Use clay and plaster to make your own "fossil" cast!

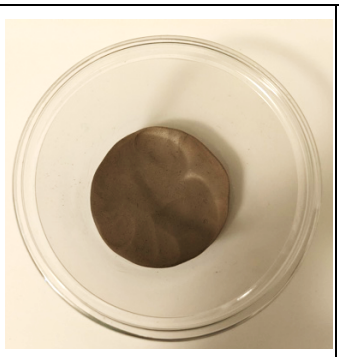
Materials needed:

Plaster
Natural clay
12oz cup for mixing
9oz cup for casting
4oz cup for measuring
Stir stick
Figurine or object for impression
Water

YouTube **VIDEO INSTRUCTIONS** at SciWorkshop.org/KITS

1. Put paper towels down on your table to make clean-up easier

Roll a handful of clay into a ball. Smoosh it into the bottom of the medium (9oz) cup. Smooth the surface flat.



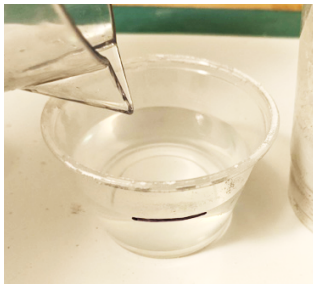
2. Pick a plastic figure or something *small* you'd like to use for your fossil -- a toy, leaf, jewelry, or any interesting or meaningful object. It will get dirty so pick something that you can wash off afterwards. **Press it down into the clay.**

3. Pull it out and look at the shape it left in the clay. This is the mold you will cast into. Smooth out any jagged edges with a finger. Are you happy with it? If not, you can smoosh it down and try again!

4. Scoop up **one small cup full** (4oz) of plaster powder. Level it, and carefully dump it into the big empty cup. (double the mixture to make two fossils at once)
CAUTION: ***watch out for plaster dust. Be careful not to breath it in or get it in your eyes***

5. Using the same small cup, fill half-way with water (2oz)

Add measured water to the big cup.



6. Using the stir-stick **quickly and carefully mix the plaster and water.** Get all the way down to the bottom and stir until there are no lumps. A chemical reaction starts when you add the water, and the plaster will soon harden. While it is still liquid **pour it on top of the clay**.

7. Tap and gently jiggle the mold before the plaster hardens. This helps the plaster get into all the nooks and crannies of the clay. Little air bubbles stuck in the plaster work their way out.

8. Let it sit at least 20 minutes. The plaster will continue to harden over the next 24 hours. The longer you wait, the stronger it will be!

If you think *this* is a long wait… REAL fossils take tens of thousands of years to form!

20 minutes

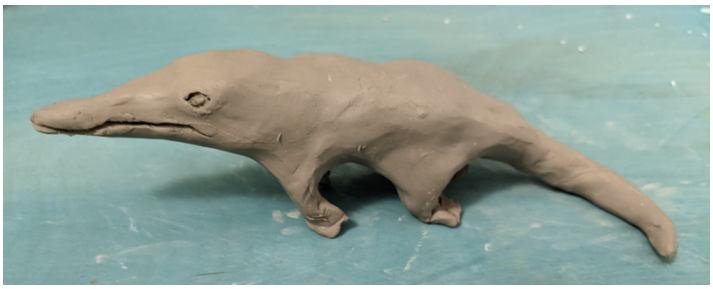
9. When the plaster is rock hard, turn the cup over and push on the bottom until the "fossil" pops out of the mold!

10. Traces of clay can be left on the plaster or washed off gently with water and a soft brush. Plaster can be painted and drawn on.

To re-use the mixing cup wait until any plaster left over dries, scrape it out, and throw it away.

The clay will dry out if left out. To keep it soft put it in an air-tight plastic bag.

Re-use your clay and make another fossil cast…. or use it to sculpt your favorite pre-historic animal!
Here is the skeleton of an ancient relative of whales, Ambulocetus, and a homemade clay model. Scientists and artists work together to show what extinct animals might have looked like.



Did you know that people have been using plaster for art and building for *9,500 years*? Painting on plaster is called a *fresco* and was a popular form of ancient mural art!

THE SCIENCE OF FOSSILS (PALEONTOLOGY)

Much of what we know about life on earth long ago comes from fossils! Fossils are the remains, traces, or imprints of an ancient plant or animal that has been preserved in the earth's crust.

There is still *much to discover* about life millions of years ago because fossils of most types of animals and plants are rare. Almost all living things decompose leaving no trace. For a fossil to be discovered a long chain of events needs to happen over "deep time"…

Steps to becoming a fossil

1) First the plant or animal dies
2) It must avoid being eaten, torn apart, or digested!
3) It helps to **have hard body parts** such as bones, a shell, claws, etc. These parts don't decompose quickly. Soft squishy animals like jellyfish, worms, or octopus are rarely preserved as fossils!
4) **Get buried quickly in deep sediment** (soil, sand, mud, ash, or dust). So deep that scavengers and bacteria can't easily reach. The bottom of silty lakes, shallow seas, tar pits, downwind of volcanic explosions, and bogs are the best places
5) **Get buried more….and become petrified!** Over thousands of years heavy layers of soil and sand pile up. Their weight compacts the sediment around the fossil and turns it into rock, helped along by chemical changes. Mineral-rich water seeps inside pores and cells and crystalizes. More and more of the original animal or plant gets filled in with minerals like calcium carbonate or silica. This is called *permineralization*. The plant or animal tissues may eventually be replaced completely – this is called *petrification* (being turned to stone!)
6) **Avoid getting recycled by geological forces**. The earth's crust is constantly being recycled. If the fossil is near the edge of a tectonic plate, where the earth's crust is being pulled under, it will be destroyed by heat and pressure (turned into metamorphic rock). If it reaches a high enough temperature it will melt into magma and become igneous rock
7) **Get uplifted and weathered** The fossil layer must be lifted up from deep under the earth by the movement of the earth's crust, and by the weathering away of all the rock above it. This process can take hundreds of millions of years!
8) **Be discovered!** A curious person might notice the fossil as they dig in the ground or go on a hike. A scientist might break open rocks in an area where fossils are likely to be found.

Carboniferous fossils of Pennsylvania

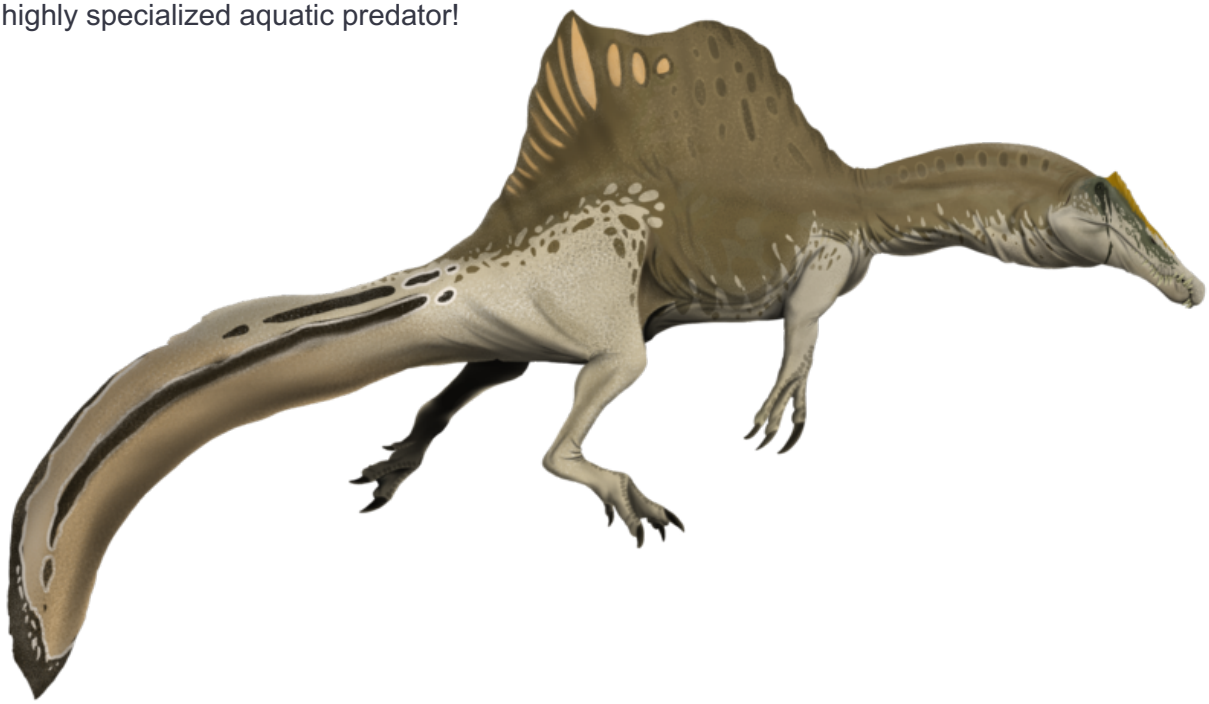
Did you know that 300 million years ago the area around Pittsburgh had a hot, tropical climate?! At that time Pittsburgh was close to the equator and it was wet, swampy, and full of plant life! Giant insects flew through the air, mushrooms flourished, and large salamander-like amphibians roamed the land. Fern-like plants grew 33 feet tall. When the plants died they piled up in the muck at the bottom of the swamp. Over millions of years these carbon-rich plants were heated, squished, and transformed deep in the earth into coal, oil, and natural gas. That's why these sources of energy are called "fossil fuels". They are non-renewable resource because they require millions of years to form. You can discover plant fossils from this time period, if you know where to look! (see Resources)

In Pennsylvania you can also find Trilobite fossils from the Devonian era ~400 million years ago! Trilobites are cute little creatures that once were the most common and diverse animal on earth. They have segmented bodies and compound eyes and lived on the sea floor. Some were tiny, others two feet long. They filled many ecological niches as predators, scavengers, and filter-feeders. They died out in the earth's largest Mass Extinction event 250 Million years ago. Over 20,000 fossil species of trilobites have been identified with more still being discovered and named!

Deep Dive: New Discoveries

People who study fossils (*paleontologists*) are always making new discoveries and testing theories. New scientific studies are published every month. Keep an eye on science news to find out what's been discovered!

Spinosaurus is the largest carnivorous dinosaur found to date – larger than Giganotosaurus and T. Rex! The most complete skeleton of Spinosaurus was destroyed in World War 2 and paleontologists are still piecing together details about its body form and lifestyle. Studies of the tail bones suggests that it was broad and paddle like. Dense bones, like those of a penguin, also suggest that the dinosaur was aquatic. How much time did Spinosaurus spend in the water? Did Spinosaurus swim? Recently scientists built a robotic version of a Spinosaurus tail to test its swimming ability! They moved the tail back and forth underwater, measured the amount of thrust it generated, and compared it to a crocodile, newt, and other animals. They concluded that the largest carnivorous dinosaur *was* able to propel itself through the water….and was a highly specialized aquatic predator!



Resources

Types of fossils you are likely to find in Pennsylvania
https://www.dcnr.pa.gov/Education/GeologyEducation/IdentifyingandCollecting/

Finding fossils near Pittsburgh
https://www.fossilguy.com/sites/ambridge/index.htm

Nature article on Spinosaurus swimming
https://www.nature.com/articles/s41586-020-2190-3

Chemistry of Plaster
https://funscience.in/plaster-of-paris/