

# **Internship Report: The Forensic Anthropology Center at Texas State (FACTS)**

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## **ABSTRACT**

During the fall of 2013, I participated in an internship with the Forensic Anthropology Center at Texas State. This report will describe what the Forensic Anthropology Center at Texas State (FACTS) is, discuss my activities there, and explore how training in forensic anthropology currently is and continues to be increasingly important to the criminal justice system and academic world.

## **INTRODUCTION**

FACTS is a multidimensional forensic anthropological research, teaching, and outreach center within the Department of Anthropology at Texas State University. FACTS is composed of three components, including two labs and an outdoor decomposition facility. The original lab, the Grady Early Forensic Anthropology Research Laboratory (GEFARL), opened in 2008. The second lab, the Osteological Research and Processing Laboratory (ORPL), opened in October of 2011, and is located on the grounds of Freeman Ranch, just 8.87 miles northwest of San Marcos, off of County Road 213. In addition to OPRL, the outdoor Forensic Anthropology Research Facility (FARF) is also located at Freeman Ranch.

The mission of FACTS is to advance forensic science and anthropology through world-class education, research, and outreach. FACTS strives to be a premier nationally and internationally recognized academic training and research facility for forensic anthropology, providing a unique environment that stimulates innovative, creative, and interdisciplinary research that advances forensic anthropology knowledge, theory, and methods.

<http://www.txstate.edu/anthropology/facts/aboutus/mission.html>

What makes FACTS so unique is that it is one of the few research and teaching facilities in the world with a willed body donation program that focuses on developing a diverse osteological collection and postmortem intervals. Unlike other research facilities, such as the ones at Western Carolina University and Sam Houston State University, FACTS aims to better understand the postmortem interval to aid law enforcement. Additionally, it functions as a tool for the local law enforcement to aid in the identification of unknown skeletal remains.

FACTS conducts research on human decomposition to determine the postmortem interval, which includes a wide range of various research designs. A majority of the individuals who willingly donate their body to FACTS are placed at FARF on Freeman Ranch and left to the elements to decompose. A majority of the donations are placed under large tarps and metal cages covered in chicken wire to deter any scavenging animals, especially raccoon and vultures, from disturbing the bodies' rate of decomposition. There are, however, some donations that are left uncovered to study any vulture activity and scattering of skeletal elements. Equipment for aquatic decomposition is also available for study. Many donations are also buried for research and training purposes for law enforcement.

An additional research aspect of FACTS is to develop a diverse osteological collection, to aid in the development of the biological<sup>1</sup>.

FACTS not only conducts research on human decomposition to determine the postmortem interval, but also develops a diverse osteological collection. This is done only after each donation has decomposed and fully processed – a process I will describe later. Once a donation or body has been fully processed, it can then be curated, meaning that the donation has been properly inventoried, boxed, stored, and placed into the osteological collection.

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1. <sup>1</sup>The biological profile of an individual consists of four main elements: age, sex, stature and ancestry. To accurately develop a biological profile of an unknown individual from skeletal remains, rigorous research must be conducted on individuals of known age, sex, stature and ancestry.

In addition, FACTS offers several key resources for assisting law enforcement whenever human remains are found. First, when skeletal remains are found, regardless of manner or condition in which they are found, a Forensic Anthropologist is almost always<sup>2</sup> consulted for examination and development of the biological profile. The profile developed is vital for law enforcement in order to narrow down any missing persons to be compared with the remains found. Second, FACTS is equipped with many tools used to extract bone samples to be sent to the University of North Texas' human identification laboratory for the development of a full DNA profile to definitively identify unknown remains. Forensic Anthropologists play a dynamic role in the identification process of unknown individuals due to their unique skills in reading skeletal material and their training in archaeological excavations. Finally, FACTS also serves as an additional resource for law enforcement often assisting in or directing the excavation of possible burial sites in forensic cases or ground searches for a missing person.

While interning at FACTS, I spent a majority of my time at Freeman Ranch, both at FARF and ORPL. While there, I had the opportunity to learn and perform a variety of tasks, including the intake and placement of donations, photo inventories, disarticulations, processing of remains, labeling, and a variety of other miscellaneous tasks. The following sections describe each of these activities in more detail.

## **PROCESSING**

One of the main duties of an intern or undergraduate volunteer is the processing of decomposed and skeletonized human remains for curation. This involves a process of hot water submersion with the addition of detergent to loosen tissues and help clean the bone, a process

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<sup>2</sup> When unknown remains are found a Forensic Anthropologist is almost always consulted. Meaning that typical procedure according to the Texas Code for identification of unknown skeletal remains states that a Forensic Anthropologist be consulted to aid in the identification of an unknown individual. However, these procedures are not always followed.

called 'maceration'. The bones are placed into a large kettle which is then filled with hot water and either 2 oz. of tergezime or 4 oz. of laundry detergent. The tergezime is used when there is a lot of tissue still left on the body or if the tissue on the body has mummified or desiccated. Laundry detergent, which is used most often, is used when there is tissue which is not mummified on the bones or when only small amounts of tissue like cartilage or muscle attachment sites are still present. If the remains have no tissue and/or only dirt on them, they are then treated like archaeological remains, meaning they are only washed with soap and water.

Once the bones have macerated and little to no tissue is left, they are then individually cleaned using dental tools and tooth brushes. Bones can be macerated for one to two hours or up to two to three days, depending on how much tissue was originally left on the bones before they were placed in the kettle. Each bone is cleaned using various dental scrapers and tongs to make sure there is no remaining tissue or cartilage left. Once the bone is clean of any tissue it is then cleaned using a toothbrush and Dawn dish soap. The bone is then washed again this time using only water and a separate toothbrush free of any soap. Once this is done, the bone is then placed on butcher paper and laid out in anatomical position to dry. Once the bones are completely dry, they can then be curated and labeled.

## **LABELING**

After each bone has been completely processed and dried it can then be labeled. However, there are standard operating procedures (SOPs) for the labeling and curation of each bone before it can be placed into the osteological collection. The labeling of each bone is extremely important in order to distinguish each bone from that of other individuals when they are being studied and compared at a later date. Each bone has a distinct and specific place where it is to be labeled, which at times can be tricky depending on which bone is being labeled, especially on the distal phalanges (finger tips/toes) of the hands and feet.

Labels are placed on the non-articular surface (the area where two bones met during the life of the individual); and usually the lateral side of the bone, in order to be consistent. Labels are never placed on an area of specific interest, such as a fractured area, an area where any pathology may be present, or an area that shows a specific representation of one of the four biological profile elements. Additionally, according to SOP stipulations for labeling, labels are never to be placed over age markers including the pubic symphyseal face, auricular surface, suture lines of the skull, sternal rib ends or the acetabulum; or sex markers including the nuchal area, mastoid process, supra-orbital margin, supra-orbital ridge or mental eminence. It is also important to note that the condition of each bone is to be taken into account when deciding where to label.

Before each bone is labeled a thin layer of acryloid, a chemical similar to that of nail polish remover, is placed on the area that had been predetermined according to SOP guidelines. Once the acryloid has dried, which it does very quickly, a fine tipped pen is used to label it. Each label for example is read as D01-2013; D for donation, followed by the ordered number for that particular donation or forensic case and then by the year it came into FACTS possession. After each bone has been properly labeled and the penna labeled has dried for approximately 10 minutes a second layer of acryloid is applied to ensure that the label is not wiped or scraped off in future analysis. Completed labels are left to dry for a few minutes and are then permanently curated at a later time at GEFARL.

## **DISARTICULATION/PHOTO INVENTORY**

Once a body has either mummified or almost completely decomposed at FARF, it is then disarticulated. Before each body is disarticulated, it is photographed and proper personal protective equipment (PPE) is put on. This includes a pair of booties, two sets of gloves, a full apron and depending on the state of the remains, a face mask. Each disarticulation begins with the removal of each hand and foot; because hand and feet bones are so easily lost they are

typically gloved prior to being placed at FARF. Once each hand and foot is removed, carpals and tarsals are counted to ensure that all bones are still present. They are then placed into brown paper bags and labeled as either left or right. Each bone, after that is removed and as much tissue or skin that may still be present, is torn off or removed using shears. Bones are then recorded and placed into a bio-hazard bag which will then be taken to ORPAL to be later processed.

## **OPERATION IDENTIFICATION CASES**

FACTS assisted on approximately ten to fifteen open forensic cases also known as OpID's (Operation Identification) of unidentified remains this past fall semester. On average, twenty to thirty unidentified bodies are brought to the facility. All of which are almost always believed to be of Hispanic descent, ranging in age and sex. In accordance to the title 1 code of criminal procedure, chapter 49 inquests upon dead bodies, subchapter A. duties performed by justices of the peace states that a justice of the peace shall conduct an inquest into the death of a person who dies in the county served by the justice if: the body or a body part of a person is found, the cause or circumstances of death are unknown; the person is unidentified; etc. If an examination has been performed by a justice of the peace, the body is either buried or given to FACTS. OpID bodies are then processed and entered into FACTS' forensic database. The information is then given to forensic anthropologists who try to determine a biological profile for the individual so that a positive identification can be made. On occasion, additional resources will be used when trying to make a positive identification such as DNA analysis which is conducted at the University of North Texas or the assistance of facial reconstructions will be used.

During my last month with FACTS, I had the opportunity to work on a number of OpID's. When an OpID body is given to FACTS it is taken directly to OPRAL and inventoried. This part of the internship was perhaps the most difficult because by the time the remains are at FACTS, they have either mummified or more typically started to decompose. This makes the

removal of the body from the body bag almost impossible to do without disarticulating it and because the body has already started to decompose the smell is extremely strong and pungent.

Before the unidentified remains are placed into the kettle to macerate and be processed, they must be inventoried. When inventorying the remains, anything that may have been found with the body such as clothing or personal effects are photographed and inventoried. It is extremely important that when inventorying, as much detail as possible be used to describe what is found. This gives law enforcement a better idea of what this individual may have been wearing before their untimely death.

### **PLACEMENT OF BODY DONATIONS AT FARF**

When a body has been willingly donated, it is either sent to FACTS or picked up if within a 200 miles radius of the lab. Once the body has either been picked up or sent to FACTS, it is taken directly to ORPAL and processed for intake. This includes taking various measurements, photos, and radiographs, along with extensive documentation of the state of the remains, any tattoos the may be present, any trauma, and anything else that may affect the decomposition process. Samples are also taken of the nails, hair and blood, if available, which are later used for research on stable isotope analysis. The body is then placed into one of the two coolers until it is ready to be taken to FARF where it will be used to study various effects on the rate of decomposition and entomological activities. The body is then taken to FARF and laid face up under either a metal cage, left uncovered, or buried. Once the body has been properly placed, it is then photographed and a stake with the donation number is placed next to the body. While interning at FACTS, I had the opportunity to assist with 3 burials, all of which were later used for law enforcement training purposes.

### **DAILY PHOTO INVENTORY**

Part of the studying of the rate of decomposition involves the daily photographing of each body to document the decomposition process. While at FACTS, I got the opportunity to assist

with this task. A series of photographs, including the face, upper limbs, lower limbs, overall body and stake shots<sup>3</sup>, are taken each day for two weeks; every other day for two weeks; and then once a week for two months.

The proper photographing and documentation of the various stages of decomposition specific to the Central Texas region is vital to our understanding of these processes. Shirley et al (2011:374) found that there are five key stages of decomposition: “*the fresh stage, the discoloration stage, the bloat stage, the initial skeletonization/advanced decomposition stage, and the skeletonized stage.*” Although the body undergoes a regular sequence of decomposition stages after death, a multitude of factors determine the rate at which a body decomposes. Shirley et al (2011) found that temperature and humidity exert the most influence on the rate at which a body moves from the fresh to the skeletonized stage. The higher the temperature and humidity, the greater the rate of decomposition and the faster the body becomes skeletonized. Parks (2011) conducted a study on the sequence of human decomposition in central Texas and found that there was an early onset of mummification when compared to other studies like those of Galloway (1997) and Dawson (1998), who also studied human decomposition rates in the southwestern region of the United States. When comparing the data of the above articles it has been found that in hotter drier climates bodies will mummify more quickly while in areas with a wetter more humid climate, like Tennessee, bodies will decompose and mummify more slowly.

## **ACADEMIC AND CRIMINAL JUSTICE SYSTEM**

FACTS provides academic functions for students, law enforcement, and the field of forensic anthropology. FACTS serves as a resource for the identification of unidentified skeletal remains and as a training facility for law enforcement cadaver dogs. FACTS additionally

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<sup>3</sup> Stake shots, are photographs taken of the wooden stakes that are labeled and placed next to the bodies. The stakes serve as large labels for each donation and an easy means of identification.

indirectly aids law enforcement with the establishment of a known biological profile database used to help establish a biological profile.

Forensic Anthropologists, like Dr. Hamilton, Dr. Wescott, and Dr. Spradley continue to not only make strides within the criminal justice system, but academic as well. Currently, Dr. Spradley is conducting research along the United States and Mexico border to generate new data and methods for estimation of sex and ancestry for individuals considered Hispanic. Spradley (2008) discusses the problems in metric identification of Hispanic skeletons. Explaining that as a group, there is little sexual dimorphism between males and females. The research Dr. Spradley is currently conducting will not only aid future law enforcement in the more accurate identification of individuals considered Hispanic, but will also aid the academic world with new methods for determining the biological profile. Dr. Wescott is currently conducting research on developing and testing forensic anthropological methods for reconstructing biological profiles, trauma patterns, and the post mortem interval. Dr. Wescott's recent 2013 publication, "Biomechanics of bone trauma" examined how the understanding of biomechanics, "*the science of mechanical laws applied to biological tissue*" (Wescott, 2013: 83) allows forensic scientists to determine proximate and ultimate cause of injury. Additionally, Dr. Wescott's research is helping law enforcement when trying to determine manner and cause of death of an individual. Dr. Hamilton currently works with local law enforcement and continues to aid in the identification of missing or unidentified skeletal remains. Additionally, the research being conducted at FACTS by Dr. Hamilton and graduate students continues to play a vital role in both the criminal justice system and academic world. The research being conducted on the various stages of decomposition and effects of various conditions continues to aid law enforcement in estimating time of death.

The research currently being done with the vulture study has aided law enforcement tremendously (Spradley et al. 2012). Prior to the study, little research had been done on how

vulture and savaging animals effected the time since death interval. After the study was initially conducted, it was found that vulture activity could change time since death intervals from hours to days to even months. It was found that within a matter of one day a body could go from being complete to almost completely skeletonized, due to vulture and savaging activity, changing how we estimate the time since death interval.

In addition to research being done on decomposition rates, there has been research done regarding new methods for siding of metacarpals and tarsals. There currently exists very few methods for the siding and identification of metacarpals and metatarsals and for the methods that exist, they are not very accurate or reliable. A recent publication on the siding of the proximal phalanges by Varas and Thompson (2011) has suggested that through the use of metrics and curvature, a positive siding can be made. However, these methods are still somewhat confusing and subjective. The work and training being done at FACTS continues to play a vital role in both the criminal justice system and academic world.

## **CONCLUSION**

While interning at FACTS, I have had the opportunity to gain a wealth of knowledge I would not have gotten had I interned elsewhere. I have had the opportunity to work hands on with the many different stages of human decomposition and curation processes. I was even given the opportunity to work on not one, but various open forensic cases and meet a world renown facial reconstructionist. Since interning with FACTS, I have become extremely proficient in the siding and identification of each bone within the human skeleton. Additionally, I have learned and practiced methods for developing the biological profile. I have since learned and met the standards for labeling and inventorying skeletal remains, as well as, the standards for data entry and cataloging of remains.

Having now completed my internship with FACTS, I plan to continue volunteering at FACTS and learning what more I can at GEFARL. I intend on perfecting my x-raying and

casting skills of skeletal remains. I also plan on assisting with future isotope analysis research during the spring semester. I am currently scheduled to graduate in May and plan to apply for graduate school sometime in the fall. I am extremely grateful for the opportunity to have interned with FACTS and to have met and made connections with the individuals that I have. I take away from this internship a wealth of knowledge and hands on experience I know I would have not otherwise acquired had I interned elsewhere.

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