



Press Release

Sizing up our ape past

Researchers suggest the last common ancestor of the apes was substantially smaller than previously thought

Tübingen, 12 October 2017

The last common ancestor of apes and humans remains a mysterious animal. Dr. Mark Grabowski from the Senckenberg Centre for Human Evolution and Palaeoenvironment at the University of Tübingen together with his colleague Professor William L. Jungers from the University of Stony Brook, New York, break new ground in assessing the size and inferring the way of life of this unknown creature and its ancestors. Using average and estimated body masses for a wide sample of living and fossil humans, apes, and other primates and novel comparative methods, the researchers reconstruct body mass evolution during and prior to the human lineage.

Up to now it has often been assumed that the last common ancestor of all apes and humans was the size of a chimpanzee, and a series of chimpanzee-sized ancestors stretched back to the earliest ancestral ape. On the contrary, the findings of this new study suggest that the ancestor of all apes lived in an environment that favored a gibbon-like size, an ape of about five kilograms. This shift in perspective has a range of biological implications. The new study will be published in the journal *Nature Communications*.

The family tree is complex, but fragmentary

The hominoids, including all apes and humans, split off from the lineage that led to Old World monkeys about 25 million years ago. The lineage that led to the gibbons was the earliest hominoid to diverge from the group that led to the great apes and humans, about 17 million years ago. Orangutans were next, followed by gorillas, with the chimpanzees and human lineages diverging from each other last. From fossils, researchers know a dazzling diversity of extinct ape and human species once existed. Their family tree is complex, but fragmentary. What a specific ancestor looked like and how it lived can only be determined indirectly.

In their new study Mark Grabowski and William Jungers concentrated on the estimation of body mass, a feature that affects almost all aspects of

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an animal's biology such as energy requirements, diet, locomotion and behavior. "To reconstruct the paleobiology of long-extinct species we need to have an idea of their body mass," explains Mark Grabowski. The researchers have incorporated data from fossil and still living species of apes, humans, and a wide array of primates from South America, Africa, Europe and Asia.

Hanging and swinging behavior evolved at a small body mass

"According to our analysis, the last common ancestor of apes and humans lived under conditions that best fit to the size of a gibbon," Grabowski reports. If this result is correct, gibbons are not a dwarfed lineage, as has been frequently proposed. A gibbon-like size has a range of consequences for existing models of ape evolution. For example, it is commonly believed that early hominoids developed overhand hanging and swinging locomotion in the trees due to an increase in body size, where they were too heavy to walk on top of the branches as most primates still do. It now appears that the hanging and swinging emerged first and independently of a later increase in body mass. "This new locomotor behavior could have been part of an arms race with monkeys for fruit resources, with a later increase in body size being another step in this race," Grabowski explains.

Increase in size was not a straight line

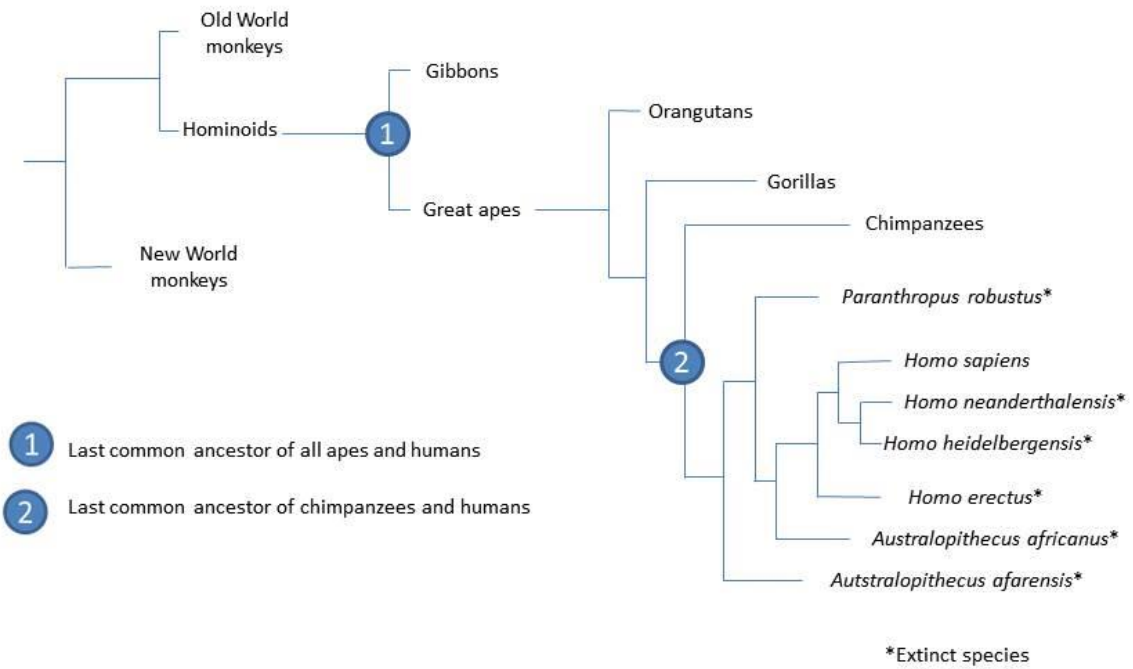
The common ancestor of humans and chimpanzees lived around 7 million years ago. This creature, Grabowski and Jungers agree with previous suggestions, had the approximate body mass of a chimpanzee. "But our study is the first to ever test this in a quantitative fashion," Grabowski says. "It also appears that early humans, like members of the genus *Australopithecus*, were actually on average smaller than their ancestors and this smaller size continued until the arrival of *Homo erectus*." In other words, there appears to be a decrease in overall body size within our lineage, rather than size simply staying the same or just getting bigger.

Publication:

Mark Grabowski and William L. Jungers: Evidence of a chimpanzee-sized ancestor of humans but a gibbon-sized ancestor of apes. *Nature Communications*, DOI 10.1038/s41467-017-00997-4.

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Sketch of ape and human lineage