case, graduate students should be warned that they do not necessarily have to master the book in its entirety before they can do current research. In closing, I should like to call on the publisher to consider issuing this fine book in a paperback edition.

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Marine Symbionts

Symbiosis in the Sea. Papers from a symposium. WINONA B. VERNBERG, Ed. Published for the Belle W. Baruch Coastal Research Institute by the University of South Carolina Press, Columbia, 1974. xvi, 276 pp., illus. $25. Belle W. Baruch Library in Marine Science, No. 2.

This volume is a compilation of 13 papers by 17 contributors. Its purpose is to present a summary of knowledge about certain aspects of marine symbiosis. This purpose has been successfully achieved. The papers fall into two categories: symbiont-host interactions and evolutionary trends.

J. H. Vandermeulen and L. Muscatine present a very good overview of current knowledge of how symbiotic dinoflagellates accelerate calcification in reef-building corals. Present information, however, does not provide a sufficient basis for clearly defined conceptual models of coral calcification. R. V. Dimock, Jr., investigates problems of intraspecific aggression and distribution of the polychaete *Arctonoe pulchra* on its hosts—the sea cucumber *Stichopus parvimensis* and the limpet *Megathura crenulata*. Evidence is presented to suggest that intraspecific aggression serves as a constraint upon the symbiont population. T. C. Cheng, A. Cali, and D. A. Foley review some of the more salient features of phagocytosis and related processes in marine clams, especially *Crassostrea virginica* and *Mercenaria mercenaria*. An interesting suggestion is that Microsporida are rarely found in mollusks because their small size renders them particularly vulnerable to phagocytosis by granulocytes. P. J. DeCoursey and W. B. Vernberg review the phenomenon of competitive interaction of two or more species of larval trematodes in host snails, especially *Nassarius obsoletus*. They state that complete coexistence without harmful interaction can occur, but they question whether this phenomenon is a contradition of the Gausian principle. Other papers on symbiont-host relationships are authored by R. W. Greene (slugs and their chloroplasts) and B. W. Ache (host location in invertebrates).

R. M. Cable discusses problems relating to phylogeny and taxonomy of marine species of Aspidobothria and Digenea. He presents a convincing diagram of the evolution of trematodes, and he calls attention to new and promising investigations of the amount and complexity of DNA in different species of parasites. A good review of turbellarian symbioses and their implications concerning the evolution of parasitism is authored by J. B. Jennings. He emphasizes the great variety of types of associations formed between turbellarians and their "hosts." W. B. Vernberg and F. J. Vernberg are concerned with the evolution of physiological responses, especially metabolic patterns of trematodes and their hosts. Each stage of parasite development, in some aspects, has apparently evolved independently of the next stage. Other papers on evolutionary trends are by D. M. Ross (associations between crabs and sea anemones). J. E. Simmons (*Gyrocotyle*), W. K. Patton (coral reef communities), and D. L. Taylor (marine algae). The last 14 pages of the book consist of a summary and an index.

Throughout the volume are abundant reminders that much more research must be done in these exciting and significant areas of investigation. I recommend the book for those interested in general biology as well as for symbiologists.

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Teleost Genetics

Genetics and Mutagenesis of Fish. Papers from a symposium, Neuherberg, Germany, Oct. 1972. J. H. SCHRÖDER, Ed. Springer-Verlag, New York, 1974. xvi, 356 pp., illus. $18.50.

Despite the growing economic importance of fish culture and the key position the fishes occupy in any understanding of vertebrate evolution, the genetics of only a few of the teleosts has been studied. Recently, the study of fish genetics has been broadened by numerous descriptions of karyotypes, measurements of DNA, and analyses of isozyme polymorphisms—none of which requires the propagation of fishes generation after generation in captivity—but our knowledge of the subject remains in a distressingly sketchy state, and this situation is reflected in the present volume.

Readers of the book will be able to pick up practically all the diverse threads that make up the loose-woven fabric of fish genetics today, but the newcomer faces several hazards in obtaining a balanced view of the subject or, in some instances, even getting his facts straight. Poor editing or translating has produced too many passages that are likely to be misread. Schröder has presented a commendable summary of the use of teleosts in mutation research and Kirpichnikov and Whitt *et al.* have successfully reviewed the voluminous literature on biochemical polymorphism, especially the lactate dehydrogenase isozymes of fishes, but readers of other papers will have to search the bibliographies to learn the complete range of the topics.

Seven of the 29 contributions emanate from the research group headed by Fritz Anders and deal with *Xiphophorus*, a group of viviparous fishes with polymorphic pigment patterns that often develop abnormally in inter- and intraspecific hybrids, sometimes producing pigmented tumors. The cytological, genic, and biochemical bases for these abnormalites have been explored in several ingenious and exciting ways, but data necessary for evaluation of the results and conclusions are frequently lacking. Some of the patterns are sex-linked, and Kallman shows that *X. maculatus* is polymorphic for female-determining gonosomes, with many populations that simultaneously exhibit male and female heterogamety.

Preadaptive reproductive behavior and so-called regressive evolution in blind cave fishes are discussed by Parzefall, Wilkens, and the Peterses; salmonid isozymes by Utter and Wolf and their respective groups; sex differentiation and hormones by Satoh and Egami; the unusual karyotype of the deep-sea *Diretmus* by Post; and the laboratory synthesis of a unisexual species by Schultz. The volume is dedicated to Curt Kosswig, one of the pioneers of fish genetics, and he has contributed an account of a number of high points in genetic investigations of fishes.

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