of which the first, a Three-point table, $-1(.0001)+1$, is exact. This is followed by 8 tables each, to 10 places of decimals: a Four-point table, $-1(.001)0(.0001)+1(.001)2$, and so on to an Eleven-point table, $-5(.1)+5$. The volume contains other tables of importance for dealing with special problems. Previously published were special tables of Huntington, Kelley and others, but nothing as comprehensive and useful as the present volume.

The main table of the third volume under review is devoted to the Circular and Hyperbolic Tangents and Cotangents for radian arguments ranging from 0 to 2 at intervals of 0.0001. The number of decimal places varies from 5 to 13 for the different functions and different argument ranges. The only previous comparable table for radian argument was the unreliable table of Hayashi, 1926. Hence the volume under review fills a real gap in the field of tables of such elementary functions.

The 7-figure table of Oakes for reciprocals of numbers from 1 to 100 000 has long been in use. The new volume expands by tenfold the scope of existing tables for the interval 100 000 to 200 009.

The first three volumes have valuable introductions and bibliographies.

We are happy to learn that two more volumes of the Mathematical Tables Project, bringing the total number to 21, are to be published by the Columbia University Press in the near future. These are (a) Tables of $\sin^{-1}x$; (b) Table of Associated Legendre Functions. This is a noble and remarkable array of most useful volumes to be published in a five-year period.

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ADVANCES IN ENZYMOLOGY

Advances in Enzymology and Related Subjects of Biochemistry. Volume IV. By F. F. NORD and C. H. WERKMAN. Illustrated. viii + 332 pp. New York: Interscience Publishers, Inc. 1944. $5.50.

THE hybrid vigor of biochemistry appears clearly in Volume IV of "Advances in Enzymology." Through the resourcefulness of the biochemist more and more biological problems are being brought within range of the methods and concepts of chemistry. The biochemical systems that are gradually emerging must often surprise and bewilder the chemist as well as the biologist. The vigor of the hybrid science is perhaps more apparent in the "Advances" than it is in the various journals of biochemistry. In them it has become necessary to restrict and even standardize papers, so that much of what an author has to say never gets into his papers. We all know how a talk with a man in his laboratory clarifies and explains a field of investigation. Reading a chapter in the "Advances" is, at its best, like listening to a worker in his laboratory.

And the chapters in "Advances" are about as varied as the kinds of talk one hears in different laboratories. There are chapters that are severely factual; there are those that are heavily laden with speculation, more heavily than the assembled data can support; and there are also several chapters in which fact and theory are nicely integrated. For the present reviewer there was something of interest in every chapter. Even the chapter by Jensen and Tenenbaum on "The Influence of Hormones on Enzymatic Reactions" is enlightening to the reader. Here is a subject that must surely become one of the great fields of investigation. Even so, the authors are able at present to review it in eight and one-half pages. One can imagine the dismay of the editors when they received the manuscript of this brief chapter with its imposing title. The effect on the reader is sobering and convincing: a valuable paper.

Another short chapter is on "The Transamination Reaction" by Herbst. This chapter consists essentially of a brief, critical summary of the work by the Russian biochemist, Braunstein, along with an interesting comparison of the work by Herbst on nonenzymatic transamination. If transamination is one of the newest fields of investigation in enzymology, the study of emulsin is one of the oldest. The most active American worker in the field, Pigman, contributes a chapter on the "Specificity, Classification and Mechanism of Action of the Glycosidases." In the study of these enzymes the biochemist has been meticulous in the attention he has given to the various substrates used but rather surprisingly carefree in the attention given to the enzymes themselves. Investigation of the glycosidases would appear to have been too little influenced by the contributions to enzymology of Sumner and of Northrop and Kunitz. Another essentially factual chapter is on "The Absorption Spectra of Vitamins, Hormones and Enzymes" by Brode. This is a useful summary, and on the whole the reviewer must accept the word of a leading authority on chemical spectroscopy. There is, however, on page 277, a figure exhibiting the absorption spectra of amino acids which could be misleading. In this figure the relative positions and extinction coefficients of the curves given for tyrosine and diiodotyrosine are almost the reverse of what they would be in the region of neutrality. The reason for this is that the curve for tyrosine represents the absorption of this amino acid in 0.1N NaOH and the curve for diiodotyrosine represents its absorption in 0.1N HCl. These facts should have been given either in the legend of the figure or in the text.

If the authors of the chapters that have just been mentioned never stray far from experimental data, this must be attributed to their own individual temperaments rather than to editorial censorship, for right next to the carefully pruned "Influence of Hormones on Enzymatic Reactions" is the luxuriant growth of "Biological Energy Transformations and the Cancer Problem." The author of the latter, V. R. Potter, is not intimidated in the least by the intricacies of biological energy transformations, and he shows that he knows his way about in this field, but in order to reach the cancer problem from this well-trodden field he has to pass through a maze consisting of nucleoproteins, the Rous tumor virus and other assorted odds and ends. In this maze he is not so sure-footed. It is supposed that the clue to the cancer problem lies in an understanding of the interrelationships between the tumor virus, the synthesis of nucleoproteins and the energy transformations of the cell. "The Chemical Formulation of Gene Structure and Gene Action" also has a decided speculative orientation. There is here much to arouse the interest of biochemists, who are only beginning to be aware of one of the greatest of biological problems. Much of Gulick's discussion of the chemical nature of the gene is unfortunately marred by an acceptance of certain theories of the constitution of proteins that already have been discredited.

When discussing problems of cancer and the gene it is at present exceedingly difficult to bring observation and theory into satisfactory relation to each other. In the two chapters yet to be considered the problems discussed are more amenable to satisfactory treatment. In "Gramicidin, Tyrocidine and Tyrothricin" Hotchkiss shows that, although these substances are, because of their toxicity, of quite limited value as therapeutic agents, an understanding of their chemical constitution and mode of action on living cells is of general interest. The observations concerning the effect of gramicidin on the phosphate-uptake of cells, for example, provides a novel insight into the problems of cellular metabolism. "Tyrosinase," by Nelson and Dawson, has been saved for the last simply because reading it gave the reviewer so much pleasure. Here is an intricate subject treated clearly and convincingly. There has been no lack of controversy in this field, and yet the authors succeed in giving fair treatment to the views of others, although they do not hesitate to consider the problem as a whole from their own point of view. A paper like this one on tyrosinase could be written only by authors who have worked in this field for many years and have discussed the subject with their students from every point of view. The reader of this account of their work is struck both by the fine achievement and by the promise of more to come. Two items that especially impressed the reviewer are: the evidence that one enzyme can be involved in two entirely different reactions; and the evidence that tyrosinase becomes inactivated by the process of enzymatic activity itself, rather than by any known products of the reaction it promotes.

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SPECIAL ARTICLES

NORMAL HUMAN STROMATA AS ANTIGENS FOR COMPLEMENT FIXATION IN THE SERA OF PATIENTS WITH RELAPSING VIVAX MALARIA[1, 2]

SEVERAL publications have dealt with the use, in tests for complement fixation in the sera of human patients with malaria, of antigens prepared from the blood of monkeys heavily infected with *Pl. knowlesi*[3] or from that of chickens heavily parasitized with *Pl. gallinaceum*.[4] Positive reactions were usually encountered only after several paroxysms in the first attack, persisted for some weeks or months, and occurred especially frequently after relapses. Kligler and Yoeli[4] noted, also, that sera of occasional malaria patients fixed complement with antigens prepared from normal chicken erythrocytes. It has now been found that such malarial sera as react with antigen from normal chicken stromata also fix complement more strongly with normal human stromata, and that many malarial sera which fail to react either with *gallinaceum* antigen or normal chicken stromata fix complement strongly with the normal human antigen. Although immunologically non-specific, this reaction appears reasonably disease-specific for malaria, with easily excluded exceptions such as noted below, for in tests on 32 normal and 81 pathological sera only 4 probable false positives were found among the latter.

[1] The work described in this paper was carried out under a contract recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and Columbia University. Filed with the Committee on June 1, 1944.

[2] From the Department of Medicine and Division of War Research, Columbia University, College of Physicians and Surgeons, and the Presbyterian Hospital, in the City of New York.

[3] M. D. Eaton and L. T. Coggeshall, 1939, through L. T. Coggeshall, A.A.A.S. Symposium on Human Malaria, Washington, 1941. A. D. Dulaney, W. K. Stratman-Thomas and O. S. Warr, *Jour. Infect. Dis.*, 70: 221, 1942.

[4] I. J. Kligler and M. Yoeli, *Am. Jour. Trop. Med.*, 21: 531, 1941.