ACTIVITY: How Body Fossils Form

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Objective: Learners will describe conditions in which fossils can form and be preserved.

Introduction: Fossils are the remains of organisms or traces of their activities that have been preserved in rocks over time. Fossil formation occurs under specific conditions that allow parts of an organism's remains to be preserved through a variety of different processes.

Have learners:

1. Gently roll out a layer of **salt dough** that is about a 4" square and ½" thick.

   a. Press various small items into the salt dough to see what will leave an impression. Try out items that range from soft to firm to hard and flat to textured.

   b. Discuss which items make an impression easily and which do not. Also, discuss how much detail can be seen in the impression.

2. Read about **Impression and Compression** fossils.

   - *Discuss the similarities and differences and which type of fossil the activity in Step 1 mimicked most closely.*

   - *Consider how you might change the setup in Step 1 to model the other type of fossil.*

3. Roll out the salt dough again so there are no impressions in it.

   a. Place a small, thin item on one layer that has both hard and soft parts (e.g., **craft bird feather**, leaf, flower, pine needles), or use two different thin items, one soft and one hard.

   b. Roll out another color of salt dough that is about the same size as the first. Place this on top of the other layer so it covers the items.

   c. Gently and evenly press down on the top layer and/or place a book on top of it to compress the layers.

   d. Carefully remove the top layer of salt dough to see what happened.

   e. Discuss which part(s) of the item(s) left a fossil and how detailed it is.

   f. Optionally, use brown paint to paint the parts of the compression fossil to show where you would most likely expect to find organic material if the item had been a real organism.

4. Read about **Mold and Cast** fossils.

a. Discuss the similarities and differences between these and impression fossils.

b. Consider how you might change the setup in Step 1 to model these types of fossils.

5. Roll out two new pieces of salt dough. Repeat Step 3 a-e with a larger object (e.g., shell, walnut, small pinecone).

a. Compare this fossil with the one made in Step 3.

b. Discuss similarities and differences.

6. View the images on the handout and try to categorize them as impressions, compressions, molds, or casts. Note that most images will contain an "everyday" object (e.g., pencil, coin, ruler) as a scale for the viewer to be able to imagine the size of the fossil.

a. Additionally, view 3D models of molds and casts:

- **Crinoid** (**more information** from Grand Canyon National Park)
- **Fish plate** (**more information** from Grand Canyon National Park)

▶ *Categorize each as either a mold or a cast, giving evidence for your answers.*

▶ *Consider and discuss the benefits (and possible drawbacks) of viewing 3D models of fossils.*

7. Consider what fossils are made of:

a. Feel samples of both shells and shell fossils, noting differences in texture. Consider why you think they might differ.

b. Study images of fossil specimens on the handout and describe possible evidence of the changes that occurred to each organism during the fossilization process.

- Tree trunks: petrification
- Dragonfly: carbonization of the imprint
- Jawbone with teeth: permineralization (the jawbone and teeth being different colors is due to replacement by different types of minerals)
- Brachiopod: permineralization (replacement of shell [originally made of calcium carbonate] with silica)

c. Read about processes that change the composition of organisms, leading to fossilization:

- **Permineralization and Replacement**
- **Recrystallization**

d. Look at 3D models of fossils and consider how processes like permineralization help preserve details of organisms:

- **Petrified Tree Stump**
- **Dragonfly wing**

e. Discuss:

- *How do you think processes like permineralization and recrystallization help preserve organisms as fossils?*
- *What if these processes did not occur? How might this affect the number of fossils that exist? How might this affect our ability to locate fossils? Explain your answers.*

8. Consider what processes and factors affect the formation of a fossil.

a. Look back at the images on the handout and look for evidence of the type(s) of environments these fossils likely formed in.

b. Discuss:

- *What are the ideal conditions for fossilization?*
- *What processes might lead to a fossil becoming exposed naturally? How might these same processes affect the fossil?*
- *How common do you think it is for a dead organism to fossilize? Why do you think this?*

c. Read about **Taphonomy**, the study of the decay and fossilization of organisms.

9. Read more about **how body fossils form**.

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Categorize the fossils in the following images as impressions, compressions, molds, or casts.

Dinosaur skin
(Denali National Park & Preserve, Alaska).*

Fossilized sponge in a building stone
(Chesapeake & Ohio Canal National Historical Park, Washington D.C., Maryland, & West Virginia).*

Fossilized fish
(Fossil Butte National Monument, Wyoming).*

Sycamore leaf and fruits
(John Day Fossil Beds National Monument, Oregon).*

- Which fossils were hardest to categorize and why?

- What additional information would you want to know about each fossil to be sure that they were classified properly?

Study the following images to look for evidence that processes have changed the organism that made the fossil.

Tree trunks
(Petrified Forest National Park, Arizona).*

A brachiopod shell
(Tallgrass Prairie National Preserve, courtesy of Justin Tweet).*

Dragonfly
(Fossil Butte National Monument, Wyoming).*

***Patriofelis* jaw with teeth**
(John Day Fossil Beds National Monument, Oregon).*

- For each fossil, describe how you think they likely differ from the appearance of the organism that made them.

- What other information might you want to collect to show that changes occurred to the organisms as these fossils formed?

*All images were sourced from the NPS Fossils and Paleontology Photos and Multimedia Galleries.