A131 Taphonomy of the Perinate Skeleton: Redefining Structural Norms and Building Analytical Models

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After attending this presentation, attendees will better understand the structural and analytical problems associated with preservation and the use of indices for scoring taphonomic change in the perinate skeleton.

This presentation will impact the forensic science community by presenting a modified, high-resolution method for documenting taphonomy in the perinate skeleton, as well as by introducing a novel method for standardizing criteria in the documentation and analysis of taphonomy.

The infant homicide rate in the United States has steadily increased over the past 45 years. The Center for Disease Control (CDC) reported 7.3 infant homicides per 100,000 in 2011 — a 75% increase since 1970.[1] The CDC further reports that the homicide risk is greater in the first year of life than in any other year of childhood before age 18.[1] Because they are easily concealed, difficult to recognize, easily relocated by scavengers, and may be further obscured by taphonomic processes within the post-deposition environment, the preservation of infant remains is often sited as the greatest investigative challenge. Analytical assumptions, such as the presumed "unachievable recovery" of perinate remains has hampered the development of analytical models, critical among which is the documentation of taphonomic change. This study seeks to introduce a modified, zone-based scoring system of indices to document taphonomic change in non-adult bone.

While the methodological frameworks utilized in bioarchaeology and forensic anthropology are often cyclically applicable, current models for analyzing and interpreting taphonomy in non-adult remains are insufficient for forensic investigation. This is largely due to methodological goals; while the bioarchaeologist strives to understand macroscopic socio-biological trends throughout blocks of deep chronological time, the forensic anthropologist is concerned with individualization in the present. Among the most pervading sentiments in the study of non-adults is that their skeletal remains suffer from poor, or a complete lack of, preservation; however, "preservation" is a loaded but often poorly defined term, the use of which may have very different implications in (bio) archaeological and modern context. The distinction between preservation (in the physical structural sense) and transport is critical to the forensic anthropologist who seeks to recover recently deposited remains. Therefore, it is not sufficient for the forensic anthropologist to rely upon simplistic models of preservation, nor should one passively fall back on assumptions associated with loss.

In an effort to quantify taphonomic change, Bello et al. propose the use of three indices to: (1) score the frequency of each bone in a sample (the Bone Representation Index); (2) express the quantity of skeletal material present (i.e., sum of anatomical number of bones) (the Anatomical Preservation Index); and, (3) evaluate the preservation of cortical surfaces as a ratio between sound cortical surfaces and damaged surfaces of each bone (the Qualitative Bone Index).[2,3] A method for increasing the resolution of these indices was developed in an effort to introduce precision and analytical homogeneity to the forensic analysis of the perinate skeleton. This study applied a modified, zone-based scoring system to a sample of 106 skeletons (represented by 371 long bones) from three geologically and temporally distinct archaeological sites within the United Kingdom. Zone scores were applied to two indices (termed the proportional anatomical preservation index and the proportional qualitative bone index). Further, following Waldron's proposal that specific operational definitions be applied to the diagnosis of disease in the skeleton to standardize criteria and facilitate valid comparisons between studies, a model termed "Qualitative Bone Filters" is proposed to serve a similar purpose in the application and documentation of categories of taphonomic change.[4]

The results indicate that "preservation" is highly dependant upon the index applied, and that resolution is effectively increased by the application of zone scores and qualitative filters. Additionally, a general pattern for the progression of taphonomic change commencing at the metaphyses was observed across all three sites. The consistent preservation of the epiphyseal interface was also observed and challenges assumptions surrounding "typical" patterns of degradation. These results indicate that the taphonomy of non-adult remains would be better understood if analytical methods are refined, standardized, and tailored to assess both intrinsic factors, such as the unique physiological and anatomical variables associated with distinct stages of development, and extrinsic factors, such as those inherent to the post-deposition environment.

Reference(s):

1. Hoyert D.L., Xu J. Deaths: preliminary data for 2011. Center for Disease Control National Vital Statistics *Reports* 2012;61(6):1-52.
2. Dodson B., Wexler D. Taphonomic investigations of owl pellets. *Paleobiol* 1979;5:279-284.
3. Bello S.M., Thomann A., Signoli M., Dutour O., Andrews P. Age and sex bias in the reconstruction of past population structures. *Am J Phys Anthropol* 2006;129:24-38.
4. Waldron T. *Operational definitions for paleopathology*. London: UCL Institute of Archaeology, 2012.

Perinate, Taphonomy, Indices