H104 Morphological Variations of the Cervical Spine as Racial Indicators: A Validation and Observer Error Study Using the Terry Collection

Joan E. Baker, PhD, Joint POW/MIA Accounting Command Central Identification, 310 Worchester Avenue, Building 45, Hickam AFB, HI 96853; and Paul S. Sledzik, MS, National Transportation Safety Board, Office of Transportation Disaster Assistance, 490 L'Enfant Plaza, SW, Washington, DC 20594*

After attending this presentation, attendees will learn to recognize the degree of bifidity in the cervical vertebrae and its relative utility as a racial indicator in building a biological profile.

This presentation will impact the forensic community by providing a validation study of a previously developed but infrequently used tool in forensic racial classification.

Constructing a biological profile from skeletal remains relies upon metric and morphological examinations. The frequency of certain morphological features may help forensic anthropologists assess sex and ancestry. Many of the methods used to assess ancestry are based on observations and measurements of the skull. When such remains are lacking, forensic anthropologists must look to measurements and observations of the postcranial skeleton.

This study undertook the validation of a method developed by Duray, Morter, and Smith (1999) in which the spinous processes of the second through seventh cervical vertebrae (C2 through C7) were assessed for one of three classifications of bifidity: bifid, partially bifid, and nonbifid. Their study relied upon the Hammann-Todd skeletal collection. Their results indicate that C2 and C7 showed, respectively, 91% bifid and 98% nonbifid spinous processes for both ancestry groups (black and white), so the utility of other cervical vertebrae were examined. C3 and C4 were shown to be the most useful in determining race, with 76% of the study subsample being correctly classified (80% for white and 72% for black).

For the current study, a sample of 591 randomly selected skeletons from the Terry Collection was analyzed for the degree of bifidity using the system developed by Duray et al. In a blind analysis the authors scored C2 through C7 for degree of bifidity as indicated above. Results indicated that C2 and C7 showed, respectively, 87% bifid and 88% nonbifid spinous processes for the combined (black and white) groups. Highly significant differences ($p = < 0.01$) were found between the ancestry groups at C3 through C6, whereas a significant difference ($p = < 0.01$) between males and females was found only at C5. As with the original study, C3 and C4 appear to be the best predictors of race.

To test the repeatability of the method, two untrained observers assisted in assessing a subsample of 28 sets of vertebrae after reading the study by Duray et al. Prior to making their own observations, each untrained observer was also shown a sample of cervical vertebrae from the Terry collection to demonstrate the range of variation. Overall, classification disagreements between untrained and trained observers were noted in approximately 23% of observations. The authors also conducted tests of intraobserver and interobserver error by scoring a subset of 28 sets of vertebrae. Intraobserver error for the trained observers occurred in 8% to 12% of observations. All of the intraobserver errors involved discrepancies in the degree of bifidity (partial versus bifid or partial versus nonbifid) rather than strictly presence/absence (bifid versus nonbifid). Interobserver error occurred in 11% of observations and included several instances of disagreement in presence/absence.

In sum, bifidity in the cervical spine appears to be a useful method for racial assessment of the postcranial skeleton.

Race, Vertebrae, Ancestry

 ** Presenting Author*