H10 Decomposition of Dismembered Pig Carcasses in Insect Repellent and Conventional Waste Disposal Bags

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After attending this presentation, attendees will gain an understanding about how decomposition of heads, limbs, and torsos in separate, sealed plastic waste disposal bags proceeds; and, if insect activity and the decomposition process can differ between regular waste disposal bags and insect repellent waste disposal bags.

This presentation will impact the forensic science community by providing results from a controlled experiment in an area with very little previous research. This presentation will add to research being carried out in forensic taphonomy by broadening the understanding of how dismembered remains decompose in particular settings, enabling a better appreciation of these processes in human decomposition.

Dismemberment of remains to complicate identification and for ease of transportation may be encountered in homicide cases. Heads and limbs, especially hands, of victims are often found severed from the trunk and disposed of separately for this reason. Furthermore, perpetrators may strive to complicate forensic analysis of remains by trying to distort indicators that aid postmortem interval estimation. Since insects are commonly known to be of forensic importance, disposal of remains in insect repellent plastic bags could be an additional way to complicate a time-since-death estimate. It has been shown previously that wrapped remains pose a greater barrier for insects. Research conducted into the effects of various coverings on decomposition by Dautartas observed that insects seemed to appear at a later stage on wrapped remains compared to exposed remains.[1] Furthermore, an examination of Louisiana cases by Manhein showed that remains buried and covered in plastic exhibited a markedly delayed decomposition.[2] It is therefore assumed that the rate of decomposition is distorted in wrapped remains as a result of reduced or delayed insect activity as well as other factors. Previous research and case studies have also found that products such as insecticide, patchouli perfume, HCl, and gas can result in delayed insect activity, and therefore may have a masking effect on decomposition of cadavers, which possibly leads to an under-estimation of the postmortem interval.[3,4]

In this experiment, 24 *Sus scrofa domestica* carcasses were used as research subjects. The experiment was conducted at the Taphonomic Research in Anthropology Centre for Experimental Study (TRACES), Northwest England. The 24 carcasses were dismembered into heads, limbs, and torsos and distributed separately into 72 waste disposal bags (36 insect repellent experimental and 36 regular control bags). The 72 bags were subdivided into four sets; three of which were opened alternatingly at intervals of approximately 50 Accumulated Degree Days (ADD) for data collection. The fourth set was held back to act as a disturbance control. A scoring scale based on the degree of surface area covered to quantify insect activity was developed for the purpose of this research, as well as a scale based on Heaton et al. for scoring decomposition stages of heads, limbs, and torsos in separate, sealed plastic bags.[5]

Insect activity was first observed at 98.5 ADD in both the experimental as well as the control group. Preliminary statistical testing found there to be no significant difference in insect activity over time between the experimental and control groups ($F_{1,250} = 2.165$; *p-value* = 0.143). Analysis of insect data did show a significant difference in insect activity over time between heads, limbs and torsos respectively ($F_{2,250} = 8.477$; *p-value* = 0.000). Trends for insect scores show that while torso bags have a continuously higher insect activity compared to limb bags they progress at the same rate, whereas heads show relatively little insect activity in the earlier stages, but then exhibit a markedly faster progression. Trends for decomposition scores of both the experimental and control groups indicate that torsos progress at the fastest rate, followed by heads and ultimately limbs with a distinctly slower rate. These observations support earlier findings that heads and limbs decompose at a slower rate than whole bodies, likely due to limited bacterial action caused by the absence of gastrointestinal organs and hence gastrointestinal bacteria, which drive most of the putrefaction process.[6,7]

In conclusion, this study provides evidence that insect repellent bags neither deter insect activity nor distort the decomposition of remains when compared to regular bags, and that decomposition rate and insect activity differs between different elements in separate bags. Furthermore, data gained from this research may be used to generate a formula for PMI calculation of heads, limbs, and torsos in separate, sealed plastic bags.

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