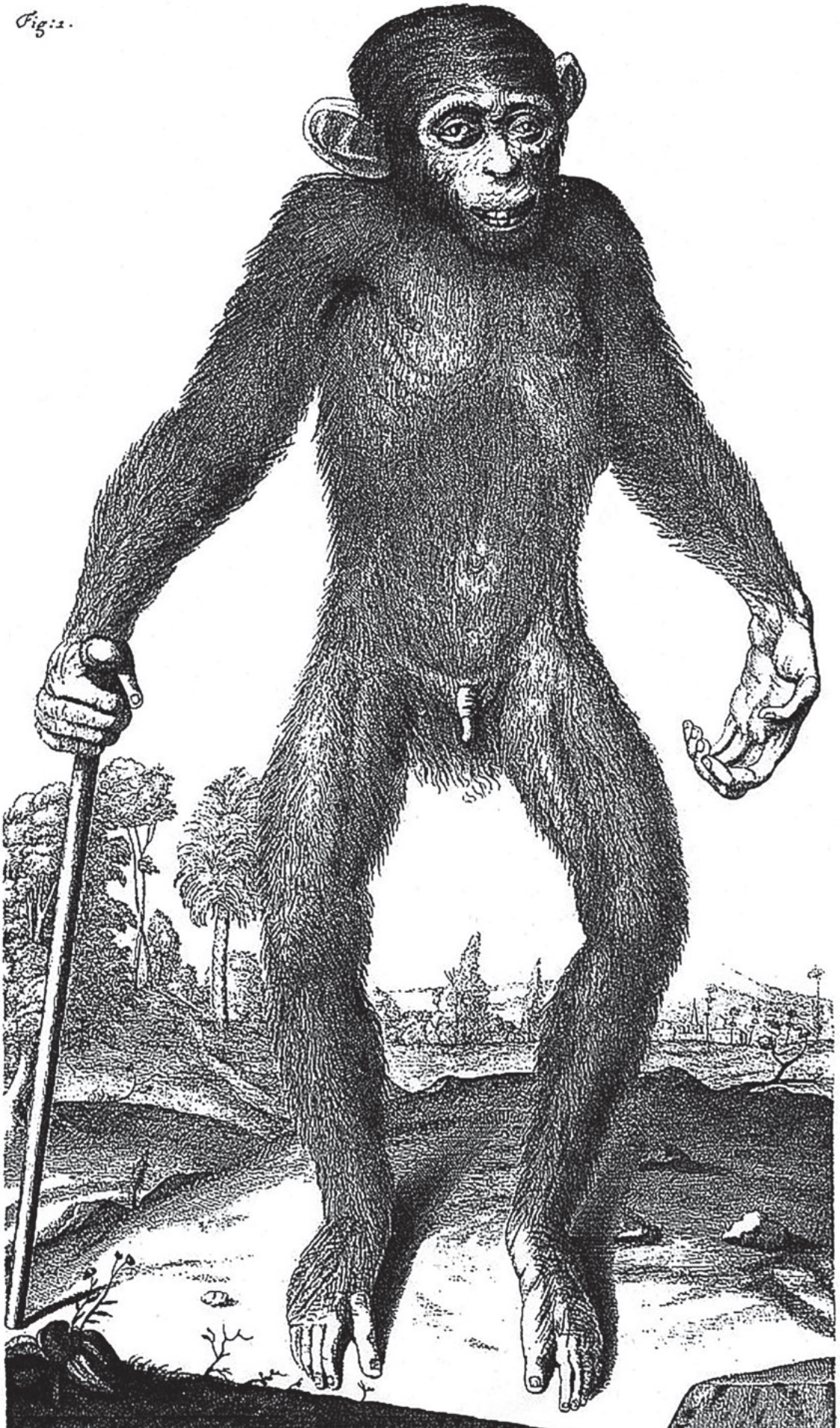
Fig: 1.



Thomas Junker

Between nature and culture: the two origins of humanity

Man in the rudest state
in which he now exists
is the most dominant animal
that has ever appeared on this earth.
Charles Darwin, The Descent of Man (1871)

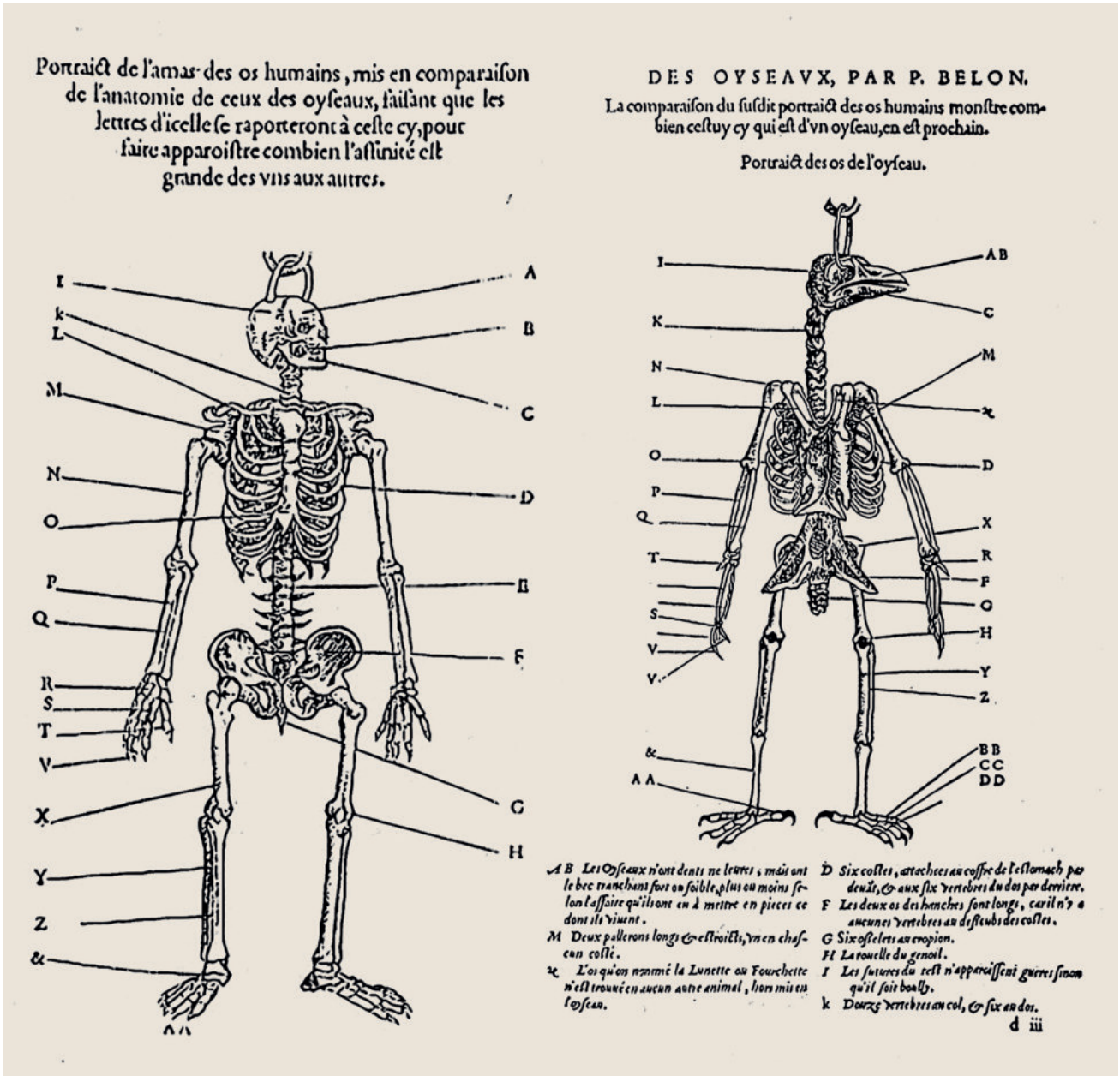
If you look at the human body — the external appearance, the anatomical details, and the physiological mechanisms — it is easy to see that humans are part of the animal kingdom. More precisely: they are mammals and primates. But that's not all. If one observes the behavior and way of life, then it is just as obvious that humans have strayed from their biological origins in many ways.

This peculiar amalgamation of nature and culture, which is so characteristic of humans, is fascinating and puzzling at the same time. And it can explain to a certain extent why it took so long for the biological origin of humans to be generally accepted. And this although the naturalists of the 18th century had already observed that the human body corresponds to that of other mammals and, above all, to that of primates in every detail. *Fig. 2*

One species among many

For the founder of biological systematics, Carl Linnæus, these similarities allowed only one conclusion: in the first edition of his *Systema Naturæ* (System of Nature) from 1735, he classified humans in the animal kingdom. The species *Homo sapiens*, as he called it, was assigned a first rank, but was placed among the four-legged animals. In later editions, Linnæus changed some of the classifications and introduced the term "mammals" which is commonly used today.

1 The first scientific study of a chimpanzee by the doctor Edward Tyson was published in 1699.



2 Treatise by Pierre Belon from 1555. The similarities in the blueprint of organisms from different animal groups were observed at an early stage and today are important evidence of their common descent.

But regarding the point that had earned him the most criticism, he was not deterred: humans were part of the system of nature, and they were close to the apes. In many ways, the Linnæus system was still an uncertain first step. At the same time, however, it marks the beginning of an ideological revolution, the consequences of which were only slowly emerging in people's consciousness. From now on they were a part of nature, one species among many.

As a result, some scientists made it their life's work to find an absolute physical difference between humans and other animals—the number and arrangement of bones, the structure of the brain, or other properties—but each of these 'findings' turned out to be deceptive. What they found were quantitative deviations—in the proportions of arms and legs, in the hair and pigmentation of the skin, and the relative size of the brain. But no qualitative anatomical or physiological uniqueness.

The ape ancestry of humans

Linnæus did not explain the similarities between humans and other primates by their common evolutionary origin but believed that each species had been created separately. Some of his contemporaries were less hesitant, and soon people began to speculate about humans as modified apes and vice versa. The theory of evolution did not gain acceptance until a century later when Charles Darwin was able to show how the properties of living beings change in the interplay between heredity and selection. The natural system thus became the basis for the family tree of organisms.

It was only a small step from the conviction that humans are primates to the thesis that they descended from primates. Of course, they did not evolve from a primate species living today, but from a long line of primate ancestors that goes back more than 80 million years to the time of the dinosaurs. The exciting question was no longer whether, but from which fossil primate humans emerged. It was one of the great successes of molecular biology that, by comparing proteins and DNA, it was able to determine both the parentage and the approximate times of the separation. The now generally accepted result is that humans are most closely related to chimpanzees and that the last common ancestor lived five to seven million years ago.

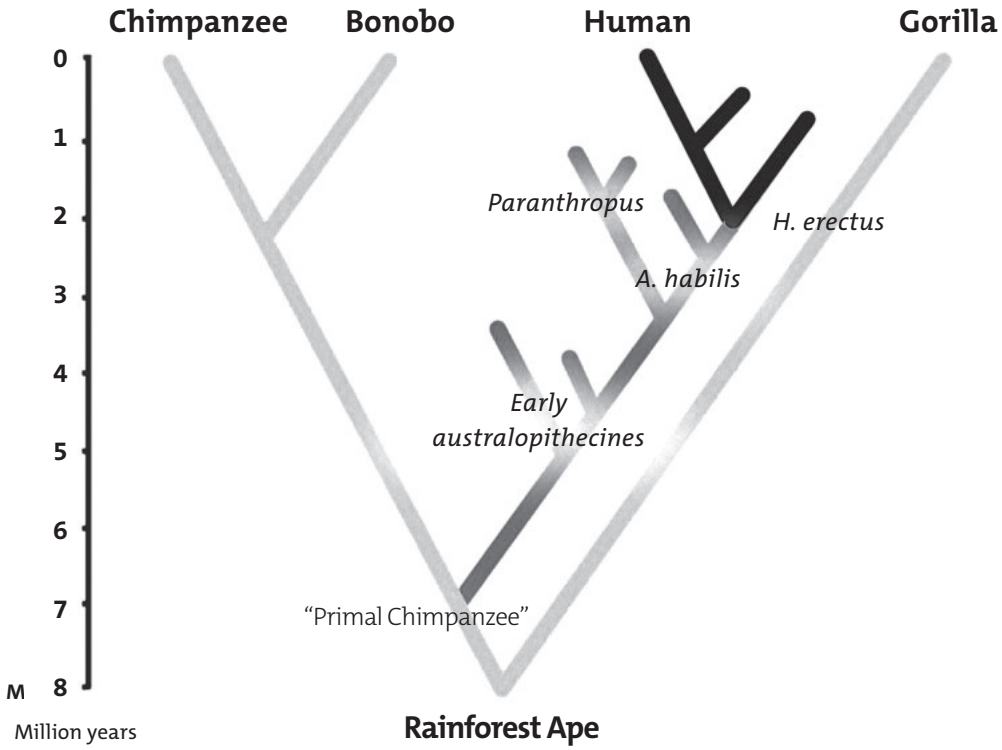
Who were the last ape-like ancestors of the first humans? Who is the "ape" from whom we descended? Since the lineages of humans and chimpanzees separated around five to seven million years ago, but the first humans emerged around 2.5 million years ago, a gap of several million years remains. During this long time, our ancestors had already separated from the chimpanzees but were not yet humans. What were they then? Today they are described as an independent type of great ape, as australopithecines ("southern apes"). They were already able to walk upright, but there was no significant enlargement of the brain or other typical human features. The best-known representative of the species is "Lucy" *(Australopithecus afarensis)*, who lived in East Africa 3.2 million years ago. Our last still ape-like ancestors were the australopithecines. *Fig. 3*

3 Simplified family tree of the African great apes.

Light line:
Chimpanzees and gorillas.

Dark line:
Australopithecines.

Black line:
Humans *(genus Homo)*.



Limits of biology?

If one accepts that humans are primates and descend from ape-like ancestors, then the riddle of what it means to be human is not yet solved—on the contrary. Because then the question arises as to how and why this particular animal species, humans, with its unique characteristics, developed. Theologians and philosophers emphasize to this day that biology is not in a position to solve this riddle. It is argued that a leap occurred in the course of evolutionary development which cannot be explained scientifically, and which resulted in an absolute difference between humans and other animals. In the Catholic Church, for example, the natural evolution of the human body is accepted while at the same time emphasizing that the spirit soul must have been created directly by God.

Absolute differences between humans and animals were also postulated in philosophy and other humanities. For the French philosopher and naturalist René Descartes, for example, the body of all living things was "a kind of machine", made up of bones, nerves, muscles, veins, blood, and skin. There is only one exception in this physically determined system: the indivisible and immortal human soul. Similar ideas are still alive today. The cultural philosopher Ernst Cassirer wrote that the "symbolic forms"—language, myth, science, religion, technology, art—are "true primordial phenomena of the spirit" that cannot be explained causally.

Fig. 4

4 The painting *"Pithecanthropus alalus"* by Gabriel von Max (1840–1915) from 1894 represents a fictional transitional form between the ape-like ancestors and today's humans.

Scientists and evolutionary biologists on the other hand tried to close the gap between humans and other animals. They argued that humans are shaped by their evolutionary heritage not only physically, but also in their feelings, thoughts, and behavior. It is basic biological knowledge that there is a close connection between the physical characteristics of an animal and its behavior. In principle, this applies to all areas of life, and humans are no exception.

The fact that humans have abilities that are only rudimentarily found in other animals—language, art, and science, for example—contradicts this only at first glance. From a biological point of view, humans have unique characteristics—just like all other living beings are special and unique in their own way. Never-

5 There are also traditional cultural behaviors in animals. One example is the method of termite fishing among chimpanzees.

theless, the question arises whether the extraordinary human characteristics can be explained by general evolutionary mechanisms or whether the method reaches its limits here. In the following, I would like to briefly discuss this using the example of culture and show to what extent the more recent biological theories build a bridge between the natural sciences and humanities approaches.

How much nature is in culture?

In terms of evolutionary biology, the cultural ability can be defined as an adaptation that combines the advantages of genetic information with those of individual experiences and at the same time avoids some of its disadvantages. What does that mean? In genetic inheritance, genes are the information-carrying units. They produce relatively inflexible behavior that can only be changed

through mutations, recombination, and selection. In contrast, learned behaviors are more flexible. This can be beneficial when an animal lives in a changing environment. However, learned behavior has a serious disadvantage: each individual must re-live and learn from the experiences again and again. And this can be associated with great risks, e.g. when learning which food is edible and where there is danger.

Social animals can compensate for this disadvantage by learning from other group members and adopting their experiences. In this way, a second information storage is created, the units of which are not inherited genetically, but conveyed through example and upbringing—culture. Therefore, cultural ability can be defined as a social learning ability and as such is genetically determined, an adaptation. *Fig. 5*

Individual experiences and cultural knowledge are important additions to the evolutionary knowledge fixed in the genes. However, this means that the learned behavior and the thoughts associated with it must not be genetically determined but must be free and open to new and unexpected things. Only then can they meaningfully complement the genetically determined instincts and behaviors.

What happens when the learned behavior interferes with biological functions? Then the individual will hurt itself or die. The same applies to cultures. The Shakers, a Christian free church that flourished in the USA in the early 19th century and had several thousand members, are an example of this. The basis of their coexistence was celibacy and complete sexual abstinence. Whatever one thinks this way of life morally, it is not biologically sustainable. In general, this means that if a society lives by cultural beliefs and rules that conflict with biological necessities, that culture will sooner or later die out.

So humans live in two worlds: they are both natural and cultural beings. In this respect, biologists are correct when they point out that human culture arose naturally and will disappear again when it no longer fulfills its purpose. But the philosophers and humanities scholars are also right when they point out that the cultural content, the special thoughts, and convictions, are not genetically determined. In this sense, humans and other animals that learn from experience can think and behave freely. However, there are always risks associated with freedom. And so, the two origins of humans from nature and culture are an ongoing evolutionary experiment with an unknown outcome: for each individual, for nations and their cultures, for humans as a biological species.

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Ardipithecus ramidus and *kadabba*

Profile

Discovery

In 1992, Gen Suwa discovered a first molar of this species in Aramis, Ethiopia. Another associate set of ten teeth was found in 1993. "Ardi"—a largely preserved skeleton—was discovered between 1994 and 1996 in the Afar Triangle in Ethiopia and represents a truly sensational find. Yohannes Haile-Selassie discovered the first fossil of an *Ardipithecus kadabba* in 1997 in the Afar Valley in Ethiopia.

Sites

Ethiopia: Aramis, Awash River

Finds

ramidus: Complete skeleton, teeth.

kadabba: Right lower jaw fragment with molar. Four additional isolated teeth from the lower jaw were discovered at a later point in time.

Age

ramidus: 4.42–3.9 million years.

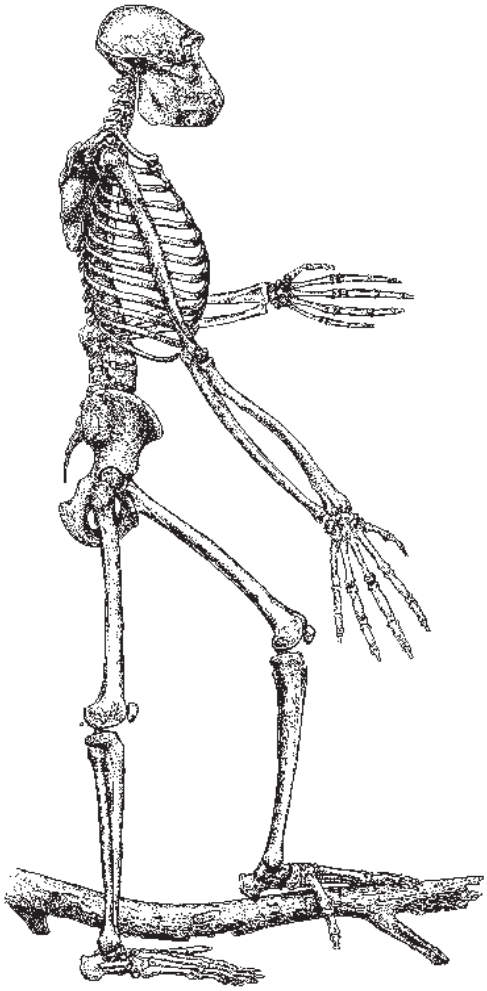
kadabba: 5.8–5.18 million years.

Brain size

280–350 cm^3.

Characteristics

Since there are up to 1.9 million years between the fossil records of *Ardipithecus kadabba* and *Ardipithecus ramidus,* it is assumed that they are two different species. *Ardipithecus* represents an early link between the climbing locomotion of the great apes and the constant bipedal walk of humans. The splayed toe and the construction of the pelvis show that they still retained their climbing ability despite walking on two legs. It is not entirely clear what they ate. The thickness of the enamel and the width of the upper incisors suggest that they ate less fruit than today's chimpanzees, but more ripe fruit, succulent plant parts, and young leaves than *Australopithecus afarensis.*



Reconstruction of *Ardipithecus ramidus*