



Physical Anthropology Section – 2004

H41 Racial Assessment Using the Platymeric Index

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The goal of this presentation is to illustrate the usefulness of the platymeric index as an indicator of race.

This presentation will impact the forensic community and/or humanity by demonstrating that subtrochanteric shape can be successfully used to distinguish between Native Americans and American Whites and Blacks in skeletal cases.

Noticeable differences in the shape of the proximal diaphysis of the femur have been observed between populations. The two most frequently cited causes for these differences are biomechanics and genetics. In the anthropological literature, biomechanics have probably received the most support, but Gill and his colleagues have argued that marked racial, and therefore genetic, differences are present in the shape in the proximal femur. In general, Gill and colleagues have found that the subtrochanteric anteroposterior diameter in Whites and Blacks is greater than that of East Asians and Native Americans. In other words, Whites and Blacks tend to have eurymeric (rounder) diaphyses, while Native Americans and East Asians have platymeric (flatter) proximal femur shafts.

In this paper, we examine variation and population differences in proximal femur shape using the platymeric index (PI) on a sample of nearly 3000 individuals. Among populations, the PI typically ranges from approximately 70 to 100. Individuals with an index below 85 are considered to display platymeria, while those above 85 are eurymeric. For the analysis of population differences, we examined five populations: American Blacks (N=319), American Whites (N=672), Native American (N=1280), Polynesian (N=179), and non-Indian Mexicans (N=40). We then, as did Gill and colleagues, grouped Native Americans and Polynesians into one group and American Whites and Blacks into a second group. The Native American group was then subdivided into six geographical regions (Northern Plains, Central Plains, Southern Plains, Prairie, Great Basin, and Southwest) and three subsistence strategies (Agriculturalists, Hunter and Gatherer, and Village Horticulturalist). No significant differences were found between males and females within populations, so the sexes were pooled for analysis.

Our results generally support Gill and colleagues' assertion that the PI can be used successfully by forensic anthropologists to distinguish Native Americans and Polynesians (81% correctly classified) from American Whites and Blacks (74% correctly classified). Native Americans (mean PI=78) and Polynesians (mean PI=71) are on average more platymeric than American Whites (mean PI=90) and Blacks (mean PI=91). Non-Indian Mexicans (mean PI=89) generally have a subtrochanteric femur shape more similar to American Whites and Blacks. Our results strongly suggest, however, that some caution should be used when using the platymeric index to discriminate between populations. The range of variation in all populations is considerable, making discrimination between the five populations difficult. Native Americans, for example, range from extremely platymeric to eurymeric and frequently classify as Polynesian or non-Indian Mexican.

Within Native Americans there are differences between regions and subsistence strategies. The PI is least in populations from the Northern Great Plains (mean PI = 75), the Native American population studied by Gill and colleagues, and greatest in the Southern Plains (mean PI = 83). Populations from the Southwest (mean PI = 78), Northern Prairie (mean PI = 79), Great Basin (mean PI = 81), and Central Plains (mean PI = 82) are intermediate in their PI. Village Horticulturalists (mean PI = 77) and Agriculturalists (mean PI=78) are generally more platymeric than Hunter and Gatherers (mean PI = 81).

We agree with Gill and colleagues that the shape of the proximal femur can be used successfully by forensic anthropologists to distinguish between Native Americans and American Blacks and Whites. But, our results also suggest that there is great variation within groups, and differences between populations are probably due to both genetics and biomechanics. As a result, we suggest that caution should be taken when using only the femur for the estimation of race.

Forensic Anthropology, Femur, Subtrochanteric Shape