Meg Vedra

Sp21-100

Frisco, TX

Sophomore
Biochemistry

Faculty Mentor: Dr. Antje Heese, Biochemistry

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Investigating roles of Clathrin-coated vesicle components in cell expansion in Arabidopsis thaliana

Meg Vedra, Nga Nguyen, Tessa Jennings, and Antje Heese

Throughout a plant's life cycle, the cell wall provides structural support and protects intracellular components. A key molecule in the plant cell wall that aids in cell expansion is the polysaccharide cellulose. In the model plant *Arabidopsis thaliana*, cellulose synthases form large enzyme complexes that need to be localized in the plasma membrane (PM) to catalyze the synthesis of extracellular cellulose. To fine-tune cellulose production for polymer arrangement and expansibility of the cell wall, the plant cell adjusts the PM abundance of cellulose synthases using vesicular trafficking via clathrin-coated vesicles (CCVs). CCVs have emerged as the prominent vesicle type that transports cellulose synthases from one cellular organelle to another in form of small membrane-bound vesicles. Newly synthesized cellulose synthase complexes are secreted via the *trans*-Golgi Network (TGN) to the PM. With the help of CCVs, cellulose synthases are internalized from the PM by constitutive endocytosis, transported to the TGN and then recycled back to the PM to allow for a new round of synthesis of cellulose. Our lab's long-term interest is identifying CCV components with novel roles in cell expansion, likely by regulating the subcellular localization of cellulose synthases between the PM and the TGN.

In this study, we investigated whether loss-of function Arabidopsis mutants in specific CCV components alter cell expansion in the hypocotyl. In five independent studies, I have observed significant differences in hypocotyl length between several single and higher-order CCV mutants compared to wild-type seedlings that were grown in dark conditions and in the absence of sucrose. Currently, I am determining whether an increase in cell size or cell number are responsible for the altered hypocotyl length in CCV mutants compared to the wild type.