



Integrity: Fossils and Artifacts Lesson

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Overview

The theme for this week is integrity. We deal honestly and respectfully with the public and one another. History is sometimes a hard subject to discuss because there have been countless violent and oppressive events even right in our own communities. As a historic park, it is our job to use archeology and paleontology to learn about this history and share it with future generations honestly and respectfully. As philosopher George Santayana once said, “those who cannot remember the past are condemned to repeat it.”

Learning Objectives

- YCC precipitants will know the difference between paleontology and archeology.
- YCC precipitants will have a basic understanding of general information about fossils.
- YCC precipitants will have a basic understanding of general information about artifacts.

Materials Needed

- 1 blank piece of paper for each student.
- Colored pencils/markers
- Writing utensils (pencils or pens)

General Outline

1. Fossils

- Discussion questions*
- Basic information*
- MONO*

2. Artifacts

- Basic information*
- Discovery process*
- MONO*

3. Activity

Background (for park employee benefit)

Paleontology is the study of natural history, and archeology is the study of human history. Both are constantly at play at a national historic park like MONO. No fossils have yet been found within MONO's borders, but some found nearby bring hope for future studies. MONO has a rich archeological history, as artifacts from the Civil War era shed light to what happened before, during, and after the battle.



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Procedure

1. Fossils

a. Discussion questions

- i. Ask the YCC precipitants: “What are the best ways that we learn about human history?”
 1. Written history
 2. Oral history
 3. Surviving family
 4. Built history
 5. Artifacts and heirlooms
- ii. Ask the YCC precipitants: “Do we have ways to learn about natural history?”
 1. Evolved traits
 2. Native species
 3. Genetic data
 4. Fossils

b. Basic information

- i. Fossils are the preserved remains or traces of once-live organisms.¹ They come in all shapes and sizes, from massive dinosaur bones to the delicate impression of a fern leaf. They are non-renewable resources that bring geologic history to life from an interpretive perspective.
- ii. Paleontology is the field of science that discovers and studies fossils. Paleontologists help us understand the evolution and the history of life on Earth, as well as ancient ecosystems and climates.
- iii. *Types:*²
 1. Body fossils: remains of an actual organism. Examples: shell, leaf, or bone.
 2. Trace fossils: records the action of an organism. Examples: footprint or burrow.
- iv. *Formation:* very rare event; most organisms die and decay to leave no remains. From most to least common, these processes include:³
 1. Petrification: the organism is quickly buried after death. The organism’s soft tissues decay in the sediment. Water then trickles through the ground and penetrates the shells, bones, or plant

¹ NPS. “Frequently Asked Questions: Fossil Day.”

² *ibid.*

³ Castro, J. (2015) “How Do Fossils Form?”



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structures. The minerals in the water replace the existing material, and after some time the shells or bones turn to stone.

2. Carbonization: the organism is quickly buried after death. The heat and pressure from the mounting sediment (mud, sand, volcanic ash) cause the tissue of organisms (from plant leaves to the soft body parts of fish) to release hydrogen and oxygen, leaving behind a residue of carbon, which creates a detailed carbon impression in sedimentary rock.
3. Mold: an organism dissolves in sedimentary rock, but it leaves an impression of its exterior in the rock. The mold can be external (in the rock) or internal (the shell or skull carries the imprint). If that mold gets filled with other minerals, it becomes a cast.
4. Encasement: if an organism is quickly frozen, dried, or encased in tar or amber, so its entire body is preserved, including bodily tissues. The most famous example is the mosquito trapped in amber in the Jurassic Park movies.
5. Video: [Fossils 101](#)⁴
- v. *Dating*: to get a sense of when the fossilized organism lived, we can date them through two processes:⁵
 1. Relative dating: between two fossils, we can tell which one is older and which one is younger by the depth at which they were found, as long as there has been no inversion of the rock layers has occurred. Sedimentary rock is formed through deposited layers of sediment, so older specimens are found in deeper regions. A Triceratops would not be found at a region closer to the Earth's surface than a human in the same place.
 2. Absolute dating: radioactive elements in rocks are unstable and change over time into a more stable element. This decay occurs at a steady, constant, predictable rate for each element. Scientists find the rate of decay and then measure the amount of the unstable element left compared to the amount of stable element present. Examples include radiocarbon and uranium-lead dating.
- c. *MONO*⁶
 - i. MONO has not had a formal paleontological inventory.

⁴ National Geographic. "Fossils 101."

⁵ NPS. "Frequently Asked Questions: Fossil Day."

⁶ Thornberry-Ehrlich, T. (2008) "Monocacy National Battlefield: Geological Resource Evaluation Report."



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- ii. However, fragments of trilobite fossils have been found in locations northeast and northwest of MONO. Dating back to the early Cambrian age, this is considered among the oldest fossils found in the Piedmont plateau, the region in Maryland between the Atlantic coastal plain and the Appalachian Mountains. Therefore, there is potential for future fossil discoveries within the park.
- iii. All NPS fossil resources are protected under the Paleontological Resources Preservation Act of 2009.⁷ This policy directs the Department of Agriculture and the Department of the Interior to create and implement comprehensive management programs for their paleontological resources.
- iv. NPS has the authority to conserve and manage resources in parks from the NPS Organic Act of 1916. This document states that the fundamental purpose of the parks is to conserve the scenery, the natural and historic objects, and the wildlife present within their boundaries. The aim is to ensure the enjoyment of these resources in a way that will leave them unimpaired for the enjoyment of future generations.

2. Artifacts

a. Basic information

- i. Artifacts are human-made objects. Examples includes arrowheads, pottery, jewelry, etc.
- ii. Archaeology is the field of science that studies artifacts to understand people and their cultures. Archaeologists allow us to learn from past societies, which is most crucial when there are no comprehensible written documents left behind.

b. Discovery process⁸

- i. Archeologists don't just start digging in random places hoping for a historic goldmine! Just like any other scientific field, they have methodologies:
 1. Research questions: these establish the goals for the study. It may include: what did the landscape look like in Colonial times? How did the lines of battle progress during a Civil War battle?
 2. Historical research: this gives scientists an insight into the existing knowledge of the region of study. Be it talking to residents whose families lived there for generations, looking at old documents and photographs, or even looking at land records.

⁷ NPS. "Laws, Regulations, & Policies: Paleontological Resources Preservation Act."

⁸ NPS. (2015) "How Do Archeologists Find the Cool Stuff?"



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3. Physical landscape study: it educates scientists on where the artifacts may be located, what collection methods will work best, how many people they will need, and how long it will take.
4. Field survey techniques: they are unique to each field studied. At MONO, for example, they have used surface collection, metal detecting, backhoe trenching, shovel test pits, and excavation units.
5. Provenience: documenting the item. The artifact is given a unique code, and the depth at which it was found is recorded, as well as the method used, the specific location in a map, among other data.
6. Catalog: the item is cleaned, numbered, and catalogued. More data is recorded about the item, such as material, size, color, weight, and original intended use. This data is entered into a database, geocoded, and the items are bagged and grouped by provenience and kept in a safe storage facility.
7. Analysis: finally, the archeological data is analyzed in reference to the initial questions posed. The analysis considers the type of artifacts, their relationship to the landscape, the features that were found, and whether new questions arise from the study.

c. *MONO*⁹

- i. Artifacts found in NPS land are protected by the National Historic Preservation Act of 1966, the Archeological Resources Protection Act of 1974, and the Native American Graves Protection and Repatriation Act.¹⁰
- ii. Since 2001, NPS archeologists, in collaboration with the University of Maryland, have been trying to learn more about the people that lived, fought, and died at MONO. The landscape has many human stories to tell; a rich and diverse history that spans over 10,000 years.
- iii. MONO is responsible for preserving the historic buildings and landscape that make up the park. Historic buildings are preserved, stabilized, and restored with their original form in mind. Whenever a new structure is constructed, be it trails, parking lots, or the new visitor center, archeological research is often needed to ensure that such activities do not adversely impact archeological resources.
- iv. Some archeological projects at MONO include:
 1. Best Farm: comprises the southern portion of the “L’Hermitage” plantation, occupied in 1790. Numerous projects focused on early occupations of the farm discovered many structures and features,

⁹ NPS. (2015) “Archeology at Monocacy.”

¹⁰ NPS. “Laws, Regulations, & Policies: Paleontological Resources Preservation Act.”



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including a slave village. Excavations also found an early-Civil War encampment near the visitor center.

2. Thomas Farm: plantation and farmstead built in 1780. Numerous projects have located areas of interest, including a mid-18th-century tavern site and a possible blacksmith shop. Archeology is vital to the on-going restoration of the Thomas Barn.
 3. Worthington House: farmhouse built in 1851. A project gathered information about undocumented porches on the side and rear elevations before an exterior restoration and rehabilitation of the house began to better inform efforts.
- v. Video: [Archaeologists use radar device to uncover slave village at Monocacy National Battlefield](#)¹¹

3. Activity

- a. Tell YCC precipitants: “Imagine it is 2525. Humans have moved on to colonize other planets, and extraterrestrial beings have landed in your hometowns. Climate change has completely changed the landscape of the planet, and it is all sand and mud. The newcomers hope to find some living plants, proof that life can survive in this deserted planet. Instead, they come across each of your belongings. On your paper, draw 5 items that you think would accurately describe who you are as a person. It can be your favorite pastime, favorite clothing article, anything that would withstand the passage of time. They can’t decode much writing, so focus on your drawings! You have 7 minutes. Don’t write your name!”
- b. Once everyone is happy with their drawings, give each student a random student’s drawing. Tell them: “Okay, now based on what you see on the paper, describe this person’s typical day. What do they like to do? What do they prize the most? Remember, you have never met a human being. You don’t know what any of these objects are. You have 5 minutes. Archaeologists don’t try to find who the owner of the items were, they are trying to learn about their community’s way of life.”
- c. After everyone is done, they can share their interpretations with the group.

¹¹ Frederick News Post. (2010) “Archaeologists use radar device to uncover slave village at Monocacy National Battlefield”



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References

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