

Forensic Anthropology In Perspective: The Current Trend

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Abstract

Knowledge and expertise in forensic anthropology could be better exhaustively explored and well dispensed both to the gurus and novice in the field. The proper and adequate applications of this anthropologic discipline to humanities both in the living and dead, and in the factual or criminal studies, are here highlighted from compiled literatures and relevant data in the field, with the view to update and disseminate the current trends.

INTRODUCTION

Anthropology from Greek, anthropos, meaning 'human being'; and logos, meaning 'speech' or 'talk about' can thus be described as the study of humanity. Anthropology in the contemporary has origins in the natural sciences, the humanities, and the social sciences. The anthropologist Eric Wolf once characterized anthropology as "the most scientific of the humanities, and the most humanistic of the social sciences." It is basically the study of humans and it manifests in several sub-fields as: cultural and linguistic anthropology – the study of the aspects of human society and language, past and present; archaeology – the study of past cultures via material remains and artifacts; and physical or biological anthropology – the study of the primate order, past and present, such as primate biology, skeletal biology, and human adaptation¹⁻⁴.

Understanding how anthropology developed, contributes to understanding how it fits into other academic disciplines. Other disciplines in physical anthropology: genetics, human growth and development, primatology (study of primates), paleo-anthropology (primate and human evolution), human osteology (study of the skeleton), paleo-demography (vital statistics of past populations), skeletal biology, nutrition, dental anthropology, human adaptation and variation⁵

Forensic anthropology is a sub-discipline within the subfield of physical anthropology. Forensic anthropology is an "applied" area. It borrows methods and techniques developed from skeletal biology and osteology and apply them to cases of forensic importance. Forensic means "legal." Methods and techniques such as anthropometry to assess age, sex, stature, ancestry, and analyze trauma and

disease are generally developed to help anthropologists understand different populations living all over the world at different times throughout history. Anthropometry deals with the quantitative assessment of human/animal physiques⁷. When we take these methods and apply them to unknown modern human remains, with the aim of establishing identity or manner of death, then we are practicing the forensic application of osteology. Forensic anthropology involves the application of these same methods to modern cases of unidentified human remains. Through the established methods, a forensic anthropologist can aid law enforcement in establishing a profile on the unidentified remains. The profile includes sex, age, ethnicity, height, length of time since death, and sometimes the evaluation of trauma seen on bones.

Further definition of the term is necessary to understand the scope and basis of forensic anthropology. Generally speaking forensic anthropology is the examination of human skeletal remains for law enforcement agencies to determine the identity of unidentified bones since bones often survive the process of decay and provide the main evidence for the human form after death. Forensic anthropology is the application of the science of physical anthropology to the legal process. The word forensic comes from the Latin word "forensic," meaning "to the forum." The forum was the basis of Roman law and was a place of public discussion and debate pertinent to the law⁶⁻¹⁰.

CONTEMPORARY IMPACTS OF FORENSIC ANTHROPOLOGY

While there are a few forensic anthropologists who work independently (as part of a medical examiner's office, for the

military, etc.) the overwhelming majority of forensic anthropologists work out of universities. This means being a college professor who teaches physical anthropology most of the time, and works on forensic anthropology cases some of the time ¹⁰. Over the past century physical anthropologists have developed methods to evaluate bones to figure out things about people who lived in the past. These techniques help them to answer questions about the remains they are studying ¹¹.

Forensic anthropologists frequently work in conjunction with forensic pathologists, odontologists, and homicide investigators to identify a decedent, discover evidence of trauma, and determine the postmortem interval. Though they typically lack the legal authority to declare the official cause of death, their opinions may be taken into consideration by the medical examiner. They may also testify in court as expert witness, though data from some of the techniques commonly used in the field—such as forensic facial reconstruction—are inadmissible as forensic evidence ⁶.

A forensic anthropologist may be called in when human remains are found during archaeological excavation, or when badly decomposed, burned, or skeletonized remains are found by law enforcement or members of the public. The identification of skeletal, badly decomposed, or otherwise unidentified human remains is important for both legal and humanitarian reasons. The anthropologist can assess metric and non-metric characteristics of the bones to determine the minimum number of individuals, sex, stature, age at death, time since death, ancestry and race, health, and unique identifying characteristics such as healed breaks or surgical scars. Sometimes the forensic anthropologist must determine whether the remains found are actually human. Occasionally, positive identification can be established from such remains, but often only an exclusionary identity can be drawn. However, the primary responsibility of a forensic anthropologist is to provide law enforcement with a biological profile of the deceased (age, sex, ancestry, stature, and individualizing characteristics) to help narrow down the possible identity of the decedent ¹¹.

In skeletal trauma analysis, some forensic anthropologists can accurately determine whether sharp force, blunt force, or ballistic injury occurred before death (antemortem), near the time of death (perimortem), or after death (postmortem). By examining the marks left on bone, particularly skilled forensic anthropologists may be able to determine general class characteristics of the weapon used. A forensic

anthropologist's analysis of skeletal trauma can assist the Medical Examiner in determining cause and manner of death (natural, accidental, homicide, suicide). Even cremated remains can provide a surprising amount of information about the deceased individual ¹¹.

One vital tool in the assessment of metric skeletal characteristics is the Fordisc program, which allows the forensic anthropologist to match specific characteristics to a racial or ethnic profile. The identification of skeletal, badly decomposed, or otherwise unidentified human remains is important for both legal and humanitarian reasons. Forensic anthropologists apply standard scientific techniques developed in physical anthropology to identify human remains, and to assist in the detection of crime. In addition to assisting in locating and recovering suspicious remains, forensic anthropologists work to suggest the age, sex, ancestry, stature, and unique features of a decedent from the skeleton ¹². In recent years, just as the investigation of a crime scene has become more complex and sophisticated, so has the task of the forensic anthropologist. Forensic anthropologists assist medical and legal specialists to identify known or suspected human remains ¹³.

The science of forensic anthropology includes archeological excavation; examination of hair, insects, plant materials and footprints; determination of elapsed time since death; facial reproduction; photographic superimposition; detection of anatomical variants; and analysis of past injury and medical treatment. However, in practice, forensic anthropologists primarily help to identify a decedent based on evidence available ⁸.

A forensic anthropologist makes significant contributions to an investigation. The greatest of these could well be the anthropologist's intensive training and experience. Most anthropologists have advanced degrees in anthropology and have examined hundreds of remains. They are also thoroughly familiar with human anatomy and how it varies in different populations. Some anthropologists may also have experience in police science or medicine, as well as in serology, toxicology, firearms and tool marks identification, crime scene investigation, handling of evidence, and photography. Such information can be obtained from complete bodies or those partially destroyed by burning, air crashes, intentional mutilation and dismemberment, explosions, or other mass disasters. In fact, a forensic anthropologist is now an integral member of most mass disaster teams. A limited number of anthropologists deal

with footprint analysis and species identification of carrion insects in relation to estimating time elapsed since death ¹⁴

Perhaps the anthropologist's most valuable skill is familiarity with subtle variations in the human skeleton. Although most adult skeletons have the same number of bones (206), no two skeletons are identical. Therefore, observations of patterns or unique skeletal traits frequently lead to positive identifications. The most frequently used method for identification is to compare before- and after-death dental photoimages. If such photoimages do not exist, or if they are unavailable, then old skeletal injuries or anatomical skeletal variants revealed in other photoimages may provide the comparative evidence necessary to establish a positive identification ⁸. Although the primary task of anthropologists is to establish the identity of a decedent, increasingly they provide expert opinion on the type and size of weapon(s) used and the number of blows sustained by victims of violent crime. It should be noted, however, that forensic pathologists or related experts in forensic medicine determine the cause or manner of death, not the forensic anthropologist ¹⁵

The old saying that “Dead men do tell tales” was borne out in a remarkable French murder case in which a skeleton gave up sufficient of its secrets to identify the victim and trap a pair of murderers. In 1889 police were called to a riverside location near Lyons where the badly decomposed body of a man had been discovered. Close by was a decayed wooden trunk bearing evidence that it had been sent to Lyons from Paris by railway. Monsieur Goron, Chief of the Surete, thought the corpse might be that of a Paris bailiff, a man called Gouffe, who had been reported missing. One of Gouffe's relatives was asked to view the remains, but as he was unable to make any identification the corpse was buried. Convinced that a crime had been committed, Boron obtained an exhumation order and three months after it was discovered the corpse was disinterred. The post-mortem examination was carried out by Alexandre Lacassagne, Professor of Forensic Medicine at Lyons University who confirmed it was Gouffe ⁸.

For example, when a skeleton found in a forest is brought to a morgue for examination, the first step is to determine whether the remains are human, animal, or inorganic material. If human, an anthropologist then attempts to estimate age at death, racial affiliation, sex, and stature of the decedent ¹⁴. Except for the skull, few persons are able to distinguish between human and animal bones with certainty.

This is a matter for the expert anatomist, and where the remains are fragmentary he may require confirmation of human origin by applying the precipitin test. Once they have been verified as human, the bones of an unidentified skeleton are examined to establish the primary characteristics of the dead person - sex, age and height ¹⁶.

When skeletalized remains are discovered, one needs to establish first if the bones are human. If so, the sex, race, age, stature, weight, and any pathology of the newly acquired skeleton must be established in order to make an identification of the remains, determine manner and cause of death and, if homicide, identify the murderer. It is the job of the Forensic Anthropologist to pursue these matters, make a report and possibly testify in court ¹¹.

IDENTIFICATION OF DECEDENTS
RACIAL AFFILIATION

The question of racial affiliation is difficult to answer because, although racial classification has some biological components, it is based primarily on social affiliation. Nevertheless, some anatomical details, especially in the face, often suggest the individual's race. In particular, white individuals have narrower faces with high noses and prominent chins. Black individuals have wider nasal openings and subnasal grooves. American Indians and Asians have forward-projecting cheekbones and specialized dental features. One vital tool in the assessment of metric skeletal characteristics is the Fordisc program, which allows the forensic anthropologist to match specific characteristics to a racial or ethnic profile (Wikipedia, 2008) or compared with such figures in the following tables using Discriminant Function Analysis (DFA) to determine the race ^{6,14,16,17}:

Figure 1
The comparative craniometric values (mm) of the skull in some world races

Authors	Year	Race	CL	CB	NH	NB	OH	OB	FH	CI	OI	NI	FI
Turners	1900	White	173.0	126.1	-	-	-	-	-	72.9	86.3	-	-
Tildesky	1920	White	175.5	132.3	-	-	-	-	-	78.5	-	49.7	-
Morant													
&Woo	1912	White	178.6	128.5	-	-	-	-	-	72.0	-	52.2	-
Singh et al	1973	Indians	176.2	127.5	48.6	24.7	32.8	32.7	63.6	72.0	86.6	52.2	51.9
Adebisi	2003	Nigerians											
		Male	208.0	152.0	58.8	47.3	42.0	39.3	128.0	76.7	93.7	72.0	97.0
		Female	202.0	151.0	46.5	34.2	34.7	37.0	118.0	73.8	69.3	70.3	87.7

Figure 2

Table 2. The mean comparative diameter (mm) of femoral head in some races

Author	Year	Race	Male	Female
Holby	1918	Caucasians	48.80	41.75
Lafgren	1956	Whites (Finns)	48.00	44.00
Thieme	1957	American Negroes	47.17	41.52
Khan	1959	Indians	48.00	41.00
Singh et al	1971	Indians	44.20	39.80
Singh et al	1983	Nigerians	52.02	46.80

Sex: In general the skeleton provides ample evidence of its sex and age: the bones of the female, for example, are less robust than those of the male and the ridges which provide attachments for muscles and tendons are less prominent in the female. The pelvis, thigh-bones and skull are particularly noted for their sexual characteristics. The female pelvis, constructed to meet the needs of child-bearing, has several features – notably wider hips – which distinguish it from the male. Apart from general appearance, a number of measurements can be made of pelvic bones which help to establish sex. The difference in ratio between the lengths of the pubis and ischium (known as the ischium-pubis index) is commonly used for this purpose. The skulls also have a number of important features which help to determine the age and sex of a skeleton^{8,10}:

Figure 3

Bone Parameters	Male	Female
General size	Large	Small
Architecture	Rugged	Smooth
Supraorbital margin	Rounded	Sharp
Mastoid process	Large	Small
Occipital bone	Muscle lines and protuberance marked	Muscle lines not marked
Glabella	Bony	Flat
Gonial Angle	Squared	Wide angle
Palate	Larger, broader, tends to be U-shaped	Small, tends to be a parabola
Occipital condyles	Large	Small

Age: Age is determined by studying a number of skeletal features, principally the skull, teeth and centres of ossification. As the young human body develops from soon after conception until early adulthood, the growth of the bones is regulated by centres of ossification which gradually

fill out and fuse together to give the bones shape and size. This process is established in a regular pattern which enables the skilled anatomist to give a reliable estimate of age to within one or two years. Examination of the growing ends of the bones epiphyses is especially relevant²¹.

The teeth also become important later in the identification of a specific individual, particularly the age^{10,21}.

Figure 4

Tooth Eruption

Deciduous dentition		Permanent dentition	
Tooth	Age at Eruption	Tooth	Age at Eruption
i ¹	7.5 mo.	I ¹	7-8 yr.
i ²	9 mo.	I ²	8-9 yr.
c ¹	18 mo.	C ¹	11-12 yr.
m ¹	14 mo.	P ¹	10-11 yr.
m ²	24 mo.	P ²	10-12 yr.
i ₁	6 mo.	M ¹	6-7 yr.
i ₂	7 mo.	M ²	12-13 yr.
c ₁	16 mo.	M ³	17-21 yr.
m ₁	12 mo.	I ₁	6-7 yr.
m ₂	20 mo.	I ₂	7-8 yr.
		C ₁	9-10 yr.
		P ₁	10-12 yr.
		P ₂	11-12 yr.
		M ₁	6-7 yr.
		M ₂	11-13 yr.
		M ₃	17-21 yr.

STATURE

Using the Regression Formula for Estimating Maximum Living Stature (with standard errors) (Steele et al), obtained from the average of the Maximum Long Bone Length of both right and left humeri, ulnae and radii, femurs, tibiae and fibulae, an estimate of the decedent height could be assessed, and hence, the weight¹⁰.

ESTIMATING TIME OF DEATH

The first question to be asked and probably the most difficult to answer is “how long has it been dead?” Bones do not decay as skin and soft tissue do, but they are subject to weathering and scatter (taphonomy). Animal scattering of bones can destroy the context of the crime scene and gnaw marks destroy actual bone. If a body is buried, insects cannot get at it, but micro-organisms can. The acidity of soil will have an effect on bone¹⁴.

Pinpointing time of death is critical evidence for crime scene investigators. Methods vary depending on whether the remains are prehistoric, historic, or recent. For recent remains, techniques vary based on the condition of the remains: fresh, decomposed, mummified, or skeletalized. Procedures include analysis using chemical tests,

entomology, and investigation of context / associated artifacts. Temperance Brennan LP (2008) Anthropology: In Forensic anthropology¹⁴.

MANNER AND CAUSE OF DEATH

Manner of death refers to the 5 possibilities: homicide, suicide, accidental, natural and unknown. Cause of death refers to injury or disease, or combination that results in death and could take months/years. Determining the cause of death is easier with a fleshed body and very difficult with the flesh and organs gone¹².

CONCLUSION

Forensic anthropology is now a no mean approach, which help to apply the knowledge from the pool of information made available in physical anthropology²², in the recovery of issues on human features which otherwise would had hitherto remain untapped in history or could not had been unraveled in criminal investigations.

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