nality of approach, it is quite the antithesis of the scissors-made text-book, and is both interesting and refreshing. Ingenious examples and similes are numerous. The "official" nomenclature for many classes of organic compounds is clearly explained. And yet the author throughout spells ole*fins* as ole*fines,* although in modern organic nomenclature the termination -ine is generally reserved for true bases.

The extent to which physical chemistry is used in the text, in addition to the 56 pages devoted to it in Part I as introductory, and the 20 pages on "From Partial Valence to Resonance" in Part II, will make its use for home study rather difficult reading for those who have not had at least an elementary course in that branch of chemistry. In other words, the book is essentially a primer of organic chemistry from the modern physical chemical standpoint. As such, it is cordially recommended, for it is clearly written and effectively presented. The net result, however, of so much physical chemistry, of rather frequent repetitions and of unnecessarily expanded structural formulas, has been to curtail seriously the amount of space available for the purely descriptive side of the subject, and that is just the side which is easiest and most attractive reading to the beginner.

The author's interest in etymology is indicated by the number of chemical words whose derivation and translation he gives. It is regrettable that so few of the great organic chemists of the past are mentioned by name in association with those parts of the science to which they have been the chief contributors. There are no references to the literature or lists of books suggested for collateral reading. In view of the author's position as senior chemist at the Edgewood Arsenal of the Chemical Warfare Service, U.S.A., it is somewhat surprising that the only war gas mentioned is "mustard gas." Phosgene, the chief killing gas of World War I, and still an important intermediate in several branches of chemical industry, does not appear at all. In the chapter on drugs, a number of the compounds mentioned bear only their German instead of their American names.

The arrangement of the subject-matter can be seen from the following table of contents: Part I. The Unique Position of the Carbon Atom in Chemistry, and a review of the modern theories concerning atoms, molecules, valence, etc. Part II—The Architecture of Carbon Compounds—discusses structural theories, chains and rings, double and triple bonds, stereochemistry and isomerism, from partial valence to resonance, paraffins, olefins, acetylenes and benzene hydrocarbons. Part III—The Classification of Carbon Compounds—presents the customary methods of classification, alkyl and aryl radicals, halogen compounds, primary, secondary and tertiary compounds, oxygen compounds (alcohols, phenols, ethers, aldehydes and ketones, acids and mixed types); nitrogen compounds; and compounds containing sulfur, phosphorus or other elements. Part IV—Special Topics in Organic Chemistry—is devoted to the structures of complex compounds, heterocycles and condensed cycles, the role of isoprene in nature, proteins, carbohydrates, dyes, drugs, hormones and vitamins, isotopic chemistry and giant molecules. A general index completes the book.

Paper, type and printing are exceptionally good. The proofreading is quite remarkable in its accuracy, not more than two or three slips having been found in the entire book. Illustrations, cuts, formulas, tabulations, etc., are admirable.

MARSTON TAYLOR BOGERT
COLUMBIA UNIVERSITY

SPECIAL ARTICLES

THE METABOLISM OF THE KIDNEY[1]

WITH a view to gaining an insight into the metabolism of the kidney in experimental renal hypertension a comparative study has been made of the concentration and activities of various enzyme systems in the kidney of normal and hypertensive dogs.

Experimental renal hypertension was produced in dogs by the clamping procedure of Goldblatt,[2] or by the Cellophane or silk perinephritis method of Page.[3] The tissue respiration was measured by the manometric method of Warburg.[4] The experiments were carried out with tissue slices, homogenized suspensions and tissue extracts at 37.5° C and at a pH of 7.4.

Histological examination of the portions of the kidney adjacent to the parts used in these experiments showed no necrosis.

I have studied the enzymatic activity of kidney slices and of homogenized tissue suspensions from the experimental and the opposite control kidneys of dogs with hypertension due to unilateral operations, from both kidneys of bilaterally operated hypertensive dogs and from the normal kidneys of non-hypertensive dogs. Preparations from the experimental kidneys of both types of hypertensive dogs, in comparison

[1] A detailed report of this work will appear in the *Journal of Experimental Medicine.*

[2] H. Goldblatt, J. Lynch, R. F. Hanzal and W. W. Summerville, *Jour. Exp. Med.,* 59: 347, 1934.

[3] I. H. Page, SCIENCE, 89: 273, 1939; *Jour. Am. Med. Asn.,* 113: 2046, 1939.

[4] O. Warburg, "The Metabolism of Tumours." New York: Richard R. Smith, Inc. 1931.

with normal kidneys and in comparison with the control kidney of the unilaterally operated dogs, showed a marked decrease in the concentration of cytochrome c and also a diminution in the activities of the cytochrome oxidase and succinic dehydrogenase systems. The rate of oxidation of pyruvate and of l(+)-glutamate as well as the rate of synthesis of carbohydrates from these substances was greatly decreased. The rate of formation of ammonia from the oxidative deamination of l(+)-glutamate was considerably reduced in these kidneys. The protein-bound phosphorus content was lower in the kidneys whose renal artery has been partially constricted or which were wrapped in Cellophane or silk.

When the renal artery of only one kidney was partially constricted or one kidney wrapped in Cellophane or silk, the control kidney, examined one to six months after operation, showed an increase in cytochrome c concentration, cytochrome oxidase, succinic dehydrogenase activities per gram of tissue of from 15 to 35 per cent. over and above the average of normal kidneys. Also after unilateral nephrectomy the concentration of cytochrome c, of flavin-adenine dinucleotide and of protein-bound phosphorus was about 20 to 40 per cent. higher in the remaining kidney.

Solutions of renin prepared according to the method of Helmer and Page[5] inhibited the activity of the cytochrome oxidase, the succinic dehydrogenase, the l-amino acid oxidase and the amine oxidase systems. The degree of inhibition ranged from 10 to 80 per cent., varying with the individual enzyme and with the amount of renin added. It must be noted, however, that pure renin has not yet been isolated and that the renin solutions used may contain other factors responsible for the inhibitory effect demonstrated.

Preparations of kidney tissue obtained from hypertensive dogs showed similar inhibitory effects. Heating at a 100° C for 5 minutes destroyed a great part of the inhibitory activity of these tissue preparations.

It has been reported that in experimental renal hypertension, the concentration of renin is increased in the kidney itself[6,7] and in its venous blood.[8,9]

Since renin is a proteolytic enzyme, it may, if it has access to the respiratory enzymes mentioned above, be responsible, directly or indirectly, for at least part of the decrease in the activities of the enzymes reported in this paper and in a previous study.[10]

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SIGWIN B. RASKA

DEPARTMENT OF PHYSIOLOGY,
UNIVERSITY OF TORONTO

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[6] T. R. Harrison, A. Blalock and M. F. Mason, *Proc. Soc. Exper. Biol. and Med.*, 35: 38, 1936.

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[8] I. H. Page, *Am. Jour. Physiol.*, 130: 22, 1940.

[9] K. G. Kohlstaedt and I. H. Page, *Jour. Exp. Med.*, 72: 201, 1940.

[10] S. B. Raska, *Jour. Exp. Med.*, 78: 75, 1943.

THE MILK AGENT IN SPONTANEOUS MAMMARY CARCINOMA[1, 2]

PREVIOUS workers have shown that the milk agent for spontaneous mouse mammary carcinoma[3] is present in milk, in lactating mammary glands and in spontaneous or transplant tumor tissue, and that it can be at least partially sedimented or is associated with particles which are sedimented, in centrifugal fields of 20,000,[4] 60,000[5] and 110,000[6] times gravity.

In the experiments reported here spontaneous or transplant tumor tissue was used. The material was homogenized with distilled water, buffers or saline solution and then either was lyophilized or spun in a centrifuge and the supernatant treated in various ways.

The test animals were hybrids between C57 black mothers and A strain fathers or the back-cross mice from these hybrids to A males. In addition a few fostered C3H or A strain mice were used. The animals were between 4 and 10 weeks of age when they were injected with the various fractions mentioned below.

Results: One experiment, dealing with the stability of the milk agent toward heat, made use of the water extract of transplant tumor tissue. The supernatant was divided into 5 aliquot portions and these were kept at 4°, 37°, 60° or 90° C for 1 hour or at 24° C for 2 hours. All portions were brought to room temperature and an amount equivalent to 1 gram of original tissue was injected. The results are shown in Table 1. All animals in this experiment are now dead.

In another experiment frozen tumor tissue was extracted with saline solution and spun at 15,000 g for 30 minutes. Part of the supernatant was extracted with petroleum ether and gave rise to 5 tumors in 8 animals. The remainder of the supernatant was centrifuged at 50,000 g for 1 hour. The sediments at 15,000 and 50,000 g, the supernatant at 50,000 g and the Berkefeld N filtrate of the original saline extract gave rise to 1 or 2 tumors each out of 10 animals. An attempt to fractionate this same saline extract by

[1] From the Divisions of Physiological Chemistry and Cancer Biology of the Department of Physiology, University of Minnesota. Preliminary report.

[2] Aided by grants from the University of Minnesota Graduate School Funds and the Sivertsen Fund for Cancer Research and from the Jane Coffin Childs Memorial Fund for Medical Research.

[3] J. J. Bittner, *Canc. Res.*, 2: 710, 1942.

[4] H. Kahler and W. R. Bryan, *Jour. Nat. Cancer Inst.*, 4: 37, 1943.

[5] W. R. Bryan, H. Kahler, M. B. Shimkin and H. B. Andervont, *Jour. Nat. Cancer Inst.*, 2: 451, 1942.

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