

JONATHAN GILKERSON, and JOANNE CHORY, Department of Biology,
Shepherd

University, Shepherdstown, WV, 25443, Plant Biology Lab, Salk Institute for
Biological Studies, La Jolla, CA 92037. Profiling the genomic response to rapid
alkalinization factor (ralf), a peptide growth factor, in *Arabidopsis*.

In plants, a number of small, chemical molecules, known as phytohormones, modulate growth. In the past decade, however, peptide hormones have been identified as playing essential roles in plant growth and development and evidence gathered from a number of plant species has indicated that a family of small peptide hormones termed Rapid Alkalinization Factors (RALFs) are important regulators of growth. RALFs appear to cause an alkalinization of the cell wall, inhibiting cell elongation and thus growth. Overexpression of RALFs results in semi-dwarfism, and ectopic treatment of seedlings with recombinant RALF peptide causes growth arrest. The goal of this project is to understand molecular mechanisms by which RALFs antagonize plant growth using *Arabidopsis thaliana* as a model. To this end we have performed an analysis of global gene expression over a 24-hour time-course on RALF treated seedlings, and conducted a forward genetics screen for RALF resistant seedlings. Analysis revealed over 4000 thousand genes whose expression changes over this time-course, and most of these changes were transient with only 409 genes with significant changes 24 hours after treatment. Cluster analysis illustrated distinct temporal patterns of expression, and gene ontology analysis of these clusters made apparent distinct biological processes affected by RALF treatment including ROS, Ca²⁺, ion movement, plastid and protein metabolism, and immunity.

Additionally, many of the mutants recovered from the screen, have reduced induction of RALF-induced genes, and positional cloning of these mutants should help elucidate the molecular mechanisms of this growth factor.