Lorentz group and its representations. Parts 4 and 5, written by Rideau, cover representation theory of finite groups and of permutation group. Finally, Part 6 is an exposition and development of quantum theory—no group theory is involved here—followed, in Part 7, by a complete discussion, by Nataf, of the rotation group and its representations.

The second volume, in preparation, will be devoted to applications in classical physics, in the quantum theory of atoms and molecules, solid state physics, nuclear physics, nuclear reactions, and elementary particles.

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Metal Hydrides

Hydrogen Compounds of the Metallic Elements. K. M. MACKAY. Spon, London; Barnes and Noble, New York, 1966. 192 pp., illus. $10.

This generally excellent book achieves its goal of providing an introduction to the subject of metal hydrides suitable for seniors and graduate students. A book of less than 200 pages normally provides little more than an introduction; nevertheless, the extensive tables of physical properties of the hydrides which this one contains extend its value significantly beyond that of an introductory text.

The author is to be commended for his balanced view of current theories. His discussion of theories of bonding in transition-metal hydrides is particularly good; he takes the experimentalist's point of view and is not overly impressed with the powers of theory. Even his discussion of the much-overworked theory of $p\pi$—$d\pi$ bonding in silicon hydrides and derivatives is restrained. This is a very good policy, for often books written at this level leave the student with the impression that theory not only explains all but predicts all.

Many students will need help in understanding parts of Mackay's presentation. A few words of explanation of the van Arkel iodine process and the Kroll process, for example, would have been extremely helpful. Moreover, the presentation of crystallographic data will confuse the typical student; the book would have been far more valuable had drawings of the representative structures been presented.

The book unfortunately does not discuss commercial aspects of metal hydrides and may therefore leave the student with the mistaken notion that these compounds are commercially useless. Thus there are only passing references to hydroformylation and stereospecific polymerization. In the discussions of the ternary U-Zr-H system, no mention is made of the important and unique role this system plays in pulsed reactors of the Triga type.

In general the misprints that occur in the book should cause little confusion. Neither will the grammatical slips do more than annoy. The book would be much more useful if the subject index were better, and, even more important, if an author index had been included. But these are minor objections; all in all this book provides an excellent introduction to the subject of metal hydrides.

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Reproduction in Fishes

Modes of Reproduction in Fishes. CHARLES M. BREDER, JR., and DONN ERIC ROSEN. Natural History Press, Garden City, N.Y., 1966. 957 pp., illus. $17.50.

When I first met Charles M. Breder, Jr., in the early 1930's he was already gathering information on the reproduction of fishes. Now, after at least 33 years, the results of this research have been published. The primary goals of Breder and Rosen's study were to amass all available information on the subject, to classify, appraise, analyze, and digest it, and to make it available in a form useful to students of ecology, ichthyology, morphology, physiology, endocrinology, and psychology.

During the preparation of the book over 20,000 known fish species were considered. About 1500 kinds are mentioned briefly, and the breeding habits of about 300 kinds are fully described; for another 100 species reproductive behavior is imperfectly known. Among over 600 fish families, there are about 17 whose modes of reproduction are reasonably well known. Fish culturists have contributed data largely on the Salmonidae, Esocidae, Cyprinidae, and Centrarchidae; aquarists have published observations mostly on the Characinidae, Cyprinidae, Cyprinodontidae, Poeciliidae, Cichlidae, and Anabantidae; and ichthyologists have published extensively on all the above-listed families and on the Petromyzontidae, Amiidae, Clupeidae, Gasterosteidae, Syngnathidae, Percidae, Cottidae, and Batrachoididae.

Breder and Rosen have attempted to arrange all data under the following headings: breeding season; breeding site; migration; secondary sexual characters; sex discrimination; competitions for mates; courtship; mating; and parental care. Because some of the authors whom they quote at length followed a different system, however, this order is not rigidly adhered to.

Detailed information is recorded in the Systematic Section (pp. 9–603). In the summary (pp. 605–17) the class Agnatha is reported to have diverse modes of reproduction. The Myxini produce eggs unlike those of any other vertebrate and deposit them in deep water on the sea floor, whereas the Petromyzontes reproduce in running streams with breeding behavior resembling that of certain teleosts. In the Gnathostomes, all elasmobranchs and chimaeras have internal fertilization effected by the mixopterygia, and living young or egg-cases are produced. Modes of reproduction among teleosts are varied and complex, as shown in the charts (pp. 620–75) which summarize reproduction down to the family level. In these charts reproduction is divided into seven modes. The modes overlap considerably, however, and I was unable to find a clear-cut definition that distinguishes the divisions.

The bibliography (pp. 679–910) gives an almost complete list of references between 1916 and 1959, with only a few after that date. Earlier papers are not cited because they are listed in Bashford Dean's *Bibliography of Fishes*. However, I note a few papers were overlooked for the period between 1916 and 1959, for example, one on the nesting habits of *Gobiodon citrinus* [*Smithsonian Inst. Ann. Rept. 1947*, 305 (1948)].

Breder and Rosen have always maintained the highest professional standards, and in this book they have unquestionably accomplished their objective of producing a comprehensive, useful work.

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