



Developed with Laura Beres

Volume 25 | Gr. 4-8

Time: 60-90 mins.

# Can you dig it?

## A fossil excavation activity



### Standards

**3-LS4-1:** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

**MS-ESS2-3:** Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

**MS-LS4-2:** Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

### Objective

Students will be able to analyze and interpret data from fossils that are excavated from rocks.

**Middle school extension objective:** Students will be able to compare and contrast modern organisms to similar fossils in order to infer possible evolutionary relationships.

### Materials list

- Fossil Hunt Kit (one per group) (SB33401)
- Glue or tape for puzzle activity
- Student handouts:
  - *Can You Dig It?* (p. 6), *Field Guide to Fossils* (p. 5), *Investigating Geologic Time and Fossils* (p. 9), *The Big Dig* (pp. 7-8), and fossil puzzles (pp. 1-4)

### Optional extension materials

- Toothpicks
- Long nails or screws
- Chocolate chip cookie (1 per student or group)

### Prep

- Set up multiple stations with a fossil kit and handouts. Decide whether you will have students work independently or in groups.
- Decide on your grading criteria prior to starting the activity.
- Decide how you will manage the puzzle activity. You can reproduce a puzzle for each student or group in color, cut out, laminate, and bag them. Alternatively, you can reproduce the puzzles, have each student cut out one and then trade with a partner to solve.
- Reproduce the student handouts for each student or group.
- You may choose to wait to pass out the cookie, toothpick and fossil hunt kit, as they could be distracting to students. Decide before the optional activity if students can eat the cookie.

# Directions

1. Create a KWL chart on the board. Discuss what students already know about fossils. During the discussion, identify any possible misconceptions, such as these:
  - Fossils are only from animals
  - Fossils are only from things that lived on land
  - Fossils are only from big animals like dinosaurs
  - Anything that dies can become a fossil
  - Fossils can be found anywhere
2. Then discuss what students want to know about fossils. Have students independently brainstorm questions and then share with a partner and with the class if time allows.
3. Introduce new facts about fossils with the following vocabulary and discussion questions.

## Vocabulary

- **Paleontologist:** A scientist who specializes in the study of life forms that existed in previous geologic periods, as represented by their fossils
- **Fossil:** The remains or impression of a prehistoric organism preserved in petrified form or as a mold or cast in rock
- **Matrix:** The material in which something is embedded
- **Mold:** A type of fossil clearly showing the outside features of an organism
- **Cast:** A type of fossil formed by hardened sediments within a mold
- **Petrified:** A description of plants or animals that have been preserved by being “turned to stone”

## Discussion questions

### How do scientists know where to look?

- Weather can wear away (erode) the soil and uncover a fossil.
- Sometimes builders and construction workers find them while digging.
- If a fossil is found, scientists continue to look in that area for others.

### How do they dig up fossils?

- Workers use shovels, drills, hammers, and chisels to get the fossils out of the ground.
- They must work very carefully so they do not break up the fossils as they work.
- Sometimes fossils are removed from the ground in a large mass of dirt and then carefully excavated.

### How are fossils kept safe?

- The part of the fossil that is exposed out of the ground is sprayed with a special glue to help make it strong.
- Once the fossil is removed, it is wrapped in bandages and covered in plaster to be safely transported.

### What data do scientists collect about fossils?

- Careful records are kept of fossils, including location found, measurements, drawings, and pictures of the fossils.

4. Hand out the *Can You Dig It?* sheet to each student and have them fill in the “thinking” section.
5. Then hand out the *Field Guide for Fossils* sheet and a baggie of precut puzzle pieces for each student. Have them put together their puzzles and add details to their finished puzzles using their field guides.
6. Optional practice excavation: If doing the optional cookie activity, pass out the cookie, toothpicks, and paper towels. This activity will likely take 5–10 minutes for most students. Let students “excavate” the chocolate chips out of their cookies and answer the questions on their *Can You Dig It?* worksheet.
7. Pass out the Fossil Hunt Kits to students or groups, along with *The Big Dig* worksheet and *Investigating Geologic Time & Fossils*. Have students excavate their fossils and fill in the information on their *The Big Dig* worksheets.



## Extensions

- Have middle school students answer the last question on *The Big Dig* by connecting the fossils they see to modern organisms.
- Connect instruction on rock layers and Earth's cycles and processes to the lesson. Discuss where fossils can be found in different rock layers or how a fossil may have happened based on processes of the Earth (landslide, earthquake, mudslide, avalanche, etc.).

## Modifications

- If students are learning virtually or need to maintain safety protocol, they may use materials commonly found at home. If students are in person for school but material sharing could be a risk, ask students to bring in common materials from home for their own experiment.

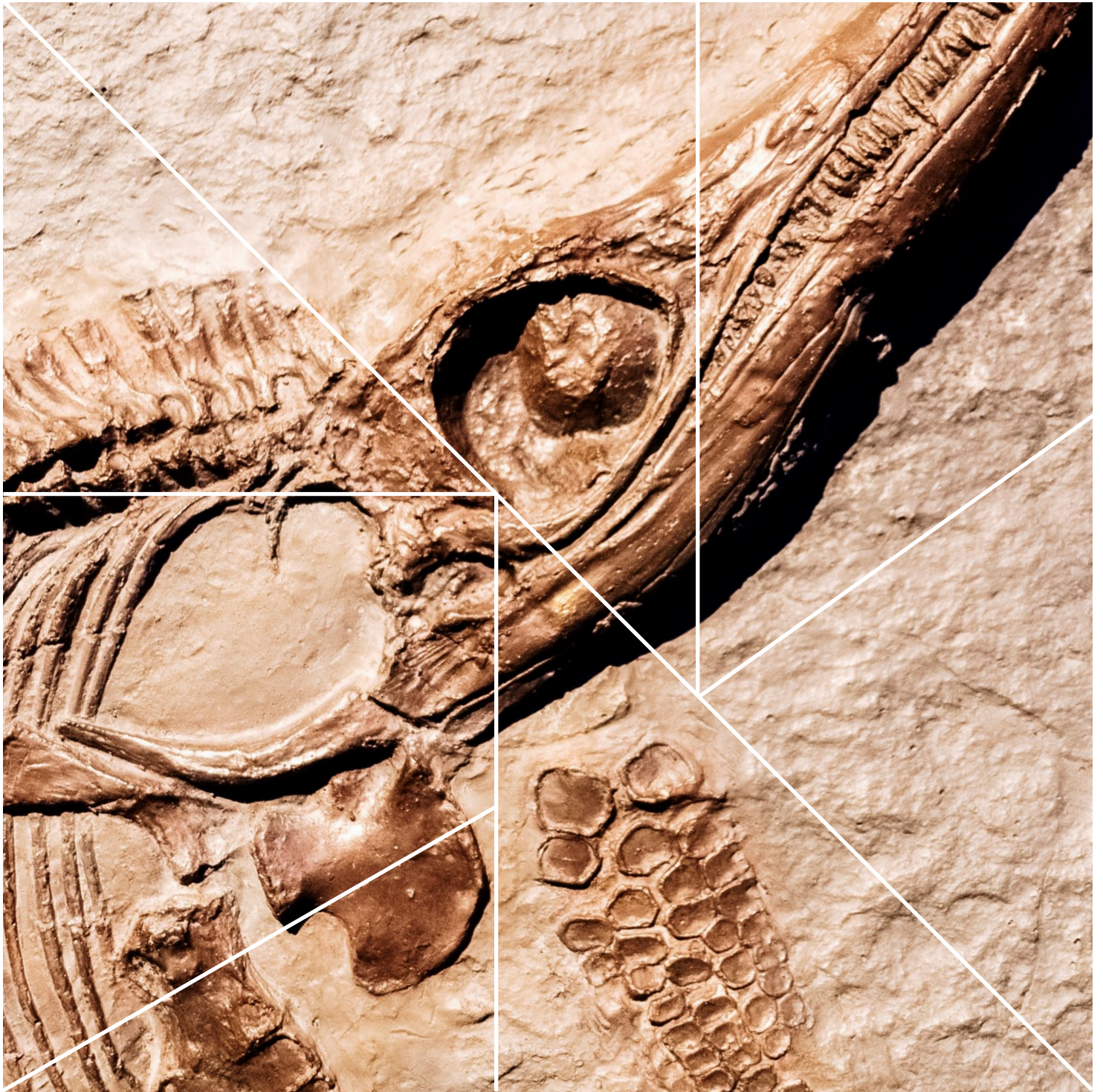






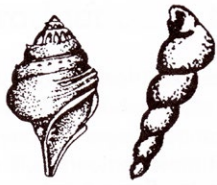










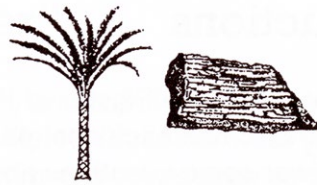


**Major group: Mollusk**

Specific group: Gastropod  
 Age: Paleozoic to recent  
 Niche: Bottom scavenger  
 Habitat: Marine, freshwater, land

**Interesting facts:**

- Most gastropods secrete a shell
- Adapted to land and freshwater
- Related to slugs, snails, conchs
- Name means "belly-footed creature"



**Major group: Plant**

Specific group: Cordaite  
 Age: Pennsylvanian to recent  
 Niche: Producer, base of the food web  
 Habitat: Forests and swamps

**Interesting facts:**

- Wood petrifies when sediment or volcanic ash covers trees
- Cycads were similar to modern palm trees and cordaites were primitive conifer trees



**Major group: Coelenterata**

Specific group: Rugose Coral  
 Age: Paleozoic to recent  
 Niche: Filter feeders  
 Habitat: Reef builder in shallow marine environments

**Interesting facts:**

- Related to jellyfish and anemones
- Secretes a hard exoskeleton
- Often forms colonies and reefs in a tropical marine environment
- Also known as "horn coral"



**Major group: Mollusk**

Specific group: Pelecypods  
 Age: Paleozoic to recent  
 Niche: Filter feeders  
 Habitat: Swarm, burrowed or attached to bottom in marine and freshwater environments

**Interesting facts:**

- Pelecypods include clams, scallops, and oysters
- Also known as "bivalves," meaning two shells joined at a hinge
- Name means "hatchet-footed" creature



**Major group: Byozoan**

Specific group: Colonial  
 Age: Paleozoic to recent  
 Niche: Filter feeders  
 Habitat: Attached to bottom in shallow marine and freshwater environments

**Interesting facts:**

- A reef dweller
- Some grow in spiral or branching colonies
- Name means "moss animal"



**Major group: Brachiopod**

Specific group: Articulate  
 Age: Paleozoic to recent  
 Niche: Filter feeders  
 Habitat: Attached to or rested on bottom in marine environments

**Interesting facts:**

- Early brachiopods were inarticulate, meaning they did not have hinged shells
- Nearly all species are extinct
- Name means "arm-footed" creature



**Major group: Echinoderm**

Specific group: Crinoid  
 Age: Cambrian to recent  
 Niche: Some predators and others feed on microorganisms collected on the cilia  
 Habitat: Attached to the bottom in marine environments

**Interesting facts:**

- Related to sand dollars, brittle stars, and sea urchins
- Many have five-fold "star" symmetry



**Major group: Chordata**

Specific group: Chondrichthyes  
 Age: Tertiary to recent  
 Niche: Predator  
 Habitat: Reefs and open seas marine environments

**Interesting facts:**

- Because sharks have skeletons made of cartilage, their teeth are all that fossilize
- Sharks have remained relatively unchanged for hundreds of millions of years
- Scientists estimate sizes of prehistoric sharks by this formula: every inch in tooth length corresponds to 10 feet in length of shark

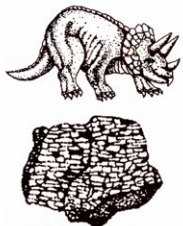


**Major group: Mollusk**

Specific group: Cephalopod  
 Age: Paleozoic to Mesozoic  
 Niche: Predators  
 Habitat: Attached to or rested on bottom in marine environments

**Interesting facts:**

- Ammonites were a coiled variety
- Bellemnites had a pointed internal shell
- Related to squid and octopus
- Cephalopod means "head-footed" creature



**Major group: Vertebrate**

Specific group: Reptilia  
 Age: Triassic to Cretaceous  
 Niche: Predators and plant eaters  
 Habitat: Tropical land and aquatic environments

**Interesting facts:**

- Lizards, amphibians, snakes and even birds are presumed descendants of the great dinosaurs
- Dinosaur means "monster or terrible lizard"

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

Paleontologists are scientists who study life forms that used to be alive, like dinosaurs and other prehistoric creatures. Some abnormal rocks have been discovered and the scientists at the local museum need your help in identifying the fossils.

In this activity, you will investigate and identify fossils.

### Thinking

- What types of fossils have you heard about?
  
  
  
  
  
  
  
  
  
  
- What kinds of tools might be used to excavate fossils?

### Put it together

You will be given puzzle pieces to put together to make a picture of a fossil. If you use an interactive notebook, make a page for your puzzle. Cut pieces apart and assemble with glue or tape. Add details about your specific fossil from the information provided in the *Field Guide for Fossils*.

### Optional practice excavation

Excavating a fossil is tricky work! It takes patience and focus. Working too fast can damage the fossil.

You will be given a chocolate chip cookie. The chocolate chips represent the fossils. The cookie represents the soil or rock surrounding the fossils. Using the tools provided, your challenge is to remove as many chocolate chips as possible with the least amount of damage. You should also try to have the least amount of cookie still stuck on your chocolate chips.

- How many chocolate chips were you able to successfully excavate without damage?
  
  
  
  
  
  
  
  
  
  
- How many were damaged or had too much cookie stuck on them?
  
  
  
  
  
  
  
  
  
  
- Do you think this would be easier to do with a hard cookie or soft cookie? Why?



Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

Write the fossil names in order from oldest to most recent: (Hint: Use the *Investigating Geologic Time & Fossils* sheet for help).

### Sketch of the fossil

Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Age: \_\_\_\_\_

Niche: \_\_\_\_\_

Habitat: \_\_\_\_\_

One interesting fact:

### Sketch of the fossil

Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Age: \_\_\_\_\_

Niche: \_\_\_\_\_

Habitat: \_\_\_\_\_

One interesting fact:

### Sketch of the fossil

Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Age: \_\_\_\_\_

Niche: \_\_\_\_\_

Habitat: \_\_\_\_\_

One interesting fact:

### Sketch of the fossil

Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Age: \_\_\_\_\_

Niche: \_\_\_\_\_

Habitat: \_\_\_\_\_

One interesting fact:



**Extension:** Compare and contrast modern organisms to similar fossils in order to infer possible evolutionary relationships.

## Fossil

Sketch

Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Age: \_\_\_\_\_

Niche: \_\_\_\_\_

Habitat: \_\_\_\_\_

## Modern Organism

Sketch

Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Age: \_\_\_\_\_

Niche: \_\_\_\_\_

Habitat: \_\_\_\_\_

Sketch:

Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Habitat: \_\_\_\_\_

Sketch:

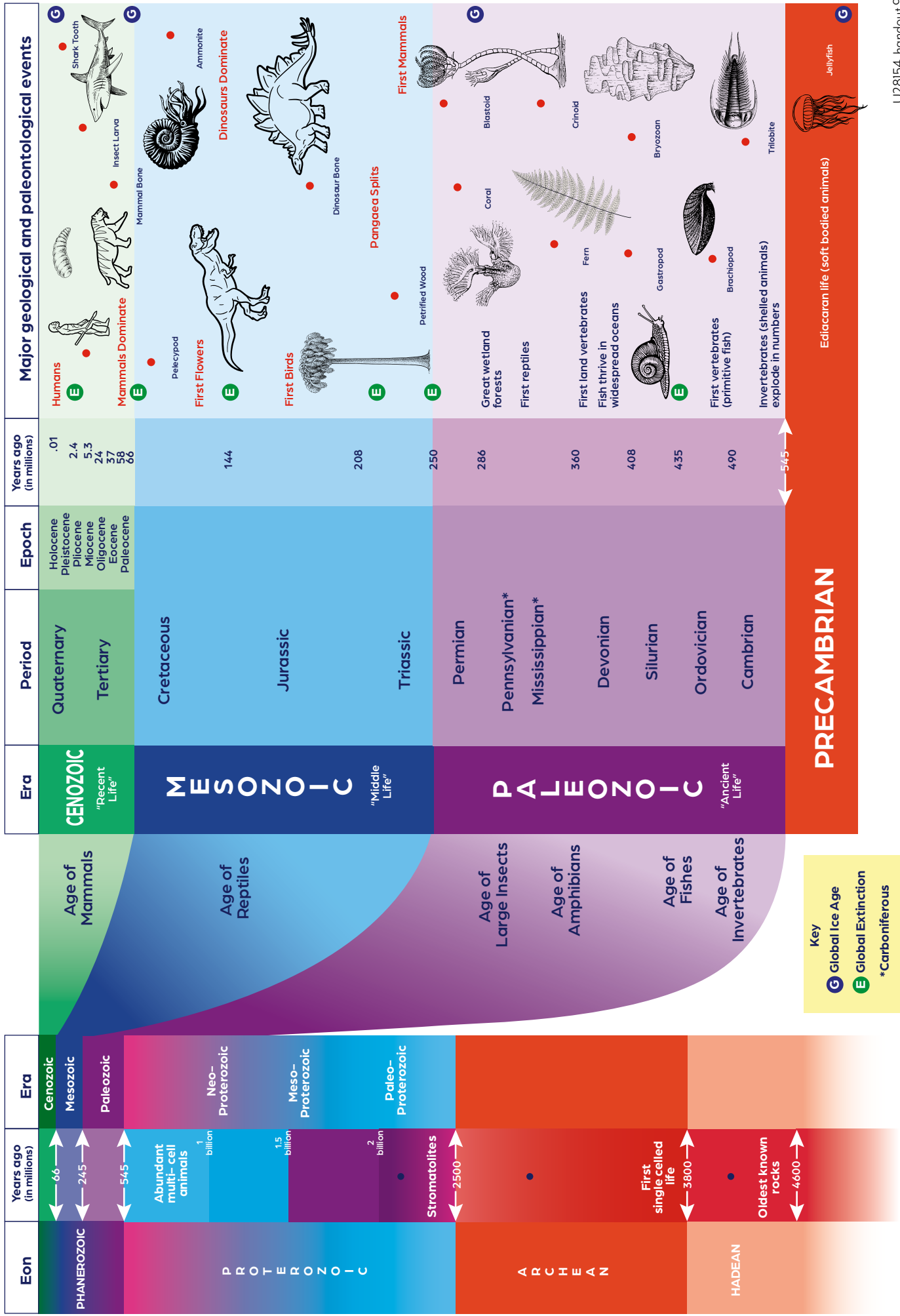
Major group: \_\_\_\_\_

Specific group: \_\_\_\_\_

Habitat: \_\_\_\_\_



# Investigating Geologic Time & Fossils



**Key**

- G Global Ice Age
- E Global Extinction
- \*Carboniferous