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 McKern's 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.

In as thorough a treatment of a subject as would be expected in these volumes, one is bemused at being able to delineate additional pertinent areas of research where coverage is almost totally lacking. The catabolism of corticoids is not dealt with, nor is corticoid transport in the blood. One could assume that the decision to exclude this information was based on "topographic" considerations—the adrenal cortex *sensu stricto* is the subject matter, rather than the fate of its products once they enter the systemic "field." However, the mechanisms of action of aldosterone and of glucocorticoids are included, as are some assessments of the physiological role of the secretory products. Inasmuch as the concentration of free corticoids, as opposed to conjugated and bound steroids, is of fundamental significance in comprehending the "control of hormone synthesis and secretion" (the stated emphasis of this series of monographs), one can only regret the exclusion of the missing topics (which are certainly of great biochemical and molecular interest). Comparative endocrinologists will note the lack of reference to the admittedly limited material available on corticosteroidogenesis in nonmammalian vertebrates.

Regardless of possible omissions—and an editor is entitled to his license in the selection of material for his 1176 pages—these two volumes are commendable for their sophistication and for their utility. It is hoped that this monograph and those that follow will result in the recognition by academic biochemists that biochemical endocrinology presents increasingly relevant subject matter which they could well afford to make available to today's biologists in the form of instructional offerings.

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Feed and Food

Comparative Nutrition of Wild Animals. Proceedings of a symposium, London, 1966. M. A. CRAWFORD, Ed. Published for the Zoological Society of London by Academic Press, New York, 1968. xxii + 430 pp., illus. $19.50. Symposium of the Zoological Society of London, No. 21.

The 26 papers of this symposium fall more or less readily into three groups: nutrition and malnutrition in "captive environments," adaptations and maladaptations to native environments, and wild herbivore as food for man. Many of these are summaries of published work, some of which has been summarized earlier. For example, composite rations for zoos (Wackernagel) and laboratories (Short) have a considerable history. Use of these rations, especially for ruminants, is supported by balance studies on deer (Nordan *et al.* and Maloiy *et al.*) and, of course, on domesticated animals. Similarly, nutritional bone diseases of cebids and hapallids (du Boulay and Crawford), of felids (Scott), and of canids (Hime) also are well known, as are suggestions that atherosclerosis is a response to "essential fatty acid" deficiency (Sinclair). However, the scheme (Bilby) by which diets are to be determined from preferences exhibited by zoo animals for fruits, vegetables, and processed foods is, at best, novel, and the discussion of nutrition for captive wild herbivores (Adams) disappointingly vague.

Adaptations to native habitats presumably reflect many unknowns. Thus, Icelandic ptarmigan select a diet superior to that selected by ptarmigan from an equivalent flora in Scotland and have a higher reproductive rate (Moss). However, adaptive difficulties of other animals—for example, reindeer in Scandinavia (Gaare, Steen) and elephants in Africa (Sikes, Laws and Parker)—can be attributed to man. Laws and Parker also find that elephant populations respond to social pressures by reduced productivity and increased mortality, as has been described for other mammals.

African ruminants also receive considerable attention. Attempts to understand adaptations range from a study of stomachs in relation to feeding habits—as in grazers versus browsers (Hofmann)—to minimum water requirements (Taylor), and food selection (Field) and utilization (Rogerson, Crawford *et al.*). Lipid digestion in ruminants and nonruminants differs strikingly (Lough and Garton).

The papers on wild herbivore as food for man are more limited, but a report on wildlife management in the Scottish Highlands and Islands (Boyd) emphasizes the lack of basic information and the obstacles presented by the reluctance of peoples to alter their food patterns. Such inertia is, of course, characteristic of man and will interfere with the production of meat from any wild species: hippopotamus or buffalo (Ledger), manatee (Bertram and Bertram), or semidomesticated eland (Treus and Kravchenko). At the same time, the formal papers and discussions of this symposium emphasize that an understanding of nutritional requirements of wild animals, how these are satisfied in native environments, and how wild animals may become a stable source of food for man is equally handicapped by sentimentality and unchanneled enthusiasm that are a result of current ignorance.

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Plant Group

The Algae. A Review. G. W. PRESCOTT. Houghton Mifflin, Boston, 1968. xii + 436 pp., illus. $7.95. Riverside Studies in Biology.

The algae are a diverse assemblage comprising not only green plants but plants which are brown, red, blue, yellow, and even black. Each of the 9 to 11 divisions of the group corresponds in diversity to the spermatophytes. Thus to review them all, as Prescott has attempted to do in this volume, is a gigantic task. While the classification of algae is admittedly fluid, the scheme used here is startling to one accustomed to the arrangement made familiar by Papenfuss and Silva, who recognize the Bacillariophyta and Charophyta as separate divisions or phyla, but not the Chloromonadophyta. Then, too, some attempt is usually made to arrange the divisions in an evolutionary sequence.

How successful is this book in reviewing the algae in all their diversity? Are there good pictures? Line drawings of 263 different species are included, but there are very few photomicrographs, and none taken with the electron microscope. In a modern treatment of the algae, the absence of electron micrographs, of which spectacular examples are available from the work of Bouck, Gibbs, Manten, Reimann, Ringo, and others, is a serious omission, especially since whole groups of algae are small, many of them unicellular.

When organisms have been ordered to our satisfaction, we turn naturally to questions of where they live and how. The last third of *The Algae* is devoted to these matters, including a chapter on economics and one on culture techniques. Do not expect a rigorous discussion of algal physiology,