H6 Modes of Mutilation in Taphonomic Context: Can Sharp Force Trauma Decelerate the Decomposition Process?

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The goal of this presentation is provide attendees information on the impact of mutilation practices on decomposition rates during the summer period in a terrestrial environment in a Mediterranean coastal region. The study will address aspects of dismemberment types that may delay decay rates, a process that is generally uncharacteristic for sharp force trauma.

Given favorable taphonomic conditions, body tissue incisions by sharp objects can significantly accelerate decomposition by attracting higher insect and scavenger succession, and by aiding more rapid internal and external bacterial action. It is however uncertain whether severing the limbs can affect decay rates in the reverse manner. Because the absence of the taphonomic model may pose a challenge to the estimation of postmortem interval (PMI) of mutilated remains discovered in advanced stages of decomposition, the consequent answers will impact on the forensic community and humanity by addressing the utility of taphonomic profiling in reconstructing postmortem histories. By providing a more coherent understanding of the decomposition processes involved, this study will consequently impact the forensic community by providing more precise estimations of PMI for the most frequent types of dismemberment.

The scientific justification of the research is based on the hypothesis that a different taphonomic model for mutilated body parts is possible, due to putrefaction being altered in the absence of the necessary gastro-intestinal organs responsible for bacterial activity. The alteration of intrinsic factors through dismemberment may cause more dependency on external factors in decomposition, consequently affecting rates of decay. This is because microscopic decomposers that are introduced from both the intestine and the outer environment are reduced mostly to the latter in the case of single-limb decay.

This experimental study involved a decomposition analysis of mutilated body parts in the terrestrial habitat in summertime on the south Croatian coast (43.02° N 17.57° E). It was conducted in June 2008 over a period of 30 days. Samples were completely exposed to the sun, deposited on salt marsh soil. Domestic pigs (*Sus scrofa*) were utilized as animal analogs to mimic human decomposition. The sample size was twelve animals: three whole carcasses (S1) were compared to three decapitated samples (S2), three animals with all limbs and the head severed (S3), and three samples mutilated in transverse plane (S4). The carcasses ranged in sizes from 21 to 23 kg., and they were kept in metal cages for the duration of the experiment to protect them from large scavengers. Temperature data were obtained from the local Hydro- meteorological Station. Once a day, micro-organisms were extracted and insects collected from the "drip zone."

The results demonstrated differences in the decomposition pattern between whole carcasses and within the three types of dismemberment. While all samples reached the decay stage, the bloating stage was omitted by S3 and S4. Significant differences in decay rates were noticed, with S3 reaching the decay stage within the first week followed by S4, S2, and S1 decomposing at the slowest rate. Entomological analysis indicated the highest succession on S3 with the intestines and the head being the preferred body parts in all three mutilated samples, followed by the body-tissue incision area. Most taxa were of the *Diptera* Order, belonging to seven Families and twelve species. Based on the microbial analysis, the species associated with decomposition on the mutilated remains was higher in number and more diverse than with whole corpses, with the highest fungal succession (*Ascomyceteous fungion*; *Aspergillus fumigatus*; *Aspergillus flavus*) on the surfaces of S3 heads and torsos and mostly torsos on S4. The analysis of small scavenger succession further exhibited preference to intestines and was highest with S3 and S4. Regression and correlation analyses demonstrated a significant positive correlation between temperature and weight loss for all carcasses and body parts ranging from r+0.90, r^2= 0.81 to r+0.91, r^2= 0.82, with intestines of S3 yielding a perfect correlation (r+1.00, r^2=1.00). Statistical analysis suggested that relative humidity would also be appropriate to be used as a variable to detect the relationship with rates of decay ranging from r=0.87 to r=0.94 for most body parts.

The results in this study demonstrate significant differences between the tested types of mutilation. The variations concerning the rate of decomposition were due to the internal and external microbial processes between different types of dismemberment caused by sharp force trauma, and aided by temperature and humidity variables, and entomological and small scavenger succession. These preliminary data will be useful for further research for assessing the PMI of the most frequent types of criminal mutilation in a terrestrial environment.

Mutilated Body Parts, Postmortem Interval, Taphonomy

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