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Complex interactions between plants and pathogens ultimately determine the extent to which disease develops. My research focuses on understanding fungal pathogenesis at the molecular level. I am most interested in the following fundamental questions:

- What are the links between diverse components of pathogenesis, e.g., morphological differentiation, conidiation, and secondary metabolism?
- What are the environmental cues that trigger pathogenesis in fungi and how are they perceived?
- To what extent is the genetic regulation of pathogenesis conserved among fungal pathogens?
- How do plants respond to pathogens at the molecular level and what genes are involved?
- How can plant pathogens be metabolically engineered to augment plant-based bioproduction?

My lab uses a wide range of techniques and approaches to investigate fungal pathogenesis and host resistance, including conventional and molecular genetics, functional, comparative, and evolutionary genomics, analytical chemistry, and metabolomics. Plant/fungal interactions of particular interest include kernel-rotting diseases caused by mycotoxigenic fungi, such as *Aspergillus flavus*, *Fusarium verticillioides*, and *Fusarium graminearum*; foliar diseases caused by species of *Cercospora*, including *C. zeae-maydis* and *C. kikuchii*; and diseases caused by necrotrophic fungi, such as *Botrytis cinerea*.

Grants

(P3-205) Perception and Modification of Biopolymers by Filamentous Fungi: Towards the Metabolic Engineering of Fungi to Complement Plant-Based Bioproduction Strategies
PI: Burton H. Bluhm (UAF); **Co-PI:** Jackson Lay (UAF)

To produce ethanol from crop residues, plant matter must first be broken down into fermentable sugars. However, crop residues are made of complex carbohydrates that are not easily digested. We are studying fungi that naturally digest crop residues, with the long-term goal of genetically engineering these organisms to maximize bioethanol production.