

Learning Guide



Fossils

We hope you enjoyed learning all about how fossils are made and unearthed—and what they teach us about how ecosystems change over time. Extend your learning with this print-ready Learning Guide!



What's in this Learning Guide?

Get Set to Listen

Answer TRUE or FALSE statements before and after listening to the episode.

Vocabulary

Discussion Questions

CCSS.ELA-Literacy.SL.3-8.1, SL.3-8.3

Writing Prompts and Extension Projects

CCSS.ELA-Literacy.W.3-8.1, W.3-8.2, W.3-8.3, W.3-8.4, W.3-8.7, W.3-8.8

Mock Fossil Dig

NGSS: 3-LS4-1, 4-ESS1-1

Fossil Timeline

NGSS: 3-LS4-1, 4-ESS1-1; ESS1.C: History of Planet Earth; CCSS.ELA-LITERACY.RI.3-4.1

Fossil Detective Lab

NGSS: 3-LS4-1, 4-ESS1-1, MS-LS4-1; ESS1.C: History of Planet Earth; CCSS.ELA-LITERACY.RI.3-4.1, RI.3-4.7, W.3-4.2, SL.3-4.4

Ancient Ecosystem Model

NGSS: 3-LS4-1, 4-ESS1-1; ESS1.C: History of Planet Earth; CCSS.ELA-LITERACY.RI.3-4.7, W.3-5.2, SL.3-5.4

Human Impact: Fossils and Me—Passage & Comprehension Questions

NGSS: 3-LS4-1, 4-ESS1-1; ESS1.C: History of Planet Earth; CCSS.ELA-LITERACY.RI.4-5.1, W.4-5.2, W.4-5.9

Additional Resources & Book List



The Children's Hour
kids public radio

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<https://www.childrenshour.org/fossils/>



Get Set to Listen

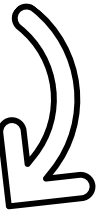
1. Before listening!

Read each statement and write TRUE or FALSE based on what you already know.



2. After listening!

Based on what the experts said in the episode, write TRUE or FALSE.



Before Listening	TRUE or FALSE?	After Listening
	1. About 300 million years ago, New Mexico was covered by glaciers.	
	2. Any object buried underground is considered a fossil.	
	3. Fossils can only come from dinosaurs.	
	4. Fossils help scientists learn about Earth's history.	
	5. Petroleum comes from fossil remains of microorganisms.	
	6. Fossils can show what ancient animals ate.	
	7. Every animal that dies eventually becomes a fossil.	

What did you learn?



Get Set to Listen

Answer key

1. FALSE. New Mexico was closer to the equator and surrounded by a much higher sea level.
2. FALSE. Only traces of past life that are more than 10,000 years old are considered fossils.
3. FALSE. Fossils include microorganisms, plants, insects, mammals, and many other living things.
4. TRUE. Studying fossils helps scientists understand the past and predict future changes.
5. TRUE. Petroleum formed from ancient microorganisms in the ocean.
6. TRUE. Bite marks, stomach contents, and other evidence reveal feeding habits.
7. FALSE. Becoming a fossil is extremely rare.



Vocabulary

Listening for Words

1. Make a four-column chart and label the columns “I don’t know,” “I’ve seen or heard, but don’t know the meaning,” “I think I know the meaning,” and “I know the meaning.”
2. Write the vocabulary word in the column that describes how well you know the meaning of the word.
3. Listen to [the episode](#). Note how the speaker uses the words.

Matching Words with Definitions

1. Print and cut apart the word and definition cards.
2. Spread out the word cards so you can see them all. One by one, attach a definition card to each word card.

Writing with New Words

After working with the words and definitions, write a one-page essay or story that uses at least three of the words.

fossil

Any trace of life that is more than 10,000 years old.

quarry

A large open pit where stone, rock, clay, or other materials are dug from the earth.



Vocabulary

limestone

A sedimentary rock made mostly from the remains of marine organisms such as shells.

terrestrial

Living or growing on land.

**estuarine
environment**

An area where a river meets the ocean, creating a habitat with both fresh and salt water.

trace

A sign, mark, or evidence that something once existed.



Vocabulary

excavate

To carefully dig fossils or objects from the ground.

microorganism

A tiny living organism seen only with a microscope.

mineralized

Changed into stone as minerals replace original material.

radiocarbon dating

A method for determining the age of fossils.



Discussion Questions

1. What does a paleontologist do, and why is their work important?
2. Why are marine fossils like shells and sharks found in the mountains and desert of New Mexico today?
3. If you visited this fossil quarry, what type of fossil would you hope to discover, and what could it teach scientists about Earth's past?
4. Why are fossils important for understanding Earth's history and predicting future environmental changes?
5. If you discovered a fossil that might be a new species, what steps do you think scientists would take to study and identify it before announcing the discovery?



Group Discussion Strategies

Think Pair Share:

1. Individually, student writes down their answer to a question.
2. Students pair up and tell each other their answers.
3. Teacher calls for volunteers to share with the whole class their answer (and/or their partner's answer). Teacher notes key words/phrases on board.

Round Robin:

1. Teacher poses one question (written on top of a large page) to students, who are assembled into small groups of 3 or 4.
2. Students take turns brainstorming the answers. The recorder of the group writes down all answers.
3. The leader reads the group's ideas to the entire class. Teacher moderates.



Writing Prompts

Informative Narrative Prompts

1. Imagine you are a paleontologist spending a day at the fossil quarry in New Mexico. Write a journal entry describing what you discovered and how you felt.
2. Pretend you discovered a new fossil species. Describe what you found, where you found it, and why it is important.

Extension: Make an illustrated scientific journal entry including important features of the new species.

3. Write a story from the point of view of a shell that lived 300 million years ago and eventually became a fossil. Describe your journey through time.

Extension: Make a comic strip of the journey through time.

Explanatory/Expository Prompts

4. Explain how fossils are formed and why they are important to scientists. Use evidence from the passage.

Extension: Create an illustrated diagram of the process.

5. Describe why marine fossils are found in the mountains of New Mexico today. Include details about how the environment changed over millions of years.

6. Compare the New Mexico fossil quarry (or another location of your choice) 300 million years ago with the same location today. Explain how the landscape and living things have changed.

Extension: Create an illustrated “then” and “now” diagram.

Opinion/Persuasive Prompts

7. Do you think fossil hunting is an important job? Write an opinion essay explaining your answer using examples from the passage.



Mock Fossil Dig: Lesson Plan

Create a mock dig site using sand or rice with shells, leaves, toy bones, and rocks. Students excavate carefully, record observations, and identify their "fossils."

Materials

- tray of sand or rice
- shells
- leaves
- toy bones
- rocks
- paintbrushes or plastic spoons
- "Mock Fossil Dig" recording sheet

Listen

- Part 1: Excavating Fossils
 - segment (10:56-8:20)
 - segment (14:15-16:40)
 - segment (36:45-38:18)



Directions

1. Carefully dig through the sand or rice to uncover hidden "fossils."
2. Use your tools like a real paleontologist—don't rush!
3. Record each fossil you find by drawing it and writing its name or a short description.
4. Decide what type of fossil it is (plant, animal, shell, or other).
5. Share your discoveries with the class and explain what they might tell us about the ancient environment.

Keep Digging!

[Activity: Paleo Fossil Cookie Dig](#)

Excavate the chocolate chip "fossils" from a cookie in this hands-on paleontology activity from the National Park Service!



Mock Fossil Dig

You are a paleontologist! Carefully excavate the hidden "fossils" from the dig site using a paintbrush, spoon, or scraper. Record each fossil you discover below.

Fossil Found

Is it: (circle one)

Plant

Animal

Other

Draw Your Fossil

Fossil Found

Is it: (circle one)

Plant

Animal

Other

Draw Your Fossil

Fossil Found

Is it: (circle one)

Plant

Animal

Other

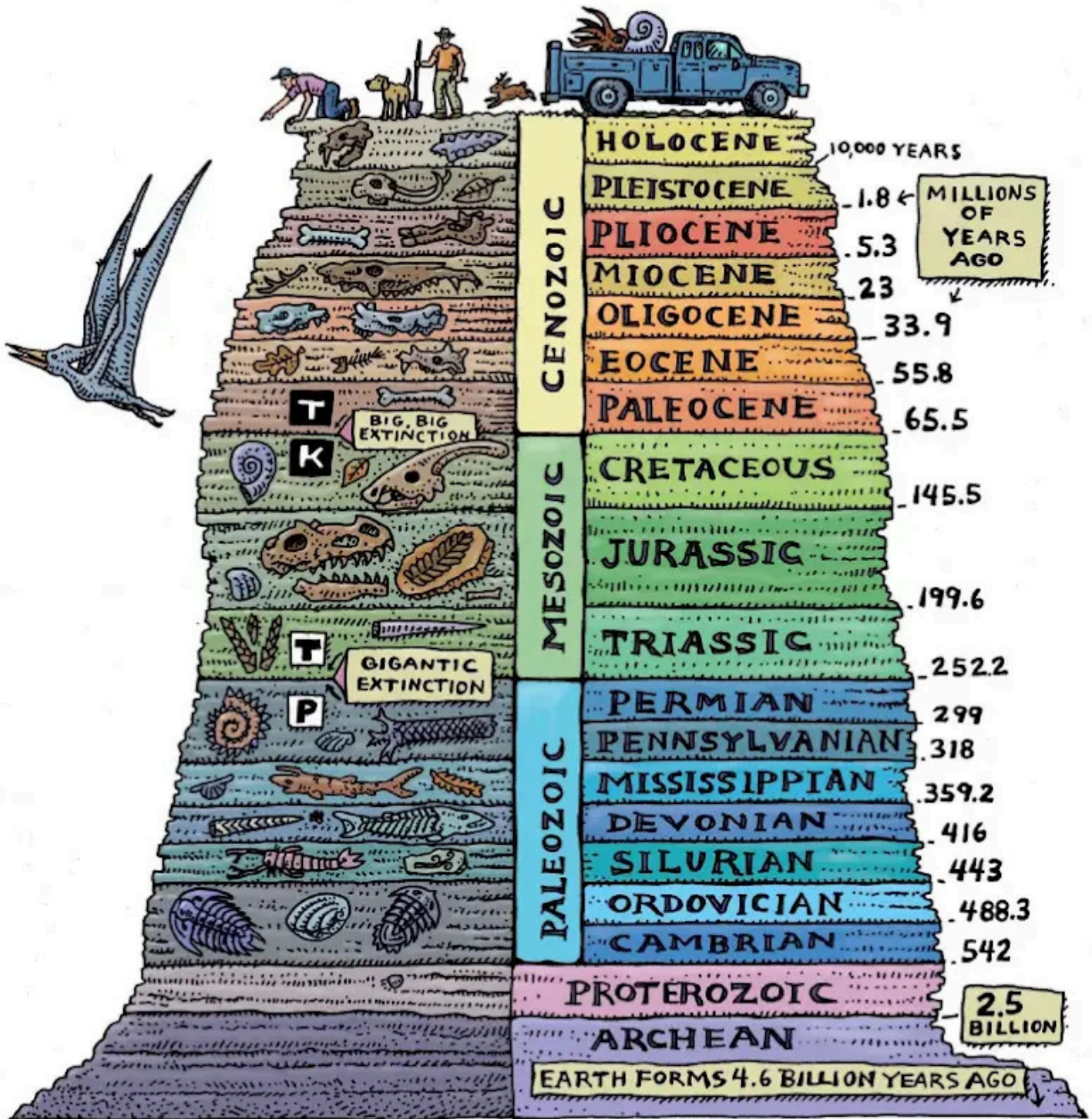
Draw Your Fossil

Reflect

1. Which fossil was the most interesting? Why?
2. What do your fossils tell you about the ancient environment?
3. What tools did you use to excavate your fossils?
4. Why do paleontologists dig carefully instead of quickly?



Fossil Timeline



Geologic ages, by [Ray Troll](#), 2007

Reflect

Which event happened the longest time ago?

Which fossils are the youngest?

Why do you think studying fossils from different time periods is important?

Learn More!

- Read about [Fossils Through Geologic Time](#)
- Complete this [Fossils Activity Sheet](#)



Fossil Detective Lab

Listen

- Part 2: Digging for marine fossils in the desert?! (segment 22:50-24:48)
- Part 3: What makes a fossil and what can we learn from them? (segment 28:42-34:02)
- Part 4: Reconstructing Ancient Environments: La Brea Tar Pits (segment 40:58-51:01)

Observe

Look at the fossils found in the [Digital Atlas of Ancient Life](#), or use the photos provided below.

Infer

Fossils give us clues about what kind of animals and plants lived in ancient environments, which gives us clues about the ancient ecosystems. Look at the pictures of fossils. What can you see and infer about the animals and plants and the environment in which they lived?

- Type of teeth tells us about the animal's diet
 - sharp teeth = tearing flesh, flat wide teeth = grinding plants
- Bones tell us about the body structure
 - Did it crawl, fly, or walk upright? What does this tell us about its behaviors?
- Plant fossils tell us about what the ancient climate was like
 - eg. ferns = warm, wet climate
- Radiocarbon dating gives us the age

Categorize

Based on the clues you observed, sort the fossils into categories:

- Marine
- Land
- Plants
- Insects
- Amphibians
- Other

Fossil Museum Exhibit

Choose one of the fossils. Use what you learned from the clues and your own research to create a museum display for the fossil, including:

- What kind of organism it was
- Where it lived
- What it ate
- Interesting facts/Why it is important
- What evidence supports your ideas?



Fossil Detective Lab



1 cm

Click on the image [source](#) to learn more about this fossil, including what it is!



Fossil Detective Lab



Click on the [image source](#) to learn more about these fossils, including what they are!



Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



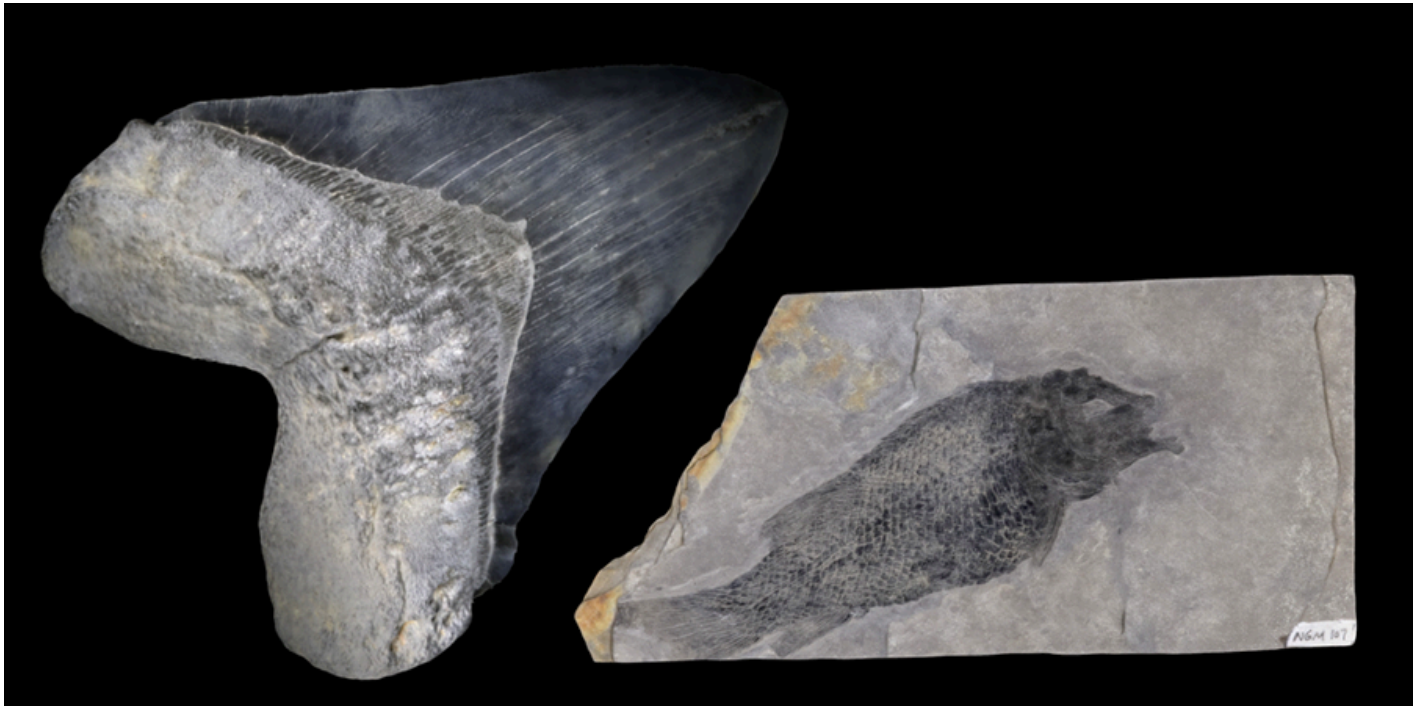
Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



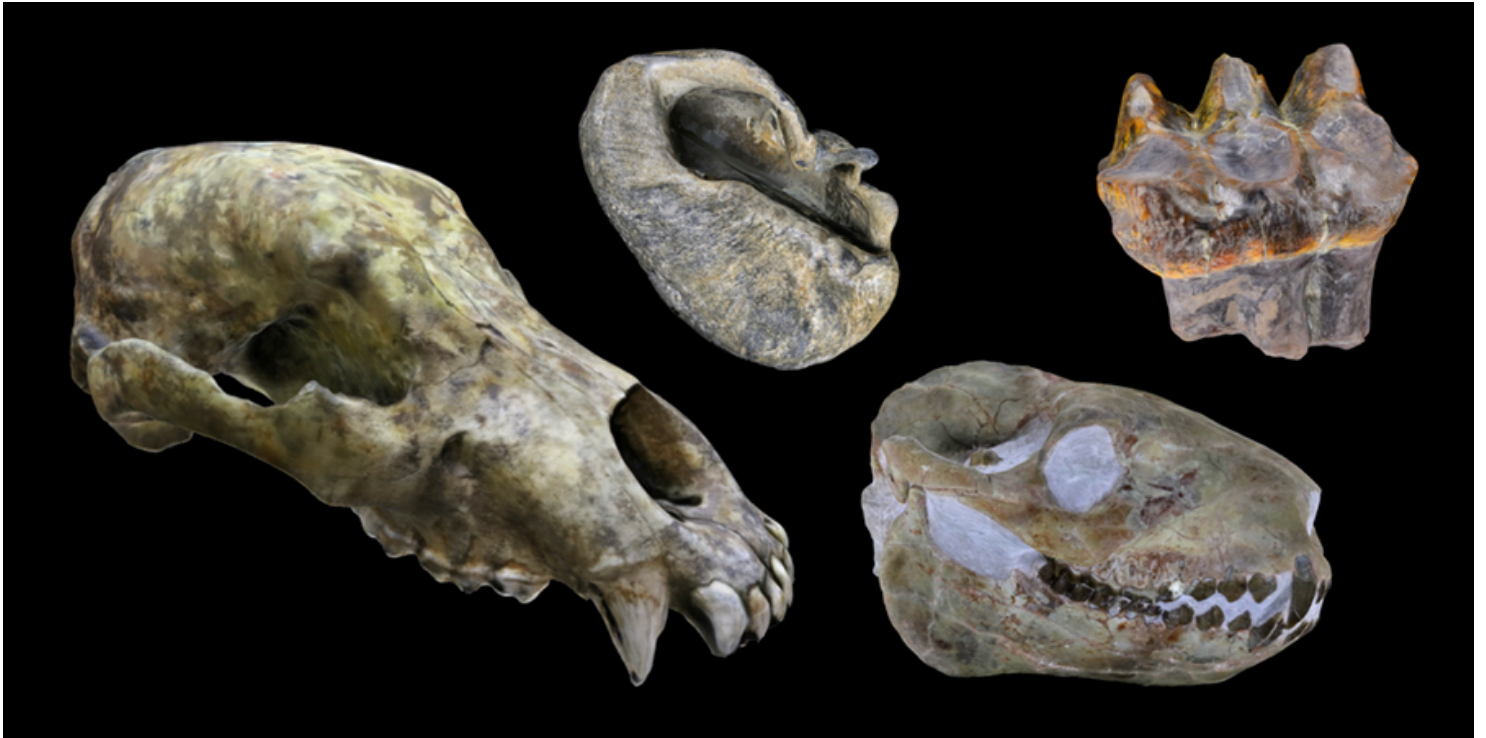
Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



Fossil Detective Lab



Click on the image [source](#) to learn more about this fossil, including what it is!



Ancient Ecosystem Model

Fossils help scientists learn how ecosystems have changed over time. By studying the past, we can better understand how to protect plants, animals, and habitats in the future. For this activity, you will be using fossil clues from New Mexico or another place of your choice to help you imagine what the ecosystem was like 10,000 years ago.

Listen

- Part 2: Digging for marine fossils in the desert?! (segment 22:50-24:48)
- Part 3: What makes a fossil and what can we learn from them? (segment 28:42-34:02)
- Part 4: Reconstructing Ancient Environments: La Brea Tar Pits (segment 40:58-51:01)

Observe, Imagine, & Model

Fold a sheet of paper in half or divide a digital page into two sections.

Left Side: Ancient Ecosystem

Using [fossil clues](#), draw what the area looked like millions of years ago. Include:

- Landforms (oceans, rivers, islands, mountains)
- Plants
- Animals (fish, insects, shells, amphibians, mammals, etc.)
- Climate

Right Side: Modern Ecosystem

Draw or describe what the same location looks like today. Include:

- Landforms
- Plants
- Animals
- Climate
- Human communities and activities

Compare & Reflect

Use the worksheet on the next page to help you draw comparisons and conclusions about how ecosystems change over time.



Ancient Ecosystem Model

Compare

After looking at the [fossil clues](#), use this chart to compare the ancient ecosystem with the modern one:

Ancient Ecosystem	Modern Ecosystem
Climate: _____ _____	Climate: _____ _____
Plants: _____ _____	Plants: _____ _____
Animals: _____ _____	Animals: _____ _____
Landforms: _____ _____	Landforms: _____ _____
Human Impact: _____ _____	Human Impact: _____ _____

Reflect

- What changed the most between the ancient and modern ecosystems?
- How did fossils help scientists learn about the ancient ecosystem?
- What can people do today to help protect ecosystems for the future?



Human Impact: Fossils and Me

Fossils are important because they help us understand Earth's history. By studying fossils, we learn about how life changed over time, including our own ancestry and how the past connects to the present and future.

Dr. Spencer from the La Brea Tar Pits helps us understand how fossils can teach us about protecting species and keeping ecosystems healthy, especially during times of climate change and environmental challenges. Small fossils, such as insects and plants, provide important clues about past environments because they stayed in one area and show what life was like there. These discoveries help scientists understand how humans, climate, and other changes have affected ecosystems, including how much Los Angeles has changed over time.

For thousands of years, people have used natural resources from places like the tar pits. Evidence shows that humans used tar to make waterproof items, such as pottery. Today, humans continue to use natural resources, which means our actions can impact ecosystems.

Reflection Questions

1. Why is the ecosystem where you live important to you and your community? _____

2. What actions can humans take to reduce their negative impacts on ecosystems, including land, water, air, and wildlife? _____

3. What are some ways humans have positively helped or improved the environment? _____



Additional Resources

[Fossils & Paleontology: US National Park Service](#)

Learn more about fossils and paleontology in the US National Parks, including [this quiz](#).

[Prehistoric Life Coloring Book](#)

Line drawings of ancient animals and plants from fossils discovered in US National Parks.

[Fossils Through Geologic Time](#)

Read descriptions of the different geologic time periods.

Learn more about the science of paleontology from [this National Geographic article](#).

Learn about fossils through geologic time and fossil formation with this [Fossils Activity Sheet](#) from The Geological Society

[Fossil Identification](#)

Visit the website of the [La Brea Tar Pits and Museum](#).

[Activity: Make a Fossil](#)

Demonstrate the process of fossilization by making mold and cast fossils.

[Activity: Paleo Fossil Cookie Dig](#)

Excavate the chocolate chip “fossils” from a cookie in this hands-on paleontology activity from the National Park Service!

Videos

[Scientist Profile: Paleontologist](#)

Watch how Paleontologist Gary Takeuchi digs in the fossiliferous area near Los Angeles, California on PBS Learning Media.

[Giant Ground Sloth: Museum of Life: BBC](#)

Learn about the giant ground sloths that lived during the last Ice Age.

[Giant Marine Reptiles: BBC Earth Kids](#)

Learn about the giant marine reptiles known as Elasmosaurus!



Additional Resources

[Indiana Fossils: PBS Kids](#)

See examples of fossils between 2 million and 300 million years old at The Children's Museum of Indianapolis, Indiana.

[Fossils and Rock Layers for Kids \(NGSS 4-ESS1-1\)](#)

This video has an active notes worksheet from Hiikoo Learning, available on Teachers Pay Teachers.

[Fossils 101: National Geographic](#)

Find out about the 2 major types of fossils, how fossilization occurs, and how fossils can help paint a picture of the planet's history in this 4-minute video.

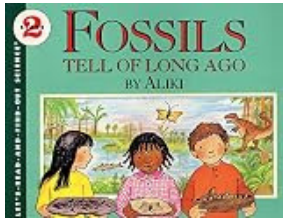
[How Do Dinosaur Fossils Form?](#)

Find out in this short, engaging, animated video from the Natural History Museum.





Book List

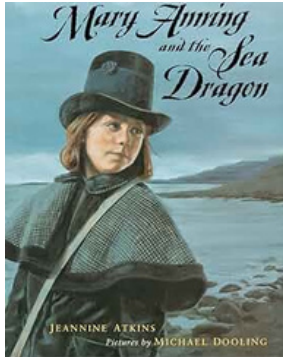


Fossils Tell of Long Ago

by Alki

This classic picture book explains how fossils were formed and what they have to teach us about the past.

ages 4-9

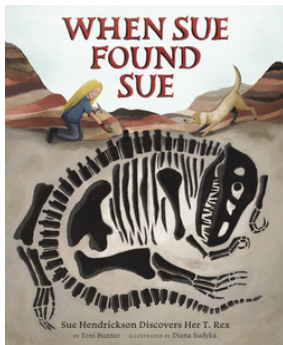


Mary Anning and the Sea Dragon

by Jeannine Atkins, illustrated by Michael Dooling

The true story of 19th-century paleontologist Mary Anning, who, at age 11, discovered a massive ichthyosaur “sea dragon” fossil on the English coast and launched her career.

ages 5-9

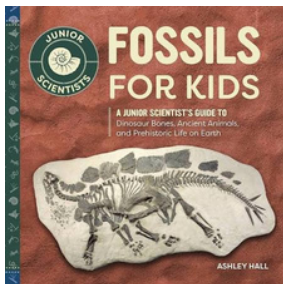


When Sue Found Sue

by Toni Buzzeo, illustrated by Diana Sudyka

The exciting true story of paleontologist Sue Hendrickson, who found the largest and most complete *T. rex* skeleton ever unearthed!

ages 4-9



Fossils for Kids: A Junior Scientist's Guide

by Ashley Hall

This book is filled with fascinating photographs and captivating facts that will teach junior fossil hunters how fossils form, where they are found, and tips on how to identify them.

ages 6-12



Smithsonian Kids: Dinosaur Fossil Hunter

by Silver Dolphin Books

This 64-page book is packed with facts about dinosaurs and fossils. It covers everything from famous fossils to fieldwork and is perfect for budding paleontologists.

ages 6-12