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Editorial

A Possible Reconstruction of Hominini Phylogeny

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The phylogeny of Hominini is definitely the most important and interesting part of the Anthropological Halls in most of the natural history museums. Many visitors will stop in front of the fossils of *Australopithecus* and learn what our ancestors might look like. By this time, people will seldom question that *Australopithecus* was an ancestor of human, just like Chinese people used to trace their ancestry to Peking man for granted decades ago. However, sufficient genetic studies invalidated that preconception subsequently. Therefore, we may rethink that why *Australopithecus* must be the direct ancestors of human. Are there sufficient evidences? Or is there another possible that *Australopithecus* was just on a side branch away from the evolutionary trunk of human? In a way, to take *Australopithecus* as our ancestor for granted may result from the opinion of the single-line anagenesis, while there are few cases in the nature.

When looking into the present version of the Hominini phylogeny (Figure 1A), we find that there is an obvious trend to put most of the fossil genera on the main stem evolving to human. Besides *Orrorin* and *Australopithecus*, *Adipithecus* was also thought to be on the main stem by most of the paleoanthropologists, although it was distinctly similar to chimpanzees rather than to human. In the same mode of thinking, *Kenyanthropus* and *Paranthropus* were put on short side branches affiliated closely to the main stem, which made the evolutionary history of human quite ample. On another side, people always complain that the ancestor of chimpanzees was yet missing. The genus *Pan* seems to have appeared suddenly. This kind of imbalance can most likely be attributed to the misunderstanding of the fossil genera, such as regarding *Adipithecus* as human ancestor.

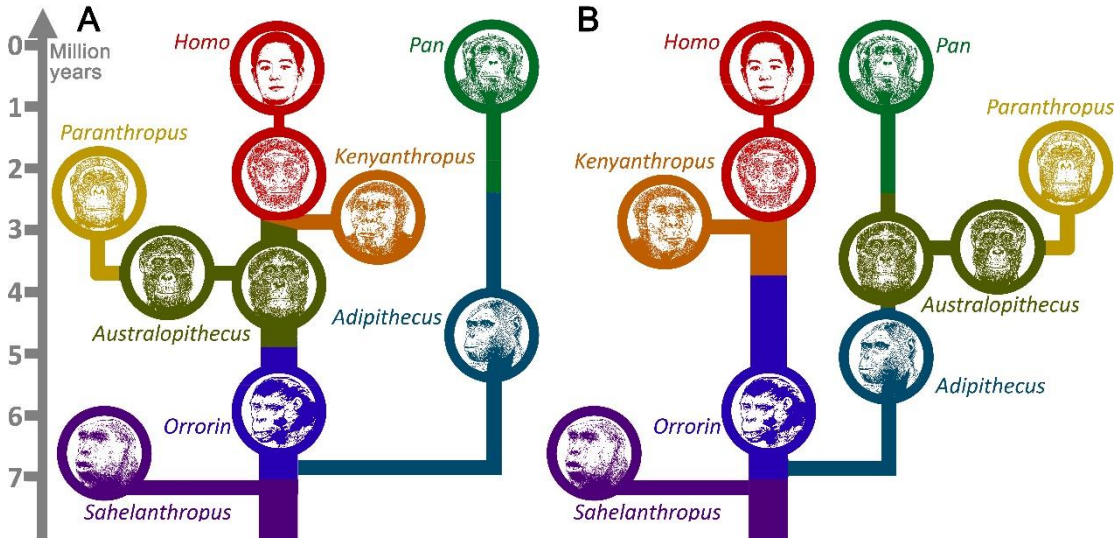

Figure 1. The present Hominini phylogeny (**A**) and a possible reconstruction (**B**).

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The most robust phylogeny is that constructed with the genomic data, however, there were no DNA remained in any fossils older than one million years. Therefore, the Hominini phylogeny was not based on genomes but phenomes. Unfortunately, fossils of the Hominini genera are mostly incomplete or even fragmentary. That means not many phenotypes can be extracted from the fossils and there are still nondeterminacies for the divergences. One of the phenotypes, angle of femur neck which is related strongly to bipedalism, exhibits a strange atavism along the present phylogeny. The angle of *Orrorin* was much larger than that of *Australopithecus*, which indicates *Australopithecus* might not be as good at bipedalism as the *Orrorin* was. Then, why was Lucy our grand grandma while she died from fall out of tall tree [1]?

More weird phenotypes of *Australopithecus* were pointed out in a letter [2] sent to *Nature Anthropology* recently. The most interesting phenotypes showing the contradiction are the skull feature and footprint. Both of the phenotypes of *Australopithecus* were more similar to *Pan* or even to *Gorilla* than to human. Although there was no statistical analysis, the suggestion of this letter, a possible reconstruction of the Hominini phylogeny to move *Australopithecus* to the branch of chimpanzee, is worth while and thoughtful (Figure 1B).

Besides the merits, some points of this letter may be excessive. For example, the authors suggested to put Gorilla onto the branch of *Australopithecus* and *Pan*, while that is inconsistent with the genomic phylogeny of the three existing species. The divergence time between human and *Pan* is seven million years, while that between human-*Pan* and *Gorilla* is ten million years [3,4]. If both *Pan* and *Gorilla* were evolved from *Australopithecus*, the divergence time will have to reduce by half. As a scientific consensus, we believe more in genomic phylogeny than in physical phylogeny. We have to consider other possible reasons caused the similarity between *Australopithecus* and *Gorilla*.

Nature Anthropology is a highly integrated journal and we are open to receive all submissions on anthropological research, including opposing views that may spark some arguments. We encourage a broader body of academics to carry out conversations so as to cross-fertilize critical debates among anthropologists. Open discussion is always good for science.

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