



Dating the Fossil Record

You have received nine rock samples from a paleontologist in California. Your job is to arrange the samples in order from oldest to youngest according to their fossil content and to determine their relative ages using the process of relative dating. Results from absolute dating methods will not be available from a laboratory for several weeks, and the paleontologist needs the information immediately. You know from previous work that the rocks of Sample 2 are the oldest.

MATERIALS

- set of nine cards representing rock samples
- pencil and paper
- colored markers
- poster board (61 cm²)

Procedure: Part 1

1. Form teams of three or four students.
2. Arrange the fossil cards from oldest to youngest. Begin with Sample 2 because you know this sample is the oldest. You may need to try several different arrangements to get the cards in order. Hint: After an organism becomes extinct, it does not reappear in younger rocks.

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|-----------------|-----------------|-----------------|
| <p>Sample 1</p> | <p>Sample 2</p> | <p>Sample 3</p> |
| <p>Sample 4</p> | <p>Sample 5</p> | <p>Sample 6</p> |
| <p>Sample 7</p> | <p>Sample 8</p> | <p>Sample 9</p> |

Dating the Fossil Record, continued

3. In the table below, record the samples in order from bottom to top (oldest to youngest) in the first column. Sample 2 is done for you.

Fossil Key



Globus slimius



Bogus biggus



Fungus amongius



Circus bozoensis



Microbius hairiensis



Bananabana bobana

Name of Fossil Organism

| Order of samples | <i>Globus slimius</i> | | | | | | Age of sample (in millions of years) |
|------------------|-----------------------|--|--|--|--|--|--------------------------------------|
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| Sample 2 | x | | | | | | |

4. Write the fossil names in order by age from left to right in the top row of the table. Hint: Examine your fossil cards carefully to determine where each fossil appears in the rock record. Write an X in the appropriate column to indicate which fossil or fossils are present in each sample.

Dating the Fossil Record, continued

Analysis: Part 1

5. Do the *Xs* make a certain pattern across the table? What would you conclude if there were an *X* outside the pattern?

6. Based on the information in your table, which fossil is the youngest?

7. From the information you have, are you able to tell exactly how old a certain fossil is? Why or why not?

8. What information does relative dating provide to paleontologists?

Procedure: Part 2

1. You are planning to prepare a timeline for the paleontologist in California. But when the results, shown here, come in from the geology lab, you discover that the dates have become separated from the appropriate rock samples. Absolute dating is very expensive, and you can't have it done again. But wait! You have already determined the relative ages of the samples. All you have to do is arrange the dates from oldest to youngest. Add these dates to your data table.

Fossil Ages

The dates provided by the geology lab are as follows: 28.5 mya, 30.2 mya, 18.3 mya, 17.6 mya, 26.3 mya, 14.2 mya, 23.1 mya, 15.5 mya, and 19.5 mya.



Dating the Fossil Record, continued

- 2. Your table now contains all the information you need to make a timeline for the paleontologist in California. Use colored markers and poster board to make your timeline. You may want to draw a rock wall showing several layers. To do this, label each layer with a date and the names of the fossils found there. Or you may want to draw a line with the dates labeled on the line and the fossils sketched above the appropriate date. Be creative!

Analysis: Part 2

- 3. Based on absolute dating, which fossil organism lived for the longest period of time? Which fossil organism lived for the shortest period of time? Hint: Measure from the year that the fossil first appeared in the rock record to the first year it was absent in the rock record.

Longest: _____

Shortest: _____

- 4. Based on the information in your timeline, what age range would you assign to the fossil of *Circus bozoensis*?

- 5. Determine the age ranges of all of your fossil species.

Going Further

Using the library or an on-line database, investigate whether the absolute dating of rock surrounding fossils is the most reliable method of dating. Find out what circumstances prevent absolute dating.