



## Physical Anthropology Section – 2011

### H82 A Longitudinal Study on the Outdoor Human Decomposition Sequence in Central Texas

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After attending this presentation, attendees will gain a better understanding of human decomposition in the climate of Central Texas as learned through a longitudinal experimental study.

This presentation will impact the forensic science community by presenting the observed stages of decomposition for a specific climate while providing insight regarding how geographic regions may influence human decomposition. Results from this study will allow forensic anthropology practitioners to better understand environmental factors present in Central Texas and similar geographic regions that complicate the estimation of the postmortem interval, or PMI, also known as the time since death.

Forensic anthropologists may be consulted in the estimation of the PMI. In this estimation forensic anthropologists employ decomposition stages. PMI is dependent upon local climate conditions, such as temperature, humidity, and scavengers (Megyesi et al. 2005; Reeves 2009). Although decomposition sequences have been proposed for specific geographic regions including Tennessee (Mann et al. 1990; Vass et al. 1992; Love and Marks 2003), New Mexico (Rhine and Dawson 1998), and Arizona (Galloway 1997), these sequences may not be applicable in other regions. The Forensic Anthropology Research Facility (FARF) at Texas State University-San Marcos is located in an area subject to various weather conditions characteristic of a sub-tropical

climate, in which the humid climate may be punctuated by periods of drought leading to semi-arid conditions (Dixson 2000).

A systematic longitudinal study on the decay of the human body was conducted with a sample of ten donated human cadavers (N = 10). The objective of the research was to monitor each donated cadaver upon arrival at the FARF by using the decomposition scoring method developed by Megyesi et al. (2005) based on Galloway's (1997) arid environment decomposition stages. For each day, decomposition was scored using the same scoring categories developed by Megyesi et al. (2005) to represent the overall condition of remains and determine if there is a sequential order to human decomposition. Decomposition stage was assessed for the torso, limbs, and head separately to account for different areas of the body decomposing at different rates (Megyesi et al. 2005). The decomposition stages used were divided into Fresh, Early, Advanced, Skeletonization, and Extreme Decomposition (Galloway 1997; Megyesi 2005). Donations were observed until skeletonization, defined as less than one half of the skeleton covered by desiccated or mummified tissue (Galloway 1997).

Previous decomposition studies (Galloway et al. 1989; Rhine and Dawson 1998; Megyesi et al. 2005) could not control for scavengers in a natural environment, but longitudinal data collection permitted a comparison between scavenged and non-scavenged human remains. Both caged donations and those exposed to scavenging were included in the sample. Time delayed photography on a wildlife camera was used to photo document specific scavengers and their effect on the rate of decomposition. Accounting for the behavior and effects of scavengers will provide anthropologists and future researchers' data on how to properly evaluate the postmortem interval when scavengers have access to a body (Reeves 2009).

The present study supports Galloway's (1997) assertion that beyond broad categories of early decomposition, advanced decomposition, skeletonization, and decomposition of skeletal material, secondary characteristics, such as coloration and mummified tissues, do not necessarily follow a sequential order of appearance. Decomposition in Central Texas also appears to coincide with incidences of high humidity as observed by Galloway et al. (1989), with a rapid onset of advanced decomposition, high rates of maggot activity when avian scavengers do not have access, accelerated autolysis, and rapid skeletonization or adipocere formation. The results of the study also demonstrate that decomposition in Central Texas can progress rapidly. In one case of an autopsied donation, without the variable of scavenging, the first sign of bone exposure was noted within four days after placement outdoors. With scavenging, bone exposure to the point of skeletonization can occur within 24 hours. The results of the study also assert that the variable of insect activity is not the only major factor that may disrupt or accelerate decomposition estimates. Temperature, humidity, and access to scavenging animals can all significantly distort time since death estimations in outdoor environments.

**Forensic Anthropology, Decomposition, Postmortem Interval**