fore valuable and successful on its own terms. It is, however, mistitled; it should have been given a more modest title such as "Aspects of the History of Twentieth Century Physics," for, in common with every similar volume published to date, it does not satisfy the need for a general historical overview of 20th-century physics. This is beyond doubt one of the greatest challenges facing contemporary historians of physics, or physicists qua historians, and one is therefore slightly disappointed that the Varenna lectures, taken together, do not make greater progress in this respect. The production of a more comprehensive and balanced history of 20th-century physics might well serve as the major goal and organizing principle for some future conference of historians, philosophers, political scientists, and physicists.

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Membranes

Structure of Biological Membranes. Proceedings of a symposium, Skövde, Sweden, June 1976. SIXTEN ABRAHAMSSON and IRMIN PASCHER, Eds. Plenum, New York, 1977. xii, 580 pp., illus. $49.50.

Faced with the prospect of reviewing yet another volume on membranes one is tempted merely to praise the book rather than to read it. In the last few years, at least four small paperbacks have appeared that are suitable for an undergraduate interested in an overview of the field, and many volumes have been published on specialized aspects of membranes—bioenergetics, structure, ion transport, biochemistry, and spectroscopic techniques. Yet we have been at a loss to know what book to recommend to a graduate student, postdoctoral fellow, or colleague who wanted to read brief, authoritative accounts of these topics. This volume of symposium proceedings is timely in that it deals with all these topics.

Perhaps recognizing that genius is "a gift for clever theft," the organizers of the conference selected as speakers scientists who have been clever in taking from physics and chemistry the concepts and techniques necessary to understand the structure and function of biological membranes. Consider the subject of bioenergetics. The chemiosmotic hypothesis of Peter Mitchell has produced both some of the most acrimonious debates and some of the most elegant experiments in biology in the last decade, and the power of the hypothesis in interpreting energy transduction in chloroplasts is amply documented by Avron, Pick, Shahak, and Siderer in this book. We were amused to learn that one can actually induce the emission of photons from the photosystem by "proton gradient-induced-reverse-electron-transport," an impressive testimony to the reversibility of the various reactions involved and to the predictive power of the hypothesis. The reconstitution approach to studying energy transduction, an approach that has yielded some of the strongest experimental support for the chemiosmotic hypothesis, is illustrated in the chapter by the preeminent workers on this subject, Eytan, Schatz, and Racker. The fluidity of mitochondrial components is reviewed by Hackenbrock, and cautionary notes indicating that the gradient of the electrochemical potential of protons might not be the only coupling factor in chromatophore membranes from photosynthetic bacteria and in mitochondria are sounded by Baltscheffsky and by Ernster, Asami, Juntti, Coleman, and Nordenbrand respectively.

The contributions dealing with physical "probes" of membrane structure (nuclear magnetic resonance [NMR], electron paramagnetic resonance [EPR], and fluorescence) emphasize the special problems that membranes, being heterogeneous, anisotropic systems, pose for the interpretation of the experimental results. The elegant contribution of Ehrenberg, Shimoyama, and Ericksson deals with the extraction of dynamic information from EPR spectra of spin-labeled lipids. They show how isotropic models that are widely used to interpret membrane data give quantitative results an order of magnitude different from those obtained from more realistic models. The contribution of Cullis, Kruijff, McGrath, Morgan, and Radda deals briefly with NMR and with a new technique, positron annihilation, but its emphasis is on the problems of interpreting fluorescent probe measurements. In particular, the authors point out the important problem of "clustering" of probes. Brûlet, Humphries, and McConnell present some interesting preliminary results on the effect of hydrocarbon phase transitions and cholesterol on the complement fixation of model membranes but point out that the observed effects (or lack of effects) are very sensitive to the nature of the spin-label probe employed.

All the contributions cannot be considered in detail here: we merely note that the book contains carefully written chapters authored or coauthored by the well-known investigators Chapman, Cadenhead, van Deenen, Luzzati, Metcalfe, Ovchinnikov, Skou, Stoeckenius, Tanford, and Vanderkooi.

The volume is dedicated to Hermann Träuble, whose death soon after the conference robbed the membrane field of one of its most brilliant and productive scientists. His chapter on membrane electrostatics, which is mainly theoretical, illustrates the many roles that diffuse double-layer potentials can play in biological phenomena. The book is a fitting memorial.

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Cellular Immunology

Lymphocyte Differentiation, Recognition, and Regulation. DAVID H. KATZ. Academic Press, New York, 1977. xii, 750 pp., illus. $24. Immunology.

One of the more thought-provoking aspects of current bioscience is the division between the chemical and the biological traditions. Each has its cultural norms, its own standards of required precision, its peculiar genre of publication output. Recent developments in the two chief branches of immunology research, the molecular and the cellular, illustrate the point well. The molecular tradition gives us precise amino acid sequences and x-ray crystallographic pictures of the antibody molecule, and it is beginning to address the structure and organization of the immunoglobulin genes. At first sight, the cellular tradition seems more untidy. Its attempts to make sense of the big scene, to grapple with the physiology of this exquisitely regulated molecular recognition and learning system, seem clumsy and imprecise. The contrast is deceptive, however, because, shining through the mass of pedestrian literature in cellular immunology, the perceptive can readily identify lines of activity that are capitalizing on classical insights. The division of lymphocytes into the two great families, the regulatory role of T cells in antibody formation, the "one cell, one antibody" rule, the genetics of immune responsiveness, the cellular mechanisms whereby the immune system distinguishes "self" from