# Create Your Own Marine Fossil!




**Goals:** Students will build a connection between the ocean and the land that surrounds them. By engaging with fossils students will build an understanding of the ocean and marine life through geology and paleontology. This activity also aims to incorporate art as a hands-on and creative means to immerse students in complex scientific concepts.

**Grade(s):** K-2, 3-5

**Standard(s):**

*3-LS4-1.* Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

*4-ESS1-1.* Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

*CCSS.ELA-Literacy.W.4.8:* Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources

## Themes/Subjects:

- Earth Science
- Biology (Marine)
- Geology (Paleontology)
- STEAM

## Learning Objectives: Students will be able to:

- Learn how the ocean is connected to the land.
- Understand the different types of fossils by creating ones of their own.
- Learn the geologic processes that bring evidence of marine life from the bottom of the ocean to rocks on land.
- Reconstruct past marine environments by studying fossil records and comparing them to the modern day.
- Guide inquiry and engagement through arts and crafts to develop a tangible understanding of marine and geologic science.

### Artistic Objectives:

1. Use clay and coloring materials to create impressions of marine animals.
2. Utilize images and physical objects to create a representation of nature.
3. Take inspiration from a natural process through sculpture.

### Scientific Questions:

1. How is the ocean connected to the land and rocks?
2. What is a fossil?
3. How are fossils created?
4. Where do we find marine fossils, and how do they connect to the ocean of the past and present?

## Materials:

**Air Dry Clay** (can be found at Walmart, Michael's Arts & Crafts, Dollar General, or other craft stores. Average Price: $4 USD).
**Various sized seashells, craft shells, fossils etc.** (can be

found at Walmart, Michael's Arts & Crafts, Dollar General, or other craft stores. Average Price: $7 USD)
**Parchment Paper** (can be found at Walmart, Michael's Arts & Crafts, Dollar General, or other craft stores. Average Price: $2 - $3 USD

**Optional: Non-toxic Colored Markers, Paint, and Paintbrushes** (can be found at Walmart, Michael's Arts & Crafts, Dollar General, or other craft stores. Average Price: $5 USD).



## Vocabulary List:

- **Fossil (noun)**: the leftovers of organisms found in rock from millions of years ago, like dinosaurs!
- **Mold (noun)**: the buried organism dissolves, leaving behind its shape in the rock.
- **Cast (noun)**: small bits of rock in water fill in the mold and turn into a rock in the shape of the organism.
- **Sediment (noun)**: small bits of rock, like sand or clay.
- **Sedimentary rock (noun)**: rocks made with sediment that are held together by a natural glue or cement
- **Burial (noun)**: an organism is covered by sediment and has its flesh rot away to the bones.
- **Uplift (noun/verb)**: when the Earth's surface moves, and rock is pushed up and exposed.
- **Erosion (noun)**: when wind and water wear down rock to reveal a fossil.
- **Marine (adjective)**: used to describe something related to the ocean.
- **Geology (noun)**: the study of the Earth as a rock. Scientists who study this are called geologists.
- **Paleontology (noun)**: the study of ancient organisms found in fossils. Scientists study fossils to understand what life looked like long ago.
- **STEAM (noun)**: Science, Technology, Engineering, Art, Math. Similar to STEM, STEAM emphasizes art as a way to think critically and creatively. This can make learning less about remembering facts and numbers and more about engagement learning.

NAUTILUS LIVE
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# Background Information:

## How is the ocean connected to the land and rocks?

For many who don't live close to the coast, the ocean is almost a world away. But if we look in places familiar to us, we can see its history in many places, written in the rocks. If you have ever used chalk on a chalkboard, found a shell in a stone while roaming a stream, or stared at rugged cliffs along a highway, then you are looking at an ancient sea that was full of life, familiar and strange to us. The ocean and geology are interconnected. The seas produce sediment and matter from living things that are preserved in rock such as limestone. Over long periods, we see these rocks form the land we live on. We can learn more about the seas by looking at marine fossils. In this activity, we will learn about how they are created and how we can use fossils to make discoveries about the oceans.

## What is a Fossil?

**Fossils** are the leftovers of organisms found in rock from millions of years ago. They are remains of a time in Earth's history when life and the environment looked much different from today. Scientists (called paleontologists) study fossils like ancient seashells or dinosaurs much like how we learn history in books. By "reading" the fossils in rocks, paleontologists can learn about what the ocean looked like long ago. They can help record time, evolution in animals, sea level rise, and climate change. They can be found in places like stream beds, cliffs along highways, and underground. Seashells on the beach are not fossils, because they have not been buried by sediment and gone through fossilization.

## How are Fossils Created?

There are many types of fossils, but most are made in the same way. A living thing, say a fish living in an ancient coral reef, dies and falls to the bottom. Through **burial**, the fish is covered with small bits of sand, clay, or chalk called **sediment**. The fish's soft parts rot down to the bone, and the sediment over millions of years is buried deep and turned into **sedimentary rock**. All fossils are found in this type of rock. The fish's bones are eaten away by water in the rock, leaving behind a **mold** of the fish. With more time, water will bring back new sediment to the mold and fill it to create a **cast**. Millions of years will continue to pass, during which the Earth's surface moves around and pushes up or **uplifts** the deep rock to the surface. Wind and water through rain or waves will break down the rock surrounding the fossil through a process called **erosion**. Now, people today can find it after millions of years! It takes a really, really long time to actually see a fossil.

## How do Fossils Connect to the Ocean of the Past and Present?



Credit: Ocean Exploration Trust

In 2022, *E/V Nautilus* picked up a stone that contained a pleasant surprise: inside was a 3.5-million-year-old megalodon shark tooth! This marine fossil was found near Johnston Atoll in the Central Pacific Ocean, which is a protected area because of the large number of sharks that live there. Finding this tooth informs scientists on what the ocean environment looked like in the distant past, and that this part of the ocean has been diverse and abundant with sharks for millions of years.

This is an example of how we can engage with the ocean through fossils. We can reconstruct Earth's history by understanding how these animals lived, died, and moved about, all by studying rocks. It is because of this that anyone can be a scientist and learn more about the sea by taking a closer look at the rubble around us.

### Additional Resources for Ideas or Information:

- Search for education materials and watch the live streams on NautilusLive.org for more information and inspiration.
- E/V *Nautilus* Discovering a Megalodon Tooth Fossil
- E/V *Nautilus* Exploring Ancient Shorelines in The Channel Islands

# Educator Guide

### Pre-Activity Discussion: (5 mins)

1. Invite student to share their prior knowledge using questions like those below:
    - Has anyone been to the beach?
    - What might you find when you walk along the beach?

2. On a classroom chart, record student responses. Be sure to write them out as they are shared with student language, the introduction is not the time to teach content.
    - You can label this class constructed list " *Before, I think…*" so that the class can return to it once they are finished with their own fossils.
3. Share that today students are going to replicate the process that takes place when a creature becomes fossilized

## Exploration: (5 mins)

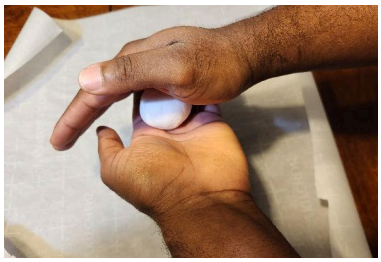
1. If you have a way to show students fossils you may pass some out for them to look at, if not you can share photos of fossils on the board or books with pictures. Students might know what they are, remind them that the goal isn't to know all the
2. information but to develop more curiosity about them. As students what they notice about the fossils or the pictures of fossils. Have students share with their seat partner. Some questions can include:
    - What do you notice about these things?
    - Where have you seen things like this before?
    - What does it remind you of?
    - What do you wonder about these objects?

## Concept Invention: (25 mins)

1. Tell students that these objects are fossils! And that they are going to get a chance to make their own fossil today!
2. Read to your class the background information on fossils in this lesson plan. When you finish reading tell them they are going to follow along and make their own fossil!
3. Establish group expectations:
    - Treat others the way you want to be treated ***Respect***; if you don't like to be tattled on, then don't tattle on someone else.
    - You are ***Responsible*** for you.

## Making a Fossil!

1. This lesson may take more than one class period, depending on how long your clay takes to dry. Also, if you decide to paint your fossils, you will need to allow enough time for them to properly dry.
2. Tear off enough parchment paper to create a nonstick workplace for your clay.
3. Create a flat shape with your clay. Roll it into a ball, squish it flat, and shape it how you like but not too flat.





4. Take a shell and press lightly into the clay.
    - Tip: if your clay appears to be a little too sticky, allow it a little time to dry before imprinting your shells, about 10 to 15 minutes.



5. Place your finished fossils on parchment paper, directly in the sunlight if possible. Allow your fossils to dry for about 30 to 40 minutes or overnight so that they can fossilize!



6. Optional: Get ready to decorate! Save your parchment paper to create an easy clean-up workspace. Take your non-toxic marker or paint of choice and a paintbrush and color your fossil how you like.
    - Tip: for a faster drying process, try using acrylic paint or colored markers.



## Additional Activities and Extended Lessons:

- Collect shells on your next trip to the beach or a stream for this lesson. Always be respectful of the laws, regulations, and cultural customs surrounding collecting natural resources from places.

- You can also create a cast fossil using these same materials. Mold your clay around a shell and let it dry. Once it's devoid of moisture, split the mold in half, and take out the shell, letting it dry on the inside. Fill the mold with a different colored clay to



create a cast. Let this dry and peel the mold from the surrounding cast. Use this additional activity to discuss the process of creating cast fossils and permineralization.

Return to the list that students created in the beginning, what can they add to the list now that they have made their own fossil.