

A point of minor criticism is that the titles—*Uranium Process Metallurgy* and *Uranium Corrosion and Alloys*—do not correctly convey the contents of the volumes, which are far broader than their titles imply. About one-half of the first volume is devoted to the extractive metallurgy of uranium and its purification and reprocessing as a fuel material; the other half is devoted to powder metallurgy, fabrication, and safety practices with uranium. Only the first 100 pages of the second volume's 700 pages cover corrosion; the remainder is devoted primarily to physical properties of uranium alloys. Valuable appendices at the end of the second book include crystallographic data on uranium compounds and 40 binary phase diagrams for uranium alloy systems. There is some duplication between Wilkinson's volumes and Holden's earlier monograph, *Physical Metallurgy of Uranium* (Addison-Wesley, 1958). However, Holden covered, in the main, the properties of pure uranium, whereas Wilkinson places emphasis on the properties of alloys.

The price of the volumes—volume 1 is \$18 and volume 2, \$16—will prevent a mass buying spree by average scientists, but the books certainly belong in all technical libraries, and they should prove invaluable to those involved in the field of uranium research and technology.

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## Comparative Anatomy

**Chordate Morphology.** Malcolm Jollie. Reinhold, New York; Chapman and Hall, London, 1962. xiv + 478 pp. Illus. \$8.75.

Although fighting rearguard actions may be more popular in biology than in certain other scientific disciplines, one seldom sees the task accomplished with such conspicuous gallantry as Malcolm Jollie displays in his new *Chordate Morphology*. At a time when comparative anatomy has already been dropped from the undergraduate curriculum of more than one great university, Jollie has produced a big new book devoted to the factual basis of vertebrate morphology and morphogenesis. The 475 double-columned pages of his handsome new volume

carry an almost unrelieved recital of facts, covering everything from the tip of the os carunculae to the end of the gephyrocercal tail.

The book proceeds in the traditional manner from a survey of the vertebrate classes through the several organ systems. About a third of the volume is devoted to the skeleton, with considerable attention being given to extinct forms. Among the extant vertebrates not only the species familiar to comparative anatomy courses but also an impressive array of less well-known species are described in detail. For example, the skulls of more than 40 vertebrates are illustrated from different aspects. The chapters on the soft parts similarly deal with numerous representatives of all vertebrate classes.

*Chordate Morphology* resembles most recent comparative anatomy texts in that some space is given to developmental considerations. Chapter 7 deals with cleavage, gastrulation, and body formation in frog and chick, but also manages to include matters like the development of *Clavelina*, *Torpedo*, and *Epatretus*, among others, as well as placentation in the dogfish, lizard, and opossum. Since the chapter is 23 pages long, it is not necessary to say that the topics are treated superficially. Nor is early development presented in a way that provides the student with any basis for understanding the descriptions which are included of the development of organ systems. For example, the derivatives of the visceral arches and pouches are dealt with in several chapters; but the embryonic visceral arch system itself is not even mentioned.

In other respects *Chordate Morphology* represents a reversion from current trends in teaching comparative anatomy. With the exception of the chapter on the integument, there is no treatment of histology. Physiological considerations fare even worse. The respiratory functions of both gills and lungs are covered in 78 words.

The value of Jollie's book will depend entirely on the use that is made of it. Well-illustrated and on the whole carefully and accurately composed, the volume is an excellent source of information on vertebrate structure. As a reference work, or as a text for advanced courses, *Chordate Morphology* will be of real service. But its relentless terminology, its esoteric detail, its avoidance of generalization (except in a brief prologue and epilogue) make it, altogether unsuitable for use by inno-

cent sophomores whose initial interest in comparative anatomy arises from the fact that the course is the next item in the curriculum. As an assigned text in the hands of such students, the book is most likely to serve as an instrument for throttling a budding interest in biological science.

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## Applied Kinetics

**Chemical Reaction Engineering.** An introduction to the design of chemical reactors. Octave Levenspiel. Wiley, New York, 1962. xv + 501 pp. Illus. \$10.75.

In recent years the steady improvement in our understanding of the effects of physical conditions on the course of chemical reactions, coupled with a greatly increased knowledge of chemical mechanism and with the availability of high-speed computers to overcome the mathematical difficulties involved, has paved the way for detailed kinetic analysis of almost every chemical reaction now utilized in large-scale production or intended for such use. This new book could play a major rôle in convincing both experienced engineers and neophytes that such analyses should be made and in helping them to know how to proceed.

Levenspiel deals primarily with the physical factors that have been the most neglected in the previously published texts. The book's title is taken from the name of two international symposia (Amsterdam, 1957 and 1960), and their proceedings are reflected in the contents, along with much additional related literature. The topics treated include an introduction to reactor design, holding time and space time, multiple-reactor systems, optimum temperature progression, residence-time distribution of fluid in vessels, axial dispersion, characteristics of a fluidized bed, and contacting patterns for two-phase systems. In the chapters on noncatalytic fluid-solid reactions and heterogeneous fluid-fluid reactions more attention is given to the interrelation between material-transfer rates and chemical kinetics than in previous texts.

On the chemical side, Levenspiel presents a survey of introductory kinetics that is somewhat more complete than