

Clarke and O'Malley have judiciously limited themselves to two broad themes: main anatomical structures, such as the neuron, spinal cord, and cerebrum, and basic physiological principles, such as the reflex and localization of cerebral functions. The book is divided into 13 chapters, the first devoted to a general survey of writings from antiquity to the 14th century and the remaining 12 to specific structural and functional topics. The selections in each chapter are arranged in chronological order, and each selection is preceded by a brief biographical sketch which includes mention of the relation of this contribution to the work of other investigators and to other selections in the volume. Readers will appreciate the compilers' having taken the time to provide these cross references.

In many instances, particularly with the writings of authors who may be unfamiliar to most readers, one wishes that space had permitted more detailed textual commentaries by the compilers. This lack, however, is more than offset by the book's many virtues. Many of the selections, often rare and hard to find even in the original, have been translated into English for the first time, so that we are now able to sample writings generally known only through secondary sources; other selections have received new and more accurate English renditions. It is a pleasure to find included the contributions of many figures generally neglected by historians, such as Otto K. F. Deiters (1834–1863), the "forgotten histologist" whose excellent preparations and descriptions of the nerve cell body and its processes were largely ignored by his contemporaries and successors.

The value of the book is also enhanced by the fact that Clarke and O'Malley have resisted the lure, which has trapped many less expert historians, of treating only those figures whose lines of research and ideas are judged "correct" or "important" in the light of present knowledge. In the chapter on the neuron, for example, they have included the writings of the "Reticularist School," which held that nerve cells and fibers are organized as a directly continuous nerve net, or reticulum. The genesis and significance of the neuron theory cannot be appreciated fully without a grasp of the reticularists' theories and their protracted and vigorous debate with the developers of the neuron theory.

Another welcome feature is the appendix on neuroanatomical technique,

which briefly covers some of the major contributions to dissection techniques, fixation and preservation of nervous tissue, coloring agents in neurohistology, and tract tracing methods. Throughout the history of the neurosciences, the techniques available to investigators have been crucial determinants of the rate and direction of progress. One wishes that a more extended treatment of techniques, both neurophysiological and neuroanatomical, had been included in this study, though the subject could fill a volume of comparable length.

One might wish *ad infinitum*, however, that certain subjects had been included or dealt with more fully in any source book. As it stands, *The Human Brain and Spinal Cord* is a sound, comprehensive, well-organized, and handsomely illustrated work, and one that helps to fill a great void for historians of biology and medicine.

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Developmental Patterns

Invertebrate Embryology. MATAZO KUMÉ and KATSUMA DAN, Eds. Translated from the Japanese edition (Tokyo, 1957) by Jean C. Dan. Published for the National Library of Medicine and the National Science Foundation by the NOLIT Publishing House, Belgrade, 1968 (available as TT 67-58050 from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). xvi + 608 pp., illus. \$6.

The combination of low cost and good quality makes this one of the best purchases of the decade for a developmental or invertebrate biologist. The translation is outstanding in providing a uniformity of style and precision of statement throughout the multiauthored text.

The book covers the major developmental patterns seen in all of the major phyla and some of the smaller ones. The last comparable volume was the final edition of Korschelt and Heider's *Vergleichende Entwicklungsgeschichte der Tiere*, which was published in 1936 and has been out of print for many years.

The major defect of this translated edition is that it is from a text that is already 12 years old. The editors did not take advantage of the impending

translation to carry out their stated intention of revision to bring the volume up to date. The omission of knowledge gained during these years on fertilization, insect hormones, regulation of cephalopod development, and biochemical and cellular interactions in invertebrate development reduces the value as both a text and a reference. A secondary deficiency is that a number of the smaller phyla are omitted, as are most of the parasitic groups. This is particularly unfortunate at this time when most developmental biologists lack training in invertebrate zoology and parasitology, for these groups surely have a great deal to offer the biochemically oriented investigator.

There is great variation in the depth and breadth of coverage of the different groups. In some cases the chapters are little more than abridged translations of Korschelt and Heider's book, whereas others consider almost exclusively the more recent work of Japanese investigators, which is largely unknown to American scientists.

Specialists will find omissions and errors in almost every chapter. Most are of minor significance but some are not. In the chapter on cephalopods, the papers of Sacarrao (1943–1954) are not considered, although they have direct bearing on the material discussed. Costello's classic paper (1945) on the analysis of development of *Nereis* is not included in the bibliography to the annelid chapter. *Ilyanassa* is listed as having a levotropic third cleavage in the discussion of the relation of cleavage direction to that of shell spiraling (p. 51), even though the shell is dextral and the direction of cleavage has been known for more than 50 years to be dextrotropic.

The book has been carefully produced, and there are few typographic errors. The line drawings which appear on almost every page are excellent, even though some are quite small. Although some of the figures are familiar from older texts, many have been taken from more recent papers. Reproductions of photographs are uniformly poor, but since there are few their quality is not particularly detrimental to the work as a whole.

The approach of this book is primarily descriptive, and, except in a few chapters, neither the experimental analysis of development nor the special evolutionary problems of the various groups are considered in any detail. A few words on the origin and significance of determinate cleavage, on the

significance of mesoderm formation in ctenophores, and on comparison of the origin of coelomic spaces would have been of value. Reconsideration of all aspects of development in relation to evolution is now required in light of recent advances in genetics.

In spite of these deficiencies, this book is the best available general introduction to the descriptive aspects of development in the major invertebrate groups. It should serve well as a major reference source, particularly to Japanese work.

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Antibiotic

Actinomycin. Nature, Formation, and Activities. SELMAN A. WAKSMAN, Ed. Interscience (Wiley), New York, 1968. x + 231 pp., illus. \$8.95.

It is well known that more than a thousand compounds and preparations with antimicrobial activity have been isolated from various species and strains of *Actinomyces*. Actinomycin was the first of these to be isolated, and no antibiotic isolated subsequently has proved to be of greater biologic interest. Among more than 50 chemical forms of the agent, actinomycin C and actinomycin D probably are the most important, according to Selman A. Waksman, editor of this stimulating book.

Interest in the antimicrobial agents has centered largely on their chemotherapeutic properties, and the highly toxic nature of actinomycin, in the form in which it was first isolated, should have led one to believe that it had no potential in this respect. Detailed and long-range study, however, clearly and concisely reviewed by Waksman and his collaborators in this book, has proved this not to be so.

The present book encompasses a vast amount of information. More than 700 references are cited. Initially, Waksman himself reviews the original detection of actinomycin, its isolation, early studies of its toxicity and its activity in experimental animals, and the initial demonstration of its antineoplastic effects. Subsequently, Boyd Woodruff and Waksman review technics for its production and isolation. More detailed reviews of the chemistry of the actinomycins have been presented elsewhere, but the brief chapters here on

the chemistry and biogenesis of these compounds will be of special interest to those desiring general information only. Of prime interest, perhaps, are those portions of the book that are concerned with the effects of actinomycin on virus replication, in the treatment of neoplastic disease, and as a biochemical tool.

Actinomycin acts as a selective inhibitor of DNA-dependent synthesis of RNA, and has the capacity to bind DNA but not RNA and to suppress RNA and protein synthesis but not DNA synthesis. It has the capacity to inhibit RNA synthesis but not cellular DNA synthesis or the multiplication of RNA viruses, knowledge of which has aided the differentiation between viral RNA and messenger RNA. Actinomycin thus has become a useful tool for the study of many biological phenomena, including the development of viruses and bacteria, antibody synthesis, immunologic memory, delayed hypersensitivity, and the rejection of transplanted tissues.

Few compounds have been studied so extensively and with such imagination. Certainly no other antimicrobial agent has been so important to cellular biology. Waksman and his collaborators have brought together in one compact book a vast amount of information on actinomycin and have given perspective to the many studies pertaining to this agent. *Actinomycin* should be read by all interested in antimicrobial effects, in antiviral or antineoplastic agents, or in cellular biology.

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Biochemical Endocrinology

Functions of the Adrenal Cortex. KENNETH W. MCKERNS, Ed. Appleton-Century-Crofts, New York, 1968. 2 vols. Vol. 1, xvi + 643 pp., illus.; vol. 2, xx + 533 pp., illus. \$21 each. Biochemical Endocrinology series.

These two volumes comprise the first of a projected series on biochemical endocrinology. Upon first consideration, the appearance of a thorough treatment of adrenocortical physiology and biochemistry against the background of three recent volumes of the *Handbuch der experimentellen Pharmakologie* on the same subject may seem

redundant. Furthermore, the guiding principle expressed in editor McKerns' preface, "to present a critical review of the development of ideas leading up to the latest interpretations and concepts . . .," may appear to be difficult to realize in such a narrow area of research. In both cases, the initial doubts become quickly resolved: these volumes represent a collection of important and original essays of interest to an audience much broader than students of the adrenal cortex alone.

The decision to leave the style of presentation to individual contributors has certain drawbacks. In some instances, the treatment is excessively heavy; other chapters are admirably succinct. Some authors end with a critical summary or a statement of perspectives (as in McKerns' own contribution on ACTH regulation), whereas others choose to end merely with the last sentence of a detailed narrative. Editors of future volumes in this series could well consider requesting some uniformity of presentation, without, however, sacrificing the individualistic character of the papers. Essays such as those of Koritz on the regulation of pregnenolone synthesis and of Edelman on aldosterone and sodium transport hold the reader's attention with all their thoroughness of treatment. On the other hand, the paper by Bartter and his colleagues on the biogenesis of aldosterone is valuable for its succinctness—the kind of presentation that allows an instructor to extract quickly the information he needs to bring his lecture up to date. Throughout, recent discoveries are discussed in detail, including the occurrence of potentially important "new" corticosteroids such as 18-hydroxycorticosterone and 18-hydroxydeoxycorticosterone.

The major section in volume 1 (Mechanism of Action of ACTH on Steroidogenesis . . .) and the major section in volume 2 (Biosynthesis at the Molecular Level . . .) are hardly separable in terms of the total picture they cover, despite the emphasis on electron-transport mechanisms and mitochondrial biochemical "architecture" in the latter. The reader will find himself surprised at the absence of any major impression of repetition, despite the close relationships among several of the subtopics; in fact, the overlap expected from the titles is largely absent from the text. All of this is to underline the value of these two volumes and the skill of the editor in choosing his contributors.