



Physical Anthropology Section - 2014

H109 The Pig-of-the-Month Club: Seasonal Variation in Decomposition in a High-Altitude Desert

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After attending this presentation, attendees will have become familiar with aspects of decomposition seen in a high-altitude desert environment.

This presentation will impact the forensic science community by examining postmortem interval estimates in arid climates.

Variables thought to significantly affect decomposition, as measured by a total body score, are time, temperature, and access of the body to insects.¹ This project set out to test how well these suppositions applied to a high-desert environment in western Colorado and whether seasonality made a difference in decomposition rate with time and temperature normalized through the use of Accumulated Degree Days (ADD).

The project took place at Colorado Mesa University's Forensic Investigation Research Station which lies in Mesa County, Colorado, at an altitude of approximately 4,700'. In 2012, the National Weather Service recorded a total of 4.53 inches of rain a year in nearby Grand Junction, an average rH for the year of 42%, and 283 fair days, 62 partly cloudy days, and 21 cloudy days.² By any measure, this area is dry and sunny.

Beginning in October 2012, one deceased swine a month was deposited in a fenced outdoor facility. A HOBO[®] weather station within the facility measured temperature, precipitation, rH, solar radiation, wind speed, and wind gusts on an hourly basis. Decomposition was scored on the basis of gross morphology using the Total Body Score (TBS).³

Maggot masses were seen on all pigs, although at different times post-deposition, reflecting the annual change in temperature. Approximately 50% of the pigs ruptured during bloat. This is seldom seen in human casework in the region, and then generally as a result of injury rather than part of the normal decomposition process. An ongoing study of 150 cases of decomposed individuals from Mesa County from 2007 to 2012, currently being conducted shows no human cases with rupture. As the rupture allowed insects' additional access to the soft tissues inside the body, this may be a difference in decomposition between the humans and pigs worth further exploration.

Pigs varied in the time it took to reach a TBS of 24. Most pigs plateaued at a score of 24. At the score of 24, generally the carcass consisted of a leathery cover with no visible skeletal elements or insect activity. When the carcass was rolled over, active decomposition was seen underneath. In some cases, adipocere formed under the carcass. Pigs moved past the score of 24, but not in their order of deposition, as would be thought if time, temperature, and access of the body to insects were the sole determinants of decomposition.

In addition to time and temperature, the rate of decomposition appears affected by the humidity and available moisture in the initial phases of decomposition. The faster the tissue desiccated past the point where fly larvae either no longer wished to, or could, consume the tissue, the slower the decomposition process. If the tissue stayed moist, it could be consumed by the fly larvae. As the tissue dried out, the mechanisms that appear responsible for the removal of the additional tissue were other species of insect larva and the gradual desiccation of the tissue to a very thin, paper-like consistency where it would break apart under minimal pressure.

References:

1. Simmons T, Cross P, Adlam R, Moffatt C. The influence of insects on decomposition rate in buried and surface remains. *J Forensic Sci* 2010;55(4):889-92.
2. National Weather Service (2013). Climatological Report Annual, Climate Report, National Weather Service, Grand Junction CO. www.nws.noaa.gov/climate/getclimate.php?wfo=gjt, accessed July 25 2013.
3. Megyesi M, Nawrocki S, Haskell N. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. *J Forensic Sci* 2005;50(3):618-26.

Taphonomy, Desiccation, Mummification