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All enquiries and manuscripts should be directed to:

Dr Alison Green
Australian Journal of Chemistry – an International Journal for Chemical Science
CSIRO PUBLISHING
PO Box 1139 (150 Oxford St)
Collingwood, Vic. 3066, Australia

Telephone: +61 3 9662 7630
Fax: +61 3 9662 7611
E-mail: publishing.ajc@csiro.au

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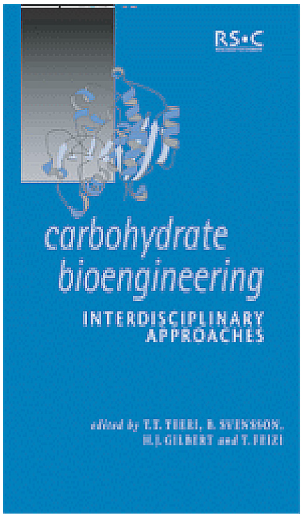
The Next Best Thing to Being There

*Peter Clements**



Carbohydrate Bioengineering: Interdisciplinary Approaches

Eds T. T. Teeri, B. Svensson, H. J. Gilbert and T. Feizi

Royal Society of Chemistry, Cambridge, UK.
2002, 196 pp.
ISBN 0-85404-826-X
Hardcover, 79.50 GBP.

If your field of work is in glycobiology or with enzymes that act on complex carbohydrates and you want to know about recent developments in the field you could not do better than to go to the conferences on carbohydrate bioengineering held biennially in Europe. However, for those who cannot get to such meetings, the next best thing is to read the proceedings. The 2001 conference was held in Stockholm and its proceedings are the subject of this volume entitled *Carbohydrate Bioengineering: Interdisciplinary Approaches.*

The volume, as a summary of the most recent developments in the many approaches used to study the enzymes that act upon carbohydrates, begins with a *tour-de-force* keynote presentation from Jakeman and Withers. They describe their selection for mutations of glycosidases in order to generate enzymes that can be used to synthesize specific oligosaccharides. This work demonstrates the depth of understanding of the mechanistic requirements for glycosidases that is a necessary prerequisite to engineer the desired changes that converted these enzymes into synthetic catalysts. Every carbohydrate chemist will know that the syntheses this makes possible would be difficult by synthetic chemistry routes.

The introductory chapter is followed by a section on structure/function studies, which includes the description of the crystal structure and mechanisms of a series of glycosyl-utilizing enzymes of significant importance. A common theme in this series is the various similarities and occasional departures from the $(\alpha/\beta)_8$ fold of the glycosidase/glycotransferase family of enzymes. Having set the scene with this background knowledge, the next sections include some engineering examples in the glucoamylases, including modifications to improve thermal stability. A section on carbohydrate domains and modules follows, including some interesting gene fusion work, which demonstrated an extended carbohydrate binding site and an intriguing development of designer nanosomes. Continuing the keynote theme in the next section, some studies on the use of enzymes to synthesize new carbohydrates followed. This section will be of particular interest to food technologists. Materials scientists will have an interest in this and the following section on plant cell wall carbohydrates. A section on informatics as it relates to the genomic information of carbohydrate enzymes completes the volume and, as a summary, it also presents the vast potential for the future of the field of glycobiology; in applications to whole systems or pathways of carbohydrate-modifying enzymes and their genes (glycomes).

This book is most useful in the entirely readable and well-illustrated text and in the wealth of reference material on carbohydrate enzyme mechanisms and structures.

Carbohydrate chemistry has been transformed from its beginnings as a 'difficult' area through an understanding of the enzymes that act upon sugars, into a science in which manipulations of structure by chemical, enzymic and genomic means can be performed. This volume displays a showcase of the techniques of glycobiology. As such it represents the peak scientific abilities in the carbohydrate bioengineering field. These will undoubtedly continue to form the basis of many commercially important processes, while at the same time contributing to the basic scientific knowledge of the structure and function of these enzymes.

* *Dr Peter Clements is the Principal Medical Scientist at the Women's and Children's Hospital, North Adelaide, South Australia (e-mail: clementsp@wch.sa.gov.au).*

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