



Physical Anthropology Section – 2006

H55 To Measure or Not to Measure: An Analysis of Maximum Length of the Tibia

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The goal of this presentation is to inform the reader of the history of metric analyses of the tibia and present the possible adjustments necessary dependent upon the metric technique applied.

This presentation will impact the forensic community and/or humanity by presenting correction factors necessary for alternate methods of metric analysis for the maximum length measure of the tibia for stature estimation.

The goal of this presentation is to inform the reader of the history of metric analyses of the tibia and the implication of these estimates on stature. The attendee will learn the possible adjustments to be applied, dependent upon the metric technique utilized.

Techniques of metric analysis for post cranial human remains have been developed in physical anthropology to quantify the morphological features of these elements. However, in recent years some of these methods have been modified and re-formulated to suit the changing direction of morphological analysis or in the case where the original definitions have been forgotten, lost, or misinterpreted. This presentation offers a re-evaluation of the maximum length measure of the tibia including and excluding the intercondylar eminences, and tests the accuracy and validity of these metric methods experimentally across population, age, and sex.

Trotter and Gleser (1952) analyzed the remains of WWII war dead and a sample from the Terry Collection, in order to develop living stature estimation formulae. These authors later (1958) re-evaluated their stature assessment by including a sample of Korean War casualties. Upon reexamination of Trotter and Gleser's original sample data by Jantz et al. (1994) it was discovered that, contrary to Trotter's own definition, her maximum length measurements of the tibia for the WWII and Terry collection excluded the malleolus from assessment. Measurements of the Korean War casualties were also unusually shorter than expected, however those measurements were taken by technicians utilizing Trotter's definitions and the original human remains were not available for re-analysis by Jantz et al.

Other authors, such as McHenry's (1974:330) analysis of stature in Australopithecines, describe the maximum or "total length" measurement for the tibia as the maximum distance between the "most proximal and most distal points" on the tibia. This definition leads the reader to believe that the intercondylar eminences are to be included by McHenry's description of the measurement, as these eminences are truly the tibia's "most proximal point."

This presentation explores three main points: (1) Why were intercondylar eminences originally excluded from the maximum length measurement of the tibia? (2) If these eminences do bias the maximum length measurement as age progresses, is this a universal effect or is it population or sex dependent? (3) If there are no significant differences produced by including the intercondylar eminences in the maximum tibia measurement by sex, age and ancestry, is there a common adjustment that can be applied for measurements including/excluding the intercondylar eminences to determine maximum length of the tibia?

Results show that the inclusion of the intercondylar eminences has no significant effect on age or sex estimates. However, the significant differences between the means of the two measurements (inclusion or exclusion of the intercondylar eminence) were noted when considering ancestry (Terry White N=94, Terry Black N=100, and South Dakota Arikara N=138

– all housed at the National Museum of Natural History, Smithsonian

Institution)($P < 0.0001$). Standard correction factors (sums of the differences) were calculated for each population and an overall correction factor was included in cases when ancestry is unknown.

	Terry White	Terry Black	Arikara	Overall
Correction Factor	3.27 mm	2.46 mm	1.86 mm	2.44 mm

Possible reasons for excluding the intercondylar eminences from maximum length analysis for the tibia include age-related arthritic changes or the high frequency of eminence fracture in archaeological and modern assemblages.

Tibia, Metric Analysis, Intercondylar Eminence