

HUMAN EVOLUTION IN A NUTSHELL: An introduction to human evolution

PART I.I: PRIMATES AND HOMININS

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In part 1.1 you will learn about:

- Our closest living relatives primates and the great apes
- Our common ancestor with the chimpanzee
- Anatomical background
- Hominins the human family and its defining characteristics

THE PRIMATES - HUMANS' CLOSEST KIN

Before trying to understand human origins, we need a little bit of context, and it's a good idea to take a quick glance at the closest living relatives of humans.

The primates are an order of mammals with around 250 species classified as lemurs, lorises, tarsiers, monkeys, apes, und humans. They range in size from 30 g (mouse lemur) to 150 kg (gorilla). With the exception of humans, they mostly live in tropical and subtropical regions (fig. 1). Most primates share the following characteristics:

- Forward facing eyes (good depth perception)
- Nails (not claws)
- Opposable thumb (and often big toe)
- Shortened muzzle (limited sense of smell)
- Large brains
- Long childhood





Among the primates, humans belong to the Hominoids (superfamily Hominoidea), commonly known as the apes (gibbons, orangutan, chimpanzee, bonobo and gorilla: fig. 2).



Figure 2. Evolutionary tree of the Hominoidea (apes).

Orangutan

- Three species, one living on Borneo (*Pongo pygmaeus*) and two on Sumatra (*Pongo abelii* and *Pongo tapanuliensis*).
- Males can weigh up to 120 kg, females about half the size.
- Extreme specialisations for suspensory behaviour (hanging from branches). Very long forelimbs with long, hooklike hands. Hindlimbs are extremely mobile with hand-like feet. Apart from adult males they rarely descend to the ground.



Gorilla

- All belong to the genus *Gorilla*, but the western and eastern populations may be separate species, *Gorilla gorilla* and *Gorilla beringei* (fig. 4).
- The largest living primates with males up to 200 kg, and females about half the size.
- Move around on four limbs by knuckle-walking. Among the most terrestrial of all primates.
- Eat mostly fruit and leaves.
- Live in groups with a single adult male (Silverback) and several adult females and their young.

Chimpanzee

- Species name *Pan troglodytes*, with four subspecies.
- Live in a broad belt across much of central Africa, from Senegal in the west to Tanzania in the east, inhabiting rain forests to dry savannahs.
- Like gorillas, they are also knuckle-walkers. In the trees they suspend more than gorillas but far less so than orangutans.





- Eat mostly fruit and nuts, but also leaves and some meat.
- Use many types of tools, such as twigs as probes, and digging sticks.

Bonobo

- *Pan paniscus,* closely related to chimpanzees but a separate species found only in the Congo jungle (fig. 6).
- Somewhat more slender than chimpanzees and use more suspensory behaviour.
- Little tool use in the wild.

Genetically our closest relatives are the chimpanzees and bonobos, sharing approximately 98.4% of our genes. Based on genetic studies it is thought that the common ancestor of humans and chimpanzees/bonobos lived around 7 million years ago.

While we have practically no fossils showing the evolutionary history of chimps and gorillas, we have by now luckily uncovered a wealth of fossils of human ancestors. So, while there are undoubtedly still many gaps in the fossil record, we now have a fairly good idea of the basic pattern of hominin evolution, and that is where we will now turn our attention to.



WHAT IS A HOMININ?

Hominins are members of the taxonomical tribe Homininae, and include humans and their extinct relatives, e.g., those species that fall on the human side of the chimpanzee-human divide.

Before getting on to the earliest known hominins though there are some basic anatomical terms that may be useful for the rest of the course:



Despite their relatively recent common ancestry, humans and apes differ in a number of ways:



HOMININ CHARACTERISTICS

So we have seen that there are a number of physical differences between humans and living apes. The defining characteristics of hominins and their emergence can be summarised as follows:

- **Bipedal locomotion** (walking upright on two legs while other apes can do this they do not do it habitually) 6 million years ago.
- **Tool users and makers** (again, while other apes do this none are able to manufacture tools like hominins have been making for the last three million years) *3 million years ago*.
- Large brains 2 million years ago.
- Language ??? unknown.

So it can be seen that not all of these characteristics evolved at the same time and that bipedal locomotion came first. The timing of, and possible reasons for, the evolution of these characteristics is of course something that we will explore at in part 1.2 of the course.

SUMMARY

In this part we looked the closest living relatives of humans. The chimpanzee is our closest living relative. We share over 98% of out DNA and share a common ancestor which would have lived around 7-8 million years ago.

Those apes on the human side of the common ancestor are the hominins, of which we are the last surviving members.

Of all the defining characteristics of the hominins it is bipedalism, walking on two legs, that appeared first. The manufacturer of stone tools and brain sizes beyond that of living apes came much later.

In the next part of the course we will at the fossil evidence for the earliest hominins.

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