H37 Postmortem Smoothing of Fractured Fresh Bones in Bodies Immersed in Moving Water: Forensic Cases Aid in Trauma Interpretation of an Archaeological Skeleton

George R. Milner, PhD, Department of Anthropology, 409 Carpenter Bldg, University Park, PA 16802; Steven A. Symes, PhD, Mercyhurst College, Mercyhurst Archaeological Inst, 501 E 38th, Erie, PA 16546; and Taylor S. Yuzwa, BSc, 2876 South Wagner Loop, Malta, MT 59538*

After attending this presentation, attendees will understand the effect of moving water on bodies, with an emphasis on broken bones subjected to bone-on-bone abrasion. Interdisciplinary collaboration between forensic and archaeological osteologists is highlighted as is the potential for forensic anthropology to contribute to archaeological taphonomy and trauma interpretations.

This presentation will impact the forensic science community by raising awareness of the fact that forensic anthropology is fundamentally an applied field, drawing inferences from events surrounding death, deposition, and recovery using methods developed in archaeology, physical anthropology, forensic pathology, and geology. In contrast, the contributions of forensic research to the accurate interpretation of archaeological death assemblages are less often acknowledged. This is unfortunate because forensic research has the unique advantage of confession or witness testimony to confirm inferences drawn from the skeleton about the circumstances of death. Documented forensic-related findings can be applied to archaeological or paleontological studies of the remote past where all that remains is the death assemblage. Here, taphonomic patterns in two forensic cases are consistent with the postmortem modification of a bone from a prehistoric skeleton. Forensic-derived information contributes to a more informed interpretation of the context of the death that took place hundreds of years ago.

The archaeological skeleton is from Norris Farms #36, a cemetery associated with a small village in Illinois dating to ca. AD 1300. The woman of interest was one of several people killed in a series of attacks.[1] The left ulna of this well-preserved skeleton was fractured and the originally sharply defined, broken edges were worn smooth. As the individual's skeleton was archaeologically recovered in anatomical order, the polishing must have occurred when soft tissue held the bone fragments in place. How the adjoining edges became polished remained a mystery until similar forms of abrasion were seen in recent forensic cases.

Two Mercyhurst University water-recovery forensic cases had abrasion patterns similar to what was observed on the Norris Farms skeleton. The bones of a leg displayed peri-mortem fractures polished by bone-on-stones abrasions and even one case of bone-on-bone smoothing, where there was evidence of a sharp, fractured fibula edge moving against the adjacent tibia. The bones were all held in place by soft tissue and a boot. Moving water turbulence, such as the Niagara and Allegheny rivers where these individuals were found, was sufficient for enough bone-on-stones and bone-on-bone movement to smooth and etch the adjacent shaft. Moving water was likewise probably responsible for the smoothing seen on the adjoining ends of the broken ulna in the archaeological skeleton.

The effects of fluvial action in terms of damage to exposed bone and on assemblage composition are well described in the literature.[2] While conducting this study, however, this particular form of bone-on-bone abrasion, which occurs when soft tissue is still present, was not found to have been reported. Although the circumstances of death were different for the forensic cases and the archaeological skeleton, the taphonomic patterns indicate that what happened afterwards — bodies were immersed for prolonged periods in moving water — was the same. In the absence of documented forensic cases, it was not possible to identify how the adjoining broken ends of the ulna in the archaeological skeleton were smoothed. Knowing the circumstances under which such bone-on-bone or bone-to-abrasive materials occurs, allows us to identify where that individual died and to infer that women spent time in the wet Illinois River floodplain where they were vulnerable to attacks. Other such skeletons probably exist in archaeological collections, but the significance of the smooth edges of fractured bones is unrecognized.

References:

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2. Haglund WD, Sorg MH. Human remains in water environments. In: Haglund WD, Sorg MH, editors. Advances in forensic taphonomy: Method, theory, and archaeological perspectives. Boca Raton: CRC Press, 2002;201-18.

Bioarchaeology, Skeletal Trauma, Norris Farms

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