Leibniz-Institut für Pflanzenbiochemie

Leibniz-Gemeinschaft

IPB Seminar Series in Plant Biochemistry

Regulatory networks for iron deficiency responses

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Thursday 22th of June, 2023, at 4 p.m.

Kurt Mothes Hall, Leibniz Institute of Plant Biochemistry

Iron is a micronutrient that is essential for plant growth and development. The roots of plants have remarkable plasticity, allowing them to adapt to various environmental and nutritional challenges. One excellent example of such plasticity is the ability of *Arabidopsis thaliana* seedling roots to increase iron acquisition upon low iron supply. The plant membrane system plays an important yet largely unknown role in controlling the amount of iron that is acquired, avoiding the overloading of cells with this potentially harmful reactive metal ion, and coordinating iron uptake with cellular growth in response to incoming signals from the surroundings. This project focuses on the IRON-REGULATED TRANSPORTER1 (IRT1), which is responsible for importing iron from the soil into the root. IRT1 is regulated by metal ions at multiple levels, including protein stability, trafficking, and localization at the plasma membrane. It contains a large cytosolic loop domain that is crucial for its function and regulation. Our team has identified three IRT1 cytosolic loop interaction partners, called ICLIPs, that mainly consist of peripheral membrane proteins. These ICLIPs may act as molecular anchors to affect dynamic processes at the face of membranes. The three ICLIPs, a C2 domain protein (EHB1/CAR6), a SEC14-GOLD lipid transfer protein (PATELLIN 2), and a small ARF-like GTPase, can form a protein complex that affects the regulation of the iron uptake system. Together, they link iron signaling with oxidative stress responses and vesicle trafficking. Our team aims to uncover the roles that ICLIPs play in decoding the signals for root cell plasticity in response to iron. Our efforts will contribute to our understanding of plant biology, plant membrane system functioning and its applications in agriculture, food security and the environment.

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