



Anthropology Section - 2016

A86 A Novel Method for Recording Palate Shape in the Estimation of Ancestry

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After attending this presentation, attendees will learn a new method for scoring palate shape with standardized descriptions. This new method can be used in conjunction with other methods of ancestry estimation to refine the biological profile. Additionally, attendees will gain an understanding of the utility of palate shape as an indicator of ancestry.

This presentation will impact the forensic science community by expanding the traits available for the forensic assessment of ancestry and by providing a standardized means by which to assess palate shape, a trait traditionally scored based on shape variables with somewhat misleading names.

Palate shape has been in use as an indicator of ancestry since 1931 when Hooton included it on the Harvard Blanks list of traits.¹ Since then, it has been included in multiple lists on ancestry-related traits.²⁻⁵ Although a well-established trait, no definition exists of what precisely should be assessed, and there is little agreement as to what shapes are associated with which ancestries. Hooton referred to White, Black, and Asian/Native American palates as pinched, narrow, and wide, respectively, while Krogman and İşcan refer to the palates of the same groups as narrow, wide, and intermediate, and Gill calls them parabolic, hyperbolic, and elliptical.¹⁻⁴ The subjectivity inherent in recording this trait has left some practitioners questioning the utility of palate shape as an effective indicator of ancestry.⁶ Previous work found that by using digital representations of the palates, individuals were assigned to the correct ancestry 68% of the time, which is more than twice as good as chance; however, the methods outlined in that study require the use of a digitizer and statistical software not available to all forensic anthropologists.

The present study defines a novel rank scale to assess palate shape. For this research, palate shape is defined as the overall trend in shape of both the dental arcade and the underlying alveolar bone and was recorded according to five ordinal character states. States 1, 3, and 5 correspond to the traditional elliptical, parabolic, and hyperbolic shapes, respectively, while states 2 and 4 represent transitional shapes. This newly defined method was then tested on a sample of individuals of known ancestry ($n=146$).

Data were collected on individuals housed at the Pima County Office of the Medical Examiner, the Donated Collection at the Forensic Anthropology Center at Texas State, and the Donated Collection curated by the Forensic Anthropology and Computer Enhancement Services (FACES) lab at Louisiana State University. Palate shape was recorded on individuals of White, Black, Asian/Native American, and Hispanic ancestry using this new method. Intra-observer error was assessed using weighted Cohen's Kappa ($K=0.55$, $p<0.001$), which indicates that there is moderately good agreement as outlined by Landis and Koch, and that this agreement score is significantly different from that expected from chance.⁷ A frequency table of the distribution of each score by ancestry was created, and Chi-square analysis indicated that significant differences in palate shape exist between ancestry groups ($\chi^2=59.9974$, $p<0.001$). A post-hoc test of the Chi-square results indicated that all pair-wise comparisons of ancestry groups were significantly different ($p<0.05$) with the exception of the Black vs. Asian/Native American comparison ($p=0.1282$), which was likely not significant due to insufficient sample size.

The adoption of this scale for recording palate shape has initially shown that it is successful at distinguishing ancestral groups and can be useful as a skeletal indicator of ancestry. The use of this scale will provide a standard means of recording palate shape that does not require the use of special equipment, therefore making it useful for a broader range of anthropologists. This new scoring method can then be added to the suite of methods available to forensic anthropologists to estimate ancestry.



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