adherence in the Gram-negative organisms appears to be well documented, again because of the relative ease with which fimbriae can be removed in a biologically active form. However, determining the molecular basis of the activity of fimbriae has not been as easy because extraction procedures often inactivate the active molecules or result in such a complex assortment of adhesive substances that analysis for the active component is difficult. Many of these problems also occur in the attempts to determine the nature of the host-cell receptor. Thus, many of the data presented concerning the interaction between Gram-negative fimbriated organisms and host cells come from studies that rely upon hapten inhibition and enzymatic hydrolysis, both of which may lead to erroneous conclusions. In many studies, a hemagglutination test is used despite the observations that adherence to erythrocytes often appears to be mediated by different bacterial adhesins and host receptors from those mediating adherence to epithelial cells. The problems in the interpretation of these types of experiments are well illustrated in chapters 9 and 10, which cover much of the same ground but with clearly differing conclusions. Thus, Watt and Ward (chapter 9) conclude that adhesion of *Neisseria gonorrhoeae* is mediated by hydrogen bonding along the sugar moieties, whereas Pearce and Buchanan (chapter 10), citing similar evidence, conclude that the interaction is more specific and involves a lectin-like receptor.

I was happy to be introduced in chapter 9 to the use of DLVO (Derjaguin-Landau-Verwey-Overbeek: long-range attraction) theory as a way of explaining the affinity between two like-charged cells. The difficulty of explaining such affinity is discussed in some detail in the introductory chapter by Ofek and Beachey. Of most interest to me was their discussion of the adhesion of the Gram-positive organisms, particularly the streptococci. Although the authors suggest that teichoic acids are important in the attachment of these organisms to epithelial cells, the difficulty of removing the surface components of the streptococci without denaturing them suggests that the complete story has not yet been written. Thus, the book is thought-provoking, and, best of all, I learned something.

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A Regulatory Protein

Calmodulin and Cell Functions. Papers from a conference, New York, May 1980. D. MARTIN WATTERSON and FRANK F. VINCENZI, Eds. New York Academy of Sciences, New York, 1980. xii, 446 pp., illus. Cloth or paper, $86. Annals of the New York Academy of Sciences, vol. 356.

Calcium ions have long been implicated in the regulation of such biological processes as contraction, motility, secretion, metabolic adjustment, and cell proliferation. Recently it has become evident that their effects are mediated through a family of structurally related Ca^{2+}-dependent regulatory proteins of common evolutionary origin. Whereas some representatives of this family are specialized and are found only in certain tissues (for example, troponin C in muscle tissue), calmodulin is apparently found in all nucleated cells and serves as a general receptor for the Ca^{2+} signal. Since its discovery a decade ago as an activator of brain cyclic nucleotide phosphodiesterase, calmodulin has been "rediscovered" by a number of investigators as a protein factor that could enhance Ca^{2+} activation of the particular biological system under study. The present book is an attempt to summarize current research on calmodulin and to define future research areas.

Since the conference of which the book is the proceedings attracted representatives of most of the major laboratories involved in calmodulin research either as featured speakers or to give poster presentations (abstracted in the volume), the objective of summarizing current research has certainly been met. Also, many of the papers contain speculative sections that point to possible future developments. Although the quality, scope, and thoroughness of the contributions vary greatly, the standard is generally high, and it would be impossible in a short review such as this to do justice to the many excellent papers contained in the volume. Suffice it to say that the significance and role of calmodulin in the regulation of neurotransmission, cyclic nucleotide metabolism, membrane transport, calcium levels, and smooth muscle contraction are dealt with very adequately by a number of authors.

In addition there are several interesting contributions dealing with such topics as structure-function relationships and mode of action of calmodulin (Jamieson *et al.*, Drabikowski *et al.*, Nairn *et al.*), comparative studies of calmodulin and calmodulin-like proteins (Van Eldik *et al.*), and the isolation and molecular cloning of a portion of the calmodulin gene (Munjaal *et al.*).

Though unavoidably out of date, the book complements the several excellent reviews recently published on the subject because it fills in the details of experimental manipulations and approaches that cannot be found in those reviews. For this reason and because it provides easy and organized access to the calmodulin literature, the book will be extremely useful, and indeed "a must," for anyone who considers entering the field. It will also appeal to anyone generally interested in the regulation of cell function.

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After the Lesson Plan. Realities of High School Teaching. Amy Puett Emmers. Teachers College Press (Columbia University), New York, 1981. xviii, 190 pp. Cloth, $19.95; paper, $10.95.

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(Continued on page 944)