BOOK REVIEWS

The Lively Membranes

R. N. ROBERTSON
Cambridge University Press, Cambridge, 1983, pp. 206, £12.50 cloth, £4.95 paper

This is unashamedly a highly personal book, which presents a partial, albeit illuminating, treatment of biological membranes and their constituents. The organization of the subject matter is fairly typical of the four or so texts already in bookshops, but is unique in so far as it tackles the topic at a distinctly more elementary level than its potential rivals. Of the eleven chapters in all, the first few are devoted to a description of the molecular structure and dynamics of membrane molecules. This leads to a description of the role of membranes in energy-transducing processes, and the final chapters conclude with a description of a selection of specialized membrane functions, such as active transport of solutes, excitability and signal transmission, membrane biogenesis etc. An attempt to put membranes into a proper evolutionary context, a device favoured by the philosophically inclined, is appended at the end. Indeed, throughout the text the author is keen to project the subject in an historical perspective and frequently presents his own position at times of major developments in the field.

The most distinctive feature of the book, however, is the conscious and determined effort to conceptualize the dynamic (lively) aspects of the assembled molecules that comprise cell membranes. The favoured device is to employ space-filling atomic models whenever possible, particularly of the lipid constituents. Needless to say, the book is very well illustrated, with 77 of the 191 pages of text devoted to diagrams containing these models, electron micrographs and the like, each with a comprehensive and informative legend. The success with which a sense of motion of the molecules can be conveyed to the reader is necessarily limited by the medium and cannot compare with the author's highly respected film on membrane dynamics associated with mitochondrial energy transduction. Where the text does come to grief, however, is where the sizes of intrinsic membrane proteins are depicted relative to the dimensions of the lipid bilayer. This could have been judged from the size of membrane-associated particles observed in electron micrographs of freeze-fractured specimens, but a wealth of more direct measurements of particular proteins and protein complexes is now available. The size and/or relative molecular masses of photosystems I and II coupled with their associated light-harvesting chlorophyll–protein complexes and of complexes III and IV of the mitochondrial inner membrane, for example, are all shown to be 2–3 times smaller than their true size relative to the lipid bilayer. A glance at the cover of issue number 5887 of Nature will go some way to convince the sceptic on this point. There are also some minor omissions. An opportunity of illustrating the fluidity of membrane lipids by more direct reference to the classical immunocytochemical evidence was missed, and consequently the foundations of current ideas of membrane protein dynamics are left largely unexplained. The treatment of some topics is also slightly dated; the direction of ribosomes to membrane sites on the endoplasmic reticulum is described without reference to the signal sequence of membrane and secretory proteins.

The author provides a very candid postscript listing some of the defects he sees in the book, including many oversimplifications and failure to get to grips with protein conformational changes. In many view, however, the book does succeed where we both agree in that it is bound to stimulate the interest of first-year and possible more mature undergraduates in some of the wider disciplines in the subject of biological membranes. For the more advanced or enquiring students a useful and comprehensive list of up-to-date references is provided for each of the chapters.

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Publications Received

Biochemical Research Techniques: A Practical Introduction, J. M. Wrigglesworth (Editor), John Wiley and Sons, Chichester, 1983, pp. 239, £15.75

Biochemistry of Lactation, T. B. Mepham (Editor), Elsevier, Amsterdam, 1983, pp. 500, $119.25

The Biochemistry of Membrane Transport, I. C. West, Chapman and Hall, London, 1983, pp. 80, £2.95


Cardiac Metabolism, A. J. Drake-Holland and M. I. M. Noble (Editors), John Wiley and Sons, Chichester, 1983, pp. 552, £39.50


Methods of Biochemical Analysis, Volume 29, D. Glick (Editor), John Wiley and Sons, New York and Chichester, 1983, pp. 507, £66.00


Safety Requirements for the First Use of New Drugs and Diagnostic Agents. A Review of Safety Issues in Early Clinical Trials of Drugs, Council for International Organizations of Medical Sciences, Geneva, 1983, pp. 61, S.Fr. 15.00

Secondary Metabolism and Differentiation in Fungi: Mycology Series, Volume 5, J. W. Bennett and A. Ciegler (Editors), Marcel Dekker, New York and Basel, 1983, pp. 496, S.Fr. 190.00
