Snakestones- a Scientific Study
A lesson for Gr. 4-8

Introduction: Elizabeth Philpot was a real person who lived in the beach town of Lyme Regis in England from 1780 to 1857. She was an artist and a fossil collector, best known for her collection of fish fossils. One day she found a different kind of fossil on the beach, called a "snakestone". In this lesson students use scientific inquiry to think about whether this type of fossil really was once a snake.

Teaching the Lesson:
1. Read aloud the excerpt from pgs. 14 & 15 of *Remarkable Creatures,* by Tracy Chevalier, and ask students to draw what Elizabeth found. Pass around images of snakestones. How do students' drawings compare?

2. An Englishman named William Camden wrote about snakestones in 1607. He said that if a person broke open a round rock containing a snakestone they'd find a curled up snake without a head. Elizabeth wasn't the only one who wondered why no heads were found. Some people believed a story that took place many, many years before William Camden wrote about snakestones. In Whitby, England, there used to be many snakes. When St. Hilda decided to construct a building for nuns there, she had to get rid of the snakes. First she did some praying and the snakes coiled up. Then she cut off their heads with a whip. The bodies turned to stone and she threw them over a cliff. Today you can still find snakestones on the beach at Whitby. Over the years, some people in Whitby carved heads on the snakestones that they found. Show "Carved Snakestones from Yorkshire, England".

3. Might these be fossils of snakes? Read aloud the excerpt from pg. 32. Let's carry out a scientific investigation. The first step is to observe, describe, and ask questions about how the fossil came to be. Elizabeth has done some of this work for you. Write down what you and Elizabeth have observed so far. Be sure to include:
- a description of the area where the fossil was found
- what you think the fossil is made of
- a description of the fossil- in words and/or pictures
- Were other similar fossils found there?
- any other observations you might have from examining the fossil example or from the book excerpt
- what else the fossil might be besides a snake

Now list the questions you and Elizabeth have. Below are Elizabeth's and Margaret's questions. Add some of your own. Also add any questions from step #3 above and turn as many of those observations as you can into questions.
- "Where is its head? It looks as if it has been chopped off."
- "Why would they curl up into balls?"
- "Those must be boa constrictors, don't you think? They're enormous!"

Use your best guesses to answer each question. Be sure to provide evidence, what you learned by observing, and reasons why you think your answer might be right. What makes sense to you? Use your answers to create a hypothesis. This is a statement describing what you think might be the right answer.

Your hypothesis needs to be tested. You'll need to find out more information. Let's use Margaret's hypothesis as an example. She thinks the fossils might be boa constrictors. What do you need to find out to prove her theory? Make a list of questions. Be sure to include:
- where boa constrictors live now
- a description of their habitat- what they eat, where they live, the climate in which they survive best
- How long have they been on this earth?
- When they first appeared, what was it like where the fossil was found in England? Is it likely that boa constrictors might have moved in or out of England at some point? Why?

The next step is to revise your hypothesis. If you found information that definitely rules out the idea of boa constrictors living in England a long time ago, now what do you think? You can keep on observing, hypothesizing, and researching until you *think* you have the right answer, but be aware that if something can't be proven for certain, the process might go on indefinitely!

Elizabeth eventually learned that snakestones are also known as “ammonites”. They don’t exist anymore but they resembled the nautilus shells that we still have in our oceans today. Show images of ammonites and nautiluses.

What was your final conclusion? How does it compare to what Elizabeth eventually learned?

Excerpts from *Remarkable Creatures*
By Tracy Chevalier
Pgs. 14 & 15

We had joined our Weymouth friends the Durhams to search out a peculiar stone ledge along the beach called the Snakes' Graveyard, which was only uncovered at low tide. It was farther than we'd thought, and the stony beach was difficult to walk on in thin pumps. I had to keep my eyes cast down so as not to trip on the rocks. As I stepped between two stones, I noticed an odd pebble decorated with a striped pattern. I bent over and picked it up- the first of thousands of times I would do so in my life. It was spiral-shaped, with ridges at even intervals around the spine, and it looked like a snake curled in on itself, the tip of the tail in the center. Its regular pattern was so pleasing to the eye that I felt I must keep it, though I had no idea what it was. I only knew that it could not be a pebble.

I showed it to Louise and Margaret, and then to the Weymouth family. "Ah, that is a snakestone," Mr. Durham declared.

I almost dropped it, despite logic telling me the snake could not be alive. It could not be just a stone, though. Then I realized. "It is a- fossil, isn't it?" I used the word hesitantly, for I wasn't sure the Weymouth family would be familiar with it. Of course I had read about fossils, and seen some displayed in a cabinet at the British Museum, but I didn't know they could be found so easily on the beach.

I expect so," Mr. Durham said. "People often find such things here. Some of the locals sell then as curiosities. They call them curies."

"Where is its head?" Margaret asked. "It looks as if it's been chopped off."

"Perhaps it has fallen off," Miss Durham suggested. "Where did you find the snakestone, Miss Philpot?"

I pointed out the spot, and we all looked but couldn't see the head of a snake lying about. Soon the others lost interest and walked on. I searched a little longer, then followed the party, opening my hand now and then to gaze at this, my first specimen of what I would learn to call an ammonite. It was odd to be holding the body of a creature, whatever it was, and yet it pleased me too. Gripping its solid form was a comfort, like holding on to a walking stick or a staircase banister.

At the end of Monmouth Beach, just before Seven Rocks Point, where the shoreline turned out of sight, we found the Snakes' Graveyard. It was a smooth ledge of limestone in which there were spiral impressions, white lines against the gray stone, of hundreds of creatures like that which I held, except that they were enormous, each the size of a dinner plate. It was such a strange, bleak sight that we all stared in silence.

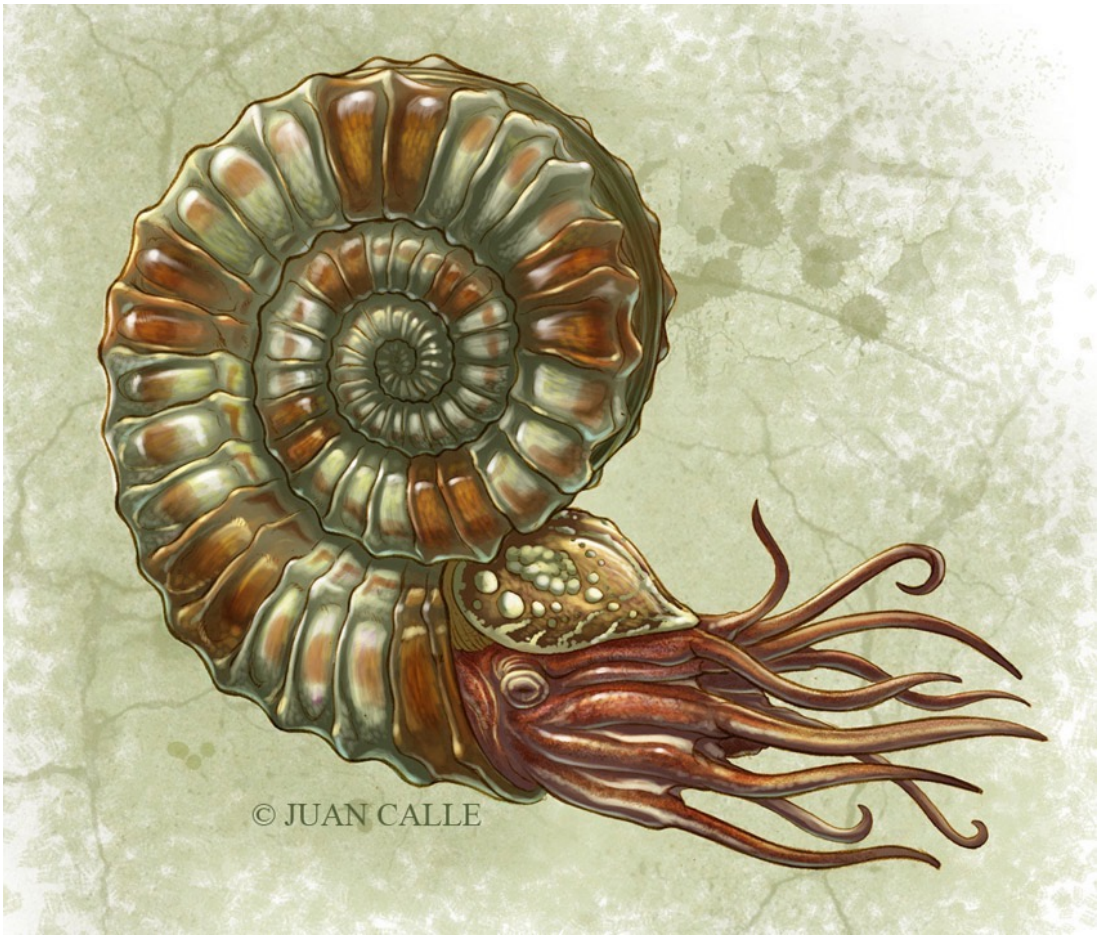
"Those must be boa constrictors, don't you think?" Margaret said. "They're enormous!"

Excerpts from *Remarkable Creatures*
By Tracy Chevalier
Pg. 32

I was particularly frustrated, as the fossils I was finding were so very puzzling, and filled me with questions I wanted to air. Ammonites, for instance, the most visible and striking of the fossils found at Lyme: What exactly were they? I could not believe they were snakes, as so many unquestionably did. Why would they curl up into balls? I had never heard of snakes doing such a thing. And where were their heads? I looked carefully each time I found an ammonite, but could discover no trace of a head. It was very peculiar that I could find so many fossils of them on the beach, and yet not see them alive.

Snakestones

Carved Snakestone from Yorkshire, England



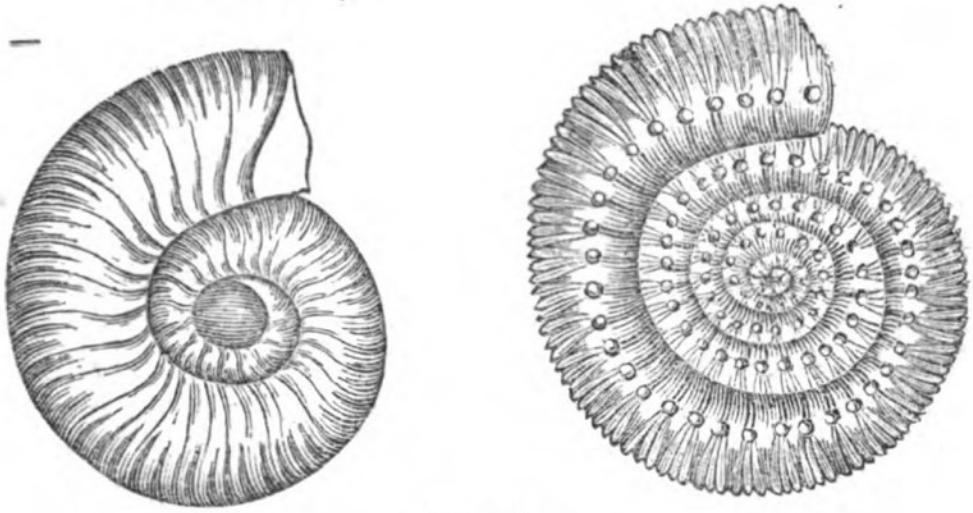
Ammonite
http://orig12.deviantart.net/20b3/f/2007/053/6/d/ammonite_by_onikaizer.jpg

Tiger Nautilus
http://www.conchking.com/imgE7.jpg

Ammonites.

Descr. With the exception of one or two species of nautilus, all the larger species of multilocular or chambered shells have disappeared from the earth, although in early times they were very numerous and widely diffused, and often of enormous size. They resembled the nautilus in general form and structure, although generically different; and they are sometimes found more than four feet in diameter. Figs. 58, 59, represent two species of ammonites.

Fig. 58. Fig. 59.



Ammonites.

Details. Brochant enumerates 270 species of ammonites: Phillips mentions 274, which he distributes as follows: In graywacke, 17: in the carboniferous system, 33: in the saliferous system, 3: in the oolitic system, 164: n the cretaceous system, 57: in the tertiary strata, 0? *Treatise on Geology, Vol.* 1. *p.* 83.

Elementary Geology, Edward Hitchcock, 1847

English Language Arts Standards

Reading: Informational Text » Grade 4

CCSS.ELA-LITERACY.RI.4.3
Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

CCSS.ELA-LITERACY.RI.4.5
Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

Reading: Informational Text » Grade 5

CCSS.ELA-LITERACY.RI.5.3
Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

CCSS.ELA-LITERACY.RI.5.5
Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.

CCSS.ELA-LITERACY.RI.5.8
Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

CCSS.ELA-LITERACY.RI.5.9
Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Science & Technical Subjects » Grade 6-8

CCSS.ELA-LITERACY.RST.6-8.1
Cite specific textual evidence to support analysis of science and technical texts.

CCSS.ELA-LITERACY.RST.6-8.7
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-LITERACY.RST.6-8.8
Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.