DETERMINATION OF THE GENETIC BASIS OF PSEUDOFLOWER FORMATION IN BOECHERA HOLBOELLI

Riston Haugen, David H. Siemens, Cyndi Anderson, and Audrey Gabel
Department of Biology
Black Hills State University
Spearfish, SD 57799

ABSTRACT

Puccinia monoica is a rust fungus that infects plants in the family Brassicaceae (Cruciferae). During infection, the fungus induces the formation of a pseudoflower that mimics plants that commonly occur with their crucifer hosts. Infected plants resemble co-occurring plants in color, morphology, and olfactory characteristics. The formation of the pseudoflower prevents flowering in the host plant, thereby sterilizing it. The pseudoflowers are covered with spermagonia containing fungal spores. Fungal spermatia of different mating types are then spread by insect pollinators that are fooled by the similarity of the pseudoflower mimic to co-occurring flowers, thereby facilitating sexual reproduction by the fungus. Though much work has been done to characterize this system of mimicry, the genetic basis of pseudoflower formation has not yet been discovered.

To determine the genetic basis of pseudoflower formation, I am conducting gene expression study involving Boechera holboellii plants infected with Puccinia monoica. Both Boechera holboellii and Puccinia monoica occur naturally in Black Hills National Forest in Western South Dakota. Gene expression in infected and uninfected Boechera holboellii plants collected in nature will be compared using microarray analysis. Once candidate genes involved in the plant-fungus interaction have been identified, RT-PCR will be used to verify the results and more accurately quantify observed differential expression. This study represents a novel investigation of the genetic basis of pseudoflower mimicry and should increase the current understanding of interactions between plants and fungal pathogens, as well as provide valuable insight into the evolution of this extraordinary case of mimicry by plant-parasitic fungi.