H17 When Primary Colonizers Are Late to the Party: Implications for Using Time of Colonization to Inform Postmortem Interval

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Learning Overview: The goal of this presentation is to describe the findings from a behavioral assay conducted with adult *Lucilia sericata* (Diptera: Calliphoridae) blow flies. The results have potential implications for how the entomological pre-colonization interval for remains and its relationship with Time Of Colonization (TOC) estimation assumptions and postmortem interval inferences are interpreted.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by highlighting some of the variability that exists in the entomological phases of decomposition, focusing on the pre-colonization interval. Attendees will better understand the assumptions associated with TOC estimations and how variability in the pre-colonization interval may influence how investigators relate TOC and Postmortem Interval (PMI) estimations.

Time of colonization (TOC) estimations calculated by forensic entomologists can be used by investigators when determining a minimum PMI (mPMI) in cases where insect evidence is present. There are a number of assumptions associated with TOC calculations and their relationship to mPMI, including the assumption that insects located and colonized a decedent at the time of death.

The five entomological phases of decomposition can be separated into the pre- and post-colonization intervals. Colonization of remains by insects (e.g., the moment that TOC calculations aim to estimate) marks the start of the post-colonization interval, which includes the consumption and dispersals phases. However, there are three phases that precede colonization (exposure, detection, and acceptance), which make up the pre-colonization interval. This pre-colonization interval and its assumed length are closely tied to the assumptions made regarding insects' rapid location and colonization of available remains.

Lucilia sericata (Diptera: Calliphoridae), the common green bottle fly, is a well-studied blow fly species traditionally viewed as a primary colonizer and known for colonizing human and other remains. In this study, behavioral assays were conducted on 7–9-day old *Lucilia sericata* adults in a dual choice olfaction cube using mouse carcasses in the fresh (<24h) and active (72h) stages of decomposition that were either uncolonized or colonized by conspecifics. As a "primary colonizer," *L. sericata* should be expected to show a preference for fresher carcasses; however, results showed an emphatic olfactory preference for carcasses in later stages of decomposition (93% [mean] preferred late uncolonized carcasses over fresh uncolonized carcasses, $p < .0001$), with existing conspecific colonization having no effect on carcass preference. Furthermore, carcasses in the later stage of decomposition elicited a 37% increase in *L. sericata* foraging behaviors than seen when exposed to fresh carcasses, suggesting that referring to *L. sericata* as a primary colonizer—and the assumptions for pre-colonization interval and TOC estimations that come with the moniker—may be more nuanced than traditionally considered. Considering the preference shown here for carcasses in later stages of decomposition, the assumption of a short pre-colonization interval and its implications for relating TOC and mPMI estimations should be used cautiously. Better understanding the variability associated with the entomological phases of decomposition can help prevent overreaching the use of basic science in applied scenarios.

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