

Assignment Discovery Online Curriculum

Lesson title:

Archaeological Detectives

Grade level:

6-8

Subject Area:

Forensic Science, Life Science

Duration:

Two class periods

Objectives:

Students will do the following:

1. Find out what forensic archaeology is
2. Research some techniques that forensic archaeologists use
3. Apply these techniques in uncovering the identity of a victim of a crime

Materials:

- Index cards
- Internet access (optional but very helpful)

Procedures:

1. Write the term *forensic archaeology* on the board or overhead projector. Ask students whether they have any ideas about what forensic archaeology is. Write down their thoughts.
2. Explain to students that forensic archaeology involves techniques used by archaeologists to help solve crimes. Specifically, forensic archaeologists focus on studying bones and teeth to reveal the identities of skeletons. Forensic archaeologists can usually determine a victim's age and sex, whether the body was subjected to trauma, and how long the victim has been dead.
3. Tell students that they will try to do the work of forensic archaeologists. Their job is to find out the identity of a skeleton found in the following scenario. (To convey this information to students, you may copy it on index cards and pass them out or read the paragraph aloud to the class.)

Local construction workers found human skeletal remains while breaking ground for a new apartment complex. When police detectives arrived to investigate, they observed that the skeleton was very fragile, which led them to believe it had been

buried there for a long time. The detectives also realized they needed help to determine the skeleton's identity. The skeleton appeared to be that of a young adult with no missing teeth. The detectives have called in a team of forensic archaeologists to help them figure out the skeleton's approximate age, sex, and possible cause of death.

After students have received the information above, tell them they will work in groups to solve the mystery. Explain that forensic archaeologists look at different aspects of the bones and teeth to determine age, gender, and potential trauma to the skeleton. For example, scientists know that the epiphyses (i-'pi-fa-sEz), or the ends of long bones, fuse to the rest of the bones at specific ages in a person's life. If scientists know that a bone fusion should take place at age 17 but find that it has not done so in a particular skeleton, they may conclude that the person was younger than 17 when he or she died. This technique is most accurate for individuals under 25, the age at which the epiphyses of all the long bones have fused. Other methods include analyzing the pelvis for gender identification, determining whether all permanent teeth have erupted, and assessing the amount of skeletal deterioration, which might indicate overall health and age.

4. Divide the class into four groups. Tell students that each group will examine in depth one aspect of forensic archaeology to determine the skeleton's age, gender, and possible cause of death. To do so, students must first understand what is involved in each aspect of forensic archaeology. Then they can apply that information to the case. Listed below are the topics each group will focus on and some Web sites they can use for research:

- The study of long-bone epiphyses
<<http://www.sfu.ca/archaeology/museum/forensics/age6.html>>
<<http://www.spoilheap.co.uk/hsrspec.htm>>
- The study of ribs and the pelvis
<<http://www.sfu.ca/archaeology/museum/forensics/age5.html>>
<<http://www.spoilheap.co.uk/hsrspec.htm>>
- Assessment of the overall health of bones
<<http://www.sfu.ca/archaeology/museum/forensics/age2.html>>
<<http://www.forensicarchaeology.com/Fa2/Bone/perimort.htm>>
<<http://www.spoilheap.co.uk/hsrspec.htm>>
- Analysis of teeth
<<http://www.forensicarchaeology.com/Fa2/Age/Teeth.htm>>
<<http://www.spoilheap.co.uk/hsrspec.htm>>

5. Tell each group to answer the following questions about the topic:
 - What do scientists look for when studying this part of the body?
 - What does the analysis tell scientists about this part of the body?
 - Is this particular analysis used to determine age, sex, or overall health?
 - For what ages is this analysis most accurate?
 - Based on your information, what preliminary conclusions can you draw about the skeleton?

6. Give students time in class to do the research and answer the questions. After each group has completed its work, tell students that new information about the victim has just arrived. Then give each group an index card that includes new findings relevant to that group's work. The information to be written on the cards for each topic is listed below.
 - The study of long-bone epiphyses:
The epiphyses of most of the skeleton's long bones have already fused.
 - The study of ribs and the pelvis:
The pelvis is low and shaped like a bowl.
 - Assessment of the overall health of bones:
Fractures that have not healed are evident on one arm bone, one leg bone, and one vertebra.
 - Analysis of teeth:
All the permanent teeth have come in, and there is very little evidence of tooth decay.

7. Ask each group to hypothesize about the skeleton's identity. Because each group has been working on one aspect of forensic archaeology, students may be able to identify only the skeleton's gender or cause of death. Tell students to use the information that their group has to develop a hypothesis.

8. Have the groups share their hypotheses and findings. Have the class develop a hypothesis about the crime victim's identity by putting all the facts together.

9. After the class has developed its hypothesis, share with students the actual identity of the victim. Tell students that the victim was a woman about 20 years old who had experienced trauma to the leg, the arm, and the back.

Discussion Questions:

1. Based on your research, how accurate do you think the techniques of forensic archaeology are? What are some of the limitations of using these techniques?
2. Describe what forensic archaeologists look for when analyzing bones and teeth.
3. What qualities do you think a forensic archaeologist should have? Do you see yourself entering this profession or one related to it?

Evaluation:

Use the following three-point rubric to evaluate how well students research different topics, make inferences based on their research, and draw conclusions:

Three points: exhibited strong research skills, above-average ability to make inferences, and above-average ability to draw conclusions.

Two points: exhibited on-grade research skills, average ability to make inferences, and average ability to draw conclusions.

One point: exhibited weak research skills, slightly below-average ability to make inferences, and difficulty drawing conclusions.

Extension:

Uncovering Pompeii

On August 24, A.D. 79, the volcano Vesuvius erupted in Italy. It covered Pompeii and the neighboring city of Herculaneum in deep layers of ash. For 2,000 years the city lay buried. In the 1500s, people who began digging uncovered temples, businesses, homes, streets, and the skeletons of people and animals.

Have students learn more about Pompeii and about how the techniques of forensic archaeology have allowed scientists to determine the ages of the victims of Vesuvius, their cause of death, and their activities before the eruption.

The following Web sites provide information about Vesuvius:

Chemical dating to verify the date of the eruption

<http://archive.nandotimes.com/newsroom/ntn/health/082997/health28_14594_noframes.html>

Causes of death

<http://ipagehealth.subportal.com/health/Safety_and_Public_Health/110012.html>

Daily life in Pompeii and neighboring Herculaneum

<<http://www.etrav.com/pathways/html/pompeii.asp>>

Events leading up to the eruption

<<http://www.discovery.com/news/features/pompeii/pompeii.html>>

After students have completed their research, have each student make a visual display (a poster) of Pompeii that shows a map of its location, a picture of the volcano, or an example of an artifact and have them write a paragraph summarizing what scientists discovered and the techniques they used in their investigations.

Suggested Reading:

The Bone Detectives: How Forensic Anthropologists Solve Crimes and Uncover Mysteries of the Dead

Donna M. Jackson. Little, Brown, 1996.

Using the case framework of a partial skeleton found in the woods, this book introduces the reader to the process of examining human bones for clues to a person's life and death. In this instance, the forensic investigation leads to the identification of the victim and of her murderer. Color photographs help illustrate this fascinating case.

Talking Bones: The Science of Forensic Anthropology

Peggy Thomas. Facts on File, 1995.

Using actual cases and beginning in the mid-19th century, this book describes the development of the study of the human skeleton to help solve crimes. Forensic anthropologists have become experts in the identification of human remains and can determine much from them: whether bones are human or animal, how old bones are, if the human suffered from an illness or was injured, and so forth. Most forensic anthropologists do more than solve crimes; they study ancient human remains and help solve archeological mysteries. Black-and-white photographs, a short glossary, and list of additional readings round out the book.

Vocabulary:

archaeology

Definition: The scientific study of material remains, such as fossils, bones, or relics, that reveal information about the human activity of cultures that flourished long ago.

Context: The field of **archaeology** has enabled scientists to piece together information about life in Pompeii in A.D. 79, when the eruption of Vesuvius buried the town with volcanic ash.

epiphysis

Definition: The end of a long bone of the human body.

Context: One way to determine a person's age a person was when he or she died is to examine whether a long bone's **epiphysis** has fused with the rest of the bone.

forensic

Definition: Material suitable for use in courts of law.

Context: **Forensic** evidence collected at the scene of a crime may include fingerprints, hair samples, and carpet fibers.

forensic archaeology

Definition: The use of techniques of conventional archaeology to uncover physical evidence from a crime scene.

Context: People working in the field of **forensic archaeology** may analyze bones and teeth to determine a crime victim's age, sex, and possible cause of death.

Academic Standards:

This lesson adheres to the National Science Education Standards for students in grades 5-8:

1. Life Science
2. Science as Inquiry

Credit: Marilyn Fenichel, freelance writer and curriculum developer.

DiscoverySchool.com

<http://www.discoveryschool.com>

Copyright 2002 Discovery.com.

Teachers may reproduce copies of these materials for classroom use only.