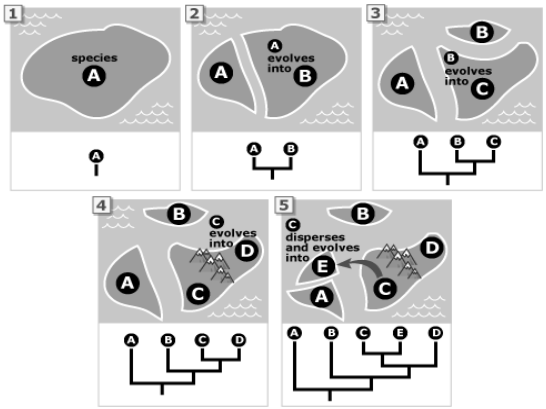
Name: _____ Date: _____ Period: _____

~EVOLUTION OF ELEPHANTS – Biogeography~

Biogeography is the study of the geographical distribution of living things. This can lead to one species evolving into two or more different species. Take a few minutes to study the image below.

How many different species evolved from A by image 3 (include the original species A)?

How many total different species existed in image 5?



What caused the different species to evolve? Use the images to help support your answer.

Elephants can be viewed as a modern day example of biogeography. Read the following article and answer the questions that accompany it.

Are the African elephants separate species? Scientists find new species all the time, but you'd think that the largest land mammals on Earth wouldn't be that difficult to spot. However, as biologists use new techniques for studying classification, sometimes their thinking changes.

African Elephant (Savannah) African Elephant (Forest) Asian Elephant

Biologists have known for more than 100 years that there are two species of elephants, one in Asia (*Elephas maximus*) and one in Africa (*Loxodonta Africana*). However, in Africa, one population of elephants lives on the savannah (grasslands), while the other is a forest-dweller. Until now, scientists have classified them as the **same** species, based on their belief that they freely interbred at the margins of their ranges.

As expected, scientists studying DNA variation in four genes in 21 elephant populations found their data indicated a 58% difference between the **African** and **Asiatic** species. They found that there was **more than half** that difference between the African savannah populations and the African forest-dwelling populations. Further studies found that the two African elephant groups rarely interbreed. The Asiatic elephant and African elephant still separate species, but the scientists propose that the African elephants should be reclassified as two separate species as well. These would be *L. africanus*, the savannah population, and *L. cyclotis*, the forest-dwelling population.

Answer questions #1-5 before reading the next article.

1. On what two continents do Elephants live?

2. What evidence changed the scientists' minds about the African elephants being one species?

3. What did the study of DNA variation tell scientists about the relationship between the Asian and African species?

4. Why do scientists now believe that the African elephants (forest dwellers and savannah dwellers) should be classified as two different species? Give two pieces of evidence cited in the article!
   a.

   b.

5. How are elephants an example of Biogeography?

Tuskless Survivors

A new study says that more male Asian elephants in China may be born without tusks because poaching of the pachyderms for their tusks is thinning out the gene pool that creates tusks in the animals. The tuskless gene, which originally existed in Asian elephants at a rate of 2 to 5 percent, has increased to 7 to 12 percent in China among males of the species. Research by Zhang Li, an associate professor of zoology with the college of life sciences at Beijing Normal University, found that the gene for "tusklessness" is spreading among the endangered species in its of southwest China. "This decrease in the number of elephants born with tusks shows the pressure that poaching for ivory is having on the animal," said Zhang.

1. How does a mutation for tusklessness affect the Asian elephant population?

2. By what percent has the tuskless gene increased in the Asian elephant population?

3. If the trend continues, what my happen to the Asian elephant population?

4. Can human actions influence evolution? _____ Explain.

BIOGEOGRAPHY

Biogeography is the study of the distribution of species in a geographic area. Piece together the puzzle pieces based on the distribution of fossils (match the fossil patterns to connect the land masses) to make Pangea. Pangea was a super continent that existed on earth 300 million years ago. Use your completed puzzle to answer the following questions.

Questions:

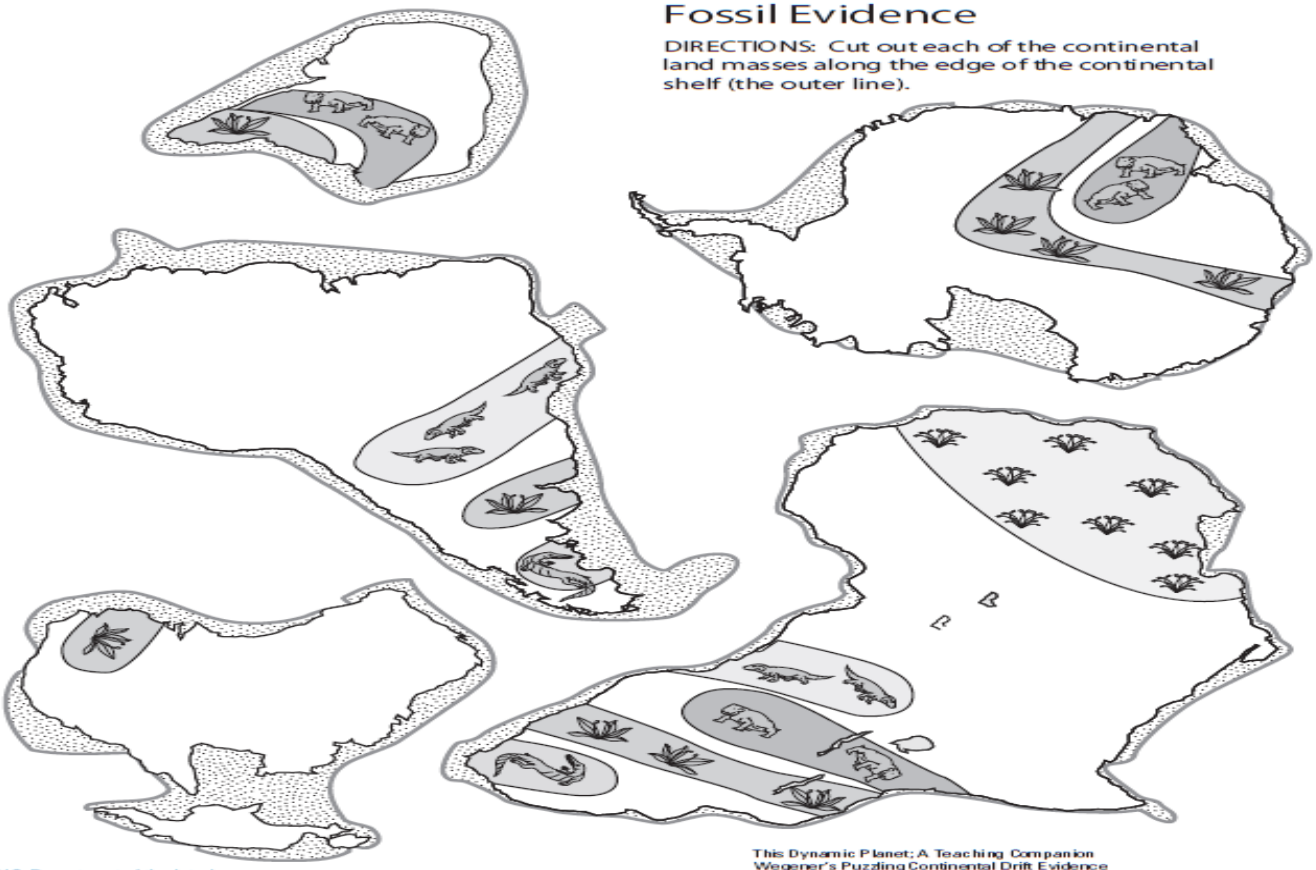
1. ***What is biogeography?***

2. ***Explain why the same alligator-like fossil could be found on both the southern tip of Africa and South America even though they are now separated by an ocean.***

3. ***Charles Darwin studied life on the Galapagos Islands off of Western South America. He discovered the organisms on the island were very similar to the organisms found on South America rather than similar to organisms living in a similar environment. Explain this finding.***

Fossil Evidence

DIRECTIONS: Cut out each of the continental land masses along the edge of the continental shelf (the outer line).



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This Dynamic Planet; A Teaching Companion
Wegener's Puzzling Continental Drift Evidence
U.S. Geological Survey, 2008
For updates see <http://volcanoes.usgs.gov/about/edu/dynamicplanet>