

suggested good reasons for believing that the serine which disappeared under these conditions was dehydrated to a peptide of dehydroalanine.

Some of the reasons have been discussed [B. H. Nicolet, *THIS JOURNAL*, **53**, 3066 (1931); *J. Biol. Chem.*, **95**, 389 (1932); *J. Wash. Acad. Sci.*, **28**, 84 (1938)] for believing that such a peptide should be especially activated for addition reactions. We are accordingly studying the reaction of various sulfur compounds on suitable proteins in the presence of alkali.

We report here specifically on the reaction of benzyl mercaptan with whole silk, in the presence of alkali. Insofar as our theory of the reaction mechanism is correct, a certain amount of addition to the dehydroalanyl residues of the protein would be expected, with formation of an occasional S-benzylcysteine unit in the peptide chain.

After hydrolysis of such a product, the technique of reduction in liquid ammonia should permit the rather quantitative conversion to cysteine of any S-benzylcysteine present.

Silk was chosen as a particularly suitable protein complex because of its conspicuously low cystine content and its conspicuously high serine content. Dried whole silk (3.923 g.), 1.98 g. of benzyl mercaptan neutralized with 16 cc. of 1 *N* sodium hydroxide, and 112 cc. of 0.1 *N* sodium hydroxide, were boiled for one hour in a nitrogen atmosphere. After acidification and hydrolysis

an aliquot of the hydrolyzate was reduced with sodium in liquid ammonia by the technique cited. Cysteine was then determined in the hydrolyzate and in the reduced hydrolyzate by the specific Sullivan method. The values before and after reduction were 0.4 and 3.3%, respectively.

The difference between the two values quoted must represent (as a minimum) the extent of the original addition of benzyl mercaptan. Incidentally, this is of course, a new cystine synthesis.

We are engaged in other experiments of a similar nature, in which (among other compounds) cysteine and sodium sulfide will be tested for their additive powers. [We already have evidence that at least a 1% increase in the cystine content of casein may be produced by 14 days incubation of this protein in an excess of 2% sodium sulfide solution.] We believe that we shall be able to throw considerable light on the mechanism by which lanthionine [M. J. Horn, D. B. Jones and S. J. Ringel, *J. Biol. Chem.*, **138**, 141 (1941)] is formed in the course of alkali treatment of wool and other proteins. And the way in which selenium enters the protein molecule [M. J. Horn and D. B. Jones, *ibid.*, **139**, 649 (1941)] may also come to seem quite simple.

DIVISION OF NUTRITION AND PHYSIOLOGY
BUREAU OF DAIRY INDUSTRY BEN H. NICOLET
UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C. LEO A. SHINN

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NEW BOOKS

Organic Chemistry. By FRANCIS EARL RAY, University of Cincinnati. J. B. Lippincott Co., 220 N. Michigan Avenue, Chicago, Illinois, 1941. x + 706 pp. Price, \$4.00.

In the preface the author describes this text as "an attempt to lead the student from the most elementary beginnings of the subject to the point where he can read with profit much of the current literature." This book should be eminently successful in accomplishing this aim. It proceeds from a clear and simple explanation of the introductory material to a more complete coverage of the field than is customarily found in texts of this kind. This great abundance of material has been carefully chosen and organized in a manner that gives sufficient emphasis to the methods of the science.

A few of the many excellent features of the book may be

mentioned. Students and teachers will find that the summaries of specific and general methods of synthesis at the end of each chapter are extremely useful. In addition to providing a review for the student, they often give a critical comparison of the available methods. Too often the student learns reactions without obtaining any idea of their practical value. The illustration of molecular structure by reproducing, side by side, photographs of models of the Stuart type and the older variety is particularly effective. The chapters dealing with diazonium compounds and with polynuclear hydrocarbons are especially good. The tables of physical constants which also contain the melting points of derivatives suitable for identification, and the author's excellent treatment of nomenclature, are also worthy of note.

The book is as modern as a text in this rapidly advancing

field could be. The concept of resonance, electronic formulas and thermochemical data are introduced where needed. Throughout the book modern methods and new substances of industrial and biological importance are discussed and, in this connection, special attention may be called to the chapters on heterocyclic and organometallic compounds and alkaloids. Some objection may be raised to the manner in which the author disposes of the controversial question of steric hindrance.

The way in which the subject is developed and the author's clear and interesting style make this one of the most readable texts that I have encountered in this field.

WILLIAM P. CAMPBELL

Die Methoden der Fermentforschung. (Methods of Investigation of Enzymes.) Edited by Prof. Dr. EUGEN BAMANN, Tübingen, and Prof. Dr. KARL MYRBÄCK, Stockholm. Lieferung 6. Georg Thieme Verlag, Rossplatz 12, Leipzig C 1, Germany, 1941. 334 pp. 92 figs. 20 × 27.5 cm. Price, RM. 25.20.

This Lieferung 6 contains articles describing a large number of enzymes. In an article on arginase, Leuthardt mentions the finding by Hellerman and Perkins that crystalline urease possesses arginase activity, but evidently he has not read later papers which show that recrystallization of urease removes this impurity.

Myrbäck has a very interesting paper dealing with pepsin, trypsin and similar enzymes, such as gelatinase and Brücke pepsin. Northrop presents an excellent review of crystalline proteolytic enzymes. All of the material pertaining to crystalline enzymes surpasses in value the older material describing purification of enzymes by adsorption and the properties of such products.

Grassmann and Müller state that the purification of papain by crystallization has not been successful, evidently basing their decision upon the fact that crystallized papain is claimed to be less active than papain purified by other methods.

Holter has written a very satisfactory discussion of chymase. The paper by Abderhalden on protective enzymes recalls the controversy as to the existence of such substances. As far as the reviewer is aware this controversy still exists.

There are many important articles in Lieferung 6, such as one by Wöhlisch on blood coagulation and one by Nilsson on alcoholic fermentation.

A list of chapters follows: Phyto-Amylases; Zoo-Amylases; Differentiation of Various Amylases; Fructanases; Glucanases; Cytases; Polyuronidases; the Enzyme System Nuclease; Crystallized Ribonuclease; Simple Amidases, Acylases; Glutaminase and Asparaginase; Nuclein Desaminases; Arginase and Histidase; Phosphaminase; Hippuricase; Urease; Peptidases; Crystallized Carboxypolypeptidase; on the Investigation of Pepsin, Trypsin and Similar Enzymes; the Crystallized Proteinases; Papain and Similar Plant Proteinases; Cathepsin; Chymase; Methods for Production and

Isolation of and Evidence for Protective Enzymes, Especially Protective Proteinases; Thrombase and Blood Coagulation; Oxynitrilese.

JAMES B. SUMNER

BOOKS RECEIVED

June 10, 1941–July 10, 1941

JANNIK BJERRUM. "Metal Ammine Formation in Aqueous Solution. Theory of the Reversible Step Reactions." P. Haase and Son, Copenhagen, Denmark, 298 pp.

"Crystalline Protein Molecules." Volume XLI, Art. 2. Pages 77–168 of the Annals of the New York Academy of Sciences. By EDWIN J. COHN, I. FANKUCHEN, J. L. ONCLEY, H. B. VICKERY, and B. E. WARREN. The New York Academy of Sciences, care of The American Museum of Natural History, New York, N. Y. 168 pp. \$1.25.

SAMUEL GLASSTONE, KEITH J. LAIDLER and HENRY EYRING. "The Theory of Rate Processes. The Kinetics of Chemical Reactions, Viscosity, Diffusion and Electrochemical Phenomena." First edition. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 611 pp. \$6.00.

JOHN C. HOGG and CHARLES L. BICKEL. "Elementary General Chemistry." D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. 603 pp. \$2.12.

DAVID INGERSOLL HITCHCOCK. "Physical Chemistry for Students of Biology and Medicine." Third edition. Charles C. Thomas, 220 East Monroe Street, Springfield, Illinois. 264 pp. \$3.50.

I. M. KOLTHOFF and J. J. LINGANE. "Polarography." First edition. Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y. 510 pp. \$6.00.

KONRAD B. KRAUSKOPF, "Fundamentals of Physical Science." McGraw-Hill Book Company, 330 West 42nd Street, New York, N. Y. 660 pp. \$3.50.

"Annual Review of Biochemistry," Vol. X, 1941. Edited by JAMES MURRAY LUCK and JAMES H. C. SMITH. Annual Reviews, Inc., Stanford University P.O., California. 692 pp. \$5.00.

NELLIE M. NAYLOR and AMY LEVESCONTE. "Introductory Chemistry with Household Applications." Revised edition. D. Appleton-Century Company, 35 West 32nd Street, New York, N. Y. 476 pp. \$3.25.

EDWIN SUTERMEISTER. "Chemistry of Pulp and Paper Making." Third edition. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 529 pp. \$6.50.

A. G. WOODMAN. "Food Analysis." Fourth edition. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y. 607 pp. \$4.00.