



## Pathology Biology Section – 2010

### G92 Exploring the Potential for Nocturnal Colonization of Fresh Cadavers by Carrion Flies in the Central United States

Timothy E. Huntington, PhD\*, Concordia University Nebraska, 800 North Columbia Avenue, Seward, NE 68434; and Leon G. Higley, PhD, University of Nebraska, 706 Hardin Hall, Lincoln, NE 68583-0987

After attending this presentation, attendees will understand the unlikelihood of nocturnal colonization of bodies by blow flies and how this affects estimates of the postmortem interval.

This presentation will impact the forensic science community by demonstrating that while nocturnal colonization of human bodies by carrion flies is conceivable, it remains highly improbable and nocturnal colonization of carrion by flies appears to be the exception rather than the rule.

Forensic (or medicocriminal) entomology, the use of arthropods in legal investigations, is most frequently employed to estimate the postmortem interval (PMI) of victims of violent crimes or suspicious deaths. The most commonly used method of PMI estimation employs temperature-dependent developmental rates of blow fly larvae (Diptera: Calliphoridae). Retrospective scene temperatures, those temperatures which the insects experienced during development, are used in combination with known developmental rates of the species involved to estimate the age of the insects.

Because forensically important flies are known to colonize cadavers very shortly after death (often within minutes), the age of their developing offspring found on a body often corresponds closely with the time of death. One exception to this standard has traditionally been death occurring at night, when flies are not presumed to be actively searching for host carrion, and colonization is often assumed to be delayed. Recent studies both confirm and refute this assumption. However, none of the previous studies have actually examined whole carrion that has been freshly killed after dark. Previous work has been limited to butchered meats, thawed carcasses, or aged meats, all of which do not adequately replicate the conditions often encountered during medicocriminal investigations of human death; death occurring during the hours of darkness.

Live pigs (*Sus scrofa*), ranging from 23-32 kg each, were euthanized at the study site via captive-penetrating bolt device to the brain. Euthanization took place after astronomical twilight had passed, ensuring that conditions were as dark as possible. Each night of the study, three pigs were placed at a site illuminated by a mercury vapor lamp and three pigs were placed at a separate site that was kept dark. Periodic observations of the dark site were made using 3<sup>rd</sup> generation night vision equipment to observe any insect activity. Exposure of the cadavers continued until either astronomical twilight began or ambient air temperatures went below 5°C, whichever came first, with a minimum period of exposure of four hours. Following exposure of the cadavers, the body surface and orifices of each pig were closely examined under a bright light for the presence of fly eggs, maggots, or fly artifacts (spots caused by regurgitation or defecation).

After eighteen studies in both brightly lit and completely dark field settings with dense populations of necrophilous insects, no colonization of the cadavers was observed at night. It is our opinion that estimates of PMI based on insect development should continue to exclude nighttime as potential times for colonization. The data at hand from multiple studies indicates nocturnal colonization of human bodies by carrion flies is highly improbable and appears to be the exception rather than the rule. When applied to medicocriminal investigations, the data do not support nocturnal colonization as a plausible scenario.

**Forensic Entomology, Postmortem Interval, Nocturnal Colonization**