## H96 Decomposition Odor Production in a Tropical Savannah

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**Learning Overview:** After attending this presentation, attendees will understand the relation of the Volatile Organic Compound (VOC) profile emitted from decomposing remains in a tropical climate to those in other climate regions.

**Impact on the Forensic Science Community:** This presentation will benefit the forensic science community by providing information about the reproducibility of decomposition odor for a new and common climate region. This is crucial to the courtroom defense of applications that rely on the detection of decomposition odor for search and recovery.

Cadaver detection canines perform an important role in the search and recovery of human remains in missing persons cases, homicides, and mass disasters. In recent years, significant advances have been made in the analytical tools used to profile the VOCs constituting the target odors for cadaver detection canines. It is well known that these canines are highly efficacious, especially in scenarios that involve a large search area or challenging terrain. They are also capable of locating human remains in a variety of weather conditions and climates across the world. However, decomposition odor research has only been performed in select locations in the past, and, therefore, more detailed information is required to understand what is consistent to odor evolution regardless of the local environment. The purpose of this study was to perform the first decomposition odor study in a Tropical region, specifically the Tropical savannah climate experienced in Honolulu, HI. Honolulu is a contrasting location to areas that have been previously studied due to relatively consistent and warm temperatures year-round, as well as minimal temperature differences throughout the day. Tropical savannah is also the world's second most common climate type (following Hot desert), and these regions experience many climate events, such as tropical storms, that may contribute to a need for forensic search and recovery. Therefore, it is very important to improve our understanding of decomposition odor in these regions. The hypothesis was that a major portion of the VOC profile would be comparable to previous studies performed in other environments.

Three pig (*Sus scrofa domesticus*) carcasses were placed on an exposed soil surface and decomposed for two weeks. Every second day, the pig carcasses were sampled for VOCs by covering them with a stainless steel hood and pumping air from above the carcasses onto a sorbent tube. Additional VOC samples were also collected from larval masses at each carcass during the period that they appeared. Sorbent tubes were thermally desorbed and analyzed using comprehensive Two-Dimensional Gas Chromatography/Quadrupole Mass Spectrometry/Flame Ionization Detection (GC×GC/qMS/FID). Approximately 30 compounds were tentatively identified from the decomposing remains, the majority of which have been reported in previous literature. This demonstrates consistency in the decomposition VOC profile in a new geographical region. Temporal trends were tracked for several compounds prominent in literature, such as alcohols, aldehydes, ester, ketones, and sulfur-containing compounds, and longitudinal trends were confirmed to present similarly to past studies. In addition, larval mass samples were found to contain rich VOC profiles, with high abundance of compounds known to be present in the decomposition VOC profile (e.g., 2-butanone, dimethyl disulfide, and 1-butanol). Larval mass data may assist in understanding the metabolic contribution of larval masses to the overall decomposition odor profile.

This research is significant because it is the first study to establish the decomposition odor profile in a Tropical savannah. This supports the development of a core VOC profile that will help provide a chemical foundation for the highly efficacious use of scent detection canines. Such information is essential to the courtroom defensibility of biological detectors, such as canines, as well as the development of chemical sensors that may help in the future to assist in large-scale search and recovery efforts where resources may be limited.

**Forensic Taphonomy, Scent Detection Canines, Volatile Organic Compounds**