass electrode, dielectric capacity by heterodyne beat method, heavy hydrogen. Twelve of the exercises retained, notably those dealing with properties of gases and boiling points of solutions, require new or modified apparatus. In addition, so many minor changes have been introduced that the whole book has been reset. Most of the important changes obviously have been made in the interest of greater accuracy without

undue complexity of apparatus. Experience may well show that this aim has been realized.

Part II (Apparatus) is not greatly altered. Here and there new material has been added, particularly on high vacuum technique, on apparatus for measurements of capacitance, and on photochemical and photographic procedures. To Part III (Miscellaneous Operations) have been added short chapters on vacuum tubes and on errors of measurement. In spite of the addition of 24 pages to these sections the volume is less bulky than before, due to the use of thinner paper.

The book is recommended to the attention of teachers and students of physical chemistry.

ARTHUR F. BENTON

Boiling Points of Ring and Chain Compounds. By F. F. E. GERMANN and O. S. KNIGHT. Available from the Authors, Department of Chemistry, University of Colorado, Boulder, Colo. Two charts, \$2.00.

The authors have selected values from the literature for the vapor pressures of some 183 common and representative organic substances, and have plotted them in a novel and ingenious fashion using line coordinates. The compounds listed range from methyl ethyl ether to anthraquinone (boiling points 7.7 and 380°, respectively).

Separate plots are made for ring and chain compounds. Values can be read from the charts directly with an accuracy of 2 mm. for pressure and 0.25° for temperature. While the range of pressures covered—500 to 900 mm.—is somewhat limited, these data should be very useful for work not too far from atmospheric pressure. Small scale reproductions of the charts, and the method of using them, are published in *Ind. Eng. Chem.*, **26**, 467 (1934).

JOHN R. RUHOFF

Asymmetric Synthesis and Asymmetric Induction. By PATRICK D. RITCHIE, B.Sc., Ph.D. St. Andrews University Publication No. XXXVI. Published for St. Andrews University by Humphrey Milford, Oxford University Press, 114 Fifth Avenue, New York, 1933. x + 155 pp. 14×22 cm.

This monograph is based on a thesis for the degree of Doctor of Philosophy presented to the University of St. Andrews where McKenzie and his collaborators have for many years made outstanding investigations on asymmetric synthesis. The first third of the volume, dealing with partial and total asymmetric synthesis, contains material that has been presented fairly completely in the recent texts on stereochemistry. The remainder of the volume is much more important. Here the author, for the first time, has collected and scrutinized nearly everything bearing on one of the three major explanations of partial asymmetric synthesis. Doubtless he believes in asymmetric induction but his examination of the evidence is none the less open minded and critical. The monograph fills its place worthily alongside the recent excellent general texts on stereochemistry; in its special field it is unique in its thoroughness.

E. P. KOHLER

Theoretische Grundlagen der organischen Chemie. (Theoretical Principles of Organic Chemistry.) By WALTER HÜCKEL, Professor at the University of Greifswald. Vol. I, second edition. Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany, 1934. xii + 475 pp. 24 figs. 16×23.5 cm.

That this important survey of the theories of organic chemistry has been rather extensively revised only three years after the publication of the first edition is more an indication of the industry of the author than a reflection of any extensive developments in the subject during this brief period. Much new material is indeed included and the references to the literature are remarkably complete and up to date, but the changes are in large part the result of a reorganization and rearrangement of the material presented in the first edition. Where previously accepted views have undergone radical revision in the light of new work, as in the case of the molecular rearrangements in the camphene and fenchene series, Hückel has made liberal changes in the text in order to take full account of such developments. The major advances in organic chemistry in the past three years, however, have not been in the field of fundamental theory, and few parts of the first edition can be said to have become antiquated.

Without altering in any essential respect the earlier interpretations and the general point of view, the author has revamped certain parts of the book in an effort to gain added clarity of presentation. The greatest changes are to be found in the chapters on tautomerism and on aromatic chemistry, the previous material having been extensively rearranged and in some cases rewritten. The tautomerism of metallic derivatives is now treated in a separate section and the author's interpretation is extended to additional cases. The Thiele theory is discussed in connection with the benzene problem, while the mechanism of substitution in the benzene ring is now transferred to a new chapter on the course of chemical reactions, which includes some material taken from the original Volume II. Such changes appear to the reviewer to be of minor importance and they perhaps reveal some weakness in the plan of organization of these stimulating discourses on the fundamental principles of organic chemistry.

LOUIS F. FISER

Chemie der organischen Farbstoffe. Zweiter Band. Natürliche organische Farbstoffe. (Chemistry of Organic Dyestuffs. Vol. II. Natural Organic Dyestuffs.) By Professor Dr. FRITZ MAYER. Third, revised edition. Verlag von Julius Springer, Linkstrasse 23-24, Berlin W 9, Germany, 1935. iv + 239 pp. 16.5×24.5 cm. Price, RM. 23.60; bound, RM. 24.80.

The high quality of Mayer's compact treatise on dyes is well maintained in this new volume devoted to the description of the source, properties, constitution and synthesis of dyestuffs and pigments occurring in nature. Although the style is that of a textbook for advanced students, the references to both the early and the recent literature are so complete and well organized that the book will be found of much value to the investigator, particularly to one seeking interesting problems for research from the field of the natural products. The literature is reviewed up to November 21, 1934.

Of perhaps outstanding interest are the chapters on the carotenoid pigments, the lyochromes and the pyrrole derivatives, which treat thoroughly the chemistry of such important substances as Vitamine A, Vitamine B₂ (lactoflavine), chlorophyll, haemin and bilirubin. The flavones and anthocyanines and related substances are described in a chapter on oxygen-containing heterocyclic systems, and a number of interesting derivatives of the quinones of the benzene, naphthalene, phenanthrene and anthracene series are included in a further chapter. The author not only reviews carefully the chemistry of the better known pigments of the vegetables, fruits, flowers, plants, of the blood, the bile and of the protein products of the animal organism, but he also includes reference to such information as is available concerning colored substances of unknown structure which have been found in leaves, flowers, wood, bark, lichens, resins, drugs and fungi. This material should prove stimulating to further research. Considering the great diversity of types and sources of the known pigments it is quite understandable that some substances such as phtiacol, plumbagin, perezone and embelic acid should have been overlooked in the first edition of this volume of the book.

Indeed the author is to be congratulated for the thoroughness with which he has reviewed a very extensive field and for his clear and concise descriptions of complicated chemical phenomena. Much of the material is the result of investigations of very recent date and has not appeared before in any but the original sources.

LOUIS F. FIESER

A Manual of Biochemistry. By J. F. McCLENDON, Professor of Physiological Chemistry, University of Minnesota Medical School. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, 1934. vii + 381 pp. 58 figs. 15.5 × 23.5 cm. Price, \$5.00.

In this book fifty-one pages deal primarily with the laboratory estimation of certain substances having biochemical interest, while twenty-seven pages are devoted to the index. A table of the properties of such substances is also appended.

The remaining three hundred and three pages are devoted to the text which emphasizes the occurrence of many biological substances in nature and in disease, their structural formulas and often their pharmacological effect. Discussion of the chemical properties and behavior as well as the biological significance of many carbohydrates, fats and proteins seems rather limited. Frequent references to original literature may, perhaps, enable the reader to remedy this defect.

RONALD M. FERRY

BOOKS RECEIVED

December 15, 1934–January 15, 1935

- T. HEDLEY BARRY AND GEORGE WILLIAM DUNSTER. "Varnish Making." Leonard Hill, Ltd., Thanet House, 231–2 Strand, London W. C. 2, England. 132 pp.
- MEYER BODANSKY AND MARION FAY. "Laboratory Manual of Physiological Chemistry." Third edition. John Wiley and Sons, Inc., 440 Fourth Ave., New York. 274 pp. \$2.00.
- A. BUTENANDT, MARIA LIPP, K. NIEDERLÄNDER, F. REINDEL AND F. ROCHUSSEN, Editors. "Carbocyclische Verbindungen, Naturstoffe und freie organische Radikale. Part I. Alicyclische Verbindungen und Naturstoffe." Zwölfte Auflage, zweiter Band, Richter-Anschütz "Chemie der Kohlenstoffverbindungen oder organische Chemie." Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany. 636 pp. RM. 38; bound, RM. 40.
- R. F. DUNBROOK AND V. N. MORRIS, Editors. "The Science of Rubber." Authorized English Translation of "Handbuch der Kautschukwissenschaft," by K. Memmler, Editor. Reinhold Publishing Corporation, 330 West 42d St., New York City. 770 pp. \$15.00.
- J. HENGSTENBERG AND KARL WOLF. "Elektronenstrahlen und ihre Wechselwirkung mit Materie." Band 6, Abschnitt I A, Eucken-Wolf "Hand- und Jahrbuch der chemischen Physik." Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany. 236 pp. RM. 24.
- GERHART JANDER AND KARL FRIEDRICH JAHN. "Massanalyse. Theorie und Praxis der klassischen und der elektrochemischen Titrierverfahren." Vols. I and II. Walter de Gruyter & Co., Genthiner Strasse 38, Berlin W 10, Germany. 139 + 138 pp. RM. 1.62 each.
- FRITZ MAYER. "Chemie der organischen Farbstoffe. Zweiter Band. Natürliche organische Farbstoffe." Third, revised edition. Verlag von Julius Springer, Linkstrasse 23–24, Berlin W 9, Germany. 239 pp. RM. 23.60; bound, RM. 24.80.
- PAUL RIVALS AND LOUIS MARGAILLAN. "Matières Grasses et Industries Dérivées Cires." Vol. I. Constitution Chimique—Analyse Technique Matières Grasses Naturelles. Librairie J.-B. Baillière et Fils, 19 Rue Hautefeuille, Paris 6e, France. 494 pp. Fr. 86.
- JÜRGEN SCHMIDT. "Das Kohlenoxyd. Seine Bedeutung und Verwendung in der technischen Chemie." Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany. 235 pp. RM. 15; bound, RM. 16.50.
- AUGUST WINKEL AND GERHART JANDER. "Schwebstoffe in Gasen. Aerosole. Über die Darstellung, die Eigenschaften, das Vorkommen und die Verwendung von Nebel, Staub und Rauch." Verlag von Ferdinand Enke, Hasenbergsteige 3, Stuttgart W, Germany. 116 pp. RM. 7.50.
- "Index to A. S. T. M. Standards and Tentative Standards." American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. 142 pp.
- "Report of the Science Advisory Board, July 31, 1933, to September 1, 1934." National Research Council, Washington, D. C. 303 pp.
- "Society of Chemical Industry in Basle. 1884–1934." Published by the Society of Chemical Industry, Basle, Switzerland. 83 pp.