Endocrinology: Anatomy and Function

The Pituitary Gland. Vols. 1 and 2, Anterior Pituitary. Vol. 3, Pars Intermedia and Neurohypophysis. G. W. HARRIS and B. T. DONOVAN, Eds. University of California Press, Berkeley, 1966. 1976 pp., illus. $75.

The rapid proliferation of endocrine research in the last 15 years has created a need for reference works which summarize and evaluate the existent information in a restricted area of interest. This set of volumes, to which 64 authors have contributed 58 chapters, is designed "to produce an over-all picture of pituitary anatomy and physiology in which recent ideas are set in perspective amid older well-established findings." It was originally intended that the work would appear by mid-1964, and with few exceptions the most recent references cited are dated 1963. The volumes are profusely illustrated and include a few color plates.

Volume 1 covers the gross anatomy of the pars distalis and includes an extensive chapter on comparative aspects and evolution of the hypophysis. This is followed by a treatment of the vascular system and a thorough study, covering about 100 pages, of the cytology of the adenohypophysis. In the remaining two-thirds of the volume the hormonal activities of the pars distalis in lower vertebrates and in mammals are discussed. A separate chapter is devoted to the physiology and chemistry of each of the recognized adenohypophyseal hormones found in mammals, and in general these chapters are well done, especially the sections on adrenocorticotropin, thyrotropin, and growth hormone. A startling deficiency, however, is the omission of a discussion of the chemistry of luteinizing hormone, aside from a few remarks in a short section on its physiology. By 1963 a considerable body of information had already been published on the purification and characterization of luteinizing hormone, and its absence is to be regretted.

Volume 2 is concerned primarily with the functional aspects of the anterior pituitary gland. Following chapters on the effects of hypophysectomy, stalk section, and pituitary transplantation in experimental animals and man, six chapters are devoted to the control and regulation of the secretion of the individual hormones. These are excellent chapters and suffer only by the absence of the extensive work that has been recently published on the separation and purification of the various hypothalamic releasing factors. Another major section of this volume covers anterior pituitary function in various physiological stages such as fetal life, infancy, puberty, and old age. Function in the menstrual cycle, pregnancy, and lactation is also covered ably. The remainder of the volume is devoted to a number of miscellaneous subjects such as pituitary tumors, regenerative capacity of the gland, clinical tests of anterior pituitary activity, extratropic effects of the tropic hormones, species specificity, and immunological considerations. Although this reference set is primarily concerned with the anatomy and physiology of the pituitary gland, a chapter or two devoted solely to the mechanism of action of the pituitary hormones, especially adrenocorticotropic and luteinizing hormone, would have added much to the completeness of the work.

Volume 3 is concerned with the pars intermedia and the neurohypophysis. The five chapters on the intermediate lobe are short, comprising 61 pages in all, and might better have been included in either volume 1 or 2, inasmuch as the active principles, α and β melanocyte-stimulating hormone, are so intimately related to adrenocorticotropic hormone. The section describes the anatomy and nerve and blood supply of the intermediate lobe, the assay and chemistry of the melanocyte-stimulating hormones, the function of the gland in lower vertebrates, and a short discussion on physiological function in mammals. The rest of this volume is devoted to the neurohypophysis and the hormones associated with it, oxytocin and the vasopressins in the mammal, and the closely related hormones found in the lower vertebrates. This volume will undoubtedly have great appeal to the comparative endocrinologists because of the immense amount of work reported at all levels on various nonmammalian species. The chapters on the chemistry of the neurohypophyseal hormones and the synthesis and biological activities of analogs are excellent. In general, the format employed for the anterior pituitary is repeated for the neurohypophysis. Following anatomical and chemical aspects, various physiological areas are treated.

I have purposely avoided the use of authors' names in this short review. Suffice it to say that all the authors are well known and respected in their fields. To cite a few to the exclusion of the others would be a disservice. The editors are to be commended not only for having accomplished the massive task of assembling this work but for their choice of authors. Despite a few shortcomings, this work will be of great use both to graduate students and to workers in the field. The price is unfortunately beyond the means of many, but it is to be expected that every good library will have a copy.

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Naturalist in Bolshaya Zemla

Where the Sea Breaks Its Back. COREY FORD. With drawings by Lois Darling. Little Brown, Boston, 1966. 218 pp. $5.95.

Where the Sea Breaks Its Back is a fitting title for this magnificent story of the tragic Russian Expendition of 1741 commanded by the Dane Vitus Bering. With him on this first voyage to Bolshaya Zemla—the Great Land now known as Alaska—was a young German naturalist, Georg Wilhelm Steller, who left a legacy of scientific knowledge and moral courage as valuable today as it was then, and who is the central figure in Corey Ford's account.

For hardship and suffering this expedition has no equal in the annals of Arctic exploration. Starting 10 years before with the 6000-mile trek overland from St. Petersburg to the Kamchatka Peninsula and Avache Bay, the point of embarkation, disaster followed it all the way. But in spite of all, Steller carried on his scientific work.

In 1941, Corey Ford made the same trip along the Aleutian Chain. He had with him not only Bering's log but Steller's complete journal of the voyage, which for two centuries had gathered dust in the archives of the Russian Academy of Sciences. He touched at all the places mentioned by Steller—Kayak Island (including Cape St. Elias), the Shumagin Islands, Adak, Atka, Amchitka, Kiska, and Buldir, islands that had not changed since discovery. Ford found the same rugged promontories, hidden reefs, and

kelp-strewn beaches, the interminable rain, fog, and mystery.

Though Steller was to spend only 10 hours on the Alaska mainland, he discovered a host of new plants and animals. Linnaeus called him a born collector "who has earned great and precious glory." He is remembered best for Steller's jay and the extinct Steller's sea cow (the giant northern manatee), but many other animals bear his name —the legendary white raven, the eagle, the greenling rock trout, the eider, and the sea monkey (which no one else has seen). Places along the route of travel also commemorate him—Steller's Hill, Steller's Mountain, and Steller's Arch. Following Bering's expedition with its news of sea otters, seals, and other treasures, a wild stampede occurred far greater than the Klondike Gold Rush, and so began a carnage that brought not only animal species but even the native people almost to extinction.

"This is," as Frank Defresne says in his foreword, "more than a thrilling adventure story. It is a vivid word picture of Alaska's pioneer naturalist and what he observed. It is a solid contribution to American natural history as well as an important restoration of our nation's neglected past." Scientists and historians should not overlook this book. Those who love Alaska and the Aleutians will treasure it.

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Magnetofluidmechanics

The Electromagnetodynamics of Fluids. W. F. HUGHES and F. J. YOUNG. Wiley, New York, 1966. 662 pp., illus. $17.50.

In the last decade magnetohydrodynamics and plasma physics have emerged to form an important branch of science. *The Electromagnetodynamics of Fluids* is a text for a graduate course or for the professional engineer who wishes to acquaint himself with the continuum or fluid aspects of this field.

After reviewing the principles of special relativity, the authors treat the electrodynamics of moving media and work several examples in detail to illustrate how to apply the principles. The electromagnetic body force in a fluid medium is introduced and the electromagnetic stress tensor formulated. After showing how the fluid equations of hydrodynamics are modified by electromagnetic effects, Hughes and Young discuss the assumptions which are made in reducing to the usual magnetohydrodynamic approximation. This material, which comprises a fourth of the book, provides a good treatment of the basic principles of magnetofluidmechanics. The remainder of the book consists of applications to viscous magnetohydrodynamic flow, both steady and transient or alternating, plane waves in unbounded and bounded fluids, discontinuities and shocks, and magnetoaerodynamics. Many excellent problems are presented.

The book's coverage seems somewhat uneven. In some areas considerable detail is presented. Expansion would be desirable in other places, such as the discussions of discontinuities and shock waves. In many places the authors repeat themselves unnecessarily. Equations are often written several times with only minor changes or in component form. Obvious vector identities could have been eliminated. With only a modest amount of effort the book could have been shortened considerably without sacrificing clarity. There are too many typographic errors for so expensive a book.

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Quantum Theory and Mathematics

Theory of Groups in Classical and Quantum Physics. Vol. 1, Mathematical Structures and the Foundations of Quantum Theory. THÉO KAHAN. Translated from the French edition (Paris, 1960) by H. Ingram. A. R. Edmonds, Translation Ed. Elsevier, New York, 1966. 590 pp., illus. $37.50.

Investigations of the structure of fundamental particles have demonstrated, more convincingly than before, that the theory of group representations is a powerful tool in the study of quantum systems [see, for example, *Science* **152**, 1048 (1966)]. The theory has been found to be indispensable for describing intricate symmetries and the so-called "quantum numbers" that characterize various states of a quantum mechanical system. Such a group-theoretical description could be termed "global," for the internal properties of the system may not be known in detail. More recently, the theory of group representations is being used in an elegant manner to provide us with a complete dynamical framework for quantum theory. The present state of research in theoretical physics indicates that some modern algebraic theories—noncompact groups, general associative algebras, and so on —that until recently were thought to be too abstract to be useful in physics will play an essential role in the developments of the near future. It is remarkable that since the beginning of theoretical physics every major new step had its own distinct mathematical discipline from which it is inseparable, as though each new level of natural philosophy requires a new language. From the infinitesimal calculus and ordinary differential equations in Newtonian mechanics, to partial differential equations in Maxwellian field theory, to linear algebra and operators in Hilbert space in the quantum mechanics of Heisenberg and Dirac, to the theory of functions of complex variables in *S*-matrix theory, the mathematics has been not merely a tool but fundamentally interwoven with the physical concepts. One then rightly wonders about the relationship of mathematical invention and physical theory and asks whether we are perhaps coming closer to the idea of Plato that the ultimate of matter is nothing but geometric forms.

The book reviewed here, which was written by Kahan in collaboration with P. Cavaillès, R. Gouvarné, T. D. Newton, G. Rideau, G. Lochak, and R. Nataf, is perhaps the most extensive book in the field. It is repetitious and lacks unity and coherence, but these faults may be an advantage for those who have time to go through the book, in that they will be able to study the same things described from different points of view. Thus, in Part 1, Theory of Groups and Axiomatized Mathematics for the Use of Physicists, and Part 3, Theory of Abstract Groups, the mathematical concepts are discussed in detail from the physicist's and the mathematician's point of view, respectively. Part 2, by Newton, deals with the important inhomogeneous