

## BOOK REVIEWS

### Adsorption of Microorganisms to Surfaces

Edited by **Gabriel Bitton** and **Kevin C. Marshall**, Wiley, New York, 1980. 432 pp., illus. \$32.50.

One tends to expect good books on a subject to provide a good synthesis of the concepts involved in it. The need is especially there if the book is intended as an introduction to a subject emerging to wider recognition and renewed interest. In that regard, the book is only moderately successful; but there is enough to whet one's appetite.

Perhaps a more representative title reflecting the book's content might be, *Adhesion of Microorganisms in Natural Habitats*. Most of the volume is concerned with the attachment of viruses and microorganisms within their ecosystems and on epithelial surfaces. The chapters are sequenced very nicely. The early part of the book includes three articles meant to deal with general considerations. One of these, by Stacy L. Daniels of Dow Chemical, discusses the variables affecting the sorption of microorganisms to surfaces and the kinetics and mechanisms postulated to describe the process. R. E. Baier (Calspan Corp.) delves into the role of critical surface tension and other surface energy parameters. The author also presents a discussion of surface chemical-physical analytical methods; I am sure of their value to those interested in working in this field. The surface components involved in the attachment of viruses, bacteria, and, briefly, fungi, algae, and protozoa are reviewed by William A. Corpe (Columbia University). Although various studies have described the involvement of secreted polymeric materials and fibrillar materials, the author properly notes the lack of critical experiments in defining the nature of attachment.

The association of microorganisms with intestinal surfaces is discussed in two chapters by Adrian Lee (Univ. of New South Wales) and Dwayne C. Savage (Univ. of Illinois, Urbana), respectively. In the context of these chapters, "associated with" implies both the microorganisms that adhere to the animal cells and those that occupy the mucin overlaying the cells. Although there is some overlap in the topics covered, the two chapters complement each other well. Both contain some excellent micrographs of microorganisms associated with epithelial surfaces. Lee expands on the normal flora associated

with the gastrointestinal tract of rodents and the mechanisms and the consequences postulated. Savage discusses the mechanisms by which bacterial pathogens might succeed or fail in colonizing the intestinal surface. He also provides a chronological view of the literature findings with *Vibrio cholerae* and *E. coli*. Hubert N. Newman (Eastman Dental Hospital, Univ. of London) reviews the accumulation of organisms on oral surfaces. The current understanding of oral ecology is presented with special emphasis on the bacterial attachment to teeth and the role of polysaccharides and glycoproteins in cell adhesion. The subject of plaque prevention is also considered, but with appropriate brevity considering the main subject of the book.

Accumulation near and adhesion to root surfaces and other plant tissue is dealt with by Frank B. Dazzo (Michigan State U., formerly Univ. of Wisconsin). Specific and nonspecific mechanisms are noted along with a discussion of the implications of the microbe-plant interaction.

Gabriel Bitton's chapter on viruses in the water and wastewater treatment processes expands on the fate of adsorbed viruses during the various stages of these processes. Dr. Bitton (Univ. of Florida) provides a view of the quantitative studies describing viral adsorption and removal in wastewaters and sludge solids, including those examining the phenomena during land application of these virus associated solids. Protection of viruses against environmental stresses is also considered.

Attachment of microbes onto inorganic and organic particle surfaces in fresh waters is the subject taken up by Hans W. Pearl (Univ. of North Carolina). The use of Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) and other methods in studying these associations is expanded on and should be useful to other workers in the field. Microbial attachment to soils and sediments is briefly touched upon by Kevin C. Marshal (Univ. of New South Wales).

Considering that the book is meant to be an introduction, a worthwhile endeavor for this field, two of the most fitting chapters are those on techniques involved in the study of attached microbes (J. W. Costerton, Univ. of Calgary) and on "microbial adhesion in perspective" (Marshall and Bitton). My only criticism of these two chapters is that there should have been more. A section on enumeration of attached microbes, to cite one example out of several, surely deserves more than a mere half-page. The "perspective" chapter (3 pages only) is good in that it at least attempts to start the synthesis of some concepts. The idea of presenting some methods as appendices is a good one.

There are plenty of literature references in the book (over 1600, without correcting for multiple citations) which partly reflects its review article character at times. Overall, it is a useful book worthy of attention by those interested in the study of microbe-surface interactions. It does have its limitations, however.

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## Dehydrogenases Requiring Nicotinamide Coenzymes

Edited by **Jonathan Jeffery**, Birkhauser Verlag,  
Basel-Boston-Stuttgart, 1980, 276 pp.

Dehydrogenases represent an important class of enzymes from the standpoints of their physiological significance and their applied potential for biochemical transformation. Inasmuch as our knowledge and understanding of the structure and function of dehydrogenases has grown dramatically over the past several years, the subject of the book and its timing are certainly adequate.

The book includes seven reviews on various aspects of dehydrogenases requiring nicotinamide coenzymes. The first article by J. Jeffery deals with dehydrogenase kinetics. In addition to a clear and informative general consideration of kinetic mechanisms and experimental approaches involved, it contains brief examples of pertinent data for such enzymes as aldehyde dehydrogenase, 3 $\alpha$ -hydroxysteroid dehydrogenase, estradiol 17  $\beta$ -dehydrogenase, alcohol dehydrogenase, sorbitol dehydrogenase, glyceraldehyde-3-phosphate dehydrogenase, and glutamate dehydrogenase. The second article written by C.-I. Brändén and H. Eklund is devoted to a discussion of the structures and mechanisms of liver alcohol dehydrogenase, lactate dehydrogenase, and glyceraldehyde-3-phosphate dehydrogenase. It represents a critical and comprehensive survey of the area and definitely is one of the highlights of the book. The chapter entitled "The specificity of dehydrogenases" by J. Jeffery excellently describes general concepts on the specificity of dehydrogenases for NAD, NADP, their analogs, substrates and their analogs, and also gives specific examples. The fourth chapter of the book authored by H. Jörnvall deals with primary structures of dehydrogenase. It discusses extensively evolutionary changes in individual dehydrogenases and draws possible relationships among them. The next article entitled "Pyridine nucleotide-disulfide oxidoreductases" by A. Holmgren is a comprehensive review of metabolic functions, structure, and enzymatic mechanisms of lipoamide dehydrogenase, glutathione reductase, and thioredoxin reductase. The sixth paper of the book deals with various aspects of fatty acid synthetases. The authors, S. S. Katiyar and J. W. Porter, give a detailed and useful summary of this complex but interesting area of enzymology. The concluding chapter written by W. E. Brown and V. W. Rodwell presents a detailed review of hydroxymethylglutaryl-CoA reductase. Although this topic is rather specific, its presence can be justified by the biochemical, physiological, and medical interest in the enzyme.

The overall impression is that the book contains much valuable biochemical material that is well classified and clearly presented. The selection of the topics appears to be quite logical and appropriate, although some significant aspects are regrettably missing, e.g., formate dehydrogenase, which certainly deserves attention owing to both its purely biochemical and its potential applied significance. The book is adequately illustrated and has a fairly good index.

Nearly all the articles are presented in the style of a critical review. In my opinion, the book will be a very useful and stimulating source for those working in the fields of enzymology, bioorganic chemistry, and enzyme technology.

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