

**Background:**

**How are Fossils Formed**

Most of the fossils that you will find in northeastern North America were formed through one of the two main processes – permineralization and impression (cast and mold). Plants are preserved as fossils less frequently than are animals, although both processes for fossilization are similar for both plants and animals. Permineralization is especially common in fossilization of ancient animals like trilobites and corals, and both plants and animals make fossil impressions, by far the most common form of fossil. A third way that plants are preserved is through coalification. Fossilization of soft parts occurs best where there is little or no oxygen to support bacterial growth. But where on Earth is there no oxygen? Likely places include the muck at the bottom of a freshwater pond and in deep or poorly circulating areas in marine environments. Another helpful condition for fossilization to occur is a lack of disturbance in the area so that the plant is not knocked around, broken, or moved to the surface of the water.

**Impressions (Cast and Mold Fossilization)**

Impressions are made when a plant or animal is buried in sediment that solidifies over time. If the organism is not crushed by the weight of the sediment around it, a mold will be left after the plant or animal rots or dissolves away. Molds of ancient marine creatures are common in the fossil-rich northeastern United States. Molds may be internal or external. Internal molds are formed when sediment fill the shell or body cavity of an organism after it dies. Over time. The sediment turns to rock. When the shell erodes, or dissolves away, an internal cast is left. External molds, or impressions are also common. They are formed when a plant or animals is pressed into the soft substrate. And external likeness of the organism’s shape remains in the substrate, which over time transforms to rock.

Karen Edelstein, *Lasting Impressions: A Guide to Understanding Fossils in the Northeastern United States* (Ithaca, New York: Cornell Cooperative Extension, 1999). Written in collaboration with the Paleontological Research Institution.

**New York in the Devonian: A Brief Account**

The Devonian Period extended from approximately 418 to 361 million years ago (Ma). At the start of the Devonian, the North American protocontinent was located at the equator, with much of what would become New York State at 25° to 30° S latitude. At that time, most of the continent was covered by a shallow tropical sea, with emergent land located to the east (all directions in present sense) is now New England and the Maritime Provinces of Canada.

Karl A. Wilson, *Field Guide to the Devonian Fossil of New York* (Ithaca, New York: Paleontological Research Institution, 2014).

**Materials:**

- Modeling Clay (one small ball per student) \*
- White glue \*\*
- Various natural object for making impressions
- Small paper plates (one per student )
- Optional: Printed Observation Pages (below)

\* Both air-dry and non-air-dry clay work well. Playdough is a possible substitute but does not produce “clean” molds. Other modeling compounds such as Crayola’s “Model Magic” do not work.

\*\* Both white glue and clear glue will work for the project. White glue is preferred because it is obvious when it has dried.

## Procedure:

- 1. Introduction:** Overview of the process of fossilization. Highlight the abundance of marine fossils in New York State. Opportunity to discuss the NYS paleo environment (marine) and draw comparisons between the modern environment.
- 2. Object Examination:** Hand each student the object they will be using for the impression activity. Next, ask them to make observations about the object relating to its size, shape, color, etc. This could be done through a think, pair, share or on the provided activity sheet. The intention of this portion of the activity is to encourage children to make comparisons between the three stages of the process.
- 3. Clay Impression:** Each student begins with a small piece of modeling clay and a paper plate. Instruct the students to roll their piece of clay into a ball with their hands. Once rounded, the clay can be flattened onto their plate using a flat object or their hand. Once the ball is flattened, instruct student to press their object into the clay, being careful not to move the object before lifting it back out of the clay, leaving an impression. Note: deeper impressions take longer to dry. Discuss this step as it relates to the process of fossilization.
- 4. Impression Examination:** Students take 3-5 minutes to examine this step in the process. This time they will be making observations of the impression made by the object. Ask them to be descriptive when discussing with their partner and / or detailed in their drawings and notes on the observation page.
- 5. Making the Cast:** Instruct students to fill the impression cavity with glue. It is best to keep the glue contained in the impression, but excess can be cut off later. Keep the mold on the paper plate to reduce mess.
- 6. Wait time:** The mold will take approximately 24 hours to dry. Once the glue has turned entirely clear, it is ready to be removed.
- 7. Removing the Cast:** Dried casts can be pulled easily out of the mold with your hands, being careful not to rip thin sections of the cast. Some casts may need more time if wet glue is revealed. Dry casts can be washed with warm water if necessary.
- 8. Final Observations:** Students take 3-5 minutes to examine and make observations of their cast. Ask them to be descriptive when discussing with their partner and / or detailed in their drawings.

## Procedural Images:



<b>OBJECT</b>	<b>MOLD</b>	<b>CAST</b>
<p>Draw It:</p>	<p>Draw It:</p>	<p>Draw It:</p>
<p><b>Notes:</b> Think about the object. What color, shape, size and weight is it?</p>	<p><b>Notes:</b> Think about the mold. What color, shape, size and weight is it?</p>	<p><b>Notes:</b> Think about the cast. What color, shape, size and weight is it?</p>