

~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.

<p>How many different species evolved from A in image 3 (include the original species A)?</p> <p>How many total different species existed in image 5?</p>		<p>What caused the different species to evolve? Use the images to help support your answer.</p>
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Elephants can be viewed as a “modern day” example of biogeography. Read the following article and answer the questions that accompany it.

How Did African Elephants Become Two Distinct Species?

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. Before 2001, scientists had classified the African elephant populations as the same species, based on their belief that they freely interbred at the margins of their ranges. Others believed the two populations were separated due to their habitat. Forest elephants are smaller than their savannah cousins; have straighter, downward-pointing tusks; smoother skin and rounder ears. They live in smaller family groups than savanna elephants and have a very different diet, with a penchant toward fruit when available. Scientists have long debated whether African elephants belong to the same or different species, but studies had suggested they were one species. The debate over whether African elephants are one species or two was settled in 2001. DNA analysis of both populations proved that the elephants living in these different environments had evolved into two different species. DNA findings showed that savanna and forest elephants separated between 1.9 million and 6.7 million years ago.² And further studies found that the two African elephant groups rarely interbred. African elephants are now classified as two different species, the forest-dwelling elephants (*Loxodonta cyclotis*) and the savanna-dwelling elephants (*Loxodonta africana*).

¹ Gilbert, N. African elephants are two distinct species. *Nature* (2010)

² Morell, V. Researchers Split African Elephants Into Two Species. *Science Magazine* (Dec. 21, 2010)



African Elephant (Savannah)



African Elephant (Forest)



Asian Elephant

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

1. On what two continents do Elephants live?
2. What are the two habitats in which African elephants are found?
3. How do forest elephants differ from those in the savannah?
4. What evidence proved that the African elephants were not one species and when did this occur?
5. How are elephants an example of Biogeography?

~EVOLUTION OF ELEPHANTS – Natural Selection?~

Tuskless Survivors

The oldest elephants wandering Mozambique's Gorongosa National Park bear the indelible markings of the civil war that gripped the country for 15 years: Many are now tuskless. They're the lone survivors of a conflict that killed about 90 percent of these animals, slaughtered for ivory to finance weapons and for meat to feed the fighters. Tusklessness is the result of a mutation that developed in the DNA. Hunting gave elephants that didn't grow tusks a biological advantage. Recent figures suggest that about 33 percent of younger females—the generation born after the war ended in 1992—never developed tusks. Normally, tusklessness would occur only in about 2 to 4 percent of female African elephants.¹

A male elephant's tusks are bigger and heavier than those of a female of the same age, but once there's been heavy poaching pressure on a population, then the poachers start to focus on the females as well. This tuskless trend isn't limited to Mozambique, either. Other countries with a history of substantial ivory poaching also see similar shifts among female survivors and their daughters. In South Africa, the effect has been particularly extreme—fully 98 percent of the 174 females in Addo Elephant National Park were reportedly tuskless. Poaching has also pushed tusk sizes down in some heavily hunted areas, such as southern Kenya where significant poaching took place in the late 1970s and early 1980s. Survivors after that period of intense poaching had much smaller tusks—they were about a fifth smaller in males and more than a third smaller in females.²

^{1,2}Maron, D. Under poaching pressure, elephants are evolving to lose their tusks. Animals Wildlife Watch.

1. What led to the increase in tusklessness in elephants?
2. How was a mutation for tusklessness beneficial to these elephant populations?
3. If the trend continues, what might happen to these elephant populations?
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 on the next page 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. Glue your completed puzzle below or on the back of this paper. 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).

