H76 Differential Decomposition in Terrestrial, Saltwater, and Freshwater Environments: A Pilot Study

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After attending this presentation, attendees will learn how decomposition rates can differ between terrestrial, freshwater, and saltwater environments in central Texas.

This presentation will impact the forensic community by helping to expand the knowledge base of information regarding rates of decomposition, which will in turn aid investigators in estimating postmortem interval in forensic settings.

The study of decomposition is essential for any forensic anthropologist for estimating postmortem interval. While surface rates of decomposition are well studied, especially in certain areas (Mann et al. 1990), the decomposition rate of bodies submerged in water have not been well studied using controlled experiments (Haglund & Sorg 2002; Sorg et al. 1997). Most forensic anthropologists simply rely on the generalization that a body decomposing one week on land is equivalent to two weeks in the water (after Mann et al. 1990). In addition, there has not been much investigation into whether a saltwater environment affects decomposition differently than a freshwater environment.

This study aimed to address three questions: (1) Does submersion in water affect the rate of decomposition compared to terrestrial surface decomposition?; (2) Does this effect support the longstanding generalization?; (3) Does type of water (salt or fresh) differentially affects the rate of decomposition? Following anecdotal evidence, it was hypothesized that the surface specimens would decompose the fastest, the specimens in freshwater would decompose slower, and specimens in saltwater would decompose the slowest of all.

This study took place outdoors at the Forensic Anthropological Research Facility at Texas State University-San Marcos, Texas. Though human remains and pig carcasses do float differently in water (Haglund & Sorg 2002), pig carcasses were used in this experiment in lieu of human remains due to their similarity to human tissue, as well as for practical constraints. Six pigs (*Sus scrota)* with weights from 20-30 lbs (9-13.6 kg) were humanely euthanized following Institutional Animal Care and Use Committee guidelines. Carcasses were placed on the surface of the ground (N=2), in saltwater tanks (N=2) with water created by mixing freshwater with a purchased saltwater mix, and in freshwater tanks (N=2) with water from the local Edwards Aquifer. Salinity in the saltwater tanks was the same as the Gulf of Mexico (34-36 ppts; Boatman 2006). Air and water temperatures were recorded daily. The surface carcasses and tanks were penned to prevent animal scavenging. The study was completed when all specimens were fully skeletonized.

While placement in water affected the rate of decomposition, placement in freshwater made the specimens decompose much faster than those on land or placed in saltwater, at least in the summer environment of central Texas. This was due to the high temperatures killing the maggot masses present on the surface carcasses only one day after hatching, while the maggot masses on the freshwater carcasses lived and thrived, possibly because the water was on average 8-12 degrees Fahrenheit cooler than ambient temperature. Thus, the effect of water on decomposition did not support the longstanding generalization in the field, as the carcasses in freshwater decomposed much more quickly than the surface carcasses. In addition, the type of water differentially affected the rate of decomposition, as the carcasses in saltwater decomposed much more slowly than the carcasses placed in freshwater or on the surface. The reason for this slower rate is likely related to the fact that the carcasses in saltwater did not have burst abdomens with intestinal protrusion present in the carcasses in freshwater, which were most likely the result of osmosis. The intestinal protrusion on the freshwater specimens attracted blowflies, while the carcasses in saltwater did not, and thus with no insect activity the decomposition rate stagnated. This differential decomposition in diverse environments, whether open-air terrestrial or in fresh or saltwater, is important to consider in Texas because there because of an abundance of freshwater lakes and rivers and the proximity of the Gulf of Mexico. **Forensic Anthropology, Decomposition, Postmortem Interval**

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