

maltase complex can initiate the hydrolysis of  $\alpha$ -dextrin by removing  $\alpha$ -linked D-glucose residues from the dextrin, cannot be rationalized in the light of the known specificities of carbohydrases. The presence of a carboxyl group in the threonine residue in the sequence shown for the polypeptide of the isomaltase molecule is unexplained in the text.

In Chapter 6 (Cellobiases and Others), the discussion on cellobiase does not include information on the  $\beta$ -D-glucosidase from almonds. There is a large volume of literature on this disaccharidase, and some discussion of this enzyme would appear to have been in order.

In the last two Chapters (7 and 8), information on the biosynthesis, metabolism, enzymic deficiency, and malabsorption of food disaccharides has been assembled. The information is complete, and should be of value to investigators in the area of food disaccharides. However, there is little discussion of the enzymology of disaccharides and, particularly, of the nature and the properties of the enzymes involved.

In conclusion, this volume of *Developments in Food Carbohydrate* deals with only a small segment of carbohydrate enzymology, and only contains information on the enzymes of hydrolysis and metabolism of disaccharides. The depth of coverage of these topics is somewhat superficial and fragmentary. It is questionable if the book would be useful as a text book in either a beginning or an advanced course, although it could be used for supplementary reading-assignments in an advanced course on carbohydrates. In view of the specialized nature of the book, it is probably more appropriate as a purchase for Libraries than for personal collections. The price, for a book of only 211 pages, seems high.

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*Biotechnology: A Comprehensive Treatise in 8 Volumes, Volume 1, Microbial Fundamentals:* edited by H.-J. REHM AND G. REED, Verlag Chemie, Weinheim, 1981, viii + 505 pages + Subject Index, DM 4.95.00.

This is Volume 1 in a series that, rather dauntingly, refers to itself as a "comprehensive treatise in 8 volumes". Future volumes will have to decide whether this description can truly be applied to the series. This first volume, "Microbial Fundamentals", does not seem to be a perfectly adequate beginning for such a self-imposed mission. It contains a mixture of topics that every biotechnologist should know and, indeed, probably already does know, but which every budding biotechnologist will have a hard time learning from the light treatments given in this book. The emphasis overall is on the biology that can be used in connection with work employing large industrial vats. The editors choose not to consider agriculture, or the more fanciful,

but spectacular, promises, such as gene-replacement therapy, that modern, recombinant-DNA technology holds out for medicine. Although it may be unfair to say that the editors are "jumping on a bandwagon", it would be reassuring to know that the series was conceived before the discovery of recombinant DNA and genetic engineering made "biotechnology" a household word. In spite of the catchy title, this is not a book about future biological revolutions, but instead, a rather staid account of the innumerable, empirical facts that have been accumulated in the thousands of years since mankind first tasted beer.

Chapter 1, by A. Kockova-Kratochvilova, summarizes taxonomic principles as applied to bacteria and the industrially important, lower eukaryotes. The incredible variety of micro-organisms is always sobering to molecular biologists brought up to think that *E. coli* is the only bacterium. The chapter is probably sufficiently detailed for most uses but, as with most of the book, this reviewer doubts that it would be the source consulted in order to solve a real problem.

Chapter 2, by C. L. Cooney, is a list of straightforward methods for measuring microbial growth, a brief description of how growth is changed by such common variables as temperature, and finally, a limited attempt to generalize these observations into design of growth media.

Chapter 3, by H. W. Doelle, is entitled "Basic Metabolic Processes". This author has taken the book's subtitle seriously, and has made an obvious effort to be comprehensive. He takes us on a quick trip through thermodynamics, enzyme kinetics, redox potentials, membrane transport, and photosynthesis before getting down to the current business of summarizing what seems to be just about every metabolic pathway known to man. These are as hard to review as they are to remember.

Chapter 4, by J. F. Martin and P. Linas, describes the very interesting variety of biosynthetic pathways by which micro-organisms produce the "secondary metabolites" so important for the biotechnology industry.

Chapter 5 is split into four parts, all of which openly flirt with molecular biology. Chapter 5a, by R. P. Elander and A. L. Demain, gives a background of molecular genetics, and indicates how this knowledge could be applied to industrial micro-organisms. There is an interesting discussion of possible strategies that might be employed to bypass the various regulatory mechanisms, in order to increase yields of metabolites. Chapter 5b, by G. K. Jacobson, summarizes mechanisms of mutagenesis, especially those having industrial applications. Chapter 5c, by K. Esser and U. Stahl, describes both sexual and "parasexual" processes of hybridization by which strains could conceivably be improved. Chapter 5d, by A. Puhler and W. Heumann, is the only section in the book that is devoted solely to genetic engineering. The authors give a clear explanation of the fundamental techniques of recombinant DNA and cloning, and describe some of its present successes and future potentialities.

Chapter 6a, by K. Nakayama, gives a bird's-eye view of the biotechnology industry, which, as an outsider, I found very interesting. The author summarizes schemes for finding new, useful micro-organisms and for selecting and screening for desirable properties, and finally describes some of the problems in setting up actual

growth at the scale of a pilot plant. Chapter 6b, by A. Dietz, is a rather dreary summary of important methods for maintaining pure cultures and collections of cultures. Chapter 6c, by V. Vossius, describes the salient points in applying for a patent. Again, as an outsider, I found the chapter to be interesting, and I suppose that it is not out of place in a book about Biotechnology. It is not made quite clear how far the different rules apply to different countries, and, in any case, it seems sure that the rules will undergo change in the next few years; indeed, in some cases, they have already been changed because of recent court decisions.

Chapter 7, by A. Fiechter, the last in the book, describes batch, and continuous, culture methods for microbial cells, with a brief discussion of plant and animal cell-growths. The main emphasis, both theoretical and experimental, is on chemostat-type experiments for obtaining a careful definition of nutritional requirements.

Finally, who will buy the book? Besides those individuals or institutions who, by reflex, buy any book with "biotechnology" in the title, I suspect: not very many. It is difficult to tell from the titles of the remaining seven volumes whether the overall series will indeed merit the description of a "comprehensive treatise". The present volume does not. It is not the ultimate reference-book, but is nonetheless an interesting overview of a varied and important industry.

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