



Anthropology Section - 2015

A120 The Forensic Anthropologist as Broker for Interdisciplinary Taphonomic Theory

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The goal of this presentation is to provide attendees with an understanding of why it is necessary to develop interdisciplinary theory within the forensic sciences to address questions related to the postmortem interval.

This presentation will impact the forensic science community by outlining how an interdisciplinary, rather than a multidisciplinary, approach is necessary to accurately and precisely estimate the postmortem interval, and by describing why forensic anthropology is ideally suited to broker this interdisciplinary research to build unifying theories. This presentation follows the planks for this year's meeting — honoring our mentors, learning from each other, and stimulating our future — by discussing a complex issue shared by many of the forensic science disciplines: estimating the postmortem interval.

Estimating the postmortem interval is an issue shared by numerous disciplines, including anthropology, medicine, entomology, and microbiology among others. The complexity of decomposition is well understood and those involved in this area strive to uncover the underlying similarities and rules governing how carrion is recycled. In the past, each discipline has attempted to understand this complexity using their own methods and theories; however, new models and approaches are needed, and this cannot be accomplished if the various disciplines approach the topic separately. Complex issues that are driven by multiple forces, such as carrion recycling, require an interdisciplinary approach where multiple disciplines cooperate to develop new methods and theories that transcend each discipline to solve a real-world, multifaceted problem. An integration of the knowledge from various fields, combining data, methodologies, perspectives, and concepts is needed to develop a more unified theory of forensic taphonomy that describes, explains, and predicts all the phenomena observed. It is only through interdisciplinary research that the common problem of estimating the postmortem interval will be satisfactorily addressed.

With the establishment of the first outdoor decomposition facility, Dr. William Bass sought to describe, explain, and even predict the processes of human decomposition. He also encouraged multidisciplinary studies. Under such an approach, forensic anthropologists have commonly addressed questions related to gross morphological changes in the soft and hard tissues of a decomposing body. Entomologists, on the other hand, have mainly been concerned with questions related to developmental stages of arthropods present on carrion, and microbiologists have addressed the diversity and quantity of microorganism on decomposing remains. Using a multidisciplinary approach, a great deal has been learned about the numerous phenomena that occur during decomposition, including how to describe and explain them. Even so, to this date, the postmortem interval still cannot be predicted, especially longer lengths, with the accuracy and precision needed in medicolegal death investigations.

Since the early pioneering work by Dr. Bass and others, forensic anthropologists have adopted methods from other fields, such as the use of accumulated degree days instead of calendar days, to help account for some of the regional and even micro-environmental differences in climate that affect the postmortem interval. Nevertheless, after the examination of over 200 decomposing human remains at Texas State University's Forensic Anthropology Research Facility, for example, it is clear that gross morphological changes do not strongly correlate with accumulated degree days in central Texas.¹ The reason for this is that the necrobiome responsible for carrion recycling is highly dependent on a number of abiotic environmental factors. As vertebrates decompose, microorganisms, arthropods, mammalian, and avian scavengers compete and, in some cases, cooperate to obtain nutrients from the valuable and short-lived carrion resource. In addition, these scavengers must persist and thrive under varying environmental conditions that sometimes involve human intrusions. Unlocking the mystery of the ecology of carrion recycling is key to understanding and interpreting the process and rate of the postmortem interval in various geographical and ecological regions and for establishing methods that accurately and precisely estimate the postmortem interval. Accomplishing this is only going to be possible using an interdisciplinary approach.

Forensic anthropology has traditionally borrowed and utilized theory and methodologies from both the natural and social sciences in research and evidence interpretation. As a result, forensic scientists are in a unique position to act as brokers in the development of interdisciplinary methodologies and theories. What better way to stimulate the future and honor the pioneering efforts of Dr. Bass and others in this discipline than by facilitating interdisciplinary theory that allows an accurate description, explanation, and estimation of the postmortem interval?



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Reference:

1. Duecker H, Mavroudas SR. Evaluating the use of accumulated degree days and total body score to estimate time-since-death of human remains in central Texas. *Proceedings of the American Academy of Forensic Sciences*. 66th Annual Scientific Meeting. Seattle, WA. 2014;20:427.
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