DEVELOPING AQUATIC MICROBIOTA AS TRACE EVIDENCE OF AQUATIC CRIME SCENES AND DROWNING

Shelly A. **Marshall**1, Victoria L.S. Chraïbi1, Allan Nelson1
1 Department of Biological Sciences, Tarleton State University, Stephenville, TX 76402, USA

Aquatic environments are common grounds for criminal activities such as drownings and body disposals. By identifying specialized aquatic biota based on trace evidence like pollen and phytoliths, one can determine the site of origin. However, forensic scientists acknowledge the limitations of using aquatic microbiota as trace evidence because of a lack of resources and training. As well, diatoms can be used as trace evidence of drowning by their presence in the lung tissue, blood stream, and bone marrow of drowning victims. However, not much is known about the pathway of diatoms into bone marrow and the limitations of using this trace evidence of drowning and body disposal. The first goal of this project is to collect high-resolution microscope images of aquatic plant pollen and phytoliths found in Texas aquatic environments to create an identification resource for trace evidence. The second half of the research will evaluate postmortem entry of aquatic microbiota into bone marrow to assess the accuracy of using diatoms as evidence of drowning as opposed to long-term submersion postmortem. We will address research questions such as: Do diatoms need to be alive in order to actively enter bone marrow, or do they enter bone marrow passively through diffusion? If diffusion is passive, can other common co-existing microbiota like pollen and phytoliths also enter bone marrow? Does frustule size limit entry of some diatoms into bone marrow? Does mobility by the raphe system influence entry into bone marrow? Pig femur bones will be submerged in suspended slurries of either live or dead diatoms along with pollen and phytoliths for different lengths of exposure time ranging from 2 days to 6 months. Diatoms, pollen, and phytoliths will be isolated from the bone marrow and enumerated. The bone marrow assemblages will be compared to the original assemblage of the slurry to determine what diffused into bone marrow, and how equally different sizes and types of trace evidence diffused into bone marrow. Having access to identification materials for aquatic pollen and phytoliths, along with knowledge of how diatoms enter bone marrow, will help forensic scientists make more accurate interpretations of trace evidence.