Report to COA on Research conducted on BCP research permit.
Timeframe fall 2006- Fall 2008.

Project title: Ecological Genetic and Molecular Genetic Evidence of Allochronic Speciation in a Specialized Insect Herbivore

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In this study, for the gall–forming wasp *B. treatae* we monitored emergence timing and exposure to natural enemies to assess (1) whether there are distinct differences in emergence timing between adjacent Travis and Hays counties, and (2) to assess if varying intensities of natural enemy induced mortality are related to emergence timing. Travis county populations were located on BCP properties accessed via a BCP research permit.

Background: Shifts in insect-host-plant phenology can alter the impact of natural enemy-associated mortality in herbivorous insects that are closely associated with their host-plant. Variation in plant phenology is particularly important to gall-forming insects because gall-formers are tissue specific and are restricted to ovipositing into newly formed tissues. Thus temporal variation in tissue availability can potentially alter oviposition timing, emergence timing and the effects of natural enemies. The gall former, *Belonocnema treatae* is host specific to live oak, *Qurecus fusiformis,* and oviposits into newly formed live oak leaves. Adults develop within leaf galls. Populations of *B. treatae* have shown asymmetry in both emergence timing and levels of natural enemy-induced mortality across sites and within and across years. Historically, (i.e., based on *B. treatae* populations monitored in Hays County from 1995-2001), populations that emerge from galls from Oct.-Dec. (early emergence) experience ≥99% mortality. In contrast, populations located in Travis County and sampled in 2001 emerged from Jan.-March (late emerging) and experienced reduced mortality (40-60% mortality)

In the study conducted under the BCP research permit, eight heavily galled trees located at one site in Hays (Freeman Ranch, operated by Texas State University) and eight trees at each of two sites in Travis Counties (BCP -SLAM and Bull Creek properties) were monitored. Leaf galls were randomly collected in 2006 and 2007 from different strata in each tree at each site once in November, December, February and January and stored in collection traps in the lab. Gall emergence timing was monitored by once weekly surveys of *B. treatae* in each collection trap. Emerged *B. treatae* were counted and stored in ethanol. *M*ortality was estimated by counting the total numbers of *B. treatae*/total number of galls.

Key results:

1) In contrast to expectations, all *B. treatae* sampled from both Hays and Travis counties emerged from December – March.

2) The Travis county population on average experienced 75% mortality ±12%, while the Hays county population on average experienced 90% mortality ±12%.

We are currently testing, through manipulative transplant experiments conducted at Freeman Ranch whether temporal variation in leaf tissue availability is a possible ecological driver creating temporal variation in oviposition timing thus dictating emergence timing and exposure to natural enemies in this system.