New Transformations of Unprotected Sugars

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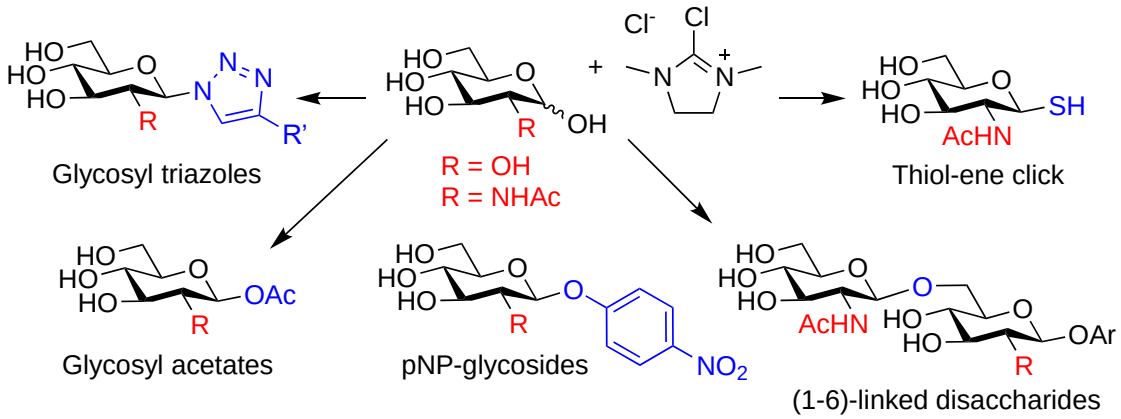
The development of new selective reactions of completely unprotected sugars, particularly in aqueous solution, has become an area of resurgent interest. Seminal studies reported by Shoda[1] and co-workers first introduced the dehydrating reagent 2-chloro-1,3-dimethylimidazolinium chloride (DMC) into the carbohydrate field, and revealed its remarkable ability to selectively activate the anomeric hydroxyl group of unprotected sugars in aqueous solution. A series of highly useful protecting group-free processes based on the use of DMC and analogues has since been developed.[2] I will discuss some of our recent work in this area,[3] building on the important developments of Shoda and others, focussing on the application of DMC and analogues for the direct conversion of unprotected sugars into a range of glycosides, glycoconjugates, and even (1-6)-linked disaccharides[4] without the need for any protecting group chemistry.



[1] Noguchi, M.; Tanaka, T.; Gyakushi, H.; Kobayashi, A.; Shoda, S.-I. *J. Org. Chem*. **2009**, 74, 2210–2212.
[2] For a review see: Fairbanks, A. J. *Carbohydr. Res.* **2021**, 499, 108197.
[3] a) Mascherpa, A.; Ishii, N.; Tayagui, A.; Liu, J.; Sollogoub, M.; Fairbanks, A. J. *Chem Eur. J.* **2023**, 29, e202203252; b) Qiu, X.; Chong, D.; Fairbanks, A. J. *Org. Lett.* **2023**, 25, 1989–1993; c) Qiu, X.; Fairbanks, A. J. *Org. Lett.* **2020**, 22, 2490–2493; d) Lim, M. A. Brimble, R. Kowalczyk, A. J. A. Watson, A. J. Fairbanks *Angew. Chem. Int Ed.* **2014**, *53*, 11907–11911.
[4] Qiu, X.; Garden, A. L.; Fairbanks, A. J. *Chem. Sci.* **2022**, 13, 4122–4130.

Professor Antony Fairbanks was born in the UK and undertook both his undergraduate degree and D.Phil. in Chemistry at Oxford, the latter working with George Fleet in the Dyson Perrins Laboratory. After two Postdocs (Pierre Sinaÿ at the Ecole Normale Superieure, Paris; Steve Ley in Cambridge, UK) he returned to Oxford in 1996 as an independent academic. He moved to the University of Canterbury, in Christchurch, New Zealand in 2009, and was Head of the Department of Chemistry there from 2010-2014 during the Christchurch earthquakes. Awards include the Dextra Carbohydrate Award from the Royal Society of Chemistry (2004) and the New Zealand Institute of Chemistry Maurice Wilkins Centre Award for Chemical Science (2018). His research interests focus on carbohydrate chemistry and biology; the development of synthetic methodology and the production of glycoconjugates, including glycoproteins, as potential therapeutic agents. He has authored >160 scientific publications, including >150 journal articles in international peer-reviewed journals, an undergraduate textbook, and seven patents.