



Physical Anthropology Section – 2007

H57 Estimating Geographic Ancestry of Hispanic Crania Using Geometric Morphometrics

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After attending this presentation, attendees will understand the use of geometric morphometrics in ancestry estimation.

This presentation will impact the forensic community and/or humanity by addressing the issue of ancestry determination of Hispanic individuals using geometric morphometric methods.

Correct ancestry estimation for American Blacks and Whites is possible due to documented reference samples such as Terry, Todd, and more recent collections including the William M. Bass Donated Collection, and the Forensic Anthropology Data Bank (FDB). However, there is no Hispanic equivalent of these large reference collections. The increasing Hispanic population in the U.S. makes it necessary to obtain appropriate reference samples for ancestry determination. Because there is no large reference collection of recent forensic Hispanic skeletons, cases from forensic anthropologists around the country must be relied on to better understand and identify the increasing number of Hispanic skeletons found in a forensic context.

Traditional craniometric morphometric methods in addition to years of experience are widely employed in ancestry determination. Results presented at this meeting by the first author (2004) suggest that traditional craniometrics, at best, provide a 45% classification rate (cross-validated) for Hispanic individuals when compared to American White, American Black, Guatemalan Mayan, and Argentinean samples. Because Hispanic individuals are a hybrid population of European and Indigenous Spanish-speaking individuals, correct ancestry estimation is more problematic. Geometric morphometric methods are suggested to better discriminate among groups that are closely related.

This presentation uses three-dimensional landmark data to examine the morphological differences between size and shape in Hispanics, American Whites, and Guatemalan Mayans. Because it is important to use samples that represent recent forensic anthropological cases that are seen in the U.S., for this analysis, Hispanics ($n = 41$), American Whites ($n = 57$), and recent Guatemalan Mayans ($n = 70$) were used as reference samples. The Hispanic and American White samples are from the Forensic Anthropology Data Bank (FDB) and were collected by the first author. The American Whites are positively identified individuals and the majority of the individuals are from Tennessee.

The Hispanic sample used in this paper contains either positively identified or contextually identified individuals. Individuals in the latter group are from U.S. border crossing fatalities found by immigration officers patrolling the border. Of the border crossing fatalities, only individuals with enough soft tissue present to indicate a positive identification of sex were used. The Guatemalan Mayan sample was collected from the Forensic Anthropology Foundation of Guatemala (FAFG); this is a recent forensic sample and consist of mostly male individuals. The context is modern Mayan, from Rabinal and Comalapa, and are either positively identified or contextually identified.

Landmarks ($n = 35$) were chosen that represent the overall cranial vault and face. A general Procrustes analysis was performed in Morphologika 2 (O'Higgins and Jones, 2006) and a discriminant function analysis was run in SAS 9.1 (SAS INSTITUTE). The cross-validated classification rate for Hispanic individuals using geometric morphometric methods is 80.5%, an improvement from the 45% utilizing traditional morphometric methods. Results will be presented along with a discussion of the major morphological differences between Hispanics, American Whites, and Guatemalan Mayans.

Ancestry, Hispanic, Geometric Morphometrics