H51 An Investigation Into the Rate of Decomposition of Decapitated Heads and Heads With an Attached Body

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After attending this presentation, attendees will understand the key factors involved in the rate of decomposition of the head and whether the rate of decomposition in the head alone varies significantly to the rate of decomposition in the head when attached to the rest of the body.

This presentation will impact the forensic community by presenting data from a controlled experiment in an area where very little research is available. This presentation will further add to the important research being carried out in the area of forensic taphonomy by aiding the understanding of how carcasses decompose and thus enabling a better appreciation of the processes involved in human decomposition.

It has been implied within taphonomic research that the head decomposes at a quicker rate than the rest of the body; however, the causes of this increase in rate are unknown and require investigation. This research explores whether the head decomposes more rapidly than the rest of the body and, if so, why this is the case. Previous work has suggested the advanced rate of decomposition of the head may be due to the preferential attraction of Diptera to the natural orifices of the head as a result of volatile gases emanating from these orifices (Cross and Simmons, in press).

Volatile gases produced during putrefaction result in the release of liquids and gases which are in turn exuded through the body's natural orifices. It has been established through previous research that the nose and mouth are the two main sites from which such odours emanate (Bass, 1997). Previous research also showed that that the attraction of carrion flies to these volatile gases results in preferential oviposition in the orifices of the head, especially the mouth. The preference of Diptera for head orifices was examined to determine whether this is due to protection from scavengers and the opportunity of a warm, moist shelter provided by such orifices or the presence of volatile gases.

A control group of 24 whole domestic pigs (*Sus scrofa*) and an experimental group of 24 pig heads was used to carry out this research. Both groups were left to decompose in the same environment at the TRACES facility in North West England. Data were collected approximately every 50 accumulated degree days (ADD) until data collection ceased at approximately 750 ADD. The scoring system proposed by Megyesi, et al. (2005) was adopted to visually assess the decomposition rate of the heads; a score according to the rate of decomposition was assigned to the heads of both the control and experimental groups. Three pigs from each group were discarded every 100 ADD to allow for additional data collection (e.g. weight and soil pH) whilst leaving the remainder of the carcasses undisturbed.

It was observed that heads with an attached body decomposed at a quicker rate than heads alone ($p \leq 0.6140$). This supports the paradigm that the expulsion of volatile gases released during the decomposition of the body is a key factor in influencing the rate at which the head decomposes. It was further noted that preferential oviposition occurred in the mouth of the heads with attached bodies, whereas the preferential oviposition on the heads alone occurred at the foramen magnum. A delay in oviposition of 26.85ADD was observed in the decapitated heads in comparison to the heads with an attached body. Moreover the decomposition rate of decapitated heads lagged behind heads with an attached body by a minimum ADD of 21.02 to reach a decomposition score of 2 and a maximum ADD of 103.06 to reach a decomposition score of 10 on the Megyesi, et al. (2005) scale. A score of 11 was the highest score attributed to the heads alone, whereas the heads with an attached body reached a score of 12.

Such findings further support the importance of the presence of volatile gases in influencing attraction of insects and hence decomposition rate.

In conclusion, this study provides evidence to support the primary role that volatile gases play in the rate of decomposition of the head. Furthermore, information gained from this research can be used to improve PMI estimation in cases of decapitation and thus aid in death investigation.

Decomposition, Heads, Taphonomy

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