

**The New England Botanical Club
Graduate Student Research Awards
2013 AWARD WINNERS**

Dennis Dietz

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**Inbreeding depression and pollination limitation
in *Sarracenia purpurea* L. ssp. *purpurea***

The founder events associated with long distance dispersal events (LDD) are expected to have substantial effects on genetic diversity, resulting in reduced offspring fitness via inbreeding in small, isolated populations. However, a study of *Sarracenia purpurea* L. ssp. *purpurea* introduced to Switzerland found evidence of outcross depression, rather than inbreeding (Parisod *et al.*, 2005). This suggests that this widespread but habitat-limited bog plant may be the ideal candidate to provide further insight to the tension between LDD, inbreeding, and successful range expansion. To examine this relationship, I am conducting a multi-site *S. purpurea* experiment utilizing open-pollinated controls and a series of 3 pollination treatments: self-pollination, non-self but within-population pollination, and beyond-population pollination. An ongoing preliminary study at only one site has shown significant reductions in seed production ($p=0.017$) but increases in seed mass ($p=0.015$) for outcrossed plants ($n=24$, $n=60$ in process). Reduced production suggests outbreeding depression and the possibility of genetic incompatibility or of an alternate fitness strategy, while increased seed mass suggests inbreeding depression. These conflicting results highlight the need for a more robust, multi-site study on breeding effects in *S. purpurea*.

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**Geographical history and infraspecific morphological variation
of the hemiparasitic wildflower, American Cow-wheat
(*Melampyrum lineare*; Orobanchaceae)**

American cow-wheat (*Melampyrum lineare* Desr.) is a hemiparasitic wildflower that grows in temperate mid- to high-latitude or high-elevation forests that contain its preferred host tree species. Four varieties of *Melampyrum lineare* are recognized: *M. lineare* var. *latifolium* Barton, *M. lineare* var. *pectinatum* (Pennell) Fernald, *M. lineare* var. *americanum* (Michaux), and *M. lineare* var. *lineare*. However, their morphology and geographic distributions have not been revised since the 1930's, nor is it clear whether they warrant recognition as separate taxonomic entities. Additionally, we do not know how *M. lineare* established its current distribution in North America or how it is related to the Eurasian members of its genus. The goals of my Master's thesis are to revise the infraspecific taxonomy of *M. lineare* and test hypotheses regarding its evolutionary history and phylogeography using comparative genetic methods. I have begun collecting morphological and distributional data for each subspecies from herbarium specimens. Additionally, I have begun collecting sequence-based genetic data in order to infer relationships between this and other members of *Melampyrum*. I will investigate the hypothesis that *M. lineare* survived Pleistocene glaciations in southern Appalachia and subsequently recolonized the formerly glaciated territory to the north by analyzing microsatellite genetic markers. Population genetic data will also be used to assess the conservation genetic status of the rare, threatened or endangered populations in Indiana, Kentucky and Ohio in light of threats from global climate change.