Disagreement exists about the best criteria used to define species. Genetic differentiation can be used to clarify relationship between groups. This project examines both the genetic makeup and floral morphology of Castilleja purpurea, C. citrina, and C. lindheimeri to test if the genetic makeup of these populations agree with their morphological traits. We also compare the Castilleja purpurea complex species to C. sessiliflora, which occurs sympatrically and near-sympatrically in the region.

We expect genetic distance to reflect the pattern of morphological difference within the groups. We also expect C. sessiliflora to be more genetically distant from the Castilleja purpurea complex.

**Methods**

**GENETICS:**
- Collected leaf tissue samples on 4 species, 2 populations each (except 1 pop. for C. citrina), 30 samples per population
- DNA extraction and amplification
- CTAB extraction protocol and PCR (6 microsatellite loci)
- Individuals were genotyped with the Beckman CEQ 8000

**MORPHOLOGY:**
- Collected floral data on 4 species, 1 population each (except 30 samples for C. sessiliflora)
- Measured floral morphology (ex: calyx lobe width, bract lobe width, stigma exsertion, corolla length and width, among others)
- Measured inflorescence color using RHS color charts, converted to RGB values

**Results:**
- Fig. 2: NMDS ordination of 8 floral traits shows large overlap between populations.
- Fig. 3: shows significant variation in stigma exsertion (ANOVA p = 0.005)
- Fig. 4: shows no significant variation in corolla length (ANOVA p = 0.680)

**Discussion:**
- Some evidence of morphological difference between the species in Castilleja purpurea complex
  - Main difference is in floral color
  - In C. sessiliflora, one population (SMP) shows a shorter genetic distance to Castilleja purpurea complex than expected
  - Castilleja purpurea shows greater genetic distance from C. citrina and C. lindheimeri than expected based on morphology
  - No striking correlation between morphology and genetic distance
  - Future work: Increase sample size for the populations in Castilleja purpurea complex for floral measurements; Increase number of markers for genetic analysis

**Acknowledgements:** Thank you to Katie Wenzell for her guidance and patience. Thank you to The Nature Conservancy of Texas, Native Prairies Association of Texas, and US Fish and Wildlife Service for access to land and populations. Thank you to Hilary Noble for her help at the laboratory. We’d like to thank NSF REU grant DBI-1461007 for support.