

MEMBRANE ULTRASTRUCTURE

The Membranes

Vol. 4. *Ultrastructure in Biological Systems*. Edited by Albert Dalton and Francoise Haguenu. Pp. xiv + 223 + 90 plates. (Academic Press: London and New York, August 1968.) 116s 8d.

THIS book does not appear to represent any attempt to provide a comprehensive view of the ultrastructure of cellular membranes or to present a particular theme. It simply collects together a new combination of four groups of authors interested in membranes and presents their electron micrographs and their comments in the high quality production that we have come to expect from Academic Press. J. F. Danielli writes a brief foreword in which he comes to the conclusion that the four chapters are "typical of the massive experimental attack now being made on cellular membrane structure", and he then proceeds to mention some equally important investigations and some preliminary thoughts on a basic theory of lipid membranes.

There is a short chapter (32 pages) by Glauert and Lucy which summarizes their published electron microscope studies of negatively stained lipid systems and their speculations concerning the possible significance of globular micelles of lipid in cellular membranes. Another short (32 page) chapter by Guy-de-Thé provides a very compact summary of cytochemical techniques as applied to electron microscopy and observations relating to the general localization of enzyme activities, particularly of phosphatases, in relation to cell membranes. The illustrations are mainly from avian and tumour tissues and do not resolve membrane details.

The longest chapter (87 pages) is probably also the most useful in that it brings together, perhaps for the first time, most of the observations of Benedetti and Emmelot on the liver plasma membrane with special emphasis on morphological aspects. These authors attempt to relate morphological features to chemical, enzymatic and immunological information in order to produce an image of the plasma membrane that is of molecular significance. In addition to their own data (14 references) they also make extensive reference (176 references) to the studies of other workers.

In the fourth chapter, Sjöstrand (30 references) presents a comprehensive picture of membranes as seen at the highest available resolution, together with extensive criticism of the arguments and conclusions of others (30 references). Although Sjöstrand claims to be fully aware of the limitations of electron microscopy with respect to providing a true picture of the molecular organization of the intact, hydrated membrane, he still persists in equating the overall dimension of the trilamellar feature seen in sections with the thickness of the membrane.

J. B. FINEAN

CAT NERVES

Composition of Peripheral Nerves

By Ian A. Boyd and Mary R. Davey. Pp. viii + 57. (Livingstone: Edinburgh and London, 1968.) 30s.

THIS slim monograph describes the nature of the myelinated nerve fibres supplying fifteen hindlimb muscles of the cat. One of the main contentions is that two types of fusimotor (γ) fibres are distinguishable in terms of threshold, conduction velocity, range of total diameter and thickness of myelin sheath. The myelin of the large, 4.5 μ -8.5 μ diameter γ fibres is described as 1 μ -1.5 μ thick as opposed to 0.3 μ -0.6 μ thick in the smaller, 2 μ -5 μ diameter ones, axon diameters in the two groups varying over a largely similar range. Myelin thickness was measured "to the nearest 0.2 μ " with a light microscope in samples of "undistorted" fibres selected from paraffin

sections. As it is impossible to measure accurately below 0.5 μ under these conditions, the exercise of arbitrary judgment in such a classification is inevitable. For it to be convincing the measurements would have to be made from low-power electron micrographs of de-afferented nerves in which there were no grounds for suspecting the presence of thinly myelinated fibres regenerating after ventral root damage. This possibility cannot be ruled out in some of the nerves analysed, because the faster rate of regeneration after damage by crushing fibres, as opposed to cutting them, is not taken into account. Even if these flaws in methods are ignored, however, the thesis does not stand up to close scrutiny, particularly if one compares the data with versions published previously and realizes that much of the de-afferented material is common to all. Four of the six cats on which the results are based (cats 2-5) were the subject of a similar analysis (as cats 8-11) published in 1962. Moreover, work by others indicates that fibre size is not a significant feature of γ duality, as there is a considerable overlap in conduction velocity between the functionally distinct static and dynamic fibres, and there is good evidence to suppose that these supply trail endings and p₂ plates, respectively, to the spindles.

The afferent component of the muscle nerves is described as forming 40 per cent or 60 per cent of the total supply. Nerves with 40 per cent are said to supply muscles in which most of the afferents innervate spindles and tendon organs, whereas the higher proportion in other nerves is attributed to afferents arising from other types of receptor located either inside or outside the muscles, though no attempt is made to check on outside sources. There may be something in this idea, though it should be noted that the afferent counts given for the tibialis posterior nerve are suspiciously high, suggesting that some articular nerves may have been included with the muscle nerve in error. Also the interpretation would be more convincing if there was some discussion about soleus (designated as 40 per cent afferent), because other workers estimate that 30 per cent of the myelinated afferents supply free endings in cat and rat soleus, including over a third of group II fibres in cat.

The conviction with which the authors pursue their γ story through thick and thin beyond the limits of optical resolution does not encourage confidence in the results. Many will regret that the value of this monograph is impaired by flaws in method and lack of wider discussion.

D. BARKER

PLANT HORMONES

Molecular Control of Plant Growth

By J. Eugene Fox. (Dickenson Series on Contemporary Thought in Biological Science.) Pp. x + 118. (Dickenson: Belmont, California, June 1968.) 23s 6d.

THE object of this volume in the series on Contemporary Thought in Biological Science is to provide for teachers and undergraduates an introduction to the areas of research in plant hormones that are currently under active study. Ten papers have been culled from five journals over the past eleven years. Of these ten, four come from *Plant Physiology*, three from *Science* and one each from *Proceedings of the National Academy of Science*, *Phytochemistry* and a Society of Experimental Biology symposium. All but one describe work carried out in the United States.

The papers have been grouped into four sections, one each on auxins, gibberellins, cytokinins and the fourth on phytochrome and florigen. There is a short foreword to each group, indicating the reasons behind the choice of papers and their importance in relation to present lines of research. The papers then follow in unabridged form.

Although this type of volume is guaranteed to stimulate the interest of students new to the field of plant growth