

FUNCTIONAL PRODUCTION OF TRANSPORTERS FROM BIOMASS-DEGRADING ANAEROBIC FUNGI FOR METABOLIC ENGINEERING

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Membrane-embedded transporters and receptors are increasingly becoming targets for the metabolic engineering community that aims to enhance the performance and stability of microbial production strains. Anaerobic gut fungi inhabit the digestive tract of herbivores such as cows and sheep, and excel at degrading raw plant biomass into fermentable sugars. Recently, a transcriptomic analysis of three strains of gut fungi suggested that they display a plethora of carbohydrate binding proteins on their surface, including G-protein coupled receptors with a novel architecture; and possess a multitude of small-solute transporters that are of chief biotechnological interest: transporters for sugars, amino acids, lipids, drugs, and metals. Here, we introduced genes encoding gut fungal fluoride transporters into *Saccharomyces cerevisiae*, and show that with codon optimization, the yeast produce large quantities of functional and correctly membrane-localized transporters capable of bolstering solvent tolerance. We are currently expanding our approach to putative drug- and sugar-transporters and receptors sourced from the anaerobic fungi. These results in part explain the physiology of these understudied fungi, and highlight the critical role that their membrane proteins play towards their existence in competitive, extreme environments. Notably, the work expands on the toolbox of receptor and transporter proteins that can be used to enhance the performance and stability of model microbial cell factory strains.

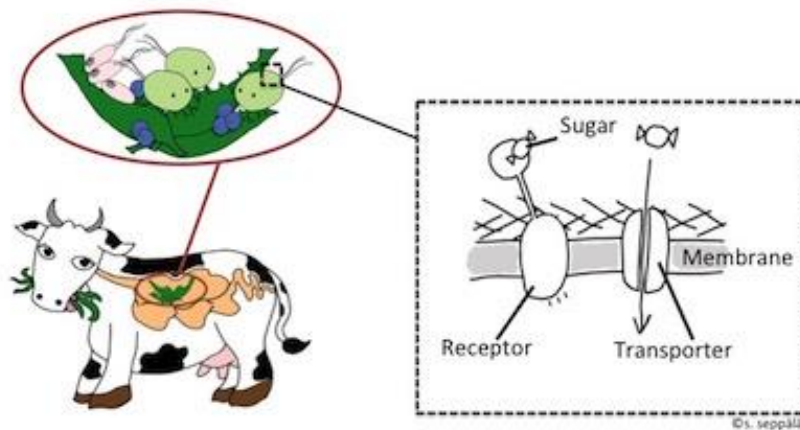


Figure 1 – Anaerobic gut fungi inhabit the intestines of herbivores such as cows, and excel at the conversion of plant biomass into fermentable sugars. Here we show that gut fungi possess a range of membrane-embedded receptors and transporters that are of chief biotechnological interest.