

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 glycotecnology, 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.

Pawadee Methacanon
John F. Kennedy

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

read format with good chapter subsections and index. Sufficient references are also included to enable further study where appropriate. This book is highly recommended for both industrial and academic scientists and engineers.

John F. Kennedy
Linda L. Lloyd

Trends in Carbohydrate Chemistry. Edited by P.L. Soni, Surya International Publications, India, 1995. v + 208 pp. Price £30.00 (hardback). ISBN 81-85276-53-6.

This book is a collection of papers delivered during the IXth Carbohydrate Conference which was held in Lucknow, India. The objective of the conference was to understand the biological properties of carbohydrates, and therefore the theme of the conference was "Carbohydrates in Biomedical Research". It seems that the contents of the book do not reflect the title of the book, *Trends in Carbohydrate Chemistry*. Most of the topics covered in the book discuss the chemistry of carbohydrates in relation with biomedical applications, i.e. more towards the biochemical, microbiological and potential usage as drugs.

Despite great effort being taken to produce this proceedings volume, the topics of the 35 papers presented during the meetings are not organised properly, based on the main subjects or areas. This might complicate matters for readers wanting to search any particular topic of their research interest. In fact some of the papers are too short and need further elaboration and explanation, particularly the methodologies employed in the particular works reported.

After going through the book a few times, the papers presented can be divided into several main sections: biomedical aspects of carbohydrates, structural studies of carbohydrates and industrial applications of carbohydrates. Papers on the synthesis and evaluation of a few carbohydrate derivatives, the synthesis of a trisaccharide repeating unit of the antigen from *Klebsiella* type 20, and other reports on the isolation of polysaccharides from microorganisms indicate the potential exploitation of bioactive components from living systems for the benefit of mankind. Another group of papers covers the structural aspects of carbohydrates, particularly with regard to NMR studies of oligosaccharides extracted from natural sources. The other few papers highlight the potential application of carbohydrates, such as marine algal polysaccharides and role of hemicelluloses in the pulp and paper industry.

Obviously this book is suitable to become another collection for those who have an advanced level of knowledge of carbohydrate chemistry. Although one cannot judge the book from the cover, the cover and earlier pages of any book can trigger readers to proceed

further, if they can find something relevant or interesting and have time to search. Nevertheless the ideas and information presented in the book can help other researchers and lecturers in carbohydrate chemistry to gain further input for improvement of the teaching and R&D aspects.

Wan Hasamudin
John F. Kennedy

Progress in Plant Polymeric Carbohydrate Research. Edited by F. Meuser, D.J. Manners and W. Seibel, B. Behr's Verlag GmbH & Co., Hamburg, Germany, 1995. xvii + 254 pp. Price DM 118. ISBN 3-86022-257-0.

This book presents an account of the current developments in the plant polymeric carbohydrates which was presented in Berlin during the 7th International Symposium on Plant Polymeric Carbohydrates.

It covers five main areas: their biosynthesis and structure, their rheological properties, their nutritional importance, their industrial applications and their chemical and enzymic conversion.

More than 60 presentations are published in this book. Actually, this is a publication of the second part of the Proceedings; the first part has already been published by the Royal Society of Chemistry in 1993.

The first section outlines the biosynthesis and structure of the polysaccharides of cereals, rice, beans, soya, etc. Also some enzymes responsible for their growth are analysed and characterised.

The second section considers their rheological properties. Novel methods are used for analysis and the physico-chemical properties are investigated.

In the third section the nutritional importance of plant polymeric carbohydrates are discussed. They are very useful in developing new energy-reduced diets, especially for patients after myocardial infarction. New biological sources are also investigated and the content of heavy metals in the polymers is considered as well.

The industrial uses of plant polymeric carbohydrates are very broad and are considered in section four. They can be used to produce biodegradable films and plastics because of their thermoplastic properties after processing.

In the last section chemical and enzymic conversions are discussed.

This book is an essential read for researchers in the food, polymer and biological sciences, nutrition, bioorganic chemistry and biotechnology. It is also an essential acquisition for industrial development laboratories, food manufacture plants and scientific and technical libraries.

Geert Jackers
John F. Kennedy