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Diurnal Oviposition of Blow Flies in Different Aged Carrion

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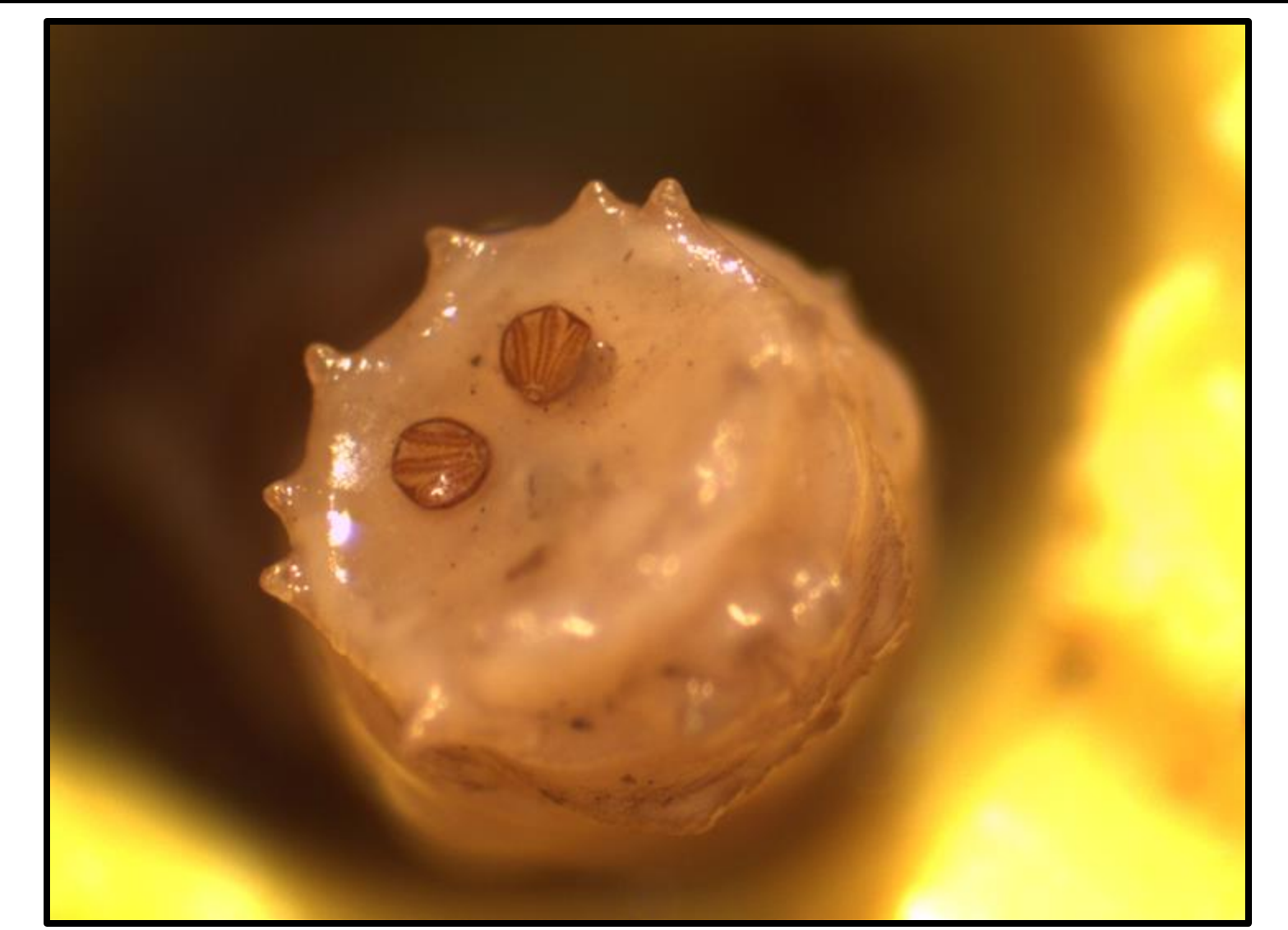
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Diurnal Oviposition of Blow Flies in Different Aged Carrion

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ABSTRACT

Blow flies (Diptera: Calliphoridae) are among the first insects to oviposit (lay eggs) on carrion. The timing of blow fly oviposition is critical for determining a postmortem interval (PMI) estimation, which is the time that has passed between death and corpse discovery. The objective of this investigation is to gain more information about the timing of blow fly oviposition in relation to sunrise. Past research in our lab has shown that blow fly oviposition occurs an average of 4.75 hours after sunrise. This year's research expanded on previous studies by placing six piglets of different ages, in a remote, wooded area one hour after sunrise. To see if there was a difference in the timing of oviposition related to the age of the carrion, three of the piglets had been thawed for 15 hours (new pigs), and the other three had been thawed for approximately 55 hours (old pigs). The piglets were checked once an hour until oviposition occurred, and it was recorded whether flies and eggs were present each hour. Egg masses were collected and reared to the third larval instar stage for identification using taxonomic keys. The timing of oviposition, in hours after sunrise, was compared between treatments and there was no significant difference found ($P=.441$). The research was repeated five times in the fall of 2017. The most common flies found ovipositing were Diptera: Calliphoridae, *Phormia regina* (Meigen) and Diptera: Calliphoridae, *Lucilia coeruleiviridis* (Macquart). This research has importance in both the scientific and forensic communities, as a more accurate PMI can strengthen the validity of a forensic investigation.

INTRODUCTION

- Forensic entomology is the use of insects in legal investigations.
- Blow flies (Diptera: Calliphoridae) are one of the first insects to oviposit (lay eggs) on a body (Byrd and Allen 2001).
- The timing of blow fly oviposition is critical for determining the postmortem interval (PMI), (the time that has passed between death and corpse discovery) (Haskell and Williams 2008).
- Determining the time between sunrise and when oviposition occurs will allow for a more accurate calculation of the PMI.
- It is currently assumed that blow flies become active at sunrise and oviposition occurs shortly after (Haskell and Williams 2008).
- Limited research has been conducted on diurnal timing of oviposition.
- Zurawski et al. (2009) found the earliest oviposition occurred at 3 hours after sunrise.

MATERIALS/METHODS

- Six fetal pigs were placed in a remote, wooded area one hour after sunrise.
- One set of piglets had been frozen and thawed for 15 hours prior to exposure (new).
- Second set of piglets had been frozen and thawed for 55 hours prior to exposure (old).
- Two sets of replicate piglets were used, three old and three new.
- The pigs were checked every hour, and the timing of flies first arrival and oviposition was documented.
- Once oviposition occurred, eggs were collected and brought to the lab for rearing and identification with a taxonomic key.
- A lux meter was used to collect field light readings, and temperature and humidity data were collected online. (www.wunderground.com)
- This study was repeated 5 times in the fall of 2017.

DISCUSSION

- *Calliphora vomitoria* (L.) were only collected on new pigs, and were absent on old pigs.
- No maggots were reared from the old pig collections on September 29, 2017.
- *Phormia regina* (Meigen) oviposited on new pigs with the same, or higher frequency than on old pigs, which is the opposite of what was expected.
- There were record high temperatures in September (34°C), and this could account for the slightly early oviposition timing found in this experiment (3.9 hours after sunrise).
- **After three years of research, it was found that the average timing of oviposition in Northwest Indiana is 4.4 hours after sunrise in the fall months.**

PURPOSE

The purpose of this research is to gain more information about the timing of blow fly oviposition in Northwest Indiana, with respect to the age of the carrion, so that a more accurate PMI can be calculated.

RESULTS

- There was no statistical difference in the timing of oviposition between new and old pigs ($t=.120$, $df=27$, $P=.441$) (Figure 1).
- Oviposition occurred an average of 3.9 hours after sunrise in new and old pigs (Figure 1).
- The species composition varied by date and between new and old pigs (Figures 2 and 3).

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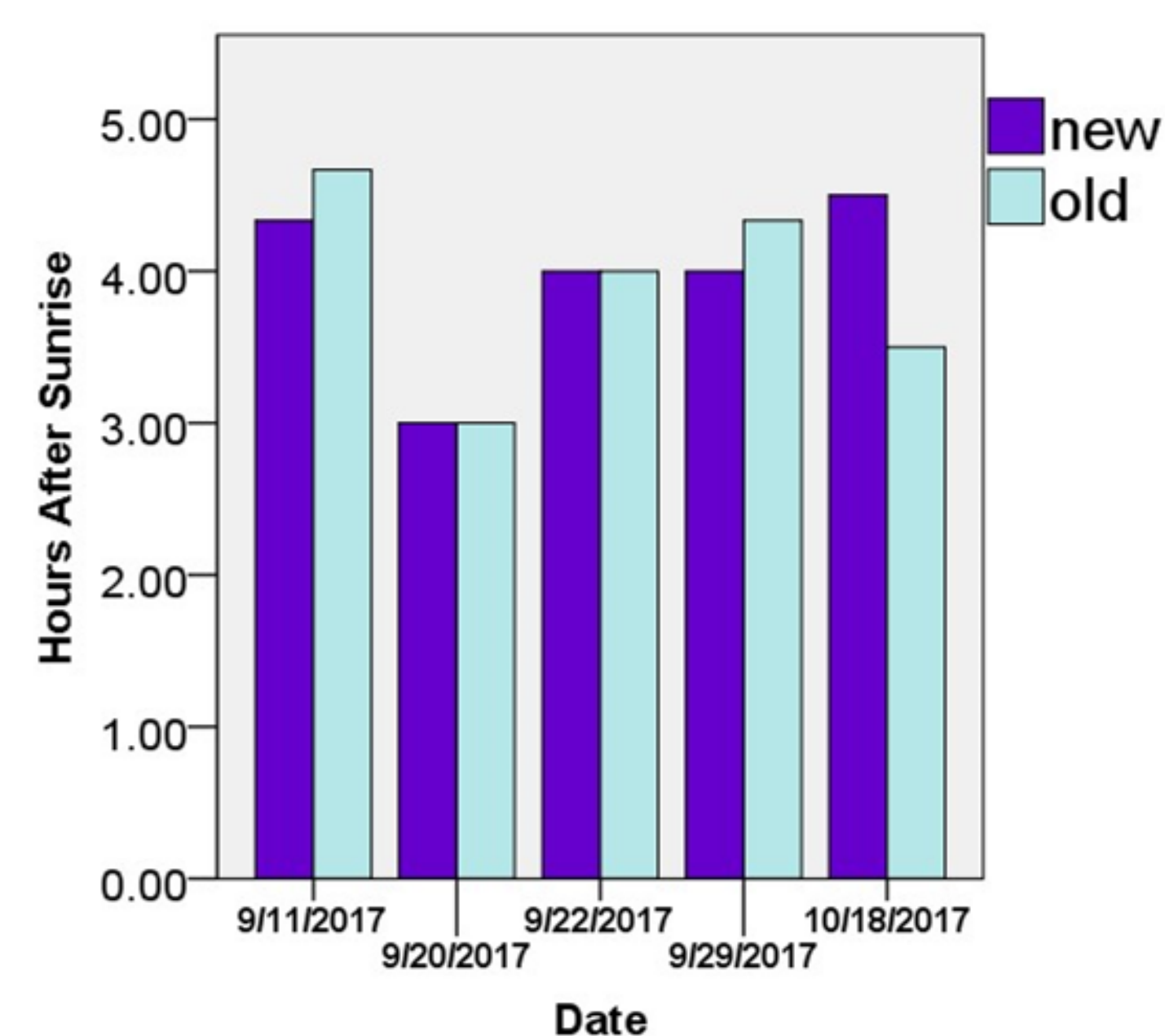


Figure 1. Comparison of the time it took in hours after sunrise for oviposition on new and old pigs.

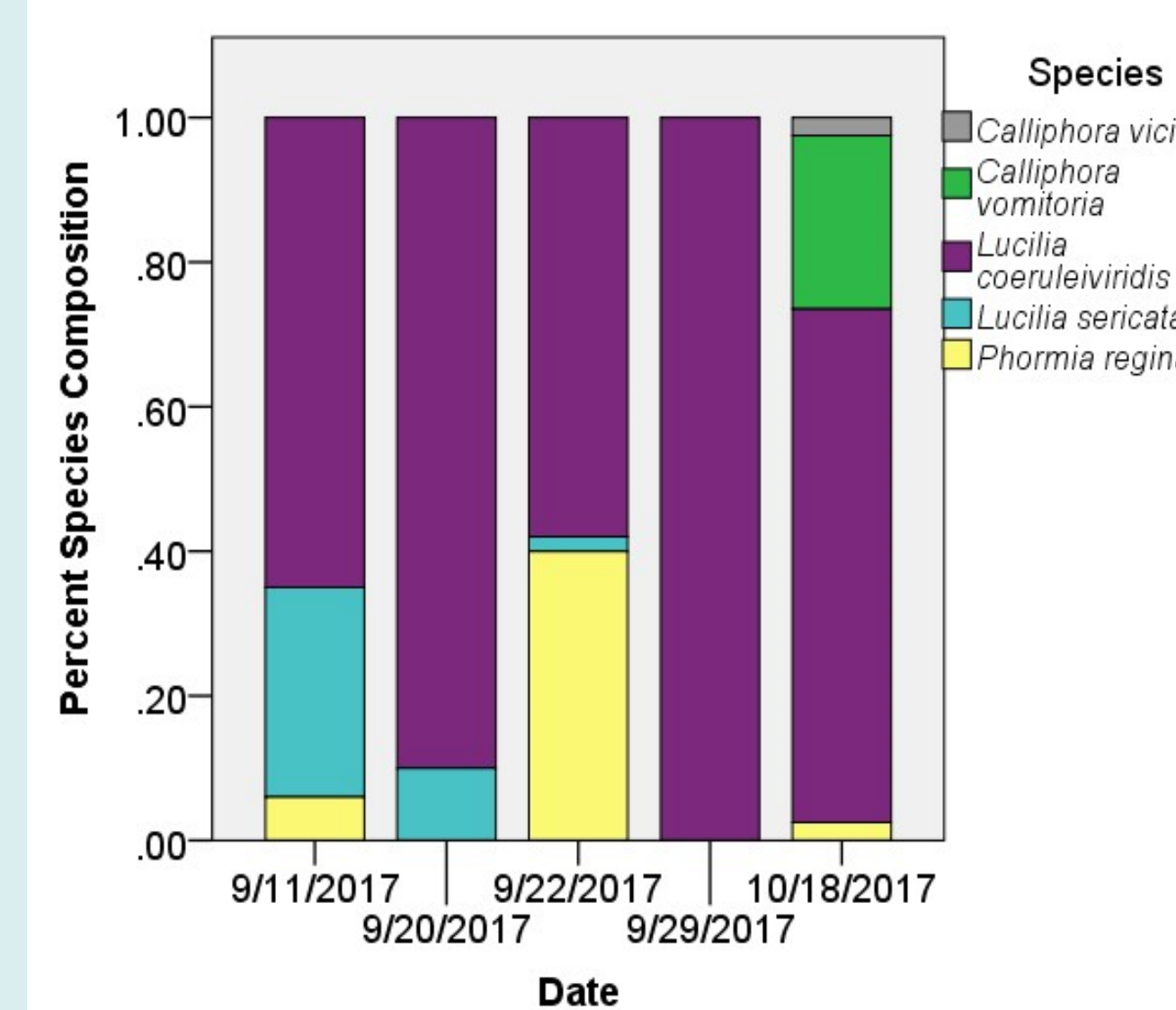


Figure 2. Percent Species Composition of larvae reared from eggs collected on new pigs

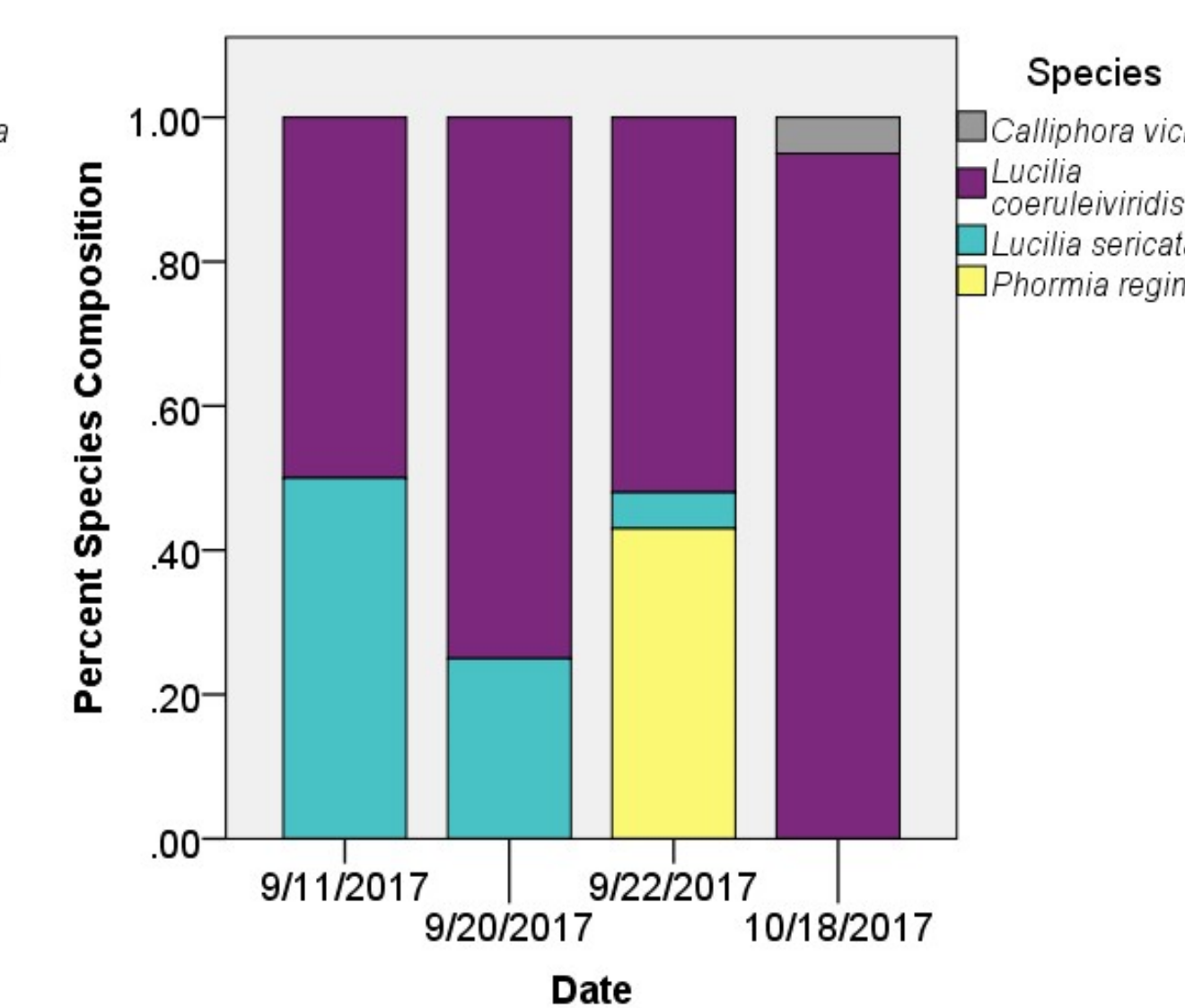


Figure 3. Percent Species Composition of larvae reared from eggs collected on old pigs

