Activity Description & Estimated Class Time

In this 50-minute exercise all students examine fossil ammonites and speculate on their natural history as if they were the first people to see one. The students then repeat this exercise with another fossil of their own choosing.

Correlations to NC Science Standards

ESS.8.1 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

Learning Target

Students will demonstrate knowledge and understanding that fossils are the mineralized remains or other evidence of previous life and can inform them about environmental conditions.

Brief Science Background

Fossils are the mineralized remains or other evidence of previous life. The term comes from the Latin, fossus, which means literally, "having been dug up." Fossils range in size from micro (such as bacteria and other small organisms) to macro (such as dinosaur bones). The oldest fossils are stromatolites which first show up in the fossil record around 2.1 billion years ago. The exact age is a current hot topic of debate within paleontology circles, some scientists claiming they are 3.5 billion years old. Fossils are found for the most part in sedimentary rocks and can be formed in many ways, depending on the type of organism that is being preserved and environmental conditions. Fossilization is a relatively rare occurrence, which means that the fossil record has many gaps.

This lesson is intended as a simple introduction to fossils. All of the fossils in the activity are real fossils recovered from fossil bearing strata of rocks. The idea is just to have the students look at the fossils and start to speculate about the organisms involved and the conditions they lived under. This is much like the first people who found fossil remains in rocks that looked like organisms and wondered how they got there and what they were. Seashells on a mountain top? How could that be?

Fossils

Materials

Materials for the whole class

The ability to project:

- Sketch of an ammonite (SD 1)
- Sketch of various other fossils (SD 2)
- Fossil Guide (SD 3)

Materials for pairs of students

- Colored pencils
- 1 ammonite fossil per pair of students
- 1 'other fossil' chosen from the collection by each pair of students
- 1 hand lens
- 2 Fossils Student Activity Sheet (SD 4)

Procedure

1. Ask students what they have heard about fossils and then have an introductory discussion based on what they say.
2. Give each student a Fossils Student Activity Sheet (SD 4) and pass out the ammonite fossil samples, one for each pair. Ask the students to make some detailed observations and drawings of their sample. Don't take too long for this part of the activity.

Procedure

3. Ask students to speculate on the organism that left this fossil. Have them sketch their imaginary view of the organism's habitat and write some notes about its possible life history, predators, food source, present day relatives, and other things they might think are important. Students should provide evidence they used to make their speculations. Explain to students that this is what early scientists did, often with very comical results (when viewed with current understanding).
4. Discuss with the class the results of their speculations and probe a bit as to why they thought one thing or another. Ask for the evidence they used to make their speculations.
   Accept all suggestions. Some may be humorous, but gently probe for more serious ideas as well.
5. Project the sketch of the ammonite and tell students the following information:
   a. These fossils came from Germany.
   b. They date back the Mesozoic Era, about 150 million years ago.
   c. Ammonites are cephalopod mollusks, related to octopuses, squid, and cuttlefish.
   d. Their bodies occupied the largest section of their shell. The smaller sections were filled with a gas that helped them maintain buoyancy in the water.
   e. They lived in the open ocean as predators, using their tentacles and rasping beaks to feed on small fish and crustaceans (shrimp, etc.).
   f. They were probably preyed upon by marine reptiles, sharks, and other larger fish.
6. Now that the stage is set, it is a good time to ask, "How do we know what I just told you?" Ask them what kind of information they would need to gather to know or find out things about fossils. This is the time to start the general conversation about how scientists collect and generate information on events that nobody was around to see.
   Discuss with students how scientists collect and generate information about events (or organisms) that nobody was around to see. If students are struggling to come up with ideas, consider asking the following probing questions:
   a. What clues DO we have about the event or organism?
   b. Do any of those clues look familiar? Do they resemble anything that is alive or happening now?
   c. Do the clues look completely different? What might have created those differences?
   d. Where were the clues found? Does the environment tell us anything? Does is rule out anything?
   e. How old are the clues? Do we know about anything else happening at that time or alive at that time that could help us?

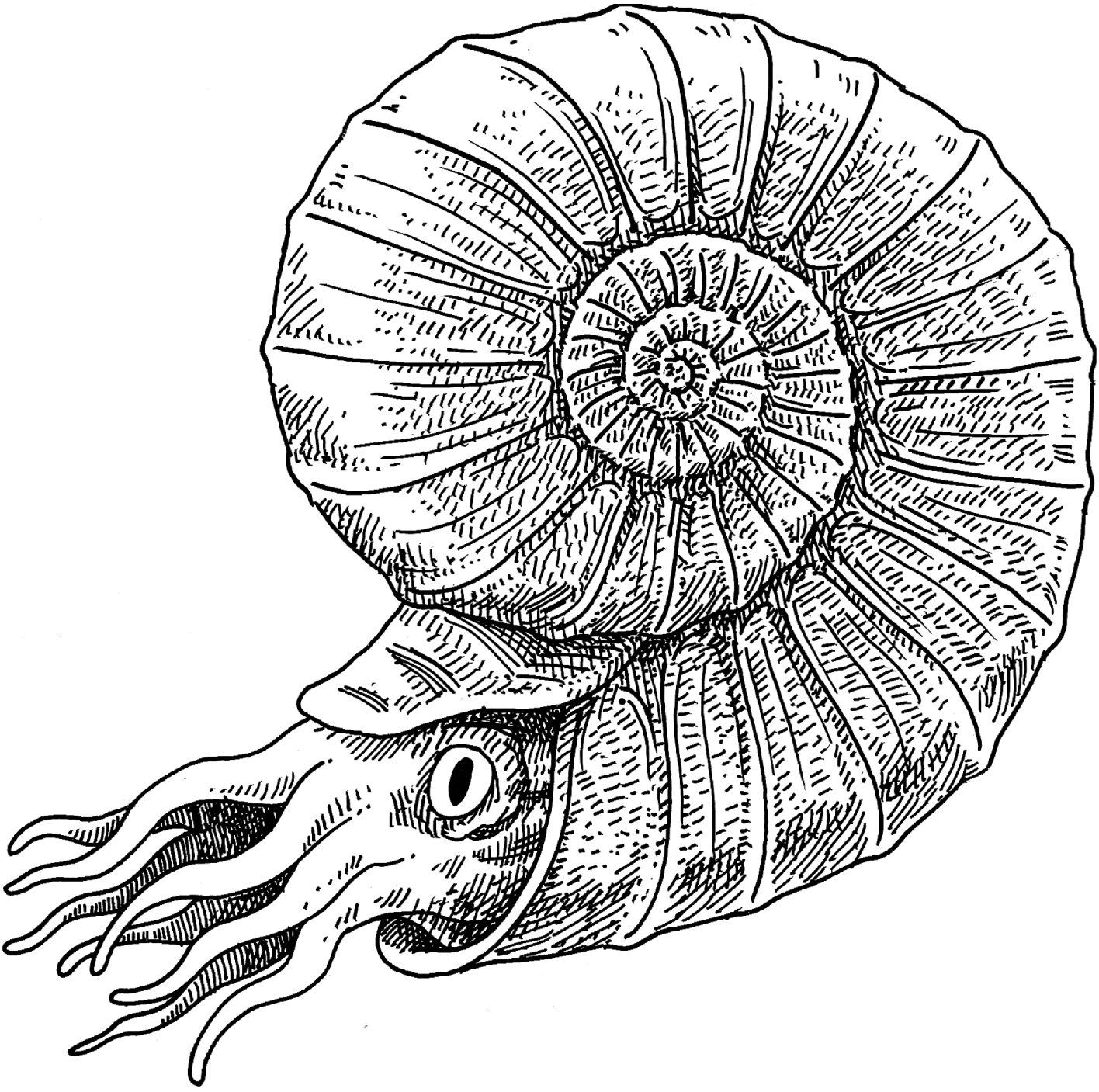
   After discussing these ideas, help students come to the generalization that scientists make inferences, not wild guesses, using the evidence they have available. If and when new evidence is discovered, the inferences can be refined.
7. Have each pair of students pick a new fossil sample. Have them observe and sketch the new fossil, and speculate as before.
8. Have groups with similar fossils meet to share their speculations and drawings.
9. Hold a brief class discussion to go over the groups' speculations and evidence. Project SD 3 and present information on what is currently known about these fossils.

Content Connection

Ask students to compile their ideas of how one gathers evidence to explain events that one has not seen.

SD 1

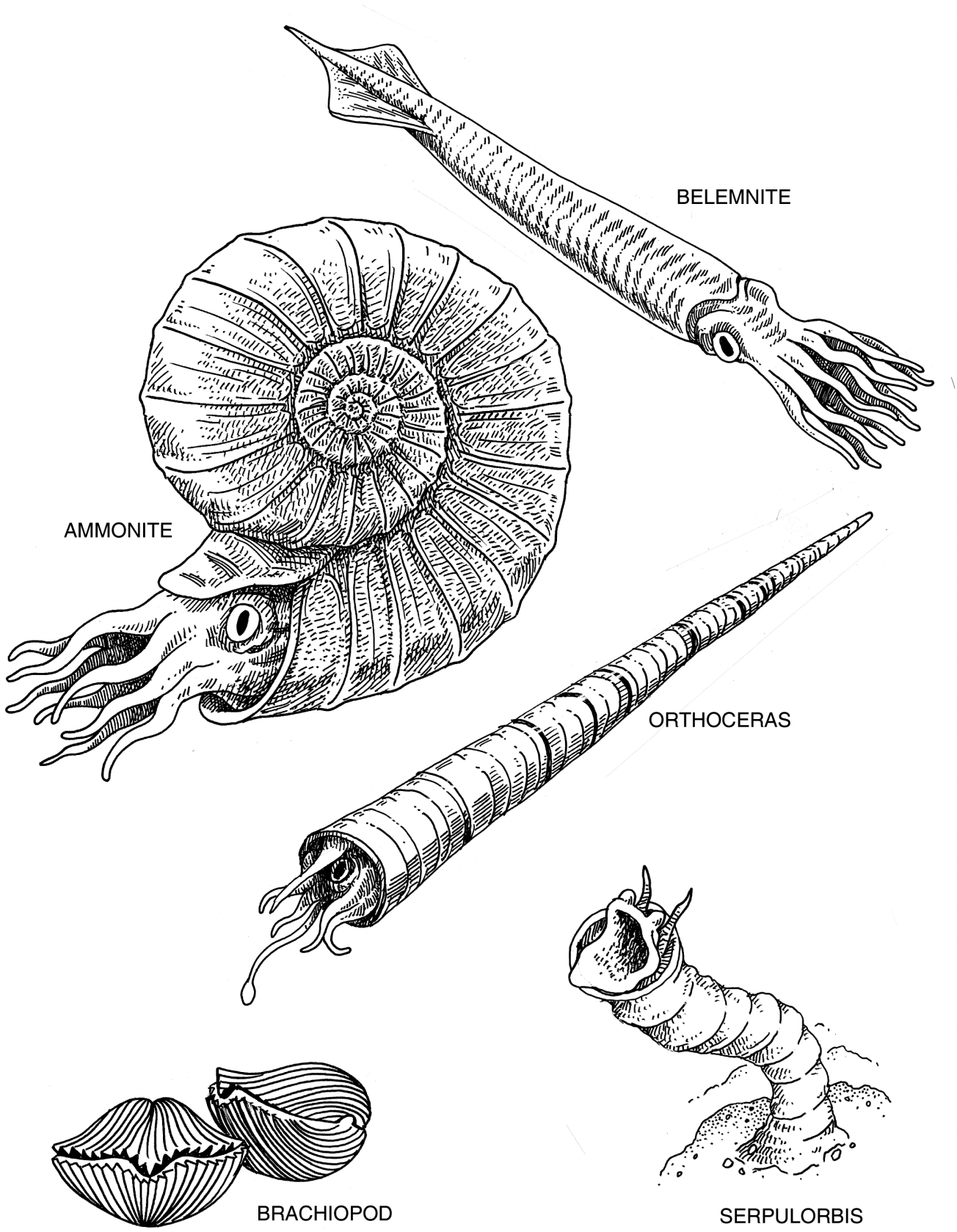
Ammonite



AMMONITE

SD 2

Other Fossils



SD 3

Fossil Guide

Each materials package will have some combination of the following fossils in labeled bags. They will be located in the cardboard box labeled Assorted Fossils.

1. **Belemnites:** These samples are from Jurassic Period deposits in Germany. The fossils resemble twigs or sticks with a hole in the middle. They are smooth, and some samples are tapered at one end. They are an internal part of an ancient cephalopod organism distantly related to modern day squid and cuttlefish.

2. **Serpulorbis:** These fossils that look like white worm tubes are actually the remnants of a gastropod (snail). They date from the Pliocene/Pleistocene Epochs or about 1.6 million years ago and were recovered from deposits in North Carolina. Modern day Serpulorbis look like a snail crammed in a tube instead of a shell. They are sedentary and catch their food by putting out a mucus net that traps plankton and detritus.

3. **Shark Teeth:** These samples are from Cretaceous Period deposits in North Carolina. The fossil record of sharks extends back 450 million years, with modern-type sharks appearing about 100 million years ago. Sharks produce thousands of teeth during their lives, replacing lost ones continually. The teeth are easily fossilized since they are composed of minerals to begin with. This explains the abundance of fossilized sharks' teeth. The shark species can sometimes be determined by the shape and size of the teeth.

4. **Brachiopods:** These are common fossils. Brachiopods can be found in rocks as old as the Cambrian Period and were a dominant life form throughout the Paleozoic Era. They resemble clams but are not related to mollusks; they belong in their own phylum. There are still living genera that generally live in cold water or deeper water "fringe" environments. Brachiopods have a distinctive appendage that they stretch out into the water to catch plankton or detritus. Their two shells are unequal in size and shape, and they attach themselves to the substrate with an organ called a pedicle.

5. **Dinosaur Bone:** These are fossilized pieces of bone from the Cretaceous rocks of Wyoming. It is not possible to determine the species, but you can let your imagination run free on this one. The samples have some smooth surfaces and also what appear to be holes, much like the inside of a chicken bone.

6. **Fish Vertebrae:** These samples resemble beads with a hole in the middle. They are from Pliocene/Pleistocene age marine deposits in North Carolina. They are from species that resemble modern day fish.

7. **Orthoceras:** These organisms are related to the ammonites that were the first sample investigated in this activity. They are from the Jurassic. They are a cephalopod organism (related to squid and octopus) with a straight external shell.

SD 4

Fossils: Student Activity Sheet

Name:

Ammonite

Observations

Sketch

Habitat Sketch

Notes

Name of Fossil:_____

Observations

Sketch

Habitat Sketch

Notes

How does a person gather evidence to explain events that they have not seen?