

answers to many of their questions. University teachers should take account of the book, which brings an up-to-date factual account of insect physiology within the reach of all undergraduates. It will allow teaching to concentrate more on the processes of research, on how we plan our observations and measurements and how we interpret them to reach the conclusions so persuasively and simply expounded in this book.

G. C. VARLEY

THE FUNCTIONAL UNIT OF LIFE

Allgemeine Cytologie:

Eine Einführung in die Funktionelle Morphologie der Zelle. Von Prof. Ekkehard Grundmann. Pp. viii + 423. (Stuttgart: Georg Thieme Verlag, 1964.) 59.70 D.M.

TO-DAY the gulfs in our ignorance are widening because the quantity of information forthcoming is so great. The more we learn the more we realize how little we really know. Even in his own field of study the scientist must restrict his attentions to a relatively small area.

True progress in science, however, depends on integrated knowledge, which can be provided by reviewing the relevant information in a comprehensive manner. The part played by those responsible for 'synthesizing' scientific information becomes more and more important, but their task also becomes more difficult due to the increasing amount and complexity of the information they have to handle. This is probably the reason why, nowadays, monographs are usually written by several authors, each having a restricted interest and knowledge of the subject under review. As a consequence, these 'monographs' tend to lack uniformity and leave many gaps in our knowledge.

Allgemeine Cytologie is the work of one author who is well known in the field of cell morphology, pathology and cytochemistry. The sub-title indicates the scope of the book; it is intended as an introduction to the functional morphology of the cell. According to Prof. E. Grundmann, the cell is the 'ultimate' organized unit of life and therefore knowledge of it is essential to all who are studying or are interested in biological sciences and medicine. Commencing with the discovery of the cell, the review is all-embracing, and it would seem that every structure and particle which have ever been seen, named or described by cytologists, pathologists, geneticists, cytochemists or electron microscopists, are given space in the book. This gigantic task involved the use of about 3,000 references. There is no doubt that the book is a valuable source of information on everything which concerns the cell.

After a brief historical review, the reader is introduced to the architecture of the cell; 100 pages are devoted to the nucleus, a similar number to the cytoplasm and even more to the various processes of cell division. In presenting his information the author follows a definite pattern: first he deals with the morphology, then with the chemical structure or composition of the particular cell constituent, and finally he discusses its function and relationship to other units of cellular metabolism. Prof. Grundmann tries hard to be objective, and as a consequence the text is full of references. It is not a rare occurrence to come across sentences broken at two or three places with the names of several authors. The reader might question the value of the references to descriptive works of the nineteenth century which occur throughout the book. What is the advantage, apart from a purely historical interest, of knowing who first saw and named the astrophere, sphäroplasma, holschisis, kinoplasma, paragenoplastin, archoplasma, or phragmatoplast? The author's attempt to ascribe roles to them is frequently based on

either circumstantial evidence or only assumption. Considering the vast field of information which is summarized in the book, it is not surprising to find, occasionally, a certain lack of critical judgement. The fine structure of the chromosome and the modern concept of DNA replication are discussed in seven pages, while twice as much space is given to 'amitosis', a special type of nuclear division, the occurrence of which is restricted to particular cells. On the other hand, the author deserves praise for the short chapters (Rückblick) in which topics previously described are summarized, the important findings are pointed out and attention is directed to the gaps in our knowledge concerning this particular subject.

Technically, *Allgemeine Cytologie* is well produced, the illustrations are clear and the diagrams are informative. The references are in small print and occupy 50 pages in double columns. There is a comprehensive subject index which makes access to information an easy task.

Next year it will be the three hundredth anniversary of the discovery of the cell. In *Micrographia* (1665) Robert Hooke published two pictures showing "minute bodies" in cork; to him they resembled little empty compartments with firm boundaries. During the ensuing 300 years similar "empty compartments" have been observed to contain the most astonishing array of structures, each with a purpose in cellular function, now well summarized by Prof. Grundmann. His monograph is a fitting tribute to the forthcoming tricentenary.

P. C. KOLLER

CELL BIOLOGY

The Cell: Biochemistry, Physiology, Morphology

Edited by Jean Brachet and Alfred E. Mirsky. Vol. 6: Supplementary Volume. Pp. xiv + 564. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1964.) 128s. 6d.

THIS is the sixth volume of a large and important treatise on cell biology which has been published over the past five years. Its six articles are concerned with topics which were either absent from the earlier volumes or were only touched on briefly.

The first two articles are on the Protozoa. K. G. Grell discusses their nuclei, and W. Trager their cytoplasm. Both authors give a certain amount of space to protozoan physiology, but their main emphasis is on structure, dominated in Trager's article by the recent work with the electron microscope. There is no doubt that a knowledge of Protozoa ought to be more widespread among cell biologists. They show many interesting variations on the common pattern of higher cells and they should be as helpful as invertebrate physiology has been in the development of mammalian physiology. To take two examples, Trager points out that the kinetoplast may provide important clues about the development of mitochondria and the nature of independent organelles, and the abnormal nuclear divisions of many Protozoa (Grell has striking photographs of these in *Aulacantha*) may help us to relate the amitotic division of bacteria to true mitosis.

J. R. Raper and K. Esser give an excellent account of the fungi. In the comparatively short space of a hundred pages, they deal clearly and comprehensively with the genetics as well as the morphology and the complex patterns of life-cycles and sexuality. Fungi, like Protozoa, are a group which should not be left only to the specialists. Although *Neurospora* and yeast have been worked on widely, there are many other fascinating organisms among the fungi. It may well be, as the authors suggest, that they are going to provide the best material for solving the central problem of differentiation.

Another good and comprehensive article (the longest in the book) is that by S. F. Jackson on connective tissue cells. She discusses this subject at all levels, from molecules