

Lesson 9. How Do We Know What Plants and Animals Were Like Long, Long Ago?

Plan Lesson 9

Students have worked with several examples of plant and animal populations changing over time and are familiar with the 6 Key Steps tool for analyzing the change process. Having consolidated their understanding of the mechanism of natural selection, they focus today on scientific evidence for changes that began a very long time ago, not just hundreds but millions of years ago, even before there were people to observe them.

Fossils are scientific evidence set in stone – literally! – that supports evolutionary stories like that of the miroungas. Today's question is:











How do we know what plants and animals were like long, long ago?

Students learn how fossils are formed, what parts of present-day plants and animals might fossilize, how the position of the rock layer containing the fossil can provide clues about time and other clues that can tell us about ancient environments. Students also consider what a fossil found on Mirounga Island might tell a scientist/paleontologist about life long, long ago or what questions the find might raise.

By the end of this lesson, students will understand what fossils can tell us about what plants and animals were like long, long ago.

Learning Targets in this Lesson

- Fossils provide evidence of species that lived many, many years ago.
- Hard structures like bones, teeth, or leaf skeletons are the parts of organisms that are most likely to become fossils.
- Rock layers also provide clues about ancient organisms and environments: The deeper the rock layer, the older the fossil plant or animal embedded in the layer.

Sequence of Experiences		
1. Introduction	 All class	 5 Minutes
2. What are Fossils and How Are They formed? Video	 All class	 15 Minutes
3. What Parts Will Fossilize?	 Small groups	 10 Minutes
4. Make Meaning	 All class	 10 Minutes
5. Wrap Up	 All class	 10 Minutes

Materials

For the class

Slide deck for this lesson

For each small group

A handout of pictures of 6 present-day animals and plants

Drawing of rock layers

For each student

Notebook page 19

Preparation

- Review the video which provides a description of how fossils are formed. https://www.youtube.com/watch?v=XjhU1Xs0_sY

The Lesson

1. Introduction



All class



5 Minutes

Remind students that we have explored stories of plants and animals and how their populations changed when the environment changed.

Tell the class that:

*Today we'll think about **scientific evidence** for these ideas. We are going to think about the evidence that scientists use to figure out what plants and animals were like long, long ago — so long ago that no humans were around to see them.*

Today's investigation question is:

- *How do we know what plants and animals were like long, long ago?*

2. What are Fossils and How Are They Formed? Video



All Class



15 minutes

Project the slide that has two panels: (i) newspaper headline and (ii) cartoons of children:

(i)



(ii)



Explain that the first part of the lesson will be about the second child's question ("what's a fossil?"). Tell students that a fossil is evidence of a plant or animal that lived a very, very long time ago and that they will watch a short video that will describe how fossils are formed.

Show students the 5:50 minute Brain Pop video:

- https://www.youtube.com/watch?v=XjhU1Xs0_sY

Allow time (4-5 minutes) for comments or questions. You can gauge your students' prior knowledge of fossils and fossilization by asking the class if there was information in the video that was new to them and inviting questions about anything in the video.

Here are the big ideas for students to understand; additional details are less important. Keep in mind this is an *overview* of the process of fossilization and don't spend time on details, e.g., explaining how bone is transformed to rock.

- A fossil is evidence of a plant or animal that lived a very, very long time ago.
- A fossil begins when a plant or animal dies in a swamp, river, lake, or ocean where clay, silt, mud, or sand can quickly bury the remains.
- Very soon, most of the animal or plant rots away and only the hard parts are left.
- More mud and sand and gravel pile on top of the buried remains.
- The layer becomes thicker and more layers pile up and the fossils are pushed deeper and deeper under Earth's surface.

- As the earth materials pile up, the remains harden into rock in the shape of the animal or plant parts and the surrounding earth materials harden into rock as well.
- The deeper layers are the oldest so the position of a layer (and the fossils in that layer) can tell you something about the age of a fossil.

Show the rock layers drawing (pictured below) to check for understanding that the position of a rock layer provides evidence of its relative age: the deeper the layer the older the rock and the fossils in that layer.



Ask a volunteer to find

- The oldest layer (The deepest one, at the bottom of the drawing.)
- Evidence of oceans (fossils of shells, fish, seaweed)
- Evidence of plants and land animals (fossils of land animals and plants)

3. What Parts Will Fossilize?



Small groups



10 Minutes

Have students move to their small groups.

Hand out a set of pictures of 6 present-day organisms, a copy for every 2-3 students so it's easy for every student to get a close look.

Ask students to imagine that the plant or animal in the picture died, fell into water and then was covered by layers of sand or mud. Tell them that more earth materials piled up over and over again, for many thousands of years. Ask:

What parts of these familiar living things do you think might become a fossil in the future? Talk about why you think so.

Give students 5 minutes to observe, think, and discuss. Then ask for volunteers to share their ideas.

Listen for:

- The soft parts of the plant or animal would disintegrate or get eaten
- The hard parts will remain: for example, bones, teeth, claws, veins of leaves, stems

Hunt for fossils

Hand out the illustrated cross-section of rock layers that shows layers with fossils embedded.

Ask students if they can find animal skulls, bones, shells, or other hard parts. Ask if they can find fossil remains of plants. Ask which fossils are the oldest fossils and why they think so.

Listen for:

- The fossils in the lower layers are oldest

4. Make Meaning



All class



10 minutes

Purpose of the discussion: to consolidate student understanding of the kind of evidence fossils provide that help explain the history of plants and animals.

Project the slide shown at the beginning of the lesson and tell students that we now can answer the question that the third child asked (Why are scientists excited?). Explain that the fossil was deep underground on an island that's inhabited by miroungas. The road construction machines dug up the earth and revealed the fossil. Ask:

Why do you think the scientists were so excited?

Show the slide of a mirounga and the fossil side by side.

Listen for:

- The fossil can tell us about what animals were like in this location long, long ago. This fossil is evidence that there were animals like these living on Mirounga Island many hundreds of generations ago and there aren't any animals exactly like this nowadays.
- It looks like it could be a pilosa skeleton: long tail, long trunk so maybe some piloses lived here once but now they are gone. [Based on prior lessons, students can explain why they are gone – they couldn't stay healthy and have lots of offspring in the new deep-water environment]

- This may be evidence that miroungas are related to the fossil animal.

5. Wrap Up



All class



10 Minutes

Ask students what ideas and information they will “take away” from today’s lesson to decide what they should record on the Takeaways Chart.

Listen for these ideas. Use student language as much as possible when you write them on the Takeaways Chart:

- Fossils and rock layers are evidence of what animals and plants used to look like long ago.
- Fossils are the remains of the hard parts of plants and animals.
- The deeper the layer, the more ancient the rock and fossils.

Before concluding the lesson, ask students to fill out the questions on page 19 of their notebooks.

Lesson 9: How do we know what plants and animals were like long, long ago?



This lesson is about fossils!



What's one thing you think is really interesting about fossils? _____

What's a question about fossils that you have? _____

Our question for next time is:

- *What can fossils tell us about changes in plants and animals over time and change in their environments?*