



June PNG: DIG DEEPER!

Hi PNGers! Hope you're ready to Dig Deeper this week!

If you have any questions, please reach out to your Librarian Liz:

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Week 2: Dig Deeper for Fossils!

This week we're digging deep into the fossil record. You get to make your very own fossils!

Your kit has 3 activities:

- Make a Mold Fossil (do this BEFORE making a cast fossil!)
- Make a Cast Fossil
- Amber Preserved Fossil Lollipops



Go online for demo videos and lots of cool
paleontology resources!
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DIG DEEPER for Fossils:

What even *is* a fossil?

A **FOSSIL** is physical evidence of a prehistoric plant or animal. This may be their remains or other traces, such as marks they made in the ground while they were alive.

Types of fossils include:

- **BODY FOSSILS** like bones, teeth, and shells
- **TRACE FOSSILS** like footprints, imprints of skin or feathers, and poop. Preserved poos are **COPROLITES!**
- **AMBER**, which is fossilized tree resin.

There are different processes of fossilization! Here are some.

- **PREMINERALIZATION** fills bone with stone. This is how most bones become fossils. Bone is highly porous because of the space needed to hold tissues like marrow. After a bone is buried, the pores can fill with minerals from ground water, forming a fossil.
- **CARBON FILMS** form when an organism leaves behind a thin layer of carbon.
- **PRESERVED REMAINS** record intact remains of animals and often include skin, muscle, bone, hair and organs. They form when an entire organism is encased in materials like ice or ash or buried in peat bogs.



Fossils are rare! Most remains just rot away completely. Nearly all fossils found are of marine life, because sand or mud could quickly bury them. Most dinosaur fossils are from animals that lived near a lake or river.

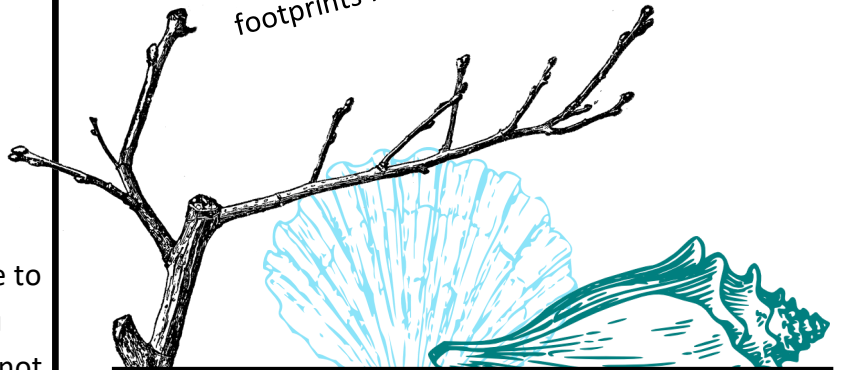
DIG DEEPER for Fossils:

Make a Mold Fossil!

FOSSIL DOUGH RECIPE

- In a cup, mix about **1 Tablespoon instant coffee** into **¾ cup water**.
- In a large bowl, mix together:
 - **1 cup flour**
 - **1 cup coffee grounds**
 - **½ cup salt**
- GRADUALLY add the instant coffee mixture to the bowl, mixing with your hands until you reach the desired consistency. (You might not use all the coffee. You should be able to form a ball easily. The dough should not be wet and sticky; add more flour if the dough is too wet.)
- Divide the dough into 4 equal pieces and then roll each piece into a ball. Place balls onto a piece of waxed paper and flatten each one with your hand.

Sometimes ground water dissolves the buried bone or shell, leaving behind hole or imprint in the sediment. This is a **NATURAL MOLD**. Trace fossils like footprints form like this too!



HOW TO MAKE A MOLD FOSSIL

- Collect 4 objects you want to make a mold of. They should be fairly hard or rigid, not too tall, and their shape should be well defined. Try nature objects like shells and twigs, or a plastic dinosaur!
- Press one object into each piece of flattened fossil dough. Push it in just deep enough to make the impression you want. (Don't push too deep; your object will be hard to remove and might push through the bottom of the dough!)
- GENTLY remove your object from the dough.
- Repeat this process for every mold.
- Notice how different objects do better or worse at making a mold. Conditions have to be just right for a fossil to form!
- Let your molds **FULLY DRY** before making a cast! This takes about a day.



Fossilized bivalve preserved as an internal and an external mold. The shell itself has dissolved away.

DIG DEEPER for Fossils: Make a Plaster Cast Fossil!

NOTE: You might want to put something like newspaper down on your work area to protect it from the plaster! Clean up any plaster drips immediately before it sets.

A CAST, which is the opposite of a mold, is made when minerals and sediment fill in the spaces of a fossil mold to create a replica of the original organism.

1. PREPARE YOUR MOLD

- Use your masking tape to build a retaining wall around the sides of a fossil dough mold of your choice.

2. MAKE PLASTER

- Put $\frac{3}{4}$ cup water into a disposable bowl.
- Sift plaster (don't mix it in yet!) into water until a plaster island remains and does not sink. Let sit for 1-2 minutes.
- Stir until smooth and creamy. The mixture should be the consistency of ketchup. Add more dry plaster if needed.

3. POUR YOUR PLASTER!

- SLOWLY pour the plaster over your mold to desired level of thickness. Tap the mold to settle the plaster.
- Let sit for about an 30-60 minutes. Then pop the cast out of the mold.
- Let the cast dry for 24 hours.



Sue the t-rex at Chicago's Field Museum. The skull is a replica cast of a mold made from the original fossil, which was too heavy to mount!

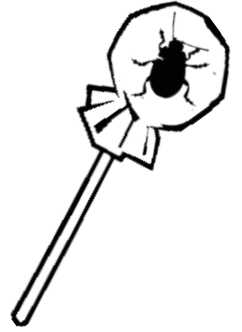


Paleontologists make artificial molds and casts of fossils for display and research. Unlike The Field Museum's Mold-A-Ramas that spit out plastic dinosaurs in seconds, molding the complex features of a prehistoric skeleton takes a lot of time!

**DO NOT POUR PLASTER DOWN THE DRAIN!!!
AND POUR YOUR PLASTER RIGHT AWAY, IT WILL SET IN 30 MINUTES!**



DIG DEEPER for Fossils: Amber Fossil Lollipops!



1. Preheat the oven to 250. Place silicone mold on baking sheet.
2. Make "licorice bugs": use scissors to cut the licorice into small squares. Then make a few snips on each slice to shape it into an insect!
3. Place a bug in each circle of the mold. Place a lollipop stick in each stick cavity.
4. Place 2 candies in each mold.
5. Place the baking sheet in the oven and bake until the candy has melted completely, about 30-45 minutes.
6. Remove from oven. CAREFULLY rotate the lollipop sticks to make sure they are completely coated with melted candy. Let the lollipops cool and harden completely before gently popping them out of their molds. (This takes about 30 minutes.)
7. Enjoy your cooled lollipops right away or wrap them up so they don't get sticky!

AMBER is fossilized tree resin. Resin is soft and sticky, so sometimes animal or plant material gets stuck in it. When the resin fossilizes into amber, these materials are known as INCLUSIONS.



Leptofoenus pittfieldae, a wasp known only from this specimen found in Hispaniola in 2008. It was trapped in resin 16-20 million years ago.

Amber comes in a range of colors! Colors range from the usual yellow-orange-brown to white to even blue!

There's a grain of truth in Jurassic Park! It is (yet) scientifically impossible to clone dinosaurs, BUT, amber CAN be conducive to preserving DNA! Scientists have sequenced fragments of DNA from amber inclusions.

HAVE AN ADULT HELP YOU WITH THE OVEN!!

