

## Book reviews

**Carbohydrate Bioengineering.** Edited by S.B. Petersen, B. Svensson and S. Pedersen, Elsevier Science Inc., New York, USA, 1995. xiv + 369 pp. Price \$203.25. ISBN 0-444-82223-2.

Biotechnological innovation, particularly in glycobiology and glycotechnology, has been significantly useful for extending our knowledge of new types of drug development for use against many diseases, ranging from microbial infections to cancer, and the application of carbohydrates in industrial sectors.

*Carbohydrate Bioengineering*, tenth volume of Progress in Biotechnology, was produced from the Carbohydrate Bioengineering International Conference in Elsinore, Denmark, April 23–26, 1995. This meeting assembled 230 scientists who are interested in carbohydrates, protein engineering of carbohydrate active enzymes and the industrial application of carbohydrates.

This book is divided into 3 major areas. The first section focuses on carbohydrate analysis and structure determination using NMR and mass spectrometry. The development of novel enzyme-based sensors, different bacterial enzymes involved either in carbohydrate metabolism or with potential applications in bioprocessing of special polysaccharides, and active site mutations, coupled with crystal structure and synthetic substrate analogue interactions, are also included in this section. Carbohydrate active enzymes becomes a predominant topic, presenting the structure, function, application and protein engineering of these enzymes. Examples are electrostatic studies of carbohydrates; the role and engineering of N-linked sugar moieties in protein stability; and the new three-dimensional structures and binding domains for biotechnological applications. Finally, it also covers industrial applications such as the production of carbohydrate-containing new materials, for example using monocomponent carbohydrates for the modification of plant materials, synthesis of fatty acid esters surfactants, and the utilisation of microorganisms in the commercial production of sugars derivatives.

Many valuable ideas are presented in this book and it could be an important source for biotechnological development, both at the present and in the future. Therefore, this book is useful for chemists, biotechnologists, technologists in industry and anyone who is interested in this subject.

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**Microbial Pentose Utilization—Current Applications in Biotechnology. Progress in Industrial Microbiology Volume 33.** By A. Singh and P. Mishra, Elsevier Science B.V., Amsterdam, The Netherlands, 1995. 401 pp. Price \$234.50. ISBN 0-444-82039-6.

The long term solution to the continuing problem of energy demand being met almost exclusively by petroleum, a finite supply, is still far from being available. The practical solution of utilising continuously renewable carbon sources is not yet an economic alternative for the production of many chemicals. The microbial utilisation of lignocellulosic materials for the production of fuel, foods and fine chemicals is an attractive approach as the biomass is readily available. Microbial utilisation of the lignocellulosic component pentoses, except in a few specific cases, is not possible to give a competitive industrial process. To fully exploit biomass for industrial processes, it is necessary to fully understand the metabolic pathways, genetics and molecular biology of the microorganisms capable of fermenting pentose and optimise the fermentation systems used for the bioconversion of the biomass to industrially relevant materials.

This book *Microbial Pentose Utilisation—Current Applications in Biotechnology* brings together in one concise volume the current knowledge in the biological and engineering aspects of lignocellulosic utilisation—fermentation technology as required for industrial processes. An overview of the problems, potential, biosynthesis and biodegradation of hemicelluloses and the extraction of the pentoses from the lignocellulosic material are initially covered together with biochemical information on the microorganisms. Kinetics of growth and product formation, together with details of the factors affecting product production and performance on natural substrates are presented. Information is provided on the microbial production of a number of industrially significant chemicals, including ethanol, acetone, butanol, 2,3-butanediol, xylitol, and organic acids such as acetic, lactic, citric and propionic. Single cell protein and single cell oil can also be produced microbially from the pentose substrate and this is also detailed. Methods to achieve genetic improvements of the pentose fermenting microorganisms and process evaluation and bioengineering are detailed in the final chapters.

This book has succeeded in bringing together, in a single volume, information and current research from the many disciplines involved in developing a technology needed for the economic industrial utilisation of biomass and the production of industrially relevant chemicals. The information is presented in an easy to