[Template:About](/wiki/Template:About" \o "Template:About) [Template:Pp-move-indef](/wiki/Template:Pp-move-indef) [Template:Automatic Taxobox](/wiki/Template:Automatic_Taxobox)

A **primate** ([Template:IPAc-en](/wiki/Template:IPAc-en) [Template:Respell](/wiki/Template:Respell)) is a [mammal](/wiki/Mammal) of the [order](/wiki/Order_(biology)) **Primates** ([Latin](/wiki/Latin): "prime, first rank").[[1]](#cite_note-1)[[2]](#cite_note-2) In [taxonomy](/wiki/Taxonomy_(biology)), primates include two distinct lineages, [strepsirrhines](/wiki/Strepsirrhini) and [haplorhines](/wiki/Haplorhini).[[3]](#cite_note-3) Primates arose from ancestors that lived in the trees of tropical forests; many primate characteristics represent adaptations to life in this challenging three-dimensional environment. Most primate species remain at least partly [arboreal](/wiki/Arboreal).

With the exception of [humans](/wiki/Human), who inhabit every continent except for [Antarctica](/wiki/Antarctica),[[4]](#cite_note-4) most primates live in tropical or subtropical regions of the Americas, Africa and Asia.[[5]](#cite_note-5) They range in size from [Madame Berthe's mouse lemur](/wiki/Madame_Berthe's_mouse_lemur), which weighs only [Template:Convert](/wiki/Template:Convert), to the [eastern gorilla](/wiki/Eastern_gorilla), weighing over [Template:Convert](/wiki/Template:Convert). Based on fossil evidence, the earliest known true primates, represented by the genus [*Teilhardina*](/wiki/Teilhardina), date to 55.8 million years old.<ref name=placental\_radiation>[Template:Cite journal](/wiki/Template:Cite_journal)</ref> An early close primate relative known from abundant remains is the Late [Paleocene](/wiki/Paleocene) [*Plesiadapis*](/wiki/Plesiadapis), c. 55–58 million years old.<ref name=ChatterjeeEtal2009>[Template:Cite journal](/wiki/Template:Cite_journal)</ref> [Molecular clock](/wiki/Molecular_clock) studies suggest that the primate branch may be even older, originating near the [Cretaceous–Paleogene boundary](/wiki/Cretaceous–Paleogene_boundary) or around 63–74 mya.[[6]](#cite_note-6)[[7]](#cite_note-7)[[8]](#cite_note-8)[[9]](#cite_note-9) The order Primates was traditionally divided into two main groupings: [prosimians](/wiki/Prosimian) and [anthropoids](/wiki/Simian) (simians). Prosimians have characteristics more like those of the earliest primates, and include the [lemurs](/wiki/Lemur) of [Madagascar](/wiki/Madagascar), [lorisoids](/wiki/Lorisoidea), and [tarsiers](/wiki/Tarsier). Simians include monkeys, apes and [hominins](/wiki/Hominin). More recently, taxonomists have preferred to split primates into the suborder Strepsirrhini, or wet-nosed primates, consisting of non-tarsier prosimians, and the suborder Haplorhini, or dry-nosed primates, consisting of tarsiers and the simians.

Simians are divided into two groups: [catarrhine](/wiki/Catarrhini) (narrow-nosed) monkeys and [apes](/wiki/Ape) of Africa and southeastern Asia and platyrrhine ("flat-nosed") or [New World monkeys](/wiki/New_World_monkey) of South and [Middle America](/wiki/Middle_America_(Americas)). Catarrhines consist of [Old World monkeys](/wiki/Old_World_monkey) (such as [baboons](/wiki/Baboon) and [macaques](/wiki/Macaque)), [gibbons](/wiki/Gibbon) and [great apes](/wiki/Great_ape); New World monkeys include the [capuchin](/wiki/Capuchin_monkey), [howler](/wiki/Howler_monkey) and [squirrel monkeys](/wiki/Squirrel_monkey). Humans are the only extant catarrhines to have spread successfully outside of Africa, South Asia, and East Asia, although fossil evidence shows many other species were formerly present in Europe. New primate species are still being discovered. More than 25 species were [taxonomically described in the decade of the 2000s](/wiki/Primates_described_in_the_2000s) and eleven have been [described since 2010](/wiki/Primates_described_in_the_2010s).

Considered [generalist](/wiki/Generalist_and_specialist_species) mammals, primates exhibit a wide range of characteristics. Some primates (including some great apes and baboons) are primarily terrestrial rather than [arboreal](/wiki/Arboreal), but all species possess adaptations for climbing trees. Locomotion techniques used include leaping from tree to tree, walking on two or four limbs, [knuckle-walking](/wiki/Knuckle-walking), and swinging between branches of trees ([brachiation](/wiki/Brachiation)).

Primates are characterized by large brains relative to other mammals, as well as an increased reliance on [stereoscopic](/wiki/Stereopsis) vision at the expense of smell, the dominant sensory system in most mammals. These features are more developed in monkeys and apes and noticeably less so in lorises and lemurs. [Three-color vision](/wiki/Trichromacy) has developed in some primates. Most also have [opposable thumbs](/wiki/Thumb) and some have [prehensile](/wiki/Prehensility) tails. Many species are [sexually dimorphic](/wiki/Sexual_dimorphism); differences include body mass, canine tooth size, and coloration. Primates have slower rates of development than other similarly sized mammals and reach maturity later, but have longer lifespans. Depending on the species, adults may live in solitude, in mated pairs, or in groups of up to hundreds of members.

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## Historical and modern terminology[[edit](/index.php?title=(none)&action=edit&section=1)]

The relationships among the different groups of primates were not clearly understood until relatively recently, so the commonly used terms are somewhat confused. For example, "ape" has been used either as an alternative for "monkey" or for any tailless, relatively human-like primate.<ref name=EB11Ape>[Template:Citation](/wiki/Template:Citation)</ref>

Sir [Wilfrid Le Gros Clark](/wiki/Wilfrid_Le_Gros_Clark) was one of the [primatologists](/wiki/Primatologists) who developed the idea of trends in primate evolution and the methodology of arranging the living members of an order into an "ascending series" leading to humans.<ref name=Dixson1981>[Template:Citation](/wiki/Template:Citation)</ref> Commonly used names for groups of primates such as "[prosimians](/wiki/Prosimian)", "[monkeys](/wiki/Monkey)", "[lesser apes](/wiki/Lesser_ape)", and "[great apes](/wiki/Great_ape)" reflect this methodology. According to our current understanding of the evolutionary history of the primates, several of these groups are [paraphyletic](/wiki/Paraphyletic): a paraphyletic group is one which does *not* include all the descendants of the group's common ancestor.[[10]](#cite_note-10) In contrast with Clark's methodology, modern classifications typically identify (or name) only those groupings that are [monophyletic](/wiki/Monophyletic); that is, such a named group includes *all* the descendants of the group's common ancestor.[[11]](#cite_note-11) The [cladogram](/wiki/Cladogram) below shows one possible classification sequence of the living primates,<ref name=Cartmill2011>[Template:Cite book](/wiki/Template:Cite_book)</ref>[[12]](#cite_note-12) with groups that use common (traditional) names are shown on the right.

[Template:Barlabel](/wiki/Template:Barlabel)

All groups with scientific names are monophyletic (that is, they are [clades](/wiki/Clade)), and the sequence of scientific classification reflects the evolutionary history of the related lineages. Traditionally named groups are shown on the right; they form an "ascending series" (per Clark, see above), and several groups are paraphyletic:

* "prosimians" contain two monophyletic groups (the suborder Strepsirrhini, or lemurs, lorises and allies, as well as the tarsiers of the suborder Haplorhini); it is a paraphyletic grouping because it excludes the Simiiformes, which also are descendants of the common ancestor Primates.
* "monkeys" comprise two monophyletic groups, New World monkeys and Old World monkeys, but is paraphyletic because it excludes hominoids, superfamily Hominoidea, also descendants of the common ancestor Simiiformes.
* "apes" as a whole, and the "great apes" in particular, are paraphyletic because they exclude humans.

Thus, the members of the two sets of groups, and hence names, do not match, which causes problems in relating scientific names to common (usually traditional) names. Consider the superfamily Hominoidea: In terms of the common names on the right, this group consists of apes and humans and there is no single common name for all the members of the group. One remedy is to create a new common name, in this case "hominoids". Another possibility is to expand the use of one of the traditional names. For example, in his 2005 book, the [vertebrate](/wiki/Vertebrate) [palaeontologist](/wiki/Palaeontology) Benton wrote, "The apes, Hominoidea, today include the gibbons and orang-utan ... the gorilla and chimpanzee ... and humans";[Template:Sfn](/wiki/Template:Sfn) thereby Benton was using "apes" to mean "hominoids". In that case, the group heretofore called "apes" must now be identified as the "non-human apes".

[Template:As of](/wiki/Template:As_of), there is no consensus as to which methodology will rule, whether to accept traditional (that is, common), but paraphyletic, names or to use monophyletic names only; or to use 'new' common names or adaptations of old ones. Both competing approaches will be found in biological sources, often in the same work, and sometimes by the same author. Thus, Benton defines "apes" to include humans, then he repeatedly uses "ape-like" to mean "like an ape rather than a human"; and when discussing the reaction of others to a new fossil he writes of "claims that [*Orrorin*](/wiki/Orrorin) ... was an ape rather than a human".[Template:Sfn](/wiki/Template:Sfn)

## Classification of living primates[[edit](/index.php?title=(none)&action=edit&section=2)]

[thumb|upright|A 1927 drawing of](/wiki/File:Primates-drawing.jpg) [chimpanzees](/wiki/Chimpanzee), a [gibbon](/wiki/Gibbon) (top right) and two [orangutans](/wiki/Orangutan) (center and bottom center): The chimp in the upper left is [brachiating](/wiki/Brachiation); the orangutan at the bottom center is [knuckle-walking](/wiki/Knuckle-walking). [right|upright|thumb|](/wiki/File:Akha_cropped.png)[*Homo sapiens*](/wiki/Homo_sapiens) is the only living primate species that is fully bipedal [thumb|](/wiki/File:NILGIRI_LANGUR_(Trachypithecus_johnii).jpg)[Nilgiri Langur](/wiki/Nilgiri_Langur) (*Trachypithecus johnii*) an [Old World Monkey](/wiki/Old_World_Monkey)

A list of the families of the living primates is given below, together with one possible classification into ranks between order and family.[[13]](#cite_note-13)<ref name=SAP>[Template:Cite book](/wiki/Template:Cite_book)</ref> Other classifications are also used. For example, an alternative classification of the living Strepsirrhini divides them into two infraorders, Lemuriformes and Lorisiformes.[Template:Sfn](/wiki/Template:Sfn)

* **Order Primates**
  + **Suborder** [**Strepsirrhini**](/wiki/Strepsirrhini): lemurs, galagos and lorisids
    - Infraorder [Lemuriformes](/wiki/Lemuriformes)[Template:Efn](/wiki/Template:Efn)
      * Superfamily [Lemuroidea](/wiki/Lemuroidea)
        + Family [Cheirogaleidae](/wiki/Cheirogaleidae): dwarf lemurs and mouse-lemurs (34 species)
        + Family [Daubentoniidae](/wiki/Aye-aye): aye-aye (one species)
        + Family [Lemuridae](/wiki/Lemuridae): ring-tailed lemur and allies (21 species)
        + Family [Lepilemuridae](/wiki/Lepilemuridae): sportive lemurs (26 species)
        + Family [Indriidae](/wiki/Indriidae): woolly lemurs and allies (19 species)
      * Superfamily [Lorisoidea](/wiki/Lorisoidea)
        + Family [Lorisidae](/wiki/Lorisidae): lorisids (14 species)
        + Family [Galagidae](/wiki/Galagidae): galagos (19 species)
  + **Suborder** [**Haplorhini**](/wiki/Haplorhini): tarsiers, monkeys and apes
    - Infraorder [Tarsiiformes](/wiki/Tarsiiformes)
      * Family [Tarsiidae](/wiki/Tarsier): tarsiers (11 species)
    - Infraorder [Simiiformes](/wiki/Simiiformes) (or Anthropoidea)
      * Parvorder [Platyrrhini](/wiki/Platyrrhini): New World monkeys
        + Family [Callitrichidae](/wiki/Callitrichidae): marmosets and tamarins (42 species)
        + Family [Cebidae](/wiki/Cebidae): capuchins and squirrel monkeys (14 species)
        + Family [Aotidae](/wiki/Aotidae): night or owl monkeys (douroucoulis) (11 species)
        + Family [Pitheciidae](/wiki/Pitheciidae): titis, sakis and uakaris (43 species)
        + Family [Atelidae](/wiki/Atelidae): howler, spider, woolly spider and woolly monkeys (29 species)
      * Parvorder [Catarrhini](/wiki/Catarrhini)
        + Superfamily [Cercopithecoidea](/wiki/Old_World_monkey)

Family [Cercopithecidae](/wiki/Old_World_monkey): Old World monkeys (138 species)

* + - * + Superfamily [Hominoidea](/wiki/Hominoidea)

Family [Hylobatidae](/wiki/Hylobatidae): gibbons or "lesser apes" (17 species)

Family [Hominidae](/wiki/Hominidae): great apes, including humans (7 species)

Order Primates was established by [Carl Linnaeus](/wiki/Carl_Linnaeus) in 1758, in the [tenth edition](/wiki/10th_edition_of_Systema_Naturae) of his book [*Systema Naturae*](/wiki/Systema_Naturae),[[14]](#cite_note-14) for the genera [*Homo*](/wiki/Homo_(genus)) (humans), [*Simia*](/wiki/Simia) (other apes and monkeys), [*Lemur*](/wiki/Lemur_(genus)) (prosimians) and [*Vespertilio*](/wiki/Vespertilio) (bats). In the first edition of the same book (1735), he had used the name [Anthropomorpha](/wiki/Anthropomorpha) for *Homo*, *Simia* and [*Bradypus*](/wiki/Bradypus) (sloths).[[15]](#cite_note-15) In 1839, [Henri Marie Ducrotay de Blainville](/wiki/Henri_Marie_Ducrotay_de_Blainville), following Linnaeus and imitating his nomenclature, established the orders [Secundates](/wiki/Secundates) (including the suborders [Chiroptera](/wiki/Bat), [Insectivora](/wiki/Insectivora) and [Carnivora](/wiki/Carnivora)), [Tertiates](/wiki/Tertiates) (or [Glires](/wiki/Glires)) and [Quaternates](/wiki/Quaternates) (including [Gravigrada](/wiki/Gravigrada), [Pachydermata](/wiki/Pachydermata) and [Ruminantia](/wiki/Ruminantia)),[[16]](#cite_note-16) but these new taxa were not accepted.

Before Anderson and Jones introduced the classification of Strepsirrhini and Haplorhini in 1984,[[17]](#cite_note-17) (followed by McKenna and Bell's 1997 work [*Classification of Mammals: Above the species level*](/wiki/Mammal_classification#McKenna/Bell_classification)),[[18]](#cite_note-18) the Primates were divided into two superfamilies: [Prosimii](/wiki/Prosimii) and [Anthropoidea](/wiki/Anthropoidea).[[19]](#cite_note-19) Prosimii included all of the [prosimians](/wiki/Prosimian): Strepsirrhini plus the [tarsiers](/wiki/Tarsier). Anthropoidea contained all of the [simians](/wiki/Simian).

## Evolutionary history[[edit](/index.php?title=(none)&action=edit&section=3)]

[Template:Cladogram](/wiki/Template:Cladogram) [Order](/wiki/Order_(biology)) Primates is part of the clade [Euarchontoglires](/wiki/Euarchontoglires), which is nested within the clade [Eutheria](/wiki/Eutheria) of Class [Mammalia](/wiki/Mammal). Recent molecular genetic research on primates, [colugos](/wiki/Colugo), and [treeshrews](/wiki/Treeshrew) has shown that the two species of colugos are more closely related to primates than to treeshrews,[[20]](#cite_note-20) even though treeshrews were at one time considered primates.[[21]](#cite_note-21) These three orders make up the [clade](/wiki/Clade) [Euarchonta](/wiki/Euarchonta). The combination of this clade with the clade [Glires](/wiki/Glires) (composed of [Rodentia](/wiki/Rodent) and [Lagomorpha](/wiki/Lagomorpha)) forms the clade Euarchontoglires. Variously, both Euarchonta and Euarchontoglires are ranked as superorders. Some scientists consider Dermoptera to be a suborder of Primates and use the suborder Euprimates for the "true" primates.[[22]](#cite_note-22)

### Evolution[[edit](/index.php?title=(none)&action=edit&section=4)]

[Template:Human timeline](/wiki/Template:Human_timeline)[Template:Life timeline](/wiki/Template:Life_timeline) [Template:Further](/wiki/Template:Further) The primate lineage is thought to go back at least 65 million years ago ([mya](/wiki/Mya_(unit))),[[23]](#cite_note-23) even though the oldest known primates from the fossil record date to the Late Paleocene of Africa ([*Altiatlasius*](/wiki/Altiatlasius))[[24]](#cite_note-24) or the Paleocene-Eocene transition in the northern continents, c. 55 mya ([*Cantius*](/wiki/Cantius), [*Donrussellia*](/wiki/Donrussellia), [*Altanius*](/wiki/Altanius), and [*Teilhardina*](/wiki/Teilhardina)).[[25]](#cite_note-25) Other studies, including molecular clock studies, have estimated the origin of the primate branch to have been in the mid-Cretaceous period, around 85 mya.[[26]](#cite_note-26)[[27]](#cite_note-27)[[28]](#cite_note-28) By modern [cladistic](/wiki/Cladistics) reckoning, the order Primates is [monophyletic](/wiki/Clade). The suborder [Strepsirrhini](/wiki/Strepsirrhini), the "[wet-nosed](/wiki/Rhinarium)" primates, is generally thought to have split off from the primitive primate line about 63 mya,[[29]](#cite_note-29) although earlier dates are also supported.[[30]](#cite_note-30) The seven strepsirrhine families are the five related [lemur](/wiki/Lemur) families and the two remaining families that include the [lorisids](/wiki/Lorisidae) and the [galagos](/wiki/Galago).[[3]](#cite_note-3)[[13]](#cite_note-13) Older classification schemes wrap [Lepilemuridae](/wiki/Sportive_lemur) into [Lemuridae](/wiki/Lemuridae) and [Galagidae](/wiki/Galago) into [Lorisidae](/wiki/Lorisidae), yielding a four-one family distribution instead of five-two as presented here.[[3]](#cite_note-3) During the [Eocene](/wiki/Eocene), most of the northern continents were dominated by two groups, the [adapiforms](/wiki/Adapiform) and the [omomyids](/wiki/Omomyid).[[31]](#cite_note-31)[[32]](#cite_note-32) The former are considered members of Strepsirrhini, but did not have a [toothcomb](/wiki/Toothcomb) like modern lemurs; recent analysis has demonstrated that [*Darwinius masillae*](/wiki/Darwinius) fits into this grouping.[[33]](#cite_note-33) The latter was closely related to tarsiers, monkeys, and apes. How these two groups relate to extant primates is unclear. Omomyids perished about 30 mya,[[32]](#cite_note-32) while adapiforms survived until about 10 mya.[[34]](#cite_note-34) According to genetic studies, the lemurs of Madagascar diverged from the lorisoids approximately 75 mya.[[30]](#cite_note-30) These studies, as well as chromosomal and molecular evidence, also show that lemurs are more closely related to each other than to other strepsirrhine primates.[[30]](#cite_note-30)[[35]](#cite_note-35) However, Madagascar split from Africa 160 mya and from India 90 mya.[[36]](#cite_note-36) To account for these facts, a founding lemur population of a few individuals is thought to have reached Madagascar from Africa via a single [rafting event](/wiki/Rafting_event) between 50 and 80 mya.[[30]](#cite_note-30)[[35]](#cite_note-35)[[36]](#cite_note-36) Other colonization options have been examined, such as multiple colonizations from Africa and India, but none are supported by the genetic and molecular evidence.[[31]](#cite_note-31)[left|thumb|](/wiki/File:Brown_Lemur_in_Andasibe.jpg)[Common brown lemur](/wiki/Common_brown_lemur), a [strepsirrhine](/wiki/Strepsirrhine) primate Until recently, the [aye-aye](/wiki/Aye-aye) has been difficult to place within Strepsirrhini.[[3]](#cite_note-3) Theories had been proposed that its family, Daubentoniidae, was either a lemuriform primate (meaning its ancestors split from the lemur line more recently than lemurs and lorises split) or a sister group to all the other strepsirrhines. In 2008, the aye-aye family was confirmed to be most closely related to the other Malagasy lemurs, likely having descended from the same ancestral population that colonized the island.[[30]](#cite_note-30) Suborder [Haplorhini](/wiki/Haplorhini), the simple-nosed or "dry-nosed" primates, is composed of two sister clades.[[3]](#cite_note-3) [Prosimian](/wiki/Prosimian) tarsiers in the family Tarsiidae (monotypic in its own infraorder Tarsiiformes), represent the most [basal](/wiki/Basal_(phylogenetics)) division, originating about 58 mya.[[37]](#cite_note-37)[[38]](#cite_note-38) The earliest known haplorhine skeleton, that of 55 MA old tarsier-like [*Archicebus*](/wiki/Archicebus), was found in central China,[[39]](#cite_note-39) supporting an already suspected Asian origin for the group.[[40]](#cite_note-40) The infraorder [Simiiformes](/wiki/Simian) (simian primates, consisting of monkeys and apes) emerged about 40 mya,[[32]](#cite_note-32) possibly also in Asia; if so, they [dispersed](/wiki/Oceanic_dispersal) across the [Tethys Sea](/wiki/Tethys_Ocean) from Asia to Africa soon afterwards.[[41]](#cite_note-41) There are two simian clades, both [parvorders](/wiki/Wikt:parvorder): [Catarrhini](/wiki/Catarrhini), which developed in Africa, consisting of [Old World monkeys](/wiki/Old_World_monkey), [humans](/wiki/Human) and the other [apes](/wiki/Ape), and Platyrrhini, which developed in South America, consisting of [New World monkeys](/wiki/New_World_monkey).[[3]](#cite_note-3) A third clade, which included the [eosimiids](/wiki/Eosimiids), developed in Asia, but became extinct millions of years ago.[[42]](#cite_note-42) As in the case of lemurs, the origin of New World monkeys is unclear. Molecular studies of concatenated nuclear sequences have yielded a widely varying estimated date of divergence between platyrrhines and catarrhines, ranging from 33 to 70 mya, while studies based on mitochondrial sequences produce a narrower range of 35 to 43 mya.[[43]](#cite_note-43) The anthropoid primates possibly traversed the Atlantic Ocean from Africa to South America during the [Eocene](/wiki/Eocene) by [island hopping](/wiki/Island_hopping), facilitated by [Atlantic Ocean ridges](/wiki/Mid-Atlantic_Ridge) and a lowered sea level.[[31]](#cite_note-31) Alternatively, a single [rafting event](/wiki/Oceanic_dispersal) may explain this transoceanic colonization. Due to [continental drift](/wiki/Continental_drift), the Atlantic Ocean was not nearly as wide at the time as it is today.[[31]](#cite_note-31) Research suggests that a small [Template:Convert](/wiki/Template:Convert) primate could have survived 13 days on a raft of vegetation.[[44]](#cite_note-44) Given estimated current and wind speeds, this would have provided enough time to make the voyage between the continents.

[200px|thumb|](/wiki/File:Tamarin_portrait_2_edit3.jpg)[Emperor tamarin](/wiki/Emperor_tamarin), a [New World monkey](/wiki/New_World_monkey) Apes and monkeys spread from Africa into Europe and Asia starting in the [Miocene](/wiki/Miocene).[[45]](#cite_note-45) Soon after, the lorises and tarsiers made the same journey. The first hominin fossils were discovered in northern Africa and date back 5–8 mya.[[32]](#cite_note-32) Old World monkeys disappeared from Europe about 1.8 mya.[[46]](#cite_note-46) Molecular and fossil studies generally show that modern humans originated in Africa 100,000–200,000 years ago.[[47]](#cite_note-47) Although primates are well studied in comparison to other animal groups, several new species have [been discovered recently](/wiki/Primates_discovered_in_the_2000s), and genetic tests have revealed previously unrecognised species in known populations. *Primate Taxonomy* listed about 350 species of primates in 2001;[[12]](#cite_note-12) the author, [Colin Groves](/wiki/Colin_Groves), increased that number to 376 for his contribution to the third edition of [*Mammal Species of the World*](/wiki/Mammal_Species_of_the_World) (MSW3).<ref name=MSW3/> However, publications since the taxonomy in MSW3 was compiled in 2003 have pushed the number to 424 species, or 658 including subspecies.<ref name=SAP/>

### Hybrids[[edit](/index.php?title=(none)&action=edit&section=5)]

Primate [hybrids](/wiki/Hybrid_(biology)) usually arise in captivity,[[48]](#cite_note-48) but there have also been examples in the wild.[[49]](#cite_note-49)[[50]](#cite_note-50) Hybridization occurs where two species' range overlap to form [hybrid zones](/wiki/Hybrid_zone); hybrids may be created by humans when animals are placed in zoos or due to environmental pressures such as predation.[[49]](#cite_note-49) Intergeneric hybridizations, hybrids of different genera, have also been found in the wild. Although they belong to genera that have been distinct for several million years, interbreeding still occurs between the [gelada](/wiki/Gelada) and the [hamadryas baboon](/wiki/Hamadryas_baboon).[[51]](#cite_note-51)

## Anatomy, physiology, and morphology[[edit](/index.php?title=(none)&action=edit&section=6)]

Primates have forward-facing eyes on the front of the skull; [binocular vision](/wiki/Binocular_vision) allows accurate distance perception, useful for the [brachiating](/wiki/Brachiation) ancestors of all great apes.[[52]](#cite_note-52) A [bony ridge](/wiki/Supraorbital_ridge) above the eye sockets reinforces weaker bones in the face, which are put under strain during chewing. [Strepsirrhines](/wiki/Strepsirrhini) have a [postorbital bar](/wiki/Postorbital_bar), a bone around the eye socket, to protect their eyes; in contrast, the higher primates, [haplorhines](/wiki/Haplorhini), have evolved fully enclosed sockets.[[53]](#cite_note-53) [thumb|Primate crania with brain masses indicated](/wiki/File:Primate_skull_series_with_legend_cropped.png) The primate skull has a large, domed [cranium](/wiki/Skull), which is particularly prominent in [anthropoids](/wiki/Simian). The cranium protects the large brain, a distinguishing characteristic of this group.[[52]](#cite_note-52) The endocranial volume (the volume within the skull) is three times greater in humans than in the greatest nonhuman primate, reflecting a larger brain size.[[54]](#cite_note-54) The mean endocranial volume is 1,201 cubic centimeters in humans, 469 cm3 in gorillas, 400 cm3 in chimpanzees and 397 cm3 in orangutans.[[54]](#cite_note-54) The primary evolutionary trend of primates has been the elaboration of the brain, in particular the [neocortex](/wiki/Neocortex) (a part of the [cerebral cortex](/wiki/Cerebral_cortex)), which is involved with [sensory perception](/wiki/Sense), generation of [motor commands](/wiki/Motor_cortex), spatial reasoning, [conscious thought](/wiki/Consciousness) and, in humans, [language](/wiki/Language).[[5]](#cite_note-5) While other mammals rely heavily on their [sense of smell](/wiki/Olfaction), the arboreal life of primates has led to a [tactile](/wiki/Somatosensory_system), [visually](/wiki/Visual_perception) dominant sensory system,[[5]](#cite_note-5) a reduction in the olfactory region of the brain and increasingly complex social behavior.[[55]](#cite_note-55) [thumb|left|upright|An 1893 drawing of the hands and feet of various primates](/wiki/File:PrimateFeet.jpg) Primates generally have five digits on each limb ([pentadactyly](/wiki/Dactyly#Pentadactyly)), with keratin [nails](/wiki/Nail_(anatomy)) on the end of each finger and toe. The bottom sides of the hands and feet have [sensitive pads](/wiki/Tactile_pad) on the [fingertips](/wiki/Distal_phalanges). Most have [opposable thumbs](/wiki/Thumb), a characteristic primate feature, though not limited to this order, ([opossums](/wiki/Opossum) and [koalas](/wiki/Koala), for example, also have them).[[52]](#cite_note-52) Thumbs allow some species to use [tools](/wiki/Tool_use_by_animals). In primates, the combination of opposing thumbs, short fingernails (rather than claws) and long, inward-closing fingers is a [relict](/wiki/Relict) of the ancestral practice of gripping branches, and has, in part, allowed some species to develop [brachiation](/wiki/Brachiation) (swinging by the arms from tree limb to tree limb) as a significant means of locomotion. Prosimians have clawlike nails on the second toe of each foot, called [toilet-claws](/wiki/Toilet-claw), which they use for grooming.[[52]](#cite_note-52) [thumb|Vervet hindfoot showing fingerprint ridges on the sole](/wiki/File:Chlorocebus_pygerythrus01.jpg) The primate [collar bone](/wiki/Clavicle) is retained as prominent element of the [pectoral girdle](/wiki/Pectoral_girdle); this allows the [shoulder joint](/wiki/Glenohumeral_joint) broad mobility.[[56]](#cite_note-56) Apes have more mobile shoulder joints and arms due to the dorsal position of the [scapula](/wiki/Scapula), broad ribcages that are flatter front-to-back, and a shorter, less mobile spine compared to Old World monkeys (with lower [vertebrae](/wiki/Vertebra) greatly reduced, resulting in tail loss in some species). Old World monkeys are unlike apes in that most have tails. New World [atelids](/wiki/Atelidae), including the [howler](/wiki/Howler_monkey), [spider](/wiki/Spider_monkey), [woolly spider](/wiki/Woolly_spider_monkey) and [woolly monkeys](/wiki/Woolly_monkey), and New World [capuchins](/wiki/Capuchin_monkey) have [prehensile tails](/wiki/Prehensile_tail).[[57]](#cite_note-57)[[58]](#cite_note-58) Male primates typically have a [pendulous penis](/wiki/Penis#Primates) and scrotal testes.[[59]](#cite_note-59)[[60]](#cite_note-60) Primates show an evolutionary trend towards a reduced [snout](/wiki/Snout).[[56]](#cite_note-56) Technically, Old World monkeys are distinguished from New World monkeys by the structure of the nose, and from apes by the [arrangement of their teeth](/wiki/Dentition).[[55]](#cite_note-55) In New World monkeys, the nostrils face sideways; in Old World monkeys, they face downwards.[[55]](#cite_note-55) Dental pattern in primates vary considerably; although some have lost most of their [incisors](/wiki/Incisor), all retain at least one lower incisor.[[55]](#cite_note-55) In most strepsirrhines, the lower incisors and canines form a [toothcomb](/wiki/Toothcomb), which is used in grooming and sometimes foraging,[[55]](#cite_note-55)[[60]](#cite_note-60) and the first lower premolar is shaped like a canine.[[60]](#cite_note-60) Old World monkeys have eight [premolars](/wiki/Premolar), compared with 12 in New World monkeys.[[55]](#cite_note-55) The Old World species are divided into apes and monkeys depending on the number of [cusps](/wiki/Cusp_(dentistry)) on their [molars](/wiki/Molar_(tooth)); apes have five, Old World monkeys have four,[[55]](#cite_note-55) although humans may have four or five.[[61]](#cite_note-61) The main hominid molar cusp ([hypocone](/wiki/Hypocone)) evolved in early primate history, while the cusp of the corresponding primitive lower molar ([paraconid](/wiki/Paraconid)) was lost. Prosimians are distinguished by their immobilized upper lips, the moist tip of their noses and forward-facing lower front teeth. [thumb|The](/wiki/Image:GarnettsGalago_CincinnatiZoo.jpg) [*tapetum lucidum*](/wiki/Tapetum_lucidum) of a [northern greater galago](/wiki/Northern_greater_galago), typical of prosimians, reflects the light of the photographers flash The [evolution of color vision in primates](/wiki/Evolution_of_color_vision_in_primates) is unique among most [eutherian](/wiki/Eutheria) [mammals](/wiki/Mammal). While the remote [vertebrate](/wiki/Vertebrate) ancestors of the primates possessed [three color vision](/wiki/Trichromacy) (trichromaticism), the [nocturnal](/wiki/Nocturnality), [warm-blooded](/wiki/Warm-blooded), mammalian ancestors lost one of three cones in the [retina](/wiki/Retina) during the [Mesozoic](/wiki/Mesozoic) era. Fish, reptiles and birds are therefore trichromatic or [tetrachromatic](/wiki/Tetrachromacy), while all mammals, with the exception of some primates and [marsupials](/wiki/Marsupial),[[62]](#cite_note-62) are dichromats or [monochromats](/wiki/Monochromacy) (totally color blind).[[60]](#cite_note-60) Nocturnal primates, such as the [night monkeys](/wiki/Night_monkey) and [bush babies](/wiki/Galago), are often monochromatic. Catarrhines are routinely trichromatic due to a [gene duplication](/wiki/Gene_duplication) of the red-green [opsin](/wiki/Opsin) gene at the base of their lineage, 30 to 40 million years ago.[[60]](#cite_note-60)[[63]](#cite_note-63) Platyrrhines, on the other hand, are trichromatic in a few cases only.[[64]](#cite_note-64) Specifically, individual females must be [heterozygous](/wiki/Zygosity#Heterozygous) for two [alleles](/wiki/Allele) of the opsin gene (red and green) located on the same [locus](/wiki/Locus_(genetics)) of the [X chromosome](/wiki/X_chromosome).[[60]](#cite_note-60) Males, therefore, can only be dichromatic, while females can be either dichromatic or trichromatic. Color vision in strepsirrhines is not as well understood; however, research indicates a range of color vision similar to that found in platyrrhines.[[60]](#cite_note-60) Like catarrhines, howler monkeys (a family of platyrrhines) show routine trichromatism that has been traced to an evolutionarily recent [gene duplication](/wiki/Gene_duplication).[[65]](#cite_note-65) Howler monkeys are one of the most specialized leaf-eaters of the New World monkeys; fruits are not a major part of their diets,[[66]](#cite_note-66) and the type of leaves they prefer to consume (young, nutritive, and digestible) are detectable only by a red-green signal. Field work exploring the dietary preferences of howler monkeys suggests that routine trichromaticism was selected by environment.[[64]](#cite_note-64)

### Sexual dimorphism[[edit](/index.php?title=(none)&action=edit&section=7)]

[Template:Main](/wiki/Template:Main) [thumb|right|Distinct sexual size dimorphism can be seen between the female and two male](/wiki/File:Hamadryas_Baboon.jpg) [hamadryas baboons](/wiki/Hamadryas_baboon). [Sexual dimorphism](/wiki/Sexual_dimorphism) is often exhibited in [simians](/wiki/Simian), though to a greater degree in Old World species (apes and some monkeys) than New World species. Recent studies involve comparing DNA to examine both the variation in the expression of the dimorphism among primates and the fundamental causes of sexual dimorphism. Primates usually have dimorphism in [body mass](/wiki/Body_weight)[[67]](#cite_note-67)[[68]](#cite_note-68) and canine tooth size[[69]](#cite_note-69)[[70]](#cite_note-70) along with [pelage](/wiki/Pelage) and skin color.[[71]](#cite_note-71) The dimorphism can be attributed to and affected by different factors, including [mating system](/wiki/Mating_system),[[72]](#cite_note-72) size,[[72]](#cite_note-72) habitat and diet.[[73]](#cite_note-73) Comparative analyses have generated a more complete understanding of the relationship between [sexual selection](/wiki/Sexual_selection), [natural selection](/wiki/Natural_selection), and mating systems in primates. Studies have shown that dimorphism is the product of changes in both male and female traits.[[74]](#cite_note-74) [Ontogenetic scaling](/wiki/Ontogenetic_scaling), where relative extension of a common growth trajectory occurs, may give some insight into the relationship between sexual dimorphism and growth patterns.[[75]](#cite_note-75) Some evidence from the fossil record suggests that there was [convergent evolution](/wiki/Convergent_evolution) of dimorphism, and some extinct [hominids](/wiki/Hominid) probably had greater dimorphism than any living primate.[[74]](#cite_note-74)

### Locomotion[[edit](/index.php?title=(none)&action=edit&section=8)]

[thumb|](/wiki/File:Diademed_ready_to_push_off.jpg)[Diademed sifaka](/wiki/Diademed_sifaka), a lemur that is a vertical clinger and leaper Primate species move by [brachiation](/wiki/Brachiation), [bipedalism](/wiki/Bipedalism), [leaping](/wiki/Jumping), arboreal and terrestrial [quadrupedalism](/wiki/Quadruped), [climbing](/wiki/Arboreal_locomotion), [knuckle-walking](/wiki/Knuckle-walking) or by a combination of these methods. Several prosimians are primarily vertical clingers and leapers. These include many [bushbabies](/wiki/Galago), all [indriids](/wiki/Indriidae) (i.e., [sifakas](/wiki/Sifaka), [avahis](/wiki/Avahi_(genus)) and [indris](/wiki/Indri)), [sportive lemurs](/wiki/Sportive_lemur), and all [tarsiers](/wiki/Tarsier).[[76]](#cite_note-76) Other prosimians are arboreal quadrupeds and climbers. Some are also terrestrial quadrupeds, while some are leapers. Most monkeys are both arboreal and terrestrial quadrupeds and climbers. [Gibbons](/wiki/Gibbon), [muriquis](/wiki/Muriqui) and [spider monkeys](/wiki/Spider_monkey) all brachiate extensively,[[46]](#cite_note-46) with gibbons sometimes doing so in remarkably acrobatic fashion. [Woolly monkeys](/wiki/Woolly_monkey) also brachiate at times.[[66]](#cite_note-66) [Orangutans](/wiki/Orangutan) use a similar form of locomotion called quadramanous climbing, in which they use their arms and legs to carry their heavy bodies through the trees.[[46]](#cite_note-46) [Chimpanzees](/wiki/Chimpanzee) and [gorillas](/wiki/Gorilla) knuckle walk,[[46]](#cite_note-46) and can move bipedally for short distances. Although numerous species, such as [australopithecines](/wiki/Australopithecine) and [early hominids](/wiki/Homo_(genus)), have exhibited fully bipedal locomotion, humans are the only extant species with this trait.[[77]](#cite_note-77)

## Behavior[[edit](/index.php?title=(none)&action=edit&section=9)]

### Social systems[[edit](/index.php?title=(none)&action=edit&section=10)]

Primates are among the most social of animals, forming pairs or family groups, uni-male harems, and multi-male/multi-female groups.[[78]](#cite_note-78) [Richard Wrangham](/wiki/Richard_Wrangham) stated that [social systems](/wiki/Social_structure) of non-human primates are best classified by the amount of movement by females occurring between groups.[[79]](#cite_note-79) He proposed four categories:

* Female transfer systems – females move away from the group in which they were born. Females of a group will not be closely related whereas males will have remained with their natal groups, and this close association may be influential in social behavior. The groups formed are generally quite small. This organization can be seen in chimpanzees, where the males, who are typically related, will cooperate in defense of the group's territory. Among New World Monkeys, [spider monkeys](/wiki/Spider_monkey) and [muriquis](/wiki/Muriqui) use this system.[[80]](#cite_note-80)[thumb|250px|right|A social huddle of ring-tailed lemurs. The two individuals on the right exposing their white ventral surface are sunning themselves.](/wiki/File:Ringstaartmakis_-_Ring-tailed_Lemur.jpg)
* Male transfer systems – while the females remain in their natal groups, the males will emigrate as adolescents. [Polygynous](/wiki/Polygyny_in_nature) and multi-male societies are classed in this category. Group sizes are usually larger. This system is common among the [ring-tailed lemur](/wiki/Ring-tailed_lemur), [capuchin monkeys](/wiki/Capuchin_monkey) and [cercopithecine monkeys](/wiki/Cercopithecinae).[[46]](#cite_note-46)\* Monogamous species – a male–female bond, sometimes accompanied by a juvenile offspring. There is shared responsibility of parental care and territorial defense. The offspring leaves the parents' territory during adolescence. [Gibbons](/wiki/Gibbon) essentially use this system, although "monogamy" in this context does not necessarily mean absolute sexual fidelity.[[81]](#cite_note-81)\* Solitary species – often males who defend territories that include the home ranges of several females. This type of organization is found in the prosimians such as the [slow loris](/wiki/Slow_loris). [Orangutans](/wiki/Orangutan) do not defend their territory but effectively have this organization.[[82]](#cite_note-82)

Other systems are known to occur as well. For example, with [howler monkeys](/wiki/Howler_monkey) both the males and females typically transfer from their natal group on reaching sexual maturity, resulting in groups in which neither the males nor females are typically related.[[66]](#cite_note-66) Some prosimians, [colobine](/wiki/Colobinae) monkeys and [callitrichid](/wiki/Callitrichinae) monkeys use this system.[[46]](#cite_note-46) The transfer of females or males from their native group is likely an adaptation for avoiding inbreeding.<ref name=Charpentier>[Template:Cite journal](/wiki/Template:Cite_journal)</ref> An analysis of breeding records of captive primate colonies representing numerous different species indicates that the infant mortality of inbred young is generally higher than that of non-inbred young.[[83]](#cite_note-83)[[84]](#cite_note-84)

### As prey[[edit](/index.php?title=(none)&action=edit&section=16)]

Predators of primates include various species of [carnivorans](/wiki/Carnivora), [birds of prey](/wiki/Birds_of_prey), [reptiles](/wiki/Reptile) and other primates. Even gorillas have been recorded as prey. Predators of primates have diverse hunting strategies and as such, primates have evolved several different [antipredator adaptations](/wiki/Antipredator_adaptation) including [crypsis](/wiki/Crypsis), [alarm calls](/wiki/Alarm_signal) and [mobbing](/wiki/Mobbing_(animal_behavior)). Several species have separate alarm calls for different predators such as air-borne or ground-dwelling predators. Predation may have shaped group size in primates as species exposed to higher predation pressures appear to live in larger groups.[[122]](#cite_note-122) With their technology and increased intelligence, modern humans are nearly free of threats from predators and are themselves [apex predators](/wiki/Apex_predators).

### Tool use and manufacture[[edit](/index.php?title=(none)&action=edit&section=17)]

[Template:Main](/wiki/Template:Main)

#### Tool use[[edit](/index.php?title=(none)&action=edit&section=18)]

[thumb|right|250px|A](/wiki/File:Gorilla_tool_use.png) [Western lowland gorilla](/wiki/Western_lowland_gorilla) using a stick possibly to gauge the depth of water [thumb|Crab-eating macaques with](/wiki/File:Macaca_fascicularis_aurea_stone_tools_-_journal.pone.0072872.g002.png) [stone tools](/wiki/Stone_tool) There are many reports of non-human primates using tools, both in the wild or when captive. The use of tools by primates is varied and includes hunting (mammals, invertebrates, fish), collecting honey, processing food (nuts, fruits, vegetables and seeds), collecting water, weapons and shelter.

In 1960, [Jane Goodall](/wiki/Jane_Goodall) observed a chimpanzee poking pieces of grass into a [termite](/wiki/Termite) mound and then raising the grass to his mouth. After he left, Goodall approached the mound and repeated the behaviour because she was unsure what the chimpanzee was doing. She found that the termites bit onto the grass with their jaws. The chimpanzee had been using the grass as a tool to “fish” or "dip" for termites.[[123]](#cite_note-123) There are more limited reports of the closely related bonobo using tools in the wild; it has been claimed they rarely use tools in the wild although they use tools as readily as chimpanzees when in captivity,[[124]](#cite_note-124) It has been reported that both female chimpanzees and bonobos use tools more avidly than males.[[125]](#cite_note-125) Orangutans in [Borneo](/wiki/Borneo) scoop catfish out of small ponds. Anthropologist Anne Russon saw several animals on these forested islands learn on their own to jab at catfish with sticks, so that the panicked prey would flop out of ponds and into the orangutan's waiting hands[[126]](#cite_note-126) There are few reports of gorillas using tools in the wild. An adult female [Western lowland gorilla](/wiki/Western_lowland_gorilla) used a branch as a walking stick apparently to test water depth and to aid her in crossing a pool of water. Another adult female used a detached trunk from a small shrub as a stabilizer during food gathering, and another used a log as a bridge.[[127]](#cite_note-127) The black-striped capuchin was the first non-ape primate for which tool use was documented in the wild; individuals were observed cracking nuts by placing them on a stone anvil and hitting them with another large stone.[[128]](#cite_note-128) In Thailand and Myanmar, [crab-eating macaques](/wiki/Crab-eating_macaque) use stone tools to open nuts, oysters and other bivalves, and various types of sea snails.[[129]](#cite_note-129) Chacma baboons use stones as weapons; stoning by these baboons is done from the rocky walls of the canyon where they sleep and retreat to when they are threatened. Stones are lifted with one hand and dropped over the side whereupon they tumble down the side of the cliff or fall directly to the canyon floor.[[130]](#cite_note-130) Although they have not been observed to use tools in the wild, lemurs in controlled settings have been shown to be capable of understanding the functional properties of the objects they had been trained to use as tools, performing as well as tool-using haplorhines.[[131]](#cite_note-131)

#### Tool manufacture[[edit](/index.php?title=(none)&action=edit&section=19)]

Tool manufacture is much rarer than simple tool use and probably represents higher cognitive functioning. Soon after her initial discovery of tool use, Goodall observed other chimpanzees picking up leafy twigs, stripping off the leaves and using the stems to fish for insects. This change of a leafy twig into a tool was a major discovery. Prior to this, scientists thought that only humans manufactured and used tools, and that this ability was what separated humans from other animals.[[123]](#cite_note-123) Both bonobos and chimpanzees have also been observed making "sponges" out of leaves and moss that suck up water and are used as grooming tools. Sumatran orangutans have been observed making and using tools. They will break off a tree branch that is about 30 cm long, snap off the twigs, fray one end and then use the stick to dig in tree holes for termites.[[132]](#cite_note-132)[[133]](#cite_note-133) In the wild, mandrills have been observed to clean their ears with modified tools. Scientists filmed a large male mandrill at [Chester Zoo](/wiki/Chester_Zoo) (UK) stripping down a twig, apparently to make it narrower, and then using the modified stick to scrape dirt from underneath its toenails.[[134]](#cite_note-134) Captive gorillas have made a variety of tools.[[135]](#cite_note-135)

## Habitat and distribution[[edit](/index.php?title=(none)&action=edit&section=20)]

[Template:See also](/wiki/Template:See_also) [thumb|upright|left|](/wiki/File:Macaque_India_3.jpg)[Rhesus macaque](/wiki/Rhesus_macaque) at [Agra Fort](/wiki/Agra_Fort), India Primates [evolved from arboreal animals](/wiki/Primate#Evolutionary_history), and many species live most of their lives in trees. Most primate species live in [tropical rain forests](/wiki/Tropical_rain_forest). The number of primate species within tropical areas has been shown to be positively [correlated](/wiki/Correlation) to the amount of rainfall and the amount of rain forest area.[[136]](#cite_note-136) Accounting for 25% to 40% of the [fruit-eating animals](/wiki/Frugivore) (by [weight](/wiki/Biomass)) within tropical rainforests, primates play an important [ecological](/wiki/Ecology) role by dispersing seeds of many tree species.[[137]](#cite_note-137) Some species are partially [terrestrial](/wiki/Terrestrial_animal), such as [baboons](/wiki/Baboon) and [patas monkeys](/wiki/Patas_monkey), and a few species are fully terrestrial, such as [geladas](/wiki/Gelada) and [humans](/wiki/Human). Non-human primates live in a diverse number of forested habitats in the tropical latitudes of Africa, India, Southeast Asia, and South America, including [rainforests](/wiki/Rainforest), [mangrove](/wiki/Mangrove) forests, and [montane forests](/wiki/Montane_forest). There are some examples of non-human primates that live outside of the tropics; the mountain-dwelling [Japanese macaque](/wiki/Japanese_macaque) lives in the north of [Honshū](/wiki/Honshū) where there is snow-cover eight months of the year; the [Barbary macaque](/wiki/Barbary_macaque) lives in the [Atlas Mountains](/wiki/Atlas_Mountains) of Algeria and Morocco. Primate habitats span a range of altitudes: the [black snub-nosed monkey](/wiki/Black_snub-nosed_monkey) has been found living in the [Hengduan Mountains](/wiki/Hengduan_Mountains) at altitudes of 4,700 meters (15,400 ft),[[138]](#cite_note-138) the [mountain gorilla](/wiki/Mountain_gorilla) can be found at 4,200 meters (13,200 ft) crossing the [Virunga Mountains](/wiki/Virunga_Mountains),[[139]](#cite_note-139) and the gelada has been found at elevations of up to [Template:Convert](/wiki/Template:Convert) in the [Ethiopian Highlands](/wiki/Ethiopian_Highlands). Although most species are generally shy of water, a few are good swimmers and are comfortable in swamps and watery areas, including the [proboscis monkey](/wiki/Proboscis_monkey), [De Brazza's monkey](/wiki/De_Brazza's_monkey) and [Allen's swamp monkey](/wiki/Allen's_swamp_monkey), which has developed small webbing between its fingers. Some primates, such as the [rhesus macaque](/wiki/Rhesus_macaque) and gray langurs, can exploit human-modified environments and even live in cities.[[86]](#cite_note-86)[[140]](#cite_note-140)[Template:Clear](/wiki/Template:Clear)

## Interactions between humans and other primates[[edit](/index.php?title=(none)&action=edit&section=21)]

[thumb|right|Slow lorises are popular in the](/wiki/File:Slow_Loris_Female.jpg) [exotic pet](/wiki/Exotic_pet) trade, which threatens wild populations. Close interactions between humans and non-human primates (NHPs) can create pathways for the transmission of [zoonotic diseases](/wiki/Zoonosis). Viruses such as [*Herpesviridae*](/wiki/Herpesviridae) (most notably [Herpes B Virus](/wiki/Herpes_B_Virus)), [*Poxviridae*](/wiki/Poxviridae), [measles](/wiki/Measles), [ebola](/wiki/Ebola), [rabies](/wiki/Rabies), the [Marburg virus](/wiki/Marburg_virus) and [viral hepatitis](/wiki/Viral_hepatitis) can be transmitted to humans; in some cases the viruses produce potentially fatal diseases in both humans and non-human primates.[[141]](#cite_note-141)

### Legal and social status[[edit](/index.php?title=(none)&action=edit&section=22)]

[Template:Further](/wiki/Template:Further) Only humans are recognized as [persons](/wiki/Person) and protected in law by the [United Nations](/wiki/United_Nations) [Universal Declaration of Human Rights](/wiki/Universal_Declaration_of_Human_Rights).[Template:Refn](/wiki/Template:Refn) The legal status of NHPs, on the other hand, is the subject of much debate, with organizations such as the [Great Ape Project](/wiki/Great_Ape_Project) (GAP) campaigning to [award at least some of them legal rights](/wiki/Great_ape_personhood).[[142]](#cite_note-142) In June 2008, Spain became the first country in the world to recognize the rights of some NHPs, when its parliament's cross-party environmental committee urged the country to comply with GAP's recommendations, which are that chimpanzees, bonobos, orangutans, and gorillas are not be used for animal experiments.[[143]](#cite_note-143)[[144]](#cite_note-144) [thumb|upright|](/wiki/File:Cebus_albifrons_edit.jpg)[Capuchin monkeys'](/wiki/Capuchin_monkeys) manual dexterity is one reason they can assist [quadriplegic](/wiki/Quadriplegic) humans. Many species of NHP are kept as pets by humans, the Allied Effort to Save Other Primates (AESOP) estimates that around 15,000 NHPs live as exotic pets in the United States.[[145]](#cite_note-145) The expanding Chinese middle class has increased demand for NHPs as exotic pets in recent years.[[146]](#cite_note-146) Although NHP import for the pet trade was banned in the U.S. in 1975, smuggling still occurs along the [United States – Mexico border](/wiki/United_States_–_Mexico_border), with prices ranging from [US$](/wiki/United_States_dollar)3000 for monkeys to $30,000 for apes.[[147]](#cite_note-147) Primates are used as [model organisms](/wiki/Model_organism) in laboratories and have been used in [space missions](/wiki/Monkeys_in_space).[[148]](#cite_note-148) They serve as [service animals](/wiki/Service_animal) for disabled humans. [Capuchin monkeys](/wiki/Capuchin_monkey) can be [trained](/wiki/Monkey_helper) to assist [quadriplegic](/wiki/Quadriplegic) humans; their intelligence, memory, and manual dexterity make them ideal helpers.[[149]](#cite_note-149) NHPs are kept in [zoos](/wiki/Zoo) around the globe. Historically, zoos were primarily a form of entertainment, but more recently have shifted their focus towards conservation, education and research. GAP does not insist that all NHPs should be released from zoos, primarily because captive-born primates lack the knowledge and experience to survive in the wild if released.[[150]](#cite_note-150)

### Role in scientific research[[edit](/index.php?title=(none)&action=edit&section=23)]

[Template:Further](/wiki/Template:Further) Thousands of non-human primates are used around the world in research because of their psychological and physiological similarity to humans.[[151]](#cite_note-151)[[152]](#cite_note-152) In particular, the brains and eyes of NHPs more closely parallel human anatomy than those of any other animals. NHPs are commonly used in [preclinical trials](/wiki/Clinical_trial#Pre-clinical_studies), [neuroscience](/wiki/Neuroscience), [ophthalmology](/wiki/Ophthalmology) studies, and toxicity studies. [Rhesus macaques](/wiki/Rhesus_macaque) are often used, as are other [macaques](/wiki/Macaque), African [green monkeys](/wiki/Chlorocebus), [chimpanzees](/wiki/Chimpanzee), [baboons](/wiki/Baboon), [squirrel monkeys](/wiki/Squirrel_monkey), and [marmosets](/wiki/Marmoset), both wild-caught and purpose-bred.[[151]](#cite_note-151)[[153]](#cite_note-153) In 2005, GAP reported that 1,280 of the 3,100 NHPs living in captivity in the United States were used for experiments.[[142]](#cite_note-142) In 2004, the [European Union](/wiki/European_Union) used around 10,000 NHPs in such experiments; in 2005 in Great Britain, 4,652 experiments were conducted on 3,115 NHPs.[[154]](#cite_note-154) Governments of many nations have strict care requirements of NHPs kept in captivity. In the US, federal guidelines extensively regulate aspects of NHP housing, feeding, enrichment, and breeding.<ref name=usda\_nhpresearch>[Template:Cite web](/wiki/Template:Cite_web)</ref> European groups such as the [European Coalition to End Animal Experiments](/wiki/European_Coalition_to_End_Animal_Experiments) are seeking a ban on all NHP use in experiments as part of the European Union's review of animal testing legislation.[[155]](#cite_note-155)

### Conservation[[edit](/index.php?title=(none)&action=edit&section=24)]

[thumb|right|Humans are known to hunt other primates for food, so-called](/wiki/File:Hunted_Silky_Sifakas.jpg) [bushmeat](/wiki/Bushmeat). Pictured are two men who have killed a number of [silky sifaka](/wiki/Silky_sifaka) and [white-headed brown](/wiki/White-headed_lemur) lemurs. The [International Union for Conservation of Nature](/wiki/International_Union_for_Conservation_of_Nature) (IUCN) lists more than a third of primates as critically endangered or vulnerable. Trade is regulated, as all species are listed by [CITES](/wiki/CITES) in [Appendix II](/wiki/CITES#Appendix_II), except 50 species and subspecies listed in [Appendix I](/wiki/CITES#Appendix_I), which gain full protection from trade.[[156]](#cite_note-156)[[157]](#cite_note-157) Common threats to primate species include [deforestation](/wiki/Deforestation), [forest fragmentation](/wiki/Forest_fragmentation), [monkey drives](/wiki/Monkey_drive) (resulting from primate crop raiding),[[158]](#cite_note-158) and primate hunting for use in medicines, as pets, and for food. Large-scale tropical forest clearing is widely regarded as the process that most threatens primates.[[159]](#cite_note-159)[[160]](#cite_note-160)[[161]](#cite_note-161) More than 90% of primate species occur in tropical forests.[[160]](#cite_note-160)[[162]](#cite_note-162) The main cause of forest loss is clearing for agriculture, although commercial logging, [subsistence](/wiki/Subsistence_agriculture) harvesting of timber, mining, and dam construction also contribute to tropical forest destruction.[[162]](#cite_note-162) In Indonesia large areas of lowland forest have been cleared to increase [palm oil](/wiki/Palm_oil) production, and one analysis of satellite imagery concluded that during 1998 and 1999 there was a loss of 1,000 [Sumatran orangutans](/wiki/Sumatran_orangutan) per year in the [Leuser Ecosystem](/wiki/Leuser_Ecosystem) alone.[[163]](#cite_note-163)[thumb|left|The](/wiki/File:Man_of_the_woods.JPG) [critically endangered](/wiki/Critically_endangered) [Sumatran orangutan](/wiki/Sumatran_orangutan)

Primates with a large body size (over 5 kg) are at increased extinction risk due to their greater profitability to [poachers](/wiki/Poaching) compared to smaller primates.[[162]](#cite_note-162) They reach sexual maturity later and have a longer period between births. Populations therefore recover more slowly after being depleted by poaching or the pet trade.[[164]](#cite_note-164) Data for some African cities show that half of all protein consumed in urban areas comes from the [bushmeat](/wiki/Bushmeat) trade.[[165]](#cite_note-165) Endangered primates such as [guenons](/wiki/Guenon) and the [drill](/wiki/Drill_(mammal)) are hunted at levels that far exceed sustainable levels.[[165]](#cite_note-165) This is due to their large body size, ease of transport and profitability per animal.[[165]](#cite_note-165) As farming encroaches on forest habitats, primates feed on the crops, causing the farmers large economic losses.[[166]](#cite_note-166) Primate crop raiding gives locals a negative impression of primates, hindering conservation efforts.[[167]](#cite_note-167) [Madagascar](/wiki/Madagascar), home to five endemic primate families, has experienced the greatest extinction of the recent past; since human settlement 1,500 years ago, at least eight classes and fifteen of the larger species have become extinct due to hunting and habitat destruction.[[5]](#cite_note-5) Among the primates wiped out were [*Archaeoindris*](/wiki/Archaeoindris) (a lemur larger than a silverback gorilla) and the families [Palaeopropithecidae](/wiki/Palaeopropithecidae) and [Archaeolemuridae](/wiki/Archaeolemuridae).[[5]](#cite_note-5) In Asia, Hinduism, Buddhism, and Islam prohibit eating primate meat; however, primates are still hunted for food.[[162]](#cite_note-162) Some smaller traditional religions allow the consumption of primate meat.[[168]](#cite_note-168)[[169]](#cite_note-169) The pet trade and traditional medicine also increase demand for illegal hunting.[[146]](#cite_note-146)[[170]](#cite_note-170)[[171]](#cite_note-171) The [rhesus macaque](/wiki/Rhesus_macaque), a [model organism](/wiki/Model_organism), was protected after excessive trapping threatened its numbers in the 1960s; the program was so effective that they are now viewed as a pest throughout their range.[[161]](#cite_note-161)[thumb|The critically endangered silky sifaka](/wiki/File:Silky_Sifaka_Pink_Face_Closeup.JPG) In Central and South America forest fragmentation and hunting are the two main problems for primates. Large tracts of forest are now rare in Central America.[[159]](#cite_note-159)[[172]](#cite_note-172) This increases the amount of forest vulnerable to [edge effects](/wiki/Edge_effect) such as farmland encroachment, lower levels of humidity and a change in plant life.[[173]](#cite_note-173)[[174]](#cite_note-174) Movement restriction results in a greater amount of inbreeding, which can cause deleterious effects leading to a [population bottleneck](/wiki/Population_bottleneck), whereby a significant percentage of the population is lost.[[175]](#cite_note-175)[[176]](#cite_note-176) There are 21 critically endangered primates, 7 of which have remained on the IUCN's "[The World's 25 Most Endangered Primates](/wiki/The_World's_25_Most_Endangered_Primates)" list since the year 2000: the [silky sifaka](/wiki/Silky_sifaka), [Delacour's langur](/wiki/Delacour's_langur), the [white-headed langur](/wiki/White-headed_langur), the [gray-shanked douc](/wiki/Gray-shanked_douc), the [Tonkin snub-nosed monkey](/wiki/Tonkin_snub-nosed_monkey), the [Cross River gorilla](/wiki/Cross_River_gorilla) and the [Sumatran orangutan](/wiki/Sumatran_orangutan).[[177]](#cite_note-177) [Miss Waldron's red colobus](/wiki/Miss_Waldron's_red_colobus) was recently declared extinct when no trace of the subspecies could be found from 1993 to 1999.[[178]](#cite_note-178) A few hunters have found and killed individuals since then, but the subspecies' prospects remain bleak.[[179]](#cite_note-179)

## See also[[edit](/index.php?title=(none)&action=edit&section=25)]

[Template:Div col](/wiki/Template:Div_col)

* [Arboreal theory](/wiki/Arboreal_theory)
* [Human evolution](/wiki/Human_evolution)
* [List of primates](/wiki/List_of_primates)
* [List of fossil primates](/wiki/List_of_fossil_primates)
* [Nest-building in primates](/wiki/Nest-building_in_primates)
* [Primatology](/wiki/Primatology)
* [Simian shelf](/wiki/Simian_shelf)

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## Footnotes[[edit](/index.php?title=(none)&action=edit&section=26)]

[Template:Reflist](/wiki/Template:Reflist)

## References[[edit](/index.php?title=(none)&action=edit&section=27)]

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### Literature cited[[edit](/index.php?title=(none)&action=edit&section=28)]

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## Further reading[[edit](/index.php?title=(none)&action=edit&section=29)]

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* [Template:Cite book](/wiki/Template:Cite_book)

## External links[[edit](/index.php?title=(none)&action=edit&section=30)]

[Template:Commons](/wiki/Template:Commons) [Template:Wikispecies](/wiki/Template:Wikispecies)

* [Primate Info Net](http://pin.primate.wisc.edu)
* [Primates](http://animaldiversity.ummz.umich.edu/site/accounts/information/Primates.html) at [Animal Diversity Web](/wiki/Animal_Diversity_Web)
* [Primate Research Institute](http://www.pri.kyoto-u.ac.jp/), [Kyoto University](/wiki/Kyoto_University)
* [High-Resolution Cytoarchitectural Primate Brain Atlases](http://primate-brain.org)
* [EUPRIM-Net: European Primate Network](http://www.euprim-net.eu)
* [PrimateImages: Natural History Collection](http://digital.library.wisc.edu/1711.dl/PCLNatHist)
* [Tree of Life web project](http://tolweb.org/Primates/15963)

[Template:Mammals](/wiki/Template:Mammals) [Template:Primates](/wiki/Template:Primates) [Template:Featured article](/wiki/Template:Featured_article) [Template:Authority control](/wiki/Template:Authority_control) [Template:Portal bar](/wiki/Template:Portal_bar)

[Category:Primates](/wiki/Category:Primates) [Category:Thanetian first appearances](/wiki/Category:Thanetian_first_appearances) [Category:Taxa named by Carl Linnaeus](/wiki/Category:Taxa_named_by_Carl_Linnaeus)