gether with numerous physical properties, such as solubilities, melting and boiling points, phase systems, crystal lattices, crystal habits and numerous others. Questions of the relative importance of these elements and their fluorides have not been neglected, and the presentation is well illustrated by numerous tables, phase diagrams, mechanisms and similar material. The data are presented in a clear and orderly manner, the coverage would appear to be good, and the documentation is very satisfactory.

The last chapter by Saunders on the physiological action of fluorine and its compounds begins with a discussion of the toxic properties of elemental fluorine, hydrogen fluoride and the fluoride ion. Acute and chronic poisoning by sodium fluoride, as well as the highly controversial question of the fluoridation of drinking water supplies to aid in the control of dental caries, have been discussed at some length. Following this, the preparation, structures and physiological properties of the various alkoxy- and alkylamino phosphorofluoridates containing the P–F link are described. The powerful effects of some of these compounds upon the autonomic, voluntary and central nervous systems in animals and humans are elucidated. This is followed by a description of the occurrence of salts of fluoroacetic acid in certain plants which are very toxic to animals. It is believed that this acid substitutes for acetic acid in the well-known Krebs cycle, which accounts well for this toxicity. It is also found that only the alternating members of the homologous series of ω-fluorocarboxylic acids, which can yield fluoroacetic acid by β-oxidation, are toxic. This furnishes good support for the accepted theory of β-oxidation in the animal organism. Some mention is also made of the toxicities of certain fluorinated hydrocarbons. Finally, the author expresses his hope that in the future at least, toxicity studies may be conducted, not to take, but rather to save lives.

In sum, this highly technical volume, which has little central theme, may be aptly described as all meat, to be read and appreciated chiefly, it is presumed, by those who can assimilate this kind of intellectual diet with equanimity and profit. In the reading it should be remembered that certain of the areas involved are advancing so rapidly as to make it well nigh impossible for any book of this kind to be completely up-to-date. On the other hand, this work constitutes a mine of information, gathered from widely scattered sources, which has been condensed into a reasonable space, on the whole clearly presented and carefully evaluated. The material is also very well documented with no less than 675 references to the original literature. For these good reasons, this book is well recommended for the reference shelf of every fluorine chemist.

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Heterocyclic Compounds. Volume 7. Polycyclic Compounds Containing Two Hetero Atoms in Different Rings. Five- and Six-Membered Heterocycles Containing Three Hetero Atoms and Their Benzo Derivatives. Edited by ROBERT C. ELDERFIELD, University of Michigan. John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1961. vii + 878 pp. 15.5 × 23.5 cm. Price, $37.50.

This volume of the Elderfield Heterocyclic Compounds series starts with an excellent chapter on compounds with two heteroöxygen atoms in different rings by W. Basil Whalley. Since this subject has not been reviewed previously, the author has treated in a comprehensive manner the degradation and synthesis of both the naturally occurring and synthetic members of this class. This chapter is well worth investing the time required to read its 197 pages. The naphthyridines are treated briefly in a chapter by M. J. Weiss and C. R. Hauser. The carbolines and phenanthrolines are discussed by W. O. Kermack and J. E. McKail. These two chapters were originally submitted in 1950 and were brought up to date by the Editor to include the major English and German language periodicals through 1959 and partially into 1960. Excellent chapters on the triazoles and oxadiazoles were contributed by J. H. Boyer. The chapter on thiadiazoles was written by W. R. Sherman, and the chapter on *s*-triazines by E. J. Modest. A very nice chapter on the 1,2,4- and 1,2,3-triazines was contributed by J. P. Horowitz and one on oxadiazines and thiadiazines by G. W. Stacy.

This volume, in common with the previous volumes of this series, provides an excellent introduction to the chemistry of the classes of heterocycles treated. In certain instances, such as the contribution of W. Basil Whalley, the class of compounds has not been reviewed or has undergone much development since its last review, and the article is very valuable. In certain other cases review articles, and in fact entire comprehensive books, have been published recently on the topics treated here. Although it is often valuable to have on hand several reviews of the same material treated from different points of view, it is unfortunate that the Editor could not omit these in order to try to lower the high price of the book.

The Editor and the authors deserve to be congratulated on the excellence of the book they have produced. The articles in general appear to be authoritative and up-to-date. They are clearly written, although, in a few instances, more liberal use of numbered structural formulas would have aided comprehension. I feel sure that this volume will take its place along with its predecessors as one of the first places one looks when a problem in heterocyclic chemistry arises.

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