

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 pre-

sented 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 sul-

fathiazole 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,

and the like. Indeed, so rapid have been developments along some of these lines that it becomes of deep interest merely to note from one of these something of the extent to which investigation has been broadened from volume to volume in the use of new words that represent names of new compounds, new subject headings, and new types of equipment—additions to the vocabulary that represent definite milestones in the advancement of our knowledge. On the whole, this book represents an exceedingly helpful addition to a series that makes more readily available the literature on control of our insect enemies—enemies that are of sufficient importance that they affect vitally the geographical distribution, the food supply, and the health and general welfare of millions of human beings all over the world.

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**The Metallurgy of Zirconium.** Benjamin Lustman and Frank Kerze, Jr., Eds. McGraw-Hill, New York, 1955. xviii + 776 pp. \$10.

Although much has been written about elemental zirconium over the years, one would be led to the belief that it has had wide usage in nonnuclear associated applications. Actually, the only tonnage use of zirconium that has materialized is a consequence of the U.S. Atomic Energy Commission's drive for low-hafnium zirconium as a cladding for fuel elements.

In view of the foregoing, it is refreshing that the first chapter of this book deals with zirconium in its nuclear reactor applications and that the matter of minerals containing the element, reserves and potential reserves, is not presented first as is so customary. Although some of the information contained in the book has been published, it is extremely helpful to get all of the available information between one set of covers, particularly since the authors carefully cross-checked references of the Technical Information Service, which sometimes are not covered completely. Because of this comprehensive coverage, not only are Lustman and Kerze to be complimented, but the contributing authors should be recognized as having done a very good job.

There is no intent whatsoever to detract from the great contributions made by Kroll. However, it is an error to credit him with an entire process from zircon through low-hafnium ingot, as is done on page 71. This does not do proper justice to the very important and excellent work done by the personnel of the Y-12 plant on the zirconium-hafnium separation process, and it is hoped that in future

editions a bit more editorial care will be exercised on this rather minor matter.

Although there is much more to be found out about the metal zirconium and its alloys, there is reason to believe that this book represents a job so well done that it will serve as a bible for those who have to plan in this area.

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## New Books

*Human Relations in Interracial Housing.* A study of the contact hypothesis. Daniel M. Wilner, Rosabelle Price Walkley, and Stuart W. Cook. Univ. of Minnesota Press, Minneapolis, 1955. 167 pp. \$4.

*Mass-Transfer Operations.* Robert E. Treybal. McGraw-Hill, New York, 1955. 666 pp. \$9.50.

*Glossary of Packaging Terms.* Standard definitions of trade terms commonly used in packaging. Packaging Inst., New York 17, ed. 2, 1955. 323 pp. \$6.75.

*Stories of Scientific Imagination.* Joseph Gallant, Ed. Oxford, New York 3, 1954. 152 pp. Paper, \$0.50; cloth, \$0.85.

*Essays in Today's Science.* Joseph Gallant, Ed. Oxford, New York, 1955. 150 pp. Paper, \$0.50; cloth, \$0.85.

*Principles and Problems in Energetics.* J. N. Brønsted. Trans. by R. P. Bell. Interscience, New York-London, 1955. 119 pp. \$3.50.

*Structural Geology for Petroleum Geologists.* William L. Russell. McGraw-Hill, New York, 1955. 427 pp. \$7.50.

*Progress in Organic Chemistry.* vol. 3. J. W. Cook, Ed. Academic Press, New York; Butterworths, London, 1955. 273 pp. \$7.80.

*Cellulose and Cellulose Derivatives.* pt. III. Emil Ott, Harold M. Spurlin, and Mildred W. Grafflin, Eds. Interscience, New York-London, revised and augmented ed. 2, 1955. 543 pp. \$12.

*Hochvakuum-Elektronenröhren.* vol. 1, *Physikalische Grundlagen.* Akademische, Frankfurt, 1955 (Order from Academic Press, New York). 297 pp. \$8.33.

*Hand Surgery in World War II.* Sterling Bunnell, Ed. Office of the Surgeon General, Dept. of the Army, Washington, D.C., 1955 (Order from Supt. of Documents, GPO, Washington, 25). 447 pp. \$3.75.

*Faune de France.* vol. 59, pt. 2, *Coléoptères Curculionides.* Adolphe Hoffmann. Lechevalier, Paris, 1954. 722 pp. F. 6000.

*Experimental Design.* Theory and application. Walter T. Federer. Macmillan, New York, 1955. 583 pp. \$11.

*Bone: An Introduction to the Physiology of Skeletal Tissue.* Franklin C. McLean and Marshall R. Urist. Univ. of Chicago Press, Chicago, 1955. 182 pp. \$6.

*The Mathematical Analysis of Electrical and Optical Wave-Motion on the Basis of Maxwell's Equations.* H. Bateman. Dover, New York (unabridged and unaltered republication of ed. 1, 1914), 1955. 159 pp. \$1.60.

*Die Physik der Hochpolymeren.* vol. 3, *Ordnungszustände und Umwandlungerscheinungen in Festen Hochpolymeren Stoffen.* H. A. Stuart, Ed. Springer, Berlin, 1955. 693 pp.

*Partial Differential Equations of Mathematical Physics.* Arthur Gordon Webster. Samuel J. Plimpton, Ed. Dover, New York (unabridged and unaltered republication of ed. 2, 1933), ed. 2, 1955. 440 pp. Paper, \$1.98.

*The Common Sense of the Exact Sciences.* William Kingdon Clifford. Edited and with a preface by Karl Pearson. Newly edited with an introduction by James R. Newman. Dover, New York (unabridged and unaltered republication of the Knopf, ed., 1946), 1955. 249 pp. Paper, \$1.60.

*Matter and Light: The New Physics.* A survey of the contributions of Heisenberg, Compton, Einstein, Fermi, Bohr, Dirac, Planck, etc. Louis de Broglie. Trans. by W. H. Johnston. Dover, New York (original ed., *Matère et Lumière*, 1937; English ed. 1, Norton, New York, 1939), 1955. 300 pp. Paper, \$1.60.

*The Windward Road.* Adventures of a naturalist on remote Caribbean shores. Archie Carr. Knopf, New York, 1956. 258 pp. \$4.50.

*Man and the Winds.* E. Aubert de la Rue. Trans. by Madge E. Thompson. Philosophical Library, New York, 1955. 206 pp. \$6.

*The Republic of Indonesia.* Dorothy Woodman. Philosophical Library, New York, 1955. 444 pp. \$6.

*The Secret of the Hittites.* The discovery of an ancient empire. C. W. Ceram. Trans. by Richard and Clara Winston. Knopf, New York, American ed. 1, 1956. \$5.

*Annual Review of Nuclear Science.* vol. 5. James G. Beckerley, Ed. Annual Reviews, Stanford, Calif., 1955. 448 pp. \$7.

*Celebrated American Caves.* Charles E. Mohr and Howard N. Sloane. Rutgers Univ. Press, New Brunswick, N.J., 1955. 339 pp. \$5.

*The North American Midwest.* A regional geography. John H. Garland, Ed. Wiley, New York; Chapman & Hall, London, 1955. 252 pp. \$3.

*Atlas of Paleogeographic Maps of North America.* Charles Schuchert. Wiley, New York; Chapman & Hall, London, 1955. 177 pp. \$4.75.

*Chemistry and Human Health.* Burnham S. Walker, Isaac Asimov, and M. Kolaya Nicholas. Blakiston Div., McGraw-Hill, New York, 1956. 445 pp. \$5.75.

*Dictionary of American Maxims.* David Kin, Ed.; introduction by J. Donald Adams. Philosophical Library, New York, 1955. 597 pp. \$7.50.

*Advances in Virus Research.* vol. III. Kenneth M. Smith and Max A. Lauffer. Academic Press, New York, 1955. 339 pp. \$8.

*Famous Problems and Other Monographs: Famous Problems of Elementary Geometry,* F. Klein; *From Determinant to Tensor,* W. F. Sheppard; *Introduction to Combinatory Analysis,* P. A. MacMahon; and *Three Lectures on Fermat's Last Theorem,* L. J. Mordell. Chelsea, New York, 1955. 322 pp. \$3.25.