H119 Underwater Decomposition: An Examination of Factors Surrounding Freshwater Decomposition in Eastern Massachusetts

Lauren K. Westling, BA, 1245 Apache Ave, Green River, WY 82935; and Donald F. Siwek, PhD, and James Pokines, PhD, Boston Univ School of Medicine, Dept of Anatomy & Neurobiology, 72 E Concord St L1004, Boston, MA 02118*

After attending this presentation, attendees will have a better understanding of the factors surrounding freshwater decomposition in eastern Massachusetts during the summer.

This presentation will impact the forensic science community by establishing a base set of data for freshwater decomposition in a deciduous forest of eastern Massachusetts. Data collected included the water temperature, ambient temperature, stages of body decomposition, rate of decomposition, invertebrate activity, and scavenger activity.

This study investigated the decomposition of three porcine (*Sus scrofa*) carcasses in the same body of water, under lentic and lotic conditions, and at variable depths. The study was performed in a temperate, mixed forest at the Boston University Outdoor Research Facility in Holliston, Massachusetts, during June and July. The remains were placed in wire dog kennels and positioned at the waterline so they could float or sink and be protected from large scavengers. Two controls were placed in dog kennels and placed in terrestrial environments near the aquatic sites. Data were collected on the invertebrate activity, scavenger activity, water and ambient temperature, stages of body decomposition, and the rate of decomposition for each set of remains. Accumulated Degree Days (ADD) and Total Body Scores (TBS) were used to determine two equations (differentiated by their microhabitat) for potential use in estimating the Postmortem Submergence Interval (PMSI) in death investigations involving similar conditions.

The three aquatic remains floated at the waterline throughout the project until they reached skeletonization on days 16 to 45. The terrestrial controls, in contrast, took 13 to 14 days to reach skeletonization. This slowed rate of decomposition at two of the three aquatic sites was due to adipocere formation, cooler water temperatures, limited access by terrestrial invertebrate activity, fluctuations in water levels, and limited scavenger activity. The third aquatic site, located in the shallow lentic water, underwent decomposition faster than the other two aquatic sites because it received direct sunlight and underwent extreme fluctuations in the amount of water present around it. These variations had a significant effect on its rate of decomposition, as ambient temperature around the remains was significantly higher than all of the other sites, and mummification occurred rather than adipocere formation.

The terrestrial and aquatic invertebrate activity was extensive both above and below the waterline with 42 families from 17 orders collected and identified. All three sites had similar terrestrial invertebrates including: water striders, blow flies and their respective maggots, and spiders. Dragonflies were prevalent around the lentic sites and damselflies around the lotic site. Aquatic invertebrate taxa that were present below the waterline at all of the aquatic sites prior to and during the decomposition phase included: predaceous diving beetles, aquatic sowbugs, giant water bugs, midge larvae, scuds, dragonfly and damselfly larvae, snails, and leeches.

Through the use of motion detector cameras, the researcher was able to view the activities performed around the remains by vertebrates including: a blue heron, a coyote, a raccoon, multiple black vultures, multiple turkey vultures, multiple squirrels, and multiple adult American bullfrogs. Snapping turtles were present in the lentic environment, but their activity around the remains was unclear.

The information presented in this presentation will be valuable to researchers studying the taphonomic processes that occur in aquatic environments similar to these in the Northeastern United States. An understanding of the invertebrate and vertebrate activity will assist in identifying the cause of postmortem artifacts. The climate, ADD, and TBS data can be combined with existing data to establish a more accurate method for estimating the PMSI.

Taphonomy, Freshwater Variables, Decomposition

 ** Presenting Author*