



Physical Anthropology Section – 2007

H62 Sex Determination in the Human Sacrum: Wing Index and Sacral Curvature

Michaela M. Huffman, BS*, National Museum of Natural History, Department of Anthropology, MRC112, 10th & Constitution Avenue NW, Washington, DC 20560-0112; and David R. Hunt, PhD, National Museum of Natural History, Department of Anthropology/MRC112, 10th & Constitution Avenue NW, Washington, DC 20560-0112

After attending this presentation, attendees will learn about results in the use of wing index as a criterion for sex determination and the variation found in the wing length of the sacrum. This presentation will also inform the attendee of the use of sacral curvature for sex determination. The participant will be familiarized with the morphological variation of the sacrum and its value as an element for sex identification in forensic anthropology.

This presentation will impact the forensic community and/or humanity by confirming that there is no significant difference in sacral wing width for both sexes in American Whites and Blacks and that the significant sex differences found in sacral curvature allows for general sex determination. However it is clear from this study that the range of variation in the sacrum is highly influenced by development in the axial skeleton. This greatly affects its morphology and using the sacrum as the single element for sex identification should be employed with caution.

The goal of this presentation is to inform the attendee results in the use of wing index as a criterion for sex determination and the variation found in the wing length of the sacrum. This presentation will also inform the attendee of the use of sacral curvature for sex determination. The participant will be familiarized with the morphological variation of the sacrum and its value as an element for sex identification in forensic anthropology.

Physical anthropology literature in the last 100 years has noted variation and sex differences in the human sacrum. In 1982, Kimura studied sex differences in the sacrum by the base-wing index using American Black and White individuals from the Terry Collection (National Museum of Natural History) and Japanese individuals from the Department of Anatomy, Yokohama City University School of Medicine. When measuring the wing of the sacrum, Kimura only measured the right side in response to the findings by Matsui in 1942 that the sacral wing was greater on the left side than on the right in Japanese skeletons for both sexes. However, Kitano (1959) found there was no significant difference in the right and left wing in Japanese individuals for both sexes. The present research assesses the variation among sacral wing widths in a sample of American Black and White individuals in order to gain further understanding in the utility of the sacral wing index as a sex determinant and to clarify disparity in previous publications.

Bass has identified sacral curvature as a sex identifier, yet no citations or references were indicated to studies that assessed the accuracy of this characteristic of the sacrum being flatter in females and more curved in males. This present study examines sacral curvature as a criterion for sex identification.

Three hundred individuals were measured in this present study using the Terry Collection at the National Museum of Natural History. Sub-groups of the sample were divided equally between the sexes and between "racial" groups of American Blacks and American Whites based on the identification of the ethnic affinity assigned to the individual at autopsy. The wing of the sacrum was measured from the lateral margin of the articular base to the most lateral border of the wing. The sacral curvature was measured sagittally (using a coordinate caliper), on the ventral side from the most anterior superior point of the articular promontory to the most anterior inferior portion of the coccyx, the depth of the curvature was derived by measuring at the deepest point of the sacral body.

Overall results from the study for wing length found for the right wing (in millimeters): Blacks=30.83 ± 3.63; Whites=34.36 ± 3.83; Males=31.25 ± 4.24; Females=33.95 ± 3.52. For the left wing: Blacks=30.70 ± 3.68; Whites=34.41 ± 3.74; Males=31.06 ± 4.20; Females=34.04 ± 3.53. Within the ancestry and sex groups there is no significant difference between the mean lengths of the right and left sacral wing. However, there are significant differences ($p=0.000$) in the mean wing values between Blacks and Whites and between males and females.

Results from the sacral curvature means (in millimeters) are: Black Males=15.72 ± 6.34; Black Females=12.88 ± 6.58; White Males=20.06 ± 7.74; White Females=17.17 ± 7.74. Tests of significance found that two groups do not have significantly different means (Black females and Black males, $p=0.212$; and White females and White males, $p=0.024$), all other groups are significantly different at the $p=0.01$ level or greater. Sectioning points and confidence intervals will be presented for group identification.

This study confirms that there is no significant difference in sacral wing width for both sexes in American Whites and Blacks, and the significant sex differences found in sacral curvature allows for general



Physical Anthropology Section – 2007

sex determination. However, it is clear from this study that the range of variation in the sacrum is highly influenced development in the axial skeleton. This greatly affects its morphology and using the sacrum as the single element for sex identification should be employed with caution.

Sex Determination, Sacrum, Sacral Curvature