F41   A Field Guide to the Anthropology of the Skull for Forensic Investigators

Paula C. Brumit, DDS, Bruce A. Schrader, DDS*, and David R. Senn, DDS, Center for Education and Research in Forensics, 7703 Floyd Curl Drive, Mail Code 7919, San Antonio, TX 78229; and Adam J. Freeman, DDS*, Westport Dental Associates, 22 Imperial Avenue, Wesport, CT 06880

After attending this presentation, attendees will understand a "user friendly" field-guide for anthropologic analysis of the skull is a valuable tool for the forensic investigation especially when no forensic anthropologist is available for the investigation. The use of the guide is intended to enhance the working relationship between disciplines and to give other forensic investigators a greater appreciation for the role that forensic anthropology plays in the identification process.

Objective: 1) To review and photograph specimens in the Robert J. Terry Collection and selected skulls from other collections located in the Museum of Natural History at the Smithsonian Institution. These skulls were examined for information relative to morphological variations of the skulls that give clues to their age, ancestry, and sex. 2) To place those criteria most commonly cited in the literature in a field guide to aid forensic investigators in determining age, race, and sex in identification cases. 3) This field-guide is a follow-up of the study presented by Brumit, Senn, and Alder in 2001.

Method: Selected skulls were examined and digitally photographed. The Terry Collection consists of 1728 specimens of known age, sex, ethnic origin, and cause of death. These specimens were collected between 1915 and 1967 by Dr.Robert J. Terry and Dr.Mildred Trotter of Washington University Medical School, St. Louis, MO. The study was augmented with skulls from other Smithsonian collections as the Terry Collection contained few Mongoloid specimens.

The field-guide is a distillation of "non-metric" methods of evaluation of the skull. These methods are preferred to a "metric" analysis because they do not require delicate or expensive laboratory equipment and can be accomplished rapidly while assessing many different features. The guide contains key elements for determining age, race and sex in the identification process. All of these anatomical landmarks are found in existing published anthropology works. Determining the biological profile of a decedent is one of the tasks of the forensic team. Correctly assessing the skeleton in the areas of race, sex and age will increase the probability of a positive identification. A "user friendly" field-guide for anthropologic analysis of the skull in these categories is a valuable tool for the forensic investigation especially when no forensic anthropologist is available to the investigation. The use of the guide is intended to enhance the working relationship between disciplines and to give other forensic investigators a greater appreciation for the role that Forensic Anthropology plays in the identification process.

Race: The anthropology sources indicate that there is a significant difference between the skulls of: 1) European (Caucasoid), 2) Asian, Hispanic, Native American (Mongoloid), and 3) African/African American (Negroid) groups. The morphology of one or two skeletal landmarks is not enough to make these determinations. Although morphological and/or size differences exist between the racial groups in certain anatomical markers, the patterns of these characteristics do not significantly differ between the sexes or between individuals of certain ages.

Age: In early development of the skeleton, when most growth is taking place, it is relatively easy to estimate age by dental development. Once the second permanent molars are fully formed development of the third molars or wisdom teeth may be used to estimate age. Current methods of estimating age by third molar development are complicated by the use of linear rather than sigmoid progression in statistical analysis. This limitation is especially significant during the early teen years and less so around the important legal age of 18. After about age 18, the skull is less helpful and age estimation is most accurately reflected by features seen in the post-cranial skeleton. When growth is complete, estimating age is more difficult due to the variable and subtle changes that take place in the adult skeleton.

Sex: Various studies have attempted to differentiate between male and female based upon size differences, males being larger than females. The idea that the cortical bone in the skeletal morphology of males is thicker and individual bones heavier and much larger is commonly held. Also areas where muscle attaches to bone are more pronounced in males. Areas such as the mastoid process, the angle of the mandible, inferior angle of the zygomatic arch and the temporal lines tend to be better defined in males. By comparison, females tend to have higher and more rounded orbits with thinner zygomatic arches and supraorbital areas. The female is also expected to have more vertically aligned frontal bones.

It is important to remember that more than one anatomical characteristic is required to support an accurate estimation or determination of age, sex, or race. Forensic scientists must use all available features and techniques before reaching a conclusion. Identification accuracy is enhanced by the use of multiple analysis techniques.

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