The plant guard cell as a paradigm for the analysis of immunity and pathogen virulence

Brad Day, Professor. Michigan State University. Department of Plant, Soil and Microbial Sciences.
East Lansing, Michigan 48823

Email: bday@msu.edu

The eukaryotic actin cytoskeleton is comprised of a dynamic and tightly regulated pool of globular (G)- and filamentous (F)-actin whose activities and organization are linked to a diverse array of cellular functions. Actin, together with the more than 75 actin-binding proteins identified in plants, regulates key signaling processes, including those required for stomatal movement and immunity. The current favored model for the regulation of actin dynamics posits that actin filaments are constantly rearranged *via* polymerization, severing, and depolymerization, processes largely governed by the activity of profilin and actin depolymerizing factors (ADFs), respectively. However, the purpose(s) of this incessant re-modeling are largely unknown. Research in my lab has demonstrated that actin remodeling is important for mediating plant immunity against pathogens. Our current research focuses on a comprehensive and quantitative evaluation of immunity as a function of cytoskeletal organization. Specifically, we are interested in defining: **1)** *How does the organization of the actin cytoskeleton support the spatiotemporal dynamics of stomatal immunity?* **2)** *How are immune hormone signaling nodes linked?* ***3)*** *How pathogens target cytoskeletal regulation to defeat immunity?* ***4)*** *How plants sense cytoskeletal perturbation to activate immunity.* In this seminar, I will present new data demonstrating phospho-regulation and pathogen targeting of a key regulatory node that controls cytoskeletal organization and stomatal guard cell dynamics, describing a role for actin in critical stomatal-based signaling pathways.