## A131 A Quantitative Approach to Estimating the Postmortem Interval (PMI) Using Histotaphonomy

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After attending this presentation, attendees will be better acquainted with how the specific depositions studied influence histotaphonomy.

This presentation will impact the forensic science community by presenting a model to quantify PMI.

Thirty-one *Sus scrofa* (16 juvenile and 15 fetal) fresh remains were obtained from the North Carolina State University (NCSU) swine farm in the summer, fall, winter, and spring months for two years (2013-2015). The traditional calendar for the start of each season was used as the initial day of placement. Juvenile pigs were used as a proxy for human children up to 9 years of age (35-50 pounds) and fetal pigs were used as a proxy for human neonatal remains (4-6 pounds). Each season, one juvenile pig was placed on the surface and one was buried, and one fetal pig was placed in a plastic bag and one fetal pig was wrapped in a baby blanket. All surface remains were enclosed in cages to prevent scavenging.

Histological thick sections were prepared from a femur midshaft from each of the pigs ($n$=31). Preparation of the histological samples followed published methods. One-millimeter-thick sections were produced using a Buehler™ IsoMet™ 1000 saw with a 15 HC diamond-edged blade. Each thick-section wafer was ground to a final thickness of 75µm-50µm on a Buehler™ variable-speed grinding unit with a diamond disc. Each thin-section was mounted on a glass slide with cover slip using SECUREMOUNT® mounting media. Histological sections were evaluated using a standard brightfield light as it produced better results than the recommended polarized light in order to assess the degree of diagenetic change and the Histological Index (HI) was employed as described by Hedges and Millard.[1]

Accumulated Degree Days (ADD) were calculated from daily maximum and minimum temperatures with data obtained from the State Climate Office of North Carolina Lake Wheeler Road Field Lab weather station located one-half mile from the open-air site. For the buried remains, ADD was calculated by summing soil temperature as minimum and maximum soil temperatures were not collected.

A destructive degradation model, which is used to model product deterioration over time, was applied using a loglogistic distribution (with the lowest Bayesian Information Criterion or BIC), which is more appropriate for decomposition studies that exhibit logistic patterns, to examine the relationship between the response or degradation measure (HI) and time variable (ADD). Statistical analysis was performed using JMP® Pro 12.1. Results reveal that there is a positive linear relationship between HI and ADD for all depositions. For the bagged fetal remains, there is a 67% probability that the HI score will be 1.5 at 2153.85 ADD, and for the blanketed fetal remains, there is a 70% probability that the HI score will be 2 at 2153.85 ADD. For the buried juvenile remains, there is a 69% probability that the HI score will be 2 at 7153.78 ADD, and for the juvenile surface remains, there is a 47% probability that the HI score will be 2.5 at 2153.85 ADD.

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**Reference(s):**

1. Hedges R., Millard A. Bones and groundwater: Towards the modelling of diagenetic processes. *J Archaeological Sci.* 1995 (2): 22: 147-54.

**PMI, Histology, Taphonomy**



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