

[PDF File](#)



THE BONE DETECTIVES

UNIT OVERVIEW: This unit will introduce anthropology and skeletal evidence, the Body Farm, and exhumations. Anthropologists are often referred to as “bone detectives.” And actually, they are. They use the bones to help solve a mystery, and in fact a crime.

DIRECTIONS: Read the following text, look at the illustrations, complete the activities, and answer the questions. Key terms will be highlighted in bold print.

FORENSIC SCIENCE KIT UNIT 08	
~ 2 chicken legs with the meat removed	
~ 2 jars with lids	
~ Vinegar	

Key Terms	
forensic anthropologist	NCIC
three-dimensional facial reproduction	clandestine grave
multidisciplinary team	cadaver dogs
emanate	exhumation
stratigraphy	saponification
adipocere	mummification
decedent	TOD

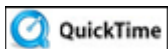
Introduction to Forensic Anthropology

Forensic anthropology has been defined as the application of the science of physical/biological anthropology to the legal process. The identification of skeletal and other decomposed human remains is important for both legal and humanitarian reasons. Because of these reasons, forensic anthropologists work to suggest the age, sex, ancestry, stature, and unique features of a **decedent** (a deceased person) from the skeleton. (From the *American Board of Forensic Anthropologists*) 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 the available evidence.

When a skeleton is brought to a morgue or an anthropologist's lab for examination, the first step is to determine whether the remains are human, animal, or inorganic material. If the remains are human, an anthropologist then attempts to estimate age at death, racial affiliation, sex, and stature of the decedent. On occasion, when bones are found, the anthropologist is called out to the scene of the crime by the C.S.I. team. In this instance, the anthropologist does a preliminary examination before the bones are packaged and transported back to the laboratory.

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. Forensic pathologists or related experts determine the cause or manner of death, not the forensic anthropologist.

Most anthropologists have advanced degrees in anthropology and may have experience in other forensic related fields. Perhaps the anthropologist's most valuable skill is familiarity with subtle variations in the human skeleton. The forensic anthropologist makes significant contributions to an investigation. The greatest of these could well be their intensive training and experience in distinguishing between human and nonhuman remains, determining age at death, racial affiliation, sex, stature, elapsed time since death, skeletal trauma, post-mortem damage and alteration of the skeleton, and establishing a positive identification based on skeletal and dental evidence. 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 (such as after 9/11). Through their training, most forensic anthropologists have knowledge of excavation techniques and mapping that are invaluable in recovering evidence.



Forensics Anthropology and Mummies

All the Particulars

RACIAL AFFILIATION:

Racial affiliation is often difficult to determine, especially since most people are blends. 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 sub-nasal grooves. American Indians and Asians have forward-projecting cheekbones and specialized dental features. There are certain traits, such as the incisors, that tend to be more common in people of specific ancestry. Keep in mind that there is more individual variation within races than variation between races.

AGE:

The approximate age of a person can be determined by examining the joints, bones, and teeth. A child's skull has more separation between the bone plates, the smoother the skull, the older the person. The examination of wrist development for children under thirteen is another reliable method of determining age. For most bones, the estimation of age works best if the victim is under age 30. Usually, examination of the pubic bone, sacroiliac joint, amount of dental wear, cranium, arthritic changes in the spine, and the microscopic studies of bones and teeth narrows the age estimate given by the anthropologist. Although the actual age cannot be determined by bones, the approximate age of the individual can be. For age determination, different parts of the skeleton are more useful at different age ranges.

SEX:

A person can be identified as a male or female by studying the pelvis, base of the skull, the forehead, and the jaw. Males usually have a more prominent brow ridge, eye sockets, and jaw as well as larger areas for muscle attachment. Women have a wider pelvis. The cranium can also be used for sex determination. The chin of males tends to be slanted back and on females it tends to be more rounded.



STATURE:

Forensic anthropologists use formulas to determine height based on the length of leg and arm bones. The longest bone, the femur, is best for this, but estimations can also be made from the metacarpals in the hand. The measurement of the maximum length of the bone can then be plugged into a formula based on race and sex to produce an estimate.

WEIGHT:

The wear on the bones at certain points determines an approximate weight for a person.

PHYSIQUE: They can determine a person's shape. Ridges where muscle was attached to the bone show the person's physique.

RIGHT OR LEFT-HANDED:

It is fairly easy to tell if the person used their right or left hand more due to the muscle attachment on the bones of the dominant side.

TIME INTERVAL SINCE DEATH:

Estimating the time interval since death can be extremely difficult. An estimate is based on the amount and condition of soft tissue, such as muscle, skin, and ligaments present, the preservation of the bones, extent of associated plant root growth, odor, and any carnivore and insect activity. Other variants must be considered such as the temperature at the time of death, penetrating wounds, humidity/aridity, soil acidity, and water retention.

The longer the time since death, the more difficult it is to determine the time interval since death. The amount of soft tissue that is still present is the key to determining time of death, or **TOD**. Weathering cracks on bones (from winter) or animal/rodent bites can also be used. Females lose one pound of tissue a day during decomposition; males three pounds a day. Acidic soil accelerates decomposition; alkaline soil retards it.

EVIDENCE OF TRAUMA:

After the dirt and debris are removed from the bones using water and a soft brush, the anthropologist observes the body for signs of trauma. The signs of trauma would include marks on the skull, broken bones, and bullets or pellets in or near the body. If the person were strangled, the bone from the throat, the hyoid bone) could be fractured.

DISTINGUISHING SKELETAL TRAITS:

The forensic anthropologist will observe the remains for any skeletal traits that are distinguishing. These observations may aid in identifying the body.

OCCUPATION:

Anthropologists may be able to guess a person's occupation. For example, a carpenter's or a roofer's teeth might be clipped in front where nails were held in their mouth. It is also easy to determine if the person was ever injured or fractured a bone during their lifetime. Detected bone injuries can be compared with a person's medical x-rays to confirm identity.

Post Examination Procedures

After the forensic anthropologist completes the examination, the medical examiner provides all information obtained from the skeleton to the law enforcement officials investigating the case. The information is then entered in the National Crime Information Center (**NCIC**). After several months, if a search fails to locate a missing person matching the anthropology's description, the anthropologist requests that a facial reproduction be attempted.

Two approaches are available to an anthropologist in reconstructing facial appearance during life. They could work with a composite artist in rendering sketches based on information supplied by eyewitnesses. Or they could call in a specialist in

three-dimensional facial reproduction, a technique in which the head is constructed in clay directly over the skull and mandible or over good casts of them. Before beginning reconstruction, the anthropologist must determine as much possible information from the skeleton such as age, sex, and race. Then, using tissue thickness sample charts, the artist glues pieces of plastic which look like pencil erasers or various lengths to the skull or a plaster copy, at 18 to 26 key points. These pegs are cut to the thickness specified by the chart. Using the pegs as a guide, the artist fills in the areas with modeling clay. The eyes are the hardest to do as they are almost entirely tissue. Other areas that are difficult include the ears, because their size is difficult to determine. It is also very difficult to reconstruct the lower parts of the nose and the lips.

Technology has become quite important when modeling in 3-D. The skull is scanned and this shows high-resolution scans that would indicate any injuries to the skull. Any tool marks such as a hammer mark can be determined so that the mark is precise in the contours and depth of the weapon mark. These marks can also be reproduced digitally. With good modeling of both the wound and the weapon, it is possible to match them in visual reconstruction of the event, not just reconstruction of the face. Digital superimposition is another way anthropologists can take advantage of the computer's ability to do grunt work in seconds. If the reconstruction is presented and they get a hit, or a suggested match, there are often photographs available of the missing individual. Once the skull scan is on file, the photographs can be digitalized and an attempt made to match them feature for feature with the skull in a series of computer overlays.



https://anthropology.si.edu/writteninbone/facial_reconstruction.html

Anthropology Calculations

The following formulas will help you determine if a humerus bone could have belonged to a particular missing person. The formula for males and females is different:

Height of male = (Length of humerus bone in cm) x (2.89) + 70.64

Height of female = (Length of humerus bone in cm) x (2.79) + 71.48

Remember that the length of the humerus bone does indicate height of stature!

A humerus bone has been found by the authorities. When measured, the bone is 25.36 cm in length. As an anthropologist, you will need to determine if the bone belongs to either of two missing persons. Donnie Davis is 5'7" tall, or 170.18 cm in height according to his driver's license. Mary Walker is 4'8" tall, or 142.24 cm in height according to her medical records. Use the length of the humerus and the formulas above to calculate an answer. Who may the humerus bone belong to?

Answer: The humerus bone more than likely belongs to Mary Walker. According to Donnie Davis' measurements, the estimation of his humerus bone would be 34.443 cm.

Activity adapted from Crime Scene Investigations for Grades 6-12.



Bone Detective Activity

In this activity, you will be observing the properties of bone. We already know that bones help to support, shape, and protect the body.

Materials: 2 chicken legs with the meat removed
2 jars with lids
vinegar

Procedure:

1. Fill a jar about two-thirds full with vinegar. Leave the other jar empty.
2. Submerge one chicken leg in the jar with vinegar. Put the other leg in the jar containing only air. Cover both jars.
3. After five days, remove the bones from the jars. Rinse the bone from the vinegar jar with water.
4. Compare the texture and flexibility of the two bones.
5. Note what has happened to the bone's minerals and marrow after being submerged in vinegar.

You will have the opportunity to share the results of this activity later in the unit.

Forensic Anthropology Books

Silent Witness: How Forensic Anthropology Is Used to Solve the World's Toughest Crimes by Roxana Ferllini Timms.

Bones: A Forensic Anthropologists Casebook. By Douglas Ubelaker and Henry Scammell.

Death's Acre: Inside the Legendary Forensic Lab/the Body Farm/Where the Dead Do Tell Tales. By William M. Bass.

Forensic Anthropology Fiction Books

Check out the novels by Kathy Reichs. Her main, character, Temperance Brennan, is a forensic anthropologist.

Aaron Elkins writes novels about a forensic anthropologist named Gideon Oliver.

Forensic Anthropology Non-Fiction Video Titles

The Body Farm

Dead Men's Tales

Digging For Clues

The Medical Detectives series

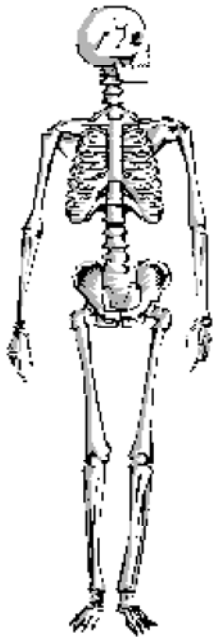
Medical Mysteries: Haunting Vision: Geophysics and Forensic Anthropology

The New Detectives Series

NOVA: Butch Cassidy & The Sundance Kid

NOVA: Anastasia: Dead or Alive?

Introduction to Skeletal Evidence



We know that a lot can be determined by looking at all or part of a skeleton. Because the anthropologist has expertise with skeletal remains, they are often able to assist in identifying the remains of people who have been dead a long time.

Most of the bones in humans develop from masses of cartilage that resembles the bones that they will become. The cartilage in bone will gradually be replaced with true bone. As long as cartilage is present the bone will continue to grow. As people grow, we know that their bones get longer and thicker. If cartilage is seen at the end of the bones, there will continue to be growth. If no cartilage is present, the child has reached full stature.

During a person's lifetime minerals are deposited and removed from bone. The deposit of mineral occurs faster than mineral loss during childhood and adolescence. An average female will grow until age 18. In males, growth occurs until 20 or 21 years of age. Between the years of 18 and 35, there is a balance of mineral deposit and loss, so bones stay constant in size. Bone loss exceeds bone gain after age 35. With human adults, the ends of the rib bones will gradually change shape over the years. The sternal ends are rounded in younger adults. With increasing age, these bones become cup-shaped and jagged.

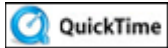
In youth, the pelvic girdle consists of three bones: ilium, ischium, and pubis. These bones will eventually fuse to form the pelvic girdle in adults. The pelvic girdle serves as an area of attachment for bones and muscles of the legs. Females have wider pelvises than males; making the additional width necessary for childbearing. In females, the pubic arch is wide, and the bones are smoother and lighter.

The skulls of children and adolescents are quite different from those of adults. The skull is incompletely developed at birth. The bones of a child's head are not fused together as they are in adulthood. Instead, they are separated by a membrane area that is called fontanelles or soft spots. These allow for some movement between bones.

This allows for the developing skull to be partially compressed and therefore able to change shape slightly. The compression of the skull allows an infant to pass through the birth canal. As the child grows, these bones will slowly grow together and eventually fuse.

Bones can tell a story. It is fairly easy to tell if an individual was either right or left-handed by comparing the size of the bones in each arm. Limbs that are used more frequently have larger bones. The loss of use of a limb can cause the bones in that limb to become smaller. Bones also tell the story of injury or disease. Access the following interactive site, The Skeleton Project:

<http://www.eskeletons.org/>



What Bones Can Tell Us (02:35)

The Body Farm

There is a real scene with bodies lying out in the open, sunk into a murky pond, and buried in shallow graves in the woods behind a university hospital in Tennessee. It is called TARF, the Tennessee Anthropological Research Facility, or as it is called, BARF.

William Bass worked at the University of Tennessee in the anthropology department and quickly gained a reputation as a bone expert, receiving bodies from police departments from all over the country. He needed a place to keep the bodies that he was being asked to examine, because he knew that the bodies were not only forensic cases that needed to be solved but also useful for researching how a body decays. The university granted Bass the use of two acres of land for his work.

Bass says that bodies are a puzzle to him, and a challenge to tell who it was, how it got there, and tell what happened to them. He believes that when a body comes in, it becomes a research tool.

Bass began to record the decay rates of bodies above and below ground. In order to get bodies, he approached the district attorneys for unidentified corpses. He offered to take the bodies for his research, with the promise of returning them for proper burial.

He began by placing the bodies on the ground of the 2-acre wooded area, which is surrounded by a chain link fence, topped with barbed wire, and a wooded inner fence to keep out the curious.

Today, the facility “processes” 30 to 40 bodies a year, plus a number of dogs donated by the local animal shelter. “Processing” means letting the decomposition process take its natural course and watching what happens. The bodies in the woods are placed in positions murder victims are most frequently found in and periodically checked and recorded and photographed.

The appearance of the body and its decomposition is recorded as well as the change in plant growth, soil conditions, weather, temperature, and the number of insects and their activities. This continues until the body is fully skeletonized.

Dr. Bass and his staff try to be as accurate as possible in their research, recreating many different types of occurrences that are common in forensic work, such as when bodies are wrapped in

plastic, buried in shallow graves, lying uncovered on the ground, on concrete slabs, and in the trunks and backseats of cars. Each experiment offers a glimpse of how a body decays in a specific situation.

Dr. Bass also works with dog trainers who teach dogs to locate buried bodies. These dogs are brought to the facility every three or four months to practice. Ahead of time, Dr. Bass buries bodies at depths of 1, 2, and 3 feet to test the dog's skill. Experiments with different substances are conducted to see if certain materials such as lime can mask a decaying body's scent and throw the dogs off track.

Entrance to the Body Farm



https://en.wikipedia.org/wiki/Body_farm

Body Disposal

The disposal and concealment of a body can be unusual in many cases. Hiding places might include septic tanks, crawl spaces, refrigerators, closets, interior of walls, spaces beneath floorboards, abandoned drums, and drums filled with concrete. Because the remains are confined within a structure, the actual retrieval of a body may be difficult and pose problems.

Many times a murderer will leave the body or bodies of their victims in the house where they reside. A murderer may go a step further when concealing a body by placing it in a container such as a drum and covering it with concrete. This type of body removal is very difficult and may require the use of power tools, which may cause damage to the remains of the body and ruin any clues. To remove a body from concrete, specialized tools must be used such as air chisels which provide control of the depth of the blast. If a body is concealed under a concrete or asphalt slab, heavy construction equipment such as a backhoe may be required. To remove a body or skeleton from a septic tank, special equipment or ingenuity on the part of the search team may be required.

Searching For a Clandestine Grave

The search for a **clandestine grave** (secret or hidden) may be difficult if the following factors are present: a large area, vast wooded area with thick trees, rugged terrain, and weather effects. Stormy conditions or frozen or flooded ground may delay the operation. To conduct a search efficiently with a **multidisciplinary team** (combining of teams from different areas of forensic science), experts from a variety of fields compose the team.

Modern science has developed several instruments to determine where and how to carry out a search. These critical decisions help investigators find clandestine graves faster and at a more reliable rate. One of the new techniques used to search for clandestine graves is the ground-penetrating radar. Within a few minutes this handy portable instrument gives a reading, thus saving time and money. It uses electric properties of the soil to identify disturbances in the ground, but can also penetrate water and snow.

Radar is most effective on a level terrain. Other methods must be implemented when searching hilly or mountainous areas. Trained dogs, or as they are called – “**cadaver dogs**”, will pick up the scent, even if only bones remain. As a body decomposes through the effects of cellular breakdown, different odors **emanate** (to flow out, or arise from a source) from the body, depending upon the stage of decomposition. A well-trained cadaver dog may be able to locate a body that has been dead for hundreds of years.



Different breeds of dogs are used for this particular task, such as bloodhounds and German shepherds. Bloodhounds are particularly good at searching for bodies that are submerged in water. However, the bloodhounds are not the best of swimmers, so the dog carries out the search from a boat and also wears a life preserver. The dog sniffs the surface as the boat moves through the water. Once the dog has sensed where the body may be located, it will jump into the water, to be followed by scuba divers.

Aerial photography may be used when a large area is to be covered. This is most effective when the area under investigation has been photographed before, allowing topography (surface areas of a region) to be compared. Other alterations due to the burial, such as the movement of vegetation or structural alteration to the landscape, may also come to the attention of investigators.


Soil gas readings are another way to locate a burial site. This form of detection can be undertaken when close to a potential burial site, since a decomposing body will produce methane and other gases.

Geological and archeological observations made at a site will seek to discover soil alterations. These alterations come about because soil comprises different layers, each with specific characteristics. When a grave is dug, the different layers of soil are mixed, causing changes in color and texture as compared with undisturbed areas nearby. A metal probe is used to judge soil texture. As the soil is removed and subsequently returned to the grave, the degree of compaction changes. The soil becomes “looser” after it has been disturbed, and this is detectable with the probe. However, such a tool must be used by an expert, because if inserted too deeply in the ground and with haste, it may touch the body below and cause damage. If soft tissue is present on the skeleton, the potential damage produced by a probe can resemble the entrance wound caused by a gunshot. There will be surplus soil displaced around a body that takes up a significant amount of space within a pit. Footprints may also be found around the grave, left by the individual who dug it.

The decomposition of the body plays an important role in how the grave appears. As the organs start to decompose in the abdominal cavity, the soil that lies over it will begin to sink. A depression is created that is often easily observed. Also, the entire area that was excavated will sink as the soil begins to settle back into place. Signs of cracking will appear around the edges of the grave. In sandy areas, because of the characteristics of the material, the visual search for clues is virtually impossible.



Surrounding vegetation may be altered, its pattern differing from the vegetation nearby. If much time has elapsed since the burial, the regeneration may not be apparent. The speed of this regeneration varies depending on local climatic conditions. The relative rate of regeneration of

 the vegetation surrounding the grave may assist in determining the time of burial.

The time of burial is crucial to the solving of any murder investigation. It will indicate whether the burial was initiated soon after the murder, or sometime afterward. Plant roots that happen to be regenerating, or newly established plants with shallow roots on top of the grave, will indicate to a forensic botanist the amount of time that has passed since the soil was disturbed. If a body is buried close to a tree, eventually its roots may reach the spot where the body is buried. A botanist can determine how long it would take growth rings within the roots to reach the body.

Removal of the Body

When the body remains are skeletonized, they may be fragmented and fragile. It is the responsibility of the forensic anthropologist to collect the bones in a proper manner. The body has to be exposed completely before it can be lifted from the grave. This is accomplished by the use of small tools such as dental picks, bamboo sticks, paintbrushes, and hand trowels, all of which provide a controlled means of exhumation. **Exhumation** means to dig out or reveal.

Paintbrushes are very handy for removing soil from bones, but their use is avoided when clothing is present, since any loose bristles may contaminate the environment of the scene. As the body is gradually exposed and prepared for removal, its various parts are bagged, labeled, and sealed according to each body section in the same manner as items of evidence. The bones are then placed in boxes to protect them while they are transported to the lab for analysis.



Following the removal of the bones, the excavation continues. A further 10 inches of soil is removed in case small bones or any other evidence may have been left behind. By looking at the **stratigraphy**, or layering of the soil, it may be possible to determine if another grave lies beneath the first one.

The crime scene procedures must be carried out and items found must be recorded by means of photography and video, while a written account is also maintained. Careful adherence to those procedures ensures that the investigation can be reviewed with accuracy at a later date, and also used as evidence in court. It is essential to record the condition and position in which a body was found, and also items discovered with it. When personal documents are discovered with it, it must not be assumed that they belong to the deceased. Various possibilities exist, such as the intentional placing of false documents to confuse investigators.

The position of the body is of great importance. This information can provide a basis for the reconstruction of events leading up to its burial. Since, initially, the means of murder or concealment will be unknown to those investigating the case; the perpetrator will often give a distorted account of what transpired when questioned by the authorities. Accurate information from the grave itself may shed light on the real circumstances of the case.

Exhumations

Persons that are directly involved in exhumations must wear protective clothing. This helps insure that the area that is under investigation is not contaminated by mistake, and protects the health of investigators. As a general rule, the investigators wear a hair cap, while men with beards or mustaches wear facial protection. Gloves and shoe protectors are worn, as well as disposable coveralls.

Minute items of trace evidence are found at every crime scene and subsequently cataloged. This type of evidence includes human hair strands, animal hair, blood spots, dirt, vegetation, fingerprints, sawdust, and a variety of fibers. These types of elements are transferable and may be carried away from the crime scene just as easily as similar ones are carried there by anyone involved in the crime. Strands of hair are easily shed and easily transferred to other elements, including human bodies. The same is true of many fibers.

The passage of time may cause various types of evidence to suffer, as well as other factors such as the elements, when carefully retrieved, they may tell of events that transpired and help identify criminals. Recovered items are sent to the appropriate lab for analysis. However, before this happens, the evidence is carefully and properly bagged, sealed, and labeled. Every time it changes hands, it must be signed for, therefore ensuring continuity in the chain of custody of each item, so that its whereabouts are known at all times. This ensures that evidence cannot be altered or tampered with following recovery.

Cemetery Graves

In some instances it may be necessary to exhume a body from an established grave within a cemetery, usually due to doubt about the cause of death. At this time a forensic anthropologist may be called upon at the time of exhumation, in case the body is skeletonized and handling of the bones is necessary during removal of the remains. The exhumation will not require the same level of preparation and types of procedure employed in the case of a clandestine grave. There may be many other reasons why the exhumation of remains from existing graves may be requested. Some examples might include: to solve a mysterious death, or for repatriation (to send back or return to the country of birth), or because there is a need for reburial.



A body may be skeletonized or well preserved depending upon the type of coffin used, and the environment in which the individual was buried. Whether the remains were buried in the ground or sealed in a vault, and also whether the body was embalmed.

Embalming is a means of preserving a body and may be achieved by a variety of methods. Today, it is employed to allow time for making funeral arrangements, and also to give the deceased a composed and restful pose for viewing. In the past, embalming was accomplished by using arsenic. Now, embalming is achieved by injecting the body with formaldehyde, through the incisions made to reach the carotid artery. As several gallons of formaldehyde are injected into the circulatory system, the

blood is pumped out through the jugular vein until the fixing liquid has replaced the blood completely. This halts the process of decomposition by destroying the bacteria responsible for tissue decay. An embalmed body may remain without visible decay for many decades. However, if moisture enters the coffin, mold and bacteria will induce the decomposition process.

Carrying Out Exhumations

A space will be designated next to the grave where the investigators will work at every exhumation. This prevents any disturbance of the grave site itself as the work progresses. The removal of the soil is accomplished by lifting layers of 10 inches at a time. Soil from each layer is passed through sieves with different sizes of screen to extract any evidence that may have been left behind. The number of soil layers removed will depend on how deeply the body was buried. On occasion the depth may be considerable (often one meter or 39.5 inches) or more. The amount of soil removed will also determine the amount of time needed to complete the exhumation.

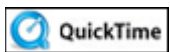
The condition of the remains will determine the time needed to work a grave. Various factors play a role in the decomposition or preservation of human remains. Buried bodies are protected from the elements (weather) and therefore the remains are largely unaltered. This is only true to a point; however, if the soil is acidic in nature, the corpse will tend to decompose more rapidly. Under these conditions a body can be skeletonized within 5 years. In zones where severe winters and long periods of ground freezing occur, the decomposition process will be slowed.

Saponification is another factor that can affect a body after burial. This will occur if the remains are buried in a moist area, or are directly exposed to water and kept free of air for a period of time. During saponification, the fatty tissues of the body are turned into a grayish wax-like substance called **adipocere**. When a body has been left under water for a period of time and has not been consumed by animal action, it will eventually saponify.

Whether the body has saponified or not, the body's natural decomposition will always take place. The human body decomposes at various rates, causing the gradual loss of its soft tissues, including the connective tissues such as tendons and ligaments. Eventually the body will become skeletonized, leaving only the bones with no connections between them.

A condition contrary to saponification is **mummification**.

When a body is buried in an arid environment, and better yet, in a hot sandy area, eventually it will become mummified. This is because the soft tissues will dehydrate rapidly, inhibiting the bacterial growth associated with the decomposition process. When this occurs, the internal organs are well preserved. Scars, tattoos, and other identifying characteristics are well preserved on the dry skin, which eventually adheres to the bones.



The Significance of the Mummification Process (03:14)

Unit Extensions

Careers to Explore:

Forensic Anthropologist
Forensic Artist

Interesting web sites on forensics:

https://a2zhomeschooling.com/explore/chemistry_kids/csi_unit_study_forensics_for_kids/

Conclusion

Anthropologists used to be confined to labs, but with the development of forensic science, they are in the forefront of investigations. Forensic anthropologists study bones, looking for clues that will identify the victim and lead to conclusions about the manner of death. William Bass, a well-known anthropologist, runs the Body Farm where bodies decompose at various rates and in various situations that help investigators learn about decomposition. By learning about the rates of decomposition, investigators can use that information to aid in solving crimes.