P·U·B·L·I·C·A·T·I·O·N·S

LECTINS: KEYS TO MICROBIAL ADHERENCE

Microbial Lectins and Agglutinins: Properties and Biological Activities. **Edited by David Mirelman. Pp. 443. ISBN 0-471-87858-8. $57.50 (John Wiley & Sons, Inc., NY: 1986).**

The first cell agglutinating proteins were discovered in castor beans by Stillmark in 1888. Twenty years later the microorganism *Escherichia coli* was shown by Guyot to agglutinate red blood cells. In the 1950s protein agglutinins came to be called lectins and were shown to bind carbohydrates in a specific manner. After nearly 100 years of research, lectins from a variety of sources have been well characterized with respect to their sugar specificities, molecular structures, and biological activities in heterologous (and artificial) systems. A conclusion drawn from reading *Microbial Lectins and Agglutinins: Properties and Biological Activity* is that we are closer to understanding the biological function of a number of microbial lectins than we are for the more fully characterized plant lectins.

Lectins are found in microorganisms as diverse as viruses and fungi, and may be their chief means of intercellular recognition. Agglutinin-like molecules may also play a central role in determining the pathogenicity of bacteria, mycoplasma, and protozoans. Attempting a summary of the state of knowledge about the hundred or so identified microbial lectins is an ambitious undertaking. David Mirelman has assembled twenty chapters from 45 authors into a rewarding, comprehensive volume which should have wide appeal.

Coming from a background of plant molecular biology and "lectinology", I was impressed by the body of knowledge accumulating about microbial lectins. The need for a survey volume on this subject is acute, and Mirelman's compilation fills the void. Perhaps more plant lectin researchers will find the book an interesting introduction into a new but related field. As a collection of state-of-the-art reviews, it is more valuable to persons outside its area than a symposium volume would be.

There is a good balance between the molecular and the more descriptive, cytological approaches to the study of microbial lectins. However, the level of background knowledge assumed varies from chapter to chapter. For example, in the rather long section on cellular slime mold lectins, authors Rosen and True do a commendable job of explaining terminology and methodology. The chapter by Jungery and Weatherall on *Plasmodium falciparum* attachment with its clear illustrations gives the uninitiated reader an introduction to the life cycle of this malarial parasite before attacking the complexities of its glycoprotein binding proteins. On the other hand, the chapter by Loffler and Svanborg-Edén on glycolipid receptors of *E. coli* lectins may be difficult to follow for those not familiar with glycolipid structure and terminology.

For molecular biologists, there are chapters on *E. coli* adhesins and myxobacterial hemagglutinins that are laced with descriptions of lectin genes and their controlling elements. Immunologists may find the chapter on structure-function analysis of gonococcal pili by Schoolnik, Rothbard and Gotschlich to be of interest. Studies of antibodies raised to synthetic gonococcal pilus peptides could lead to the development of a gonorrhea vaccine.

Much of the book is devoted to organisms that may cause disease in humans. Clinicians with interest in the mode of attachment of pathogens to their host will find portions of the book relevant to their work. The chapter about the role of lectin in the attachment of the protozoan *Giardia lamblia* to the small intestine is a case in point. Understanding the mechanism of attachment of a parasite affecting up to 25% of the world's population should be a high medical priority.

Overall, the volume is very well-planned, and its scope is appropriate. The chapters have individual tables of contents which make locating a specific topic easy. Reproductions of photomicrographs and gel photos are of high quality. A minor flaw is the editor's decision not to use inclusive pages in the Reference sections.

There is a noticeable attempt throughout the book to include the most current data and approaches. As an example, Zusman, et al. present future directions for their research on myxobacterial hemagglutinin (MBHA) and add a note in proof about the recently deduced structure of the agglutinin. Found in nature as a monomer, MBHA is exceptional. As a rule, lectins must be multimeric in order to agglutinate cells. MBHA has four almost identical domains, each with carbohydrate binding capacity. Because it is functionally multivalent, it can agglutinate erythrocytes as a monomer polypeptide.

Microbial Lectins and Agglutinins is recommended reading for many in the life sciences. It will probably become the definitive first text for an expanding discipline.

Les Hoffman is a senior research scientist at Agrigenetics Advanced Science Company, Madison, WI.

ELECTRON MICROSCOPY WITH A DIGITAL FLAVOR

Advanced Techniques in Biological Electron Microscopy III. **Edited by James K. Koehler. Pp. 277. ISBN 30540-16400-6. $66.00. (Springer-Verlag Berlin: 1986).**

With the development of high quality easy-to-use microscopic equipment over the past 20 years, many biologists learned EM as part of their graduate education and carried out sample preparation and imaging themselves. However, the revolution in digital image analysis, new developments in electron imaging hardware, and an array of new preparation techniques that better preserve native structures have transformed EM into a specialization that often requires extensive training in an array of different disciplines. Similar to modern X-ray diffraction and NMR spectroscopy, projects requiring EM are increasingly becoming collaborative ventures between technically trained researchers who spend most of their time with the instrumentation, and those investigators who have a need for specific data to complement other biological studies. It is this latter group to which this reviewer is most sympathetic.