



E71 The Use of Heterospecific Development Data for Time-Of-Colonization (TOC) Estimation

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After attending this presentation, attendees will understand the limits of using closely related Calliphoridae species growth data to determine TOC estimations when using species that have not been studied.

This presentation will impact the forensic science community by determining if this suggested practice is acceptable in forensic entomology casework, where errors in the estimation of TOC and Postmortem Interval (PMI) can have important implications for reports and testimony of forensic entomologists.

A historical analysis of forensic entomology reveals several centuries of practical use of entomology at the crime scene. Modern research advanced forensic entomological knowledge in recent decades, and it is now commonly known that insect and arthropod evidence can assist in the estimation of the PMI via the TOC of insects on the remains. This estimate is based on how long insect larvae have been feeding on the decedent (assuming colonization occurred shortly after death) and is determined through the use of known development rates for the insect species attracted to the body at known temperatures. The most commonly utilized arthropod for this analysis is the blow fly (Diptera: Calliphoridae), as these flies are often the first to colonize both human and animal remains.

This method of analysis relies upon intimate knowledge of growth rates of the insect species observed on decomposing bodies, which is highly useful when this knowledge is available but problematic when these data are unknown. Since blow flies are poikilothermic, they are significantly affected by fluctuating ambient temperatures. Each species has a required amount of heat above a minimum threshold necessary to complete development and each species has its own requirements for completing the developmental milestones necessary to complete development. This knowledge is gained through intensive study of each species and is, therefore, only available for a select few blow flies in the country.

When unstudied Calliphoridae are encountered at a scene, a problem may arise. It has been suggested that development data from closely related flies (i.e., those within the same taxonomic tribe) may be used to approximate development rates and therefore TOC; however, there is, little independent data to support this suggestion. This study attempted to test this hypothesis.

In this study, Calliphoridae larvae were collected from human remains at the Forensic Anthropology Research Facility at Texas State University. TOC estimates were calculated using development data from heterospecific organisms within the same tribe and compared to known placement rates for the cadavers. Statistical comparisons between the use of specific and within-tribe development data and the actual time of cadaver placement were used to determine if the development data of closely related species may be confidently used to determine an accurate TOC estimation.

PMI Estimation, Forensic Entomology, Calliphoridae