Egg-laying habits of Slosser’s buckmoth (*Lepidoptera: Saturniidae*) from Andrews County in northwest Texas

Trilby King, Nicholas Negovetich, PhD, Lendon Partain, PhD, and Ned E. Strenth, PhD

Abstract

*Hemileuca slosseri* inhabits the rolling sand plains of southeastern New Mexico, northwest Texas, and southwestern Oklahoma, where the larval stages of this species feed exclusively on the leaves of *Quercus havardii*. Adults emerge in November and immediately complete their egg laying activities. Observations in the field during the fall of 2013 reveal that many of the newly deposited egg rings were positioned in close proximity to existing hatched egg rings left over from the previous year. This study was undertaken to observe the egg laying habits of *H. slosseri* in Andrews County and determine if there is any correlation between the presence of existing hatched egg rings and the deposition of new eggs.

In January 2014, a 12 by 40 meter study area was established SW of Andrews, Texas. All egg rings were mapped as to location, and height above ground as well as the stem diameter of each egg ring was recorded. A total of 134 egg rings were observed on the study plot (91 hatched and 43 un-hatched).

Height above ground did not vary between new and old egg cases, but new eggs were found on smaller stems compared to old eggs. All egg cases exhibited an aggregated dispersion that appeared to follow the dispersion of the *Q. havardii*. Nearest neighbor analysis supports this claim, but it does not suggest an association between new and old egg rings. Therefore, stem diameter and not presence of hatched egg cases appears to be the determining factor in the positioning of the new egg rings.

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Introduction

*Hemileuca* is one of three different genera within Lepidoptera whose eggs overwinter. *Agapema* within Saturniidae and *Malacosoma* within Lasiocampidae also share a similar life cycle. All three genera lay their eggs in the same pattern as tight rings around their host plants’ stems. It is thought that this method of egg laying is an adaptation for winter survival. Since average surface area is greatly reduced by positioning the eggs in tight concentric bands, individual eggs are less likely to be damaged by freezing temperatures (Ferguson 1971).

Eggs are usually deposited in groups of 10 to 71 individuals, 0.3 – 0.6m above
the ground on stems 2.5 – 3.5mm in diameter (Slosser 2001). Females tend to choose plants along edges of clearings or cattle trails but are known to deposit in dense patches of *Quercus havardii* (Slosser 2001). The distribution of *H. slosseri* follows the distribution of *Quercus havardii* closely, and both can be found in sandy plains scrubland in west Texas, southwest Oklahoma, and southeast New Mexico. *Quercus havardii* often occurs in clusters along roadsides in these areas. The leaves of deciduous *Quercus havardii* are tough and leathery, but *H. slosseri*’s life cycle allows the larvae to eat the tender leaf sprouts in the spring and complete their growth before the leaves become inedible.

In the field, unhatched eggs of *H. slosseri* from the current year were frequently observed in close proximity to hatched eggs from previous years. The goal of this project was to determine any possible correlation between the placement of new eggs and the position of old eggs, which may indicate some sort of attractant from the hatched eggs to the females of the current brood.

**Methods**

A 12 by 40 meter survey area was established on a patch of shinnery oak in Andrews County where *H. slosseri* had been observed in large numbers. The location was approximately 13 kilometers southwest of Andrews, Texas, adjacent to Highway 115. Hatched and unhatched egg clusters were mapped within the grid, and height above ground and stem diameter measurements were taken. Two instances of data were collected in January 2014 and January 2015, after all reproductive and egg laying activities had been concluded. At least two years’ worth of data was needed for analysis, because age of the hatched egg rings from the first year of collection was not known. Hatched and unhatched egg clusters for each year were marked with different colored twist ties so they would not be counted again the following year.

**Results and Discussion**

Nearest neighbor analysis revealed that average distance between unhatched eggs and hatched eggs or other unhatched eggs was not statistically significant (Table 1), which does not support the hypothesis that there is a correlation between the placement of new eggs and the position of hatched eggs from the previous year. Hatched eggs were found significantly closer to other hatched eggs (Table 1), which likely indicated a much larger breeding population of *H. slosseri* in a previous year that oviposited on similarly-aged stems that were spatially clumped within the habitat.
Table 1. Average distance of hatched/unhatched eggs from other hatched/unhatched eggs was measured in meters. Standard error is shown in parenthesis.

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<tr>
<th></th>
<th>Unhatched</th>
<th>Hatched</th>
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<tbody>
<tr>
<td>Unhatched</td>
<td>0.76 (0.130)</td>
<td>0.70 (0.148)</td>
</tr>
<tr>
<td>Hatched</td>
<td>1.15 (0.104)</td>
<td>0.53 (0.061)</td>
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Observational data would support this claim as well; only three adults were seen flying during the January 2015 visit, whereas many adults were seen flying in January 2014. Large brood size fluctuations are not unusual for Lepidopterans, or insects in general. Stem diameter and plant location were likely the largest determinants of egg deposition. Our results for height above ground data were similar for both hatched and unhatched eggs (randomization test, P<0.06) and agrees with data reported by Slosser (Figure 1). Stem diameter was significantly different for unhatched and hatched eggs (randomization test, P<0.0002; Figure 2).

Figure 1. Average height above the ground for hatched and unhatched egg cases, which were not significantly different (P<0.06). The height above ground is similar to those data collected by Slosser (2001).
Figure 2. Average stem diameter for hatched and unhatched egg cases. Unhatched eggs were found on smaller stems compared to hatched eggs (P<0.0002).

Stems that were too large or small would not be able to support an ideal egg cluster, and would increase surface area, making eggs more susceptible to freezing in the winter. Within the grid, eggs showed a clumping pattern and were much more concentrated where the density of *Q. havardii* was highest. This would also reduce exposure to the elements, provide shelter from potential predators, and position the soon-to-be hatched larvae in close proximity to an abundant food source.

Based on our findings, females from each year likely chose their egg-laying sites based on ideal stem diameter and density of host plant population. It is unlikely that the presence of hatched eggs had any effect on the placement of new eggs. Since eggs can remain on a stem for more than a year, further data can be gathered that might reveal the history of oviposition behavior in an area. Additional field studies are currently underway and should provide a more complete resolution of the factors affecting oviposition in female moths.
References
