A3   **A Two-Pronged Approach to the Identification of Deceased Unidentified Border Crossers in North Carolina: 3D-ID and Geochemical Analysis**

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After attending this presentation, attendees will better understand the utility of a two-pronged approach for the identification of deceased undocumented border crossers and, in particular, how this combination of tools is uniquely suited for unidentified persons from Central and South America.

This presentation will impact the forensic science community by providing results from a case representing a growing scenario in the Southeastern United States, the undocumented immigration of Central and South Americans. This presentation will add to research being implemented in forensic anthropology by demonstrating the increased precision for region-of-origin identification when 3D-ID software and geochemical analysis are combined. In addition, this presentation will also discuss the difficulties of dealing with the identification of "non-conventional" undocumented migrant groups (e.g., South Americans rather than Mexicans).

According to the Federal Bureau of Investigation's (FBI's) National Crime Information Center (NCIC) missing person and unidentified person files, as of December 31, 2014, there were approximately 40,000 to 50,000 unidentified dead in the United States. Human remains are thought to go unidentified for many reasons. According to Kimmerle et al., the missing who end up as unidentified are predominantly male, adult, foreign-born individuals, minorities, and at-risk individuals.[1] Undocumented status of many of the unidentified presents a unique challenge in the process of identification as conventional forensic identification tools such as family DNA-reference databases focus on United States citizens with next of kin. Thus, although the ability to solve a cold case is multifactorial, region-of-origin data is a critical component in successfully beginning the identification process.[2] Of the total foreign-born individuals, approximately 56% are from Mexico, 26% are from Central and South America, and as many as 26% of the total population of foreign-born persons are thought to be undocumented. Undocumented persons travel and reside throughout the country and, as a result, states such as North Carolina, Georgia, and Illinois are among the top states with the highest undocumented populations.[3]

The cold case described in this presentation represents one such case from the Wake County Sheriff's Office and Office of the Chief Medical Examiner's in Raleigh, NC. The unidentified remains of a single adult male initially found in 2003 were delivered to the NC State Forensic Anthropological Facility for analysis more than a decade after initial recovery. Biological sex and age estimates indicated the decedent was a male 41.9-53.7 years of age. Craniofacial morphology was characteristic of an individual of Hispanic ancestry. Metric and geometric morphometric ancestry assessment was conducted using both FORDISC® 3.0 and 3D-ID with similar, but critically contrasting, results. Metrically using FORDISC® 3.0, the individual classified as a Hispanic male with posterior (0.476) and typicality (0.655) probabilities. The software 3D-ID, which utilizes coordinate data, classified this individual as South American Male with posterior (0.4683) and typicality (0.4573) probabilities. In order to clarify region of origin, samples of tooth #30, a portion of the right femoral shaft, and a portion of the sternal end of right rib #12 were sampled for carbon, oxygen, and strontium isotopes. Results showed that tissue samples of all types were mechanistically indistinguishable within their categories and not consistent with a North Carolina acclimation, suggesting that the individual had been in North Carolina for less than five years (Bone 87Sr/86Sr ratio: 0.70802; Tooth 87Sr/86Sr ratio: 0.70813). Both samples had a standard error of +/-0.00001 (Femur δ18O value 22.7+/-0.341‰; Rib δ18O value 22.5+/-0.107‰; Enamel δ18O value 22.4+/-0.269‰). Oxygen isotopes in body tissues are obtained primarily from drinking water (~70%). The value of potential drinking water sources from body tissues was estimated to be -11.11‰. Utilizing the region-specific data from the 3D-ID combined with the isotope data, the region of origin for this individual was consistent with Southern Peru, which demonstrated a 87Sr/86Sr range of 0.70728 to 0.70906 and a drinking water range of -11.1 to -12.6.[3,4]

In conclusion, both isotopes and ancestry assessments are more successful at region-of-origin identification when combined. This case study suggests that in the case of undocumented Latinos, the combination of isotopes and 3D-ID may be better able to discern individuals of South and Central American descent and should be considered an important investigative component for forensic anthropologists working with these populations.

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3D-ID, Isotopes, Border Crossers