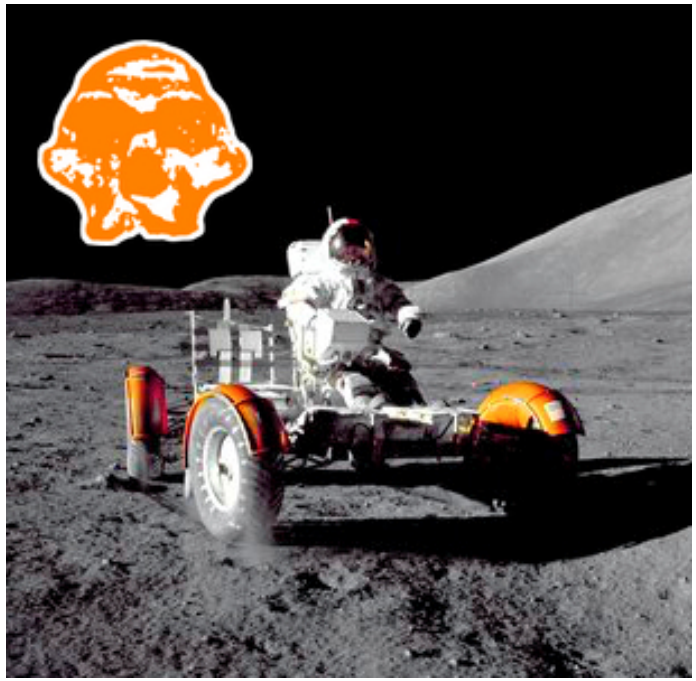

FROM APEMEN TO SPACEMEN:

THE STORY OF HUMAN EVOLUTION

PART 1.1: THE PRIMATES

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In order to provide a context for human evolution we will here look at what typical features of primates are and look in some detail and our closest relatives, the apes.

In part 1.1 you will learn about:

- The defining characteristics of primates
- The asian apes: gibbons and orangutans
- The African great apes: gorillas, chimpanzee, and bonobos

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 look 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). On the whole, primates are not the most specialised of mammals (just think of bats and whales, for example).

Most primates share the following characteristics:

- Eye sockets that are closely spaced and forward facing (provides good depth perception)
- Flattened nails that have replaced the claws typical of most mammals
- Opposable thumb (and often big toe) with highly mobile digits (provides excellent grasping ability)
- Fewer incisor and premolar teeth compared to many other mammals
- Shortened muzzle or snout compared to most other mammals (limited sense of smell)
- Loss of one incisor and one premolar from the tooth row (compared to other mammals)
- Large brains (other features of the brain are also unique to primates)
- Long childhood (in humans particularly so)

Apart from humans, primates mostly live in tropical and subtropical regions (fig. 1). They inhabit a range of habitats, from deserts to rain forests.

In the past primates were widespread in North America and Europe, but in those times the global climate was warmer and subtropical conditions extended at higher latitudes than today.

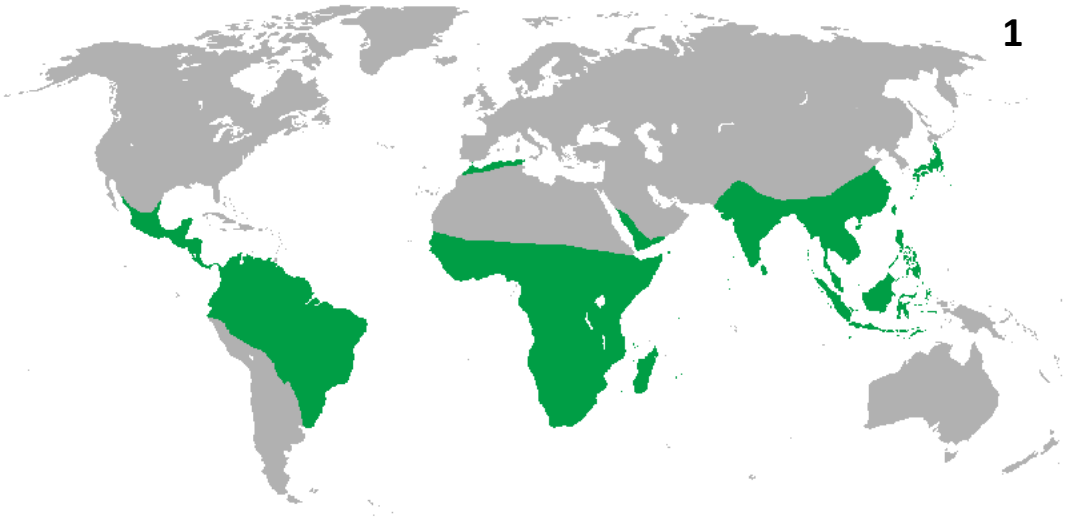

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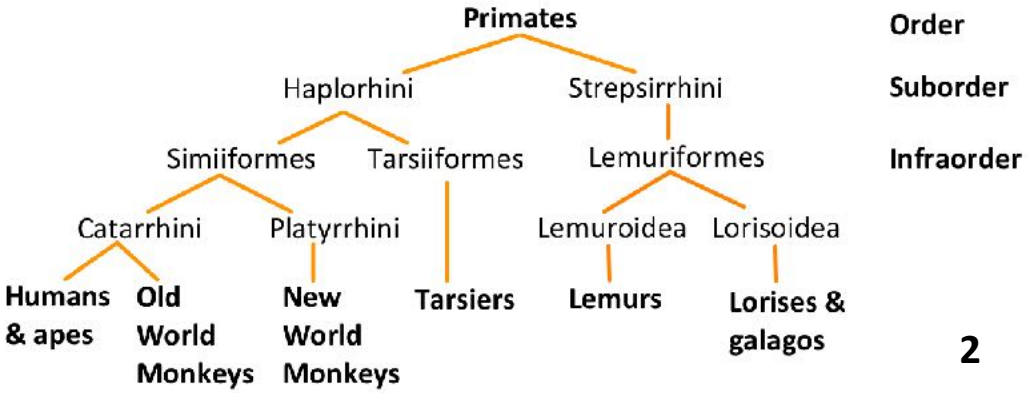
Figure 1. The range of non-human primates today

The order primates is divided into two suborders (fig. 2):

- **Strepsirrhini** ("wet-nosed")
  - Lemurs, galagos, lorises
- **Haplorhini** ("curved-nosed")
  - Tarsiers, platyrrhines (New World monkeys), catarrhines (Old World monkeys, apes, humans)



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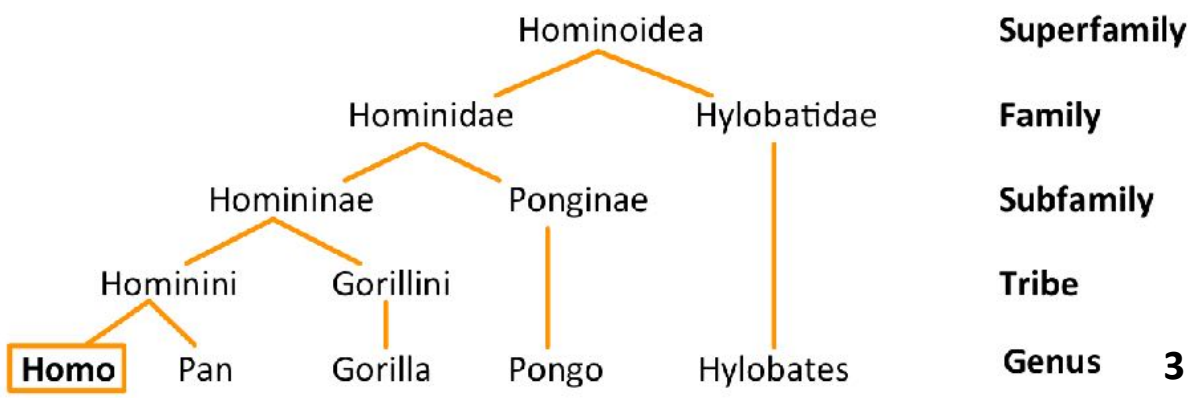
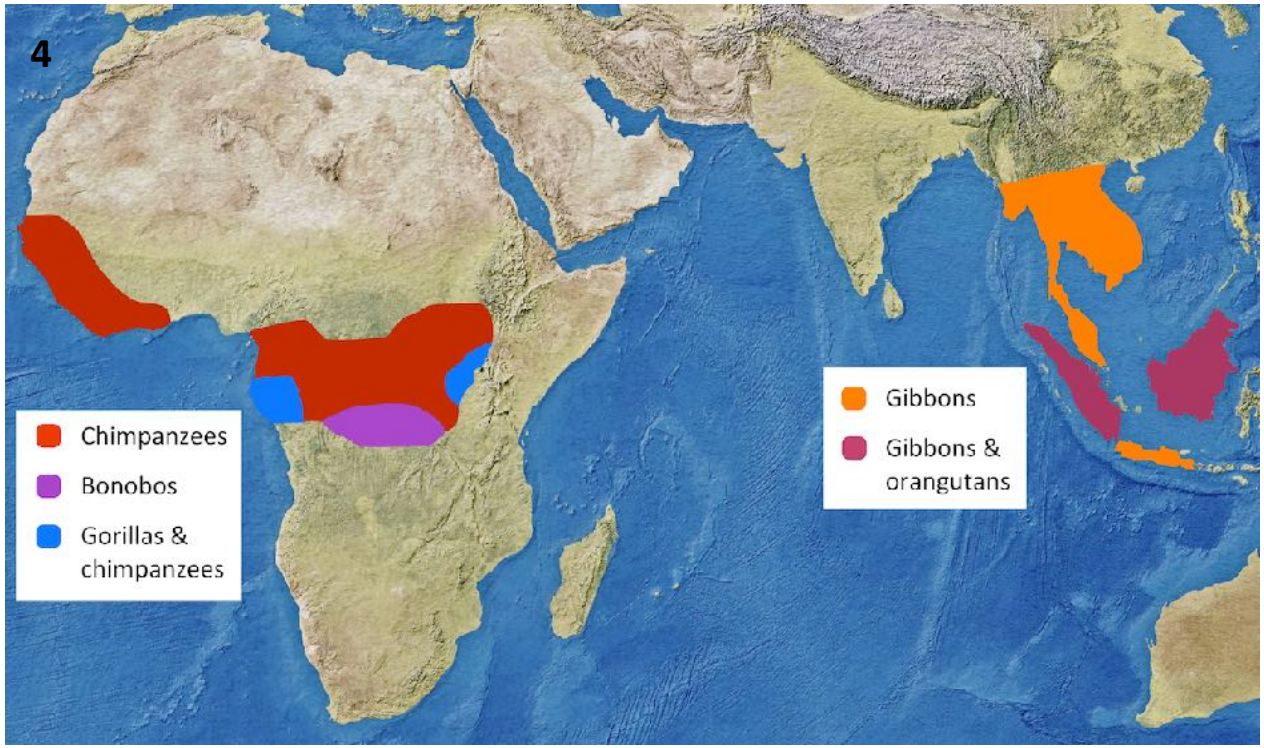
Let's take a closer look at our closest primate relatives.

THE APES

Among the primates, humans belong to the Hominoids (superfamily Hominoidea), commonly known as the apes (gibbons, orangutan, chimpanzee, bonobo and gorilla: figs. 3 & 4).

Based on fossil and genetic evidence the apes split from the Old World Monkey around 25 million years ago, probably in Africa. The gibbons (Hylobatidae) later split from the rest of the apes (Hominidae) around 18 million years ago, and it is with gibbons that we will start our tour of the apes with.





Gibbons

The gibbons, of the family Hylobatidae, comprise up to 18 species spread across four genera (*Hylobates*, *Hoolock*, *Nomascus* (fig. 5), and *Symphalangus*). They all live in south-east Asia, ranging from eastern India to southern China as well as the Islands of Borneo, Java and Sumatra.


5

They are the smallest of the apes, weighing between about 5 and 11 kg, depending on the species. Siamangs (genus *Symphalangus*) are the largest species (fig. 6). The males and females of all species are the same size.

They are a highly monogamous species, with males and females pair-bonding for life. They usually live with up to four offspring.

Gibbons have the longest forelimbs relative to body size of any primate. They have long curved digits on their hands and toes, acting like hooks, and highly mobile shoulder joints. This allows them to be the most suspensory and acrobatic of all the primates, moving almost exclusively by two-armed brachiation (swinging). Humans too have relatively mobile shoulders, which betrays our brachiating heritage and enabling us to be skilful throwers.


6

Gibbons specialise on a diet of ripe fruit, but also varying amounts of new leaves and also invertebrates such as termites and arachnids.

Orangutan

Like the gibbons, the orangutans are confined to Asia, with one species on Borneo (*Pongo pygmaeus*) and two species on Sumatra (*Pongo abelii* and *Pongo tapanuliensis*). In the past they had a more extensive range, which included parts of southern China. Like many primates they are highly endangered due to habitat destruction.


7

Males can weigh up to 120 kg (fig. 7), females about half the size (fig. 8).

Orangutans are largely solitary. Males range over a much larger area than females and so will cover the ranges of several females.

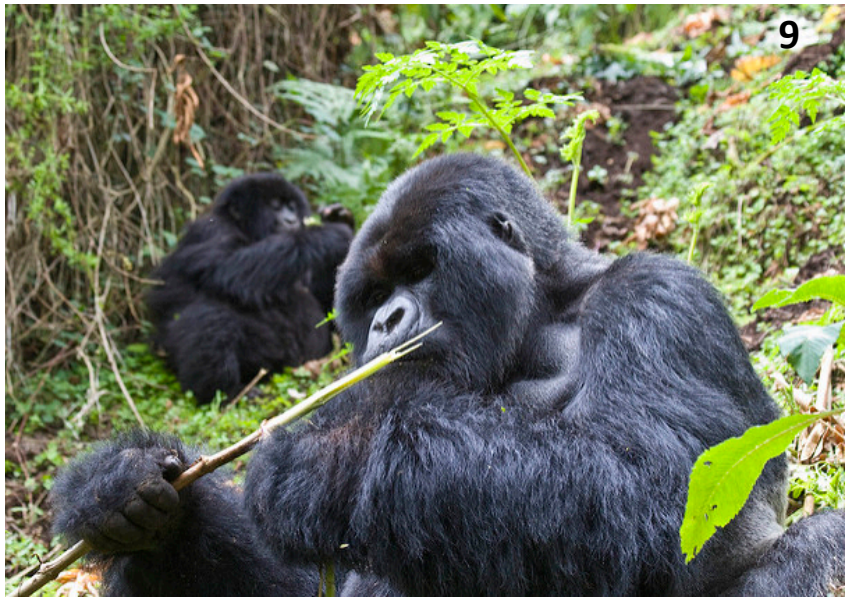

8

They have extreme specialisations for suspensory behaviour (hanging from branches). They have very long forelimbs with long, hooklike hands. The hindlimbs are extremely mobile with hand-like feet. In the trees they move by slow climbing, using all four limbs. Apart from adult males they rarely descend to the ground, whereby they walk on all fours, with their hands held in a fist.

Orangutans eat mostly fruit, but also substantial amounts of new leaves, shoots and bark.

Gorilla

Gorillas all belong to the genus *Gorilla*, but the western and eastern populations may be separate species, *Gorilla gorilla* and *Gorilla beringei*, respectively (fig. 9).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They are the largest living primates with males up to 200 kg, and females about half the size.

They move around on four limbs by knuckle-walking and are among the most terrestrial of all primates. Young gorillas are still highly competent at brachiating (swinging) through trees - adults are simply too large. Some adults do still sleep in trees though.

For lowland gorillas, fruit makes up perhaps half the diet in some seasons, with leaves and shoots the rest. Mountain gorillas eat mostly leaves and pith. Gorillas put their great strength to good use when foraging, often ripping apart branches and sometimes even whole trees!

Gorillas live in groups with one mature adult male (silverback), one or more younger males and several adult females and their young (about nine to ten individuals in total). In many primates, females in the group tend be related. This is not so in gorilla society, where it is common for females to migrate and join new groups.

Chimpanzee

Species name *Pan troglodytes*, with four subspecies. They live in a broad belt across much of central Africa, from Tanzania in the east to Senegal in the west, inhabiting rain forests to dry savannas.

The difference in size between males and females is greater than in humans but far less than that seen in orangutans and gorillas (roughly 55 kg for males and 40 kg for females).

Like gorillas, they are also knuckle-walkers. In the trees they suspend more than gorillas but far less so than orangutans.

Chimpanzees eat mostly fruit and nuts, but also leaves and some meat. Some chimpanzee groups engage in cooperative hunting of small prey such as monkeys. They often climb trees to obtain their food.

They use many types of tools, such as twigs as probes, leaves as sponges, digging sticks, and clubs and stones for breaking open hard nuts. These so-called ‘material cultures’ vary across populations.

Chimpanzee social groups are quite fluid, so-called fission-fusion societies, and like gorillas females often leave to join new groups. Adult males can be highly aggressive, especially to those from neighbouring groups.

Bonobo

The bonobo, *Pan paniscus*, is closely related to the (common) chimpanzees but is a separate species found only in the Congo jungle. They live in more forested habitats than do chimpanzees.

They have similar body weight to some of the smaller chimpanzees but have a darker face and more lightly-built skull, more slender limbs, and longer hands and feet.

They use more suspensory behaviour than chimpanzees and walk on two legs more often. Overall though, their locomotion is very similar to chimpanzees, who they are very closely related to.

They have a similar diet to chimpanzees (fruit, pith, and leaves) but display little tool use in the wild. In captivity, they are at least as competent as chimpanzees at using tools, so they must have less need for tools in the wild.

Compared to chimpanzees, feeding groups often contain both males and females. Bonobo society shows stronger bonds between females, more food sharing, and less aggression than chimpanzee society.

OUR RELATIONSHIP TO THE GREAT APES

We have seen that among the primates we are most closely related to the great apes, specifically the African ones, the gorilla, chimpanzee, and bonobo. It is thought that the last common ancestor of all great apes (including us) lived around 15 million years ago, possibly in Asia but perhaps Africa. We and the African great apes last shared a common ancestor around 10 million years ago, when the gorilla line went its own way.

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 last common ancestor of humans and chimpanzees/bonobos lived around 7 million years ago (the chimpanzees and bonobos had their own split around 2 million years ago). Those apes that fall on the human side of the chimpanzee-human divide are called 'hominins'

While we have practically no fossils showing the evolutionary history of chimps and gorillas, little more than a few teeth, we have by now luckily uncovered a wealth of fossils of human ancestors, or hominins. So, while there are undoubtedly still many gaps in the fossil record, we now have a fairly good idea of the basic pattern of human evolution.

In part 2 we will go on to explore the earliest currently known hominins.

 **If you have the premium content go to part 1.2 to learn more about primates.**

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