



Physical Anthropology Section – 2007

H26 Standardizing Saw and Knife Mark Analysis on Bone

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As a part of a series of presentations covering toolmarks on bone, the goal of this presentation is to discuss toolmark relevance, particularly in a court of law. Earlier presentations (Symes, Kroman et al. 2006; Symes, Rainwater et al. 2006) classified major approaches and common pitfalls regarding toolmark analysis while promoting the use of tool class characteristics. This presentation will identify and explore historic misperceptions regarding toolmarks, introduce a systematic approach for the analysis of toolmarks, present initial results of toolmark examination produced by a series of new mass-produced saws, and discuss the relevance of these changes to future toolmark analysis.

This presentation will impact the forensic community and/or humanity by demonstrating a standardized, systematic approach to toolmark analysis on bone will promote cohesion among forensic professionals thereby enhancing the resolution of skeletal trauma evidence.

Forensic anthropologists – once limited to traditional identification issues – are becoming more involved in investigations of death events, directing their expertise to the analysis and interpretation of traumatic injuries and taphonomic influences. This broadening role is evident in forensic anthropology's contribution to cases of dismemberment and mutilation.

The evidentiary value of toolmark analysis in these cases is compelling. However, its potential at times is impeded by a lack of interdisciplinary research and communication among anthropologists, pathologists and criminalists.

Anthropologists (osteologists) are uniquely qualified to examine defects in bone but lack a background in toolmark examination. Pathologists commonly work with marks created by tools, but rarely have time to devote to this specialized analysis. Likewise, criminalists are not usually positioned or equipped to examine fresh specimens removed from the recently deceased. The objective of each professional is the same; to narrow the possible range of tools used in a crime and assist investigators in narrowing their search for the tool(s) used in the commission of a crime. Nevertheless, each profession remains generally unaware of the others' efforts and advances.

This glaring discrepancy is compounded by the fact that forensic toolmark research appears to have stagnated in the midst of a forensic climate that demands a closer look at ignored or unrealized evidence.

Historically, disregard for toolmarks on bone is enhanced by misperceptions that analysis fails to produce significant information in an investigation. This flawed thinking can be traced to two sources.

First, the archaic view that every pass of a saw tooth on bone erases the marks left behind by the previous tooth has resulted in an inherent error in the standard approach to saw mark analysis. While this view may reveal limitations in individual characteristics, it essentially disregards the vast potential of "class characteristics."

Second, traditional anthropological approaches are outdated with the advent of the anthropologists' relatively new and evolving association with the recently dead. Hypotheses developed for historic or prehistoric peoples serve a different purpose than those analytical results developed in a modern forensic case.

While it is tempting to examine toolmark striae for generic patterns or striation frequency, these uninformed approaches will likely be subjected to subsequent judicial scrutiny where admissibility may be challenged based on accuracy, reliability of the technique, replicability, and absence of validation studies. The repercussions of an 'academic' as opposed to an applied forensic approach can be nothing short of an obstruction to justice.

This presentation will outline experimental approaches to researching toolmarks on bone while outlining methodologies for the examination, analysis, and documentation of such marks. Saw mark class characteristics will be systematically analyzed in order to produce tool descriptions that may be useful when presented in court. This approach is simplified in order to standardize methods and to make features more recognizable. This simplified approach is attempted despite the fact that mass-produced "junk" saws lack conformity to age-old saw manufacture standards. In the end, toolmark analysis on bone with guidelines, standards, and the appropriate equipment should result in productive answers to the frequently asked question: *what is the potential of toolmark analysis in dismemberment interpretation?*

References:

- ¹ Symes, Steven A., and Anne M. Kroman, Susan M. Thurston Myster, Christopher W. Rainwater and John J. Matia, 2006, Anthropological Saw Mark Analysis on Bone: What is the Potential of



Physical Anthropology Section – 2007

Dismemberment Interpretation? Paper presented at the 59th Annual Meeting of American Academy of Forensic Sciences, Seattle.

- ² Symes, Steven A., and Christopher W. Rainwater, Susan M. Thurston Myster and John J. Matia, 2006, Tool Mark Analysis of Knife and Saw Dismemberment. Paper presented at the 91st International Education Conference of the International Association of Identification, Boston.

Saw Marks, Dismemberment, Skeletal Trauma