

This is borne out in studies on isolated nuclear components by Mirsky, Pollister, and Ris, and in histochemical studies by Serra, Schultz, and Mazia, Daniel, Hayashi, and Yudowitch. The presence of the Stedmans at the symposium, and their discussion of nonhistone proteins in the chromosome, give hope that a long controversy is on its way toward resolution.

The role of NA and NP in the biology of bacteria is considered by Belozersky and by Chargaff. Boivin presents his results on the production of mutations in colon bacilli by specific desoxyribose-nucleic acids and proceeds to an interesting discussion concerning the purity of his preparations of NA. The effect of chemical mutagens on bacteria is discussed by Witkin.

The possible significance of NA and NP in the embryonic development of organisms receives consideration by Brachet and Thorell. These authors deal with the possible function of NP as organizer and the changes of NA content in differentiating tissues.

An important phase in the current investigation of NA and NP is their relation to virus reproduction and to the synthesis of proteins. This field is covered by Knight, Hyden, S. S. Cohen, and Spiegelman and Kamen. The papers of the last three authors deserve attention because of their objections to an oversimplified interpretation of the relation of NA content to protein synthesis in cells.

This volume has been a valuable aid to the reviewer in the course of his research on related topics—by the stimulating comparisons suggested in its widely different approaches, by its critical discussions, its reference lists, and its index. The subject selected for discussion and the high standard of contributions make this symposium a worthy continuation of the series. One is inclined to keep the volume near at hand at the laboratory. Swimming in the swift waters of present research on nucleoproteins, one may regard this book as an anchored raft on which to catch one's breath and gain enough distance from the currents to set one's own course.

HEINZ HERRMANN

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**Investigations of human requirements for B-complex vitamins.** Max K. Horwitt, Erich Liebert, Oscar Kreisler, and Phyllis Wittman. Washington, D. C.: National Research Council, 1948. Pp. v + 106. (Illustrated.) \$1.00.

Because it is costly and difficult to measure man's physiological needs with quantitative precision, few such measurements have been made. There are very few estimates of continuing needs through periods long enough to stabilize body storage at fixed levels. In the present study, which sets a record for length of observation, experimental subjects were kept under controlled conditions for three years.

Detailed studies are reported on 36 men, 21 of them old and 15 young, who were kept on diets containing graded amounts of thiamine and riboflavin. The results are not dramatic but they indicate that 400 micrograms of thiamine is below the minimal daily requirement of inactive men; that the aged are less resistant than the

young to restriction of B vitamins, although their optimal requirements do not appear higher; that a restricted intake of thiamine tends to intensify neurologic and psychiatric symptoms of the mentally infirm, but that a very liberal provision of B vitamins has no observable therapeutic value. A metabolic load test is described which promises to be useful clinically in the diagnosis of thiamine deficiency. It comprises mild exercise after oral glucose and immediate determination of lactic and pyruvic acids in the blood.

In epitome, the book reveals a careful, sober study whose value lies as much in its negative as in its positive findings. It illustrates both the possibilities and the difficulties of using the patients of mental hospitals for practical studies in nutrition. The authors, their sponsors, and the authorities of the Elgin State Hospital are to be congratulated for thoroughness and patience in an investigation requiring a high level of cooperation on the part of staff and subjects.

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**Experimental immunochemistry.** Elvin A. Kabat and Manfred M. Mayer. Springfield, Ill.: Charles C. Thomas, 1948. Pp. xv + 567. (Illustrated.) \$8.75.

This book fills a particular need long felt by many workers not privileged to mature in the laboratories in which the science of immunochemistry was being molded. Drs. Kabat and Mayer, as students of Professor Heidelberger, have been instrumental in the development of this subject. The present book contains, "for the first time, in one place, the scattered techniques which have been developed to fill the needs of immunochemical problems."

In the first part we have the methodology of the antigen-antibody reactions. Here the quantitative immunochemical principles and methods are very clearly expounded and illustrated so that the student can apply these principles by analyzing for himself some of the numerous tables and graphs that have been compiled from the voluminous source literature. The book also serves as a laboratory manual with its many detailed procedures. Hence, from this section alone the book is an excellent accompaniment to an advanced laboratory course in the subject. Part II gives various applications and uses of the quantitative methods, such as assaying serological reagents and using quantitative methods in studying problems of homogeneity and cross reaction. Part III gives instruction in the special methods ranging from Kjeldahl nitrogen and phosphorus estimations to the more specialized physical biochemistry methodology. Part IV is a compendium of what might be termed "immunochemical preparations," giving methods for preparing substances of altered specificities, such as phosphorylated proteins, serum proteins and their fractionation, and various types of bacterial antigens. An appendix deals with the usual problems of bleedings, animal injections, glassware calibration, buffers, spectrophotometry, etc.

*Experimental immunochemistry* should be, therefore, of considerable value to those who work in the basic fields of preparative biochemistry and microbial metabolism

and who are concerned with problems of "purity" and homogeneity of substances. Every section concludes with an ample bibliography, so that the book serves as an excellent guide to the basic literature of immunochemistry.

With due respect to the present controversy over the terms serology, immunochemistry, and immunology, *Experimental immunochemistry* by Drs. Kabat and Mayer is a book every worker in these fields should have.

SANFORD S. ELBERG

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***The hormones: physiology, chemistry and applications.*** (Vol. 1.) Gregory Pincus and Kenneth V. Thimann. (Eds.) New York: Academic Press, 1948. Pp. xi + 886. (Illustrated.) \$13.50.

*The hormones* is a work designed for the serious student of general biochemistry and physiology. This volume and its forthcoming companion are intended to provide a well-organized and critical description of the chemistry, physiology, and applications of the hormones.

We are in this book treated to a "stock-taking," by experts in their respective studies, of the hormones of plants, insects, and invertebrates. There are excellent discussions of the parathyroid and the gastrointestinal hormones, a somewhat less thoroughgoing treatment of the pancreas, and a very good chapter on the recognized hormones of the anterior pituitary. More than 300 of the nearly 800 pages of text are occupied by accounts of the chemistry and metabolism of the various steroid hormones. (The biology of these hormones, as well as those of the pituitary, will be treated in Volume II.)

Two final chapters, by Folley and Malpress, furnish a most competent guide to the labyrinthine ways of mammary gland development and the control of lactation. From the book as a whole and these last chapters in particular, two essentials to rapid progress in endocrinology are made clear. The first is the need for developing accurate and specific methods of assay. The second is the need for pure hormones in amounts adequate for detailed and extensive study. On the whole, this volume sets a high standard and fulfills its purpose. It is well printed and illustrated, and thoroughly indexed, and its 3,441 references will be invaluable to the student. The editors are to be congratulated both upon their selection of contributors and upon the realization of a needed, useful work.

JANE A. RUSSELL and ALFRED E. WILHELMI

*Yale University*

***The chemistry of penicillin.*** Hans T. Clarke, John R. Johnson, and Sir Robert Robinson. (Editorial Board.) Princeton, N. J.: Princeton Univ. Press; London: Geoffrey Cumberlege, Oxford Univ. Press, 1949. Pp. x + 1094. (Illustrated.) \$36.00.

This book records in detail the results of experimental and theoretical studies carried out by a group of American and

British chemists, under the joint sponsorship of the U. S. Office of Scientific Research and Development and the Medical Research Council, London, to determine the chemical constitution and structure of penicillin and to devise synthetic methods for its production. The material published was compiled under the auspices of the National Academy of Sciences, Washington, D. C., under contract with the OSRD and is presented under the following 29 chapters: Brief History of the Chemical Study of Penicillin, by Hans T. Clarke, John R. Johnson, and Robert Robinson; The Earlier Investigations relating to 2-Pentenylpenicillin, by E. P. Abraham, W. Baker, W. R. Boon, C. T. Calam, H. C. Carrington, E. Chain, H. W. Florey, G. G. Freeman, R. Robinson, and A. G. Sanders; The Chemistry of n-Amylpenicillin up to December 1943, by A. H. Cook, and I. M. Heilbron; Status of the Research on the Structure of Benzylpenicillin in December 1943, by Robert L. Peck, and Karl Folkers; Isolation and Characterization of the Various Penicillins, by O. Wintersteiner, W. R. Boon, H. C. Carrington, D. W. MacCorquodale, F. H. Stodola, J. L. Wachtel, R. D. Coghill, W. C. Risser, J. E. Philip, and O. Touster; Penillic Acids and Penillamines, by A. H. Cook; Review of Certain Investigations on the Structure of Benzylpenicillin during 1944-1945, by Robert L. Peck, and Karl Folkers; Some Inactivation and Degradation Reactions of Penicillin, by O. Wintersteiner, H. E. Stavely, J. D. Dutcher, and M. S. Spielman; Desthiobenzylpenicillin and Other Hydrogenolysis Products of Benzylpenicillin, by Edward Kaczka, and Karl Folkers; The Thiocyanate Derivative of Benzylpenicillin Methyl Ester, by Vincent du Vigneaud, and Donald B. Melville; The X-Ray Crystallographic Investigation of the Structure of Penicillin, by D. Crowfoot, C. W. Bunn, B. W. Rogers-Low, and A. Turner-Jones; Identification and Crystallography of Penicillins and Related Compounds by X-Ray Diffraction Methods, by G. L. Clark, W. I. Kaye, K. J. Pipenberg, and N. C. Schieltz; Infrared Spectroscopic Studies on the Structure of Penicillin, by H. W. Thompson, R. R. Brattain, H. M. Randall, and R. S. Rasmussen; Other Physical Methods, by R. B. Woodward, A. Neuburger, and N. R. Trenner; The Constitution of Penicillins, by John R. Johnson, Robert B. Woodward, and Robert Robinson; Penicillamine, Its Analogs and Homologs, by Harry M. Crooks; Penilloaldehydes and Penaldic Acids, by Ellis V. Brown; The Penilloic and Penilloic Acids and Their Derivatives and Analogs, by Ralph Mozingo, and Karl Folkers; Biosynthesis of Penicillins, by Otto K. Behrens; Chemical Modifications of Natural Penicillins, by R. D. Coghill, F. H. Stodola, and J. L. Wachtel; Oxazoles and Oxazolones, by J. W. Cornforth; Attempted Syntheses of Penicillins, by W. E. Bachmann, and M. W. Cronyn; The Condensation of Oxazolones and D-Penicillamine and the Resultant Antibiotic Activity, by V. du Vigneaud, J. L. Wood, and M. E. Wright; Methyl Benzylpseudopenicillinate, by J. H. Hunter, J. W. Hinman, and H. E. Carter; Thiazolidines, by A. H. Cook, and I. M. Heilbron; The Chemistry of  $\beta$ -Lactams, by S. A. Ballard, D. S. Melstrom, and C. W. Smith; The  $\gamma$ -Lactam of Benzylhomopenicilloic Acid and Related Compounds, by Vincent du Vigneaud and Frederick H. Carpenter; Synthetic Benzylpenicillin, by Vincent du Vigneaud, Frederick H. Carpenter, Robert W. Holley, Arthur H. Livermore, and Julian R. Rachele; Assay of Penicillins, by John V. Scudi, and H. B. Woodruff. There is also an appendix and an index.

During the past three years chemists have looked forward with great expectation to the appearance of this monograph, in which for the first time there would be presented in its entirety a description of the work connected with one of the important war projects, namely, the determination of the structure of the antibiotic peni-