



***Forensic Anthropology: Stories in Bone***

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This curriculum unit is recommended for:  
Honors Forensic Science or Honors Anatomy and Physiology courses  
10<sup>th</sup> – 12<sup>th</sup> grades

**Keywords:** forensics, anthropology, bones, mass graves, skeleton, mitochondrial DNA, International Criminal Court, forensic anthropology, civics, world history

**Teaching Standards:** See [Appendix 1](#) for teaching standards addressed in this unit.

**Synopsis:**

“Forensic Anthropology: Stories in Bone” is written as a self-contained unit for a high school forensic science course. It could also be adapted for use in an Anatomy and Physiology course. Some material is also appropriate for a Civics or World History course. It covers the formation of bone and the human skeleton. It then examines the characteristics of the skeleton which anthropologists use to identify human remains such as age, gender, race and height. Mitochondrial DNA is studied as a way to identify partial or badly damaged remains. Various case studies are examined from an international perspective. Students learn how to use body measurements and bone features to identify skeletal remains. They then conduct a research project involving a case of genocide and/or crimes against humanity from an anthropological perspective. They prepare arguments for the prosecution or defense of a suspect charged in an international tribunal. The unit culminates with mini-mock trials involving cases from Rwanda, Argentina, Guatemala, the former Yugoslavia and Iraq.

*I plan to teach this unit during the coming year to approximately 200 students in grades 10 through 12 taking Honors Forensic Science.*

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## **Forensic Anthropology: Stories in Bone**

*Jackie Smith*

### **Rationale**

The popularity of fictional characters such as Patricia Cornwell's Kay Scarpetta and Kathy Reichs' Temperance Brennan, as well as television shows such as the CSI franchise and "Bones," has sparked an increased interest in forensic science. In particular the examination of human remains to solve crimes has caught the nation's imagination. This field is known as forensic anthropology. Broadly, forensic anthropology is the study of human skeletal remains as they relate to a medicolegal setting.<sup>1</sup> The goal of forensic anthropology is to locate and identify human remains and determine the cause of death.<sup>2</sup> This curriculum unit focuses on the field of forensic anthropology within the larger context of forensic science.

Students will learn about the relatively short history of forensic anthropology, with the focus on the explosion of its use in human rights investigations since the mid-1980's. Students will study the foundations of anthropology: bone formation and the human skeleton. With this base, students will move on to learn about the goals of a forensic anthropologist such as determining gender, age, race, stature and cause of death from human skeletal remains. Emphasis will be placed on problem-solving until students are proficient at determining basic characteristics of remains. Students will learn how mitochondrial DNA (mtDNA) is used to aid in identification. They will conduct investigations tracing lineage using mtDNA. Students will use their own family trees to trace their maternal lineage back several generations to understand how mtDNA is transferred only by the mother.

At this point, the focus will move to global applications of forensic anthropology. Students will study cases from Argentina, Guatemala, the former Yugoslavia, Rwanda and Iraq to learn about the role forensic anthropologists played in uncovering mind-boggling atrocities and how that evidence was used to bring the perpetrators to justice. They will learn about international courts and how the work of scientists is critical to their function. By analyzing current and past cases, students will learn critical thinking skills as well as how to develop an informed opinion and to defend their positions.

William Amos Hough High School is a large suburban high school of approximately 2,600 students located in the small town of Cornelius, North Carolina. We opened our doors in 2010 to serve the northern part of the Charlotte-Mecklenburg School District. Ninety-five percent of our graduates go on to either two- or four-year colleges. Twenty-nine percent of our students are minorities. We offer a comprehensive college preparatory program in the arts and sciences. Classes are taught at the Standard and Honors levels and

we offer 22 Advanced Placement (AP) courses in conjunction with the College Board. Our science program requires one earth science (Earth and Environmental Science or AP Environmental Science), Biology, and one physical science (chemistry, physics or physical science). Biology, chemistry and physics are also offered at the AP level.

Students are required to take either a fourth-year science or social studies course. We offer Honor Forensic Science to meet that requirement. With the overwhelming popularity of forensics in popular culture, we believe this course will grab students' interest while teaching them valuable lab skills and critical thinking.

## **Background**

### Development of Forensic Anthropology

Forensic anthropology as an independent discipline has not been around very long. Up until the late 1700's, forensic anthropology was in practice mostly just applied anatomy. Jean-Joseph Sue, a Frenchman, published a reference work in 1755 in which he had measured the bones of hundreds of cadavers from fetuses to adults. When an unknown skeleton was found, these measurements were used to attempt a guess at the age of the remains. For nearly half a century, this was the extent of development in this field.

The early 1800's brought the first formal period in forensic anthropology, called the Formative Period. During this time, several Europeans were working in the field of human measurement with the intent of using measurements to identify both living and dead human beings. Matthieu Orfila wrote two textbooks based on measurements of human skeletons that he had taken which became a database for other researchers for years.

Simultaneously in America, two major events took place that led to the explosion of forensic anthropology as a science. In 1849, John Webster, a Harvard professor, killed fellow Harvard professor Dr. George Parkman over a debt owed to Parkman. Webster, in an effort to cover up the killing, dismembered the body and attempted to burn pieces of it in the furnace at his Harvard laboratory. Just a few fragments of bone were recovered from the furnace and physical anthropologist Jefferies Wyman was called in to examine the burned remains. Wyman testified at trial that the bone fragments found in Webster's furnace were consistent with the pieces of skeleton missing from Parkman's recovered remains and Webster was convicted of murder.<sup>3</sup>

In 1896, the second trial that established forensic anthropology's place in the medicolegal world took place in Chicago. Sausage-king Adolph Leutgert was accused of killing his wife and attempting to dispose of her remains by cooking them in a vat in one of his factories and turning them into sausage. Again, only a few pieces of bone were recovered from the vat, but anthropologist George Dorsey testified at trial that those

pieces were consistent with the skeleton of the unfortunate Mrs. Leutgert and Adolph was convicted of murder.<sup>4</sup>

The Consolidation Period of forensic anthropology began with the publication of Wilton Krogman's *Guide to the Identification of Human Skeletal Material* in 1938. This seminal work detailed techniques of skeletal analysis and increased interest in the field.<sup>5</sup> During this time, the need for the ability to accurately identify human remains became painfully obvious with the advent of World War II and the Korean conflict. As a result of the massive number of casualties who needed identification, Dr. Charles Snow established the Central Identification Laboratory in Hawaii. Measurements of thousands of sets of remains were taken and formulas were developed to estimate the height of unknown individuals based on single bones, most accurately the femur. This allowed anthropologists who discovered partial remains to identify more deceased soldiers than ever before.

The Modern Period in forensic anthropology began in 1972. Bill Bass established a facility like no other at the University of Tennessee at Knoxville called the Body Farm in 1980 to study the decomposition of human remains. In 1986, after Bass' work showed that recent skeletons were not conforming to norms established during World War II and Korea— people overall seemed to be getting taller — several scientists developed a computer program to estimate skeletal statistics. Known as Fordisc, the program is capable of evolving as more data is entered into it.<sup>6</sup> Around this time, in response to world events, Dr. Snow also began training other anthropologists to work crimes against humanity and genocide cases.

Currently, the premiere organization for the accreditation of forensic anthropologists is the American Board of Forensic Anthropology. It requires its diplomats to demonstrate a history of education, training and achievement in the field as well as to pass a rigorous examination covering both theory and practice.<sup>7</sup> There have only been 111 people certified as diplomats in the organization's almost 40 year history.<sup>8</sup>

### The Fundamentals: Bone Formation and the Skeleton

The foundation of an anthropologist's work is the study of bone, therefore an understanding of how bone is formed is essential. There are two processes of bone formation in the human skeleton. Long, short and irregular bones<sup>9</sup> are formed by a process called endochondrial ossification.<sup>10</sup> About three weeks after conception, the skeleton in a fetus begins to form and at eight weeks the new skeleton is visible. The skeleton is not made of bone at this point, but of cartilage. Specialized cells called osteoblasts, containing a mix of collagen fibrous proteins and an organic glue,<sup>11</sup> seek out cartilage cells and replace them. Minerals such as calcium phosphate are deposited at the sites of the osteoblasts, which then harden into bone. The mature bone cells are now called osteocytes. This process continues past birth and into late adolescence. In the flat

bones (i.e. skull, ribs), the original structure is not made of cartilage, but “fibrous membranes consisting largely of collagen and blood vessels.”<sup>12</sup> The osteoblasts deposit their mixture in the membrane which hardens into bone. This process is called intermembranous ossification.<sup>13</sup>

The third type of cell involved in bone formation is an osteoclast. This cell functions to break down old or damaged bone cells which can then be replaced with new osteoblasts. The destruction of bone is as necessary to the development of the skeleton as is the formation of new bone. Osteoclasts allow the body to maintain proper bone size and shape. They also aid in maintaining homeostasis in the body as they release necessary minerals into the blood stream as they dissolve bone.

The adult human skeleton contains 206 bones. These bones are categorized into two subsets, the axial skeleton and the appendicular skeleton. The axial skeleton is the body’s core. It consists of 80 bones including the skull, ribs, sternum, vertebrae and hyoid bone. The appendicular skeleton consists of 126 bones contained in the shoulders, pelvis and upper and lower limbs. The bones function in protecting the internal organs as well as providing structural support for the body. An anthropologist needs to know these bones inside and out and be able to identify them even when they are not articulated.<sup>14</sup> The bones of the skull, pelvis and the long bones of the limbs are particularly useful in identifying the age, gender, race and height of a person.

### Focus of Forensic Anthropology

The goal of forensic anthropologists is to provide investigators with a physical description of a person which can be matched with missing persons’ reports. Once a possible match has been made, dental and medical records are used to positively identify the remains.<sup>15</sup> The process begins with several questions that are at the heart of the forensic anthropologist’s inquiry.

First, it is essential to determine whether the remains are human or animal. Some work has been done with testing proteins in bone to determine species. It is still not an exact science. Some bones are very difficult to distinguish. For example, bear paws appear very similar to the human hand.

Next, there may be an issue of how many person’s remains have been recovered. This becomes increasingly important in cases of mass disasters such as airplane crashes, terrorist attacks and natural disasters like tsunamis, where many people have been killed simultaneously, as well as in cases of mass burials. If there hasn’t been much damage to the bones, conducting a simple skeletal inventory can suffice. Anthropologists will literally reconstruct skeletons pieces by piece until all of the bones have been identified as belonging to a particular individual. In the case of mass disasters, bones can be fragmented and difficult to individualize. Generally, the larger fragments are pieced

together first and then the smaller bits are fit together like a jigsaw puzzle until all of the remains have been placed.

Determining the gender of the bones is the next major objective. The most reliable area of the body to use for determining gender is the pelvis. The female pelvis will be wider than its male counterpart to accommodate childbirth. The angle between the ischium, the lower “loopy” bones of the pelvis, is greater than 90° in females. The sacrum and the coccyx are tilted to the posterior of the pelvis in females to make room for childbirth. In males, the sub-pubic angle is less than 90° and the sacrum and coccyx are tilted to the front of the pelvis.

There are also features on the skull that allow for fairly accurate determination of gender. Male skulls tend to be more robust (rough) and female skulls more gracile (smooth). Males have more pronounced brow ridges, a more sloping forehead and a bump on the back of the skull called the occipital protuberance which gives their larger jaw and neck muscles a place to attach.

The age of the person at their death can be estimated using cranial sutures. Sutures are the squiggly lines on the skull where the different skull bones meet. When a baby is born, the different bones of the skull have not fused and the sutures are wide open. As the body ages, the different sutures begin closing at different but set times. It is this information that allows forensic anthropologists to estimate the age of the deceased. For example, the coronal suture runs across the top of the skull from ear to ear. It is where the frontal bone meets the parietal bones of the skull. It closes at age 50. The lamboidal suture, which runs around the back of the skull begins to close at age 21 and is completely closed by age 30. Thus if a skull were found with the lamboidal suture closed and the coronal suture open, the estimated age of the skeleton at death would be 30-50 years.

Another means of estimating age is the use of the long bones of the human body. Bone growth takes place in the shaft of the bone and in the ends, or heads, of the bone. During development, the shaft and heads of the bone are joined by an area of cartilage known as an epiphysis, or cartilaginous plate. These areas of cartilage are replaced by bone as the skeleton ages until the shaft and heads of the bone are completely fused together leaving only a faint line where they used to be. Because these areas close at different times in different bones, they can be used to estimate the age of the remains.

Much of the data on skeletal remains gathered during World War II and the Korean Conflict focused on establishing norms for the heights of different genders and races of people. Forensic anthropology recognizes three races: Caucasoid, Negroid and Mongoloid. Caucasoid is anyone of European descent. Negroid is anyone of African descent. Mongoloid includes people of Asian descent as well as Native Americans and other peoples not of European or African descent. From the study of thousands of bodies, formulas were developed for estimating the height of individuals using various long

bones in the human body along with the race and gender of the bones. The most useful bone in the body for using with these formulas is the femur, but the humerus, ulna, radius, tibia or fibula can also be used. There is a significant margin of error in the formulas since femur length in two person could be identical while overall height could be much different due to one person having a shorter torso. The formulas will at best give a range to help narrow down the possible identity of the remains.

Trained forensic anthropologists can also determine the race of recovered remains. The shape of the eye orbits, the nasal index and the prominence of the upper jaw over the lower jaw, called prognathism, are some of the factors that are examined. Race cannot be determined as accurately as age or gender.

Once the above questions are answered, the forensic anthropologist attempts to take this information and match it to missing persons who fit the profile. If a possible match is found, medical and dental records for the missing person are obtained to compare with the remains in hopes of making a positive identification. A positive identification is one where there is no scientific doubt as to the identity of the deceased.<sup>16</sup> Dental and medical x-rays are compared to look for evidence of healed fractures, dental work or other unique characteristics that would allow the anthropologist, or forensic odontologist,<sup>17</sup> to declare the remains to be the missing person in question.

In situations involving mass disasters, the bone material forensic anthropologists have to work with is usually degraded due to fire or exposure to the elements or there is very little material available. Scientists have developed a method of studying the DNA in the cells' mitochondria to trace ancestry in an effort to identify human remains. Mitochondria are organelles in every somatic cell in the body which provide energy to the rest of the cell. While the most common form of DNA is nuclear DNA which is found in the nucleus of the cell, mitochondria also contain DNA. Mitochondrial DNA (mtDNA) is a small circular genome and there are hundreds of copies of it in each cell (as opposed to just two copies of nuclear DNA in each cell). MtDNA only contains coding for 37 genes unlike nuclear DNA which codes for more than 70,000 genes. This high number of copies of mtDNA in a cell and its small size increase the likelihood that usable traces of mtDNA will remain in bone fragments.

Mitochondrial DNA is only inherited from one's mother. Because it does not recombine with the father's DNA, identical copies (absent random mutations) are passed down through generations from mother to child. This allows anthropologists to work backwards and laterally through a family tree to find a maternally-related relative to use for comparison purposes when trying to identify an unknown skeleton.

In 1987, several scientists conducted a study where they traced the mtDNA of 143 individuals far enough back to discover that all human beings alive today have a most recent common ancestor, a person they titled "Mitochondrial Eve." Mitochondrial Eve,

who lived in East Africa approximately 200,000 years ago, was not the only woman alive in her time, nor the only woman to reproduce. She was, however, the only woman whose mtDNA continued to be passed down from generation to generation to the present day. MtDNA from other women eventually died out as they either didn't reproduce or had only sons who didn't pass on their mtDNA.

### **Global Applications of Forensic Anthropology**

The mid-twentieth century saw the rise of acts of such atrocity as to result in the codification of a new international crime: genocide. Genocide is defined as any of certain acts "committed with intent to destroy, in whole or in part, a national, ethnic, racial or religious group, as such."<sup>18</sup> Those acts include killing members of the group, causing serious bodily or mental harm to members of the group, deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part, imposing measures intended to prevent births within the group, and forcibly transferring children of the group to another group.<sup>19</sup>

Until 1948, there was no internationally recognized crime of genocide. In that year, in response to the six million people killed during the Holocaust, the United Nations General Assembly passed a resolution condemning genocide and establishing a committee to draft laws against it.<sup>20</sup> Before then, including at the trials at Nuremberg, defendants were charged with crimes against humanity, a charge recognized internationally since the turn of the 20<sup>th</sup> century. Crimes against humanity include many of the same actions as genocide and those actions must be part of a systematic attack against a civilian population. The main difference between crimes against humanity and genocide is the intent element. Genocide requires the intent to destroy a defined group of people. Crimes against humanity don't require a discriminatory motive.<sup>21</sup> In the 1990's, arising from the conflict in the Balkan states, the term "ethnic cleansing" was coined. The primary goal of ethnic cleansing is the expulsion of a group of people from a geographic area, not the actual physical destruction of the group.<sup>22</sup> Many times the acts committed are similar to those defined as genocide or crimes against humanity, but again the distinction is in the intent of the actor.

Genocides in the 20<sup>th</sup> century have resulted in millions of deaths. In Rwanda alone it is estimated that approximately 800,000 people were killed in 1994.<sup>23</sup> In Cambodia, approximately 1.7 million people were systematically killed by the Khmer Rouge in the late 1970s. Hundreds of thousands were killed in Bosnia, Croatia, Kosovo and Serbia in the 1990s. Twenty-five percent of the population of East Timor was wiped out between 1975 and 1999. Guatemala and Iraq have each seen up to 200,000 deaths as the result of genocide.<sup>24</sup> All of these events left the need for massive numbers of bodies to be disposed of. Mass graves were the most convenient answer.



When excavating mass graves, the forensic anthropologist plays a critical role in helping to not only identify the dead, but to make sure that evidence is preserved for future prosecutions. The objectives of the forensic anthropologist when excavating mass graves include:

[F]irst, collect narrative and physical evidence needed to establish accountability and prosecute the guilty; second, obtain the information necessary to identify the individual and their associated group; third, create a record that can withstand the scrutiny of courts and historical revisionists; fourth, expose atrocities to the world to prevent future atrocities; and fifth, provide a semblance of basic human dignity to the victims.<sup>25</sup>

Argentina was the first country to use forensic anthropology on a large scale to locate mass grave sites and investigate human rights abuses. During a military crackdown as part of Argentina's "Dirty War" lasting from 1976 through 1983, thousands of people disappeared.<sup>26</sup> When democracy was restored to Argentina in 1983, there were calls from relatives of the missing to find out what happened and to punish those responsible. Some of those killed had been thrown alive from airplanes over the Atlantic Ocean in an effort to dispose of their bodies. Most, however, were simply buried in the cemetery nearest their execution or in mass grave sites on land controlled by the military.<sup>27</sup>

After the return of democracy, judges began ordering the exhumations of mass graves in Argentina. However, these were run by medical doctors with little to no forensic training. The actual digging was done by untrained cemetery workers with backhoes and much scientific evidence was lost. In addition, the remains of thousands of people who might have been able to be identified were broken and mixed up. In 1984, the families searching for disappeared relatives petitioned the American Association for the Advancement of Science for help. In response, Dr. Clyde Snow, the leading forensic anthropologist of the 20<sup>th</sup> century, went to Argentina and began to train archaeology and anthropology students in correct anthropological techniques. He put an immediate stop to the helter-skelter exhumations that were happening throughout the country and instead developed a systematic investigative method for all to follow.

First, he taught that a preliminary investigation should be done to gather as much physical and biological information about the missing as possible to aid in identification once remains were recovered. He showed students how to search government documents as well as mass media archives for evidence as to where to conduct searches. He next taught the students how to conduct proper archaeological fieldwork so that remains and artifacts could be recovered as intact as possible along with as much surrounding circumstantial evidence as there was to recover. Lastly, he taught correct laboratory analysis methods for identifying the individuals recovered.

Dr. Snow returned many times over the course of the next five years to assist in the work and the Argentine Forensic Anthropology Team (EAAF in Spanish) was formed. This team now works in Latin America, Europe, Africa and Asia uncovering mass burial sites and recovering bodies and evidence for future prosecutions.

Barely a year after arriving in Argentina, Snow and his team were called to Guatemala to investigate the results of decades of military abuses there. In 1954, the military staged a coup and came to power with the stated goal of wiping out Communist forces in the country. The Guatemalan army made “leftist insurgents” (who they defined as anyone belonging to a trade union, students, political activists, etc.) disappear by the thousands. Very few of these people survived to tell their stories. At the time, very few bodies were found either.

By 1991, the Guatemalan government had information on over 100 mass grave sites, but due to the lack of qualified personnel<sup>28</sup> only 6 had been excavated, none with anthropologists, and of 64 sets of remains recovered, only 8 were identified.<sup>29</sup> Dr. Clyde Snow repeated his work in Argentina and set up and trained the Guatemalan Forensic Anthropology Team. In 1991, it reported that more than 200,000 people, mostly Mayans, had been killed between 1962 and 1996 by government forces. Working from this report, a United Nations panel found that the atrocities in Guatemala could be called genocide. Unfortunately, many of the perpetrators were not able to be brought to justice because as they left office, the military leaders passed “self-amnesty laws,” precluding their prosecution.

After World War II, the international community sought to hold participants in mass crimes accountable for their actions. The trials at Nuremberg and Tokyo were the first steps towards a global system of accountability. As the acts of atrocities continued to increase in number, the international community recognized the need to bring criminals to justice in cases where the governments of the countries involved might have trouble doing so. The United Nations wanted the focus to be on the individuals committing heinous acts, rather than trying to hold entire governments responsible. The result was a series of ad hoc tribunals established in response to specific situations designed to deal only with one particular set of facts.

For example, after World War II, the Balkan States (including Bosnia-Herzegovina, Serbia, Croatia and others) became part of the Federal Republic of Yugoslavia. By the mid-1980’s nationalism was growing among the separate states. Tensions were particularly high between Serbians in Bosnia and Croatia and their primarily Muslim neighbors.<sup>30</sup> In 1991, Serbian separatists declared Croatia to be an independent country. The following year Bosnia declared independence. The Bosnian Serbs, wanting to be part of a dominant Serbian state in the Balkans, attacked Bosniaks and began a campaign of ethnic cleansing. By the end of 1993, there were few Bosniaks left in the country and even fewer Croats.

The worst acts of the war took place in a town called Srebrenica, Bosnia. The U.N. had declared this town a safe zone and tens of thousands of Bosniaks had taken refuge there. The town was protected by U.N. peacekeeping forces. In July 1995, the U.N. withdrew its forces and Serbs attacked. The people were separated by gender with women and girls being bussed off to Serbian held territory where they were imprisoned and raped. The men and boys were summarily executed. Estimates place the number murdered between seven and nine thousand males.<sup>31</sup> Eventually Slobodan Milosevic agreed to talk and the result was the Dayton Accords, which established the country of Bosnia divided between a Croat-Bosniak federation and a Serbian republic.

In 1993, the United Nations established the International Criminal Tribunal for the Former Yugoslavia (ICTY) to try leaders for their roles in the ethnic cleansing and war crimes taking place. It was the first international criminal court established since the Nuremberg trials and it was the first to prosecute the crime of genocide as such. Archaeologists and physical anthropologists were instrumental in investigating the Srebrenica massacre and obtaining arrest warrants for Radovan Karadzic and many others for genocide, crimes against humanity and war crimes. A mass grave containing 146 bodies was excavated and showed evidence of the executions of men and boys in groups of 10, some with their hands bound and wearing blindfolds. There is additional evidence that some of the nearby mass graves may have been dug up and the bodies disposed of by dissolving in sodium hydroxide in a local chemical plant.<sup>32</sup>

Over the next 20 years, the Tribunal charged over 160 people, including Slobodan Milosevic, former president of Yugoslavia. He stood trial on charges of genocide, war crimes and crimes against humanity beginning in 2002, but died in prison before the end of the trial in 2006. Eighty people have been convicted and sentenced, 18 have been acquitted and 14 cases are still ongoing.

The next court to be established by the U.N. was the International Criminal Tribunal for Rwanda, set in Tanzania. This court was established to deal with the genocide that occurred during the spring and summer of 1994 in that country. Rwanda's ethnic population was split mainly between the Hutu (approximately 85 percent of the population) and the Tutsi (14 percent), with a very small Twa minority. Ethnic identification cards were introduced by the Belgians who colonized Rwanda. These were to play a devastating role in later events. During colonial times, the Tutsi were the favored party. When Rwanda gained its independence in 1962, the Hutu were in sole control of the government and many Tutsi fled to neighboring Uganda to escape mass killings. In 1990, the Tutsi-led Rwanda Patriotic Front invaded Rwanda to take back their country. After several years of fighting, the Arusha Accords were signed, purportedly bringing peace to the country. However, the Hutu extremists in government were smoldering in place, still plotting the destruction of the Tutsi. On April 6, 1994, President Habyarimana's plane was shot down over Kigali and the embers ignited. Over the next

four months, approximately 800,000 Tutsi and moderate Hutu were exterminated by Hutu government forces, militant youth groups and civilians.<sup>33</sup>

Only two mass grave sites were exhumed in Rwanda. The main reasons for this were the overwhelming number of bodies to be identified and the lack of survivors and family members to identify them. The Catholic Church at Kibuye was one of the sites that was excavated. Thousands of Tutsi had sought sanctuary at the church as the killings escalated in April 1994. On April 17, the Hutu military, local police and civilians attacked the church, killing hundreds. The mass grave located there was exhumed in three phases and the remains of 454 individuals were discovered. Despite the best work of the forensic anthropologists, only 17 bodies were able to be identified and living relatives were only found for two of the victims. The forensic evidence recovered “was used primarily to demonstrate the cause and manner of death, prove that the victims were not combatants, and establish the age and sex of the victims and the widespread nature of the crimes.”<sup>34</sup>

From the time Saddam Hussein took power in 1968 until his capture in 2003, the Iraqi army under his control engaged in a systematic plan to exterminate Iraq’s Kurdish population. The Kurds live primarily in the north. Tens of thousands of Kurds disappeared in the mid-1980’s as part of the Iraqi campaign against them. After years of purges and attacks with chemical and traditional weapons, in 1991 the Kurdish resistance fighters, known as *peshmerga*, completed a counterattack driving Iraqi troops out of the region.<sup>35</sup> The Kurds were able to then recover thousands of documents from military headquarters enumerating the atrocities committed.

Realizing they were unable to fully evaluate the evidence under the conditions existing at the time, the Kurds called for international help. A team was put together, including American anthropologist Clyde Snow. The team only had 10 days to gather and evaluate evidence, given that there was no stable government in the area at the time and conditions were too dangerous for a longer stay. By then, the Kurds had amassed evidence of 145 individual and mass graves. Snow’s report said that there was sufficient proof that Iraq’s military might have committed genocide and recommended that the United Nations send a team to investigate. Unfortunately, the U.N. didn’t respond so two groups named Middle East Watch and Physicians for Human Rights sent a forensic team in the summer of 1992. Snow was once again a part of this team which was made up of scientists, lawyers and volunteers from Argentina, Chile, Guatemala and the United States. They focused on one town in Iraq called Koreme. The belief was that if they could develop a good picture of what had happened there, they would have a solid blueprint for understanding the military’s tactics in thousands more villages just like it.

Koreme was a village of 150 Muslim families who made a living growing and selling vegetables. On 27 August 1988, Iraqi warplanes circled the village and the villagers fled to a neighboring town. Upon arriving, they realized that their neighbors had been

decimated by chemical weapons just hours earlier. The villagers headed back to Koreme. When they arrived, 33 men and boys were taken from the group by the military, lined up and shot on the side of the road. The women, children and elderly were taken away to camps with no food, water, shelter or medical supplies and abandoned. Incredibly, six of the 33 men and boys survived the gunfire. Because the Iraqi soldiers initially left their bodies on the road, they were able to escape into the mountains to tell their tales. The soldiers later returned and buried the remaining bodies.

Snow's group was able to exhume and identify all 27 remaining bodies, which ranged in age from early teens to mid-40's. They were also able to identify the number and types of weapons used in the executions through ballistics analysis. This investigation was important because they were able to recover documentary, testimonial and physical evidence to use in later prosecutions. They set new standards for how human rights abuses and the excavation of mass graves should be carried out. The Coalition Provisional Authority, established as a transitional government following the invasion of Iraq in 2003 by U.S., British, Australian and Polish forces, along with the post-Saddam Iraqi government, set up the Iraqi High Criminal Court to try leaders of Saddam Hussein's regime for crimes against humanity, war crimes and genocide. Saddam Hussein was convicted by the Court, lost his appeals and was executed by hanging on December 30, 2006.<sup>36</sup>

After several other ad hoc courts were established for specific situations, the U.N. recognized the need for a permanent court, with its own investigative and judicial bodies to handle the worst crimes of concern to the international community. The International Criminal Court (ICC) was established with the adoption of the Rome Statute on July 17, 1998, by many United Nation member states and came into effect on July 1, 2002, when it was ratified by 60 member states. Notably, the United States is no longer a signatory to the Rome Statute. President Clinton originally signed it, but citing concerns over the court being used against Americans for political purposes, President George W. Bush withdrew the U.S.'s participation. The ICC is based in The Hague. To date, it has dealt with situations arising in Uganda, the Democratic Republic of Congo, the Central African Republic, Sudan, the Republic of Kenya, Libya, the Ivory Coast and Mali.<sup>37</sup> The African Union has raised questions as to why the ICC has seemingly targeted African countries and it remains a sensitive issue.

The Rome Statute established the crimes that are within the jurisdiction of the ICC and the rules of procedure for the court. The ICC can hear cases of genocide, war crimes and crimes against humanity. Genocide and crimes against humanity are defined above. War crimes are "grave breaches of the Geneva Conventions and other serious violations of laws and customs applicable in international armed conflict ... when they are committed as part of a plan or policy on a large scale."<sup>38</sup> Specific criminal acts include murder, mutilation, the taking of hostages, attacks on civilians, sexual slavery and others.

## Teaching Strategies

Forensic Science lends itself well to many different types of teaching activities. It is helpful to have a life-size skeleton in the classroom. Posters of the skeletal system will work as well.

Students will watch a brief video entitled "[What role do anthropologists play in solving crimes?](#)" as an introduction to the unit. Brief lectures will be used to introduce main concepts to students. Lectures will be accompanied by PowerPoint presentations that include interactive warm-ups and brief spot assessments of student understanding. [Kahoot](#) and [Quia](#) are effective for this purpose as they give the teacher real time feedback on student understanding.

Students will conduct a bone measurement lab in which they measure their femurs and graph their collective data. They will then use this information to predict the heights of other individuals in the room. Once they are proficient at this, they will be given data on several missing persons and data on fictitious bones recovered from a mass grave discovered at a construction site and will be asked to determine the minimum number of individuals represented and to tentatively identify any missing persons.

Students will conduct an "excavation" of a grave site where they learn proper techniques for laying out a search grid and removing soil without disturbing bones or other circumstantial evidence. This exercise is conducted in shoe boxes with buried, laminated copies of bones. Students are asked to determine the number of individuals in the grave, as well as the age, gender and height of any persons they can (See [Appendix 2](#)). As an extension activity, students can conduct a soil analysis lab on the removed dirt where they build a soil density profile and test for characteristics such as pH.

Students will complete exercises where they will work with pictures of various human bones and will be asked to identify characteristics such as age, gender, height and race. They will also work with a teaching skeleton and with online simulations to learn the major bones in the human body as well as the cranial sutures important in age determinations.

Students will conduct an online exploration comparing various hominid skulls to learn the different features of each and become able to identify that of a modern human. This exercise can be found on [Class Zone](#).<sup>39</sup>

Students will conduct an exercise working with a family tree to trace the inheritance pattern of mtDNA through five generations. They will then identify those relatives available to donate mtDNA to identify the remains of a man suspected to be a relative who perished in WWII (See [Appendix 3](#)).

Students will choose from among several internationally known cases with forensic anthropology at their core. This paper focuses on cases from Rwanda, Iraq, the former Yugoslavia, Guatemala and Argentina. There are more situations which could be explored such as East Timor, Cambodia and others. Students will research a case with a focus on the anthropologic evidence and will produce an analysis of the investigation and evidence. They will then prepare either a prosecution or defense argument for their situation including the use and introduction into trial (or objection to the introduction) of all relevant forensic evidence. We will conclude with mini-mock trials for the whole class (See [Appendix 4](#)).

## **Conclusion**

Through this unit, students should develop a deeper understanding of the role of forensic anthropologists in the location and identification of human remains. Through case studies, they should also learn about global uses of forensic anthropology, particularly its application to cases of genocide and crimes against humanity. Students will look beyond our own borders to examine how atrocities can happen and what can be done to bring the perpetrators to justice while at the same time recognizing that the accused have rights too. They will hone their critical thinking skills and their public speaking and persuasion skills. Hopefully, they will finish this unit excited about all the possibilities forensic anthropology has to offer.

## Materials for Classroom Use

Attached to this unit are several appendices with activities for this unit. Appendix 2 is the directions for the “Digging Up Bones” activity which will allow students to learn and practice search and excavation techniques and how to interpret evidence they find at grave sites. Appendix 3 is a family tree exercise requiring students to trace the path of mitochondrial DNA through five generations of one family leading to a greater understanding of how mtDNA can be used to identify remains. Appendix 4 is the culminating activity of the unit. It includes instructions for students to produce a presentation on their chosen situation and an argument for or against the use of anthropological evidence in court. It culminates either in mini mock trials or a classroom debate.

## Reading List for Students

*Confronting Crimes Against Humanity: A Study Guide Series on Peace and Conflict.* United States Institute of Peace, Washington, D.C. 2008.

Booklet discusses the various levels of crime and possible interventions. It includes topics for discussion and classroom activities.

Ilibagiza, Immaculée. *Left To Tell.* Hay House (2006).

Compelling account of one woman’s struggle to stay alive during the Rwandan genocide. This book does focus on her Christian faith as the source of the strength she needed to get through three months hiding from machete-wielding killers in a pastor’s bathroom, so it may or may not be appropriate as a school assignment but it is an excellent read.

Fondebrider, Luis. “The Application of Forensic Anthropology Into Cases of Political Violence.” *Politorbis.* Nr. 50-3 (2010).

Excellent article on the role forensic anthropologists have played in unearthing some of the world’s greatest atrocities in multiple countries. This article is a good starting place for students beginning their research into genocide and crimes against humanity.

Stover, Eric and Molly Ryan. “Breaking Bread With The Dead.” *Historical Anthropology*, Vol. 35 No. 1, Society for Historical Anthropology (2001).

Excellent article for summaries of various anthropological investigations including Argentina, Guatemala, Iraq, Rwanda and others. This is a good starting place for student research.



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- Bertino, Anthony J., and Patricia Nolan. Bertino. *Forensic Science: Fundamentals & Investigations*. Mason, OH: South-Western Cengage Learning, 2012.  
High school level textbook on forensic science with a chapter on forensic anthropology.
- Deslich, Barbara, and John Funkhouser. *Forensic Science for High School*. Dubuque, IA: Kendall/Hunt, 2006.  
Basic textbook of forensic science at high school level. Many quizzes and hands-on activities included.
- "Historical Background of Forensic Anthropology." Cheshire Anthropology. January 17, 2013. Accessed August 30, 2015.  
<https://cheshireanthropology.wordpress.com/2013/01/17/historical-background-of-forensic-anthropology/>.  
Description of the three periods in forensic anthropology.
- Lundy, John K. "Physical Anthropology in Forensic Medicine." *Anthropology Today* 2, no. 5 (1986): 14-17. Accessed September 19, 2015.  
Discussion of the basic questions faced by a forensic anthropologist when examining human remains.
- Morgan, Jean Marie. "Proving Genocide: Forensic Anthropologist's Role In Developing Evidence To Convict Those Responsible For Genocide." *Electronic Theses, Treatises and Dissertations* Paper 5053. (November 8, 2011).  
Thorough review of the goals of the forensic anthropologist in a mass death investigation. Includes many tables and graphics about the major incidents of genocide in the 20th century.
- Snow, Clyde Collins. "Forensic Anthropology." *Annual Review of Anthropology* 11 (January 01, 1982): 97-131. Accessed September 19, 2015.  
Thorough and entertaining introduction to forensic anthropology by one of the great names in the field.
- "Summary of the Key Provisions of the ICC Statute." Human Rights Watch. December 01, 1998. Accessed September 26, 2015.  
<https://www.hrw.org/news/1998/12/01/summary-key-provisions-icc-statute>.  
Summary of the Rome Statute establishing the International Criminal Court shortly after it was ratified by the United Nations. Contains an excellent overview of the workings of the Court and how cases are brought before the Court.

Szilagy, Silmarien. "Forensic Anthropology Lesson 1: Introduction and History."  
Forensic Anthropology. 2013. Accessed September 12, 2015.  
<https://sites.google.com/site/holforensicanthro/home/lesson-1-introduction-and-history>.  
Introduction to the different branches of Anthropology and discussion of the four periods of development of Forensic Anthropology.

Ubelaker, Douglas H. "Chapter 1: Introduction to Forensic Anthropology." In *Forensic Anthropology and Medicine: Complementary Sciences from Recovery to Cause of Death*, by Aurore Schmitt, Eugenia Cunha, and João Pinheiro. Totowa, NJ: Humana Press, 2006.  
Concise history of Forensic Anthropology.

## Appendix 1 Implementing Teaching Standards

### Essential Standard

HS-FS-FA-1: Students will demonstrate that the human body can be identified by the measurements of skeletal and odontological remains.

### Clarifying Objectives

HS-FS-FA-1a: Students will describe how bone is formed  
Students will study the process of bone formation and learn the major bones of the human skeleton.

HS-FS-FA-1b: Students will distinguish between male and female skeletal remains.  
Students will learn how to use characteristics of the pelvis and skull to establish the gender of skeletal remains.

HS-FS-FA-1c: Students will describe how bones contain a record of injuries and disease.  
Students will study real life applications of forensic anthropology, particularly in the context of genocides and crimes against humanity to learn how forensic anthropologists use human remains to locate and identify missing persons and how to use the evidence they find to prosecute criminals.

HS-FS-FA-1d: Students will describe how a person's appropriate personal characteristics (age, height, and race) could be determined by examining his or her bones.  
Students will learn how to use the long bones of the skeleton to estimate stature. They will explore how to use cranial features and epiphyses to estimate the age of a deceased person. They will also use characteristics of the skull to determine race.

HS-FS-FA-1e: Students will describe the role of mitochondrial DNA in bone identification.  
Students will conduct exercises to explore how to trace mitochondrial DNA through generations and how it can be used to identify unknown remains.

## Appendix 2: Digging Up Bones Lab

**Objectives:** Students will practice techniques related to excavating a grave site. They construct a search grid and record their findings on a graph. They will then identify the recovered body parts and determine how many bodies are in the grave and the gender and height of the person(s).

**Materials:**

- Shoe boxes (one per lab group)
- Dirt (potting soil works well)
- Laminated copies of male and female skeletons (one each per group)
- String
- Scissors
- Rulers
- Plastic spoons
- Paint brushes
- Tape
- Graph paper
- Paper plates
- Buckets or boxes for excavated dirt

### Teacher Preparation:

1. Laminate copies of a male and a female skeleton (one per lab group). Determine the scale of the skeletons.
2. Bury the skeletons in shoe boxes of dirt. It is most interesting when the bones are disarticulated and buried at different depths. Create a graph key for each box as you proceed.
3. This lab is best performed outside, if possible. If not, be sure to bring plastic sheeting or newspapers for students to work on.

### Procedure:

1. Measure the shoe box on both sides and mark the sides in 10cm intervals.
2. Lay string on top of the dirt across the box from one mark to the opposite mark. Tape the ends of the string to the box. Do this for all of the marks in both directions, until you have a search grid.



3. Draw a corresponding grid on your graph paper to scale with your box. For example, each 10 cm in the box might be graphed as 5 cm on the graph paper.
4. Excavate one layer of dirt (1 cm deep) from one square at a time. Put the dirt on the paper plate and search it for evidence. Then dispose of the dirt in the bucket. Mark any evidence found on your graph. Be sure to mark the depth at which you found the evidence. You must excavate one entire layer of dirt before moving to the next layer.
5. Continue excavating 1 cm at a time. Label each piece of evidence found with a number on your graph and fill in the corresponding key with the name of the item and the depth at which it was found.
6. Once you have completely excavated the grave, you will need to reconstruct the skeleton(s). Then answer the following questions.

Questions:

1. How many skeletons did you find?
2. What bones did you recover for each skeleton?
3. Are the remains male, female or both? What characteristics did you use to determine this?
4. Choose a long bone for each skeleton, if there are more than one. Measure the bone. Use the table of formulas in the power point to calculate the height of the person(s). Remember to multiply the length of the bone by the factor your teacher gives you to bring it up to scale.

### Appendix 3: Mitochondrial DNA Activity

Below is a (somewhat accurate) copy of my family tree. It covers five generations, from my children's generation back to one set of my great-grandparents. My great uncle John McKenna fought in Europe during World War II. He was killed during the infamous D-Day landing in France near the end of the war. His remains were not recovered at the time and a simple white cross was erected in a nearby cemetery to honor him and all the men who died on the beaches at Normandy.

Recently, a construction company has been building condos on the cliffs overlooking the English Channel in France. Construction was halted when bulldozers uncovered several partial sets of human remains. No identification was found with the bodies, but based on the location and clothing and other artifacts found with the bones, it is suspected that the remains belong to American servicemen killed during the invasion on June 6, 1945.

You are a forensic anthropologist with the American Association for the Advancement of Science, the same organization that years ago sent Dr. Clyde Snow to Argentina and Guatemala. You have been asked to attempt to identify the remains using mitochondrial DNA from relatives. You must determine who to test for mtDNA. No bodies of deceased relatives may be exhumed to take mtDNA samples.





Following the rules for mtDNA inheritance, determine which living relatives of John McKenna should be tested to compare to the remains.

1. Start with my great grandmother, Anna Conway McKenna, and darken the lines that show the inheritance pattern of her mtDNA through the entire family tree.
2. Of the living relatives connected to this darkened line, circle the ones eligible to donate mtDNA today for comparison.
3. When you are done, answer the following questions on the back of this page.

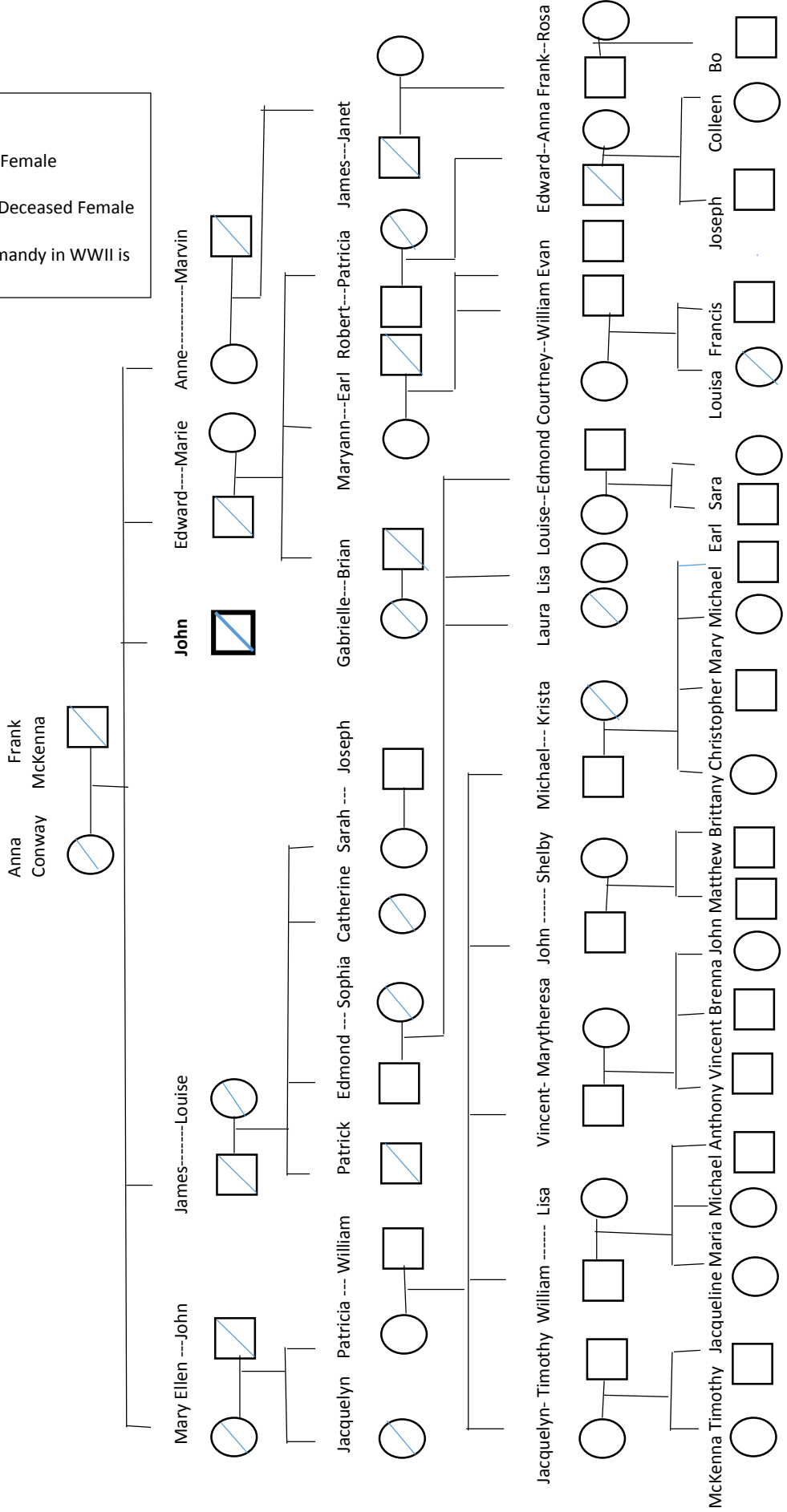
#### QUESTIONS

1. How many living relatives could provide mtDNA to compare with that of the remains?
2. Describe the inheritance pattern of mtDNA.
3. If two siblings died together in a car crash, could you use mtDNA to distinguish one from the other? Why or why not?

Legend

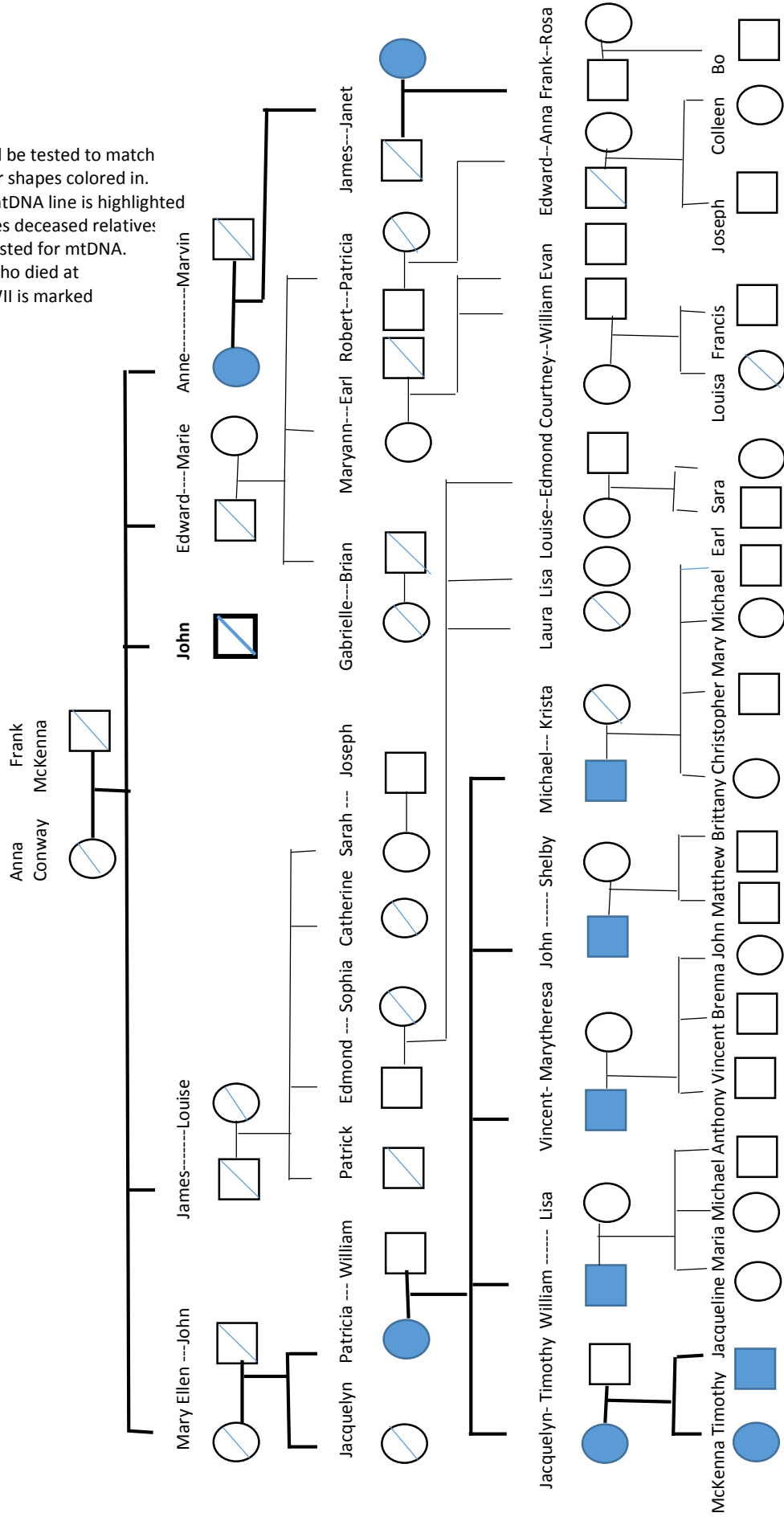
	Male		Female
	Deceased Male		Deceased Female

John McKenna, who died at Normandy in WWII is marked in bold.



**KEY**

People who could be tested to match mtDNA have their shapes colored in. Anna Conway's mtDNA line is highlighted in bold. It includes deceased relative: who cannot be tested for mtDNA. John McKenna, who died at Normandy in WWII is marked in bold.





## Appendix 4: Global Applications of Forensic Anthropology

### Purpose:

The purposes of this activity are:

1. To expose students to international criminal proceedings;
2. To explore forensic anthropology in the context of genocide and crimes against humanity;
3. To develop critical thinking skills;
4. To increase research and writing skills; and
5. To allow students to establish and defend a position using evidence and data.

### Materials:

Copies of *Breaking Bread with the Dead* by Eric Stover and Molly Ryan

Copies of *Confronting Crimes Against Humanity*

Computer access

### Plan:

1. Read *Breaking Bread with the Dead* as a class.
2. Discuss the definitions of genocide, crimes against humanity, war crimes and ethnic cleansing.
3. Read *Confronting Crimes Against Humanity* as a class.
4. Discuss the International Criminal Court and other tribunals that have been authorized to address crimes of this magnitude.
5. Assign students (or allow them to choose) an instance of a crime involving national or international criminal courts. Possibilities include situations in Argentina, Guatemala, Iraq, the former Yugoslavia, Rwanda, Cambodia, East Timor and others. Be sure to pick situations where forensic anthropology played a major role in bringing cases to the courts.
6. Assign students a role – either prosecutor or defense. You will likely have to do this as most students don't want to defend people charged with crimes. Be sure there are prosecutors and defenders for each situation you assign.
7. Students conduct independent research and produce a presentation that answers the following questions.
  - a) Discuss the background situation in your assigned country. Who are the parties to the conflict? The victims? The perpetrators? What is the political, economic and/or cultural background that contributed to the situation? What triggered the situation?
  - b) Describe the crimes that were committed and by whom.
  - c) Discuss the role of forensic anthropology in the case. Were mass graves excavated? Where? When? How many? What evidence was found? Were victims able to be identified? What did the evidence prove, if anything?

d) Discuss the outcome of the case. Was anyone prosecuted? If so, what evidence was used against them? Where were they tried and by whom? What was the outcome?

8. Students have been assigned the role of prosecutor or defense attorney. Tell students to take the forensic evidence in their case. Their job is to argue for or against the admission of the forensic evidence in their case into trial. They will write an argument for or against its admission and support their argument with facts about forensic anthropology and about the case. They should address things like forensic techniques and their reliability, whether the evidence in their case ties to specific people and the role of emotions and public outrage in determining the validity of the evidence. Their arguments should stay focused on the forensic evidence in their case.

9. Once students have completed their arguments, you can stage a mock court where students present their arguments to the judges (their peers) or you could set up a debate. Other students should be encouraged to ask questions of the presenters, particularly as it pertains to defending their positions.

I suggest a rubric that assigns 15 points to each of the four factual questions, 20 points to the written argument and 20 points to the oral argument for a total of 100 points. There are many rubrics for written and oral arguments online.

## Endnotes

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- <sup>1</sup> Bertino, Anthony J., and Patricia Nolan. *Forensic Science: Fundamentals & Investigations*. Mason, OH: South-Western Cengage Learning, 2012. p. 361.
- <sup>2</sup> Ubelaker, Douglas H. Chapter 1: Introduction to Forensic Anthropology." In *Forensic Anthropology and Medicine: Complementary Sciences from Recovery to Cause of Death*, by Aurore Schmitt et al. 2006. p.4.
- <sup>3</sup> Snow, Clyde Collins. "Forensic Anthropology." *Annual Review of Anthropology* 11 (January 1, 1982): 97-131. Accessed September 19, 2015. pp.102-103.
- <sup>4</sup> Ibid. pp. 99-100.
- <sup>5</sup> Ibid.
- <sup>6</sup> "Historical Background of Forensic Anthropology." *Cheshire Anthropology*. January 17, 2013. Accessed August 30, 2015.
- <sup>7</sup> "American Board of Forensic Anthropology." ABFA-American Board of Forensic Anthropology. Accessed September 26, 2015. <http://www.theabfa.org/index.html>.
- <sup>8</sup> Ibid.
- <sup>9</sup> Long bones are arm and leg bones. Short bones are the small bones of the wrists and ankles. Irregular bones are the vertebrae.
- <sup>10</sup> "Skeletal Development." *Encyclopedia of Children's Health*. Accessed September 17, 2015. <http://www.healthofchildren.com/S/Skeletal-Development.html>.
- <sup>11</sup> "Bone Formation." *Encyclopedia Britannica*. Accessed September 17, 2015. <http://www.britannica.com/print/article/434208>.
- <sup>12</sup> Ibid.
- <sup>13</sup> Ibid.
- <sup>14</sup> An articulated skeleton is one where the bones are attached in correct anatomical locations.
- <sup>15</sup> Lundy, John K. "Physical Anthropology in Forensic Medicine." *Anthropology Today* 2, no. 5 (1986): 14-17. Accessed September 19, 2015. doi:10.2307/3032978.
- <sup>16</sup> Ibid. p.16.
- <sup>17</sup> A forensic odontologist is a dentist who specializes in identifying human remains using dental records.
- <sup>18</sup> Convention on the Prevention and Punishment of the Crime of Genocide. Art. II, adopted by the U.N. General Assembly 9 December 1948.
- <sup>19</sup> Ibid.
- <sup>20</sup> Morgan, Jean Marie. "Proving Genocide: Forensic Anthropologist's Role in Developing Evidence to Convict Those Responsible for Genocide." *Electronic Theses, Treatises and Dissertations*. Paper 5053. (2011). p. 4.
- <sup>21</sup> Ibid. p.6
- <sup>22</sup> "Bosnian Genocide." *History.com*. Accessed October 11, 2015. [www.history.com/topics/bosnian-genocide](http://www.history.com/topics/bosnian-genocide).
- <sup>23</sup> DesForges, Alison. *Leave None to Tell the Story: Genocide in Rwanda*. Human Rights Watch, New York, 1999. Accessed at [www.hrw.org/reports/pdfs/r/rwanda/rwanda993.pdf](http://www.hrw.org/reports/pdfs/r/rwanda/rwanda993.pdf). 14 October 2015.
- <sup>24</sup> Morgan, ibid. p.9
- <sup>25</sup> Morgan, ibid. p. 8.
- <sup>26</sup> MacLean, Dana. *Argentina's forensic anthropology is finding 'disappeared ones'*. [www.irinnews.org/report/99593/argentina-s-forensic-anthropology-is-finding-disappeared-ones](http://www.irinnews.org/report/99593/argentina-s-forensic-anthropology-is-finding-disappeared-ones). 5 February 2014. Accessed 15 October 2015.
- <sup>27</sup> Fondebrider, Lius. "The Application of Forensic Anthropology to the Investigation of Cases of Political Violence." *Politorbis*. Nr. 50-3. 2010
- <sup>28</sup> It only took a medical degree, being Guatemalan by birth and membership in an organization to be considered a "forensic anthropologist." Stover, ibid.
- <sup>29</sup> Stover, ibid.
- <sup>30</sup> Bosnian Muslims are known as Bosniaks.
- <sup>31</sup> "Bosnian Genocide." Ibid.

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<sup>32</sup> Juhl, Kirsten. The Contribution of (Forensic) Archaeologists to Human Rights Investigations of Mass Graves. Pub. Stavanger, 2005. Am.uis.no/getfile.php/Arleologisk%20museum/publikasjoner/ams-nett/Mass\_Graves.

<sup>33</sup> DesForges, *ibid*.

<sup>34</sup> *Beyond Reasonable Doubt: Using Scientific Evidence to Advance Prosecutions at the International Criminal Court*. Workshop Report, Human Rights Center, Berkeley School of Law 24 October 2012.

<sup>35</sup> Stover, Eric and Molly Ryan. "Breaking Bread With the Dead." *Historical Archaeology*, Vol. 35, No. 1 (2001). Stable URL: <http://www.jstor.org/stable/25616889>. Accessed 16 October 2015.

<sup>36</sup> "Execution of Saddam Hussein." Wikipedia. Accessed October 18, 2015.

[https://en.wikipedia.org/wiki/Execution\\_of\\_Saddam\\_Hussein](https://en.wikipedia.org/wiki/Execution_of_Saddam_Hussein).

<sup>37</sup> "ICC – All Situations." ICC – All-Situations. Accessed September 26, 2015. [http://www.icc-cpi.int/en\\_menus/icc/situations%20and%20cases/situations/Pages/situations%20index.aspx](http://www.icc-cpi.int/en_menus/icc/situations%20and%20cases/situations/Pages/situations%20index.aspx).

<sup>38</sup> "Frequently Asked Questions." ICC – Frequently Asked Questions. Accessed October 1, 2015.

[http://www.icc-cpi.int/en\\_menus/icc/about%20the%20court/frequently%20asked%20questions/Pages/13.aspx](http://www.icc-cpi.int/en_menus/icc/about%20the%20court/frequently%20asked%20questions/Pages/13.aspx).

<sup>39</sup> Select "North Carolina," "High School Science," "Biology 2008," "Virtual Labs" and "Comparing Hominid Skulls."