Book Reviews

Immunological Phenomena

Cold Spring Harbor Symposia on Quantitative Biology. Vol. 41, Origins of Lymphocyte Diversity. Papers from a symposium, Cold Spring Harbor, N.Y. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1977. In two parts. xxxviii, 902 pp., illus. + indexes. $60.

Anyone interested in immunology will want to read this major collection of papers, which marks the state of immunological understanding in 1976. The whole package is bound by an introduction by N. K. Jerne and a summary by G. M. Edelman, each of whom offers the reader a characteristic brand of history, philosophy, and futurology.

"Lymphocytes are a diverse group of cells," says the first line of the opening paper. By p. 902 the persistent reader will also be aware of the diversity of immunologists and of their views. Almost 20 years after Burnet's hypothesis concerning clonal selection, immunology is showing the characteristics of a mature discipline without having lost any of its youthful enthusiasm. This volume describes at least as many new phenomena as were described in the 1967 volume, but the confidence with which the phenomena are explained has grown. One might even speak of overconfidence, since there is an air that almost any explanation is possible for novel findings.

The volume largely reflects the extensive growth of cellular immunology. From the novelty of the division of lymphocytes into two classes, T and B cells, immunologists have progressed to the classification of many subsets of T and B cells. There has been a concomitant realization that many immunological phenomena can be understood as results of interaction between lymphocytes. Simple ideas of direct interaction by cell-cell contact or interaction mediated by an antibody molecule appear to have been drowned in a sea of factors. The diversity of factors is most strikingly illustrated by the table in which J. Klein compares the properties of the B cell activation factors reported to date.

In striking contrast, the wealth of detailed information about antibody molecules clearly points to the only sure way forward for immunology. A firm foundation for the subject must rely on detailed molecular studies. Even the advanced studies of antibody molecules are by no means complete, however, and for many other immunologically important molecules this volume documents merely the first steps in their detailed study. Perhaps the discovery of the structures of the products of the major histocompatibility locus will, in the next few years, yield as much insight into immunological phenomena as has information on the structure of antibodies. There is certainly no shortage of questions to answer. One of the most intriguing concerns the linked recognition of the products of the major histocompatibility complex and other surface antigens in killing that is mediated by cytotoxic T cells. Despite various plausible explanations, one is left wondering whether some vital new piece of information is needed before an obvious solution will emerge.

The extent to which antibody diversity is generated on an evolutionary time scale and the extent to which it is generated on a somatic time scale is not yet clear, but in this volume proponents of the two sides of the argument express their views stridently. "Network" emerges as the fashionable word for the discussion of antibody or lymphocyte diversity. The idea that antibodies form a closed self-regulatory system of idiotype–anti-idiotype interactions is intriguing and experimentally productive. Whether networks will provide the ultimate description of immune phenomena or merely prove to be a laboratory curiosity may be clear by the time of the next Cold Spring Harbor Symposium.

The last section of the volume relates some of the exciting advances in the molecular genetics of the antibody system, including reports of direct studies, at the nucleic acid level, of the number and arrangement of antibody genes. It is fitting that these studies, which mark the beginning of a more satisfying understanding of the immune system, conclude a volume that, overall, describes a few more steps toward such an understanding.

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Brain Biochemistry

Cyclic Nucleotides in the Nervous System. JOHN DALY. Plenum, New York, 1977. xiv, 402 pp., illus. $32.50.

Cyclic AMP (adenosine 3′,5′ cyclic monophosphate) has provided a unifying mechanism for the study of the actions of a variety of hormones. This single molecule initiates the tissue-specific response to hormones of many different types of cells. Sutherland, Rall, and co-workers have shown that the mammalian brain contains large quantities of cyclic AMP as well as the enzymes catalyzing both the hormone-sensitive synthesis and the degradation of cyclic nucleotides, and Rall and his co-workers have identified compounds that cause accumulations of cyclic nucleotides in preparations of intact brain tissue. Although these experimental approaches continue to be used, the complexity of the nervous system has hindered efforts to elucidate the functional role played by cyclic nucleotides therein. In peripheral tissues, cyclic nucleotides are usually implicated in only one or two well-characterized tissue-specific responses to hormones. Brain, however, is a tissue of diverse physiology and biochemistry, and it is thus not surprising that cyclic nucleotides have been implicated, with varying degrees of certainty, in a number of biochemical or physiological aspects of brain function.

John Daly has provided an extensive overview of the physiology, biochemistry, and pharmacology of cyclic nucleotides in the nervous system. The monograph has three main parts. First, the enzymology of the cyclic nucleotides and cyclic-nucleotide-dependent protein phosphorylation are discussed. This section is concise, and it introduces all the concepts that have attracted experimental interest in the past 15 years. The second section is concerned with the numerous factors that cause the accumulation of cyclic nucleotides in preparations of intact neural tissue. This is the aspect of cyclic nucleotide metabolism that Daly and his co-workers have studied. Since considerable interspecies variability exists, the discussion is organized on the basis of species, brain region, and finally test compounds. A considerable quantity of data are presented in this section, but few general principles emerge; rather, the differences between species and brain regions are highlighted. Nonetheless, a compilation of this information in a single, indexed volume is useful. The third section describes the numerous physiological phenomena in which a reg-