



Physical Anthropology Section – 2003

H11 The Estimation of Sex From the Proximal Ulna

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This paper's objective is to present the findings of a metric analysis quantifying the degree of sexual dimorphism of the proximal ulna and to assess its value in estimating sex.

The estimation of sex based on measurements of long bones has been a useful tool to the forensic anthropologist and skeletal biologist for years. These techniques are particularly effective when one is confronted with analyzing fragmentary remains. Much of the research available has focused on analysis of the lower limb bones, with the humerus receiving slightly less attention. Fewer studies have been conducted using bones of the forearm, with most utilizing non-U.S. collections.

The present study utilizes a discriminant function analysis of two measurements taken from the proximal ulna to estimate sex. The first measures the length of the semilunar and radial notches while the second measures the width of the proximal rim of the olecranon.

White and Black male and female samples were taken from the William M. Bass Donated Skeletal Collection (n=113), the Smithsonian's Terry Collection (n=98), and from U.S. Army Central Identification Laboratory, Hawaii (CILHI) cases (n=5). The Bass sample consisted of 78 White males, 15 White females, 17 Black males, and 2 Black females, with ages ranging from 18-89 years. From the Terry Collection, measurements were taken from 8 White males, 51 White females, 7 Black males, and 33 Black females. The ages of this sample ranged from 17-54 years. For the CILHI sample, 4 males (2 White and 2 Black) and 1 female (White) were utilized, with ages ranging from 19-38 years.

All of the ulnae were measured using a GPM sliding caliper with measurements taken to the nearest 0.5 millimeter. Whenever possible, the left ulna was chosen over the right, and only those ulnae free of pathological insult were measured.

Discriminant function analyses were run on the data, with separate examinations conducted to control for any possible racial differences. Results (using both measurements) indicate that White males and females were correctly sexed with 93.2% and 95.5% accuracy (respectively), while Black males and females were correctly sexed 92.6% and 97.1% of the time (respectively). An analysis was also conducted to determine whether there was a significant secular trend between the Terry and Bass samples. The results of this latter test proved negative.

The results of this study demonstrate that the proximal ulna is highly dimorphic. Sex estimation using two dimensions of the proximal ulna yields correct sex classification as high as any other postcranial element, and exceeds correct classification rates normally obtained from the skull. The proximal ulna has obvious application to sex estimation in mass disasters, where remains may be fragmented, but should also be given considerable weight in sex estimation of complete remains.

Ulna, Sex Estimation, Sexual Dimorphism