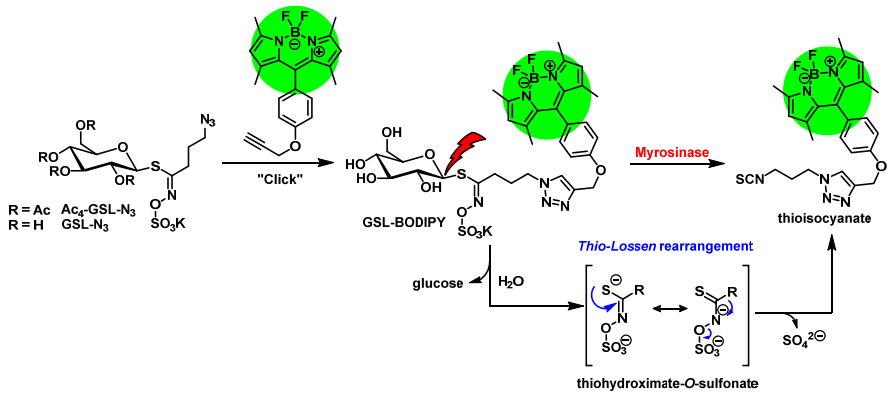
SYNTHESIS AND BIOCHEMICAL EVALUATION OF AN ARTIFICIAL, FLUORESCENT GLUCOSINOLATE (GSL)

Carina P. Glindemann,[a] Anita Backenköhler,[b] Matthias Strieker,[b] Ute Wittstock,[b] and Philipp Klahn [a]

[a]Institute of Organic Chemistry, Technische Universität Braunschweig, Germany
[b]Institute of Pharmaceutical Biology, Technische Universität Braunschweig, Germany

Glucosinolates (GSLs) are secondary metabolites produced by plants of the order Brassicales including several agricultural crops of the Brassicaceae such as cauliflower, radish, white and black mustard, broccoli or rocket. They are part of the myrosinase-GSL defense system that protects against herbivores.[1] Chemically, GSLs are thioglycosidic thiohydroximate-*O*-sulfonates with variable, amino acid-derived side chains, which are stored in the vacuole of so-called S-cells by the producing plants. Adjacent myrosin cells contain the enzyme myrosinase, a thioglucosidase, in vacuole-derived myrosin bodies. Upon tissue damage by herbivore feeding the myrosinase hydrolyze the anomeric thioglycosidic bond of GSLs under release of glucose and a thiohydroximate-*O*-sulfonate aglycone.[1] The aglycone undergoes a Thio-*Lossen* rearrangement to form a corresponding isothiocyanate, which acts as toxic or deterrent defense compound.[1] As additional components of their self-defence mechanism GSL producing plants posses specifier proteins, which can convert the aglycone into less reactive alternative products such as nitriles. Structurally different specifier proteins are used by some specialist herbivores such as *Pieris rapae* to overcome the myrosinase-GSL defense of their host plants.[2] In the context of studies on GSL metabolism and transport in plants, herbivores, bacteria or humans, artificial fluorescent GSLs, which release isothiocyanates as nucleophile-reactive fluorophores in the presence of thioglucosidases can serve as valuable tools in fluorescence imaging. Herein, we report the synthesis and biochemical evaluation of the first artificial, fluorescent GSL as molecular tool for fluorescence imaging of GSL-associated biological processes.[2].



[1] F. S. Hanschen, E. Lamy, M. Schreiner, S. Rohn, *Angew. Chem. Int. Ed.* **2014**, *53*, 11430–11450.

[2] U. Wittstock, B. A. Halkier, *Trends Plant Sci.* **2002**, *7*, 263–270.

[3] C. P. Glindemann, A. Backenköhler, M. Strieker, U. Wittstock, P. Klahn, *ChemBioChem* **2019**, DOI:10.1002/cbic.201900148.