D12 Can a Scoring System Accurately Reflect Cadaver Decomposition?

Reyna Johnson, Department of Entomology, University of Nebraska- Lincoln, Lincoln, NE 68583-0816; Ashley Spicka, Biology Department, Nebraska Wesleyan University, 5000 St. Paul Avenue, Lincoln, NE 68504; and Jennifer Bushing, David O. Carter, PhD and Leon G. Higley, PhD, University of Nebraska, 202 Plant Industry Building, Lincoln, NE 68583*

After attending this presentation, the attendees will understand that several ecological variables influence cadaver decomposition, making it problematic to treat decomposition as a semi-continuous variable to accurately predict postmortem interval (PMI).

This presentation will impact the forensic science community by demonstrating the current challenges of using stages of decomposition to determine PMI and by proposing a system to determine PMI using key decomposition characteristics.

Estimating postmortem interval can be vitally important in a death investigation. Not only can PMI help determine the possible victims to identify the cadaver, but an accurate PMI can also assist in retaining or eliminating suspects. Using key physical characteristics of decomposition coupled with consideration of the ecological factors could help investigators estimate PMI more accurately. However, developing a reliable method to uniformly identify the current stage of decomposition becomes a challenge that the forensic community should be aware of and work together to overcome. To help achieve this, we tested a proposed point-based system in which a number is assigned based on the physical characteristics of the cadaver. This number, along with accumulated degree days (ADDs), has been reported to provide an accurate estimate of PMI.

The experimental site was located at the University of Nebraska Agricultural Research Development Center located approximately 48 km north of Lincoln, Nebraska, USA. The site is a pasture that is intermittently grazed by cattle and horses. The climate is temperate mid-continental characterized by hot summers, cold winters, and moderately strong surface winds. Average annual precipitation is 695 mm. Approximately 75 percent of the precipitation occurs between April and September. Mean annual temperature is 9.8 °C with mean minimum and maximum temperatures ranging from 0 C (January) to 31°C (July). The vegetation at site is dominated by non-native grass (smooth brougham) and forb (white clover) with some native vegetation, including daisy fleabane, yellowwood sorrel nut sedge, and pasture rose. Swine (Sus scrofa) carcasses of four contrasting masses approximating sizes from neonate to adult (~3 kg, ~20 kg, ~40 kg, and ~50 kg) were used. Swine were killed with blunt force trauma to the cranium, weighed, and placed on their right side on the soil surface facing west. Each day for two weeks, the remains were scored using the provided scale for three body regions: the head and neck, the trunk, and the limbs. Cadavers were photographed each day. At the end of the two weeks, cadaver decomposition was scored using the photographs. This experiment was replicated three times, which resulted in a total of twelve swine cadavers.

The scoring method failed to have uniformity between measurement in the field and measurement in the laboratory using photos of cadavers. A major flaw with the system is the lack of detail and number of stages of the decomposition process. Not only do the stages of decomposition vary with body region, but the stages of decomposition are not extensive enough to give the necessary detail to determine PMI. Thus, to improve the system, we suggest that five broad descriptions of decomposition (Fresh, Bloated, Active Decay, Advanced Decay, Remains) should be used, with additional detail and specificity of key characteristics of each stage and the progression of each stage. In particular, details of insect activity, patterns of tissue loss, and changes in cadaver anatomy, all coupled with environmental data (especially temperature) are necessary to develop more accurate tools for associating the status of decomposition with time.

Forensic Taphonomy, Decomposition, Postmortem Interval

 ** Presenting Author*