

cluded. The second part deals with a description of phases (solid, liquid, and vapor) and their interactions. The theory regarding the approach to equilibrium condition in both elements and compounds, and with both native and foreign atoms, is outlined in some detail and presented in graphic form. Several chapters present experimental results from the literature on defect crystals of compounds, relating Hall effect, conductivity, optical properties, and self-diffusion to the chemistry and past treatment of the specimen. A detailed comparison of theory and experimental results is discussed, with particular emphasis on PbS, alkali halides, BaO, and Cu₂O. Special cases of cation disorder-order relations in compounds such as spinels and doped ice are considered, and an excellent chapter on relaxation deals with the kinetics of precipitation and diffusion.

The final part (five chapters) is concerned with chemical and physical effects of point defects. Sintering, oxidation rates, the photographic process, the electrochemistry of cells of imperfect crystals, and phase transitions are the principal applications discussed.

Dislocations and their effect on chemical or physical properties are only briefly mentioned; reference is made several times to a companion book, *Imperfection in Crystals*, written by the author's colleague, H. G. van Bueren (Philips Research Laboratory, Eindhoven). With the exception of the first chapters, there is little discussion of experimental problems or instrumentation; however, the copious references (including some papers published in 1962) will lead the reader to such information.

This book is characterized by the unity that can be attained when one author treats a subject rather than by the disorder that one so frequently encounters in "edited" volumes produced by several contributors. This work should become a standard textbook for advanced solid-state courses, and it should be widely used by ceramists engaged in basic studies, particularly about phase theory, sintering, oxidation, and electrical properties. Although it is priced rather high, it is well bound, printed on excellent paper, contains excellent author and subject indexes, and does cover a tremendous amount of material.

H. F. McMURDIE

National Bureau of Standards,
Washington, D.C.

Zoology

Molluscs. J. E. Morton. Hutchinson University Library, London; Hillary House, New York, ed. 2, 1963. 232 pp. Illus. \$3.

Morton's little book is a welcome addition to the zoological literature. The text, written in a simple and lucid style, is aimed to a broad audience of persons who have only elementary knowledge of zoology; at the same time the book contains a wealth of information that will be useful to biology teachers and malacologists. General features and habits of molluscs are rather briefly discussed in the first three chapters. Greater emphasis is placed, however, on the functional morphology of the following systems of organs: mantle and gills; feeding and digestion; blood and excretion; sex and reproduction; and the nervous system. The major structural features of the organs are discussed together with their function and evolution. Unfortunately, the major role of the mantle in the formation of shape and sculpture of the shell is only briefly mentioned, and no reference is made to geometrical regularity of the shape of the shell and its growth.

The last three chapters deal with evolution and classification. These chapters are an expansion of, and an addition to, the material presented in the preceding five chapters. The evolution of cephalopods is discussed vividly and interestingly. By reconstructing the life and habits of fossil *Nautiloidea* and *Ammonoidea*, the author arrives at the conclusion that "the advent of the ammonoids saved [my italics] the Cephalopoda from decline." This is an intriguing speculation, but it is very probable that some other line of evolutionary process would have developed, if ammonoids had not appeared. The evolution of cephalopods provides fascinating reading. The author wisely reminds the reader, however, that the phylogeny of fossil cephalopods must be approached as cautiously as their ecology.

Regrettably, certain facts of great interest to the general public are not mentioned—for instance, Li's recent findings of antimicrobial agents in molluscan tissues; poisonous shellfish and poison conch shells; the role of tropical freshwater snails in transmitting schistosomiasis; Gabet's work on neurosecretory cycles in bivalves; the important

role of squid nerve cells in neurophysiological research.

The "second edition" is in reality a reprint of the 1958 edition without additions or changes. This explains the absence of references to such an excellent book as *British Prosobranchia* (1962), by V. Fretter and A. Graham, and the monograph on Neopalina, (1959), by H. Lemche, in volume 3 of the Galathea Report. Only the preliminary note of 1957 to the latter, a major zoological discovery, is mentioned in the text.

PAUL S. GALTISOFF

Biological Laboratory,
Bureau of Commercial Fisheries,
Woods Hole, Massachusetts

Mathematics

Structure of Algebra. Vincent H. Haag. Addison-Wesley, Reading, Mass., 1964. vi + 154 pp. Illus. \$5.

What a wealth of books on algebra—elementary, intermediate, advanced, college, modern, and abstract algebra—are available today! However, it is probable that Haag's *Structure of Algebra* is close to unique; certainly it meets a definite need.

Haag seeks to explain the "why's" and the "wherefore's" of elementary algebra and in doing so he dips into the foundations of analysis and of modern abstract algebra. Although a student of modern algebra does study the ring of polynomial forms, for example, it is questionable whether he makes the connection with elementary manipulations or places "variable" and "indeterminate" in their proper relationship.

This book is not a treatise; it does not attempt to cover all aspects of a given topic. It does give considerable insight into mathematical systems; the concepts of finite, infinite, and countability; the apparatus of algebra, such as mappings and functions; and the language and applications of sets and basic logic. It treats real numbers as a model of a complete ordered field, beginning with a development of the properties of such a system and its principal subsystems. The reader should have a meaningful grasp of real number concepts by the time he finishes this volume, a grasp that he can put to effective use. The status and importance of complex numbers receive a thorough elementary treatment; the