Glock has summarized the data on pentoses. She has included a number of helpful metabolic "maps." The difficult work in the field of purine and pyrimidine biosynthesis has been covered by Peter Reichard. The reader is aided considerably in understanding the means by which assignments of the metabolic origin of the atoms of these compounds were made through the inclusion of numerous charts of the degradation methods employed. The next chapter by Fritz Schlenk covers not only the biosynthetic pathways for nucleosides and nucleotides but includes a discussion of the hydrolases as well. The literature is reviewed critically and the important point of the biological origin of the enzymatic preparations is consistently noted.

Brown and Roll have written a superb chapter in which the biochemical literature on the biosynthesis of the nucleic acids is organized on a framework of the biological aspects of these compounds. The detailed numerical data have been pulled together into a single table. These authors are to be commended for the cohesive narrative style in which they review and discuss this involved and rapidly developing area. In the succeeding chapter, Smellie has reviewed the more physiological aspects of nucleic acid metabolism and catabolism. The catabolism of the nitrogenous portions of the nucleic acids is covered in more detail in this chapter than it is in other places in the volume. The literature on the incorporation of phosphorus-32 is usefully summarized in three carefully prepared tables.

The final two chapters are indeed a fitting conclusion to the two volumes. In the first of these, the biological activities of DNA are discussed in an elegant manner by Rollin Hotchkiss. Nowhere have I read a more concise summary of this aspect of DNA than that which concludes this chapter. Brachet wrote the final chapter; he reviews the rapidly growing body of evidence for the role of pentose nucleic acid in protein synthesis, morphogenesis, and plant viruses. Many pieces of evidence are pulled together to evaluate each of the principal hypotheses on these topics. A lengthy addendum brings the reader up to the exciting present.

The documentation of the chapters in this volume is impressive, both with regard to the recency and number of references. One-half to three-quarters of the references are dated 1950 or later. Many references are from 1954. There are from 100 to 300 references per chapter. Relatively few errors were found. There is considerable overlap of subject matter between a number of the chapters, with resultant overlap in references. Few cross references by page are employed.

This volume alone represents a unique work in its field. The two volumes together form an indispensable reference unit; but they are more than that, for they carry the added value of critical consideration and discussion by many leaders in this important field.

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Principles of Animal Virology. F. M. Burnet. Academic Press, New York, 1955. x + 486 pp. $10.

Burnet's book is certain to be read by a wide group of people who will seek to be informed about those aspects of the subject in which they have interest, but not highly specialized knowledge. I do not believe that they will be disappointed or misled. The book is a very ambitious one in that it seeks to interpret a tremendous range of experimental observations. Burnet is well fitted for this task, for he is a lucid, finished writer with laboratory background, and he has previously carried out some successful smaller operations of this general character. As might be expected, the most stimulating chapters deal with subjects in which the author had vital personal experiences. This applies particularly to those concerned with immune mechanisms, virus variation, and epidemiology. These will provide fascinating reading to those unfamiliar with this field; in addition, they will also be of interest to anyone who attempts to follow the forming outlines in this jigsaw puzzle.

Specialists are bound to carp about points of interpretation relative to their own subjects but probably should not be taken too seriously. However, Burnet is no tyro in the field of poliomyelitis (which is my major interest), so it seems fair to criticize him here. I found the topics chosen for presentation germane but their development occasionally cloudy. For example, it is quite permissible to call attention to the difficulties of understanding poliomyelitis as a disease caused by an exclusively neurotropic virus, but to say that axonal transmission of this virus is a "hypothesis" blurs the subsequent discussion, since it indicates a lack of clear understanding of the many observations on this subject. There were times, also, when I sighed over the omission of some reference to work which to me has seemed important in the development of thinking in this field. One, in particular, was the failure, in the table that details *the* important animal passage experiments, to mention the adaptation of poliomyelitis virus to rodents by Armstrong in 1939. This discovery furnished a technique that during the succeeding 10 years made it possible to lay the groundwork for current successes in immunization with inactivated vaccines.

These criticisms need not imply serious faults in the book, but they indicate rather that one should not expect everything. Omissions are inevitable and one great asset of single authorship is a kind of continuity which is missing from the symposium-type books now so numerous in this field. I found that nearly every chapter gave me a good idea. This, I think, achieves the primary aim of the book—to stimulate. The bibliography is also reasonably extensive and should be an invitation to those who would go further.

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Stuttering in Children and Adults. Thirty years of research at the University of Iowa. Wendell Johnson, Ed., assisted by Ralph R. Leutenegger. Univ. of Minnesota Press, Minneapolis, 1955. xviii + 472 pp. $5.

For a long time there has been a need in the field of speech pathology for a book devoted entirely to researches in the age-old problem of stuttering. Stutterers constitute one of the largest groups of handicapped people in the world. It is estimated that there are 15 million persons who stutter.

This new book contains 43 papers that have resulted from the research program at the State University of Iowa during the last 30 years. Many heretofore unpublished studies are also included.

A great deal of the work centers on the onset of stuttering in children and proposes the theory that the defect begins with the parent rather than with the child. The authors advance the view that stuttering is what the talker does in trying to keep from stuttering again. In other words, Johnson believes that stuttering is a conditioned response resulting from an anxiety to avoid stuttering.

Many of the studies reviewed in this volume deal with interpersonal relationships between personality and stuttering, conditions affecting the severity, variations in the amount of stuttering, and approaches to stuttering therapy.

Part VII is a review of several studies that were formerly available only at the University of Iowa library.

The styling of the volume is excellent. Proper credit and appreciation are given to all the graduate students whose academic labors are so well documented.

I am of the opinion that the total research picture of the Iowa Speech Pathology Laboratories, in order to be complete, should include detailed accounts of

the studies done in the 1920's under the supervision of Samuel Orton and Lee Travis. However, there is a fairly complete bibliographic listing of the many pioneer studies made in the Iowa laboratories during the decade prior to 1931.

Despite the fact that the recorded researches bend in the direction of one point of view, namely a semantogenic interpretation of the problem of stuttering, one cannot help being awed by the number and versatility of the attacks manifested in the diligent labors of the many students who participated in the University of Iowa research program.

The book can well be adapted to courses in "stuttering" now offered by many colleges and universities in this country and abroad.

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Origins of Resistance to Toxic Agents. A symposium. M. G. Sevag, R. D. Reid, and O. E. Reynolds, Eds. Academic Press, New York, 1955. xv + 471 pp. $12.

This is a remarkable book in that it seems to be lacking in any unifying principle. The papers are connected in a tenuous way by certain key words such as *drug,* in "drug resistance," "drug tolerance," and "drug addiction," and *resistance* in "microbicide resistance," "herbicide resistance," "insecticide resistance," and "resistance to infection." Although the ostensible purpose of the book is to demonstrate that the development of resistance to toxic agents has some common mechanism, regardless of the toxic agent or the organism involved, it actually demonstrates only that the English language is a remarkably flexible device for conducting arguments. Both the papers and the discussions furnish abundant evidence that even well-defined technical words such as *mutation* and *gene* have different meanings for different people.

This book is a continuation of a long-standing dispute regarding the nature and causation of so-called "adaptive modifications" in the properties of microorganisms. The dispute has its basis partly in semantics and partly in strongly held opinions with an intuitive, rather than a logical, foundation. Until these difficulties are resolved, symposia on this topic are unlikely to be useful. The present symposium resembles a major propaganda campaign rather than a serious scientific meeting. Although the book contains a number of excellent and interesting papers, the over-all effect on the reader is distinctly unpleasant. The first section on "Resistance to microbicides" is a repetition of the arguments presented at the Third Symposium of the Society for General Microbiology in 1953. It simply demonstrates that symposia are not effective in changing opinions. The remaining sections are devoted to herbicides and insecticides, drug and alcohol addiction, various aspects of cancer, and summaries.

An unusual paper by C. P. Martin on "Theories on evolution" deserves comment. The author, who confesses to being an anatomist, discards as untenable the work of all major theorists in the field of evolution from Darwin to Dobzhansky, Mayr and Simpson. The quality of his arguments may be judged by the following quotation: "All the evidence available to us indicates that mutation is a pathological process. All known mutations depress viability and/or fertility to some extent. The existence of a truly favorable mutation is unknown." These statements are incompatible with the evidence presented elsewhere in this volume that acquisition of resistance to chemotherapy is a major clinical problem in the treatment of infectious disease.

A peculiar feature of the book is a number of footnotes that the editor, Sevag, has gratuitously scattered through the volume. On page 93 Sevag and Lam have introduced into the discussion a brief report dealing with replica plating. This report was not presented at the original symposium and the other contributors were not given an opportunity to criticize it. The essence of the report, according to Sevag, is "that results obtained with replica plate test do not offer any proof in regard to the spontaneous origin of drug-resistant mutants. On the contrary, the data strongly support the conclusion that resistance was induced by streptomycin action." Actually the report of Sevag and Lam demonstrates only that these authors failed to comprehend either the experimental or theoretical basis for the replica plate technique of Lederberg and Lederberg. However, Sevag felt that he had destroyed the validity of evidence based on this technique, because footnotes to this effect appear on pages 89, 91, 93, 346, 423, 428 and 429. Also, on page 426 Sevag has added to a discussion by Werner Braun the rather ambiguous footnote "This premise is no longer generally valid. Editors." It seems to me that this is taking unfair advantage of editorial prerogatives.

The longest paper in the book is by Sevag and bears the intriguing title "Protein molecule resistance to microbicides, mutations, and related problems" [*sic*]. It is impossible in a short review to discuss all the remarkable statements that appear in this paper; however, one sentence is quoted in its entirety without comment. In discussing the effect of sulfathiazole on the utilization of tryptophan by staphylococci, Sevag states "It must be noted that, though in the absence of sulfathiazole only 42 percent of the utilized tryptophan cannot be accounted for, in the presence of sulfathiazole this value increased to 259 percent."

The book seems overpriced at $12.

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Index XIII to the Literature of American Economic Entomology, 1953. Special Publ. 13. Compiled by Ina L. Hawes. Entomological Society of America, Washington, 1955. 303 pp. $3.

This book is the latest issue of the well-known bibliographical series, the origin and scope and earlier volumes of which have had previous notice in *Science* [**120,** 978 (1954)]. It will be welcomed both in entomological research and in control operations for the reason that it now completes and brings down to date an exceedingly useful reference work that reaches back for 95 years and covers American economic literature from 1860 down to the present time. It will be remembered that it was the urgency of the need for a work of this kind that prompted the beginning of the compilation by B. Pickman Mann and Samuel Henshaw and its continuation by Nathan Banks. The original compilation consisted of 8 volumes and covered the years 1860 to 1905 and was published under authorization of the Congress.

The 13 volumes subsequent to that period have been prepared by Nathan Banks, Mabel Colcord, and Ina L. Hawes, who have been assisted at various times by other interested workers. Beginning with *Index VII,* it became necessary to enlarge the geographical scope of the series to comprise continental North America, including Canada, Alaska, Mexico, the Canal Zone, Cuba, Puerto Rico, Hawaii, and certain other Pacific islands, particularly those that played a part in World War II.

This index covers in minute detail a field of research not fully or adequately covered elsewhere; therefore it would be a matter of difficulty to attempt to evaluate its great, outstanding usefulness to the research workers within the scope of its subject matter. This would be particularly true with regard to keeping up with the most recent periodical literature dealing with up-to-the-minute work on such subjects as the newer insecticides, the latest approved methods for their application, or, perhaps, on the latest results obtained from tests of new compounds,