

DETERMINATION OF ANCESTRY FROM DISCRETE TRAITS OF THE MANDIBLE

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ABSTRACT of a Master's Thesis in Human Biology at the University of Indianapolis
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In the field of forensic anthropology, the construction of a biological profile is of utmost importance in the identification of a decedent. The biological profile includes the age, sex, stature, and ancestry of the individual. Of these, ancestry is considered the most difficult to determine. The purpose of this study is to build on previous non-metric studies of the mandible to determine whether it may be used to differentiate between individuals of European and African ancestry. This study looks at skeletal remains from the Hamann-Todd Collection, the Terry Collection, a contemporary forensic collection at the University of Florida, and the Pretoria Bone Collection in South Africa. A total of 921 individuals with documented age, sex, and ancestry were analyzed. Twelve non-metric traits were examined: ramus inversion, location of inversion, gonial eversion, mandibular border form, mandibular tori, robusticity of muscle attachment sites, mylohyoid bridging, accessory mandibular foramen, chin prominence, chin shape, number of mental foramina, and the position of the mental foramen.

Wilcoxon Signed Ranks Test was used to determine if there was a relationship between trait frequency and side. This test was also used to see if there was a significant amount of intra-observer error between the first and second scorings of the Florida sample. Ordinal regression was utilized to determine the effect, if any, that age, sex, ancestry, and the interaction between sex and ancestry have on any given non-metric trait.

Six traits differed significantly between the left and right sides. Intra-observer error was relatively low, with two traits showing a significant difference between the first and second observations. Nine out of 12 traits were significantly affected by ancestry. However, due to the effects of sex, age, and the sensitivity of ordinal regression, some of these traits may be less useful than others in determining ancestry in unknown cases. Ramus inversion, gonial inversion, muscle attachment sites, chin shape, number of mental foramina, and position of the mental foramen are the most effective traits to use when determining ancestry. However, caution must be taken because all of them except the number of mental foramen are significantly affected by sex. The number of mental foramina may be the most reliable trait because it is statistically and practically significant and it is not affected by sex, age, or the interaction between sex and ancestry. However, multiple foramina are very rare in all populations studied.

European individuals were found to most likely possess little to no ramus inversion, no gonial eversion (straight gonion), gracile muscle attachment sites, a round or square chin, one mental foramen, and a more anteriorly placed mental foramen. Individuals of African descent were more likely to display moderate to extreme ramus inversion, gonial inversion, a round chin, and multiple mental foramina.

This study is the first multivariate study conducted on discrete mandibular traits used for the determination of ancestry. Employing ordinal regression on a large sample of identified individuals, this study determines whether sex and age affect the incidence of each trait independently of ancestry. Additionally individuals from two separate continents are examined; therefore, the findings are applicable for worldwide use. While ancestry determination from the cranium has been established as reliable in the literature, a suite of characteristics derived from multiple bones is preferred. The inclusion of mandibular traits builds on previous non-metric studies and helps to increase the reliability of ancestral determination from the skeleton.

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