



## Physical Anthropology Section - 2012

### H79 Hanging in an Outdoor Context: An Actual Perspective Using Human Cadavers

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After attending this presentation, attendees will appreciate how hanging changes the decomposition process to include the colonization of particular arthropods, the amount of biomass reduced, and the subsequent effects these factors have on estimating the postmortem interval.

This presentation will impact the forensic science community by describing and defining the decomposition process of hanging cadavers in the outdoors, the entomological activity associated with the hanging of human cadavers, the resulting skeletal deposition, and how these relate to time-since-death estimations of outdoor hangings.

Most suicidal hangings occur indoors, but outdoor hangings often create more questions than answers for investigators (Komar et al., Spitz and Fisher).<sup>1,2</sup> Shalaby et al. are one of the first studies to evaluate how hanging can affect decomposition using a carrion model.<sup>3</sup> This research highlighted how the pattern of decomposition in a hanging versus surface deposition followed similar patterns; however, they did not explain the long-term preservation of hanging remains or the lack of biomass reduction. Komar et al.'s retrospective study, on Edmonton medical examiner cases, indicated a high rate of mummification and a large quantity of desiccated tissue being recovered in hanging contexts.<sup>1</sup> Despite these studies, few researchers have systemically evaluated how the stages of decomposition are affected by hanging a human cadaver.

The goals of this project were three-fold: to document the basic stages and differences in decomposition of cadavers that are hanging compared to those on the surface of the ground; to document the entomological activity associated with a hanging scene (including defining the "drip zone"); and to determine the final skeletal deposition related to the hanging environment. A 10-foot high wooden device was built with a pulley/crank system to ease the force required to lift individuals into the hanging position approximately one to two feet above the ground surface. The number of variables, such as clothing or knot type, was limited so that seasonal differences could be appreciated. Eight cadavers from the University of Tennessee's Forensic Anthropology Center's body donation program were used in this experiment (8 males ages 50-60, weighing less than 200 lbs). Four cadavers were hanged and four were placed on the surface about 10 feet from the hanging contraptions at the Anthropological Research Facility, the University of Tennessee, Knoxville, in the summer and fall 2009.

Similar series of decomposition events including oviposition patterns were observed for the control and hanging cadavers; however, significant differences, including the rate of decomposition, and biomass reduction were observed. These differences can primarily be explained by the fact that hanging cadavers maintained ambient temperatures while surface cadavers were able to maintain more constant and significantly higher temperatures even in the winter months. Coupled with limited continual larval activity, the hanging individuals exhibited putrefaction and advanced decomposition much later than the control/surface individuals. This corresponds with previous surveys indicating that decomposition rates are significantly slower in hangings at higher heights as opposed to individuals partially on the ground (Komar et al.).<sup>1</sup>

The most significant difference in the decomposition process occurred between the individuals hanged in the summer as opposed to the late fall months. The summer trials experienced rapid decomposition and subsequent purging of the internal cavities through the loss of the perineum, while the late fall trials had a settling of the internal materials, but no loss of the perineum. Instead of being hollow, these bodies maintained biomass for a longer period of time, falling from the noose prior to those in the summer trials. In fact, the summer trials have been hanging for over two years.

Expanding our understanding of the decomposition process and subsequent skeletal deposition in situations other than an individual lying on the ground is necessary for the continued development of our field. The limited nature of published research evaluating hanging scenarios, both indoor and outdoor, necessitates the continuation of this project over the long term, as there is potential to determine characteristic markers to differentiate between skeletal remains that decomposed on the surface as opposed to those from a hanging situation.

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#### References:

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2. Fisher RS, Spitz WU, Spitz DJ. Spitz and Fisher's medicolegal investigation of death: guidelines for the application of pathology to crime investigation. 4th ed. Springfield: Charles C. Thomas, 2004.
3. Shalaby OA, deCarvalho LM, Goff ML. Comparison of patterns of decomposition in a hanging carcass and a carcass in contact with soil in a xerophytic habitat on the island of Oahu, Hawaii. *J Forensic Sci* 2000;45(6):1267-73.

#### Human Decomposition, Hanging, Forensic Anthropology