Graduate School Event

Thesis Defense: Auxin signalling in Arabidopsis thaliana development

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Host: Andela Saric

Auxin is a central regulator of plant growth and development, orchestrating processes from embryogenesis to senescence through a complex network of biosynthesis, transport, and signaling pathways. In Arabidopsis thaliana, canonical nuclear auxin signaling is mediated by the TIR1/AFB receptors, which promote degradation of AUX/IAA repressors to enable ARF transcription factors-driven transcriptional reprogramming. Parallel to this well-established nuclear mechanism, auxin also triggers rapid, non-transcriptional responses. In particular, at the cell surface, most notably through ABP1 and TMKs. Despite decades of research, the integration of these pathways and their links to fundamental cellular processes remains not fully understood. In this study, we uncover a new role for TIR1/AFB signaling in rapidly activating macroautophagy during developmental reprogramming. Auxin induces autophagy via TIR1/AFB adenylate cyclase activity, linking auxin perception to cAMP production and transcriptional activation of autophagy machinery. Autophagy-deficient mutants exhibit delayed meristem differentiation, impaired lateral root progression, and reduced shoot organogenesis, demonstrating its necessity for timely developmental transitions.We also revisit the ABP1-TMK1 cell-surface auxin perception complex, providing biochemical and mass photometry evidence for auxin-dependent complex formation. We show that ABP1-TMK1 triggers an ultrafast global phosphorylation response targeting ~1000 proteins, including the auxin transporter PIN2, and Rho-of-plants (ROP) GTPases regulators. This pathway directly regulates PIN2 phosphorylation, for gravitropism and auxin dependent ROP activation.These findings establish an integrated framework in which nuclear TIR1/AFB signaling and cell-surface ABP1-TMK signaling act in parallel to synchronize gene expression, cytoplasmic remodelling, and transporter regulation, thereby ensuring robust developmental plasticity in Arabidopsis thaliana.

Tuesday, September 9, 2025 01:00pm - 02:00pm
Central Bldg / O1 / Mondi 2a (I01.O1.008) and Zoom

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.