

TABLE II
 VISCOSITY OF DNA

DNA concn., g./100 cc.	Solvent	η/η_0 capil- lary	s_0/s		
			BSV	T3	PSL
0.0023	0.3 μ KCl-cacodylate, pH 7	1.1	1.9
.023	0.3 μ KCl-cacodylate, pH 7	1.83	1.06	1.10 ⁵	1.6
.023	1.0 μ KCl-cacodylate, pH 7	...	1.08
.023	0.3 μ acetate, pH 4	1.99	1.10
.094	0.3 μ KCl-cacodylate, pH 7	...	1.21	...	32

^a Solvent was 0.3 μ phosphate, pH 7.

at a rate only slightly less than their rate in solvent. The results to date can be interpreted tentatively on the assumption that the thread-like molecules of DNA form a loose entanglement which permits T3 or BSV to pass through readily but slows down PSL.^{4,5}

More work is in progress to enable a more precise interpretation of the results with DNA and permit an evaluation of the various factors involved in order to test this ultracentrifuge method as a useful measure of viscosity.

(4) The diameters of PSL, T3 and BSV are about 2600, 150 and 300A, respectively.

(5) W. Kuhn, *Makromol. Chem.*, **6**, 224 (1951), has drawn similar conclusions for the structure of rubber based on viscosity determinations using diffusion of foreign particles of varying size.

DEPARTMENT OF BIOCHEMISTRY
 VIRUS LABORATORY
 UNIVERSITY OF CALIFORNIA
 BERKELEY, CALIFORNIA

H. K. SCHACHMAN
 W. F. HARRINGTON

RECEIVED MAY 29, 1952

OCCURRENCE OF THE L-ARABINOSE UNIT IN SAPOTE GUM

Sir:

In all heretofore known instances when L-arabinose occurs as a component of polysaccharides the

furanoose ring structure prevails. Apparently this is not invariably the case, as is illustrated in sapote gum.¹ This polysaccharide forms slowly in the wounds made in the sapote tree following the flow of latex. It is a heteropolysaccharide composed of D-xylose, L-arabinose and D-glucuronic acid units.² The components resulting from methanolysis of the methyl ether derivative³ have been separated and one of these proves to be methyl 2,3,4-trimethyl-L-arabopyranoside. The free sugar and corresponding lactone have not been obtained in crystalline form, although the latter furnishes a well-characterized amide when treated with methanolic ammonia. The amide has m.p. 103^o⁴ and specific rotation +24^o (c, 1.5 in water at 20). With phenylhydrazine the lactone forms 2,3,4-trimethyl-L-arabonic acid phenylhydrazide, m.p. 156^o⁵ and not depressed upon admixture with an authentic specimen.⁶

When the free sugar is oxidized with nitric acid 2,3,4-trimethyl-L-araboglutaric acid is produced in good yield, identified through the corresponding ester as the crystalline diamide; m.p. 233^o,⁷ specific rotation +42.6^o (c, 3.5 in water at 20^o).

A report of the investigation of sapote gum is planned in a later issue of THIS JOURNAL.

(1) Probably from *Sapotaceae achrus*.

(2) E. Anderson, *J. Am. Pharm. Assoc.*, **40**, 623 (1951).

(3) Prepared from the original gum by the Haworth method by four separate methylations with intermediate dialysis and concentration.

(4) J. Pryde, B. L. Hirst and R. W. Humphreys, *J. Chem. Soc.*, **127**, 356 (1925).

(5) F. Smith, *ibid.*, 747 (1939).

(6) Sample kindly supplied by Professor Smith.

(7) B. L. Hirst and G. J. Robertson, *J. Chem. Soc.*, **127**, 362 (1925).

THE INSTITUTE OF PAPER CHEMISTRY
 APPLETON, WISCONSIN

ELWOOD V. WHITE

RECEIVED JUNE 27, 1952

BOOK REVIEWS

Annual Review of Biochemistry. Volume 20. By J. MURRAY LUCK, Editor, Stanford University, HUBERT S. LORING, Associate Editor, Stanford University, and GORDON MACKINNEY, Associate Editor, University of California. Annual Reviews, Inc., Stanford, California. 1951. ix + 648 pp. 16 x 23 cm. Price, \$6.00.

The burden of maintaining contact with the contemporary chemical literature lies heavily on the teacher and on the investigator. *Chemical Abstracts* has been the traditional medium through which the chemist has kept in touch with affairs in his own particular field of interest. It continues to serve that purpose effectively. The difficulty is to find means to follow and comprehend the changing trends of ideas in areas outside the particular competence of the reader. This need for help in epitomizing the literature has been recognized particularly in the physiological field and has given birth to two new types of journal. One of these may be referred to as the "Recent Advances" type. It consists of the periodical publication of monographs on selected topics which are treated comprehensively and project contemporary ideas against the background of their development. It follows the pattern of Chemical Reviews and serves the same admirable purpose.

The second type of synoptic literature is the "Annual Review." This publication expects the reader to provide his own background for what can be little more than a pre-digest of Abstracts for the period under review. Annual Reviews is a guide to the library stacks rather than an arm-chair companion.

The Annual Review of Biochemistry is the oldest and best known of the Series. During the past 20 years it has given notable service to investigators, teachers and advanced students. Its purpose is evident from a glance at the pages of the 1951 Review. This volume contains 475 pages of text and 123 of bibliography, comprising some 4500 references. There are 23 chapters. The average chapter consists of 20 pages reviewing about 200 original papers. Through this fine sieve few significant contributions are likely to escape. On the other hand, there is little scope for critical analysis in so wide a coverage.

Many of the subjects are reviewed annually. These cover such fields as the Chemistry and the Metabolism of the Carbohydrates, the Fats, the Proteins, the Vitamins, and the Enzymes. The treatment of such recurring themes is inevitably staccato. To follow the trend of ideas the reader must often turn back to preceding volumes. A few reviewers do manage to avoid the compendium approach by reso-

lutely restricting themselves to a few definitive problems within the broader area assigned to them. A good example of this is the chapter on Protein Metabolism by Borsook and Deasy. This is devoted almost entirely to an analysis of the significance of that measure of protein synthesis which has come to be known as "protein turn-over." It is a critical and illuminating review. The chapter on Immunology, likewise, confines itself largely to a broad discussion of the antigen-antibody reaction and to the characterization of complement. It is interesting to note that cancer is the only diseased state which rates a chapter annually. This suggests that the amount of financial support available for particular aspects of medical research does influence the contemporary concentration of interest of investigators.

Some subjects are only reviewed at intervals of several years. Reviewers, consequently, feel that they have more latitude and are able to handle their material with a broader sweep. The occasional topics in the volume under review include chapters on the Polyuronides, the Metabolism of Drugs and Toxic Substances, X-Ray Crystallographic Studies of Compounds of Biological Interest, Biochemical Genetics, and the Biochemistry of Natural Pigments other than Heme and the Carotinoids. These chapters make satisfying reading.

The volume is admirably edited and produced. The reviewers have executed their unrewarding task with resolution and authority. It is a pleasure to record the fact that the Annual Review is regaining its international flavor. This volume contains four contributions from England and one each from France, Denmark and India.

DEPARTMENT OF CHEMISTRY
N. Y. UNIVERSITY COLLEGE OF MEDICINE
NEW YORK 16, N. Y. R. KEITH CANNAN

The Plant Glycosides. By R. J. McILROY, M.Sc., Ph.D., F.R.I.C., Professor of Chemistry, University College, Ibadan, Nigeria, West Africa. Longmans, Green and Co., Inc., 55 Fifth Avenue, New York, N. Y. (Edward Arnold and Co., London.) 1951. iv + 138 pp. 14.5 × 22.5 cm. Price, \$3.25.

This volume contains a number of short summarizing chapters in which much of the literature through October 1950, is directly cited. As stated in the preface it is not intended that the work should be treated as more than an up-to-date summary for convenient reference. Inasmuch as no review of the entire field of plant glycosides has appeared in the past fifteen years, Dr. McIlroy's work furnishes a valuable tool with which to supplement the earlier more comprehensive reviews. Following two chapters on general material are eleven chapters on specific glycosides. The divisions are made on the basis of the chemical nature of the aglycones of the parent glycosides. A chapter on the nucleosides is also included.

Although the chemistry involved is but cursorily treated, a rich store of literature citations has been incorporated. Inclusion of much material in tabular form aids in such concentration. The reader who desires a detailed discussion of the glycosides will have to turn to other works. However the person interested in having at hand a carefully and critically compiled bibliography will find the book highly useful.

The typography in general is good and very few errors were apparent. The excellent index adds greatly to the value of the book.

UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN ROBERT C. ELDERFIELD

Immuno-Catalysis and Related Fields of Bacteriology and Biochemistry. Second Edition. By M. G. SEVAG, Ph.D., Associate Professor, Department of Bacteriology, School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania. Charles C Thomas, Publisher, 301 East Lawrence Avenue, Springfield, Illinois. 1951. xx + 547 pp. 16 × 23.5 cm. Price, \$12.00.

In Part I entitled, "Antigens as Biocatalysts," the author discusses briefly the chemical nature of antibodies. Before discussing the characteristics which are common to inorganic catalysts, enzymes, and antigens, examples of catalysis of inorganic and organic reactions are given and, where pos-

sible, the mechanisms of the reactions are clearly shown by employing the concepts of resonance. In a well-documented discussion, the similarity between antigens and enzymes is emphasized. In raising the rhetorical question, "Does antibody synthesis involve new processes which did not already exist in the animal system?"—the author answers in the negative by stating that the change from normal globulin to antibody globulin involves only a change in configuration and not in the basic structure of the molecule.

In Part II entitled, "Mechanism of Antibody Formation," the author discusses at length the reasons for the absence of an immune response to an antigenic substance derived from an animal of the same species, and the immediate immune response to an antigenic substance from an animal of a different species.

As an introduction to the long discussion on the theories concerning the mechanism of the formation of antibodies, the author discusses the factors which influence the rate of antibody production and the length of time that an antigen may remain active. A number of theories that have been advanced by various investigators to explain the mechanism of antibody formation are discussed and critically evaluated in the light of the latest advances in the sciences. The author supports the view that antigens exercise the rôle of catalysts in the formation of specific antibodies.

In the introduction to Part III, "Antibody as a Specific Enzyme Inhibitor," the statement is made that, "Since practically all proteins are antigenic the conclusion appears to be inescapable that all proteins are endowed with catalytic activity. . ." Dr. Sevag feels that if an enzyme can be defined as, "Any protein capable of performing a specialized physiological function, in accordance with the criteria of ideal catalysis, a comprehensive theory of biocatalysis is provided which links antigens, enzymes, vitamins and hormones." An interesting comparison is made on the reaction mechanism of immune and enzyme reactions.

Antigen + globulin factors → antibody globulin
Enzyme + substrate → reaction products
The author discusses the similarity in the *in vivo* mechanism of the following pairs: (a) Antigen and enzyme, (b) Globulin factors and substrate, (c) Antibodies and reaction products.

Part IV entitled, "Anti-Enzyme Immunity," is by far the largest chapter in the book—comprising 187 pages. The first section deals with certain controversial aspects of anti-enzyme immunity and a point by point analysis is made of Bayliss' objections against the existence of anti-enzymes. Much space is devoted to antibodies that act against carbohydrases, protease, nucleases, rennins and hyaluronidases.

In Part V, "Antibodies Against Respiratory Enzymes," it seems that too much space is devoted to a review of the glycolytic scheme and the tricarboxylic acid cycle, since readers of this book would already be familiar with these fundamental concepts. Most of this chapter is devoted to a discussion of the inhibition of respiratory enzymes by its specific immune serum.

Chapter VI is concerned with the physiology and biochemistry of shock. Descriptions of various types of shock, such as anaphylactic, peptone and histamine shock are given.

The book is written for the advanced graduate student and research worker in immuno-chemistry or other closely related fields. While the author is quick to admit that large gaps remain in many areas of this relatively new science, he has thoughtfully pointed out where progress may be expected to take place. The text is documented with over 1,000 titled references and a complete author and subject index. These additions should aid the research worker greatly in his search for information of a specific nature.

The book appears to be relatively free of errors. In the statement on page 49, "The Relation of the Specificities of Host Enzymes to the Anti-genicity of Substances Foreign to the Species of the Host," it seems that the word "Species" would be better replaced by the word "Proteins." Two of the formulas in pages 412 and 413 do not agree with the name as written.

INSTITUTE FOR ENZYME RESEARCH
UNIVERSITY OF WISCONSIN MORRIS H. GOLDBERG
MADISON, WISCONSIN

Comptes Rendus de la II Réunion—1950. By Comité International de Thermodynamique et de Cinétique Electrochimiques. Libreria Editrice Politecnica, Cesare Tamburini, Milano, Italy, 1951. xvi + 406 pp. 18 × 24.5 cm. Price, L. 3800.

As stated in the preface "The International Committee of Electrochemical Thermodynamics and Kinetics is essentially a group of workers interested in the same problems and collaborating on the basis of the most complete cordiality and frankness." M. Pourbaix gives the following explanation of the founding of the group. "Le hasard a fait que, lorsque nous nous rendîmes en Septembre 1948 à une des réunions de la Faraday Society (Process Metallurgy), Pierre Van Rysselberghe et moi nous sommes trouvés seuls dans un des compartiments du train qui nous emmenait de Londres à Ashborne Hill. Cette solitude nous permit de discuter à l'aise de questions qui nous préoccupaient, et c'est ainsi qu'est née, dans un compartiment de chemin de fer, l'idée de notre Comité." The first meeting was held in March, 1949, in Brussels, and the second meeting, whose proceedings are described in this book, was held in Milan in September, 1950. The present President is P. Van Rysselberghe (University of Oregon), the Vice-President is A. Juliard (University of Brussels), and M. Pourbaix (University of Brussels) is Secretary.

The book is divided into eight sections. Short Sections I and II comprise an introduction by P. Van Rysselberghe and a report by M. Pourbaix on the organization and current activities of the group.

Section III on Electrochemical Equilibria is chiefly composed of a series of papers on "potential-pH diagrams" for lead, silver, zinc, oxygen, hydrogen peroxide and sulfur. These diagrams present the potentials of the half-reactions of an element and its various compounds as a function of pH. After one acquires the knack of interpreting them they serve very handily to present an over-all picture of the oxidation-reduction chemistry of an element and its compounds in aqueous media, and the authors present numerous examples of their practical use.

Electrochemical kinetics is the theme of Section IV, which contains papers on the influence of inhibitors on electrochemical processes at metallic interfaces, oscillographic studies of diffusion current phenomena, the mechanism of electrochemical oxidation, polarization in metal deposition, polarographic reduction of hydrogen peroxide and oxygen, relations between ionic and atomic properties of metals and their electrochemical behavior, and the influence of anions on the electrochemical properties of metals.

Section V contains eight papers on various aspects of corrosion and passivation of metals.

Analytical chemists will be especially interested in Sections VI and VII which contain a number of papers on potentiometric and polarographic techniques. I was particularly intrigued by the paper of A. Juliard and L. Gierst, which describes a new electroanalytical technique based on the measurement with a radially deflecting cathode ray oscillograph of the decay of potential at a mercury electrode.

No meeting of electrochemists would be complete without a discussion of nomenclature and sign conventions, and this is found in Section VIII. This section also contains papers and discussion of various fundamental aspects of electrochemical thermodynamics.

The foregoing gives only a very imperfect idea of the wealth of ideas and information contained in this book. Electrochemists of all creeds will find something of special interest in it.

DEPARTMENT OF CHEMISTRY
HARVARD UNIVERSITY
CAMBRIDGE, MASS.

JAMES J. LINGANE

BOOKS RECEIVED

June 10, 1952–July 10, 1952

JOHN WILLIAM BAKER. "Hyperconjugation." Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. 1952. 158 pp. \$3.50.

ERNEST BALDWIN. "Dynamic Aspects of Biochemistry." Second Edition. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1952. 544 pp. \$5.00.

L. L. BAMBAS. "Five-Membered Heterocyclic Compounds with Nitrogen and Sulfur or Nitrogen, Sulfur, and Oxygen (except Thiazole)." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1952. 403 pp. Price, \$14.00; Subscription Price, \$12.60.

R. P. BELL. "Acids and Bases—Their Quantitative Behaviour." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. 90 pp. \$1.50.

GEORGE O. CURME, JR., AND FRANKLIN JOHNSTON (edited by). "Glycols." Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y. 1952. 389 pp. \$12.00.

A. HALD. "Statistical Theory with Engineering Applications." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. 783 pp. \$9.00.

A. Hald. "Statistical Tables and Formulas." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. 97 pp. \$2.50.

JOSEPH W. KENNEDY. "Radioactive Atoms and Isotopic Tracers." Twenty-Sixth Annual Priestley Lectures. The Pennsylvania State College, State College, Pennsylvania. 1952. 89 pp. \$2.00.

LEWIS R. KOLLER. "Ultraviolet Radiation." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 270 pp. \$6.50.

I. M. KOLTHOFF AND JAMES J. LINGANE. "Polarography." Second Edition. Volume I. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1952. 420 pp. \$9.00.

JAMES J. NICKSON (edited by). "Symposium on Radiobiology. The Basic Aspects of Radiation Effects on Living Systems." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. 465 pp. \$7.50.

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WERNER NOWACKI. "Fouriersynthese von Kristallen und ihre Anwendung in der Chemie." Verlag Birkhauser, Basel, Switzerland. 1952. 237 pp. Ganzleinen—Fr. 34.30; Broschiert—Fr. 30.15.

W. SHOCKLEY, J. H. HOLLOMON, R. MAURER AND F. SEITZ (Editorial Committee). "Imperfections in Nearly Perfect Crystals." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. 490 pp. \$7.50.