Geography Standard 17 Science Standard G Language Arts Standards 3, 5 Theater Arts Standards 1, 4

FOSSILS ROCK! TALES FROM THE FIELD

What is it like to work as a paleontologist? In Activity 1, students listen to or read an interview with paleontologist Paul Sereno, a National Geographic Explorer-in-Residence, to learn about his passion for science and his discovery of SuperCroc in sub-Saharan Africa. In Activity 2, students join a dig with paleontologist Mike Everhart to learn what happens when a scientist in the field suddenly discovers fossil remains. In the Closing Activity, students create a story or conduct an interview and present or record their work for an imaginary radio program.

Vocabulary (see Glossary)

deep time
excavate
fossil
fossil dig
GPS (Global Positioning System)
jacket
paleontologist
paleontology
prospect
remains
Smoky Hill Chalk
SuperCroc

Try This First!

Show students the picture of paleontologists working on a fossil dig (see back inside cover). Ask students to describe what is happening in the picture. Remind students to use observational skills to look for tools, geographic clues, and the work being done.

Guiding Question:

Why and how do paleontologists study fossils?

Activity	Objectives	Instructional Strategy	Materials
ACTIVITY 1 Meet a Paleontologist 20 min.	Students will: - Learn about the work of paleontologists	- Multimedia Instruction	- "Meet a Paleontologist"
ACTIVITY 2 Join a Dig 45 min.	Students will: - Learn about the tools paleontologists use on a field dig; and - Learn about actions paleontologists take after discovering a fossil.	- Multimedia Instruction	- "Join a Dig" - "Join a Dig" (optional audio file; online only) - Internet access (optional)
CLOSING ACTIVITY "Fossils Rock!" Radio Program 60 min.	Students will: - Write a story or conduct an interview using vocabulary and information from previous activities; and - Present and/or record their work.	- Role-playing	- "'Fossils Rock!' Radio Program" - Audio-recording device such as a digital recorder, computer with a microphone, tape, or audio recorder (optional)

Activity 1 Meet a Paleontologist

Students listen to or read an interview with paleontologist Paul Sereno, a National Geographic Explorer-in-Residence, to learn about his passion for science and his discovery of SuperCroc in sub-Saharan Africa.

"Meet a Paleontologist"

Directions:

1. **Explain.** Scientist Paul Sereno searches for, discovers, and studies fossil remains. Scientists who do this work are called paleontologists. While on a dig in sub-Saharan Africa, Sereno discovered the fossil remains of *Sarcosuchus imperator* ("flesh crocodile emperor"), one of the largest crocodilians to ever walk the Earth. This SuperCroc was 40 feet long (as long as a city bus) and weighed about ten tons.

   Note: *Additional information about SuperCroc and Paul Sereno, a National Geographic Explorer-in-Residence, is available online.*

   nationalgeographic.com/explorers-program/eir/psereno.html

   nationalgeographic.com/supercroc

2. **Distribute "Meet a Paleontologist" to each student.**

3. **Listen or read aloud.** Ask a pair of students to read the interview aloud, with each student playing the role of interviewer or interviewee.

   Note: *This interview has been adapted and abridged for students. The original audio interview was broadcast on National Geographic World Talk (nationalgeographic.com/radio/worldtalk.html) and is available online.*

   nationalgeographic.com/explorers-program/eir/psereno.html (Running time: 19:13)

4. **Review and discuss.** Check student comprehension. Write new vocabulary words on the board and discuss with students. Have students answer the following questions on a separate piece of paper and then discuss as a class.

   - Why does Paul Sereno think science is fun?
     Answer: *He believes that science is about discovery and creativity, and asking questions or finding answers that no one else has.*

   - Why does Paul Sereno think it is important to study dinosaurs?
     Answer: *Dinosaurs are a connection to the distant past, a time that we can only dream about or think about scientifically.*

   - Where did Paul Sereno find SuperCroc?
     Answer: *In Africa.*

   - What did SuperCroc look like?
     Answer: *Its skull was six feet long and its body was 40 feet long.*

   - Why do you think it is named SuperCroc?
     Answer: *This prehistoric crocodile was twice as long and many times heavier than modern crocodiles.*

5. **Brainstorm.** Ask students to brainstorm additional questions they might have about paleontologists and their work. Write this list on the board and suggest that students look for answers to these questions as they watch *Sea Monsters: A Prehistoric Adventure.*

   Note: *The film* Sea Monsters: A Prehistoric Adventure *primarily profiles prehistoric marine reptiles, which are not classified as dinosaurs but lived at the same time.*

View *Sea Monsters: A Prehistoric Adventure.*

Activity 2 Join a Dig

45 min.

Students join a dig with paleontologist Mike Everhart to learn what happens when a scientist in the field suddenly discovers fossil remains.

"Join a Dig"
or "Join a Dig" (audio;
nationalgeographic.com/seamonsters/educators)

Directions:

1. **Explain.** In 2002, paleontologist Mike Everhart was prospecting, or looking, for fossils in Kansas when he came across a wonderful discovery. In this activity, students will read or listen to his firsthand account of this find and then answer questions.

   Note: *Additional information about Mike Everhart's work is available online.*

   oceansofkansas.com

2. **Distribute "Join a Dig" to each student.**

3. **Listen to the story.** Play the "Join a Dig" audio recording narrated by the scientist, or read the story aloud. Students can read along as they listen. The audio recording is available online.

   nationalgeographic.com/seamonsters/educators

4. **Review learning.** Write new vocabulary words on the board and discuss with students. Then use the following questions to lead a class discussion on the story. Have students answer the following questions on a separate piece of paper and then discuss as a class. Alternatively: Discuss the following questions with the whole class.

What actions did Everhart take to find and collect the fossil remains?

Possible answers:

- *Observe*
- *Identify*
- *Photograph*
- *Locate*
- *Excavate (remove) dirt*
- *Sketch*
- *Protect*
- *Transport*

What tools did Everhart use? Why were they helpful?

Possible answers:

- *Map and GPS data to record the location of the fossil*
- *Camera and notebook to document the fossil*
- *Large pick, shovel, small knife, ice pick, and small brush to remove dirt and excavate the fossil*
- *Wet paper towels, burlap, plaster, plastic, and a plaster frame to protect the fossil*
- *A van to transport the fossil*

ADAPTATIONS

This activity contains content-area reading and listening. Support students who have difficulty comprehending some of the text by providing scaffolding such as reinforcing vocabulary concepts, using words in context, predicting, summarizing and clarifying key points, and modeling comprehension strategies.

Cretoxyrhina

Closing Activity

"Fossils Rock!" Radio Program

60 min.

Students synthesize their learning to write a story or conduct an interview. They will orally present or record their work for a fictional radio program.

"'Fossils Rock!' Radio Program"

Directions:

1. **Explain.** Students will create a story or conduct an interview for a fictional radio program called "Fossils Rock!". They can work in groups or individually, as appropriate.

2. **Distribute "'Fossils Rock!' Radio Program" to each student.** Review the directions with students.

3. **Student presentations.** After students have had time to prepare their story or interview, have them present their work to the class. Students can pretend they are recording an imaginary radio program called "Fossils Rock!".

Option: *Student work can be recorded using a computer with a microphone, or an audio or video recorder.*

STUDENT ASSESSMENT

Rate student work on a scale from one to five on each of the following categories: creativity, accurate use of vocabulary, accurate understanding of paleontology, organization of main ideas.

BACKGROUND INFORMATION

Paleontology is a science dealing with the life of past geological periods as known from fossil remains. Paleontologists look for, discover, excavate, and study fossils to learn about life on Earth during prehistoric times.

Student Handout

MEET A PALEONTOLOGIST

While on a fossil dig in Africa, paleontologist Paul Sereno uncovered the skeleton of a very old, very large crocodile. In this interview he talks about this important discovery.

Interviewer, Peter Laufer: This is National Geographic World Talk. I'm Peter Laufer, along with paleontologist Paul Sereno. Is there any kid, anywhere, who's not fascinated by dinosaurs? Why is it so important that we learn where dinosaurs came from, when the first dinosaurs appeared, and why they died out?

Paleontologist, Paul Sereno: We're curious about our history. We're curious about deep time. Dinosaurs speak about a time that we can only dream about and think about scientifically.

Peter Laufer: Tell us about SuperCroc, who he was, and how you found him.

Paul Sereno: Well, [in Africa] we came upon an incredibly huge skull—six feet long. It was just astonishing that it was a crocodile with a skull that long. Then we found enough of the skeleton to get a good idea of what it looked like. You're talking about an animal 40 feet long, twice as long as the largest living crocodiles today and many times as heavy.

Peter Laufer: You are finding things that have never been seen before. They are related to animals that live with us today.

Paul Sereno: That's the great thrill of working in paleontology.

Peter Laufer: Despite the fact that you're studying these [animals] who lived so long ago, there's constantly new material. Isn't that correct?

Paul Sereno: Yes. That's my great understanding of science. In college, I started out as an artist. Science seemed like a pile of facts that I could never remember. As I got interested in paleontology I began to understand that it's about discovery and creativity. It's about thinking of a question or trying to answer a question that nobody else has before you.

That's what I love. We're always going to be finding out new things.

Peter Laufer: Paleontologist Paul Sereno, thanks so much for joining us today on National Geographic World Talk. I'm Peter Laufer.

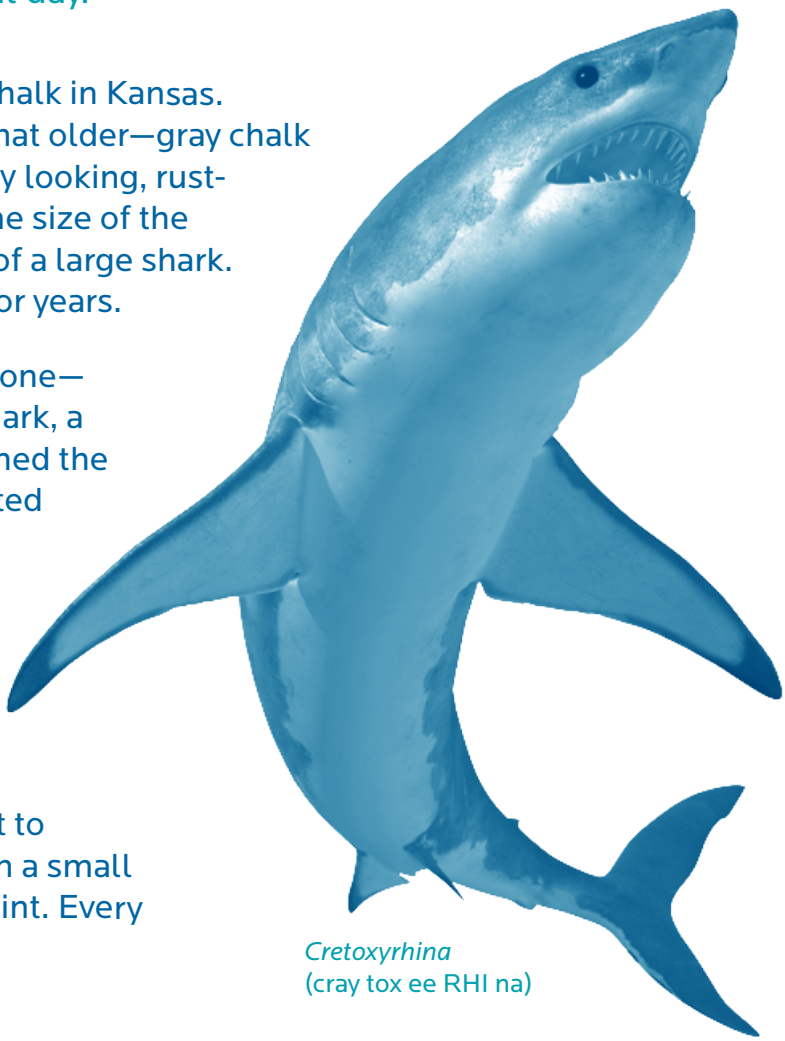
Student Handout

JOIN A DIG

In 2002, paleontologist Mike Everhart came across a wonderful discovery. Here is his story about what happened that day.

We were on a field trip to the Smoky Hill Chalk in Kansas. I decided to search the lower—and somewhat older—gray chalk flats. When I looked down, I noticed a funny looking, rust-orange lump. Then I saw six teeth. From the size of the teeth, I could tell I had found the remains of a large shark. A shark like this had been on my wish list for years.

I got my camera out to take pictures. Everyone—including me—was in awe. It was a huge shark, a *Cretoxyrhina mantelli,* which I had nicknamed the "Ginsu" shark. I got out my field map, plotted the location, and checked it against the GPS data.



Cretoxyrhina
(cray tox ee RHI na)

Time to start the excavation. First, I used a large pick and shovel. Then I got down on my hands and knees to work closer to the skeleton. I had to work very carefully because I didn't want to damage the fossil. I removed the chalk with a small knife and an ice pick that has a very fine point. Every so often, I cleared away the bits of chalk with a small brush.

After a few hours, we had exposed the front 16 feet of a 20-foot shark. I made drawings in my notebook to show where each piece was found.

Now that the remains were exposed, we had to protect them. We used wet paper towels to pad the skull. Then we made a protective jacket for the skull out of burlap dipped in plaster. We waited for the plaster to dry and then loaded the jacket into my van. Then we covered the rest of the shark with plastic.

After a complicated but successful recovery, a plaster frame holding the body of the shark arrived at the Sternberg Museum three weeks later.

Student Handout

"FOSSILS ROCK!" RADIO PROGRAM

You have been asked to work on a radio program, "Fossils Rock!" Use your imagination to write a story or an interview for this program. Write about finding the fossil remains of a prehistoric animal.

Step 1: Think about ideas. What details can you include to make your story or interview interesting for listeners? For example:

- Where did you find the fossil?
- What did you notice first?
- What is the name of the prehistoric animal you found?
- What did you do to recover the fossil?
- What tools helped you?

Step 2: Write your story or interview. Use at least ten words from the Word Bank in your story or interview. If you do not know the meaning of a word, use a dictionary to look it up.

Word Bank

burlap	jacket	plastic frame
camera	large pick	protect
chalk	locate	remains
discovery	location	scientific
excavate (remove) dirt	observation	shovel
field map	observe	skeleton
fossil	paleontologist	sketch
GPS data	paleontology	small brush
ice pick	photograph	small knife
identify	plaster	transport