Anal. Calcd. for $C_{10}H_{18}O_9$: C, 42.53; H, 6.42. Found: C, 42.5; H, 6.4.

Iodimetric titration gave the expected equivalent value for a disaccharide and on hydrolysis the final reducing value and specific rotation were those calculated for D-xylose. On acetylation of the disaccharide, there was produced the same crystalline hexaacetyl xylobiose as reported by Bachrach and Whistler.[2] Thus, the structure of the disaccharide is 4-(β-D-xylopyranosyl)-β-D-xylopyranose.

In another instance a 2% xylan solution in 42% hydrochloric acid solution was hydrolyzed to 50% of completion. It was neutralized and chromatographically separated as before. After washing the column with water and 5% ethanol, a trisaccharide fraction was removed with 9% ethanol. The concentrated sirup was dissolved in a small amount of warm water and hot absolute ethanol was added to produce a solution of 80–85% alcohol concentration. Upon cooling, crystallization occurred. The yield was 8.0% of the original xylan; m.p. 205–206°; $[\alpha]_D^{25}$ 46.96 (1.06% in water).

Anal. Calcd. for $C_{15}H_{26}O_{13}$: C, 43.48; H, 6.33. Found: C, 43.4; H, 6.4.

Iodimetric titration gave the expected value for a trisaccharide and on hydrolysis the reducing value and specific rotation were those calculated for D-xylose.

(2) J. Bachrach and R. L. Whistler, paper presented before the Division of Sugar Chemistry, 116th meeting of American Chemical Society, Atlantic City, 1949.

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RECEIVED FEBRUARY 3, 1951

ADRENAL CONVERSION OF C^{14} LABELED CHOLESTEROL AND ACETATE TO ADRENAL CORTICAL HORMONES[1]

Sir:

It previously has been demonstrated that beef adrenals, perfused with blood containing added ACTH, synthesize and release into the perfusion medium a mixture of corticosteroids, the principal components of which are 17-hydroxycorticosterone (I) and corticosterone (II).[2,3] We wish to report that when similar experiments are carried out in the presence of either C^{14} labeled acetate or cholesterol, the I and II isolated from adrenal perfusates are radioactive, and have approximately the same number of counts per mg. per min. (c.m.m.) as determined under identical conditions.

Groups of 5 glands were perfused in parallel from a manifold with 1 liter of homologous citrated blood containing 25 mg. of ACTH (Armour) for four hours, the perfusate being recycled through the glands. The corticosteroids were extracted from perfusates with activated carbon (Darco G-60),[4] and fractionated by paper partition chromatography. The compounds were characterized by the method of mixed chromatograms,[5] both of the free steroids and of their esters, and by measuring the chromogen produced by H_2SO_4.[6] All counts were made using a thin-window Geiger counter with 0.1–0.7 mg. samples (diluted with non-isotopic compound when necessary) plated as a thin film. Ten milligrams of carboxyl labeled sodium acetate having radioactivity of 5.8×10^6 c.m.m. was added to the medium at the initiation of the perfusion. I and II were isolated in **3.0** and **1.0** mg. amounts, and had activity of 319 and 305 c.m.m. respectively, in one experiment; in a second similar experiment, the c.m.m. for each were 219 and 208 and the total amounts isolated were **4.5** and **1.5** mg. for I and II, respectively. The counts were made with 0.09 to 0.13 mg. samples; with our technique the c.m.m. of I or II remains constant in the range 0.09 to 0.7 mg.

A similar perfusion of cholesterol labeled in position 3 with C^{14} prepared from radio-cholestenone[7] by Drs. Schwenk, Gut and Belisle[8] was conducted in which 90 mg. of radiocholesterol (300 c.m.m.) was used. I and II were isolated in **1.0** and **0.4** mg. amounts and had activities of 25 and 18 c.m.m., respectively.

The data of Table I indicate that the radioactivity is a property of the compounds isolated since (a) rechromatography on paper and (b) the preparation of two derivatives led to no significant alteration of the specific activity. It is recognized that the method of mixed chromatograms of the free compounds and their esters plus determination of the H_2SO_4 chromogen does not constitute a classical characterization of I and II. In our experience, however, no substance proved to be homogeneous by this method, has failed to meet classical criteria of purity and composition.

TABLE I

The specific activities of cortical hormones and their derivatives isolated from an adrenal perfusion experiment with $CH_3C^{14}OONa$.

		mg.	c.m.m.
1	Free 17-hydroxycorticosterone (I)[a]	0.125	319
2	I after rechromatography	.115	340
3	I acetate[b]	.130	362
4	I propionate[b]	.098	332
1	Free corticosterone (II)[a]	.130	305
2	II after rechromatography[a]	.090	326
3	II acetate[b]	.123	294
4	II propionate[b]	.110	342

[a] Isolated from paper following partition chromatography using the propylene glycol–toluene system. [b] Isolated from paper following partition chromatography using the formamide–benzene system. The samples were then rechromatographed on paper.

These data indicate that both acetate and cholesterol can be transformed by the isolated adrenal

(1) Aided by United States Public Health Service Grant GG-2742 and G. D. Searle and Company.

(2) Hechter, Zaffaroni, Jacobsen, Levy, Jeanloz, Schenker and Pincus, *Recent Progress in Hormone Research*, in press.

(3) Pincus, Hechter and Zaffaroni, *2nd Clin. ACTH Conf.*, The Blakiston Co., Philadelphia, Pa., 1951, in press.

(4) Hechter, Jacobsen, Jeanloz, Levy, Marshall, Pincus and Schenker, *Arch. Biochem.*, **25**, 477 (1950).

(5) Zaffaroni, Burton and Keutman, *Science*, **111**, 6 (1950).

(6) Zaffaroni, THIS JOURNAL, **72**, 3828 (1950).

(7) Turner, THIS JOURNAL, **69**, 726 (1947).

(8) Schwenk, Gut and Belisle, in press.

gland into adrenocortical steroids. While cholesterol appears to be a more efficient precursor than acetate, further experiments are necessary to accurately define the percentage conversion with both precursors. Since in adrenal slices cholesterol has been shown to arise from acetate condensation[9] it is not inconceivable that cholesterol may be an intermediary in the reactions leading to corticosteroid synthesis from acetate. We hope in further studies to determine whether cholesterol is an obligatory intermediate in steroidogenesis.

(9) Srere, Chaikoff and Dauben, *J. Biol. Chem.*, **176**, 829 (1948).

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BOOK REVIEWS

Principles of Ionic Organic Reactions. By ELLIOT R. ALEXANDER, Assistant Professor of Chemistry in the University of Illinois. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1950. viii + 318 pp. 15.5 × 23.5 cm. Price, $5.50.

This book applies ionic principles in presenting the mechanisms of those organic reactions where the ionic concept has been established or appears very likely. The treatment is entirely from the point of view of the organic chemist and actual kinetic data and mathematics are omitted. The author has not merely presented reaction explanation but has also presented the important data leading to the validity of the ionic mechanisms. The documentation is adequate but not exhaustive.

The book will serve admirably as a primary textbook for an advanced course in organic reaction mechanisms to follow a more orthodox advanced chemistry course, or as a supplementary book for a comprehensive advanced organic course. The research organic chemist whose formal schooling was completed say ten years ago will find this an indispensable means of mastering the newer concepts.

The style and treatment are, for the most part, quite clear although more explanation of the symbolism employed might be suggested. More detail would be helpful in explaining the actual physical nature of carbonium ions and the sequence of events leading up to their transitory existence. Conspicuous omissions include ionic oxidation reactions and the application of the transition state concept to ionic processes.

The complete objectivity of the book impresses this reviewer. Although Dr. Alexander is a firm believer in ions he accepts them, applies them, and submits the evidence without any apparent attempt to crusade for them. This is a healthy attitude in a book of this type; one regrets that the same approach has not yet been used in free radical books. The book is excellent and highly recommended.

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Technique of Organic Chemistry. Volume I, Part II. **Physical Methods of Organic Chemistry.** Edited by ARNOLD WEISSBERGER. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1949. xi + 1024 pp. 15.5 × 23 cm. Price, $12.50.

The chapter headings, and the authors, are as follows: X-Ray Diffraction, by I. Fankuchen; Electron Diffraction, by L. O. Brockway; Refractometry, by N. Bauer and K. Fajans; Spectroscopy and Spectrophotometry by W. West; Colorimetry, Photometric Analysis, Fluorimetry and Turbidimetry, by W. West; Polarimetry, by W. Heller; Determination of Dipole Moments, by C. P. Smyth; Conductometry, by T. Shedlovsky; Electrophoresis, by D. H. Moore; Potentiometry, by L. Michaelis; Polarography, by O. H. Müller; Determination of Magnetic Susceptibility, by L. Michaelis; Determination of Radioactivity, by W. F. Bale and J. F. Bonner, Jr.; Mass Spectrometry, by D. W. Stewart.

This book is necessarily of encyclopedic proportions and character, and like other encyclopedias it must suffer from obsolescence setting in before the ink is dry. Indeed, if a book of this nature is to be any good, its publication must accelerate its own obsolescence, for if the authors are conscientious in pointing out the pitfalls and the weaknesses of existing procedures and instruments this must in turn stimulate new advances. By this criterion the book is not a very good one. On the whole it shows little dissatisfaction with present-day instrumentation.

The authors have been faced with the necessity of compromising between theory and experimental techniques; for the most part they have elected to present an adequate treatment of fundamental principles at the expense of detailed experimental procedures. The book is thus in no sense a working manual but it is a comprehensive and authoritative reference source of material not otherwise readily available to the analyst.

If any one chapter excels in excellence and thoroughness, the reviewer would choose the discussion of polarimetry by W. Heller. Granted the advantage of dealing with a quiescent, maturely developed field, this presentation is worthy of special comment for the abundant illustrations, the preciseness of its formulation, and for the wealth of information it contains.

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Fortschritte der Alkaloidchemie Seit 1933. Scientia Chimica, Band 2. By HANS-G. BOIT, Chemisches Institute der Universität, Berlin. Akademie-Verlag G. m. b. H., Presseabteilung, Schiffbauerdamm 19, Berlin NW 7, Germany. 1950. xxxii + 425 pp. 18 × 25 cm. Price, paper, 49 DM, bound, 53 DM.

A progress report is one of the devices which a busy worker in one field can use to keep abreast with advances in another field. The present monograph serves this purpose excellently. It does not present the extensive background in alkaloid chemistry which preceded 1933, the year chosen for the start of the report. It does attempt to supplement some of the excellent reviews available at that time, such as Winterstein-Trier, with a broad account of the work which has been completed in the intervening years. In spite of this, the book is self-contained. The author follows the practice of giving sufficient information in each discussion to pick up the thread of the argument.

The major portion of the book is devoted to a discussion of the chemistry of alkaloids whose structures are either completely elucidated or tentatively assigned. These are