



Physical Anthropology Section – 2008

H28 Debugging Decomposition Data

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After attending this presentation, participants should gain an understanding of the relative effects of environmental variables on soft tissue decomposition.

This presentation will impact the forensic science community by transforming decomposition data into linear equations allows comparisons across multiple environments and variables when energy input and time are measured using ADD. This has demonstrated that insect activity is the primary effector of decomposition rate, although carcass weight plays a secondary role.

Comparison of data from a variety of environments and ambient temperatures shows no difference in the progression of decomposition when measured using a logarithmic scale of Accumulated Degree Days. The major effector of change in decomposition rate was the presence or absence of insects, regardless of: terrestrial (surface or buried) or aquatic environment, natural or laboratory setting, species, or season.

When carcass weights are divided according to Vass, et al.'s (1992) 50 pound broad weight categories, carcass size appears to have a limited effect on the relationship between decomposition rate and ADD. Smaller carcasses decompose at a relatively faster rate than larger ones. The difference appears to be statistically significant; however, this is based on a small sample size of data derived from limited sources. Therefore, it is not possible at this time to differentiate between the effects of carcass size and data source. Recent research (Brand 2007) indicates that there is no significant difference in the decomposition rate among carcasses in the 0-50 pound category in a controlled experiment. These data were derived from experiments conducted in the presence of insects and it is not possible to compare weight category data in the absence of insects at this time.

This paper compares previously published data with recent experimental data and retrospective studies from taphonomic research conducted in the United Kingdom. The data was wide ranging in experimental environment; from Tibbet and Carter's (2006) 1.5 g cubes of meat decomposing in a bucket of soil to human bodies floating down various UK river systems. Simple conversions were used to present all timescale data in ADD, and to convert weight loss data to decomposition scoring systems (Adlam and Simmons, 2007; Brewer Heaton, 2006; 2005; Megyesi et al., 2005). This conversion allows comparison across multiple environments and experiments. Weight loss shows a strong correlation to decomposition score and they describe the same process (Adlam and Simmons, 2007). Duration of immersion and average daily water temperature were used to calculate ADD for the aquatic cases, in the same manner in which ADD was calculated from duration of environmental exposure and average daily air temperature for the terrestrial cases and experimental subjects.

Plotting decomposition score or weight loss against log ADD allows for the exponential progression of decomposition to be expressed as a simple linear equation. Regression analysis of the data shows no significant difference among environments or ambient temperature; whereas presence of insects has a significant effect on the rate of decomposition, accelerating it considerably. Thus, the significance of the differing rates of decay seen in aquatic versus terrestrial human cadavers appears to be solely related to the absence of insects rather than a product of a different decomposition process.

This study once more emphasizes the crucial necessity for future taphonomic work to be conducted using ADD and standard scoring systems (Adlam and Simmons, 2007). Although anecdotal data has previously suggested that e.g., aquatic and terrestrial decomposition differ, or that ambient temperature will alter the rate of decomposition, these variables have no discernible impact on the process, and data from experiments using these variables all fall within the same regression equation. Further studies of carcasses in different weight categories conducted in controlled settings comparing decomposition in the absence of insects are warranted.

Decomposition Rate, Insects, ADD