D43   Identification of *Canis Familiaris* Signature Odor Chemicals in Human Remains

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The purpose of this project is to determine the signature odor(s) of human decomposition. In addition, a comparative study will be conducted to distinguish the odor of decomposing human remains from that of the scent, which emanates from other deceased animals, including pigs. Finally, to test whether or not a human remains canine will alert solely to bone, as opposed to attached tissue or the soil in which it is surrounded.

This presentation will impact the forensic community and/or humanity by distinguishing the signature odor of human remains, as opposed to other animals, is an essential part in forensic investigation, when a detector canine is used. It is crucial that the canine is consistent in its alert and not distracted by the surrounding environment.

Distinguishing the signature odor of human remains from that of other animals is an essential part of investigation in both the law enforcement and forensic science communities. When canines are employed for search and recovery missions it is crucial that they consistently alert to human remains as opposed to being distracted by the surrounding environment. By identifying the signature odor(s), canine training aids and subsequently the reliability of both the canine and those aids could be better established.

The process of human decomposition is a dynamic one. As the body goes through its various stages of putrefaction, biological compounds are broken down and an array of scent is emitted. Other studies have tested and identified some compounds, which are believed to be sources of the odor. Some of those compounds include 3-methyl indole (skatole), 1,4-diaminobutane (putrescine), and butanoic (butyric) acid. These compounds and eleven others are currently the focus for the identification of the signature odor(s). The compounds have been separated into five categories (biological amines, alcohols/cresols, indoles, methyl sulfides and organic fatty acids).

Since most of the compounds of interest have a strong unpleasant odor, optimization methods have been developed to transfer, absorb and maintain the compounds. This process included testing different absorbent media, as well as storage containers and bags. The samples were subjected to varying conditions to best mimic circumstances encountered in the field.

Human remains canines, 'cadaver dogs,' are those that are specially trained to alert to the scent of human decomposition. The ones used in this study are actively employed and certified by the Miami-Dade Police Department. Weekly field tests with the suspected compounds, human samples and animal samples are being conducted. In an effort to avoid conditioning the canines to any confounding variables, the searching procedures have been established and are implemented by the handler. In addition, some experiments will be blind (where the handler is not aware of the presence or absence of a sample) and some will not. This will be done to help assess the amount of influence (and subsequent bias) the handlers impose on their canine partners. To date, preliminary trials have shown no indication that the canines alert to animal remains. Conversely, they have alerted to some of the suspected chemical compounds, including 1,5-diaminopentane (cadaverine), dimethyl-trisulfide, and butyric acid.

In an effort to identify and quantify chemical compositions, headspace analysis of all the samples will be analyzed by solid phase microextraction/gas chromatography/mass spectroscopy (SPME/ GC/MS) and solid phase microextraction/high performance liquid chromatography (SPME/HPLC). These techniques have been used in other forensic applications including identifying and quantifying narcotics, fire debris and explosives. However, their usage with regards to identifying the components of human decomposition has not yet been comprehensively studied. SPME/GC/MS analysis has revealed significantly better peak resolution when the samples undergo derivitization prior to analysis. Additionally, SPME/HPLC methodology is being optimized.

Human Remains, Animal Remains, Canine Scent Identification