



H90 Diurnal Oviposition Timing of Blow Flies and DNA Identification of Early Arrivers

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After attending this presentation, attendees will better understand how DNA technology is used to identify blow fly oviposition timing.

This presentation will impact the forensic science community by providing research information in an area where very little research has been conducted. Blow flies are usually the first insects to arrive at a crime scene, so information about their oviposition is crucial for accurate Postmortem Interval (PMI) estimations.

Hypothesis: Based on previous research, it was hypothesized that blow flies would oviposit starting at three hours after sunrise.

Synopsis of Methods: Three pigs were placed in a field one hour after sunrise and observed hourly for the presence of blow flies and oviposition. DNA from egg masses was isolated and the mitochondrial Cytochrome Oxidase I (CO I) gene was amplified by Polymerase Chain Reaction (PCR). CO I sequences specific to individual blow fly species were identified using Basic Local Alignment Search Tool (BLAST).

Summary of Results: The earliest oviposition on pigs occurred four and one-half hours after sunrise, but adult flies were observed starting two hours after sunrise. The two blow fly species identified were *Lucilia coeruleiviridis* (Macquart) and *Lucilia illustris* (Meigen).

Conclusions: These results confirm previous findings that *Lucilia* species are early arrivers on carrion. Blow flies did not start ovipositing immediately after sunrise, and forensic entomologists should take this into consideration when making PMI estimations.

Abstract: Forensic entomology is the use of insects in the criminal justice system. Blow flies (Diptera: Calliphoridae) are usually the first insects to arrive and oviposit (lay eggs) on carrion.¹ Their early arrival makes the timing of blow fly oviposition critical for PMI calculations.² The PMI is the time that has passed between death and corpse discovery, and forensic entomologists can help provide an estimation of this interval.² There is little known about the diurnal timing of oviposition in forensic entomology. Previous studies found oviposition occurs as early as three hours after sunrise, but diurnal oviposition was not the primary focus of that study, nocturnal oviposition was.³ Nocturnal oviposition has been well studied in forensic entomology, but the earliest diurnal oviposition has not.³ This study documented the earliest oviposition time in relation to hours after sunrise.

Three pigs were placed in a field one hour after sunrise and observed hourly for the presence of blow flies and oviposition. Three bait cups filled with aged chicken liver were also placed in the field to note differences in oviposition timing and magnitude between pigs and liver. Pigs and liver were observed every hour to document the presence of eggs. The experiment was replicated three times in September 2015 and will be replicated in the late summer and fall of 2016.

No oviposition was observed on any of the chicken liver bait cups. The earliest oviposition on pigs occurred four and one-half hours after sunrise, but adult flies were observed starting two hours after sunrise. Temperature and light data were also recorded to try to determine if either have an influence on oviposition timing. Those results will be analyzed and presented at the meeting. Egg masses were collected from pigs immediately after oviposition



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to ensure the first blow fly species ovipositing was recorded. Egg masses were frozen in a -20°C freezer prior to DNA isolation. DNA from egg masses was isolated and the mitochondrial CO I gene was amplified by PCR. CO I sequences specific to individual blow fly species were identified using BLAST.

The two blow fly species identified were *Lucilia coeruleiviridis* (Macquart) and *Lucilia illustris* (Meigen). These results confirm previous findings that *Lucilia* species are usually the first to arrive on carrion.¹ It is important to note that blow flies did not start ovipositing immediately after sunrise, and forensic entomologists should take this into consideration when making PMI estimations.

Reference(s):

1. Byrd J., Castner J. 2010. *Forensic Entomology: The Utility of Arthropods in Legal Investigations*, 2nd ed. CRC Press, Inc., Boca Raton, Florida. 681 pages.
2. Haskell N., Williams R. 2008. *Entomology and Death: A Procedural Guide*, 2nd ed. Forensic Entomology Partners, Clemson, South Carolina. 182 pages.
3. Zurawski K.N., Benbow M.E., Miller J.R., Merritt R.W. 2009. Examination of nocturnal blow fly (Diptera: Calliphoridae) oviposition on pig carcasses in mid-Michigan. *J Med Entomol.* 46(3):671-9.

Calliphoridae, Oviposition, Diurnal