

8.4 Dr Gerd Wagner, University of East Anglia, Norwich ***Investigation of Cell Surface Carbohydrates***

My research group is interested in understanding the “machinery” biological cells use to “decorate” their surface with carbohydrate molecules. These cell surface carbohydrates are important for cell-cell interactions associated with a variety of diseases, e.g. chronic inflammation, infection and cancer. Understanding the events that lead to the biosynthesis of these cell surface carbohydrates at a molecular level will improve our understanding of these disorders and can help finding new therapeutic approaches.

We are preparing small molecules as “tools” to study the “cellular glycosylation machinery” at a molecular level. In the past year we have explored novel synthetic approaches towards the rapid generation of such small molecules. Unfortunately, the molecules that interest us usually have certain qualities which make them difficult to work with: they are highly polar, water soluble, and rather fragile. These properties complicate both their preparation and their analysis.

The EPSRC National MS Centre is crucial for our work, because it allows us to elucidate the structure of unknown molecules we have made, as well as confirm their integrity. In particular, we rely on the high-resolution mass spectrometry service provided to analyse the purity of our material. More common techniques for that purpose, like elemental analysis, are not suited for our molecules because they carry multiple charges, and the number of counterions (and consequently the elemental composition) can vary. In the past year, results provided by the EPSRC National MS Centre have allowed us to publish our results in scientific journals which demand such data as a prerequisite for publication. A particular highlight in this respect was the first published example of the direct cross-coupling of guanosine mono- and triphosphates.¹ We are now using these molecules as lead compounds for the development of novel inhibitors for glycosyltransferases as well as other glycoprocessing enzymes.

1. Collier, A., Wagner, G. K. A facile two-step synthesis of 8-arylated guanosine mono- and triphosphates (8-aryl GXPs). *Org. Biomol. Chem.* **2006**, *4*, 4526-4532.