

Chapter 19 Lab **Using Index Fossils**

Problem

How can fossils be used to determine the relative ages of rock layers?

Introduction

It is easy to compare the ages of fossils found in sedimentary rocks at one location. Fossils found in an upper rock layer will be younger than fossils found in a lower layer, unless the layers have been overturned. It is not as easy to compare the ages of fossils found in rocks at different locations. Scientists use index fossils to determine the relative ages of rock layers. Scientists use radiometric dating to find the actual age of rocks and fossils.

In this lab, you will work with drawings of rock layers from different locations. Each layer will contain at least two fossils. Using the fossils as clues, you will organize the layers from oldest to youngest.

Skills Focus

Interpret Visuals, Sequence, Draw Conclusions

Materials

- scissors

Safety

Do not direct the points of the scissors toward yourself or others. Use the scissors only as instructed.

Pre-Lab Questions

1. **Organize Data** After you cut out the drawings of the rock layers, how will you begin the process of sorting the layers by age?


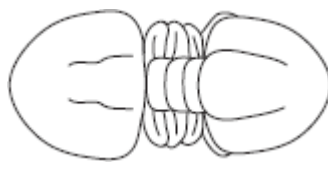
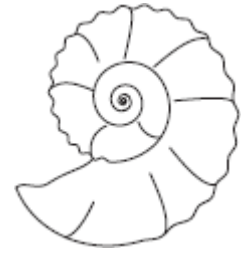
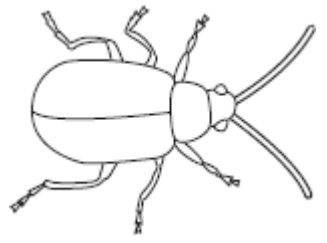





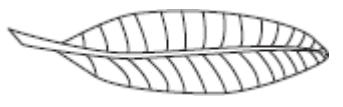

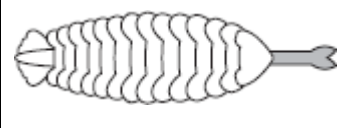

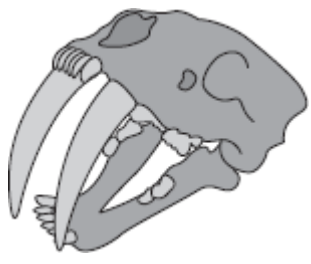

2. **Infer** *Desmotosuchus* was a crocodile relative that lived only during the Triassic Period. Horsetails are plants that first appeared in the Triassic Period and still exist. Which of these organisms would be more useful as an index fossil for the Triassic Period? Why?

3. Use Analogies Luke found a box of photos labeled 1970–1995. Each photo shows his entire extended family. No dates appear on the photos. Luke knows that his grandmother died in 1985 and his uncle was born in 1975. Luke’s sister was born in 1990. How can Luke use this information to sort the photos into four batches? How are Luke’s relatives similar to index fossils?

Procedure


You will use fossils to order the rock layers pictured at the end of this lab. Nine of the layers represent periods from the Paleozoic and Mesozoic Eras. One layer represents the Cenozoic Era.

1. Tear out pages 121 and 123 at the end of this lab. Cut out each drawing of a rock layer. **NOTE:** The fossils are not drawn to scale.
2. Spread out the layers on a flat surface. Use the Key to Fossils to identify the fossils in each layer. Write the names of the fossils on the drawings. **NOTE:** Some of the drawings represent one species or one genus. Some represent a higher taxonomic level.
3. The oldest rock layer is from the Cambrian Period. Some organisms in this layer will not be found in any other layer. No organism in this layer still exists. Locate the layer that represents the Cambrian Period.
4. Look for fossils that are found in only two layers. Using this information, pair up layers that must represent consecutive periods in the geologic record.
5. Use other fossils to determine which layer in each pair is older and the order of all the layers from oldest to youngest.
6. Each drawing has a letter in the upper left corner. Use the letters to record the correct sequence of layers in the data table on page 118. Record the letter for the youngest layer in the first row and the letter for the oldest layer in the last row. Also record the names of the fossils found in each layer.
7. Use pages 560–563 in your textbook to identify the geologic period that corresponds to each rock layer.

Key to Fossils		
 <p>acanthodian(jawed fish with bony spines)</p>	 <p>agnostid(order of trilobites)</p>	 <p>ammonite(mollusk with coiled shell)</p>
 <p>beetle(order of insects)</p>	 <p><i>Brachiosaurus</i>(long-necked dinosaur)</p>	 <p>cockroach(order of insects)</p>
 <p><i>Edaphosaurus</i>(sail-backed herbivore)</p>	 <p>eurypterid(large, ancient sea scorpion)</p>	 <p>ginkgo(tree with fan-shaped leaves)</p>
 <p><i>Glossopteris</i>(plant with veined leaves)</p>	 <p>oak(tree with broad leaves)</p>	 <p><i>Opabinia</i>(small animal with five eyes)</p>
 <p>placoderm(armored fish)</p>	 <p><i>Smilodon</i>(saber-toothed cat)</p>	 <p><i>Wiwaxia</i>(small, spiny bottom feeder)</p>

Data Table		
Layer	Fossils Found	Geologic Period

Youngest



oldest

Analyze and Conclude

1. Analyze Data How did you identify the layer from the Cambrian Period?

2. Sequence How did you identify the layer that belonged next to the Cambrian layer?

3. Sequence How were you able to determine which of the two layers containing a *Glossopteris* fossil was the older layer?

4. Draw Conclusions Why might a placoderm be a more useful index fossil than a cockroach?

5. Infer Ammonoids are found in rock layers from six different geologic periods. Yet ammonoids are considered excellent index fossils. Explain why this is possible. *Hint:* See the note in Step 2 of the procedure.

6. Apply Concepts Provide two explanations for why a species might disappear from the fossil record.

Extend Your Inquiry

Mass extinctions occurred at the end of the Permian and Cretaceous Periods. Do research to find what scientists think may have caused these extinctions. Then decide whether any of these hypotheses could help to explain the current worldwide reduction in biodiversity.

