TIME AND LIGHT DEPENDENT CHANGES OF EXPRESSION LEVELS OF CALVIN CYCLE GENES IN *PHAEODACTYLUM TRICORNUTUM*

Matthias Sachse[1], Sabine Sturm[1], Ansgar Gruber[1], Benjamin Schellenberger-Costa[2], Julia Rottberger[1] & Peter Kroth[1]

[1]Plant Ecophysiology, Department of Biology, University of Konstanz
[2]Plant Physiology, Department of Biology, University of Leipzig

We are investigating light and time depending regulation of the Calvin Cycle in diatoms, namely the model organism Phaeodactlyum tricornutum. The Calvin Cycle in diatoms is clearly regulated via different mechanisms than in higher plants or green algae. While light induced redox-regulation of the Calvin Cycle is of central importance in higher plants, the capacity for such redox-regulation is generally reduced in diatoms.
As this elaborate control at the enzymatic level is seemingly missing, we investigated the possibility of increased control at the transcriptional and protein level for in higher plants redox-regulated Calvin Cycle genes. We determined transcript and protein levels over time under two different light conditions to identify diurnal effects and their dependency to light. We were able to identify a surprisingly strong transcriptional regulation for both the phophoribulokinase (PRK) (light modulated diurnal) and plastidic glyceraldehydes-3-phosphate dehydrogenase (GAP C1) (primarily light independent diurnal), which are exceeding any relative changes which are known for higher plants under similar light and time conditions by far. Most of the other investigated Calvin Cycle genes show a light modulated diurnal control of weak to moderate magnitude.
Investigation of protein abundances via western blot analysis mostly confirms these results. In total the expression levels of the Calvin Cycle enzymes are increased after light exposure, which is consistent to expectations as light provides the energy needed for carbon fixation. Our investigations emphasise the importance of regulatory mechanisms via expression levels for the diatom Calvin Cycle.