H35 The Effect of Human Body Mass on the Rate of Decomposition

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The attendee can expect to come away from this presentation understanding: 1) differences in soft tissue removal rates for varying body compositions, 2) during which stage of decomposition there is a significant reduction in body mass, and 3) the relationship between internal body temperature and ambient air temperature relative to body mass.

All vertebrate organisms, given equal opportunity at death, will proceed through the same stages of decomposition. However, the rate at which individual organisms move through the stages of soft tissue and osseous destruction is dependent on a myriad of variables, including body mass. Previous studies examining the relationship between body mass and rate of decomposition are few. Hewadikaram and Goff (1991), using two domestic pig carcasses (*Sus scrofa L.*), provide the only systematic analysis of the effect of body mass, as well as the patterns of insect succession on the rate of decomposition. The authors found that there was a difference in the rate of decomposition, but not in insect succession, relative to the size of the carcasses. Their study showed that a greater number of adult flies were attracted to the larger carcass (15.1 kg. Vs. 8.4kg) resulting in larger maggot masses and more rapid removal of soft tissue.

Ongoing experiments in body mass and rate of decomposition are being conducted at the Anthropological Research Facility (ARF) located at the University of Tennessee using donated human bodies. To estimate relative body fat, skinfold measurements are recorded for each donated specimen upon arrival at ARF. Body mass, gross morphological changes, internal body temperature, external ambient temperature, and humidity are recorded daily for 30 days, followed by every third day for two weeks. Linear regression analysis is employed to measure the association between body mass, time, and temperature. Preliminary observations show that in the warmer months the most significant reductions in body mass occur during the bloat stage, and that a specimen can lose up to one quarter of its mass within a 24-hour period. Additionally, while specimens of various body compositions may lose up to a quarter of their mass in one day, those with greater relative body fat measures (i.e., greater fat mass) tend to lose mass more rapidly. However, further research is needed to confirm and expand initial results.

Previous studies documenting rates of decomposition in relation to body mass are few. This presentation will provide baseline regional information on rates of human soft tissue removal relative to body mass. Additionally, data derived from this project may aid the forensic anthropologist and forensic pathologist in estimates of time since death in the early stages of the postmortem interval.

Hewadikaram, Kamani A., and M. Lee Goff (1991) Effect of Carcass Size on the Rate of Decomposition and Anthropod Succession Patterns. *The American Journal of Forensic Medicine and Pathology.* 12(3):235-240.

Body Mass, Decomposition, Forensic Anthropology

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