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**Activity – The Mystery of the Far-Flung Fossils – Investigating Plate Tectonics**



**Introduction:**

Let’s go on a fossil-collecting expedition to the continents of South America, Africa, Australia, Antarctica, and the sub-continent of India. In South America you will collect fossils in Brazil. You will explore the coal fields of Gondwana in southern India. Some of our African rocks are in a gorge near Capetown. In Australia you’ll look at rocks on the southern coast. Your fossils of Antarctica occur mostly beneath glacial ice in the mountains of the western shores. Since each continent is now separated from the others by oceans and seas, you must travel between them by plane or by boat. You will look for fossils in sedimentary rocks of three ages.

Imagine that the five continents are each represented by a stack of sedimentary rocks on five tables around the room. The continents are in their natural geographical shape and their sizes are proportional. The blue, top layer represents modern times; and the pictures of the modern animals you see are native to the continent. The three lower layers depict sedimentary rocks of three past ages:

Green rocks Late in the Age of Dinosaurs 100 mya

Yellow rocks Early in the Age of Reptiles 200 mya

Red rocks The Coal Age 300 mya

\*\*mya = million years ago

Fossils can be seen in sedimentary rocks of each past age. These are some of the important organisms that lived on the continents at those times. To identify and learn more about each fossil refer to the FOSSIL CATALOG.

**Directions:**

For each continent, record on your data sheet the names of the fossils you find in the rocks for the past ages. Also record the names of the animals now living on the present day continents.

Once you have rotated through all 5 continents, continue with the analysis questions.

Record the fossil names you find at each location.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data:** | Time | | | |
| Continent | Present Day (Blue) | 100 mya (Green) | 200 mya (Yellow) | 300 mya (Red) |
| South America |  |  |  |  |
| Africa |  |  |  |  |
| India |  |  |  |  |
| Australia |  |  |  |  |
| Antarctica |  |  |  |  |

**Analysis Questions:**

Now that the expedition is over, we need to try and make sense of our data. For each response, be sure to write in ***complete sentences*** and give a clear explanation of your evidence and reasoning.

1. On the basis of what you found in the red rocks,
   1. Which continents had similar fossils?
   2. From the fossil evidence, which continents seem to have been connected 300 mya?
2. On the basis of what you found in the yellow rocks,
   1. Which continents had similar fossils?
   2. From the fossil evidence, what can you tell about the connections of the 5 continents about 200 mya?
3. On the basis of what you found in the green rocks,
   1. Which continents had similar fossils?
   2. From the fossil evidence which continent seems to have been connected 100 mya?
4. Look at the black arrows on the red rocks of the continents. The arrows represent grooves in the rock. The grooves were carved by advancing continental glaciers about 300 mya. The arrows point in the direction the glaciers were moving.



* 1. Suppose you were the first person to have found the glacial grooves in south-eastern South America. From where would it seem the glacier came?
  2. Could the glacier have come from the ocean? Explain.
  3. Why would the geologist who first found the glacial grooves in India be puzzled by the discovery?
  4. How might the idea of continental drift explain 300-million-year-old glacial grooves on four separate southern continents?
  5. Where was the probable spreading center of the glaciers? **Make an “X”** to mark this location on the map above. Where on the surface of the earth was the probable location of the “X” 300 mya? (Remember, a continental glacier tend to move out and away from its center, the North or South Pole.)
  6. Where would you look for grooves in the 300 million year old rock of Antarctica? **Draw arrows** where you would expect to find glacial grooves in Antarctica on the map above.

1. Two species of living earthworms in the soils of southern South America and Africa were found to be very closely related. Also, two species of living earthworms in the soils of southern India and southern Australia were found to be very closely related.
   1. How was the theory of continental drift strengthened by discoveries of closely related earthworms on widely separated continents?
2. Examine the mammals pictured on the continents of South America, Africa, India, and Australia. These living animals are native on their continents. Each eats insects, and is a major ant/termite eater among all of the mammals there. These four mammals are very distantly related, even though each is highly specialized for eating ants and/or termites.
   1. Explain in terms of continental drift and evolution how four very different kinds of ant/termite eaters could occur in India, Africa, South America, and Australia. (Remember, the Age of Mammals began on Earth *after* Dinosaurs became extinct about 65 mya.)

Summary:

1. Is the theory of continental drift a well-supported theory?

CLAIM:

EVIDENCE (give as much evidence as you can):

REASONING (why is this evidence significant):

1. Why do you think it is so difficult for some people to accept the idea of continental drift?