

Research Area: **Biological Molecular Science**

Research Specialization: **Synthetic Organic Chemistry**

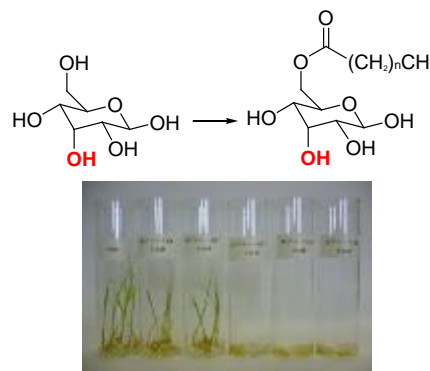
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Key ward: rare sugar, biological activity, aplysiatoxin, anti-cancer

Recent Research

1. Synthesis and Biological Evaluation of Rare Sugar Derivatives

Rare sugar is a monosaccharide that exists only in trace amounts in nature and has been shown to have various biological activities by our research on rare sugars. In order to further improve the biological activity of D-allose, which is an epimer at the C-3 position of D-glucose, we have synthesized D-allose fatty acid esters having a hydrophobic linear alkyl group from hydrophilic D-allose and are studying on structure-activity relationship of their plant growth inhibitory activity and cancer cell proliferation inhibitory activity.



2. Synthesis of optically active alcohols using asymmetric catalyst derived from amino acid

So far we have synthesized a natural amino acid derivative and developed an asymmetric borane reduction reaction of ketone using them as an asymmetric catalyst and demonstrated that the reaction proceeds with high stereoselectivity in asymmetric reduction of many aromatic ketones. At present, we are working on asymmetric reduction of trifluoromethyl ketone with low stereoselectivity due to high reactivity.

3. Function-Oriented Synthesis of Aplysiatoxin Simplified Analogs

Marine natural products, aplysiatoxin has tumor-promoting activity and cancer cell proliferation inhibitory activity. To develop novel anti-cancer agents with reduced side effects, we designed simplified analogs that eliminate tumor-promoting activity and evaluate their binding ability with kinase C playing an important role in intracellular signal transduction.

Publications

Synthese and biological activities of deoxy-D-alloses fatty acid ester analogs, *Biosci. Biotechnol. Biochem.*, **88** (4), 676-681, 2016, Chowdhury, M. T. I., Naito, M., Yanagita, R. C., Kawanami, Y.

Binding mode prediction of aplysiatoxin, a potent agonist of protein kinase C, through molecular simulation and structure-activity study on simplified analogs of the receptor-recognition domain, *Bioorg. Med. Chem.*, **24**, 4218-4227, 2016, Ashida, Y., Yanagita, R. C., Takahashi, C., Kawanami, Y., Irie, K.

Effect of BF₃ on the enantioselective reduction of trifluoromethyl ketones using a chiral lactam alcohol with borane, *Tetrahedron: Asymmetry*, **26**, 333-337, 2015, Harauchi, Y., Takakura, C., Furumoto, T., Yanagita, R. C., Kawanami, Y.

Anti-proliferative Activity of 6-O-Acyl-D-Allose against the Human Leukemia MOLT-4F Cell Line, *Biosci. Biotechnol. Biochem.*, **78** (2), 190-194, 2014, Yanagita, R. C., Kobayashi, K., Ogawa, C., Ashida, Y., Kawanami, Y.