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Defence announcement **Public Defence on 14 June 2024**

Sugar transport in *Trichoderma reesei*

Title of the doctoral thesis	Sugar transport in *Trichoderma reesei*
Content of the doctoral thesis	Fungi are present in our everyday lives, although we rarely note their presence. Some fungal species are used in the biotechnology industry to produce food, pharmaceuticals, and many other products. One of the most important fungal production hosts in biotechnology industry is *Trichoderma reesei*, which is used to produce a wide variety of enzymes. It natively produces biomass-degrading enzymes, which can be used in biofuels production processes. These enzymes, and the improvement of their production, have been the subject of many studies. Less attention has been paid to understand how *T. reesei* obtains nutrients, such as the sugars released from the biomass by the aforementioned enzymes, from its environment. The transport of sugars across the cell membrane is mediated by specialized sugar transporter proteins. The genome of *T. reesei* has been predicted to code for numerous sugar transporters, although only few of them have been characterized in the literature. As the availability of sugars affects the production of biomass-degrading enzymes, manipulation of sugar transport processes could lead to improved enzyme production and thus reduce the costs of biofuels production. The aim of this thesis was to characterize the most important members of *T. reesei* sugar transportome. Transporters were functionally characterized by heterologously expressing them in yeast *Saccharomyces cerevisiae* or in oocytes of the frog *Xenopus laevis*. We were able to characterize multiple *T. reesei* sugar transporters, including three which had not been described previously. Importantly, we could demonstrate transport function for CRT1, which has been shown to play a crucial role in the production of biomass-degrading enzymes. We were also able to further establish the *X. laevis* expression system as a powerful tool for studying fungal sugar transporters. Our results contain a lot of new information about *T. reesei* sugar transporters, and they can be used as the basis for many future studies.
Field of the doctoral thesis	Biotechnology
Doctoral candidate and contact information	M.Sc. (Tech.) Sami Havukainen sami.havukainen@vtt.fi
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Remote defence	https://aalto.zoom.us/j/64669254069
Place of public defence	Aalto University School of Chemical Engineering, Lecture hall Ke2 (Komppa-Sali), Kemistintie 1 (main door at Biologinkuja), Espoo
Opponent(s)	Associate professor Matthias G. Steiger, Vienna University of Technology, Austria
Custos	Professor Alexander D. Frey, Aalto University School of Chemical Engineering
Link to electronic thesis	https://aaltodoc.aalto.fi/handle/123456789/51
Keywords	*Trichoderma reesei*, sugar transport, electrophysiology, *Xenopus laevis*

Dissertation will be on public display at https://aaltodoc.aalto.fi/doc_public/eonly/riiputus/