the acid were administered. After about two months of treatment I observed in all cases a marked darkening of the hair. The recently grown shafts appeared to be normally pigmented. It is my impression that an oral dose of 100 mg twice a day is ample to give results. The data seem to show that p-aminobenzoic acid has the same effect with respect to graying as the B complex preparation used in my earlier studies.

In view of the favorable results obtained I am continuing my experiments with a considerably larger series of cases in order to establish the optimum daily dosage of para-aminobenzoic acid. The detailed data will appear elsewhere.

BENJAMIN F. SIEVE

TUFTS MEDICAL COLLEGE
AND BOSTON CITY HOSPITAL

QUOTATIONS

CHEMISTRY AND CANCER

ON our "Science in the News" page to-day is a collection of strange diagrams. They show the structures as the chemist conceives them of certain molecules known to produce cancer. It was for his brilliant fundamental study of these structures that Professor Louis Frederick Fieser of Harvard's chemistry department merited the Katherine Berkan Judd $1,000 prize of The Memorial Hospital for the Treatment of Cancer and Allied Diseases.

No one can now predict whether this particular study will be the one that will lead to that goal of so many wearying researches—the prevention of malignant cell growth and its non-surgical treatment. But there can be little doubt that if the goal is to be reached it must be through a more complete understanding of the body's own normal and abnormal chemical processes.

Memorial Hospital, in its hearteningly handsome building on East Sixty-eighth Street, provides the occupants of its 250 beds with the most modern x-ray machines, ranging in size up to 1,000,000 volts, with the most up-to-date devices for applying the curative radiation of radon gas, with the most skillful and aseptic surgery. But all these are drastic methods of dealing with a malignant growth that has already become dangerous. What about the cause? It is fortunate that beneath the same roof, under the direction of Dr. Cornelius P. Rhoads, men are working on the chemical root of the problem—subjecting experimental mice, for example, to the carcinogenic chemicals synthesized in Harvard's Converse Laboratory.

This correlation of the clinical and the chemical is one of the most encouraging aspects of modern cancer research. While doing all possible by present means for those already afflicted, scientists no longer base all their hopes on mysterious therapies whose modes of action are unknown. They are trying, step by difficult step, to reconstruct the chemical processes of life and ascertain the point at which those processes occasionally go off into the wilderness detour that we know as cancer. A substantial contribution toward that pathfinding is acknowledged in the award to Dr. Fieser, who thinks of the disease in terms of strange diagrams of molecular structure.—*The New York Times.*

SCIENTIFIC BOOKS

ORGANIC CHEMISTRY

High Polymers. Editorial Board, R. E. BURK, H. MARK and G. S. WHITBY. *Volume I. Collected Papers of W. H. Carothers on High Polymeric Substances.* By H. MARK and G. S. WHITBY. Illustrated. xix + 459 pp. New York: Interscience Publishers, Inc. 1940. $8.50.

Volume II. Physical Chemistry of High Polymeric Systems. By H. MARK. Illustrated. vii + 345 pp. New York: Interscience Publishers, Inc. 1940. $6.50.

IN the introduction to the series, "High Polymers," included in Volume I, the Editorial Board points out the technical and theoretical importance of high polymeric materials to the chemist. They set as their aim in this series the collection of our present knowledge in this field.

Volume I in the series, as the name shows, is a collection of the original papers of Carothers on high polymers and closely related topics. The volume contains a biography of Carothers; his papers reprinted under the headings: Studies on Polymerization and Ring Formation; Acetylene Polymers and Their Derivatives; Miscellaneous Papers; and a complete bibliography of Carothers' papers and patents. The value of the original papers has been increased by the preparation of an index which is a great aid to the student in locating specific topics.

Volume II in the series is essentially a revised edition of Professor Mark's "Allgemeine Grundlagen der hochpolymere Chemie." It contains a discussion of the fundamental concepts in general and physical chemistry which the author deems to be essential for the student who expects to work in the high polymer

field. Only a small portion of the book is devoted to the applications of these concepts to polymers, as the main object of the book is to provide an adequate background in physical chemistry for a proper appreciation of polymer problems.

C. S. MARVEL

UNIVERSITY OF ILLINOIS

Catalysis—Inorganic and Organic. By SOPHIA BERKMAN, JACQUE C. MORRELL and GUSTAV EGLOFF. xi + 1130 pp. Illustrated. New York: Reinhold Publishing Corporation. 1940. $18.00.

THE importance of catalysts in chemical processes is phenomenal. The selection of catalysts and their preparation is still essentially an art; for this reason, the literature is extremely voluminous. This book comprises a stupendous compilation of material on heterogeneous and homogeneous catalysis, on various types of catalysts and their classification, conditions effecting activity, inhibitors, promoters, poisons and carriers. The arrangement is such that the reader readily may find either the facts about any catalyst or what catalysts may be used in any particular reaction. An enormous number of original references is given. The publication will be a welcome asset to the research chemist who desires an up-to-date handbook and reference work on catalysis.

ROGER ADAMS

UNIVERSITY OF ILLINOIS

The Ring Index—A List of Ring Systems Used in Organic Chemistry. By AUSTIN M. PATTERSON and LEONARD T. CAPELL. 661 pp. New York: Reinhold Publishing Corporation. 1940. $8.00.

THIS book represents a collection of known parent ring systems, arranged in order from the simplest to the most complex. Widely accepted names, other preferred names and systematic names are given. An original reference to each ring is cited. Rules for numbering are discussed. The publication has involved a tremendous amount of time and thought. It will be most helpful to the organic chemical investigator who so frequently must struggle with the appropriate naming of compounds under study.

ROGER ADAMS

UNIVERSITY OF ILLINOIS

The Theory of Organic Chemistry—An Advanced Course. By GERALD E. K. BRANCH and MELVIN CALVIN. Illustrated. xix + 523 pp. New York: Prentice-Hall, Inc. 1941.

THIS book discusses the application of electronic structural theory to organic chemistry, with particular emphasis on the "resonance theory." The theories of the structure of atoms and molecules are outlined, stressing the quantum mechanical development. The authors then consider the application of these theories to various physical properties and to the energy relations and rates of certain reactions of organic compounds. Some of the principal topics included are the dimensions of molecules, dipole moments, spectra, the strength of acids and bases, tautomerism, oxidation-reduction potentials, free radicals and the rates of such reactions as substitution at a saturated carbon atom and addition to unsaturated compounds.

The authors state in the preface that they have avoided "a collection and evaluation of the mass of existing theories" and that, "This policy necessitates giving our opinions undue prominence. Ideas have been ignored on the slight grounds that we do not agree with them." In view of this policy it is not surprising that the treatment appears dogmatic and that the correlation of experimental and theoretical material is often highly speculative. However, such an interpretation of the variety of ideas which have come to be known as the "resonance theory" should be a useful contribution, whether or not the reader agrees with the ideas.

The book is well set up, printed and bound and has a minimum of typographical errors.

C. C. PRICE

Laboratory Outlines and Notebook for Organic Chemistry. By CECIL E. BOORD, WALLACE R. BRODE and ROY G. BOSSERT, all of the Department of Chemistry of the Ohio State University. Illustrated. ix + 241 pp. 28 figs. New York: John Wiley and Sons, Inc. 1940. $1.75.

THE authors have provided an excellent combination laboratory manual and record book suitable for use in either a year's course in organic chemistry, or by proper choice of experiments, a one semester's course. The manual represents a gradual development over a period of twenty years and shows care and forethought. Each experiment contains a preliminary discussion, experimental procedure and space for observations. Questions and problems with blanks for answers follow each experiment. The discussion is succinct, the directions clear and concise. The student is taught to think about organic molecules in three dimensions by actually constructing molecular models in the laboratory. The work is up-to-date, including among its 69 experiments sulfanilamide, organic plastics and an introduction to qualitative organic analysis. Helpful information concerning reagents, supplies and list of necessary apparatus is given. The packaging of the required amounts of chemicals for each student for each experiment is recommended as a means of avoiding waste, preventing congestion at

balances and reagent shelves and materially speeding up the laboratory work. The book is well printed and bound in attractively colored cardboard covers with a spiral binding so that the pages lie flat, even though the book is folded back cover to cover.

R. L. SHRINER

SPECIAL ARTICLES

A STUDY OF HORMONAL FACTORS WHICH INFLUENCE THE PRODUCTION OF INSULIN[1]

THE present work had its origin in the attempt to devise a method for diagnosing diabetic "tendencies" prior to the time when positive diagnosis is obtained with the routine tests, as gathered from analyses of blood, urine and glucose tolerance curves. It seemed possible that stimulating carbohydrate metabolism in "normal" subjects and in those with diabetic "tendencies" might reveal differences in hormonal relationship which could, perhaps, be detected by urine analysis.

Some preliminary work was necessary before embarking upon the more ambitious part of our program; and the present report deals with several interesting observations.

In a study of carbohydrate metabolism, involving the activity of hormones, we had to consider, aside from insulin, the diabetogenic hormone (D.H.) and the insulinotropic substance (I. S.).[2]

Methods of extraction and methods of estimation are given by Best, Haist and Ridout and by Campbell and Keenan.[3] Methods of estimation are based upon the following facts: the injection of an extract containing D. H. will decrease the amount of insulin in the pancreas, whereas the injection of an extract containing I. S. will increase the insulin content.

For the assay of the diabetogenic and insulinotropic effects, the rat method of Best[3] was used, ten male albino rats of 200–300 g in weight being injected intraperitoneally for a period of 14 days. The insulin assay in the pancreas of rats was carried out according to the directions of Marks,[4] using 40 mice.

Based on the work of Campbell and Keenan,[3] a fractionation procedure for the anterior pituitary was developed. These authors describe the preparation of an active extract of D. H. We were hopeful that the anterior pituitary would also yield an active extract of I. S.; and we therefore prepared fractions from the residue obtained after complete extraction of D. H. by a 10 per cent. salt solution. Four fractions prepared and tested were the following: 1. An alkaline extract of the glandular tissue which had previously been extracted with a solution of NaCl (fraction 2); 2. A globulin-like material, soluble in salt solution and insoluble after dialysis; 3. A fraction recovered from the solution remaining in the dialyzing bag after dialysis; 4. The combined dialysates after elimination of NaCl. In each case the fractions were concentrated *in vacuo* and precipitated with alcohol-ether.

Using 10 rats per fraction, amounts were injected equivalent to 10 g of the original anterior pituitary gland. From the table it can be seen that fraction 3 exhibits a slight diabetogenic effect, and that fraction 1 shows insulinotropic activity. The other two fractions were found to be inactive.[5]

Another phase of the subject was suggested by the work of Marks and Young,[6] who reported that crude prolactin preparations exhibited marked insulinotropic effects, although they were of the opinion that the activity was not due to prolactin itself. Using highly purified samples of prolactin, we found, on the contrary, that they show definite diabetogenic activity (see Table 1).

The same authors pointed out that estrone, unlike testosterone, produces a definite insulinotropic effect.[7] We were able to confirm, to a certain extent, and to enlarge this observation (see table). The synthetic estrogen, stilbestrol, shows even more insulinotropic activity than estradiol; and progesterone, and more particularly, testosterone, show diabetogenic effects.

A fact worthy of comment is that an insulinotropic effect has been obtained using such widely divergent substances as a protein fraction of the anterior pituitary on the one hand, and estradiol and stilbestrol on the other. The activity of the latter substances may perhaps be explained by stimulation of the anterior pituitary.

[1] We are indebted to the following: Dr. Erwin Schwenk, Schering Corporation, for estradiol, progesterone and testosterone; the U. S. Vitamin Corporation, N. Y., for stilbestrol; Professor H. M. Evans, Professor Abraham White and Dr. Oscar Riddle for samples of prolactin; and Dr. David Klein, Wilson Laboratories, for supplies of pituitary glands. We wish to thank Dr. Julius Rosenthal, director of the Pathological Laboratories of the Welfare Hospital, for his interest in our work.

[2] The "diabetogenic hormone" tends to increase the amount of sugar in the blood and tends to decrease the production of insulin in the pancreas. The "insulinotropic substance"—there is some debate as to whether we are dealing with a hormone—stimulates the production of insulin.

[3] C. H. Best, R. E. Haist and J. H. Ridout, *Jour. Physiol.*, 97: 107, 1939; J. Campbell and H. Keenan, *Canadian Chemical Process Industry*, 23, 280, 1939.

[4] H. P. Marks, cited in "Biological Standardization" by J. H. Burn, pp. 91, etc.

[5] According to Campbell and Keenan, fraction 2 should have contained D.H.

[6] H. P. Marks and F. G. Young, *Lancet* II, p. 710, 1940.

[7] See, also, E. Cantilo, *Endocrinology*, 28: 20, 1941, who describes the beneficial effects of estrogens in menopausal diabetes.