**Characterization of Plant Golgi-Localized Nucleotide Sugar Transporters**

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**Project Goals: The most abundant organic material on earth is lignocellulosic biomass or non-food plant material. JBEI's mission is to convert biomass to biofuels. The goal is to provide the nation with clean, renewable transportation fuels identical to gasoline, diesel and jet fuel. Building a successful lignocellulosic biofuels industry depends, in part, on developing specialized biofuel crops or feedstocks that are optimized for deconstruction into sugars and fermentation into biofuels and bioproducts.**

Abstract: The majority of the nucleotide sugar substrates required for plant polysaccharide biosynthesis are made in the cytosol. Non-cellulosic polysaccharides, including hemicelluloses and pectins, are synthesized inside the Golgi lumen by glycosyltransferases. Nucleotide sugar transporters (NSTs) are therefore required to move the substrates to the correct compartment. Whilst Arabidopsis is estimated to have ~50 NSTs, only 4 are predicted to transport GDP-sugars. Arabidopsis synthesizes four different GDP-sugars: GDP-D-mannose, GDP-D-glucose, GDP-L-galactose and GDP-L-fucose which glycosylate pectins, hemicelluloses, proteins and sphingolipids.

Recent work has shown that the Arabidopsis GOLGI NUCLEOTIDE SUGAR TRANSPORTER1 (GONST1) specifically transports GDP-D-mannose for sphingolipid glycosylation[1] and GOLGI FUCOSE TRANSPORTER (GFT) transports GDP-L-fucose for multiple purposes, including xyloglucan fucosylation[2]. Here, we have characterized the remaining two predicted GDP-sugar transporters: GONST2 and GONST3, and identified specific functions for both. These data will be discussed in the context of engineering plant cell walls for improved production of biofuels and biochemicals.

**References**

1. Mortimer et al. (2013) Plant Cell 25: 1881.
2. Rautengarten et al. (2016) Nature Communications 7:12119.

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