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**PART TWO**

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# Fossils

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**MATERIALS****FOR EACH STUDENT:**

Student Fossils

Student Science Notebooks

Analysis of Fossil Samples Chart (opt.)

**FOR CLASS:**

Fossil CD with PowerPoint

Geologic Cross Section Poster

Book: *Fossils Tell of Long Ago* by Alik

Brachiopod and Trilobite fossils

**PREPARATIONS:**

Set up PowerPoint

**PROCEDURE:**

1. Review the activities of Day One.
2. Show the PowerPoint on fossils making the following points:
  - It takes special conditions to make a fossil.
  - Fossils give us clues to life and the environment of long ago.
  - Fossils help us understand plant and animal species over time.
3. Arrange the class in a big circle on the floor. Show the Brachiopod fossil. Ask questions such as:
  - What might you find today that looks like this organism? (clam)
  - What environment did it live in? (in the water, perhaps the ocean)
  - Why do you think that? (clams live in the water, they have two hard shells, they have no wings or feet)
4. Show the trilobite fossil that no longer exists today.
  - What might you find today that looks like this organism? (We don't see this organism today but it is related to the arthropods such as pill bugs, sow bugs, lobster.)
  - What is the term we use to describe organisms that are no longer living? (EXTINCT)
  - What environment did this organism live in? (shallow ocean water)
  - Why do you think that? (same habitat the lobster lives in)

5. Using their fossil descriptions from Part One, have students find “their” fossil from the fossil set.
6. Students read the information on the label of the fossil bag. Ask students to stand. Engage them in a “sorting exercise” using the following categories:
  - Plant or animal
  - Extinct organism or not extinct organism
  - Lived on land or lived in the water
7. Students should return to their seats. An Analysis of Fossil Samples Chart (see below) could be created by asking students to discuss each of the fossils. The chart can be done as a group using an overhead. Students can record the data using their own chart attached to their science notebook.
8. Students should put their fossil back into its corresponding bag. Pick up fossils.

## Analysis of Fossil Samples

Fossil	Plant	Animal	Extinct	Not Extinct	Land	Water
Ammonite		X	X			X
Brachiopod		X		X		X
Crinoid Stem		X		X*		X
Dinosaur Bone		X	X		X	
Dinosaur Egg Shell		X	X		X	
Echinoid		X		X		X
Nautiloid		X		X*		X
Oyster		X		X		X
Petrified Wood	X			X	X	
Rugose Coral		X	X*			X
Shark Tooth		X		X		X
Trilobite		X	X			X

\* Students should use the text found on the Fossil Cards to cite evidence for extinct and not extinct.

9. Using the picture of the geologic cross section (available for download from our website or on the CD provided with your kit), remind students that a PALEONTOLOGIST is a scientist who studies fossils. They study places on the earth where fossils have been exposed through erosion, excavation, or earthquakes.

### Key for Layers in Geologic Cross Section Poster—top to bottom

Visible hills of post-basalt sediment  
Gingko Flow flood basalt  
Petrified wood in bottom of Gingko Flow  
Vantage sandstone of fluvial sand  
Museum Flow of basalt  
Sedimentary interbed  
Rocky Coulee of flood basalt  
Flood basalt

10. Discuss how a fossil could be found in different layers, such as a fish that lived in the ocean at one layer and a leaf from a tree in another layer. You might then find a dinosaur skeleton at another layer.
  - How might this happen? (the environments change over time – each layer represents a point in time when something was buried)
11. End the lesson by reading: *Fossils Tell of Long Ago* by Alik. Before you read the book, please be aware of the following misconceptions that should be addressed.

#### **MISCONCEPTION #1**

The fish within a fish on page 10 – 11 shows a little fish inside the larger fish. This little fish would also be fossilized bones and not a whole fish. It's soft tissue would probably have decayed as well.

#### **TEACHABLE MOMENT:**

After reading this page, show the sequence of pictures and ask students, “Is there a problem with these pictures?” Foster some brainstorming and discussion about the misrepresentations as well as some reasoning as to why the author decided to show the little fish as if it was just eaten. Take this opportunity to discuss how important it is to read books with a “critical eye” for accuracy.

#### **MISCONCEPTION #2**

Making a handprint fossil on page 28 – 29 misrepresents the amount of time a fossil might take to form. In fact, fossils take millions of years to form. Students may get the impression that their handprint is a real fossil.

#### **TEACHABLE MOMENT:**

After reading these pages, discuss why this is a model of a fossil and not truly a fossil. Understanding models as a representation of an actual occurrence is valuable but students need to understand that models are not the real thing.

# EALRs for Reading

<b>EALR 1</b>	<b>The student understands and uses different skills and strategies to read.</b>
1.2	Use vocabulary (word meaning) strategies to comprehend text.
<b>EALR 2</b>	<b>The student understands the meaning of what they have read.</b>
2.1	Demonstrate evidence of reading comprehension.
2.2	Understand and apply knowledge of text components to comprehend text.
2.3	Expand comprehension by analyzing, interpreting, and synthesizing information and ideas in literary and informational text.
2.4	Think critically and analyze author's use of language, style, purpose, and perspective in informational and literary text.
<b>EALR 3</b>	<b>The student reads different materials for a variety of purposes.</b>
3.1	Read to learn new information.
3.4	Read for literary/narrative experience in a variety of genres.

# FOSSILS



## Start with a Living Organism

The organism can be either a plant or an animal.



## The Organism Dies

- The soft parts that are exposed to air decompose quickly.
- Hard parts like bones, shells, or wood, don't decompose as quickly. They have the greatest chance of becoming a fossil.



Ask children what it means to decompose.  
(to breakdown, to rot, to disintegrate)

You might have your students feel their own hand for soft parts (skin, tendons, muscles) and hard parts (bones and joints.)

Some fossil beds contain soft bodied fossils. To find out more, do a web search for Burgess Shale.

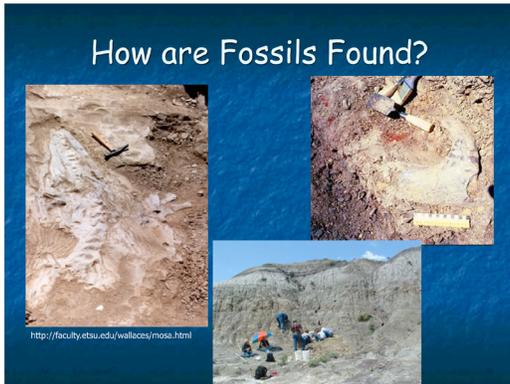
The organism may be buried with layers from the earth. These layers might be mud, lava or water.



When an organism is covered, it is protected from weather damage, rotting or decay, and from scavengers who might eat the dead organism.

Layers shown from top down:

- Top two layers are sediment
- Basalt
- Fossil layer—sedimentary
- Sandstone
- Basalt
- Sedimentary
- Basalt
- Basalt



Sometimes fossils are found on the surface of the earth. They become exposed by:

- Weathering
- Erosion
- Earthquakes
- The activity of humans

Once fossils are found, scientists often dig in the same area to find other fossils.



Point out that the scientist in the picture is making observations of an animal skull. From observations the scientist makes inferences about the environment and life of long ago.

**Observation:** The skill of recognizing facts or occurrences in the natural world.

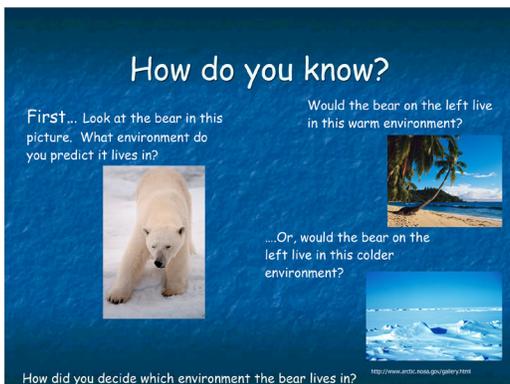
**Inference:** The skill of arriving at a decision or conclusion (best guess) after examining all of the known facts and information.



A **paleontologist** is a scientist who studies fossils. Paleontologists and many other scientist use inference—this is not what they actually observe, but what they think about their observations.

This picture shows a scientist working in a lab. What tools is the scientist using? (microscopes, lights, magnifying glasses, small hand tools.)

What fossils do they see in the lab? (skull on shelf, bones on table, specimens on shelves.)



Students need to make observations about this polar bear. Ask them to make an inference about the environment in which the polar bear lives.

**Possible observations of why they chose a certain environment:**

- Thick white fur
- Standing on snow

## Let's Try Again



Look at these pictures of things that come from a tree. Make a prediction about the environment where you would find this tree.

This is more difficult isn't it? Why? What would help you decide on the correct environment?

Would the tree live in this environment?



<http://www.rps.gov/est/abdf/ndba/101>

... or, would the tree live in this environment?



<http://www.rps.gov/est/abdf/ndba/101>

Students are not expected to know or learn the answers to these questions. The emphasis is on that to answer the questions, you need more information about the plants and the environment where the plants are found. Scientists who study fossils use their knowledge about current and extinct plants and animals to make predictions about new discoveries.

### Questions a scientist might ask:

- What do I already know about similar plants or animals?
- Where can I go to find out information?
- What else has been discovered in this area?

## Now you are the paleontologist

This is the environment where you are looking for fossils.




Here is an example of the kinds of fossil your team has found. What do you think the environment might have been like in the past?

The fossil, that of a fish, lived in a lake or ocean certainly not the sand dunes where it was found by scientists. This should tell the students that the area must have been covered by water in the past.

## Now you are the paleontologist




You just found the plant fossils, on the left, in an area where it is now hot and dry like the picture on the right. What predictions can you make about what the environment might have been like in the past?

The plant (fern) fossils would indicate a moist, shady environment, certainly not the desert where it was found.

"Small animal fossils are one of the best indicators of prehistoric ecosystems and environments. For example, a fossilized frog tells scientists that the habitat within which it lived must have been wetter because the frog was dependent on permanent water to breed. In other words, it was a captive within its environment."



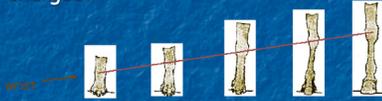
A quote from a Scientist from the Page Museum's Laboratory  
<http://www.tairpits.org/education/guide/index.html>

This page is from a Paleontologist's notebook.



## Change Over Time - A Horse's Foot

Note how the distance of the wrist bones from the ground changes. What else has changed?

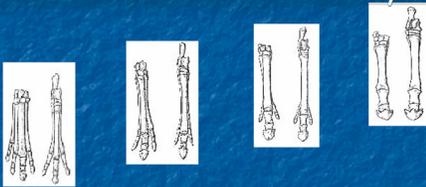


Adapted from Florida Museum of Natural History. For more information visit their website at <http://www.flmnh.ufl.edu/natsci/vertepaleo/fhc/relatives1.htm>

What to look for:

- Total length of foot
- Number of toes making up the foot
- The size of the hoof covering the foot

## Let's Look More Closely



How have the bones in horse feet changed over time?  
Why might this have happened?

Adapted from Florida Museum of Natural History. For more information visit their website at <http://www.flmnh.ufl.edu/natsci/vertepaleo/fhc/relatives1.htm>

The bones become longer and more streamlined, enabling horses to run faster to avoid predators.

The central toe of horses became increasingly stronger while the "side toes" became less important and are virtually lost in the modern horse.

Reduction and loss of side toes minimizes the weight at the extreme end of the foot. The horse's limb may move faster.

Changes:

- Middle bone (toe) becomes more dominant
- Side toes become virtually lost

## Wrap-Up

- Fossils are formed under very special conditions.
- They give us clues about what life was like long ago.
- Fossils also give us clues about the environment from a long time ago.
- They help us understand that plant and animal species change over time.



## CREDITS

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## Analysis of Fossil Samples

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Dinosaur Bone						
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Echinoid						
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