Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 333 Jay Street, Brooklyn 1, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Biological Ultrastructure. By ARNE ENGSTROM and J. B. FINEAN. Pp. ix + 326 with many figs. and tables. New York: Academic Press Inc. 1959. Price $8.

Research on biological ultrastructure seeks to explain biological function in terms of molecular architecture. It is one of the most interesting and rapidly growing fields at the present day and one in which most research workers are too busy with experiments to write books. Hence the present monograph, written by men who have themselves made original contributions to the field, is welcome and fulfills a definite need. It is written primarily for students of biology and medicine, but it also contains much information useful to physicists and chemists interested in biology.

The book begins with a general introduction to the methods of investigation, such as modern optical and electron microscopy, spectroscopy and X-ray diffraction. This is followed by a chapter on the nature of the chemical bond, together with a little lattice theory and some glimpses of colloid science, all written for readers without knowledge of either chemistry or physics. The section on X-ray analysis covers fourteen pages and is well balanced, though it would have helped the reader to have the text on Fourier and Patterson projections illustrated by figures. The section on birefringence, on the other hand, is so brief and lacking in illustrations that it would be extremely difficult for any newcomer to gather the principles involved. One statement which might be corrected in later editions concerns the nature of the hydrogen bond, which the authors wrongly define as being due to resonance of the proton between the two atoms to which it is linked.

In the main part of the book the authors deal with proteins (90 pages), lipids (58 pages), polysaccharides (11 pages), nucleic acids and nucleoproteins (25 pages) and mineral salts (19 pages). Most of these chapters are interesting and well balanced. The section on fibrous proteins, for instance, gives a lucid account of the vast array of experimental facts and of the few structural models we have to account for these. X-ray work on globular proteins is given a thoughtful and interesting description, with very few inaccuracies noticeable to the specialist, though the paramount biological importance of enzymes might have received greater emphasis. In their section on muscle the authors relate structural, chemical and physical data as well as the short space permits, but more stress might have been laid on the very convincing evidence in favour of the sliding mechanism of muscle contraction discovered by H. E. Huxley and Jean Hanson and by A. F. Huxley and F. Niedergerke.

n a later edition the pictures of amino-acid structures might perhaps be changed. These take the form of drawings of space-filling models which convey little information and might well be replaced by pictures giving bond distances and angles. The picture of cystine should also be modified, as it does not take account of the dihedral angle of the S–S bond.

The chapters on carbohydrates and mineral salts are well presented, but the best is undoubtedly the section on lipids, a subject to which one of the authors has made notable contributions. The structure and function of lipoprotein membranes is one of the most important and intractable of molecular biology. It is interesting to read of the great progress made in unravelling the delicate fine structure of nerve membranes and the complex chemistry of the phospholipids which are needed to build them. Unfortunately lipoproteins are too labile to be extracted intact and crystallized for X-ray analysis, and it may be a long time yet before biological membranes are understood in molecular terms.

The chapter on nucleic acids and nucleoproteins is disappointing. The literature describing the exciting progress made in the last few years is duly quoted, but one is left with the impression that it failed to excite the authors. The genetic implications of Watson and Crick's model of DNA, the most important result, from the biologist's point of view, which X-ray analysis has yet produced, are mentioned only in passing. The part dealing with viruses is somewhat marred by the authors' lack of familiarity with that subject.

Summing up, it may be said that the book is carefully written and accurate in most, if not all, details and that it contains much useful information not previously collected in one place. As an introduction to newcomers it suffers from a certain lack of enthusiasm and over-cautious scepticism which makes this exciting new field appear in various shades of grey rather than in brilliant colours of light and dark. Ingenious structures which are now supported by an overwhelming weight of evidence, like for instance the α-helix or the double helix of DNA, are treated in the same aloof manner as Meyer and Misch's structure of cellulose, which is known to need revision. There is much to be said for accepting what is surely right and rejecting what is demonstrably wrong, even at the risk of making an occasional mistake. Thus the book instructs rather than inspires, but it deserves to be widely read all the same.

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