## H92 Foramen Magnum Shape as a Potential Indicator of Ancestry

*Stephanie M. Crider, BA*, Louisiana State University, Department of Geography and Anthropology, 227 Howe-Russell, Baton Rouge, LA 70803; and Mary H. Manhein, MA, Louisiana State University, Department of Geography & Anthropology, Baton Rouge, LA 70803*

After attending this presentation, attendees will be familiar with the variation present in the shape of the foramen magnum and its potential as an indicator of ancestry.

This presentation will impact the forensic science community by highlighting the advantages and disadvantages of using foramen magnum shape as an ancestry indicator when crania are fragmentary.

Accurate assessment of ancestry is essential in forensic anthropology to lead to a positive identification of unknown remains. The cranium has been used for numerous studies and many researchers believe it to be an excellent indicator of ancestry based on metric and non-metric characteristics (Rhine 1990).[3] The cranial base also has been studied on several different occasions (Holland 1986a, Holland 1989)[1,2] to determine ancestral similarities and dissimilarities and is the focus of this presentation.

A total of 462 intact cranial bases for persons of known ancestry were measured and visually assessed during a blind study. The database included crania from four different collections: Louisiana State University's Forensic Anthropology and Computer Enhancement Services (FACES) Laboratory, Pima County Office of the Medical Examiner, University of New Mexico's Maxwell Museum of Osteology Laboratory, and University of Tennessee at Knoxville's William M. Bass Donated Skeletal Collection. The crania in the sample set represent the major ancestral groups typically seen in forensic cases (white, black, Hispanic/Southwest Hispanic, Native American and Asian). First, twelve measurements were taken on each cranial base; then, the foramen magnums were assessed visually and were placed into different categories based on their respective shapes. The twelve measurements that were taken from each cranial base are: maximum length of the right occipital condyle, maximum width of the right occipital condyle, minimum width of the right occipital condyle, maximum distance between occipital condyles, minimum distance between occipital condyles, maximum interior distance between occipital condyles, maximum length of the left occipital condyle, maximum width of the left occipital condyle, minimum width of the left occipital condyle, maximum length of the foramen magnum, maximum width of the foramen magnum, and maximum length of the basilar process (based in part on Holland 1986).[1] The different shape categories that every foramen magnum was placed into are Arrowhead, Egg, Circle, Oval, and Diamond.

Statistical results suggest some association between foramen magnum shape and ancestry. Of 334 skulls of known white ancestry, almost half (46.4%, N=155) possessed an arrowhead-shaped foramen magnum. Of 70 skulls of known black ancestry, 40% (N=28) also had an arrowhead-shaped foramen magnum. The other four shapes were somewhat evenly distributed throughout both groups. Of the 55 Hispanic/Southwest Hispanic crania studied, none possessed the egg- shaped foramen magnum. This suggests that the presence of an egg- shaped foramen magnum has the potential as an eliminator for Hispanic/Southwest Hispanic ancestry. Both American Indian and Asian ancestries could not be categorized sufficiently due to the low number of each ancestry (three crania total) available for study. Results are also presented regarding measurements of the cranial base.

Finally, in an effort to test the practicality of such a technique, one of the purposes of this research is to determine the amount of subjectivity and accuracy for this new method of non-metric ancestry determination. Conference participants are asked to fill out a short survey based on the example images on the poster and the different foramen magnum shapes on the survey to determine whether or not this method is user friendly or if it is too subjective for regular use. Results of the survey will be presented.

**References:**

1 Holland, T.D. "Race Determination of Fragmentary Crania by Analysis of the Cranial Base." *Journal of Forensic Sciences*. Vol 31, No 2. (1986): 719-725.

2 Holland, T. D. "Use of the Cranial Base in the Identification of Fire Victims." *Journal of Forensic Sciences*. Vol 34, No 2. (1989): 458-460.

3 Rhine, Stanley. "Non-Metric Skull Racing." *Skeletal Attribution of Race: Methods for Forensic Anthropology.* Albuquerque: Maxwell Museum of Anthropology Press, 1990.

**Ancestry, Foramen Magnum, Biological Profile**

 ** Presenting Author*