A36 A Look Into the Past, Present, and Future of Decomposition Research and the Estimation of the Postmortem Interval

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The goal of this presentation is discuss the nature and trends of decomposition research in relation to the estimation of the Postmortem Interval (PMI) and to make recommendations for future research directions.

This presentation will impact the forensic science community by demonstrating that a great deal of decomposition research is unsystematic, descriptive, and/or idiosyncratic to a particular region. Statistically testable methods based on human subjects using depositional environments likely to be encountered in human remains cases are not particularly common.

The progression and rate of decomposition plays a key role in establishing a PMI for a set of human remains. The goal of this project is to examine previously published human and non-human decomposition research in relation to the estimate of the PMI in order to evaluate the scientific progress of past methods and projects and to make recommendations for future research directions.

In order to evaluate previous decomposition research, this study examined the American Academy of Forensic Sciences (AAFS) *Proceedings* from 2002 to 2014, as well as all issues of the *Journal of Forensic Sciences* (*JFS*) from 1972 to 2014. All research that examined decomposition was categorized and those projects which addressed issues of decomposition rates, progression, or other topics related to the estimation of PMI involving the usage of tissue or remains were included in the study sample (excluding those that were purely entomological in nature).

A total of 76 AAFS presentations and 77 papers published in the *Journal of Forensic Sciences* were examined for this project as they were determined to contribute to the literature on tissue decomposition and the estimation of the PMI. Overall, 32% and 45% of decomposition research involved human cadavers or tissue from the *JFS* and the AAFS *Proceedings*, respectively. Most studies (over 60%) either described decomposition in unique circumstances (e.g., corpses hanging or encased in concrete) or were descriptive decomposition studies for a region/area. Less than 20% of studies actually presented or tested a statistical method for estimating the PMI for a test of remains (not just describing time to reach a decomposition stage). Concerning non-human decomposition research, over 75% of the projects used pigs as proxies for human cadavers.

The discipline of forensic anthropology is currently in an era of method validation and refinement, much of which has been inspired by the *Daubert* criteria. This professionalization of the field has only been furthered by the introduction of best practice guidelines from the Scientific Working Group for Forensic Anthropology (SWGANTH); however, from this study, very few systematic approaches to decomposition research were found, and almost no statistical methods for estimating the postmortem interval of forensic cases (which should be the goal). Further, while soft tissue has been demonstrated to decompose similarly across a variety of species, no studies have directly correlated porcine specimens as reasonable proxies for human cadavers.[1] Looking toward the future, it is suggested that decomposition research focus on more defined, applicable approaches to the estimation of the PMI. There is a need to standardize variable collection and measurement for consistency between research projects (e.g., using accumulated degree days, consistent measures of total body score). Additionally, little research has been conducted on the decomposition of osseous materials for extended PMIs.[2]

Finally, this study contends that while non-human models were necessary proxies for foundational decomposition research, it is time to move on to systematic, directly applicable research using human cadavers to inform measurements of uncertainty for human forensic cases (which should be best practice). There are currently five human decomposition facilities and plans for at least two more in the very near future. With increasing access to human decomposition facilities and the questionable correlation of non-human to human decomposition models, the necessity of non-human decomposition research is called into question. Beyond entomological work, careful consideration of equating non-human and human decomposition studies is suggested and researchers without access to human subjects are encouraged to carefully evaluate how differences between human and non-human decomposition could affect results.[3]

References:

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Decomposition, Postmortem Interval, Time-Since-Death