

Influence of Biomass and Bisection of Remains on Production of Necrophagous Flies.

Learning Overview: After attending this presentation, attendees will have a better understanding of how manipulation of remains (i.e. vertebrate scavenging) influence arthropod colonization patterns.

Impact Statement: This presentation will impact the forensic science community by discussing the impact of body manipulation on the quantity of entomological evidence in casework involving medicolegal and urban forensic entomology.

The presence of necrophagous insects can be utilized to provide forensically important timelines through the time of colonization interval and may provide context in relation to the condition and treatment of decedents before, during, or after death (i.e., neglect and abuse). Previous research has indicated that bodily openings generated by scavengers have the potential to increase the abundance of necrophagous insects at remains with preliminary evidence indicating carrion biomass has an additional effect. Furthermore, it has been established that remains with a high surface area to volume ratio decompose faster than those with relatively smaller ratios. However, no research has conducted a controlled experiment to quantify insect production from remains by artificially increasing surface area through disarticulation.

This research aims to better understand the role surface area and biomass play on the production of insects at remains. It is hypothesized that artificially increased surface area through bisection will allow for the greatest abundance of insects emerging from remains, with larger biomasses having the greatest effect. To test this hypothesis, 24 adult feeder rats equally representing three size classes (eight small (3-45 g), medium (85-175g), and extra-large (275-375g) rats) were purchased frozen. Four rats from each size class were bisected along the transverse plane, where both halves of a body were considered one replicate. The biomass, diameter and circumference of the torso were measured from all rats and placed under vertebrate exclusion cages on top of sand in a plastic tub and placed outdoors with at least 30 m from the next set of remains on the Curry College Campus in Milton, Massachusetts. Remains were left to be colonized for 48 hours before being placed in individual rearing chambers, allowing larvae to develop to adulthood. Remaining biomass was measured after larvae left remains to pupate. Adults were identified to the lowest taxonomic resolution and quantified before calculating successful pupations and emergence. Influence of biomass and surface area on adult population metrics and the residual carrion biomass at the conclusion of the study will be discussed.

This presentation will highlight the need to further understand the surface area to volume ratio of remains, its influence on insect colonization, and its utility in criminal and civil litigation involving insect evidence. Additionally, the need for more interdisciplinary research among entomologists, anthropologists, and wildlife biologists in decomposition ecology will be discussed.

Keywords

Dismemberment, Entomology, Decomposition