



Physical Anthropology Section – 2006

H63 Sexual Dimorphism in the Vertebral Column

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The goal of this presentation is to demonstrate the extent of sexual variability existing throughout the vertebral column.

This presentation will impact the forensic community and/or humanity by demonstrating sexual dimorphism in the vertebral column and the usefulness of various vertebrae as sex indicators.

This poster will demonstrate the potential ability of the vertebral column to assist in sex estimation. Sex determination is a key characteristic in developing a biological profile of an individual. Sexual dimorphism has been demonstrated in various skeletal elements, including the pelvis and cranium. Previous studies have also demonstrated that elements of the axial skeleton are useful in determining sex. The atlas, axis, twelfth thoracic, first lumbar, and sacrum have all demonstrated usefulness as sex indicators. Since forensic and archaeological remains are often fragmentary, the ability to determine sex from as many skeletal elements as possible is important. The ability to determine sex from any specific vertebra would prove very useful.

A series of measurements were taken on a small sample of males and females from the William M. Bass Donated Collection at the University of Tennessee. This collection was utilized because it represents a sample of a modern population of known age, sex, and ancestry. Though studies have already demonstrated that the axis, atlas, twelfth thoracic, and first lumbar are sexually dimorphic, measurements from these vertebrae were included in this study in order to obtain a better picture of the variability of the entire vertebral column and to consider the variability of these vertebrae in a different population from the ones in which they were originally tested. Measurements used in this study were based on measurements defined by previous studies on vertebrae. Measurements taken on all vertebrae include the anterior-posterior length of the vertebral foramen (LVF), length and width of left superior and inferior facets (LSF, WSF, LIF, and WIF, respectively), maximum breadth between superior/inferior facets (SFB/IFB), maximum height from superior to inferior facets (MHF), maximum length of the vertebra from posterior point of spinous process to most anterior point of the vertebra (XSL). Width of the fovea (WFF) was taken on first cervical vertebrae and the maximum height and diameter of the dens (MHD/MWD) was taken on second cervical vertebrae. Measurements taken on all but the first two cervical vertebrae include the maximum sagittal and transverse length of the vertebral body (SLVB, TLVB) as well as the anterior and posterior heights of the vertebral body (MHVA, MHVP). All measurements were taken to the nearest millimeter using a Mitutoyo digital sliding caliper.

Preliminary analyses of results in this study indicate several features may exhibit sexual dimorphism throughout the vertebral column. The maximum length of the vertebrae appears to exhibit strong variability between the sexes, while the length of the vertebral foramen does not. The differences in the lengths and widths of the superior and inferior facets also suggest sexual dimorphism. Breadth between facets, height of superior to inferior facets, and dimensions of the vertebral body also appear to demonstrate differences between the sexes. Though differences are noted between the heights of the vertebral bodies of males and females, this pattern may be due more to age than to sex. These preliminary results suggest that sexual dimorphism exists throughout the vertebral column and that vertebrae can be used in estimating sex. Further investigation using a larger sample of individuals from the Bass Donated Collection will be conducted to determine the extent of sexual dimorphism in the vertebral column and the level of accuracy and reliability obtainable when using vertebrae to determine sex. This research could demonstrate that any vertebra can be used for estimating sex, possibly even if fragmented and/or specific vertebra number is unidentifiable, which could prove useful in forensic and archaeological situations, especially where skeletal material is fragmented or commingled.

Sex Determination, Vertebrae, Physical Anthropology