

Bacterial Glycomics

Current Research, Technology and Applications



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Published: February 2012. **Pages:** x + 270

Hardback: ISBN 978-1-904455-95-0 £159, \$319

Published by: Caister Academic Press www.caister.com

Glycomics, the study of glycoconjugate assembly and expression in biological systems, is important in many areas of microbiology. Because glycans play such diverse roles in bacterial physiology, the field of bacterial glycomics is indispensable for the understanding of bacterial pathogenesis, metabolism and cell communities. Progress in bacterial glycomics is advancing rapidly due to improvements in analytical methodologies and the development of new and innovative approaches for glycan isolation, characterization and synthesis. Research in bacterial glycomics could lead to the development of novel drugs, bioactive glycans and glycoconjugate vaccines.

Written by a team of acknowledged experts, this book provides an up-to-date overview of our current understanding of bacterial glycomes, describes the main analytical methods in use and discusses recent and novel applications. The book is divided into three sections. The first section includes overviews of microbial glycoconjugates, lipopolysaccharide, capsular polysaccharide, lipoarabinomannan biosynthesis, cell wall metabolism, and glycosylation of bacterial and archaeal proteins. The second section reviews the analytical approaches used in the characterization of the bacterial glycome. The final section describes applications of bacterial glycomics, including metabolic oligosaccharide labeling, the synthesis of bioactive glycans and the potential for glycoconjugate vaccines.

Essential reading for microbiologists working in polysaccharide and carbohydrate research, the book is also recommended for carbohydrate experts, microbiologists, immunologists and researchers in many other fields of life sciences.

Chapter 1. Lipopolysaccharide Biosynthesis. *Leslie Cuthbertson*

Chapter 2. Biosynthesis of Capsular Polysaccharides and Exopolysaccharides. *Anne N. Reid and Leslie Cuthbertson*

Chapter 3. Control of Lytic Transglycosylase Activity within Bacterial Cell Walls. *John M. Pfeffer, Patrick J. Moynihan, Chelsea A. Clarke, Chris Vandenende and Anthony J. Clarke*

Chapter 4. Bacterial Flagellar Glycosylation Systems: Opportunities and Applications. *Susan M. Twine and Susan M. Logan*

Chapter 5. Bacterial N-linked Glycosylation Systems: Current Knowledge and Future Perspectives. *J. Cuccui, R.H. Langdon, M.G. Moule and Brendan W. Wren*

Chapter 6. Bacterial Lipoarabinomannan: Structure to Biogenesis. *Arun K. Mishra, Sarah M. Batt, Luke J. Alderwick, Klaus Futterer, and Gurdyal Singh Besra*

Chapter 7. Protein Glycosylation in the Third Domain of Life: the Archaea. *John F. Kelly and Ken F. Jarrell*

Chapter 8. Identification and Characterisation of Glycosylation in Bacterial Proteins. *Nichollas E. Scott, Stuart J. Cordwell, John F. Kelly and Susan M. Twine*

Chapter 9. Solid-state NMR of the Bacterial Cell Wall. *Catherine Bougault, Sabine Hediger and Jean-Pierre Simorre*

Chapter 10. Methods for the Analysis of Microbial Lipid-Linked Oligosaccharides By Mass Spectrometry. *Christopher W. Reid*

Chapter 11. Synthesis of 4-acetamidohexoses in Bacteria: Structural Insights from the Bacillosamine and Nonulosonic Acid Pathways. *Allan Matte, Ian C. Schoenhofen, Traian Sulea, Miroslaw Cygler and N. Martin Young*

Chapter 12. Application of Bacterial Glycosyltransferases in the Synthesis of Bioactive Glycans. *Warren Wakarchuk*

Chapter 13. Metabolic Labeling of Bacterial Glycans with Chemical Reporters. *Danielle H. Dube*

Chapter 14. Glycoconjugate Vaccines. *Robert Pon*

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