Physical Chemical Aspects of Cell Surface Events in Cellular Regulation

CHARLES DE LISI and ROBERT BLUMENTHAL (Editors)

Elsevier/North Holland, Amsterdam, 1979, pp. 393, $45.00

One of the manifest virtues of the Singer–Nicolson fluid-mosaic model of the cell membrane was that it provided tangible means whereby the membrane could act as a transducer of information. Signals received by membrane-spanning proteins and glycoproteins could result in significant biochemical events on the other side of the Davson–Danielli lipid-bilayer palisade. The fluid-mosaic model was, of course, erected in part to account for this known function of biological membranes and drew on evidence, both structural and functional, for transmembrane communication in its formulation. Nevertheless, its appearance was a considerable stimulus to work in the field of ligand–receptor interactions and the volume under review gathers together recent contributions in a number of areas where refinement of experimental technique has provided data sufficiently precise and extensive to permit analysis by the techniques of the theoretical physical chemist. It contains the formal papers together with some 60 pages of transcribed discussion of an international conference held at Bethesda in October 1978. The avowed aim of the conference was to catalyse interaction between specialists, both theoreticians and experimentalists, in an apparent diversity of disciplines and the Proceedings contain papers reflecting this spread of interests; he would be indeed well informed who could profusely detailed acquaintance with the experimental systems from neurobiology, endocrinology, immunology, pharmacology and toxicology treated in the various sessions of the meeting. However, the role of the plasma membrane as the cell’s primary sense organ runs throughout the whole and should permit the reader to emerge Theseus-like having threaded the labyrinth.

The kernel of the book is probably represented by a number of papers dealing with mathematical and physical models of membrane–ligand interaction, and its consequences (J. Schlessinger), a computer model of membrane fluidity (L. Finegold), reversible binding of bivalent antigen (A. S. Perelson) and a random-hit model by coupling (R. N. Bergman et al.). These are intermixed with experimentally based papers dealing with systems in which physiological function and molecular geometry have been highly correlated, such as the calcium pump of the sarcoplasmic reticulum (A. E. Shamoo), with ‘clean’ cell-agonist interacting systems, such as insulin with cultured cell lines (P. Demeyts), and with definitely ‘dirty’ systems such as the activation of B lymphocytes by anti-immunoglobulin G antibodies (D. G. Sieckmann et al.). The papers are generally self-contained and authoritative. Unusually full references for this type of publication will enable the reader ready access to the literature of any unfamiliar field, should he so wish. The reprinted discussion, jokes from the Chair and all, are in the main pertinent and highlight strengths and weaknesses in the formal papers. The constraints of rapid publication have left some marks on the book. Not all the camera-ready scripts deserved that epithet and the worst is no pleasure at all to decipher; the index is a joke. Nevertheless, the contents of the book make a stimulating read, and it is to be hoped that, for example, the immunologist who may be attracted to the last section of the book will find time at least to dip in elsewhere so that the cross-fertilization of the original meeting may continue to yield fruit in the scientific community at large.

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