Uncovering the role of SAURs in stomatal aperture regulation and drought response

Dynamic and specific control of gas and water vapor exchange is critical for regulating plant growth and survivability of flowering plants in various environmental conditions. Pores known as stomata cover the surface of plants, and each is surrounded by two oblong cells that swell and contract through osmotic turgor pressure regulation to regulate the stomatal aperture. Small auxin upregulated RNAs (SAURs) comprise a highly conserved family of plant specific proteins that has 79 members in *A. thaliana* that are typically transiently expressed in various cell types. Several SAURs can be stabilized by translational fusions with fluorescent proteins, and these variants have been shown to facilitate cell elongation through the inhibition of Protein phosphatase 2C (PP2C) phosphatase activity and subsequent activation of membrane bound H^+-ATPases and cell wall acidification. The rapid changes in guard cell size to regulate stomatal aperture is likely facilitated by dynamic cell wall modifications. SAUR56 and SAUR60 form a small clade that are enriched in guard cells based on transcriptomics data, and ubiquitously overexpressed lines have been shown to have more open guard cells that are less responsive to ABA mediated stomatal closure than wild-type plants. Using CRISPR/Cas9 genome editing technology, single and double gene knockouts of *saur56* and *saur60* were generated and are being used to study the role of SAUR56 and SAUR60 in guard cell responses in hormonal and physiological responses. Additionally, expression patterns of other SAURs that may potentially regulate guard cell activity are being analyzed through the generation of pSAUR fusions with GUS and fluorescent reporter constructs. Collectively, we seek to understand of the role of SAURs in guard cell function and drought response.