

mination from a Lissajous figure. The table of symbols furnished shows only minor variations from nomenclature common in this country. The index appears to be complete. It should be noted that all units are in the cgs system.

The author has achieved his objective in a workman-like manner, considering the space used, 296 pages. The discussions are clear, the numerous diagrams are well executed, and the mathematics used is well within the grasp of anyone who has had a college course in calculus.

For the engineer or plant executive who wishes to gain familiarity with the general field of vibrations, this is an excellent first book. For the serious worker in the field or for the prospective teacher of a college-level course in vibrations, the treatment would have to be amplified by material from other sources, since much of the treatment is descriptive rather than analytic. In general, it is a review of many aspects of the field rather than a textbook on the subject.

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**Condensed Pyridazine and Pyrazine Rings.** Cinnolines, Phthalazines, and Quinoxalines. J. C. E. Simpson. Interscience, New York-London, 1953. xvi + 394 pp. Illus. \$12.50.

The advancement of science is highly dependent on the accurate classification of scientific data. Accordingly, much appreciation should be felt for the accomplishments of those who labor at the often unrewarding task of gathering and classifying chemical knowledge.

This book is the fifth volume published in a series of monographs devoted to the field of heterocyclic chemistry. It is indeed lamentable that the capable author of this work passed away before publication time. Simpson died on 7 Feb. 1952, at a time when his manuscript was being set in type.

Dealing with the chemistry of condensed pyridazine and pyrazine rings, the subject matter of the book is divided into three distinct parts: cinnolines, phthalazines (both formed by fusion of pyridazine and aromatic rings), and quinoxalines (formed by the fusion of pyrazine and aromatic rings). As stated by the author

... this book has been written with the objective of ensuring continuity with, and expansion from, Meyer-Jacobson's *Lehrbuch der organischen Chemie*, Volume II, 3, and in order to avoid the creation of possible gaps the literature has been fully covered from 1917 up to the end of 1948. Adequate reference is also made to the 1949 literature, and in many instances details of compounds there described have been included in the tables.

In all, 9, 14, and 16 chapters are devoted to cinnolines, phthalazines, and quinoxalines, respectively. Where adequate information is to be found in the literature, the subject matter of each chapter is or-

ganized in sections devoted to methods of preparation, properties, and reactions. Much of the material is presented in convenient tables listing for each compound: preparation, melting point, general remarks of chemical and physical character, and references to the original literature. Appendixes give data on the ultraviolet absorption spectra, basic strengths, and antibacterial-parasitocidal activities of various compounds.

The text is well prepared and the binding is excellent. As a reference, the book should be welcomed by all who are interested in the complex and difficult field of heterocyclic organic chemistry.

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**Annual Review of Nuclear Science**, vol. 3. James G. Beckerley *et al.*, Eds. Annual Reviews, Stanford, Calif., 1953. 412 pp. Illus. \$7.

Probably no one, certainly not the undersigned, can claim honestly and critically to review this book. The subjects of three full-page charts will make the reason clear: one shows the cross section for photoproduction of pi mesons from protons, over the whole energy range, including the quasi resonance at around 300 Mev; one, the time-scale for events in radiation chemistry, from the molecular transit of a fast primary electron to the reaction time of free radicals in water; and the third, the frequency of production of specific abnormalities in the development of mice, as a function of the amount and timing of the x-ray dose to the embryo. Nuclear science is broadly seen by the editors!

The editors and publishers deserve high praise for the production of such a volume of expert essays, with a good index and a set of more than 2000 references, in a time of only some 7 months between the latest citations and general availability of the book—moreover, one in serviceable letterpress typography.

One can group the 15 articles into three or four broad categories. Two authoritative articles, surprisingly up to date in such a volatile field, deal with "fundamental particle physics." Three Columbia experts present a succinct résumé of theory and experiment in the area of pion-nucleon interaction, and Leprince-Ringuet summarizes the situation of the "strange particles" of cosmic rays, as of late last summer (including the new nomenclature). Both of these pieces, particularly the first, can be highly recommended to students.

Three pieces concern themselves with nuclear physics of the more or less "classical" kind. Corson and Hanson review the interactions of photons and electrons, especially at energies from 10 or 20 Mev up. Hughes recounts the subtle and powerful technique of neutron optics and presents a useful up to date summary of coherent amplitudes for just about 100 nuclear targets. Wattenberg tells how neutron measurements have been made absolute, to a precision of about 4 percent.