Book Reviews

The Physiology of the Pituitary Glands of Fishes. Grace E. Pickford and James W. Atz. New York Zoological Society, New York, 1957. xxiii + 613 pp. $6.

The Physiology of the Pituitary Gland of Fishes is a book that students of fish endocrinology have been hoping for. Heretofore, the literature of this field has been scattered through a wide variety of journals and languages. Now, for the first time, all significant contributions to the knowledge of the functioning of the pituitary gland of fishes, including its morphology and relationships to the target organs of the endocrine system, have been brought together in a comprehensive and orderly manner.

The book consists of three main divisions: text, tables, and bibliography. The introduction and six of the seven chapters of the text are written by Grace E. Pickford; the last and longest section, by James W. Atz. In the introductory chapter, an attempt is made to bring order out of the chaos of the terminology used in describing the several parts of the fish pituitary, which differs considerably from the mammalian gland. While the proposed terminology may not be generally acceptable or final, it does indicate clearly the different regions of the fish pituitary and should be helpful to workers in this field. To provide a general background for discussion of the physiology of the fish pituitary, a succinct and well-balanced account of the hormones and cell types of the mammal pituitary is presented.

Each of the succeeding sections, which deal with the different pituitary hormones and their effects, begins with a statement of what is known concerning the particular hormone in mammals, birds, and amphibians. Then the several classes, orders, and suborders of fishes are taken up. The value of separating groups and species of fishes is brought out, particularly in the classification of their chromatophore reactions. It is doubtful whether any zoological literature is more confusing and contradictory than that dealing with fishes' color responses to pituitary hormones and other influences. By means of careful analyses of procedures and the grouping of types of response in different fishes (given in detail in the accompanying tables), Pickford has managed to derive a reasonable working classification in a field which is still far from being completely explored. This is the best discussion that has been written on the subject and constitutes a real contribution.

Limitations of space preclude comments on the excellent presentation of the hormones of the neurohypophysis, growth hormone, corticotropin, and the adrenal. Treatment of the thyroid and thyrotropin is comprehensive and brings out many similarities to, and some differences from, the mammalian thyroid functioning. In part VII, the relation of the pituitary to reproduction in fishes, Atz has with great success assembled, analyzed, and classified the abundant and diversified literature on this subject. This chapter is of especial value in that a number of Russian and Brazilian contributions, previously inaccessible to the general reader, are here made available. Since most of the work on hormonal stimulation of spawning in fishes has been done in these two countries, knowledge of their progress in the field is obviously important.

One of the outstanding merits of the book is the section of some 200 pages of tables. The tabulated data, presented clearly and in sufficient detail by the authors, adds greatly to the value of the text. In addition, there are 25 summarizing text tables. The bibliography is inclusive and brings the literature up to the middle of 1956. The index is unusually complete. This is a remarkably scholarly and valuable piece of work, which adds new significance to the study of fish endocrines as a fertile field in the domain of general vertebrate endocrinology.

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Advances in Protein Chemistry. vol. XI. M. L. Anson, K. Bailey, and J. T. Edsall, Eds. Academic Press, New York, 1956. 591 pp. Illus. + cumulative index, vols. VI–X. $12.

The 11th volume in this valuable series maintains the consistently high standards of the earlier volumes with a series of six articles which range over a good part of present-day protein chemistry. The articles and their authors are as follows: "Protein structure in relation to function and biosynthesis," by C. B. Anfinsen and R. R. Redfield; "Hormones of the anterior pituitary gland: part 1, Growth and adrenocorticotropic hormones," by C. H. Li; "Column chromatography of peptides and proteins," by S. Moore and W. H. Stein; "Countercurrent distribution in protein chemistry," by P. von Tavel and R. Signer; "Complex formation between metallic cations and proteins, peptides, and amino acids," by F. N. R. Gurd and P. E. Wilcox; and "Measurement and interpretation of diffusion coefficients of proteins," by L. J. Gosting.

The types of reviews included in the present volume tend to reflect the spectacular progress of recent years in the study of protein structure and in the attempts to understand the functional properties of these complex molecules in terms of their structure. The articles by Anfinsen and Redfield and by Li deal largely with this problem. Likewise, the discussion of column chromatography and countercurrent distribution reflects the important advances in methodology which have made possible such rapid progress. These methods have been invaluable, both for isolation of pure proteins and for their partial hydrolysis products, the peptides. Both types of methods have come to be among the most generally used in protein chemistry in a relatively short time.

The specific interactions of proteins are obviously of great importance for understanding the behavior and function of these large molecules. The present review by Gurd and Wilcox summarizes current theory of interaction of metallic cations with proteins and discusses the presently available information.

Hand-in-hand with progress in understanding the chemical structure of proteins has been the development and use of physical methods which have permitted studies of these large molecules. Gosting provides a comprehensive discussion of the theory and application of diffusion measurements. Technical progress in this field has been spectacular, owing largely to the development of interferometric optical systems for measuring refractive index gradients. This has provided a tenfold increase in the accuracy by which diffusion constants can be estimated. As a result, such measurements are now among the most precise available for studying the physical properties of proteins.

It is of interest to all who must keep abreast of rapidly developing fields to contrast the two types of review volumes which are published periodically—those which summarize information in certain fields annually and those which review certain topics occasionally. *Advances in*

Protein Chemistry falls into the latter class. The present volume contains only six articles, which occupy more than 550 pages. For a comprehensive view of the whole field of protein chemistry, it is necessary to peruse the entire series of volumes. Nevertheless, the current volume is required reading for all who are interested in protein chemistry. As in the earlier volumes, the articles are well written, and the editing has been done with great care.

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The Proceedings of the Third International Conference on Electron Microscopy, London, 1954. V. E. Cosslett, chair., editorial committee; R. Ross, General Ed. Royal Microscopical Society, London, 1956. xv + 705 pp. Illus. + plates. $15.

This impressive volume represents the text of papers contributed to, and the discussion offered at, the third international Conference on Electron Microscopy, the previous meetings being those at Delft, in 1948, and Paris, in 1950. The book is a rich source of information on many aspects of electron microscopy and related fields of endeavor; it deserves a place on the shelf of every professional electron microscopist.

The contributions, 158 in all, including three introductory survey papers, although of rather unequal quality, contain many papers of high quality. A prime advantage of a volume such as this is that it brings together, in conveniently accessible and brief form, a wealth of information on topics such as electron optics, specimen preparation, microtomy, the action of electrons on the specimen, and the attainment of high resolution, which in this era of very rapid expansion of the field is only to be gleaned otherwise from a rapidly increasing and formidably diverse list of publications and, moreover, is not to be found in the textbooks. For those involved in pursuits less orthodox than transmission microscopy, there are the sections on ion microscopes, x-ray microscopes, and emission and reflection electron microscopy. In addition, there are sections devoted to applications—for example, those concerned with biological fine structure, metallurgy, and industrial and chemical applications.

The format of the volume and the quality of the reproductions are excellent. The classification of the contributions under a wide variety of headings assists the reader in locating information of interest, but it is to be regretted that no author or subject index, however brief, was included.

A further cause for regret, and a more serious one, is the excessively long time interval between the meeting itself and the appearance of the *Proceedings*. Such a time lag is particularly undesirable if results presented to the conference will not become available to those interested until and unless they are published elsewhere in addition. The spectacularly rapid growth of the field of electron microscopy in recent years makes it more and more important that the proceedings of such conferences be published promptly, so that results of importance are circulated in as short a time as possible. The editorial committee and the Royal Microscopical Society are, in the present case, to be congratulated on carrying out a fine and very thorough job, even though they considerably overstepped their original aim of publication within 12 months of the conference. However, the need for more stringent measures is clearly indicated for future conferences of this character. In the present volume, the discussions following papers or groups of papers appear contribute but a small fraction of the useful information contained in the book, yet they must surely have demanded an inordinate amount of editorial time as well as entailing considerable delay in publication. Publication of such discussions could probably be eliminated without detracting too seriously from the value of such a volume. It must seriously be considered whether rapidity of publication of such proceedings is not more important than detailed reporting, especially of discussions which are often of a sporadic nature, uneven in quality, and of questionable bearing on the subject under discussion.

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Quantum Mechanics. H. A. Kramers. Translated by D. ter Haar. North-Holland, Amsterdam; Interscience, New York, 1957. xvi + 496 pp. $12.50. (pt. 1, 5 chapters, also published separately as *The Foundations of Quantum Theory,* xv + 228 pp. $6.50.)

"When I was asked whether I would be willing to prepare a translation of Kramers' monograph, and thus complete an English edition of all his published works, I agreed for several reasons, even if it meant the hazardous task of translating from one foreign language into another. The main reason was that I felt that this book still represents the best available exposition of quantum theory and that the English speaking world was the poorer for not having it readily available. Also, in this book, as much as in some of his papers, Kramers showed some delightfully elegant methods which might otherwise be lost to the physics world in general."

With these words the translator's preface to *Quantum Mechanics* starts. I would like to add at once that this admirable translation, of which the language in parts is smoother than that of the original, is a good book for the intelligent, self-taught, theoretical student who wants to get a thorough understanding of many of the principles of modern quantum theory, in particular if he plans to continue his studies later by more specialized books. Some students may consider it a drawback that there are no assigned problems and that the number of applications of the theory worked out in the text itself is relatively small. An instructor using Kramers' book as a textbook can, of course, provide his class with his own choice of problems picked from other textbooks. For the students, however, working out in detail some mathematical derivations which the book gives merely in the form of an outline may be an assignment more useful than some of the useless "exercises for the sake of an exercise" found in certain other introductory textbooks. By not burdening the student with such useless material, this book finds space for a thorough discussion of a number of important aspects of wave mechanics and of matrix mechanics which in many other textbooks are neglected.

The book is somewhat mathematical in character, although the author purposely avoids mathematical rigor (see the preface on page v !), but at no place are theoretical results compared with any illustrative experimental data. The book consists of two parts, of which the first is available as a separate book under the title *The Foundations of Quantum Theory.* Part I deals with nonrelativistic wave mechanics of electrons and does not discuss spin, Pauli's exclusion principle, or electromagnetic radiation. It may be sufficient as a textbook for an introductory course on wave mechanics. Since part II is available only together with part I, in a single volume, students who need quantum theory for their later work, or who may later want to find out at least for themselves about spin, exclusion principle, Bohr's quantum jumps, and photons, would do well to buy at once the complete *Quantum Mechanics,* containing both parts.

Part I starts out with a discussion of de Broglie waves and their superposition and the uncertainty relations. Among the further topics treated we note thorough discussions of eigenvalue problems; proper and improper eigenfunctions; the approximately classical motion of wave packets for interacting particles; the interpretation of the state vector; transformation theory; Dirac's bra-and-ket nota-