taking into account merely that the cells are asynchronous, and that there may be correlations between the life expectancies of mother and daughter, or of sister cells. Further complications, such as senescence, differentiation, and diurnal rhythms, are then considered as perturbing factors.

This approach to cell biology is very valuable because of the important practical implications. For instance, irradiation and most cytostatic drugs preferentially kill cells in some phases of the cell cycle, and delay transitions in other cells to a greater or lesser extent. This often introduces a partial synchrony, so that a second treatment acts on a population of cells with a different distribution among the phases of the cycle from the original population. Clearly, it is important to be able in some way to take account of this in any manipulation of cell types. However, from the biochemist's point of view, it is unfortunate that most of the models presented in this volume use only the descriptive G_1, G_2, S and M labels for the phases. (Even here, one may note a stochastic model proposed by Hopper, which avoids the need to introduce the concept of a 'G_0' phase, which there is at present no physical means of identifying.) Only one paper makes any attempt to relate the phases to biochemical events, such as DNA replication; this is the satisfying discussion of Control of Cell Growth and Division by Alberghina and Mariani.

For most people one imagines that the chief value of the book will lie in the long and critical review of flow microfluorimetry by Zietz and Nicolini, who discuss this very important new technique for studying cell kinetics and biopsy material both in terms of the available instruments, and of the basic nucleic acid and protein chemistry which underlies the methodology. They also discuss the necessary mathematical techniques. To a non-specialist this review appears to be very helpful indeed.

J. H. Ottaway

Progress in Industrial Microbiology Volume 15

Edited by M. J. Bull
Elsevier; Amsterdam, New York, 1979
viii + 298 pages. $63.00, Dfl 129.00

This volume in the established series contains five chapters on diverse topics ranging from industrial enzymology, through microbial genetics to marine microbiology.

Taking these chapters in turn, the first on microbial β-glucanases by G. Halliwell mainly consists of a detailed review of cellulases, their composition, action and regulation. This is a good up to date review of a most complex area. Commercial scale production of glucose from cellulose using such enzymes would be highly desirable.

K. Venkatasubramanin and W. R. Vieth present a short, but important review of immobilised microbial cells. Whether in the long term these can hold off the competition from immobilised enzymes remains to be seen. Both types of system have advantages and disadvantages. Certainly it is tempting at present to use immobilised cells for many applications, but the biochemist's rôle should increase in the future.

W. M. Fogarty and C. T. Kelly present a long, comprehensive, most detailed and finely documented review of the distribution and characteristics of starch degrading enzymes. Volume 16 of this series is expected to publish Part II of this chapter, on biosynthesis, regulation and production of these enzymes.

Yeast genetics in industry by J. R. Johnston and H. Oberman is a most welcome review, related to the brewing and other industries. There is a strong interest now in this field in relation to genetic engineering techniques, and this review from Strathclyde and Lódź is timely and well written.

The final chapter on the microbiology of interfaces in the marine environment by P. S. Meadows and J. G. Anderson was justified especially by the editor in his preface, because of the economic implications of marine microorganisms. Certainly the

chapter seems to be slightly out of place in this volume, but basic studies in relation to applied and industrial microbiology must be brought to the attention of researchers and applicators.

This volume is of considerable interest to microbial biochemists especially in industry and does contain a selection of useful and timely material. The typesetting of the book however is not very attractive, nor easily read in some chapters.

A. Wiseman

Topics in Enzyme and Fermentation Technology: Volume 3

Edited by A. Wiseman
Ellis Horwood; Chichester, 1979
294 pages $43.00, £19.50

This work is the third volume in a series. It contains a short introduction by the editor and 5 reviews by specialists, all on topics of industrial importance in the expanding field of biotechnology. The series is timely because of the current increased interest in this field.

Professor S. A. Barker and Dr P. J. Somers discuss Uses of Anions in Enzyme Equilibrium Displacement. This is a subject of general interest in cases where the normally attained equilibrium gives a relatively low conversion of substrate to product, as happens for example in the production of fructose from glucose using glucose isomerase. Only 11 of the 49 references quoted are subsequent to 1973, and as many of the earlier observations are now considered to have been misinterpreted the authors clearly feel that much fruitful work could now be done on this subject.

Dr W. M. Fogarty and Dr C. T. Kelly discuss Developments in Microbial Extracellular Enzymes. Their review covers carbohydrate-degrading enzymes and proteases, and concludes with short sections on enzyme production and enzyme immobilisation. It provides an introduction for newcomers to what is now a very active field of development.

R. Scott discusses 'Rennets' and Cheese and this contribution includes a long introduction. The main text, of roughly equal length, is devoted to traditional and more modern methods of inducing coagulation. Inevitably this article is largely descriptive. It contains a large bibliography.

The most extensive review in the volume is by G. T. Banks, who provides 97 pages on Scale-up in Fermentation Processes. This is a very clear account, which identifies and discusses three main scale-up problems: development of the inoculum, medium sterilisation and aeration–agitation. Very little of the work discussed is recent, and most will be very familiar to the few who are regularly involved with scale-up. For others, newly interested in the field, this is a very fine introduction. The section on inoculum development should be mandatory reading for geneticists interested in producing industrial strains by the newer methods of genetic manipulation to emphasise the problems presented by culture degeneration to industrial microbiologists. Such difficulties are likely to be greater with some of the specially designed 'safe' microorganisms at present being used in genetic manipulation work.

The final review is a short essay on New and Modified Invertases and their Applications by Dr A. Wiseman, which demonstrates that this classic enzyme is still of interest both to academics and to industry.

K. Sargeant