



## Physical Anthropology Section – 2010

### H15 Estimating Sex of the Human Skeleton Based on Metrics of the Sternum

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After attending this presentation, attendees will understand the call for utilization of the sternum as a viable estimate of sex in a recent forensic sample from North America and be introduced to the necessary measurements of the sternum, reasons preventing the taking of measurements, the process and reasoning behind the collection of data, and subsequent statistical analysis employed in this study.

This presentation will impact the forensic science community by showing that the sternum provides a viable estimate of sex in a recent forensic sample from North America and is a useful addition to the methods employed in human identification.

Estimating the sex of an adult skeleton is a critical facet in creating the biological profile of an individual. To date, there are different methods used on select elements of the skeleton to assess the sex of the individual. Studies performed on an Indian population (Jit et al 1980) indicate that analyzing the sternum may lead to an accurate estimation of sex. Therefore, the method is not population specific and may not prove useful on a recent forensic sample from North America, hence the motivation for this study.

Sternal measurements were collected from the William M. Bass Skeletal Collection located at The University of Tennessee, Knoxville. This is a collection of recent forensic skeletons with known age at death, ancestry, and sex. The metric definitions provided by Schwartz (2007) and Bass (1987) were followed so that others attempting to replicate this research will be able to reliably measure the sternum. The measurements include length of the manubrium, length of the body, sternebra 1 width, and sternebra 3 width. A digital sliding caliper was utilized to take these measurements. Time was designated at the beginning of the second and third days to employ the test-retest method in order to calculate the intra-observer error rate and ensure reliability of these measurements.

In this study, comparisons of the proportion of the length of the manubrium to the length of the body of the sternum were performed to determine if there are measureable differences between males and females. Based on the work of Dahiphale et al. (2002), it is hypothesized that the body of the sternum in an American population will be greater than twice the length of the manubrium in male samples, but that in female samples, the length of the manubrium will be greater than half the length of the body. This is referred to as Hyrtl's Law. In addition, comparisons of these measurements between individuals identified as American Black and White were analyzed to determine whether or not this method could be used on both population groups.

The study contained 412 sterna (289 males, 123 females; 377 White: 35 Black). The data was entered into the Statistical Analysis Software (SAS) computer program, version 9.1.2. A discriminate function analysis (DFA), using all variables, produced an overall cross-validation classification rate of 84.12% for sex estimation. The cross-validation classification rates for males and females were 80.00% and 88.24%, respectively. The applicability will be discussed of utilizing the sternum as a method of sex estimation and propose specialists in the field adopt it as a supplementary method for use in human identification. **Forensic Anthropology, Sex Estimation, Sternum**