

repetition. Figures and reproduction of typescripts are generally good. Some of the manuscripts could have used more extensive editing. In general, however, the book gives a good account of a very exciting meeting. It is strongly recommended for the library of those studying or intending to study halophilic or salt-tolerant microorganisms, who will find the experimental detail most useful. The review chapters will give the general microbiologist a good background in

the subject (though many by the same authors have been published recently in such sources as Microbiological Reviews and Advances in Microbial Physiology.) The book should be in university or departmental libraries but not necessarily in those of all individual microbiologists or biochemists.

D. J. Kushner

### *A Double Image of the Double Helix*

by Clifford Grobstein

W. H. Freeman; San Francisco, 1979

xii + 177 pages. £ 6.90 (hardcover), £3.50 (softcover)

This short history of the debate of the merits and hazards of recombinant DNA research will annoy those in the field and confuse those outside it. Much of the text is reprinted from the United States NIH documents on recombinants; there is little acknowledgment that the rest of the world exists, either scientifically or politically. The author comes down against regulation on philosophical grounds and discusses laboratory risk in detail, but industrial and military dangers hardly at all. Any book in a rapidly moving field like this is sure to be out of date when published, but in this case it is a particular pity that the author did not discuss hazard analysis of the type suggested by Sidney Brenner, which allows any dangers from

recombinant DNA to be put in perspective with other microbiological and chemical hazards. The flowery language of the book will irritate scientists, who are used to more direct writing. Radicals will be interested in the statement that physical attractiveness, personality and intelligence are 'polygenic' characteristics (page 61); intelligence may be debatable, but physical attractiveness? By the time the more interesting speculations at the end of the book are reached, most readers, I feel, will have been sufficiently offended by one or another of the views of the author to stop reading. This interesting field deserves better.

Bob Williamson

### *Specificity of Embryological Interactions*

Edited by D. R. Garrod

Chapman and Hall; Andover, 1978

xii + 274 pages. £15.00

It is a widely held view that during development the position that cells come to occupy is determined by their adhesive properties, and that specificity of

adhesion could account for the patterning of cells including neural connections. This excellent volume fairly represents the range of current views on this

problem. Noden reviews the migration and differentiation of neural crest cells. What determines their pathway and final state? He concludes that this is largely determined by interactions with their environment, and while proteoglycans may be involved, the nature of the interactions is unknown. So too are the interactions in the formation of nerve connections so well analysed by Gaze. He considers three main classes of mechanism for the establishment of the ordered pattern of connections between retina and tectum and points out some of the confusion concerning the concept of neuronal specificity. While concluding that neurones carry markers, he points out that there is no evidence that selective adhesiveness plays any role in the process of ordering.

Steinberg reviews his differential adhesion hypothesis which can account for the sorting of different cell types when they are mixed together. In this theory, the cells are assigned a surface energy which varies as a scalar and which can be used to predict the behaviour of mixtures at equilibrium. The relation of this parameter to specific ligands is discussed. Lilien and colleagues approach the problem in terms of the molecules that may specifically interact, in the classic lock and key fashion of enzyme and substrate, to provide cell adhesion. Evidence of the role of sugars is presented, based largely on aggregation studies. Models based on ligands and receptors are attractive but unproven. This is particularly clearly seen from the review of Rosen and Barondes on the cellular slime moulds. While Gerisch's group have

evidence for two types of attachment sites, their own work implicates carbohydrate-binding proteins, lectins, and the relationship between them is not known. The best evidence for an aggregation factor comes from sponges, which are reviewed by Turner, but even here, the distinction between cell adhesion and cell recognition is not clear. The complexity of such systems is further emphasized by Curtis, who invokes diffusible morphogens which can diminish the adhesiveness of unlike cell types. My own conclusion was that while evidence for molecular specificity in cell adhesion is available, it is by no means established. One should remember that many types of cells can stick to one another, thus weakening the analogy with systems such as antigen—antibody and enzyme—substrate, that are our models for specificity.

The emphasis in this volume on cell adhesion, makes the title somewhat misleading. There is a large class of interactions in development, hardly considered here, which are concerned with the specification of cell state. Moreover, specific interactions do not require specificity at the cell surface. It is possible that many of the observed phenomena may involve cell-to-cell communication via gap junctions between the internal contents of cells.

The volume can be recommended to all cell biologists as well as to advanced students. The confusion will do them good.

Lewis Wolpert

### *Biomathematics and Cell Kinetics*

#### Developments in Cell Biology, Volume 2

Edited by A.-J. Valleron and P. D. M. Macdonald  
Elsevier/North-Holland; Amsterdam, New York, 1978  
xviii + 432 pages. \$67.25, Dfl 138.00

This volume contains papers presented at a workshop held in the University of Paris in early 1978. The papers are divided into seven categories: general mathematical and computer methods; modelling the cell cycle; development, differentiation and ageing;

diurnal rhythms; haemopoiesis models; tumour models; and flow cytometry methods. Basically, the papers explore the problem of describing in mathematical terms, and hence of predicting the properties of, an assembly of dividing cells of one type, first of all