Book Reviews

The Fossil Evidence for Human Evolution. An introduction to the study of paleoanthropology. W. E. Le Gros Clark. University of Chicago Press, Chicago, 1955. x + 181 pp. Illus. $6.

This book is the first in a new series intended to provide "authoritative information about the growth and status" of various biological and medical subjects. It does this job admirably and will be important reading for specialists, students, and people interested primarily in other fields.

The author has not attempted to inventory the fossil record of the human family. In the first chapter he has chosen to underline some major problems of a morphological and phylogenetic nature important in analyzing and interpreting hominid evolution. He indicates the basic features that characterize the hominid and pongid radiations and the importance of defining clearly taxonomic categories on carefully chosen comparative-anatomical grounds. The need for an appreciation of modern evolutionary and genetic concepts is stressed and the significance of functional anatomical studies is indicated. The author emphasizes particularly the value of "total morphological pattern" (a term more inclusive than the "character complex" of the zoologist) in contrast to comparisons of isolated characters in assessing the status of a fossil.

The remainder of the book deals with the major taxonomic categories in the fossil record of the Hominidae. The author applies separate generic terms for the australopithecines of Africa and the Middle Pleistocene men of China and Java (*Australopithecus* and *Pithecanthropus*, respectively); all other fossil hominids are regarded as members of the genus *Homo*. The author's treatment proceeds from the present species (*Homo sapiens*) to that most recently extinct (*H. neanderthalensis*) and finally to the still earlier forms, *Pithecanthropus* and *Australopithecus*. After a discussion of the major morphological features of each, definitions are offered of each major category, and probable relationships are indicated. Although the book is well illustrated with line drawings, it is unfortunate that no photographs of fossil hominids are included.

There has long been a need for an up-to-date introduction to human evolution, particularly one that recognizes fully advances made in modern biology. Sir Wilfrid's book fills this void excellently. Undoubtedly many workers will quibble about minor points, but it remains nonetheless as a major effort by a worker well acquainted with the complexities of the field and the difficulties involved in providing final answers.

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Biochemistry of the Developing Nervous System. Proceedings of the first International Neurochemical Symposium, held at Magdalen College, Oxford, 13–17 July 1954. Heinrich Waelsch, Ed. Academic Press, New York, 1955. xvii + 537 pp. Illus. $11.50.

The rapid advance of biochemical techniques and knowledge in general has, during recent years, intensified research in brain and nerve chemistry. Investigators in a variety of border fields have become interested in this development. Organization of meetings on neurochemistry on an international scale appears therefore to be a useful effort. The book under review presents the proceedings of the first International Neurochemical Symposium. The conference was devoted to the "Biochemistry of the developing nervous system," but topics were discussed that covered a wide range of related fields: morphological and functional ontogeny of the central nervous system, chemical composition and intermediary metabolism of brain during growth, enzymes and enzyme inhibitors, genetic, hormonal, and pathological factors.

To illustrate the diversity of the specific subjects reviewed, a few of them may be mentioned. V. Hamburger discussed "Trends in experimental neuroembryology"; J. Folch-Pi, "Composition of the brain in relation to maturation"; W. M. Sperry, "The lipids of the brain during early development in the rat"; D. Richter, "Metabolism of the developing brain"; H. Waelsch, "Blood-brain barrier"; L. B. Flexner, "Enzymatic and functional patterns of the developing mammalian brain." The pathological chemistry of the developing brain was reviewed by E. Klenk; "Genetic factors of the development of the nervous system" by S. Gluecksohn-Waelsch. Remarkable developments in ultramicro techniques were presented by Lowry and Hyden; the former showed well reproducible data on enzyme activity with 0.1 microgram of tissue or less; the latter described a new method of x-ray microphotometry, which permits in the analysis of nerve cells the determination of the intracellular mass, lipids, and proteins, in amounts of picograms (10^{-12} g).

It is impossible to mention all the interesting papers presented. Some of them, as might be expected among such a great number of papers, did not stand up to the high level maintained in general, but the few examples noted here may suffice to show the broad approach that was applied. The rapid scientific developments in so many directions make it difficult for the investigator to follow neighboring fields of interest in his work, and it should be one of the functions of such symposia to serve as a means of communication. Although the book contains much valuable information, the discussion of the innumerable gaps in our knowledge of the various fields is perhaps as profitable as the presentation of the progress achieved.

The question may be raised whether it is worth while to include in the book all the discussions. Many remarks, even if appropriate at the meeting, do not really contribute to the information of the reader. On the other hand, they increase the editorial burden, probably out of proportion to their significance, raise the costs, and impose unnecessarily on the time of the reader. A procedure may be found to include only those discussion remarks that contain pertinent criticism or additional information of real value. On the whole, the book is to be recommended as a collection of interesting and stimulating papers that convey a fair picture of the present state of the subject to all those interested in the field.

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Small-Angle Scattering of X-rays. André Guinier and Gérard Fournet. Translated by Christopher B. Walker. Wiley, New York; Chapman & Hall, London, 1955. xi + 268 pp. Illus. $7.50.

Small-angle scattering of x-rays was first used in 1930 to study particle size. In the 25 years that have elapsed, especially in the last 10, the study of such scattering has become of very great importance, particularly because of its application to the

elucidation of pressing technologic problems. The subject is not an easy one. In many papers that have appeared, particularly those devoted to theory, the treatment has been such as to muddy the waters rather than to clarify them. This timely and elegantly written monograph succinctly brings the reader up to date. The authors have, with expertness, separated the grain from the chaff.

The first four chapters, entitled "Origin and characteristics of small-angle x-ray scattering," "General theory," "Experimental equipment," and "Methods of interpretation of experimental results," cover these subjects clearly, thoroughly, and, above all, thoughtfully. The final two chapters deal with the results achieved to date and will prove a surprise to many scientific workers, who will discover that here is a versatile physical technique, useful in such diverse fields as metallurgy, biology, and mineralogy, which they have perhaps overlooked. The metallurgist will discover that small-angle x-ray scattering studies of severely cold-worked metals tell him some of the story of what happens during cold-working, and the biologist will find that the sizes and shapes of protein and virus molecules can be obtained from the interpretation of small-angle data.

A bibliography, originally compiled by K. L. Yudowitch and expanded somewhat to include recent work, follows the text. It lists 569 papers. Here, a perhaps petty criticism can be made. It is too complete; some papers are listed that do not deal with the subject even remotely.

To anyone interested in small-angle scattering this book is a "must." The volume may perhaps be disconcerting to those who have worked in this field, for it will also tell most of us where we have erred!

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Echinodermata. vol. IV of *The Invertebrates.* The coelomate bilateria. Libbie Henrietta Hyman. McGraw-Hill, New York, 1955. vii + 763 pp. Illus. $10.

One must sincerely regret that the four outstanding echinodermologists to whom Libbie Hyman pays homage in her introduction did not live to see this volume published. These men who spent 40 to 60 years of their lives on the study of echinoderms would, more than any other reader, have been able to appreciate the gigantic work that the author has completed. To be acquainted with the enormous amount of literature is in itself an accomplishment, especially for a nonspecialist, and to weld the whole subject together into a complete and harmonious picture is more than what one could expect a single individual to do.

The volume consists of a single chapter, divided into 12 parts. After a brief outline of the history of the phylum and its most salient features, the reader is given a bird's-eye view of the classification, and then the different classes are treated in detail. The arrangement of each section is similar to that used in the earlier volumes of the series, and in other works of similar scope. Considerable space is given to the distribution, since the echinoderms are well suited to delimit marine geographic provinces.

Much of the account follows the classical pattern, laid down in the large works published in Europe around the turn of the century, and here brought up to date with the inclusion of the many important contributions that have been made since that time. Of particular interest is the part that deals with these animals' physiology, which was almost unknown 50 years ago.

The last section deals with the phylogeny of the echinoderms and justifies the unorthodox manner in which the author has rearranged the various classes. Based as it is, on larval forms, it is an arrangement that most students of these animals have visualized, without having taken any further step in that direction. The views of the author are well supported by the most recent biochemical studies. The account is fascinatingly written and is convincing, although the author probably will agree, in the case of these unpredictable animals, that one can modify Miss Hawes' opinion on fashion and say that phylogeny is spinach.

The style is easy flowing and clear; the language is refreshingly unorthodox and picturesque, although the author never forgets to brief the reader on the peculiar language of the specialists, without which they would not be able to delve into the original papers. The typographic setup is of the same quality as in the previous volumes; typographic errors are rare and quite unimportant, and there are few statements that need to be corrected.

The illustrations complete the text and appear whenever they are needed. Many are original, while others have been redrawn by the author, which also adds to the harmonious aspect of the volume. The numbering is clear, the legends are models of clearness, and, characteristic of the author's ability to omit irrelevant matters, all measurements are consistently left out where they are not needed. The method of giving the reference to a special question in the text as is done here is infinitely to be preferred to the nondescript numbers used in similar works. It takes a little more space, but it fixes the author's name in the reader's mind in connection with this particular problem. If the reader wishes to check on such a point, he turns to the end of the volume, where 40 pages of literature are printed with a compactness reminiscent of a New York subway during rush hours, but where one with the greatest ease can extract complete information about each paper.

The obvious enjoyment the author has had in tackling this odd group of animals and overcoming all obstacles seems to penetrate the whole work. It comes out in the open in the preface, where the echinoderms are saluted as a noble group of animals. After one has had the pleasure of reading this volume, one is happy to salute the noble work of a noble writer.

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The Atomic Nucleus. Robley D. Evans. McGraw-Hill, New York, 1955. xv + 972 pp. Illus. $14.50.

This book has been two decades in the making: it is the result of 20 eventful years' experience in teaching a course in the rapidly changing subject of nuclear physics to seniors and first-year graduate students at Massachusetts Institute of Technology. It could not have been written so well by anyone without such experience, and both today's student and instructor are very much in Robley Evans' debt for making their respective tasks so much easier.

Although I have not had the good fortune of having been a member of one of Evans' classes, I did meet the present book as an old friend after a lapse of years, for in common with many others on this continent I used, in the early 1940's, the mimeographed versions of Evans' class notes as very welcome material for my own first attempts at teaching a similar course, now taken over by a colleague. As often happens on meeting old friends after an interval of a decade or more, one is struck by an increase not only in their experience of the world and in their wisdom but, alas, also in their girth. In this case the "girth" is partly unavoidably due to the growth of the subject, but to some extent the usual explanation of obesity—too catholic an appetite—also applies here. Of the book's 972 pages, 566 are devoted to a discussion of the nucleus (with time out at several points for what amounts to a short course on wave mechanics supplemented later by an additional 38-page mathematical appendix). Of the balance, 179 pages deal with the interactions between particles, radiation, and matter, and 63 with a condensed course on sta-