



B31 The Decomposition Clock: A Characterization of Insect Volatile Odor Profiles

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Learning Overview: After attending this presentation, attendees will gain a better understanding of the volatile organic compounds emitted from collected maggots feeding from a decomposing pig cadaver and how the volatile odor pattern changes during the decomposition stages.

Impact on the Forensic Science Community: This presentation will impact the forensic community by providing strong scientific perspectives on insect odor profiling, by implementing a chemical study regarding odor compound identification both qualitative and semi-quantitatively throughout an animal model decomposition process. Insects are observed at nearly every death scene and are among the first creatures to arrive to a corpse. Therefore, this study will further enhance the use of insects as evidence at death scenes by providing vital information that may not be available elsewhere. The optimal implementation of insects as a source for odor biomarkers impacts the forensic field by providing a valuable, highly advantageous technique that can be used in multiple situations.

Significance: The benefit of this study is enhanced knowledge in the realm of optimal odor profiling of maggots from the different stages of decomposition. This research will fundamentally bridge the gap in knowledge regarding the odor profiles emitted by maggots at various decomposition stages and how this profile impacts criminal investigations, which may be lacking evidence, and provide it with a new upcoming technique.

Forensic Entomology is a growing discipline with very little scientific research regarding insects found on a dead body and how they can provide vital information that may not be found anywhere else. Perhaps due to the limited research that has been done, there are also few experts in this discipline who look at odor profiles in connection with the insects that appear. Emerging research includes looking at odor profiles of different animal cadavers as well as the odor emitted from beetles placed on a corpse. However, there are no studies that are specifically looking at the odor emitted by maggots feeding on a cadaver. The purpose of this study is to investigate the volatile odor profile within maggots found on decaying piglet cadavers as a function of decomposition stage and compare with previous literature the results obtained to see how an insect's volatile odor profile compares to human/animal decomposition models. With this information from the maggots, the utilization of insects as a sample matrix can potentially be implemented by forensic scientists using volatile biomarkers as indicators of postmortem intervals. Knowing the volatile organic compounds emitted from the cadaver insect populations will also give cadaver canine teams more information to improve training procedures in hopes of enhancing and standardizing those procedures. This study used thirteen piglet cadavers: three for a pilot study, five for a summer sampling period, and five for a fall sampling period. Instrumental evaluation utilized Divinylbenzene/Carbon/Polydimethylsiloxane (DVB/CAR/PDMS) coated Solid Phase-Microextraction (SPME) fibers, samples from which were injected into a Gas Chromatography-Mass Spectrometry (GC/MS) system for the identification of extracted volatile odor profiles of maggots at the different stages of decomposition. The pilot study recorded and sampled the decomposition process every two hours until the process was complete. The piglet cadavers from the summer and fall sampling periods were sampled three times a day to optimize the intervals. Decomposing tissue samples from the piglet cadavers were also collected to provide a correlation between the odors emitted from the maggots and the pig cadavers themselves. The findings include an assortment of chemical compounds emitted from each of the maggots collected exhibiting distinctive odor profiles as a determinant of the stage of decomposition.

Odor, Insect, Decomposition