



## Physical Anthropology Section – 2003

### H2 Skull vs. Postcranial Elements in Sex Determination

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This poster will provide participants with information, derived from the Forensic Anthropology Data Bank, enabling them to make informed choices about which skeletal elements provide the most reliable indicators of sex.

When performing a forensic anthropological analysis, sex estimation is one of the first and most important steps. A visual analysis of the pelvis is an excellent indicator of sex. However, not all forensic cases provide the luxury of a complete skeleton. If an individual is left exposed in an outdoor context, not all elements may be recovered due to various taphonomic processes. Some cases may only consist of a cranium, others just a few postcranial bones. What to use when only the skull and long bones are present, in the absence of the pelvis, is of some debate. Bass (1995) and Byers (2001) indicate that the skull is the second best area of sex determination, the pelvis being the most reliable. This perception persists despite evidence to the contrary (Berrizbeitia 1989, France 1998, Ousley 2001, Robling and Ubelaker 1997). France (1998), while noting that the cranium is still often presented as the second best indicator of sex, reviews evidence showing that postcranial estimates are generally superior.

The purpose of this study is: 1) to test the hypothesis that the skull is better than postcranial elements using a recent forensic sample, 2) establish a hierarchy of sexing reliability by element, and 3) investigate race variation in sexual dimorphism.

The Forensic Data Bank (FDB) is unique in the fact that it continues to store data from individuals derived from the populations for which it is used, and provides an opportunity to explore postcranial sex discrimination techniques. Samples used in this study are comprised of 360 adult individuals, 90 Black and 270 White, with post 1929 birth years. Standard measurements were obtained for these individuals, 24 cranial, 10 mandibular, and 44 post-cranial (Moore-Jansen, Ousley, and Jantz 1994). Mahalanobis distance, sectioning points, and expected classifications were computed for each individual measurement. A stepwise discriminant function analysis was performed on the cranium, mandible and each postcranial element in order to find the best subset of variables for a discriminant function. A MANOVA test was performed to test race variation in sexual dimorphism.

The humerus, clavicle, femur, scapula, tibia, radius, and ulna, respectively provided higher classification rates than the cranium in Whites. In Blacks, the humerus, clavicle, innominate, femur, and scapula, respectively yield higher classification results than the cranium. The fibula, calcaneus, mandible, and sacrum all present lower classification results than the cranium for both Blacks and Whites. The innominate presents as the third best element for sexing in Blacks and ranks below the cranium in Whites. In addition, the tibia ranks above the cranium in Whites and below in Blacks. The MANOVA test indicates the only elements exhibiting race variation in sexual dimorphism are the mandible and radius. Discriminant functions provide better classification rates than the univariate methods, with the exception of the tibia in Whites and the calcaneus in Blacks. Models and classification rates are provided.

#### **Sex Estimation, Sexual Dimorphism, Discriminant Function Analysis**