

**Saturday, October 10, 8:45-9:35 a.m.**

**Chris Oakley, Michigan State University**

The genetics of freezing tolerance and local adaptation in *Arabidopsis*

Understanding the ecological and genetic mechanisms that contribute to adaptation is a primary goal of evolutionary biology. Fitness tradeoffs, where adaptation to one environment comes at a fitness cost in alternate environments, are an intuitive explanation for local adaptation. Despite many empirical studies of local adaptation, relatively little is known about the traits that mediate adaptation or the genes that underlie those traits. In order to map Quantitative Trait Loci for fitness and adaptive traits, we used a large set of Recombinant Inbred Lines derived from locally adapted populations of *Arabidopsis thaliana* near the northern and southern edge of the native range. Through field and growth chamber studies, multiple freezing tolerance QTL were identified as likely to underlie fitness tradeoff QTL. Experiments underway utilize near isogenic and genetically engineered lines to identify the causal genes underlying these QTL, and to better understand the cost of freezing tolerance in non-freezing environments. This work is placed in a broader geographic context using a survey of freezing tolerance in 60 natural populations from the northern and southern range edges. Uncovering the links between genes, freezing tolerance, and fitness in contrasting environments advances our understanding of adaptation, and may inform efforts to improve yield in temperate crops.