Department of Molecular and Cellular Biology

Graduate Seminar MCB*7500

Friday, September 27th, 2024 @ 12:00 p.m.

presented by:

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"*In vivo* effects of dehydrin expression on plant cells in response to abiotic stress"

Plants are subjected to a wide array of environmental stressors, such as cold, osmotic, and drought stress, each resulting in cellular dehydration. As a result, plants have developed countless adaptations to reduce water loss, including the expression of dehydration-induced proteins (dehydrins). Dehydrins are a large class of intrinsically disordered proteins expressed throughout the plant kingdom and are known for their ability to confer drought tolerance. They are defined by the presence of a lysine-rich K-segment, which has been shown to gain α-helicity in the presence of membranes. Dehydrins have several proposed mechanisms of protection, including membrane binding to prevent aggregation and reduce porosity, prevention of protein aggregation and misfolding, and DNA binding for ROS protection. *In vivo* evidence tells us that dehydrin expression results in a variety of morphological and physiological changes in response to abiotic stress, such as reduced wilting and electrolyte leakage, improved plant growth, and increased expression levels of ROS scavenging enzymes. Despite an extensive number of *in vitro* and *in vivo* studies, there are crucial gaps in our knowledge of dehydrin function, preventing researchers from connecting physiological and morphological changes with their underlying biochemical mechanism. The large body of *in vitro* evidence cannot be easily connected to in vivo studies, necessitating a shift toward *in vivo* or *in vivo*-like experimental systems. This project aims to bridge this gap by shifting towards an *in vivo* approach to dehydrin plant protection mechanisms through three main focuses: metabolite production, global protein structure, and physiological markers such as electrolyte leakage.