Book Reviews

D'Arcy Wentworth Thompson. The scholar-naturalist, 1860–1948. Ruth D'Arcy Thompson. Oxford University Press, New York, 1958. xi + 244 pp. $4.

It has not been customary, during the past several generations, to write books about biology subjectively. *Growth and Form,* which appeared first in 1917 and again in 1942, greatly revised and expanded, has seemed an outstanding exception. This is a book with many virtues, the first of which is surely that it develops an original and stimulating idea about the relationships between biology and mathematics. Almost as important, however, is the fact that both its wonderful style and its diversified content let the personality of its author shine through. It brings the reader to share the enthusiasm and love of D'Arcy Thompson not only for an idea, not only for literature and for wisdom, but particularly for the creatures of the earth, the waters, and the skies. The reader envisions the author as having been a sort of latter-day Aristotle, as happy in prowling the fish markets and shores of the northern ocean as was his predecessor who frequented those which rimmed a more temperate sea. His writings are genial, in more than one sense of the word, and they seem to reflect the mood of a contented and successful man.

This biography by his daughter amends the impression. He was happy indeed in his remarkable family, but he was fretful and unhappy in his isolation in Dundee—where he spent over 30 years, including those in which he completed the first edition of *Growth and Form*—and frankly embittered at his lack of recognition. Though he was eventually to serve as its vice president, it was only in 1916, in the middle of his sixth decade, that he was elected a fellow of the Royal Society. It comes as a shock, too, to the present generation, which unthinkingly speaks of evolution and mechanism in the same half breath, to be reminded that *Growth and Form,* when it first appeared, was considered daringly antievolutionary.

This biography is of value, however, not only for what it tells of things of which we may not have known but also for what it confirms of things we have felt about the quality of D'Arcy as a person. His daughter's text, which is ably written in its own right, is richly interspersed with excerpts from his own letters and writings, and all that stands here, in his own words or his daughter's, attests to his honesty, simplicity, and kindness. This book is recommended not only to those who are interested in the growth and form of an idea but as strongly to those for whom the growth and form of humanity has meaning.

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Biological Ultrastructure. Arne Engström and J. B. Finean. Academic Press, New York, 1958. ix + 326 pp. Illus. $8.

The field of biological fine structure is currently in a state of very rapid expansion, and as a result there exists a great need for suitable source books. The present volume is valuable from this point of view. As stated in their preface, the aim of the authors has been to introduce the rather extensive field of biological ultrastructure to the student and also, rather importantly, to the research worker in various fields of medical and biological science who is becoming more interested in the fine structure of the systems he studies in relation to their biophysical and biochemical properties.

The authors have adopted the useful device of beginning with the simple building blocks, progressing to the larger molecules, and finally considering a number of biological systems of current interest. While this approach is useful from the standpoint of teaching, it inevitably reduces the coverage of any particular system, so that the specialist in a given field is likely to find relatively little of interest in his specialty. The book is illustrated with a considerable number of electron micrographs, x-ray diffraction diagrams, and line drawings, which, although generally of good quality, could, in some instances at least, have been chosen with a more critical eye.

After a short introductory chapter, the methods used in ultrastructural research are presented rather briefly. The essentials of the various methods of microscopy (phase contrast, interference, polarization, x-ray, and electron microscopy), spectroscopic techniques, and x-ray diffraction are outlined in a concise and readable form. Following this is a chapter on principles of molecular structure, beginning with simple atomic and molecular theory and progressing to a consideration of more complex aggregations, such as liquid crystals and gels, and their relation to the structure of water. The bulk of the book is taken up with a more detailed consideration of the roles of proteins, lipids, carbohydrates, nucleic acids, and mineral salts, the last-mentioned discussion being a discourse on mineralized tissues, both normal and pathological.

As would be expected, the authors are at their best in those chapters nearest to their own particular specialties, the lipid systems and mineral salts. The material in these various chapters is well presented, on the whole, but the more experienced worker in the field will be handicapped by the paucity of references, and the specialist will recognize various inaccuracies—for instance, the concept that the structure of native collagen is not easily reconciled with a macromolecular unit about 2800 angstroms in length. On the contrary, present results of refined physical chemical measurements and of electron microscopy are overwhelmingly in favor of such a unit. Again, the concept of linear aggregation of globular units in fibrogenesis is presented as an established fact, whereas in reality there are at least several important proteins in which there is no evidence for such a view, and in which, on the contrary, the available data are strongly in favor of highly asymmetric rodlike monomeric units.

On the whole, the book is a useful addition to the literature in this field, but it could reasonably be argued that its rather general title should have been reserved for a very much more comprehensive work.

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Medical Sociology. Theory, scope and method. Norman G. Hawkins. Thomas, Springfield, Ill., 1958. xx + 290 pp. $6.75.

The most appropriate comment about this book is given by the author in the foreword: "This book is not intended to be read lightly, nor is it intended for light readers. . . . Nor is this intended

as a treatise which will establish a grand new unified 'system' with carefully elaborated postulates, propositions, and formal logic." Unquestionably it is a difficult book to read and one easy to criticize. The editorial work has not been of high quality, consequently loose statements have been allowed to remain. For example, in the chapter on "Methods of analysis," we find, "A normal distribution, in turn, is what happens when an infinite number of cases are arrayed by pure chance on an infinite straight progression of some quality" (page 167), and "Z^2 (the square of the standard deviation in a normal distribution)" page 197). These and similar statements detract from the value of the author's ideas on the proper application of statistical methods.

Aside from its editorial shortcomings, this work suffers from lack of organization, as the author apparently realizes. The order of presentation consists of an "Introduction," in which medical sociology is defined as the behavioral science specialty which encompasses demography and is concerned with the study of mental disorders and chronic disease in the population, of hospital structure and utilization of medical services. The next chapter, on the "Matrix of man," is devoted to theoretical considerations and an attempt to integrate concepts of culture theory with those of physiology. For some reason, here, he feels he must attack Darwin and Freud. This chapter is followed by one which summarily reviews studies dealing with ageing and with diseases such as schizophrenia, alcoholism, and tuberculosis; by another mainly concerned with rules of conduct for the medical sociologists who become involved in interdisciplinary studies; by another which briefly discusses social changes and health problems; and, finally, by the chapter on "Methods of analysis" already mentioned.

In brief, this book is a series of essays based on the author's own work and reflections on the work of others, with a number of good, bad, and indifferent ideas in varying stages of maturation thrown at the reader. The author has obviously read widely in public health.

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Elementary Statistical Physics. C. Kittel. Wiley, New York; Chapman & Hall, London, 1958. x + 228 pp. $8.

The field of statistical mechanics and kinetic theory is one which finds many applications in the description of both microscopic and macroscopic physical phenomena. Much of the variety of application of these fields is reflected in this book—an expanded set of lecture notes—by Kittel. Unfortunately there are many topics of major interest that are not included, and those subjects that are treated are frequently given a sketchy analysis.

Several of the topics discussed here that are not found in any other book on statistical mechanics or kinetic theory are the concept of negative temperature, the representation of random noise by a Fourier series, the Wiener-Khintchine theorem, the Fokker-Planck equation, the Onsager relations for irreversible processes, and the Kramers-Kronig relations. The treatment given these topics, although brief, might be stimulating enough to prompt students to pursue the various topics further. However, there are many topics of at least equal or even greater importance that have been omitted. Among these are the theory of imperfect gases and cooperative phenomena and methods useful in the theory of liquids, such as the use of the radial distribution function and the methods pioneered by Kirkwood, Born, and Green.

It is difficult to recommend this book because of its many omissions and because of its uncritical approach to the problems of statistical physics. The statistical approach to physical problems is fraught with subtlety, little of which appears in this book. Perhaps a book on calculation methods of statistical physics is needed; a really good one would have to be far more complete than this, both in philosophy and in coverage.

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Information Indexing and Subject Cataloging: Alphabetic: Classified: Coordinate: Mechanical. John Metcalfe. Scarecrow Press, New York, 1957. 338 pp. $6.50.

The best advice that a trained librarian can come up with for the tyros determined to standardize and to mechanize the retrieval process is that old jingle from New York horsecar days (page 211),

"Punch brothers, punch, punch with care,
Punch in the presence of the passengaire."

To suggest caution is always good advice to give but awkward to follow. Of what should one be cautious? John Metcalfe, an eminent Australian librarian, has done his best to map the byways frequented by unwary librarians and now unduly popular among documentalists. This makes the advice even harder to take, for the past mistakes of others never seem similar to one's own newest and dearest project.

Until now, no trained librarian has deigned to define and to evaluate the new field of documentation in terms of library systems. As long as machines are designed to retrieve bibliographic references, the particular worth of library experience should be recognized and exploited. For hundreds of years, librarians have tusseled to get the right book to each and every would-be reader. They have acquired understanding of the tricky process whereby people ask for one thing while wanting another.

Metcalf starts with fundamentals. What is being classified or indexed? Is it existing information about various subjects, or are the subjects themselves being classified? On this simple-appearing dichotomy have foundered many retrieval systems, of both library and documentation types. The organization of all knowledge is the chimera that has seduced them. Metcalfe (page 199) takes J. W. Perry particularly to task on this point: "We do not choose a genus or class for such things as dogs because it is more natural, or scientific or permanent; this is the talk of Bliss and the metaphysical 'order of the sciences' school. We choose it because there is general literature on the genus and special literature on its species, whether it is a genus or class of animals, for example, by their anatomy or by their use."

Tailoring a classification scheme to the needs of a particular collection was the example set by the Library of Congress, and today this method still has many skillful practitioners [see S. Herner and R. S. Meyer, "Classifying and indexing for the special library," *Science* **125**, 799 (1957)].

Another necessary distinction is between finding information and communicating information, or between "indication" and "communication," as Metcalfe expresses it (page 25). Indication consists in describing information in a particular physical form, with word clues for the limited purposes of retrieval. Fortunately, it is not necessary to communicate the information itself in order to perform retrieval successfully.

There is a big difference, linguistically and logically, between providing references to documents where there is a high probability that the answer will be found and providing actual answers to a question. One difference is that the latter requires full sentence structure while the former does not. If this difference between indication and communication was generally understood by documentalists, it would not have been necessary for the logician Yehoshua Bar-Hillel to deliver a homily on the subject [Y. Bar-Hillel, "A Logician's reaction to recent theorizing on information search systems," *Am. Document.* **8**, 103 (1957)]. This article may seem to be a negative contribution, but then clarity and con-