



BLACK ROCK DESERT
HIGH ROCK CANYON
EMIGRANT TRAILS



NATIONAL CONSERVATION AREA

LASSEN-CLAPPER MURDER SITE

Forensic Anthropology

Grade Level: Middle and High School

Purpose: The purpose of this lesson is to give students the opportunity to explore the field of forensic anthropology, the science used to investigate the Lassen/Clapper murder mystery.

Objectives: The student will be able to define what forensic anthropology is; research some techniques that forensic anthropologists use; apply these techniques in uncovering the identity of a victim of a crime.



Nevada State Standards:

The Nature and History of Science Content Standard 18.0: Scientific, Historical, and Technological Perspectives—Students understand that science is a unique way of knowing about things. Many men and women have contributed to the traditions of science. The ability to pursue activities and careers in science is accessible to people from all cultures and abilities.

Scientific Inquiry: Processes and Skills Content Standard 21.0: Scientific Values and Attitudes—Students understand that science is an active process of systematically examining the natural world.

Materials:

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

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.

Anticipatory Set: Write the term forensic anthropology on the board or overhead projector. Ask students whether they have any ideas about what forensic anthropology is. Write down their thoughts. Explain to students that forensic anthropology involves techniques used by archaeologists to help solve crimes. Specifically, forensic anthropologists focus on studying bones and teeth to reveal the identities of skeletons. Forensic anthropologists can usually determine a victim's age and sex, whether the body was subjected to trauma, and how long the victim has been dead.



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- Anticipatory Set (cont.):** This is the field of science used to investigate the Lassen/Clapper murder mystery. The murder took place in 1859 but it wasn't until 1992, 133 years later, that the body was "found." It took a team of specialized scientists, forensic anthropologists, to study the remains of the body and identify it. Tell students that they will try to do the work of forensic anthropologists. 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.).
- Developing the Lesson:** After students have received the information above, tell them they will work in groups to solve the mystery. Explain that forensic anthropologists 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.
- Divide the class into four groups. Tell students that each group will examine in depth one aspect of forensic anthropology 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 anthropology. Then they can apply that information to the case. Each group should Google "forensic anthropology + their topic" (epiphyses, for example).



Listed below are the four group topics and an additional website that can be used for research.

- <http://www.spoilheap.co.uk/hsrspec.htm>.
- The study of long-bone epiphyses (epiphysis fusion).
- The study of ribs and the pelvis.
- Assessment of the overall health of bones (age, bone).
- Analysis of teeth (forensic odontology).



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Each group should answer the following questions about the topic:

1. What do scientists look for when studying this part of the body?
2. What does the analysis tell scientists about this part of the body?
3. Is this particular analysis used to determine age, sex, or overall health?
4. For what ages is this analysis most accurate?
5. Based on your information, what preliminary conclusions can you draw about the skeleton?



Give students time in class to do the research and answer the questions. After each group has completed its work, or after a certain time period, 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.

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.

Closure: 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. 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 are some details in the Lassen/Clapper case that would make using these techniques difficult?
4. Based on what you've learned, describe what the condition of the Clapper's skeleton would have looked like when it was found 133 years after his murder.



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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 anthropology 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:
 - 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>

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



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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:

Anthropology: 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: 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: 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 anthropology: 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.



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