



Physical Anthropology Section – 2005

H62 A Potential New Morphological Indicator of Biological Affinity in Human Skeletal Remains

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The goal of this study is to introduce a new cranial non-metric trait which can aid investigators and anthropologists in assessing the population affinity of unidentified skeletal remains.

This presentation will impact the forensic community and/or humanity by presenting a new method of assessing biological affinity in unidentified remains.

Establishing population affinity in cases involving unidentified decomposed or skeletal remains is an integral part of a complete osteological analysis. Determining the ethnic affinity of skeletal remains found in forensic contexts greatly reduces the number of antemortem records searches needed to establish identity. Anthropologists have traditionally relied on both morphological and metric indicators to determine racial identity. Determining ancestry from non-metric traits relies on a skull exhibiting traits believed to be representative of a particular population.

This study introduces a new morphological indicator, the infraorbital “fold,” which demonstrates the potential to differentiate White individuals from those of Black, Hispanic or Native American ancestry. The morphology of the lateral infraorbital margin, specifically the presence/absence of an “infraorbital fold,” appears to be an accurate indicator of ancestry.

The infraorbital fold, when present, is a projection or crest of bone emanating from the lateral portion of the infraorbital margin. The superior, medial portion of the zygomaticomaxillary suture protrudes anteriorly, forming a transverse crease. This bony projection is restricted to the zygomatic bone; the fold terminates medially at the zygomaticomaxillary suture. The trait was scored as present if the fold was evident bilaterally; the trait was scored absent if neither infraorbital region displayed the fold.

The sample was drawn from the documented collection housed at the Laboratory of Human Osteology of the Maxwell Museum at the University of New Mexico. Additional individuals were taken from the Office of the Medical Investigator's forensic collection, also housed at the Maxwell Museum. All individuals included in the sample had known sex, age, and ethnic affinity. This trait was scored on a total of 418 adult skulls; 276 were males, 142 were females. The sample included 228 White, 104 Native American, 77 Hispanic, and 9 Black individuals.

The fold was present in 93.4% of the White individuals but only 2.6% of the Hispanic, and 6.7% of the Native American individuals. The fold was completely absent in the small number of Blacks included in the study.

Knowledge of the anatomy of the suborbital region aids in understanding why the trait varies among populations. The orbital surface of the zygomatic bone is the site of the orbital fat pad and the insertion for the inferior oblique muscle of the eye. The lateral infraorbital margin serves as the site of attachment for the palpebral and orbital portions of the orbicularis oculi muscle as well as the levator labii superioris and zygomaticus major and minor. Variations in these soft and hard tissues among racial groups have been reported previously.

Population variation of a closely associated trait – the angle of the zygomaticomaxillary suture – provides further insight. The morphology of the suture varies among Whites, Black and Native Americans. Suture structure typifying Whites is described and illustrated as “s-shaped,” with the superior and inferior portions of the suture oriented medially and the midpoint of the suture deviating laterally. It is the upper portion of the zygomatic, superior to the suture's midpoint deviation, which makes up the infraorbital fold (when present). Although described respectively as “angled” or “curved,” suture morphology for both Native Americans and Blacks is illustrated as an arc with its medial most point inferior to the orbit. The absence of a sharp change in direction within the suture may provide greater joint stability and raises the possibility that the infraorbital fold represents a buttress for muscle attachment.

Ethnic affinity cannot accurately be determined by a single indicator or isolated trait. The infraorbital fold trait, when used in concert with other cranial non-metric traits, appears to contribute significantly to the correct assignment of ancestry in unidentified crania. Additional studies on larger Black samples, as well as other ethnic groups, are warranted.

Osteology, Population Affinity, Identification