Teleosts

Functional Morphology and Classification of Teleostean Fishes. WILLIAM A. GOSLINE. University of Hawaii Press, Honolulu, 1971. x, 208 pp., illus. Paper, $5.

The teleostean fishes are the largest group of vertebrates: with more than 20,000 living species, they probably outnumber all others combined. Partly because of this abundance and bewildering variety, the evolution and interrelationships of teleosts are still understood only in a rudimentary way, and the classification has not developed much beyond the framework laid down by C. Tate Regan before the first World War.

W. A. Gosline is one of the few living zoologists who have consistently directed their efforts toward problems of "higher classification" in teleosts, and he has made himself familiar with at least the bare bones of all the main types. His book consists of two very different sections, one on functional morphology and one on classification. The first 90 pages are an account of what is known about the structures involved in the various activities of teleosts—moving, feeding, breathing, and sensing. This section demands surprisingly little specialized knowledge from the reader and is agreeably written: it could be read with ease and profit by undergraduates and many biologists. Gosline's approach to functional morphology is not experimental or physico-mathematical but is that of the naturalist. It is based upon extensive anatomical knowledge and leavened by the author's opportunities to observe tropical inshore fishes, the richest fauna in the world. This section is sparsely illustrated with line diagrams.

The second half of the book presents a new classification of living teleostean fishes, and will be appreciated by a different audience. Understanding of this section requires wide knowledge of teleosts and close familiarity with previous classifications, especially that of Greenwood, Rosen, Weitzman, and Myers (1966), with which Gosline's will inevitably (and according to his intention) be compared. There are no illustrations to give the uninitiated some idea of the animals under discussion, and few but professional ichthyologists will feel at home.

Gosline introduces the classification with an account of his philosophy: that classification should express "genetic relationships" (how these are to be determined is not specified); that groups should be biologically definable; and that a classification is at best an interim summary of information and therefore should in fields where knowledge is advancing rapidly have as little formal superstructure as possible, serving as a vehicle for discussion rather than an end in itself. He divides his 27 orders among three grades, "lower," "intermediate," and "higher" teleosts, each introduced by a survey of the evolution and interrelationships of the contained groups. Every order is diagnosed and discussed, something is said about each suborder, and families are listed. The arrangement is traditional in that it uses no formal supraordinal categories, discarding those (cohorts and superorders) set up by Greenwood *et al.* Gosline admits that this is, in part, due merely to a difference in philosophy, but to my mind it is the chief defect of his system, for these supraordinal groupings, right or wrong, are a great stimulus to research, and some such synthesis must eventually be agreed upon. Gosline has withdrawn to an earlier disposition partly because he wishes to emphasize the primitiveness of certain forms (*Elops, Chanos*) rather than their relationships. But no other up-to-date account of the scope of this one exists, and ichthyologists will find it indispensable as a reference work and spur.

The book includes an index and a bibliography of more than 400 items.

COLIN PATTERSON

Department of Palaeontology,
British Museum (Natural History),
London

The Isotope Kinetics Method

Isotope Effects in Chemical Reactions. CLAIR J. COLLINS and NEWELL S. BOWMAN, Eds. Van Nostrand Reinhold, New York, 1971. xii, 436 pp., illus. $22.50. American Chemical Society Monographs, 167.

Isotope chemists in general and isotope kineticists in particular will find much of value in the six chapters comprising Collins and Bowman's volume on the kinetic isotope effect as a tool in reaction mechanism studies. The book can—and, one hopes, will—serve to introduce the field to others now uncommitted; this review is intended for them. I assure the committed that the book is worthy of their attention and their purse.

The best places for the neophyte to start are Joseph J. Katz and Henry L. Crespi's chapter on isotope effects in biological systems and Arthur Fry's detailed survey of the kinds of reaction mechanism questions for which answer-like results are yielded by carbon, nitrogen, oxygen, chlorine, and other "heavy element" isotope kinetics studies. Katz and Crespi treat systems of such complexity that *any* source of insight is welcome; Fry emphasizes formation and rupture of chemical bonds whose end atoms *can* be labeled, thus introducing the isotope kinetics method with a maximum amount of straightforwardness.

If the novice's interest has been engaged, he is advised to turn next to Elizabeth and Edward Thornton's fine chapter on the origin and interpretation of isotope effects. Here, the phenomena are examined as nonelectronic substituent effects; the origins of primary, secondary, and solvent effects are discussed, as are approximations inherent in the transition state theory (which is nearly everyone's vehicle for interpretation of results). Then, half a dozen examples are set out to show "how the combination of isotope effect theory with experiment may lead to interesting conclusions about reaction mechanisms."

The remaining three chapters comprise one and a pair; some will feel comfortable reading them in that order, others will prefer the reverse.

W. Alexander Van Hook's chapter 1 of the volume is a detailed, insightful introduction to the theory of kinetic isotope effects and its applications as developed and practiced during the past 25 years. Exact approaches are treated, as well as a number of successful and unsuccessful approximation methods. As examples, $H + H_2$ and $H_2 + Cl$ are given the full treatment. This chapter abounds in helpful mention and explanation of a host of subtle points (the kind that "everyone understands"—except you and me).

The reader should now be well prepared to digest and appreciate the chapter by V. J. Shiner, Jr., on deuterium isotope effects in solvolyses at saturated carbon and that of Dionis E. Sunko and Stanko Borčić on secondary deuterium effects and neighboring group participation. Both of these are systematic surveys containing but not emphasizing their authors' own important contributions (and unpublished results).

Isotope kinetics seems to have lost its early attractions for many organic