

New York State Museum **EARTH SCIENCE WORKSHOP**

Continental Drift

by Paul A. Scott

Purpose: To reconstruct the positions of the continents as they were 225 million years ago.

The Theory of Continental Drift has been attributed to Alfred Wegener (1880-1930), a German meteorologist and polar explorer. In a letter to his future wife in 1910, Wegener wrote, "Doesn't the east coast of South America fit exactly against the west coast of Africa, as if they had been joined? This is an idea I'll have to pursue."

In the years between 1910 and 1926, Wegener reviewed the current scientific research regarding the fossils, mountain chains, and rock types that existed on the continents. His goal was to find evidence that would lead him to believe that the continents were once connected.

You will be given the same evidence as Wegener and attempt to reconstruct the positions of the continents 225 million years ago.

The following is a list of the evidence that Wegener used:

Mountain Chains

- narrow mountain ranges of similar age and rock type
- mountain ranges form due to the crumpling and deformation from one continent drifting into another

Coal Deposits

- coal deposits as paleo-climate indicators

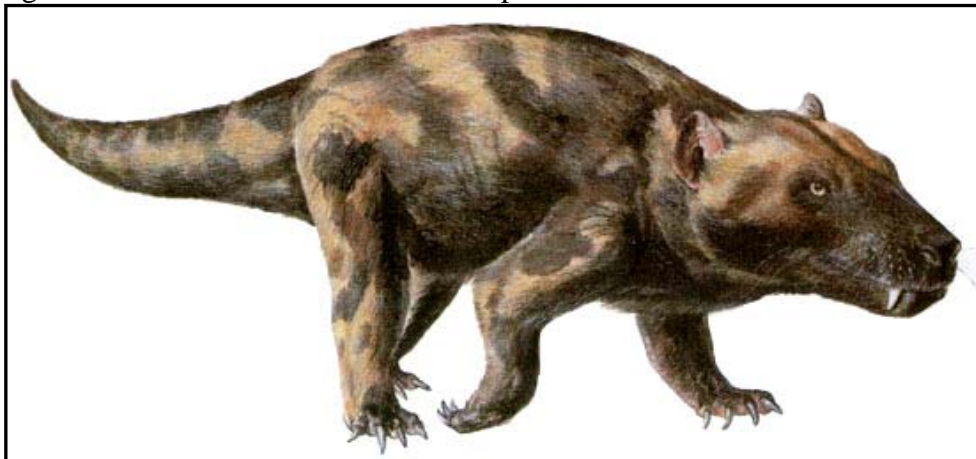
Mesosaurus

- fresh-water reptile
- lightly-built, four-legged
- elongated head and snout
- nostrils near its eyes
- flattened tail that was probably used for swimming
- about 1.5 feet (45 cm) long
- probably ate fish and shrimp
- one of the first aquatic reptiles



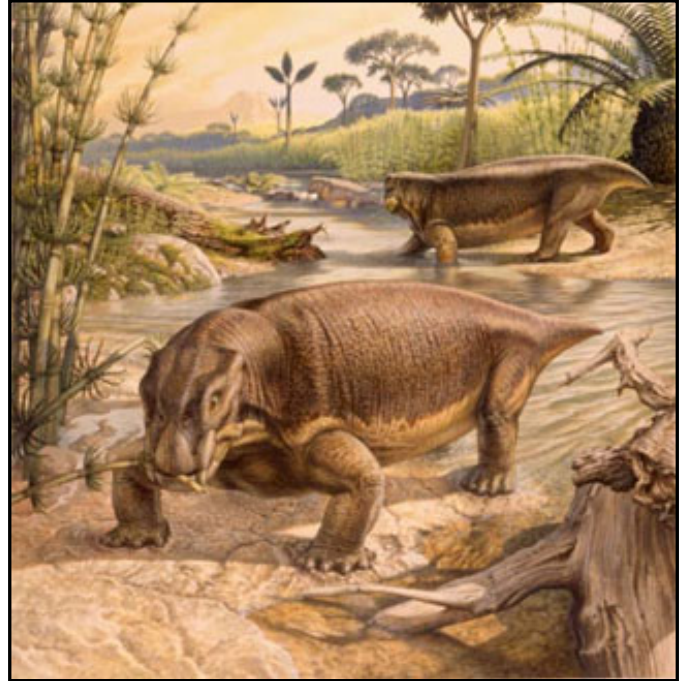
Cynognathus

- its name means "dog jaw"
- a cynodont (a mammal-like reptile, not a dinosaur)
- size of a wolf, about 5 feet (1.5 m) long
- fast-moving carnivore
- lived on open plains
- probably warm-blooded and gave birth to live young
- dog-like teeth and hunted herbivores in packs



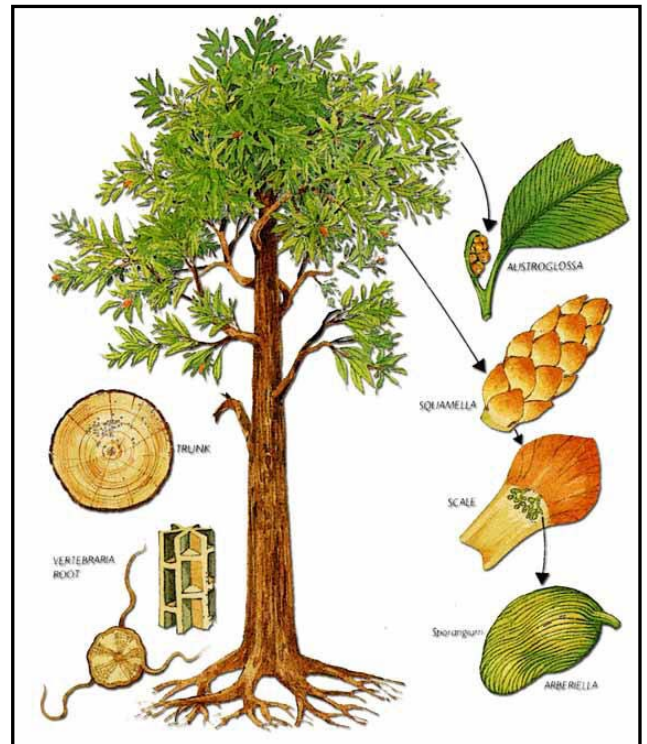
Lystrosaurus

- its name means “shovel lizard”
- heavily-built plant-eater
- about 3 feet (1 m) long and about 200 pounds
- short, stubby tail
- instead of teeth it had two tusk-like fangs made of horn
- lived in herds near lakes and swamps



Glossopteris

- from the Greek *glossa*, meaning tongue, because the leaves were tongue shaped
- a genus of extinct seed fern
- about 12 ft (3.6 m) tall



Procedures:

1. You will need 7 different colored pencils.
2. Choose a color to represent each of the 7 pieces of evidence shown.
3. The regions marked “M” represent the presence of Mesosaurus fossils, a reptile that lived on Earth 260 million years ago. Pick a color and color its locations on South America, and Africa.
4. The regions marked “C” represent the presence of Cynognathus fossils, a reptile that lived on Earth 240 million years ago. Pick a different color and color its locations on South America and Africa.
5. The regions marked “L” represent the presence of Lystrosaurus fossils, a reptile that lived on Earth 240 million years ago. Pick another color and color its locations on Africa, Madagascar, India, and Antarctica.
6. The regions marked “G” represent the presence of Glossopteris fossils, a tree that lived on Earth 260 million years ago. Pick another color and color its locations on South America, Africa, Madagascar, India, Antarctica, and Australia.
7. Color the coal deposits on the continents.
8. There are 2 mountain chains. Mountain chain #1 is the Appalachians. Color its locations on North America, Greenland, and Europe.
9. Mountain chain #2 is the Atlas, Alps and Apennine mountains. Color its locations on Europe and Africa.
10. Now that you have all the fossil evidence and geologic evidence colored on the continents, cut them out along the dotted lines. The dotted lines represent the coastlines approximately 225 million years ago.
11. Match the fossil evidence of the continents to reconstruct the continent positions 225 million years ago. Here’s the order I suggest you follow –
 - a. match the fossil evidence of Cynognathus first
 - b. then Lystrosaurus and Glossopteris
 - c. then Mountain Chain #1
 - d. then Mountain Chain #2
12. Once you’ve matched all of the fossil and geologic evidence, tape the continents together.

The end result should be one large continent.

It’s name is Pangaea. In Latin, pan means “all”, gaea means “land” – “all land”.

Conclusions:

1. Coal deposits are listed as paleo-climate indicators. This means that it is an indicator of past climates. Describe the type of climate that would promote the deposition of large coal deposits?
2. Using your Earth Science Reference Tables, what important geologic event was occurring during the Pennsylvanian and Permian geologic periods?
3. Explain why the discovery of the fossil remains of Mesosaurus, Cynognathus, Lystrosaurus, and Glossopteris on distant continents supports the evidence of continental drift.



KEY:

M – Mesosaurus Fossil
 C – Cynognathus Fossil
 L – Lystrosaurus Fossil
 G – Glossopteris Fossil

Coal – Coal Deposits (evidence of warm, moist climate)

Mtn 1 – Mountain Chain 1

Mtn 2 – Mountain Chain 2