H18 Analysis of Non-Metric Subadult Sex Determination Traits in Four Samples of Known Age and Sex: Sex Determinants or Population Variants?

Kathleen Blake, PhD, State University of NY at Oswego, Dept of Anthropology, Mahar 441, Oswego, NY 13126*

After attending this presentation, attendees will gain an understanding of the morphological variation of two non-metric traits in four different subadult skeletal samples previously determined to be sexually dimorphic.

This presentation will impact the forensic science community by: (1) demonstrating differences in two non-metric traits within each sample analyzed; (2) showing how these traits vary between four populations; and, (3) comparing these results to previous studies of subadult skeletal material. This presentation will add to the research on reliability and repeatability of forensic anthropological methods in sex determination through the analysis of subadult skeletal samples with known age and sex compared to previously published rates.

Finding a subadult sex determination method has long been the goal of biological anthropologists. For more than 100 years, dimorphism has been noted in the subadult pelvis.[1, 2] This is the most dimorphic area in the adult skeletal system and many studies have been tantalizingly close to finding distinctive traits in subadults.[3-6] However, quantifying the dimorphism observed and creating reliable and repeatable techniques which meet *Daubert* requirements for sex determination in subadults have proven elusive.[7] Part of the reason for a lack of standardization may relate to population variation, as most studies examined one population with few cross-population evaluations conducted. This is primarily due to the limited number of collections of juvenile material of known age and sex available for analysis.

This study examines four samples for the two nonmetric traits outlined in Byers' *Introduction to Forensic Anthropology* as potentially dimorphic in subadults, the auricular surface elevation and greater sciatic notch angle.[8] For the auricular surface analysis, females exhibit a completely raised surface on all edges. Males demonstrate an auricular surface with most, if not all, of its edges, in the same plane as the ilium.[4,6] The greater sciatic notch is evaluated as either "deep" for males or "shallow" for females.[3-5]

Samples examined for this study include the Forensic Fetal Osteological Collection (FFC) (n=113), a subadult component of the Hamann-Todd Collection (HTH) (n=37), and the Trotter Fetal Bone Collection (n=37), and the Scheuer Collection (n=15). Only individuals with unfused ilium were analyzed as fusion of the ischium at the acetabulum alters the shape of the sciatic notch.

This study could not establish a relationship between auricular surface elevation and biological sex. In the FFC sample, 72% of males and 39% of females were correctly identified. The HTH component had poorer results, with 57.6% of males and 30% of females correctly identified. The Trotter collection showed no reliability in these features for determining sex; 12.9% of males and 9.5% of females were correctly identified. In the Scheuer collection, males were correctly identified at 80%, but female accuracy was 20%.

When the sciatic notch was examined, no consistent pattern was discerned. In the FFC sample, males were correctly identified 40% of the time, females 53%. In the HTH collection, a higher rate for males was determined (70%); however, female rates were much lower (27%). In the Trotter collection, 70% of males and 67% of females were correctly identified, the best of the four samples. Lastly, the Scheuer collection showed 100% accuracy for males but 0% for females. The small sample may have contributed to this unusual result.

While finding a method for subadult sex determination is a continued goal for biological anthropologists, the difficulty lies in translating the dimorphism observed into quantifiable and reliable methods. Therefore, multiple populations must be compared to ensure that traits found to be dimorphic are not specific to one group, but are found across populations. This study demonstrates that two nonmetric traits previously studied and shown to be dimorphic fail to exhibit the same results when compared to additional samples. Further research is needed to more fully understand these traits across populations.

References:

1. Thomson A. The sexual differences of the foetal pelvis. J Anat Physiol 1899;33(Pt 3):359-80.
2. Boucher BJ. Sex differences in the foetal pelvis. Am J Phys Anthropol 1957;15(4):581-600.
3. Schutkowski H. Sex determination of infant and juvenile skeletons: I. morphognostic features. Am J Phys Anthropol 1993;90(2):199-205.
4. Sutter RC. Nonmetric subadult skeletal sexing traits: I. A blind test of the accuracy of eight previously proposed methods using prehistoric known-sex mummies from Northern Chile. J Forensic Sci 2003;48(5):1-9.
5. Vlak D, Roksandic M, Schillaci MA. Greater sciatic notch as a sex indicator in juveniles. Am J

 ** Presenting Author*

Phys Anthropol 2008;137(3):309-15.
6. Weaver DS. Sex differences in the ilia of a known sex and age sample of fetal and infant skeletons. Am J Phys Anthropol 1980;52(2):191-95.
7. National Academy of Science 2009 Report, *Strengthening Forensic Science in the United States: A Path Forward*, Committee on identifying the needs of the forensic sciences community. National Research Council. The National Academies Press, Washington DC.
8. Byers SN. Introduction to forensic anthropology. 4th edition. Pearson/Prentice Hall, Upper Saddle River, NJ: 2011

Subadult Sex Determination, Sciatic Notch, Auricular Surface

