The validation of human decomposition fluid as a cadaver-detection dog training aid

by

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Certificate of Original Authorship

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student:

Date: 23 May, 2016

In Loving Memory of

Sharon G. Buis

Missing May 23, 2014

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Abstract

Cadaver-detection dogs are used by police services to locate human remains. Due to ethical restrictions, the dogs are not trained using human cadavers, but rather, using pseudo-scents or human tissues, such as blood and decomposition fluid. However, the chemical profile of these training aids has not been comprehensively investigated and their accuracy as substitutes for decomposed remains has not been determined. The aim of this study was to validate human decomposition fluid as a training aid for cadaver-detection dogs. The study examined the odour profile of decomposition fluid, including the changes in the profile over time (aged for one year) and under different storage conditions (room temperature, refrigerator and freezer) in order to determine the optimal conditions for its use as a training aid. The study also examined the dogs' sensitivity to decomposition fluid and compared their responses with the chemical odour profiles.

The odour profile of the decomposition fluid was collected using Solid-Phase Micro-Extraction (SPME) and analysed using Comprehensive Two Dimensional Gas Chromatography—Time of Flight Mass Spectrometry (GC×GC-TOFMS). The volatile organic compounds (VOCs) identified in decomposition fluid were compared to the VOCs reported in the literature for human cadaver decomposition odour. A wide range of characteristic decomposition VOCs were identified in the decomposition fluid. While individual VOCs were not comparable to human remains, the compound class proportions of the odour profiles were deemed similar. Variable odour profiles were observed under different storage conditions; room temperature and refrigeration were suitable, but freezing was not recommended for sample storage.

The decomposition fluid was also serially diluted to 1 part-per-trillion to determine the sensitivity of cadaver-detection dogs to this training aid. The samples were presented to three cadaver-detection dog teams under standard indoor training conditions over 14 training sessions. The dogs were capable of detecting the 1 part-per-trillion dilutions after several exposures to the fluid. The samples were subsequently analysed using SPME-GC×GC-TOFMS to determine the odour profile for all dilution levels. A range of VOCs were detected, although their abundances decreased in the lowest dilutions. The results of this study suggest that decomposition fluid closely mimics the odour profile of a decomposing cadaver and is a suitable training aid for cadaver-detection dogs when stored appropriately.

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Related Publications

Buis R, Rust L, Nizio K, Rai T, Stuart B, Forbes S. (2015). Investigating the sensitivity of cadaver-detection dogs to decomposition fluid. *Journal of Forensic Identification*, 65(6): 985-997.

Rust L, **Buis R**. (2015). The Scent of a Crime. *Australasian Science*, 36(7), 16-18.