



## Physical Anthropology Section - 2013

### H87 Decomposition in Central Texas and Utility of a Universal Postmortem Interval

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After attending this presentation, attendees will understand the process of decomposition in Central Texas, the utility and accuracy of a universal Postmortem Interval (PMI) formula, and will be presented with a baseline postmortem interval for Central Texas.

This presentation will impact the forensic science community and medicolegal professionals by detailing the decomposition process that is unique to Central Texas with detailed explanations of each stage of decomposition, accompanied by photographic aids. This presentation will also impact the forensic science community by analyzing the pros and cons of using a universal PMI formula.<sup>1</sup>

Although decomposition has been studied by many over the past few decades, most notably Galloway *et al.* and Megyesi *et al.*, the majority of research conducted regarding the decomposition sequence have used animals as human analogs.<sup>2-5</sup> These previous studies have provided a framework for further studies; however, animals are not always an appropriate proxy for human subjects.<sup>6</sup> Additionally, previous studies of decomposition in Central Texas had relatively small sample sizes, leaving room for potential error.<sup>7-8</sup> Unlike previous studies, this study includes over 60 individuals donated to the Forensic Anthropology Center at Texas State University-San Marcos. This study will provide individuals with access to a large-sample, region-specific collection of decomposition data.

Photos were collected daily for the first month after placement of each individual at the Forensic Anthropology Research Facility (FARF), and bi-weekly thereafter until decomposition was complete. Each donation was analyzed and the date of each stage of decomposition recorded. Stages of decomposition recorded at the facility were: fresh, early decomposition, late decomposition, mummification, and skeletonization.<sup>2</sup> In this study, fresh describes the conditions of the bodies at time of placement, prior to decomposition. Early decomposition at the facility is characterized by marbling, bloat, maggot activity, skin slippage, and increased odor. Donations at the FARF show that early decomposition occurs between 2 and 13 days after placement (34-302 ADD). Advanced decomposition is characterized by the loss of marbling, a sunken stomach due to the purge of fluid and gases from the body, and decreased insect activity. Advanced decomposition is initially shown to occur between 6 and 53 days after placement (212.5-784.4 ADD). Mummification occurs when all fluid has left the body and no soft tissue remains. Mummification at the FARF is characterized by a uniform beige or brown color, with a very thin, paper-like skin remaining over the skeleton. Complete mummification occurs between 11 and 106 days after placement (240.9-1697.7 ADD). Skeletonization, the last decomposition stage studied for this project, occurs when the complete skeleton is visible. Skeletonization presented in only 30% of the donations initially analyzed, and of those individuals, only half-skeletonization occurred. When data from the 2012 donations are applied to the Universal PMI formula introduced by Vass, a significant difference is found in the stages of early decomposition ( $\chi^2=251.49$ ), late decomposition ( $\chi^2=291.85$ ), and mummification ( $\chi^2=216.1$ ) between the observed PMI and the PMI expected from Vass' formula.

When these data are used in collaboration with decomposition data acquired from different regions, a more accurate PMI can be established. Initial results vary greatly from other regions previously studied, and this shows the necessity of region-specific PMIs. This project builds upon previously collected data and adds new data that are part of an ongoing standardized decomposition database that includes photos and notes that will be beneficial for researchers interested in standardizing the visual assessment of decomposition.

#### References:

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3. Megyesi MS, Nawrocki SP, Haskell NH. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. *J Forensic Sci* 2005;50(3):1-9.
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#### Decomposition, Postmortem Interval (PMI), Forensic Anthropology Research Facility (FARF)