



Open position for the LSM call of applications

Department/Institute: LMU Faculty of Biology, Plant Metabolism

Subject areas/Research fields: Botany and Plant Science, Cell Biology, Molecular Biology, Physiology, Systems Biology

Keywords: light acclimation, thioredoxins, proteomics, metabolomics, redox sensors

Name of supervisor: Prof. Dr. Peter Geigenberger

Project title: Role of thioredoxins in acclimation of plants to elevated light intensity

Project description:

During photosynthesis, plants must manage strong fluctuations in light availability on different time scales, leading to long-term acclimation and short-term responses. However, little is known about the regulation and coordination of these processes and the modulators involved.

In our preliminary work, we discovered that high light, but surprisingly not fluctuating light, leads to large quantitative changes in the proteome and metabolome, resulting in increased photosynthetic dynamics. It turned out that deficiencies in NADPH-dependent thioredoxin (Trx) reductase C (NTRC) or Trxs *m1/m2*, but not Trx *f1*, almost completely suppressed the proteome remodeling, which is required for fast and correct acclimation, thus conferring new functions to both types of redox-regulatory proteins for controlling dynamic light responses.

It will be the aim of the project to analyze the retrograde signals by which NTRC and Trxs *m1/m2* regulate the reengineering of the proteome during high-light acclimation. Genetics, redox proteomics, transcriptomics and genetically encoded sensors will be used to investigate how these chloroplast proteins modulate inter-organellar redox signals to regulate gene expression.

References:

Dziubek D, Poeker L, Siemiątkowska B, Graf A, Marino G, Alseekh S, Arrivault S, Fernie AR, Armbruster U, Geigenberger P (2024) NTRC and thioredoxins *m1/m2* underpin the light acclimation of plants on proteome and metabolome levels. *Plant Physiol* 194, 982-1005; <https://doi.org/10.1093/plphys/kiad535>

Hou LY, Sommer FK, Poeker L, Dziubek D, Schroda M, Geigenberger P (2024) The impact of light and thioredoxins on the plant thiol-disulfide proteome. *Plant Physiol* 195, 1536-1560; <https://doi.org/10.1093/plphys/kiad669>

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<https://www.en.botanik.bio.lmu.de/research/geigenberger/index.html>

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