H16 Investigating Linkages Between Volatile Organic Compounds (VOCs), Total Body Scoring (TBS), and the Stages of Decomposition in Adult Pigs

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Learning Overview: After attending this presentation, attendees will have a better understanding of TBS and its connections to the stages of decomposition and VOC production during the decomposition of adult pigs.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing more information on pig model decomposition and the use of TBS in combination with the stages of decomposition to provide a more detailed description of decomposition.

Decomposition can be used to assist in the determination of Postmortem Interval (PMI). The complete process of decomposition has traditionally been separated into five stages: fresh, bloat, active decay, advanced decay, and dry remains/skeletonization.[1] Often due to legal reasons, most studies focusing on decomposition use domestic pig cadavers as the closest proxies for human remains. As decomposition does not always occur linearly, determining the stage of decomposition can be difficult; thus, a new method called TBS was proposed by Galloway et al. and refined by Megyesi et al.[2,3] TBS is used to assess the decomposition quantitatively in humans by assigning sections of a body a score based on the progression of decomposition. Since the use of pigs in decomposition research is more prominent than humans, an initial TBS method for pigs was developed by Keough et al. to compare to human decomposition.[4] Previous research suggested dividing the remains into three sections: the head and neck, trunk, and limbs. However, as more significant changes can be seen between the torso and rear than between the trunk and limbs, an amended TBS method was developed for the purposes of this research.

Three pigs (45kg each) were placed in a field at an outdoor research facility in Southern Ontario and were allowed to decompose over three months. Decompositional changes and environmental conditions were recorded. The VOCs associated with the remains were collected and processed using Gas Chromatography/Mass Spectrometry (GC/MS). This project proposed comparing the amended method to the Keough et al. method to determine if it, or the stages of decomposition, better describes the state of the remains. The Keough et al. method was used along with the amended method to calculate the TBS. VOCs associated with decomposition were also compared to the stages of decomposition and TBS to determine if there were any associations.

Quantitative and qualitative analyses showed significant differences between the Keough et al. method and the amended scoring system, particularly between the torso and rear sections of the remains. The analysis of the VOC patterns showed that decomposition VOCs were produced during their characteristic stages of decomposition and occurred linearly with the TBS.

The combination of the amended TBS method and stages of decomposition can be used together to describe the state of the remains better than each method individually. It takes into account the variance of the sections of the body while still describing the state of the remains as a whole.

Reference(s):

1. Payne, Jerry A. 1965. A Summer Carrion Study of the Baby Pig *Sus Scrofa* Linnaeus. Ecology 46 (5): 592–602. https://doi.org/10.2307/1934999.
2. Galloway, Alison, Walter H. Birkby, Allen M. Jones, Thomas E. Henry, and Bruce O. Parks. 1989. Decay Rates of Human Remains in an Arid Environment. *Journal of Forensic Sciences* 34 (3): 607–16. https://doi.org/10.1520/jfs12680j.
3. Megyesi, Mary S., Stephen P. Nawrocki, and Neal H. Haskell. 2005. Using Accumulated Degree-Days to Estimate the Postmortem Interval from Decomposed Human Remains. *Journal of Forensic Sciences* 50 (3): 1–9. https://doi.org/10.1520/jfs2004017.
4. Keough, Natalie, Jolandie Myburgh, and Maryna Steyn. 2017. Scoring of Decomposition: A Proposed Amendment to the Method When Using a Pig Model for Human Studies. *Journal of Forensic Sciences* 62 (4): 986–93. https://doi.org/10.1111/1556-4029.13390.

Decomposition, TBS, VOC

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