A62 Obliteration of Sharp Force Trauma Artifact by High Particulate Water Wash

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After attending this presentation, attendees will understand: (1) the taphonomic processes occurring in marine and aquatic environments; (2) the abrasive effect that suspended particulate has on bone and sharp force trauma wounds existing on bone; and, (3) the applicability of this information in the forensic science field.

This presentation will impact the forensic science community by providing information about specific morphological changes that occur when injured bones are left submerged in water for extended periods of time as well as estimation of time-since-deposition, trauma site identification, and associating remains with a particular event.

Forensic examination of bone is not always a straightforward enterprise. A complex interplay of factors contribute to the information able to be gleaned from a set of skeletonized remains that is largely influenced by the environment in which the remains were found. Bone weathering has been well studied and documented regarding skeletonized remains in terrestrial environments; however, less work has been published on the process of abrasion to bones that are submerged in particulate-laden dynamic water.

Skeletal material under water is subjected to a different set of stresses than in a terrestrial setting and research to fully document these postmortem changes is therefore required. Increasing instances of maritime disasters, such as the sinking of the Italian cruise ship *Concordia,* the loss of migrant boats in the Mediterranean and Timor Sea, as well as the recent loss of a ferry in South Korea, warrant further investigation of the processes of degradation of human remains found in marine environments as a result of both water flow and abrasion by suspended particulate matter. Studying the physical changes that occur over time to bones that may have been injured in a traumatic event such as a shipwreck can provide useful information to investigators, as information regarding time-of-death is often crucial to an investigation. This study seeks to determine if and how suspended particulate abrades identifiable characteristics of bone.

Pig (*Sus scrofa*) ribs were inflicted with sharp force trauma wounds using a meat cleaver and were then subjected to an environment simulating an underwater decompositional site using a high-particulate water wash in two different apparatuses. One model created bi-directional wave action via a rotational tumbler system in which the water and particulate were passed back and forth over the sample bones. The other model imitated uni-directional wave action using a circular track to wash a continuous wave over the sample bones. Uniform-grain sand and diatomaceous earth — comprised of the microscopic remnants of dead diatoms — were used separately as suspended particulate to mimic the sediment that is present in a marine environment. Samples were allowed to abrade for set intervals of time and examined using micrometer caliper and stereomicroscopy. These measurements were then inputted into a database, where statistical software was used to run Analysis of Variance (ANOVA) tests in order to determine significant differences. Regression analysis was conducted to determine the relationships between the rates of ablation and associated skeletal measurements.

Marine Taphonomy, Skeletal Abrasion, Forensic Anthropology