G37 First Oviposition Timing of Blow Flies on Human Cadavers

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After attending this presentation, attendees will understand the degree to which the first oviposition timing of blow flies varies depending on temperatures and/or covering and the importance of consideration of this information during estimation of the Postmortem Interval (PMI).

This presentation will impact the forensic science community by providing information that will enhance the prediction accuracy of PMI mathematical models using entomological evidence. As a result, the potential error produced by simply assuming that blow flies deposit eggs shortly after a victim's death is reduced, resulting in a more accurate estimation of PMI.

The goal of this research was to understand the relationship between temperature and the first oviposition timing of blow flies and to test whether covering on a body can delay the first oviposition timing. The hypotheses of the study were first, that fly eggs will be observed on a cadaver earlier in warm weather than in cold weather, and secondly, that covering on a body will delay the first oviposition timing.

It is generally understood that blow flies are the first insects that approach and deposit eggs on a cadaver. Due to the extensive literature on the life cycle of blow flies in various temperature conditions, it is believed that PMI can be calculated by mathematical models developed with great accuracy. However, the first oviposition can be delayed due to a number of factors, and as such, the delayed oviposition still remains a potential source of error in estimating PMI.

This research was conducted at the Anthropology Research Facility at the University of Tennessee, Knoxville. A total of 60 donated individuals were observed each day for the timing of fly egg deposits between April 2011 and March 2012. Approximately half (n = 36) of the individuals were covered in black plastic sheeting, while the rest were uncovered and unclothed.

For this study it was found that the first oviposition timing was largely dependent on temperature. In the month of July, when the monthly temperature was 28°C, which was the highest of the year, fly eggs were observed within 24 hours after placement of bodies at the facility. Also, from May to September, when monthly temperatures were above 20°C, it took three days or less for the first oviposition to occur. Conversely, in January, when the monthly temperature was 6°C, which was the lowest of the year, fly eggs appeared about 19 days after placement on average.

More specifically, the first oviposition timing was found to have varied more in cold weather than in warm weather. From May to September, it took between one and three days for the first oviposition to occur. However, in January, fly eggs were observed between 10-28 days after placement. Even though average monthly temperatures of October and March were equal (16°C), the first oviposition timing of October was faster than that of March. This difference can be attributed to the population density of currently existing flies. That is, in October, at the end of the summer season, it is likely that there still remain a large number of active flies as well as pregnant flies; however, in March, at the end of the winter season, it is likely that there are few active flies over the landscape and even less numbers of pregnant flies. Because there are not many existing flies at this time that are prepared to oviposit, it is likely to take some time for flies to emerge and mate.

Finally, the timing of the first oviposition was only marginally affected by covering. While black plastic sheeting delayed the first oviposition timing during summer, the delay was one day at most. Unfortunately, this study cannot present the effect of black plastic sheeting during winter because all the cadavers placed between December 2011 and March 2012 were covered in black plastic sheeting.

In conclusion, forensic anthropologists and entomologists must be aware of the varied effect of temperature and covering on the first oviposition timing of blow flies. This detailed information should be taken into account when PMI is calculated using blow fly evidence.

Reference:

1. Gennard, Dorothy E. Forensic Entomology: An Introduction (2nd ed.). Chichester, West Sussex: Wiley-Blackwell, 2012.

Oviposition Timing, Blow Fly, Postmortem Interval

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