The Mystery Of The Missing Apes Who Came Before Humans

06-29-2024 ~ *The fossil record of our ape ancestors in Africa is almost nonexistent for a period of about 8 or 9 million years.*

The fossil record of our ape ancestors in Africa is almost nonexistent for a period of about 8 or 9 million years. This long gap lasted from about 16.5 million to 7 to 9 million years ago, during the Miocene geological epoch.

Yet fossil remains in Europe and Asia show an abundance of ape species flourishing and evolving new traits during that gap period for African apes.

The unanswered question is: How did the current ape species found in Africa evolve? The ape species now living in Africa are the closest living evolutionary relatives that humans have. For this reason, it is important to know where they came from. Are they the descendants of those apes that migrated to Eurasia during the Miocene and then returned to Africa? Or is the lack of African fossil remains from that period simply a result of local conditions, such as wet acidic soils, that might have destroyed them?

Paleoanthropologists have approached the puzzle from different angles. One hypothesis for the missing ape fossil record in Africa is that apes originated in Africa and then migrated to Eurasia in the mid-Miocene, where they evolved the preconditions for evolving into humans. In this scenario, the better-adapted ape species that weathered the late Miocene climate change, then returned to Africa where the human lineage then evolved.

Reconstructing Ape Lineages

Another approach is to infer the missing ape evolution that might have occurred

in Africa, but without leaving any fossil remains, by using genomic evidence from living ape species to reconstruct the missing lineages. University of Cambridge paleontologists Robert A. Foley and Marta Mirazón Lahr proposed a model of what this possible ape evolution might look like in a January 2024 article in Trends in Ecology & Evolution.

Foley and Mirazón Lahr refer to the inferred evolutionary tree of extinct apes as "ghost lineages." "Ghost lineages are species or groups of species that have not been observed directly, either in fossils or living species, but which have been inferred from gene sequences," the authors said in an interview.

Tracing these ghosts is made possible by modern genomics, especially DNA analysis.

"We know about these ghosts by building phylogenetic or evolutionary trees of known species––such as apes, humans, Neanderthals, and so on––and looking for points in the trees that can only be explained if there were other, unknown species involved," they said. "These are the hypothetical ghost lineages. Research has shown ghost lineages in hominin, chimpanzee, and gorilla lineages, as well as in many other taxa." (Taxa is the technical term for divisions of species.)

"In hominin evolution they are 'ghosts' in the sense that we think they must have existed and been part of our history, leaving only traces in our DNA." (Hominins is the term for humans and our fossil relatives.)

African Ape Ghosts

Foley and Mirazón Lahr discuss two plausible ghost models for extinct African apes based on the existing genomic evidence: a low-divergence and a high-extinction model.

In the low-divergence model, the *Gorilla* lineage branched off from the last common ancestor of *Pan* (ape ancestor) and *Homo* (human ancestor) between about 7.2 and 11 million years ago. Then both *Pan* and *Gorilla*ancestors of today's existing ape species branched off from their ghost lineages. This view holds that the ancestors of the living ape species had only two periods of species growth, about 3 to 3.5 million years ago, and later, less than 2 million years ago.

As Foley and Mirazón Lahr point out, this rate of divergence "contrasts strongly with that of the hominins," but it is still possible. "It seems unlikely given the

geographical range, environmental diversity, and time involved, that so little divergence occurred."

The other hypothesis is the high-extinction ghost model, which holds that the African ape evolution followed a similar trajectory to that of hominins. The apes diversified and dispersed into new regions, but earlier lineages became extinct. This is a scenario that Foley and Mirazón Lahr find "more probable." This high-extinction pattern follows what is known about the hominin fossil record from fossil finds in the last 50 years.

Foley and Mirazón Lahr stressed the importance of knowing more about the missing ape evolutionary evidence in the interview. "Chimpanzees and bonobos are the closest living relatives of humans, having a last common ancestor about 7 million years ago. Humans and their ancestors must have evolved in parallel to the African apes. However, with no fossil record, we know virtually nothing about African ape evolution."

"There is a general tendency to think that unlike us, they have changed little since the last common ancestor," they said. "However, this is almost certainly not true, and we need an ape fossil record to tell us when, where, and how the living apes evolved. Similarities and differences from the evolutionary history of humans will be ground-breaking discoveries."

Pieces of the Puzzle

Paleoanthropologists have proposed possible explanations for the puzzle of the missing Late Miocene ape fossils. For one, the climate and geography changes in Africa may have not allowed the preservation of ape remains in this period. It's also possible that the forest soil of ape habitats was too acidic for fossils to survive. Another factor may be that paleontologists have not looked in the right places for ape fossils.

But Late Miocene ape fossils are not entirely missing from Africa. A partial lower jaw and 11 teeth from a now-extinct ape species that lived about 10 million years ago was discovered in Nakali, Kenya in 2005 by an international team of paleontologists, which named it *Nakalipithecus nakayamai.*

The authors of an article describing this find write that it "suggests that it is highly probable that large-bodied hominoids survived through the Middle to Late Miocene in Africa, giving rise to the last common ancestor of African great apes

and humans." (Hominoids are humans, their fossil ancestors, and the anthropoid apes, which include chimpanzees, bonobos, gorillas, and orangutans.)

Another ape fossil find by a different international team, is from the Chorora Formation near the southern part of the Afar rift, named *Chororapithecus abyssinicus*. The fossil is dated about 8 million years ago, and as the journal *Nature* reports, "The attribution to the gorilla lineage looks all the more important as it helps constrain the split between gorillas and the lineage leading to hominins and chimpanzees, and suggests that this split occurred in Africa."

A Hot Debate

The paleoanthropology community is not unified in its solutions to the missing ape evolutionary puzzle, and some think that it's likely that apes made a round-trip, prompted by climate changes in the Miocene. In this view, apes originated in Africa and some dispersed to Eurasia for a few million years, where they evolved some proto-human characteristics, and then returned to Africa about 7 to 9 million years ago.

Asked about the Eurasian scenario, Foley and Mirazón Lahr replied: "This is a tricky one! The idea that the last common ancestor of the African apes and hominins was recent (in the geological sense, about 9 million years ago) is hotly debated. On the one hand, it is tempting to see a long line of ape evolution in Africa––there is a very rich fossil record of them. But on the other hand, fossils most similar to the African apes are found in Western Asia and the eastern Mediterranean."

And here, the views of the collaborators diverged: Robert A. Foley felt that "this makes the 'into Africa' hypothesis more probable," but co-author Marta Mirazón Lahr said, "the absence of later Miocene fossils in Africa––a big blank space––leaves the question open."

Future fossil discoveries are likely to shed more light on some of the ghost apes and help solve the puzzle.

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Source: Human Bridges

Credit Line: This article was produced by Human Bridges.