



Pathology/Biology Section - 2016

H9 Bacteria Triggering a Preference in Flesh Flies (Diptera: *Sarcophagidae*) Associated With Human Cadavers

*Keli L. King**, Sam Houston State University, 2200 Crosstimbers, #3, Huntsville, TX 77320; *Aaron M. Lynne, PhD*, Box 2116, LDB #300, 1900 Avenue I, Huntsville, TX 77341; *Sibyl R. Bucheli, PhD*, Sam Houston State University, Dept of Biological Sciences, Box 2116, Huntsville, TX 77340; and *Joseph F. Petrosino, PhD*, Baylor College of Medicine, Dept of Molec Virology & Microbiology, Houston, TX 77030

After attending this presentation, attendees will have a better understanding of insect interactions with human cadavers.

This presentation will impact the forensic science community by helping attendees understand the interaction between bacteria found on the decomposing cadavers and flesh flies which may provide a deeper understanding of how decomposition progresses and, if chemical compounds are responsible for fly attraction, they may also help form a more precise estimation of the Postmortem Interval (PMI).

Bacteria, credited as having a major role in human decomposition, are credited with driving the tempo and mode of the process. Flesh flies of the family *Sarcophagidae* (“flesh-eating”) are among the first scavengers to arrive to a cadaver and can greatly impact soft tissue removal, along with other flies, and may be responsible for delivering important bacteria to the ecosystem. Flesh flies are attracted or repulsed by various stages of decomposition, aiding in the establishment of a cadaver-specific microbiome. Understanding the interaction between bacteria found on the decomposing cadavers and flesh flies may provide a deeper understanding of how decomposition progresses, and if chemical compounds are responsible for fly attraction, they may help to form a more precise estimation of the PMI.

In an effort to understand fly behavior, this research tested the flies’ preference for bacteria specific to these stages of decomposition. Using classic choice experiments, swabs of bacteria from two decomposing cadavers placed outdoors to decompose under natural conditions at the Southeast Texas Applied Forensic Science (STAFS) facility, a willed body donation facility at Sam Houston State University in Huntsville, TX, were presented to commercially purchased flies from April and July of 2015. Sterile cotton-tipped applicators were used to swab cadavers at different stages of decomposition (initial decay, putrefaction, black putrefaction, butyric fermentation, and dry decay) and at different areas of the body (mouth, groin area, and torso). The swabs were placed into respective sterile cryotubes and stored at -80°C. A control experiment was performed using the same stage of decomposition, the same body sites, and the same storage method of the cadaver on both ends of the y-tube. Swabs were placed at the top of the y-tube thereby giving flies a choice as to which stage they prefer. A chi-squared distribution was used to determine if preference was due to random chance alone. Taxa summaries showing bacterial community structures were created from sequenced data at each sample site for each stage of decomposition. These were used with the data from fly preference trials to correlate preference to stage-associated bacteria.

Preliminary results suggest that flies have a preference for the consortium of soil, human, and fly bacteria associated with initial stages of decomposition. This research has significance in forensic sciences. If the initial consortium of bacteria is altered (e.g., freezing), it could interfere with fly oviposition behavior and lead to a skewed estimation of PMI. Ultimately, bacterial data such as these can be refined to develop a model of microbial succession that can then be used to estimate the postmortem interval or the time since death.

Flesh Flies, Human Decomposition, Insect Behavior