Laura Shannon

Major: Biology and Anthropology
University: Grinnell College
Faculty Mentor: Dr. Tim Holtsford
Mentor Department: Biological Sciences
Funded by: NSF-REU Program in Biological Sciences & Biochemistry

Development of CAPS markers for Nicotiana

Laura Shannon, Dulce Figueroa-Castro and Tim Holtsford

The area in which the ranges of *Nicotiana longiflora* and *Nicotiana plumbaginifolia* overlap presents an ideal system for studying the interaction and hybridization of a selfing and an outcrossing species. *N. longiflora* is characterized by long corollas and self compatibility but sets little fruit on its own due to anther stigma separation. *N. plumbaginifolia* exhibits shorter corollas and self pollinates almost all of it's flowers. A third morph with medium length corollas is found in populations comprised of both species. It seems likely that this morph is a hybrid. In order to better understand how hybridization occurred and the genetic consequences of species interaction, we plan to perform pollen races in which we will allow self, out crossed, and inter-specific pollen to compete on the same style. Pollen competes and is selected through a variety of mechanisms including stigma and/or style clogging, pollen tube germination success and speed of growth, and differential seed abortion.

The winners of the races will be determined through paternity tests of the resulting off spring. Using this method allows us to examine the genetic consequences of all the stages of pollen competition. We will test for paternity using molecular markers in the form of single nucleotide polymorphisms in restriction enzyme recognition sites (CAPS markers). We used DNA sequences of randomly chosen genetic loci to develop CAPS markers. We found a high degree of variability within our population, however only loci at which an individual is heterozygous are useful, so most of the polymorphisms we found cannot serve as markers. At this point the most promising marker seems to be SNPs in the recognition site for Taq I on the gene for Cu-Zn superoxide dismutase.