

FORENSIC ANTHROPOLOGY – IDENTIFYING INDIVIDUALS

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Abstract

Forensic anthropology involves identification of individuals. As such, both physical anthropology and forensics can be considered specialties of medical law. Forensic anthropology focuses on the study of human osteology to make positive identifications, whereas physical anthropology focuses on primate evolution, human genetics, and biological variation. We focus on the study of our species. One difference between physical anthropology and forensic anthropology is the age of human remains. Physical anthropology is concerned with all ages, while forensic anthropology focuses on human remains under the age of 50. A second difference between physical anthropology and forensic anthropology is that while forensic anthropology analyzes human remains, it achieves the specific goal of identifying the deceased based on their biological characteristics and, if possible, to achieve unexplainable circumstances to determine death. Forensic anthropology focuses on differences in the human skeleton to determine specific physical characteristics such as age, sex, height, weight, health status, abnormalities, and ethnic background.

One of the main interpretations by the forensic anthropologist is the manner of death, or the manner in which a person died. There are five recognized manners of death: homicide, suicide, accident, natural, and unknown. It is the forensic anthropologist's job to avoid as much as possible an unknown cause of death, unless there is insufficient evidence to prove one of the other four manners of death.

INTRODUCTION

Forensic anthropology is the application of physical anthropology to legal cases, usually with a focus on the human skeleton. Forensic anthropology is used to analyse skeletal, badly decomposed, or otherwise unidentified human remains to help in the solving of crimes. Using forensic anthropology, forensic anthropologists can find out the age, sex, and unique features of an individual and are also helpful in documenting trauma to the body and estimating how long a corpse has been decomposing.

Forensic anthropologists may work with corpses in a variety of conditions, including mummies, piles of bones, decomposing corpses, charred corpses, and victims of plane crashes and natural disasters. Investigations often begins with ground search teams using cadaver dogs and low-flying aircraft to locate missing corpses and skeletons. Because careful examination of each death scene is essential and forensic anthropologists are often involved in the early stages of examining human skeletons. After mapping, photographing, and labelling the relevant items at the crime scene, the skeletal evidence is examined in the forensic lab.

In forensic anthropology, the same method should be applied to modern unidentified human remains. Forensic anthropologists can assist law enforcement in profiling unidentified remains through established methods. Profiles include gender, age, race, height, time since death, and possibly a rating of bone trauma.

In the practice of forensic anthropology, identification is based on a certain level of certainty identity:

- Impossible (absolute contradiction between ante-mortem and post-mortem evidence ruled out identity)
- Distinct (when only general common similarities are noted, i.e., no firm conclusions can be drawn, and when a match seems likely, but there are unique characteristics that set the person apart).
- Possible (unless there is a major nonconformity that excludes the individual from consideration and qualifies the individual for more rigorous and specialized examination).
- Positive identification (can only be voiced when there is no contradiction or doubt, and can only be achieved when unique factors of individualization are present).

In the practice of forensic anthropology, identification occurs in two steps. First, the characteristics of the group (gender, age, height and build, ancestry) are determined, which in themselves serve as clues to legal authorities and can limit the group of people they seek. The second step is the identification of individual characteristics.

BODY

Forensic anthropology is a field of forensics that utilizes the science of anthropology to examine human skeletons for legal and criminal cases. It deals with analyzation of human skeletal remains not older than 50 years. Forensic

anthropology focuses on differences in the human skeleton to determine specific physical traits, such as age, sex, height, weight, health, anomalies, and ethnic background.

These differences became particularly apparent in 1972 when the American Academy of Forensic Sciences (AAFS) established the Physical Anthropology Section. Membership in this section includes only forensic applications of anthropology, not all of anthropology in general. Fourteen members became known as forensic anthropologists in 1972. This led to the establishment of the Board of Forensic Anthropology (ABFA) (www.theabfa.org/index.html) in 1977 with the support of the AAFS and the Forensic Foundation. For the past 100 years, physical anthropologists have contributed to forensic investigation. Many physical anthropologists, especially from the Smithsonian Institute, acted as advisors to medico-legal officials through published articles and law enforcement bulletins during the 1930s and 1940s. In the 1960s, Lawrence Angel joined the staff of the Smithsonian and continued working as a consultant for the FBI, including initiating a training program in the forensic applications of skeletal biology.

There are five main objectives in forensic anthropology:

- (1) Determine ancestry, sex, age, and living height
- (2) attempt to identify the nature and causative agent if evidence of traumatic injury to human bone exists
- (3) render a determination of postmortem interval
- (4) assist in locating and recovering remains so that all evidence relevant to a forensic investigation is recovered
- (5) provide information useful in obtaining a positive identification of deceased persons (Byers, 2002, p. 1).

Forensic anthropology is necessary to recover the names and identities of unknown human remains from murders, catastrophes, or other human remains found. Forensic anthropologists assist in bone identification and body recovery. In addition to identifying bones, forensic anthropologists analyze bone trauma to gain necessary insight into the causes and methods of death. Nafté (2000) argued that identifying remains can actually avoid the time and expense of extensive legal investigations. In addition to processing and analyzing human remains in the laboratory, forensic anthropologists assist in locating and recovering bodies and interpret pre-, pre-, post-, and post-mortem (before, during, or after) movement or alteration of remains.

Forensic anthropology can be divided into three time periods, according to Rhine (1998): formative (early 1800s–1938), consolidation (1939–1971), and modern (1972 onward). Prior to the 1970s, those physical anthropologists working particularly with the medico-legal and forensic aspects of anthropology had no official name. The father of American forensic anthropology is Thomas Dwight, a Harvard anatomy professor in the late 19th century who published *The Identification of the Human Skeleton, a Medicolegal Study* in 1878. In his book, Dwight discussed how an examination of human bones could lead to the determination of gender and stature of the remains.

During the formative period (early 1800s–1938), one of the first known cases occurred. In 1849, Dr. Jeffries Wyman of Harvard University identified human remains in order to help solve the death of a prominent Boston-area doctor, George Parkman. In this case, Dr. John White Webster, a colleague of Dr. Wyman, was accused of the murder based on evidence that on November 23, 1849, Parkman went to claim money owed to him by Webster. This date was the last time anyone saw Parkman alive. Less than a week later, a janitor at the Harvard Medical School called the police on discovery of what appeared to be human remains in a stone vault underneath Webster's office. While officers suspected these approximately 150 bones, some of which were burned, and set of false teeth belonged to Parkman, the police left it up to a team of doctors and dentists to prove it in court. On examination, the doctors were able to testify that these remains matched a person of Parkman's age, build, and height. Three hours of deliberation led to a guilty verdict for Webster.

More forensic anthropological activity was recorded during the consolidation period (1939–1971), such as the identification of servicemen killed on the battlefields during World War II and the Korean War. The work of the physical anthropologists called on by the United States Army during World War II for the identification of skeletal remains for repatriation led to the establishment of the Central Identification Laboratory (CIL) at the Hickman Air Force Base in Hawaii in 1947.

The third, or modern period, which began approximately 20 years ago, is when the application of forensic anthropology to the investigation of human rights violations increased dramatically, mostly due to the reinstatement of democratic governments along with higher levels of public awareness and social action. Requests for such action have been from countries such as those in Latin America, Africa, the Middle East, and Eastern Europe. One team in particular demand is the Forensic Anthropology Team of Argentina (EAAF), which has established its own precedent by becoming involved in other missions worldwide; this team is very much in demand due to their expertise, particularly in presenting evidence for war tribunals.

There are five methods to analyze the data from the skeleton: decision table, range chart, index, discriminant function, and regression equation. The last two methods come from statistics.

A decision table helps the researcher judge the importance of conflicting information to arrive at a single conclusion. In a decision table, options are listed across the top of the table, while characteristics for determining these options are listed down the left-hand side. A forensic anthropologist marks the columns where characteristics observed indicate agreement with the option at the top. The name of the column (option) with the most marks is the one most likely to be correct.

A range chart provides multiple ranges of estimates so that a central tendency can be determined. To use a range chart, a forensic anthropologist charts the ranges of features observed. Where the most overlap on the chart occurs is the data range that is most likely to be correct. These are particularly useful for parameters in which multiple sources of data are encountered such as time since death and age at death.

An index is a method to standardize skeletal measures for two dimensions. This method was developed so that numerical expressions of the shape of a structure can be compared between two groups. An index is a simple yet powerful statistical method for quantifying anthroposcopic traits. When two measurements express visually identifiable characteristics, the forensic anthropologist will divide one into the other, multiple the quotient by 100, and arrive at an index.

A discriminant function is a method for calculating a numerical expression of shape that can be used when more than two measurements are available. A forensic anthropologist would use a discriminant function whenever there are discrete categories to determine to assist in distinguishing between two or more predetermined groups. These might consist of gender or hair color.

A regression equation is a method by which one value can be predicted from the values of other measurements.

While regression equations are included in the five methods to analyze data from skeletons, these are often incorrect because they do not account for the increasingly unknown nature of points away from the middle line of a set of values, and they do not consider that other samples might yield other values

Data is gathered using four techniques: anthroposcopic, osteometric, chemical, and histological. Anthroposcopic data is gathered visually, including through the use of X-rays, and involves such characteristics as ancestry, sex, age, and stature. Osteometric data involves the measurement of human bone on an objective scale using calipers or an osteometric board in an attempt to quantify many of the anthroposcopic characteristics. Chemical data is gathered through the examination of chemical makeup of certain structures of the skeleton, including mitochondrial DNA (mtDNA) and associated matter such as the ground beneath the skeleton. Histological data is gathered through the study of the microstructure of teeth and bone.

Investigation regarding forensic anthropology involves 3 parts: (1) interview; (2) excavation; (3) analysis. There are four major steps involved in the collecting of evidence, specifically location, mapping, excavation and retrieval. Locating the remains is the first step of the process. Next is mapping, which includes drawings, photographs, videos, and other methods of recording the location and the process itself from locating to retrieving to relocating the remains to the forensic anthropologist's laboratory. The excavation includes searching and collecting the bones and other materials considered necessary for the forensic anthropologist's work, while the retrieval includes packing and transporting the materials to the forensic anthropologist's laboratory.

A forensic anthropologist may form 3 types of opinions: (1) speculation; (2) possible; (3) probable. Speculation is based on few or no data and should be given only if specifically asked and never in a written form. A possible opinion is one that is based on a characteristic or event that is possible but is too unlikely to be taken seriously. A probable opinion is one with the highest level of certainty.

Facial reconstruction is a subset of methods used in forensic anthropology. In facial reconstruction, forensic anthropologists reconstruct facial features to aid in identification. This should be considered a last resort and should only be used if a missing person's file search fails to find a potential match. Traditionally, this involves sculpting and casting the original skull, placing spacers to indicate the amount of tissue thickness at various locations on the facial skeleton, and filling the areas between and around these spacers. Computer software is now the preferred method for generating faces from skull images. However, in other cases, artist drawings, repair of destroyed or damaged tissue reapplied to the skull, or photographic/portrait overlays are also used. There are more. B. Prediction of individual unrecognizable features in the skull regardless of the method used.

An adult skeleton has 206 bones, but this number varies from person to person. A person may have extra vertebrae or ribs. In general, adult male skeletons are larger and more robust in appearance than adult female skeletons. A pelvic exam can be used to determine a person's gender. A smaller pelvic inlet and narrower pelvic opening indicates an adult male, while a larger pelvic inlet and wider pelvic opening indicates an adult female. A person's general age can be determined from skull size, suture condition, dental examination, and the length of a particular bone which is present between the axis of the long bone and the end cap.

Positive identification involves scientifically establishing identity through the presence of known unique characteristics. All identification methods requires a known characteristic of an individual that distinguishes them from all others be compared with a similar characteristic of the deceased person. Forensic anthropology focuses on assessing all aspects of human remains in a forensic context with the goal of establishing identity and if possible, cause of death and surrounding circumstances. Forensic Anthropologists regularly work together with forensic pathologists and forensic odontologists. These experts are also consulted to investigate and authenticate historical and even prehistoric remains and sites.

Forensic anthropology can be very helpful in large-scale disasters, military casualties with significant skeletal remains, or mass burials. Because it also involves the analysis of facial images, forensic anthropology can also support investigations of living individuals captured by surveillance cameras, casual witnesses, etc. In the practice of forensic anthropology, identification is based on a certain level of certainty identity:

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It is not uncommon for skeletons and other body parts to arrive to forensic anthropologists in a badly decomposed and fragmented state. In principle, the identification begins by answering the question: Are the bones human? If they are, how many individuals do they represent? Some bones, especially subadults, sometimes resemble human bones, so it may not be an easy task for the forensic anthropologist to identify it. In addition, skeletal remains should be inspected for signs of disease that may have affected growth and confounded morphological diagnoses of sex and age.

CONCLUSION

In 1986, a forensic anthropology database was created at the University of Tennessee, Knoxville, to identify the skeleton's race and ancestry. The Forensic Anthropology Databank contains measurements and observations of thousands of individual skeletons analyzed from forensic cases and museum collections. This vast amount of data will help forensic anthropologists uncover previously unrecognized subtleties. This database forms the basis of FORDISC, a computer tool that analyzes these subtleties to confirm or challenge anthropologists' findings. FORDISC allows users to enter measurements from their current case to help estimate gender, ancestry and height.

Forensic anthropologists are increasingly called upon to help identify victims of murders, catastrophes, and political atrocities (Camenson, 2001). As the methods used to identify human remains become more accurate and sophisticated, older cases are reopened for further analysis by forensic anthropologists, helping to resolve outstanding cases.

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