This book should provide a very useful function as a source of information on iron and copper proteins for some time to come. It is certainly recommended for use in libraries and research laboratories.

D. O. HALL

The Generation of Antibody Diversity: A New Look

A. J. CUNNINGHAM (Editor)


The origin of the complexity and wide range of antibody production in vertebrates in response to the injection of a foreign antigen has stimulated speculation and experimentation ever since the phenomenon was recognized at the end of the last century. When the structure of antibodies became known and the range of specificity and combining affinity could be defined in terms of amino acid sequences in the variable regions of heavy and light chains, interest in the genetic origin of all these structures reached a crescendo. Most of the current ideas and relevant information were summarized admirably by Cohn & Lennox in their article in the Annual Review of Biochemistry (1967), and they coined the phrase Generation of Diversity, or GOD. There then followed a lull as the topic became rather tedious by repetition without novelty.

This new monograph, edited by A. J. Cunningham, was therefore scrutinized first for fresh approaches—and there are several described—that have been developed and carried through successfully over the last few years. The question remains the same, of course. Are there millions of genes in the germ line, of animals capable of an immune response, able to code for all the different antibodies produced, or are there a much smaller number that are increased greatly by somatic mutation during the lifetime of the animal?

The most direct approach to this question is to estimate the number of germ-line genes by DNA hybridization techniques with antibody light-chain or heavy-chain messenger RNA or complementary DNA made from it. This is an exacting method, which misled some early experimenters, but workers in several laboratories have overcome most of the difficulties, and here Tonegawa & Steinberg describe well-controlled experiments with mouse λ-chain in RNA that suggest strongly that there are only a few germ-line genes and hence that somatic mutants must be an important feature of the immune response. A following article by Williamson & Fitzmaurice, however, draws attention to the uncertainties in interpretation that remain. Another new approach described is the development by Pasquier of genetically identical frogs and a study of their antibody response to several antigens. Here the close similarity of antibodies formed to a given antigen by frogs that are identical genetically, with obvious differences in outbred frogs, suggests that in amphibians somatic mutation plays little or no role in the production of antibodies.

And so it goes on, the theoretical arguments and the good experiments leading to contradictory conclusions. The 12 articles in this book are brief, generally clear and will certainly interest the many aficionados of this problem. An excellent book for these biochemistry students who are beginning to believe they understand immunology, it should leave them the clear promise that there is at least one well-defined problem of fundamental importance in biology that their teachers are unlikely to solve before they have the chance to get at it.

R. R. PORTER
A nice presentation explaining mechanisms in generation of antibody diversity.

11. Generation of antibody diversity

To understand the diversification mechanisms in antibody generation, we must know the genetics in immunology, regarding...

1. Multigene organisation of Ig genes
2. Variable region gene rearrangements (VJ & V(D)J recombination)
3. Mechanism of recombination

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