Dissecting Glycosylation Reaction Mechanisms

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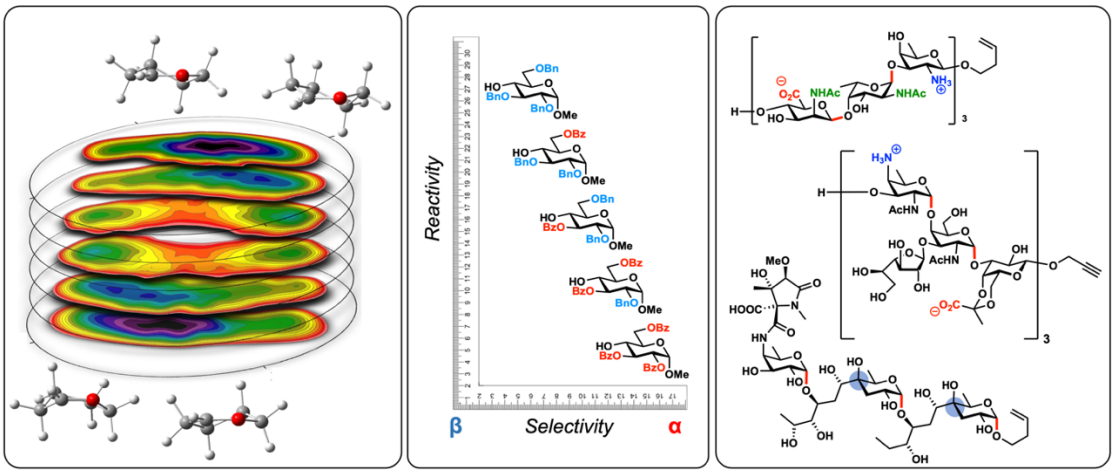
Synthetic oligosaccharides are invaluable tools to unravel their role in biological processes, as components of synthetic vaccines and in the development of carbohydrate-based drugs. Therefore, these fascinating molecules have been the subject of synthetic studies for decades. However, because of the huge structural variety in both the donor and acceptor building blocks there is no general glycosylation method to forge all possible bonds and it often is difficult, if not impossible, to translate glycosylation methodology from one system to another.

To expediate the synthesis of complex oligosaccharides and analogues a better understanding of the glycosylation reaction is imperative. The glycosylation reaction mechanism balances between S_N1 and S_N2 type substitutions and we will here present how subtle structural changes in carbohydrate building blocks impact the reactivity of the building blocks and as a result the stereochemical course of the glycosylation reaction. Using systematic sets of substrates, we have been able to delineate structure-reactivity-stereoselectivity principles and understand the stereoelectronic effects at play in glycosylation reactions.

These have been applied in the development of effective routes of synthesis to assemble complex bacterial glycans of which several illustrative examples will be presented.



European Carbohydrate Organisation

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