GLYCODIVERSIFICATION: GLYCOSYNTHASES TOWARDS VARIATION OF FLAVONOID GLYCOSIDES

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Many naturally occurring glycosidic compounds are of high interest in pharmaceutical, food and detergent industry. The synthesis and analysis of these structures can, for example, help towards the development of new bioactive compounds (anti-viral or -carcinogenic compounds, etc.). The chemical synthesis and modification of complex glycosides can be very difficult by the many additional steps required for the regio-selective linkage of the numerous reactive hydroxyl groups of the carbohydrate moieties. In addition, high stereoselectivity in forming pure anomers is prerequisite in order to avoid difficult and lengthy purification of the synthesised product. New genetically modified glycosidases, namely ‘glycosynthases’, which are void of hydrolytic activity can catalyse glycosidic bond synthesis using activated glycosyl donors such as glycosyl fluorides, azides, or oxazoline structures. Since then, a large variety of glycosynthases have been developed and characterised capable of synthesising glycosides and oligosaccharides selectively in high yields.[1] In cooperation with the group of *Prof. Elling* (RWTH Aachen) and of *Prof. Fujiyama* (Osaka University) we are working on the identification and characterisation of glycosidases, their mutagenesis towards new glycosynthases, and possible applications in organic synthesis (Figure 1).[2]

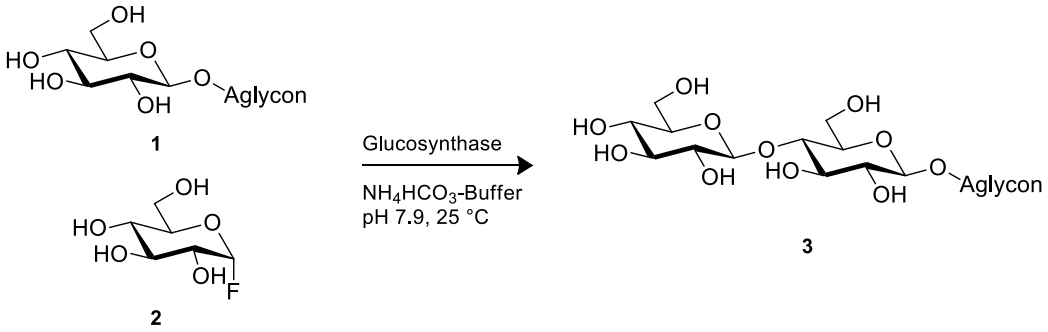

Figure 1. Principle of glucosylation of a glucoside 1 (utilising a glucosyl fluoride 2 donor) catalysed by developed glycosynthases.

[1] Danby, P. M.; Withers, S. G., Advances in Enzymatic Glycoside Synthesis. ACS Chemical Biology 2016, *11 (7)*, 1784-1794.
[2] Hayes, M. R.; Bochinsky, K. A.; Seibt, L. S.; Elling, L.; Pietruszka, J., Development of a colourimetric assay for glycosynthases, Journal of Biotechnology 2017, DOI: 10.1016/j.jbiotec.2017.02.005.