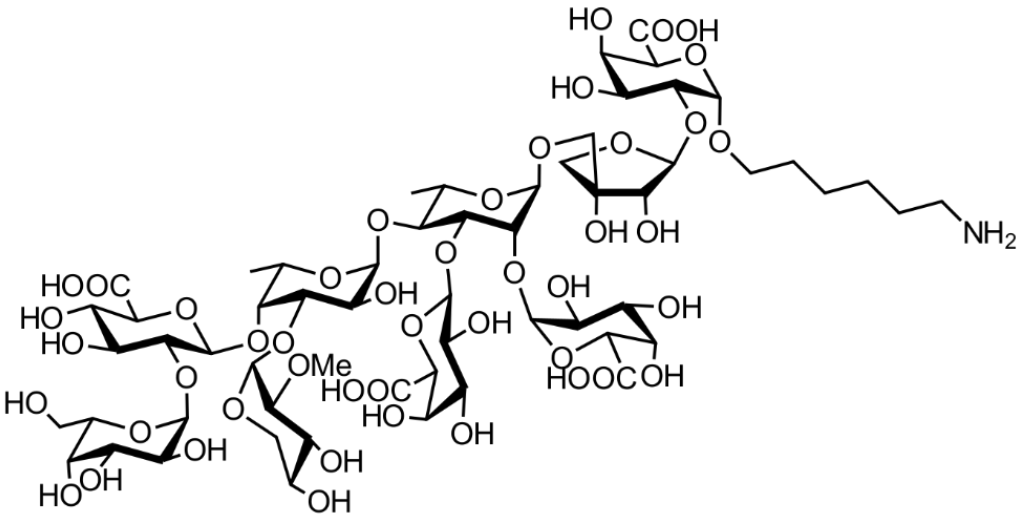
TOTAL SYNTHESIS OF PECTIC POLYSACCARIDE RG-II SIDE CHAIN A

Uwe Osswald, Katharina Obleser, Fabian Pfrengle

Department of Natural Sciences and Sustainable Resources, BOKU University Muthgasse 18, 1190 Vienna, Austria
uwe.osswald@boku.ac.at

The pectin domain rhamnogalacturonan-II (RG-II) is one of the most complex, yet poorly understood polysaccharide structures in nature with irreplaceable relevance for plant growth and human diet [1]. RG-II evolved very early in plant evolution and its unique structure has been conserved in all vascular plants to this day [2]. It is hypothesized that side chain A self-assembles with borate to a chiral borate diester in the plant cell wall [3], which is essential for cell wall stability and plant growth [4]. Despite its importance its three-dimensional structure and biosynthesis remain elusive. In this work we report the successful convergent synthesis of RG-II side chain A in 74 total steps, with the longest linear sequence comprising 19 steps.



Its composition of seven different monosaccharides including the rare sugar apiose, the presence of five different 1,2-*cis*-glycosidic linkages, a dense branching pattern, and the unique reactivity of the four uronic acids pose the major challenges for the synthesis of this highly branched and unusually complex nonasaccharide. The presented approach is based on a carefully designed set of orthogonal protecting groups and various advanced glycosylation methods and is assisted by analytical tools such as advanced NMR techniques and x-ray crystallography.

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References:
1. D. Ndeh *et al.* in *Nature,* **2017***, 544,* 65-70.
2. T. Matsunaga *et al.* in *Plant Physiol.,* **2004**, 134(1), 339-351.
3. V. S. Bharadwaj *et al*. in *J. Phys. Chem. B*, **2020**, 124, 10117-10125.
4. J. Sechet *et al.* In *Plant J*, **2018**, 96(5), 1036-1050