

REGULATORY NETWORKS IN PLANTS

Erich Grotewold

Center for Applied Plant Sciences (CAPS), Dept. of Molecular Genetics and Dept. of Horticulture & Crop Sciences, The Ohio State University, Columbus, OH 43210.

Our long-term goal is to understand the mechanisms by which plants control gene expression and to elucidate the structure and dynamics of the underlying gene regulatory networks (GRNs). We combine systems biology approaches that include chromatin immunoprecipitation coupled with Illumina sequencing (ChIP-Seq) and mRNA high-throughput profiling (RNA-Seq) on a number of cellular processes to explore the architecture of plant GRNs in plant model systems such as maize and *Arabidopsis*. For example, studies on the regulation of maize flavonoid pigments established new aspects of combinatorial gene regulation and identified previously unknown branches of the pathway. The differentiation of *Arabidopsis* epidermal cells into leaf hairs and pores (stomates) furnished an outstanding system for the application of systems approaches to understanding GRN architecture, which combined with modeling is providing novel insights on sub-network dynamics. We host two public databases, AGRIS (<http://arabidopsis.med.ohio-state.edu/>) for *Arabidopsis* and GRASSIUS (www.grassius.org) for maize and other grasses. They contain information on transcription factors, promoters and their interaction, significantly facilitating the study and visualization of plant GRNs.