H57 Decomposition in Western Montana: Defining Postmortem Changes in the Fall, Winter, and Spring

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After attending this presentation, attendees will better understand the processes of decomposition in western Montana for remains deposited outdoors in the fall, winter, and spring and will have gained knowledge of better Postmortem Interval (PMI) estimation in an environment with extended periods of cold ambient temperatures.

This presentation will impact the forensic science community by providing a baseline dataset for the rate and sequence of decomposition in western Montana allowing for more accurate estimations of PMI by forensic anthropologists.

Little is known about how remains decompose in western Montana; however, preliminary decomposition studies indicate that the decay processes do not follow expected rates found in other geographic locations. Western Montana's climate is unique; it can be extreme and fluctuate rapidly, even hourly. The arid environment that is found throughout this region provides four distinct seasons that differ in their humidity and temperature. Understanding how the unpredictable environment affects human remains is crucial for forensic anthropologists in estimating PMI. Without an expected pre-established baseline dataset, estimating Time Since Death (TSD) can be difficult, especially in an environment like western Montana, where approximately six months of the year ambient temperatures are around and below freezing. This leads to the important research question; do remains deposited during the winter months show specific indictors that can be used to better obtain TSD.

This study utilized three adult pigs (*Sus scrofa*) ranging in weight from 68-90kg as human proxies which were acquired from a local Montana Rancher. Specimens were deposited in two separate locations, both on private ranches: fall (October 1, 2011) and winter (December 2, 2011) were deposited in the Missoula Valley and spring (May 26, 2012) in the Bitterroot Valley, approximately 20 miles south of Missoula. Each specimen was deposited on the surface and enclosed in a 1.8m x 3.0m x 1.8m prefabricated dog kennel which was protected by electric fencing to deter scavenging and disruption by ranch animals. Data was collected using procedures established for western Montana by Gonder and analyzed by comparing the following variables: ambient temperature; relative humidity; weather patterns; internal temperature; external temperature; bloat; odor; color; entomological activity; and other visual observations.[1] For the purpose of this study, the Galloway *et al.* method was altered to more accurately reflect the decompositional changes of the specimens. Four stages were used: (1) fresh; (2) early decomposition; (3) advanced decomposition; and, (4) mummification.[2]

Results of this study indicate that the overall patterns of decomposition are similar compared to studies conducted in other geographic locations; however, unscavenged remains ultimately result in mummification and not skeletonization. The rate of decay for the three specimens differed from one another and deviated from standard expected results. Due to Montana's cold winter temperatures, the remains deposited in the fall and winter decomposed at slower rates and both experienced stasis in the decay process as a consequence of ambient temperatures below 4.4°C. The remains deposited in the fall stayed in the fresh stage for 1 day, early stage for 26 days, advanced stage for 17 days, stasis for 116 days, advanced stage for 125 days, then mummification for 80 days until the conclusion of the study.[2] The remains deposited in the winter stayed in the fresh stage for 7 days, early stage for 19 days, stasis for 61 days, early stage for 75 days, advanced stage for 69 days, and mummification for 134 days until the conclusion of the study. The remains deposited in the spring stayed in the fresh stage for 1 day, early stage for 14 days, advanced stage for 14 days, and mummification for 248 days until the conclusion of the study.[3] Results of this study also indicate that there are specific identifiers that are useful in estimating PMI in cold weather environments.

References:

1. Gonder FC. Wildlife decomposition in west central Montana: a preliminary study conducted to provide field investigation material and training for wildlife officers. Manuscript on file, University of Montana, 2008.
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