tinue to teach physics to as many students as possible, some departments of physics will find it impossible to continue in operation and their staff members should be added to departments in need of their services.

The reason why all departments of physics which can possibly do so should continue in operation is that it is probable that the needs of the Army and the Navy will be barely satisfied through the training programs. The needs of war research, war industry and teaching must be satisfied, for the most part, by women and the physically unfit. In this connection it should be mentioned that there seems to be no possibility of meeting the need for competent teachers of physics in the secondary schools.

Accordingly, it is important that colleges which are not fortunate enough to secure training contracts should continue to teach physics to even larger numbers than before. So great is the need for men and women trained in physics that every effort should be made to recruit into departments of physics all students with the necessary aptitude.

These considerations make it clear that the more favored departments should not take men from other institutions unless it is necessary for these men to find employment elsewhere. The other source of supply, and the one that should be utilized wherever possible, is within the institution itself.

In any college or university there are teachers in other fields, including botany, geology, physiology, psychology and zoology, who have sufficient knowledge of physics so that, with a little brushing up and some observation of good physics teachers at work, they should become proficient teachers of beginning physics. These men and women should be found at once and encouraged to prepare themselves for the teaching service which they will almost certainly be called upon to perform either at their own institutions or elsewhere.

Similar adjustments, although on a smaller scale, will be necessary in the field of mathematics.

It is the hope of this office that most of the required readjustments in the staffs of physics and mathematics departments may be worked out by drawing in new staff members from near-by institutions or by adjustments within the institutions themselves. This office will facilitate such adjustments in every way possible if they can not be worked out locally and will be glad to receive information regarding institutional needs and available personnel but only with the understanding that we will attempt to prevent bidding of institution against institution in mad competition for personnel. It is to the interest of all concerned that a sufficient supply of teachers of physics and mathematics should be developed so that the necessary readjustments may be made easily and efficiently.

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SCIENTIFIC BOOKS

ADVANCES IN ENZYMOLOGY

Advances in Enzymology. Volume II. Edited by F. F. NORD and C. H. WERKMAN. 374 pp. Interscience Publishers Inc., New York. 1942.

THE second volume of "Advances in Enzymology," this excellent successor to "Ergebnisse für Enzymforschung," edited by Nord and Werkman, has fulfilled the expectations of those who read the first volume, although there are some articles which have departed somewhat from the field a book of this kind is expected to cover.

The first article in particular, "Bacterial Viruses (Bacteriophages)" by M. Delbrück, seems to be outside the scope of enzymology. After calling bacteriophage a virus ("what's in a name?") Delbrück tells his readers that there are at present two aspects of the phage problem of particular interest: "the biochemical basis of the specific relation of the phage to its host" and "the problem of phage growth." Then he proceeds with remarks about "distribution in nature," "methods of assay," "the 'Life Cycle' of virus in sensitive hosts," etc., and leaves the reader with the same curiosity as when he started regarding the two aspects of particular interest. Neither of the two aspects is discussed in a manner to satisfy or clarify the mind of the student of enzymes.

The kinetics of hydrolytic enzymes has been presented by D. D. Van Slyke in the second article with his usual clarity. The assumption of substrate-enzyme complex formation first formulated by Michaelis and now generally accepted has been treated by Van Slyke with such unusual success that a study of this paper is recommended to any one interested in the kinetics of enzyme systems in general. The "Classification of Proteolytic Enzymes" by M. Bergman fills a need long felt. Professor Bergman must be congratulated for having resolutely discarded the outmoded but tenaciously retained classification of proteolytic enzymes in peptidases and proteinases. His tentative classification, based on two characteristics of proteolytic specificity, namely, that each proteolytic enzyme

requires the presence of certain atomic groupings within the main body and within the side chain of the reacting molecule, is a step forward toward a rational nomenclature. Bergman's discussion of the nature of proteolytic enzymes is evidence that the rapid progress made in the field of oxidation enzymes has also aided in the better understanding of the nature of other enzymes. Proteolytic enzymes are far simpler than oxidation enzymes as they resemble in their chemical constitution the first type of oxidation enzymes, the metalloproteins; the fact that certain metals act as "activators" does not mean, as Bergman correctly points out, that "the active enzyme is composed of an inactive apoenzyme and an activator" but that the particular enzyme is made up of a protein combined to a metal both being equally essential for enzyme action in the same manner as polyphenol oxidase is a Cu-protein. The example of coupled reaction given by Bergman—the hydrolysis of glycyl-l-leucine by papain on addition of acetylphenylalanylglycine—is so clearly presented that the reader can immediately understand the observations and conclusions of Schoenheimer on the continuous splitting and synthesis of the protein molecule wherever those enzymes are present. Johnson and Berger provide, in their article on the enzymatic properties of peptidases, more examples of proteolytic enzymes made up of metalloproteins (Zn, Mn, Mg-proteins).

Zeller's article on diamine oxidase shows how difficult it is to discard old, misleading terminologies (aerodehydrases, oxydehydrases). In spite of the considerable work done by Zeller and his coworkers, in spite of the solubility of the enzyme, it has not yet been prepared in reasonably purified condition; furthermore, the enzyme preparation of Zeller, the properties of which are discussed in this paper, is rather inactive compared with that of Laskowski (personal communication). The problem of specificity, of the components of the enzyme system, will not be elucidated until a better preparation of diamineoxidase than that of Zeller is obtained. His excellent contributions will be always helpful. Roberts, who for years has studied the chemical processes during the manufacture of black tea, discusses the chemistry of tea-fermentation (oxidation of the leaf-tannins). The author's hypothesis that tea-tannins are oxidized by cytochrome oxidase has no valid support. Although we are in thorough agreement with Roberts in his insistence that cytochrome oxidase might be different in different cells, and would readily grant that cytochrome oxidase exists in tea-leaf, we must conclude that he offers no evidence for his opinion. No argument is given against the simpler assumption that the enzyme is a Cu-protein similar to polyphenol oxidase. Tea tannins consist mainly of the simpler condensation products of epi-catechin and gallo-catechin, o-quinones being the first product of oxidation; these, according to Roberts, condense afterwards. The kinetics of these condensation reactions are briefly discussed. Roberts's discussion of the mechanism of tea-fermentation must be read with attention by all students of oxidation-reduction processes. Although his conclusions and his hypotheses have no factual foundation and even run counter to established concepts, the presentation of the problem opens a field full of questions to be answered.

To discuss the problem of heterotrophic assimilation of carbon dioxide no more appropriate selection could have been made than that of Werkman and Wood, the undisputed pioneers and leaders in this field, the investigators who for the last seven years have been courageously trying to convince biologists that living cells could assimilate CO_2 by other processes than photosynthesis. This chapter is so well presented that the reviewer can only recommend its thorough study to all biologists interested in the physico-chemical processes of life.

H. Tamiya, who with his coworkers has contributed greatly to our knowledge of mould metabolism, has written the chapter on "Respiration, Fermentation and Enzyme Systems of Aspergillus." The exhaustive and careful study of the total metabolic balance of this mould, so useful to Japan, unfortunately has not been followed by a study of the mechanisms of oxidation-reduction. The pathways of carbohydrate fermentation and oxidation, for example, remain still a subject for study. It is especially unfortunate because *Aspergillus* seems to be one of those moulds where non-phosphorylating glycolysis exists, where the Szent-Györgyi cycle of accessory oxidation catalysts does not operate.

In their article on cellulose decomposition by microorganisms, Norman and Fuller give, after a brief presentation of the chemical structure and properties of cellulose, a good presentation of the probable mechanism of cellulose decomposition by bacteria and fungi. The extreme abundance of cellulose makes a careful study of these probable mechanisms necessary, because the controlled hydrolysis of cellulose or the controlled oxidation of its hydrolytic products might be used for the production on a large scale of the products of hydrolysis or oxidation.

"A Unified Hypothesis of the Reciprocal Integration of Carbohydrate and Fat Catabolism" is the title of an essay by E. J. Witzemann. The twenty "fundamental facts relating to fat and carbohydrate catabolism" do not help the reader in understanding the "unified hypothesis." Moreover, the first three of these fundamental facts are so naïve that the reader is left with no desire to go on with the remaining seventeen. The role assigned to choline in fat metabo-

lism is not in agreement with McHenry's conception of the function of choline, nor has it factual support. Biologists now go farther than Witzemann; they are aware of the interrelation not only of fat and carbohydrate metabolism but of all foodstuffs. They have been speaking for some time of pyruvic acid as the hub towards which the breakdown of foodstuff (carbohydrate, fat, protein) converges, from which synthesis starts.

H. Dam, the discoverer of vitamin K, has given us an excellent review of the chemical and physiological properties of this vitamin, and has shown that there still remain many obscure problems, such as the nature of the action of vitamin K on prothrombin formation.

Pfiffner's article on the "Adrenal Cortical Hormones" concludes the book. After reviewing the chemical properties of the different steroids extracted from the adrenals, the methods of assay, Pfiffner devotes one page (out of 27) to the effect of corticosterones on carbohydrate metabolism, unfortunate neglect when the article is written for "Advances in Enzymology."

The publishers are to be congratulated for the excellent care with which the book has been presented. The errors found in Van Slyke's article (pp. 34 and 39) were promptly corrected. It is unnecessary to say that this series must be in the library of every laboratory where there is interest in the mechanism of biochemical activities.

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BIOLOGICAL SYMPOSIA

Comparative Biochemistry, Intermediate Metabolism of Fats, Carbohydrate Metabolism and the Biochemistry of Choline. Edited by HOWARD B. LEWIS. ix + 247 pp. Illustrated. Jaques Cattell Press. 1942.

THE fifth volume of "Biological Symposia" deals with comparative biochemistry, intermediate metabolism of fats, carbohydrate metabolism and the biochemistry of choline. This volume is edited by Professor Howard B. Lewis, who provides a short introduction for it.

It may be stated immediately that there is a wealth of information in this collection of scientific articles. Those in which comparative biochemistry is discussed will be found of great value, not only to students who are interested in this subject specifically, but to workers in all branches of the biological sciences. The article on the end products of nitrogen metabolism in plants will be stimulating to those who are interested in nitrogen metabolism of animals. This latter subject is also discussed and it may in turn suggest new approaches to the problems of the plant biochemists and physiologists.

The article on the merging of growth factors and vitamins proves again the point that investigators of bacterial metabolism must keep pace with the rapid growth of our knowledge of the vitamins, while the vitamin experts will profit greatly by studying the results of investigations of the metabolism of bacteria.

Four articles on the intermediate metabolism of fat help us to keep abreast of this rapidly growing field and the changing views which must be adopted in light of the accumulating evidence. The symposium on carbohydrate metabolism deals primarily with the more purely biochemical aspects of the study and consists of four stimulating articles on "Oxidation Catalysts," "Phosphorylation of Glycogen and Glucose," "Oxidoreduction in Carbohydrate Breakdown" and "Pyruvate Oxidation and the Citric Acid Cycle." There is little doubt that many of the fundamental changes in sugars within the body are now being revealed. These short reviews should help materially to bring the subject up to date. Here again the interrelationship of the various fields discussed in this volume is obvious. The accessory food factors are assuming an ever-increasing role in all considerations of protein, fat and carbohydrate metabolism.

The four articles on choline provide a most useful picture of this relatively new but rapidly extending field. Choline, as a dietary factor, is now known to be intimately related to fat, protein, and more indirectly to carbohydrate metabolism as well as to many of the components of the vitamin B complex.

In this review it will be impossible, of course, to make any detailed summary of the information found in any of the four divisions into which the symposia fall. The general impression given by the whole volume is that a great deal of essential information has been gathered together and presented in a most pleasing and stimulating way. One is left with the feeling that a much more extended review of each of the fields would be most acceptable. This, however, would not be possible under the conditions of presentation of these symposia. It is to be hoped that editors will be found and the necessary arrangements made for the publication of the symposia which have more recently been presented before the Federation of American Societies for Experimental Biology.

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HURRICANES

Hurricanes. By I. R. TANNEHILL. 2nd edition, 8vo, x + 256 pages. 119 figures. Princeton University Press. 1942.