



Plant Metabolic Network Dynamics under elevated CO₂

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**PhD project, funded by the DFG,
in co-operation with LMU Munich
and MPI Potsdam**

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Climate change is caused by constantly rising greenhouse gas emissions, among which carbon dioxide (CO₂) is the quantitatively most relevant. The only relevant process on earth causing a reduction in atmospheric CO₂ concentration is plant photosynthesis, but for a long time it is known that elevated CO₂ (eCO₂) causes a reduction in the efficacy of carbon fixation by plants, known as "acclimation to elevated CO₂". So far, however, it is not clear what causes this "negative acclimation".

Upon environmental changes, plants need to immediately adjust their metabolism in order to prevent tissue damage. The study of metabolic regulation in changing environments is complicated by the high degree of compartmentalization of plant cells. We have developed a range of methods that allow resolution of metabolic regulation at the sub-cellular level. Based on these methods, we want to investigate dynamics of sub-cellular metabolic networks under eCO₂ by combining "omics" analysis with mathematical modeling.

In a project funded by the Deutsche Forschungsgemeinschaft (DFG), we want to focus on the role of three enzymes that represent different sub-cellular compartments: HEXOKINASE 1 (HXK1) is a cytosolic enzyme that is involved in sugar metabolism and functions as a sugar sensor in plant cells, HYDROXYPYRUVATE REDUCTASE 1 (HPR1) resides in peroxisomes and is important in photorespiration, while the mitochondrial glutamate transporter BOU affects energy household in a yet unknown way. Using mutants defective in the respective genes we intend to study the interactions of the various pathways as well as effects of eCO₂ on these networks. For this purpose, transcriptome studies by next generation sequencing (NGS), proteomics and metabolomics approaches will be combined in a joint work with the University of Munich (LMU) and the Max-Planck-Institute in Potsdam. Together, the consortium will develop and apply a genome-scale data integration platform for the analysis of subcellular metabolism at eCO₂.

We offer a PhD position in a three year project at the Institute of Biomaterials and Biomolecular Systems, Department of Plant Biotechnology. The group is fully equipped and has long-term experience with sub-cellular fractionation, metabolomics and molecular biology methods, as well as with mathematical modeling of metabolite dynamics. The PhD candidate will closely co-operate with a PhD student at LMU and the Bioinformatics group of the MPI in Potsdam.

Requirements / Application

We are looking for a recently graduated, talented candidate with affinity for plant physiology and bioanalytics. A willingness to engage in systems biology methods and to work interdisciplinary is required. Start of the project is May 2021.

We invite you to submit an application that includes a cover letter expressing your motivation, Curriculum vitae and a brief description of your MSc thesis via e-mail to:

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