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*Australopithecus afarensis*  
Reconstruction of a male  
Artist: William Munns

Although our ancestors are gone, fossil remains reveal many clues about them. The earliest hominids were more like apes than humans. Compared to today's humans they had small brains, large teeth, and heavy jaws. The greatest difference between us and them is the size and shape of our brains.

There are large gaps in the record of hominid evolution, but fossil by fossil, the gaps are becoming smaller.

One of the most elusive and sought after fossils is an ancestor close to the divergence of hominids and apes—a “missing link.” New discoveries show there are many links which are all important. In 1992, *Ardipithecus ramidus* was dated at 4.4 million years ago (mya); then, in 1997, an older subspecies named *Ardipithecus ramidus kadabba* was dated at 5.8 mya. In 2002, a fossil skull from Chad, central Africa, named *Sahelanthropus tchadensis*, was announced with an age between 7 and 6 mya. Molecular evidence suggests 6–7 million years ago as the time when the split between hominids and apes occurred, which is consistent with the accumulating fossil record.

Sometime around 7 million years ago, a group of quadrupedal apes began to walk upright more than they walked on all fours. The tropical forest, the forest edge, and open woodland environment gave them many opportunities to exploit a mixed habitat. Generation after generation, those best adapted to living and feeding on the ground passed these behaviors on to their offspring. Through natural selection they adapted to bipedal locomotion.

The changes were not just behavioral, as vast remodeling had to take place in the skeleton and musculature: the spinal cord entered the brain directly under the skull, the vertebral column with its lumbar curve formed an S-shape, the pelvic girdle widened and became basin-shaped, the legs became longer than the arms, the thigh bone met the shin bone at an angle (at the knee), the well arched foot with its aligned big toe was no longer used like a grasping hand, and the muscles changed in their attachment to the pelvis and lower limbs. Last, but certainly not least, changes were made in the brain for the new behaviors and motor skills.

The advantages of bipedal locomotion were many: hominid bipedal walking was more energy efficient than chimpanzee quadrupedalism; the hands were free to carry food, infants, and tools; they could see farther; and less body surface was exposed to the hot sun. They did not give up the trees—a source of food, a playground for the young (just as trees are today), and a safe place to sleep.

Our most numerous early fossils and therefore our best sources of information come from the 2–4 million year range of the australopithecines. These hominids varied in size from small creatures such as “Lucy” (*Australopithecus afarensis*) and “Mrs. Ples” (*Australopithecus*

4.4 MYA

4

TIMESTONE

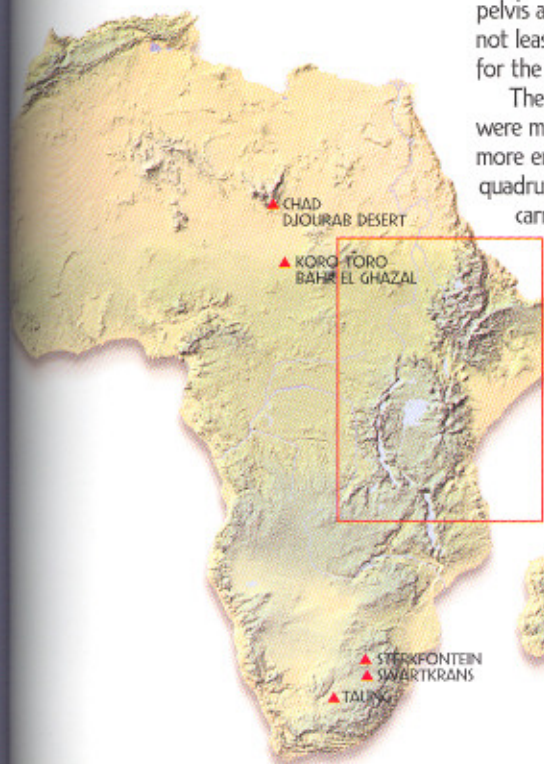
### *Ardipithecus ramidus*

This is one of the earliest hominid fossils ever found and the first dated as older than 4 million years. This species lived in what is now Ethiopia in Africa and had both ape-like and human-like features.



Fossil jaw fragment with tooth  
*Ardipithecus ramidus* (child)  
Found in Aramis, Ethiopia,  
in 1992 by Alamyehu Asfaw,  
a member of Tim White's team  
Age: 4.4 million years

More fossils of *Ardipithecus*,  
dated 5.8 to 5.2 mya have been  
found in Ethiopia since 1997  
by Tim White, Giday WoldeGabriel,  
Yohannes Haile-Selassie, and colleagues



*afarensis*), both no more than 4 feet tall, to larger, more robust forms with heavy skulls, jaws, and teeth such as *Australopithecus aethiopicus* and *Australopithecus boisei*. Depending on how they are classified, we have at least six species of australopithecines in this time period. Undoubtedly, there are more hominids to be discovered. For example, Meave Leakey's recently discovered *Kenyanthropus platyops* has a small brain like those of the australopithecines, but a very flat face.

Thus we have several species of early bipedal hominids existing at the same time and sometimes in the same region. Our direct ancestor may or may not be one of these hominids. We do know that the larger, robust forms are not our ancestors. The last representative of this lineage became extinct one million years ago without leaving descendants.