H111 The Effect of Outdoor Microclimate on Time to Skeletonization in Clothed and Unclothed Remains in an Arid Southwest U.S. Environment

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The goal of this presentation is to explore the forensic taphonomic effects of clothing and exposure to sunlight, with previous research indicating that varying amounts of sunlight have caused differential rates of decomposition due to preferences in feeding behavior of insects and desiccation of tissue. Effects of these conditions were compared based on the Accumulated Degree Days (ADD) to produce a skeleton among domestic pig (*Sus scrofa domesticus*) subjects in an arid environment.

This presentation will impact the forensic science community by demonstrating decomposition patterns in an arid environment as well as the effect of variation caused by cover on decomposing remains from amounts of shade or clothing. Additionally, this study examines the method of estimating PMI developed by Megyesi *et al*.[1]

Six subjects were placed at a site in Warner Springs, CA, located approximately 1341.12m above sea level, in June 2009, in pairs of one clothed and one unclothed pig inside wire enclosures in three outdoor microclimates: full shade; partial shade; and sun. Observations of the subjects' environment, decomposition progress, and associated arthropod activity were made regularly for 40 days, at which point changes ceased to occur hourly. Subjects were then observed every third day for 14 days, and then once per week for 28 days. Decomposition events were noted, including observations of carcass skin color, bloat circumference, lividity, skin slippage, odor, kill-wound discharge, fluid discharge, skeletal disarticulation, and tooth loss. Site observations included ambient temperature, relative humidity, soil temperature, and atmospheric conditions (e.g., sky appearance). Weather data from microenvironment sites and from the National Weather Service/National Oceanic and Atmospheric Administration weather station in Anza, CA, (19.29km from the study site), were used to Calculate ADD (CADD). The ADD were also Estimated (EADD) according to the Megyesi *et al*. (2005) regression equation. The CADD and EADD were compared by Student's t-test in order to examine the effectiveness of the Megyesi *et al*. (2005) method of estimating ADD by calculating a Total Body Score (TBS). The time to each decomposition event between subjects in each microclimate site, and between microclimate sites, was compared by using a two-tailed Student's t-test and/or two-factor ANOVA without replication.

Results from this experiment indicate that microclimate had a greater overall effect on decomposition rate than clothing. However, clothing did play an important role in shielding from necrophagous insects while they consumed decomposing remains. Subjects in shade and partial shade locations reached the skeletal stage prior to the subjects located in the sun, with the clothed subject located in full shade reaching skeletonization first. Statistical comparisons indicate that time to decomposition events were more greatly affected by microclimate than clothing condition. Weather data from a weather station located in Anza, CA, which is at a similar elevation to the study site, was found to be statistically similar to the data from the microclimate locations. There was no statistical difference between EADD and CADD. In a comparison of EADD and CADD to decomposition events by Student's t-test for unequal variance, there was no statistical difference. Calculations based on this experiment indicate that the regression equations developed by Megyesi *et al*. (2005) are a good estimate of ADD in a more arid environment than the environment for which they were formulated. The regression equations will require further testing in other seasons and climates.

The results of this experiment demonstrate that advances have been made in quantitatively estimating PMI. However, repeated testing and longitudinal studies must be undertaken to increase accuracy in future investigations. It is advisable that investigators use caution in outright estimating the PMI of remains found in direct sunlight in arid environments because of the stark lack of change that occurs following desiccation.

Reference:

1. Megyesi MS, Nawrocki SP, Haskell NH. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. *J Forensic Sci* 2005;50(3):1-9.

Decomposition, Microclimate, Clothing

 ** Presenting Author*