A127 Dental Morphology as a Key to Understanding the Population History of Latinos

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Learning Overview: After attending this presentation, attendees will better understand the utility of dental morphology in exploring the ancestry of modern Latinos through their population history.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating how dental morphology can augment information provided by genetic, cranial, and historical studies, especially as they pertain to groups with diverse population histories resulting in clinal variation, such as Latinos.

The modern Latino population has been established over the past 500 years through genetic drift and gene flow events resulting from European colonization of the New World. Existing variation among Native American, European, and African populations that are parental to Latinos has created a mosaic of genotypic and phenotypic variation that is only beginning to be understood within a forensic anthropological context. As Latinos are among the fastest growing populations within the United States, it is critical that every available tool be utilized to explore their variation so ancestry estimations can continue to improve for existing populations within this country.[1] Genetic studies of Latino populations within the United States show that they generally fall into either a dihybrid or trihybrid pattern of ancestral influence, with levels of parental ancestry varying regionally.[2-5] Regional trends within the United States and Mexico are well-known and have been supported with cranial studies.[6-9] Dental morphology studies exploring this variation, however, are rare, despite moderate to high levels of heritability associated with tooth shape.[10-13] This study examines dental morphology from pre- and post-contact, as well as forensically significant populations, to gain insight into how microevolutionary forces have affected the modern Latino population. The primary goals of this preliminary investigation are: (1) to explore the variation within Native American populations, historic European/American, African/American, and Latino populations, and (2) to see how these populations may have contributed to a modern Latino population.

Samples within this study include: Native American data from Mexico City from the Escuela Nacional de Antropología e Historia (ENAH) and samples from the Christy G. Turner II Database (with permission and access granted by Dr. G. Richard Scott), and a New Mexico sample from the Phoebe A. Hearst Museum of Anthropology; historic European and West African data from the Turner II Database; historic Latino sample from ENAH; historic European American and African American data from the Robert J. Terry Collection; modern European American data from the Texas State University Donated Skeletal Collection and the Documented Skeletal Collection at the Maxwell Museum at the University of New Mexico; and a modern Latino sample from Mexico City at the Universidad Nacional Autónoma de México (UNAM). Morphological data from the Turner II Database were collected according to the published Arizona State University Dental Anthropology System (ASUDAS) standards and data collected for this study were gathered according to the new ASUDAS standards.[14-15] Previously conducted intra-observer error tests found trait agreement at levels of 0.621 or above.[16] Pearson's chi-squares were applied to raw scores for 27 dental morphological traits, with all but two differing significantly ($p<0.05$) among the samples. The remaining traits were subjected to a Kendall's tau to examine inter-trait correlations; traits with correlation values of 0.4 or higher or those with an uncertain key tooth were removed from future analyses. Additionally, Pearson's chi-squares were conducted to check for sex-correlated traits within the samples. The remaining 19 traits were dichotomized for Mean Measure of Divergence (MMD) and Fuzzy C-Means (FCM) analyses. MMD results show some significant variation among the Native American samples, the historic samples all differ significantly from one another, and the modern Latino sample differs significantly from most samples, except for the New Mexico Native American sample and the historic Latino sample. The FCM analysis shows much overlap among the samples, with only the Texas State sample not falling in the largest cluster with all other samples.

These exploratory results demonstrate there is overlap among the samples through time and space, though some notable differences are present among the modern and pre-contact samples that warrant further analyses. Dental morphology for Latinos, however, does align with genetic and cranial data showing expected influences based on population history with Native American, European, and African ancestries. The continuation of this project will include additional samples and classificatory statistics for application within a forensic setting.

Reference(s):

1. Humes Karen R., Nicholas A. Jones, and Roberto R. Ramirez. *Overview of Hispanic Race and Origin: 2010.* U.S. Department of Commerce: Economics and Statistics Administration, U.S. Census Bureau, 2011.
2. Bertoni Bernardo, Bruce Budowle, Mónica Sans, Sara A. Barton, and Ranajit Chakraborty. Admixture in Hispanics: Distribution of Ancestral Population Contributions in the Continental United States. *Human Biology* 75 (2003): 1-11.
3. Bryc Katarzyna, Eric Y. Durand, J. Michael Macpherson, David Reich, Joanna L. Mountain. The Genetic Ancestry of African Americans, Latinos, and European Americans Across the United States. *American Journal of Human Genetics* 96 (2015): 37-53.
4. Rubi-Castellanos Rodrigo, Gabriela Martínez-Cortés, José Francisco Muñoz-Valle, Antonio González-Martín, Ricardo M. Cerda-Flores, Manuel Anaya-Palafox, and Héctor Rangel-Villalobos. Pre-Hispanic Mesoamerican Demography Approximates the Present-Day Ancestry of Mestizos Throughout the Territory of Mexico. *American Journal of Physical Anthropology* 139 (2009): 284-294.
5. Cerda-Flores Ricardo M., Maria C. Villalobos-Torres, Hugo A. Barrera-Saldaña, Lizette M. Cortés-Prieto, Leticia O. Barajas, Fernando Rivas, Angel Carracedo. Yixi Zhong, Sara A. Barton, and Ranajot Chakraborty. Genetic Admixture in Three Mexico Mestizo Populations Based on D1S80 and HLA-DQA1 Loci. *American Journal of Human Biology* 14 (2002): 257-263.
6. Ross Ann H., Dennis E. Slice, Douglas H. Ubelaker, and Anthony B. Falsetti. Population Affinities of 19th Century Cuban Crania: Implications for Identification Criteria in South Florida Cuban Americans. *Journal of Forensic Sci*ences 49, no. 1 (2004): 11-16.

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7. Hughes Cris E., Meredith L. Tise, Lindsay H. Trammell, and Bruce E. Anderson. Cranial Morphological Variation Among Contemporary Mexicans: Regional Trends, Ancestral Affinities, and Genetic Comparisons. *American Journal of Physical Anthropol*ogy 151 (2013): 506-517.
8. Spradley M. Katherine. Toward Estimating Geographic Origin of Migrant Remains Along the United States-Mexico Border. *Annals of Anthropological Pract*ice 38, no. 1 (2014): 101-110.
9. Hefner Joseph T., Marin A. Pilloud, Cullen J. Black, and Bruce E. Anderson. Morphoscopic Trait Expression in 'Hispanic' Populations. *Journal of Forensic Sciences* 60, no. 5 (2015): 1135-1139.
10. Edgar H.J.H. Estimation of Ancestry Using Dental Morphological Characteristics. *Journal of Forensic Sciences* 58, no. S1 (2013): S3-S8.
11. George, Rebecca L., and Marin A. Pilloud. Dental Morphological Variation in Asian and Asian-Derived Populations. *Forensic Anthropology* 2, no. 4 (2019): 1-6. http://dx.doi.org.unr.idm.oclc.org/10.5744/fa.2019.1025.
12. Pilloud M.A., H.J.H. Edgar, R. George, and G.R. Scott. Dental Morphology in Biodistance. In *Biological Distance Analysis: Forensic and Bioarchaeological Perspectives*, edited by Marin A. Pilloud and Joseph T. Hefner, 135-155. London: Elsevier, 2016.
13. Scott G. Richard, Christy G. Turner II, Grant C. Townsend, and María Martinón-Torres. *The Anthropology of Modern Human Teeth: Dental Morphology and Its Variation in Recent and Fossil* Homo sapiens. 2nd edition. Cambridge: Cambridge University Press, 2018.
14. Turner II Christy G., Christian R. Nichol, and G. Richard Scott. Scoring Procedures for Key Morphological Traits of the Permanent Dentition: The Arizona State University Dental Anthropology System. In *Advances in Dental Anthropology*, edited by Mark A. Kelley and Clark Spencer Larsen, 13-31. New York: John Wiley and Sons, Inc., 1991.
15. Scott G. Richard, and Joel D. Irish. *Human Tooth Crown and Root Morphology: The Arizona State University Dental Anthropology System.* Cambridge: Cambridge University Press, 2017.
16. McHugh Mary L. Interrater Reliability: The Kappa Statistic. *Biochemica Medica* 22, no. 3 (2012): 276-282.

ASUDAS, Ancestry, Latino