



## Physical Anthropology Section – 2008

### H2 An Assessment of Biological Ancestry in an Unmarked Cemetery From Nevada: An Integrated Approach

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After attending this presentation, the audience will understand the value of a multidisciplinary approach in the assessment of biological ancestry, and the inherent limitations between methods. Using a small historic cemetery sample, biological ancestry is assessed through the study of craniometric variation, non-metric cranial traits, and ancient DNA.

This presentation will impact the forensic community in general by increasing the understanding of different methods used to evaluate biological ancestry and their value in constructing biological profiles of unknown individuals.

This study presents an analysis of nine individuals recovered in 2000 from an unmarked cemetery in Palisade, Nevada, a ghost town officially abandoned in 1961. The cemetery was discovered during a mining operation, which required that the burials be removed. The remains and associated grave items were excavated by local law enforcement, and were submitted to the Human Identification Laboratory at California State University, Chico for osteological analysis. An analysis of the coffin material and associated grave items suggests that these individuals were interred between 1880 and 1910. Because these individuals were buried in separate location in close proximity to the town's main cemetery, it is hypothesized that the burial site may represent a segregated cemetery.

Sex, age, and stature were estimated using standard osteological methods. The nine individuals consist of four males and five females, and range from 25 to 59 years of age. Stature was estimated using regression formulas from the 19th century Terry collection. Female stature ranged from 4'10" to 5' and male stature ranged from 5'3" to 5'6".

Ancestry was assessed through craniometrics, non-metric traits, and ancient DNA. Cranial measurements were taken following guidelines outlined in the Forensic Databank. Each skull was measured twice by different authors to limit intra-observer error. Many of the skulls were fragmentary and/or showed evidence of deformation, which reduced the number of valid measurements that could be taken. Of the nine skulls, only individuals 4, 5, and 8 had crania intact enough for all measurements. The skull of individual 9 is incomplete and is excluded from the analysis. Also, burial 3 lacked a skull upon initial recovery. However, a skull discovered in 2001 at the site is thought to be associated with this burial. Ongoing DNA testing will be used to resolve this issue.

Burial	Sex	Age	Stature	Ancestry	FORDISC 3.0	
1	Female	40-49	4'10" +/-3.1"	Black	Post: 0.816	Typ: 0.307
2	Male	40-49	5'6" +/-3.1"	Japanese	Post: 0.871	Typ: 0.004
3	Male	25-34	5'4" +/-3.1"	Black	Post: 0.333	Typ: 0.071
4	Female	30-39	4'11" +/-3.1"	Black	Post: 0.756	Typ: 0.589
5	Female	40-49	5'0" +/-3.1"	American Indian	Post: 0.538	Typ: 0.993
6	Female	50-59	4'11" +/-3.1"	American Indian	Post: 0.676	Typ: 0.355
7	Female	35-45	4'11" +/-3.1"	Black	Post: 0.882	Typ: 0.344
8	Male	30-35	5'3" +/-3.1"	Guatemalan	Post: 0.670	Typ: 0.127
9	Male	35-39	5'4" +/-3.1"	N/A	N/A	N/A

FORDISC 3.0 was used to compare cranial measurement data from our sample against the modern Forensic Databank sample. In addition, 17 non-metric traits were recorded for the dentition as well as the malar, nasal, and alveolar region following by Gill and Rhine (1990).

Biological profiles and statistical results for FORDISC 3.0 (posterior probability and typicality probability) are provided in the table. FORDISC

3.0 classified each individual into one of five groups: Black, Japanese, American Indian, and Guatemalan. However, the low typicality values for individuals 2 and 3 suggest that these crania are highly atypical of the classified groups. The non-metric assessment yielded similar results as the metric assessment, in that it also indicated that these individuals are of Asian, Native American, and/or African ancestry. However, none of the individuals showed non-metric cranial traits consistent with a single ancestral group. This may suggest that at least some of the individuals are of mixed ancestry.

To help reconstruct the maternal genetic ancestry of this population, mitochondrial DNA was also extracted



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from a minimum of two samples from each individual. Haplotypes based on HVS I sequences were analyzed, and where applicable, haplogroups based on restriction fragment length polymorphisms were determined. Ongoing DNA testing will provide an additional line of evidence for evaluating the ancestry of these individuals.

Although the metric and nonmetric assessment of ancestry suggests a biologically diverse sample, none of the individuals were classified as European ancestry. In conjunction with the grave items and other contextual information, our analysis suggests that these individuals may have been buried in a segregated location due to their biological (non-European) heritage. This study shows that osteological assessment of ancestry is just one key piece of the puzzle. When used in conjunction with other forms of evidence such as ancient DNA, and archaeological evidence, a more complete picture of biological heritage is achieved.

### **Ancestry, Craniometrics, DNA**