

# What is a primate?

Scientists are interested in knowing how animals are related to one another, so that they can understand the "tree of life"; the evolutionary process that led to the diversity of living forms we see today. Linnaeus came up with a hierarchical system of names that we still use today to classify animals and plants into different groups. Species are the smallest groups, consisting of a group of individuals that can reproduce and produce viable offspring. Species are grouped into genera (the plural of 'genus'), genera are grouped into families, and so on. The basic classification scheme he came up with is as follows, along with the formal and informal names of each group to which we, humans, belong:

Kingdom = ANIMALIA (animals)

Phylum = CHORDATA (vertebrates)

Class = MAMMALIA (mammals)

Order = PRIMATES (primates)

Family = HOMINIDAE (hominids)

Genus = *HOMO*

Species = *HOMO SAPIENS*

So, the species that we are most closely related to is also in our genus:

*Homo erectus*

The genus that *Homo* is most closely related to is also in our family:

*Australopithecus* or *Kenyanthropus*

Living and fossil primate species are grouped into these categories according to how they are related. If two species share a specialized trait, they are probably closely related, and that trait probably evolved in their common ancestor. Shared specialized traits are referred to as homologous traits. A good example of a homologous trait is the lack of a tail in apes. Apes lack tails because a tail was lost in their common ancestor.

Sometimes, species might share a trait that is specialized, and appears to be similar, but on closer inspection only appears to be homologous. A good example of this type of trait is wings in birds and bats. Bird and bat wings are analogous traits; they evolved separately in different lineages. If you look at them closely, they are really quite different. Primatologists and paleontologists try to use homologous traits to decide how living and fossil primate species are related.

There are over 200 species in the order Primates alive today, and many more existed in the past. We group them according to their evolutionary relationships, which were determined using homologous traits.

# Current Classification of the Primates

## ORDER -Primates

SUBORDER - Strepsirhines "wet noses" (like your dog) (= prosimians)

SUPERFAMILY -**Lemuroidea** (lemurs) (Madagascar)

SUPERFAMILY -**Lorisoidea** (lorises, bushbabies) (Asia)

SUBORDER - **Haplorhines** "dry, furry noses" (like you have) (= anthropoids)

SUPERFAMILY -**Tarsiioidea** (tarsiers) (Africa)

SUPERFAMILY -**Ceboidea** (New World monkeys) (South America)

SUPERFAMILY -**Cercopithecoidea** (Old World monkeys) (Africa & Asia)

SUPERFAMILY -**Hominoidea** (apes) (Africa & Asia)

FAMILY -**Hylobatidae** (gibbons and siamangs) (Asia)

FAMILY -**Pongidae**

GENUS -**Pongo** (orangutans) (Asia)

FAMILY -**Hominidae\*\***

GENUS -**Gorilla** (gorillas) (Africa)

GENUS -**Pan** (chimps, bonobos) (Africa)

GENUS -**Ardipithecus** (a "hominid") (Africa)

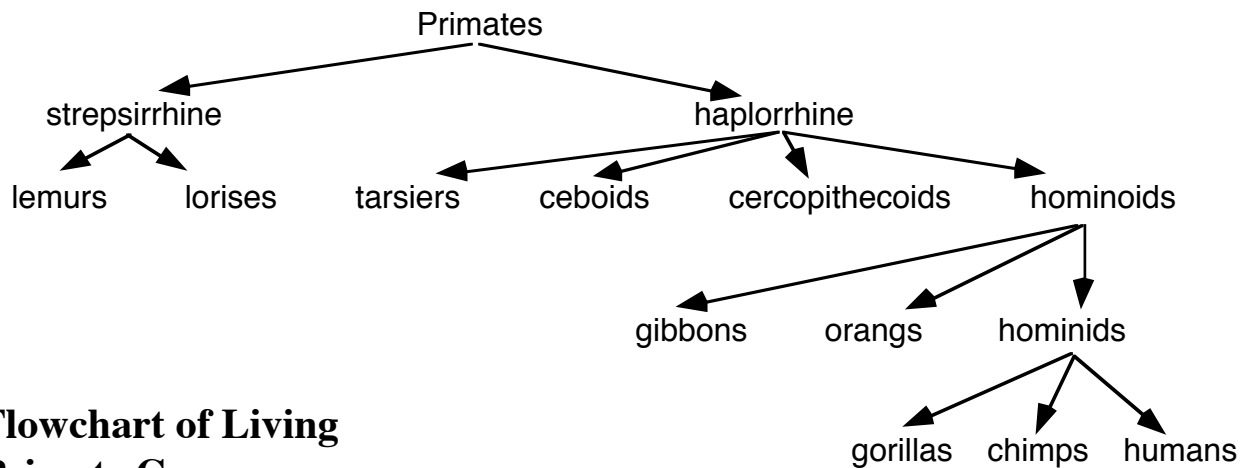
GENUS -**Orrorin** (a "hominid") (Africa)

GENUS -**Sahelanthropus** (a "hominid") (Africa)

GENUS -**Kenyanthropus** (a "hominid") (Africa)

GENUS -**Australopithecus** (a "hominid") (Africa)

GENUS -**Homo** (a "hominid") (everywhere)



**Flowchart of Living Primate Groups**

## Homologous primate features

There are many homologous traits that make primates 'primates.' In general, primates are less specialized than many other groups, like bats, whales, etc. This is one reason that they are so successful; being generalists, they can take advantage of many niches, or portions of the environment. The main features found in all primates are:

**1. Primitive body plan, including five fingers and toes, and the retention of a clavicle.**

Clavicles are lost in many animals, such as cats, dogs, horses, deer, antelope, etc. The clavicle's job is to keep the shoulders pushed out to the side. But, clavicles also link the shoulder girdle to the chest, so they limit movement. Since these other animals who depend on fast running want to have more movement (front-back) of the shoulder to make longer strides, and have their shoulders facing the ground all the time, they have lost their clavicles.

**2. The loss of at least some teeth.** The first mammals from which primate evolved had 3 incisors, 1 canine, 4 premolars and 4 molars. Thus, their dental formula is 3-1-4-4. The dental formula of all primates is less than this.

**3. Prehensile hands and feet.** All primates, except humans, have opposable big toes and thumbs.

**4. Nails instead of claws on at least some fingers or toes.** All primates have broad, flat nails on at least one finger or toe, on the front of which there is a sensitive area called a tactile pad. The tactile pad has many nerve endings in it, providing it with an enhanced sense of touch. The nail protects the tactile pad. A squirrel, for example, has narrow, thick claws, which are great for climbing trees, but no tactile pad.

**5. Stereoscopic vision, and enhanced sense of sight.** Because our eyes face the front, their visual fields (the area that each eye sees) overlap. This is not true for a horse, or any animal whose eyes face out to the side. Overlapping visual fields is called stereoscopic vision, and enables primates to judge depth (how far away things are). As the eyes moved forward, there needed to be bone around the sides and back of the orbits to support and protect them. Thus, we will see early primates (the first strepsirhines) developed a postorbital bar, and haplorhines developed a full postorbital plate as their eyes moved even further forward.

**6. Reduced sense of olfaction (smell).** Primates rely more on vision than olfaction. You know this, because you can more quickly recognize your classmates by looking at them than smelling them. Primate noses are smaller, making their snouts shorter. The olfactory regions of the brain are also reduced in primates.

**7. Increased brain size and complexity.** Primates are smart. Most have at least slightly larger brains for their size than you would expect for other mammals. They have increased areas to process visual information, and decreased areas for olfaction.