Monkey

An adaptive or evolutionary grade among the primates, represented by members of two of the three modern anthropoid superfamilies. The New World, platyrrhine monkeys (Ateloidea) and Old World, catarrhine forms (Cercopithecoidea) probably reached a monkey level of adaptation independently some time after their separation from a common ancestor, perhaps 45 million years ago (Ma; **Fig. 1**). The term monkey is not indicative of taxonomic or phylogenetic relationship: the closest relatives of the cercopithecoids are not the ateloid monkeys but the Old World apes and humans.

The Ateloidea comprise two families, while the living Cercopithecoidea are today considered to comprise only one family, with two subfamilies. A modern classification of the Anthropoidea follows:

Hyporder Anthropoidea
- Infraorder Platyrrhini
  - Superfamily Ateloidea (New World or platyrrhine monkeys)
    - Family Atelidae
      - Subfamily Atelinae (howler and spider monkeys)
      - Subfamily Pitheciinae (saki, owl, and titi monkeys)
    - Family Cebidae
      - Subfamily Cebinae (capuchin and squirrel monkeys)
      - Subfamily Callitrichinae (marmosets and tamarins)
      - Subfamily Branisellinae (extinct early ateloids)
- Infraorder Catarrhini (Old World anthropoids)
  - Parvorder Eucatarrhini (modern catarrhines)
    - Superfamily Hominoidea (gibbons, great apes, and humans)
    - Superfamily Cercopithecoidea
      - Family Cercopithecidae (Old World or catarrhine monkeys)
        - Subfamily Cercopithecinae (cheek-pouched monkeys: macaques, baboons, guenons, and mangabeys)
        - Subfamily Colobinae (leaf eaters: langurs and colobus)
        - Subfamily Victoriapithecinae (extinct early cercopithecids)
  - Parvorder Eocatarrhini (archaic catarrhines)
    - Family Pliopithecidae (later archaic catarrhines)
    - Family Propliopithecidae (early archaic catarrhines)
- Infraorder Paracatarrhini (extinct early anthropoids)
  - Family Parapithecidae (extinct Egyptian monkeys)
  - Family Oligopithecidae (extinct archaic anthropoids)

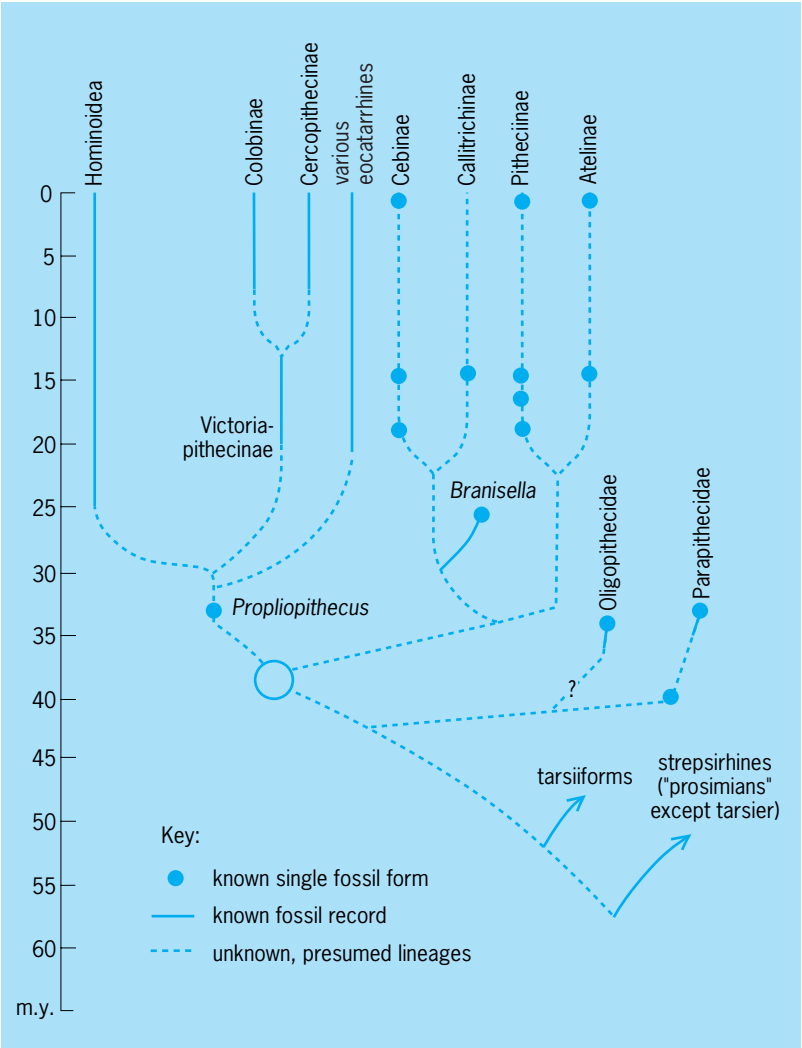

Fig. 1. Evolutionary relationships of monkeys among the primates.

Monkeys are hard to characterize as a group because of their great diversity, and because much of the discussion reflects a comparison with the apes. Both monkeys and apes contrast with the prosimian grade in that they are typically large, diurnal animals that live in social groups. Monkeys differ from apes in their possession of a tail, a smaller brain, quadrupedal pronograde posture, and a usually longer face (**Fig. 2**). They are generally smaller than apes, but large monkeys outweigh gibbons. Like almost all primates, monkeys are pentadactyl (**Fig. 3**), with nails rather than claws on the digits in most cases. They have pectoral mammary glands and well-developed vision. Monkeys are primarily vegetarian and inhabit forested tropical or subtropical regions of Africa, Asia, and South America. The differences between the New and Old World monkeys are summarized in the **table**.

Origins. The origin of the anthropoid or higher primates is still under debate in terms of the source group, area, and timing. The tarsier (*Tarsius*) is probably the living primate sharing the most recent common ancestry with anthropoids, and the tarsierlike

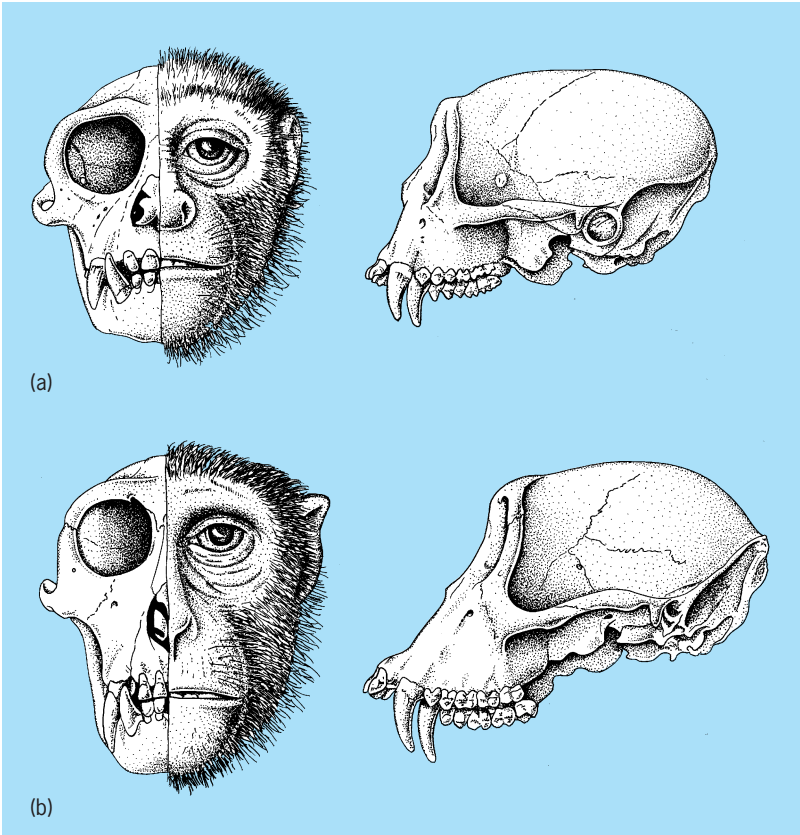

Fig. 2. Side and front views of the heads and skulls of adult male monkeys: (*a*) *Cebus* (New World) and (*b*) *Macaca* (Old World). (*After A. H. Schultz, The Life of Primates, Universe Books, 1969*)

extinct Omomyidae is accepted as a likely ancestral stock. The omomyids are known in all northern continents, especially between 55 and 35 Ma. At that time, South America and Africa were much closer, and the ancestors of New World monkeys may have traveled there from Africa on natural vegetation rafts, following paleocurrents across a 600-mi (1000-km) ocean gap. However, this has seemed unlikely to some researchers, both because such rafted small primates would probably die of thirst or exposure and because known African fossils were not reasonable ancestors. Instead, it was hypothesized that anthropoid origins are from omomyids in North America or eastern Asia, regions that were connected during the Eocene (50–40 Ma, at least) by a Bering land bridge. Early anthropoids might then have entered South America from Central America or the Caribbean by crossing narrow water gaps on rafts or by island hopping. New finds of protoanthropoid primates in northern Africa have reenergized the transatlantic hypothesis, and both views are now strongly supported.

In China and Burma, several fossil sites 45–40 million years old have yielded the remains of primates claimed to be protoanthropoids, but these are better interpreted as early strepsirhines or tarsier relatives. Others are known from North African localities dated about 55–40 Ma. Most of these, again, are either strepsirhines or tarsiiforms. Some authors have suggested that one or more of these newly recovered fossils represent a previously unknown group of early primates (unrelated to the omomyids) which gave rise directly to the anthropoids, while others consider them to be omomyid offshoots. Whichever hypothesis is supported, it is generally agreed that the most complete remains of early anthropoids are known from the Fayum area of northern Egypt.

In this region, three groups of fossil anthropoids have been found. The Parapithecidae (about 35–33 Ma) are monkeylike in adaptation and may be considered a third type of monkey that is not closely related to either living group. They have been suggested as being ancestral to Cercopithecoidea but are specialized in their own ways while lacking the different specializations of the cercopithecoids (or the ateloids; see table). For example, some parapithecid species had complex teeth with extra cusps,

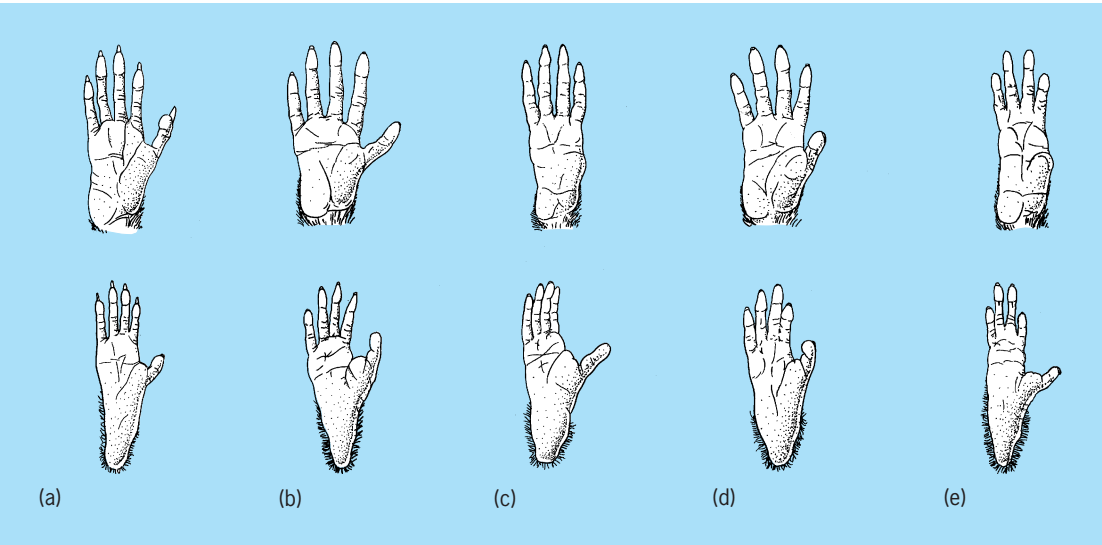

Fig. 3. Right feet (below) and hands (above) of (*a*) *Saguinus*, (*b*) *Cebus*, (*c*) *Ateles*, (*d*) *Macaca*, and (*e*) *Colobus*. (*After A. H. Schultz, The Life of Primates, Universe Books, 1969*)

Major contrasts between New and Old World monkeys and special features of each

Ateloidea (New World species)	Cercopithecoidea (Old World species)
Nose platyrrhine (nasal septum wide, nostrils open to sides)	Nose catarrhine (septum narrow, nostrills open downward)
Tail long, prehensile only in atelines and *Cebus*	Tail short to long, nonprehensile
3 premolar teeth in each quadrant	2 premolars in each quadrant
24 deciduous, 36 permanent teeth (4 fewer in Callitrichinae), I 2/2 C 1/1 P 3/3 M 3/3/(M 2/2 in Callitrichinae)	20 deciduous, 32 permanent teeth, I 2/2 C 1/1 P 2/2 M 3/3
	Ischial callosities present
Jaws and teeth lightly built in Cebidae; more robust in Atelidae, with deep lower jaw	Cheek pouches in Cercopithecinae
	Sacculated stomach in Colobinae
Fingers and toes with curved nails (clawlike in Callitrichinae)	All nails tend to be flattened
Big toe opposable, thumb not fully so and sometimes reduced in Cebidae	Thumb and big toe opposable, thumb reduced in colobinae

while one had no lower incisor (front) teeth. Probably, they occupied ecological niches later exploited by cercopithecoids, but became extinct without descendants. Previously, it was thought that they represented the earliest known catarrhines, but it now seems more likely that they were part of a radiation of "primitive" anthropoids which preceded the split between catarrhines and platyrrhines. It appears that a number of isolated teeth belonging to early parapithecids have been recovered from the 42-million-year-old site of Glib Zegdou, Algeria, which would make them the oldest recognized anthropoids.

Another group of Fayum primates which may belong to the same paracatarrhine radiation is the oligopithecids. Occurrence of these forms ranged from around 36 to 34 Ma, and recently several partial damaged skulls have been recovered. They do not seem to have been monkeylike in adaptation and are really on the border of being anthropoids. Their teeth and lower jaw were conservative, but their skull presents the important anthropoid features of fusion in the middle of the frontal bone (forehead) and complete closure of the back of the orbit (eye socket). It is interesting that the oligopithecids are far more "primitive" than the contemporaneous (and even much older) parapithecids, suggesting that an as yet unknown species of oligopithecid must have lived even earlier than the first parapithecids, perhaps about 45 Ma.

The third group of Fayum primates is the Propliopithecidae (34–33 Ma). These species are monkeylike but also in some ways almost apelike; they may well have been close to the common ancestors of cercopithecoid monkeys and hominoids (apes and humans).

Old World species. These animals are found throughout all the warmer regions of the Eastern Hemisphere, except Australia and Madagascar. Many of the familiar monkeys are included in this family, such as the rhesus macaque, Barbary "ape," mangabey, baboon, and mandrill. The earliest known representatives of the Cercopithecidae, *Prohylobates* and *Victoriapithecus*, are from the early Miocene in north and east Africa, some 15–20 Ma. They probably diverged from their apelike relatives by adapting to a more folivorous (leaf-eating) diet, involving reshaping of the dental chewing surfaces. By the late Miocene, some 10 Ma, colobines (*Mesopithecus*) were present in Europe, where one line (*Dolichopithecus*) became highly terrestrial before dying out at the beginning of the Pleistocene. Colobines probably entered Asia in the later Miocene as well, and many fossil forms are known in the African Plio-Pleistocene. Members of this subfamily are primarily arboreal leaf eaters and have sharp teeth and specialized stomachs like ruminants to process difficult-to-digest leaf protein. The dispersal of the cercopithecines may have been somewhat later, with the oldest macaquelike forms appearing in North Africa about 7 Ma, whence they spread to Europe and Asia before 5 Ma. In sub-Saharan Africa, probable ancestors of the baboons and mangabeys (the extinct *Parapapio*) are present from the Pliocene, and early geladas were widespread in the Pliocene and Pleistocene. The *Cercopithecus* group probably separated from the macaques and baboons in the late Miocene and entered the high forest, but fossils are very rare. All cercopithecines have cheek pouches for temporary food storage, and many are terrestrial.

Macaques. About 12 species of the genus *Macaca* are known as macaques, and with the exception of *M. sylvanus*, the Barbary ape, all are found in southern Asia. The Barbary ape, so called because it lacks an external tail like true apes, occurs in the wild in Algeria and Morocco, and is the only monkey now found in Europe, where it was introduced to Gibraltar. It is thought to be the remains of a population that originally extended from Britain to the Caucasus and north Africa, and from there to southwestern Asia. *Macaca sylvanus* is a large, robust, and rather terrestrial species with a thick coat that protects it from low temperatures in its natural habitat, where it roams through cedar forests and mountain gorges in large troops. Its diet consists of fruit, leaves, and other vegetation, in addition to small invertebrates such as insects; in fact, this diet is typical of most cercopithecine monkeys. Because these animals raid farm areas and beg for food, they have become a nuisance on Gibraltar. Their gestation period is about 30 weeks, with a single young born almost annually, as in most monkeys. The adult male stands over 2 ft (66 cm) and weighs a maximum of 40 lb (18 kg).

Macaca mulatta is the rhesus monkey, which is found throughout southern continental Asia. Large numbers were previously exported from India each year for medical research, but restrictions have been adopted to protect the species. These monkeys have

been used in studies on the effects of space travel and in the development of polio vaccine. The rhesus, or Rh, blood group was so named because the antigen was first found in the red blood cells of rhesus macaques.

The rhesus is an agile, gregarious species with a short tail, robust limbs of almost equal length, and a stocky build. It is considered sacred in some parts of the Indian subcontinent and thus has become a scavenger in towns and cities, as well as living in larger troops in its natural forested habitat. Troops of 15 to 40 are led by an older, experienced male who is dominant to the others in terms of access to food, mates, and living space. These animals do not defend a true territory, but groups generally avoid each other. Macaques have large cheek pouches, which they fill with food. They then wander about eating directly, and when danger approaches, they scatter to the nearest place of safety with a ready supply of food. The adult male is about 2 ft (66 cm) high; he is sexually mature at 4 years and full grown at 5, with a maximum lifespan of about 20 years. Mating is promiscuous within a troop, with the dominant male probably siring most offspring. The gestation period is about 23 weeks. On average, males weigh 18 lb (8 kg) and females 11 lb (5 kg).

The natural history of some of the other species of macaques is less well known, although studies are proliferating. Some live at high altitudes, and one (the Japanese *M. fuscata*) roams in winter snows. The lion-tailed macaque (*M. silenus*) of southern India is one of the least well known and least typical of the group, being a shy animal that inhabits dense forests. The stump-tailed macaque (*M. arctoides*) is found at high altitudes from Assam to southeastern China. It has long fur, and the naked face is brightly colored, so it is also known as the red-faced monkey.

Mandrills and baboons. These are terrestrial animals with long canines in the males, a long muzzle with terminal nostrils, and a great disparity in size between the sexes. Mandrills (*Mandrillus sphinx*) are found on the forest floor of west-central Africa. The males have brightly colored red and blue facial markings for recognition by subordinate troop members (**Fig. 4**). In both sexes, the body is robust, the legs stout, and the tail short. Males weigh up to 77–88 lb (35–40 kg), making them the heaviest of all monkeys. The closely related drill (*M. leucophaeus*) is smaller and less brightly colored than the mandrill but otherwise quite similar. Troop size varies from a dozen (with one adult male) to over 100.

Typical or "savannah" baboons of the genus *Papio* include five or six subspecies of a single species, *P. hamadryas*. They were previously thought to represent separate local species, but studies of contact zones have revealed significant interbreeding and hybridization. As full species are defined to be reproductively isolated, the baboon groups are now usually considered only subspecies. *Papio h. hamadryas* inhabits coastal Arabia and Ethiopia, while *P. h. cynocephalus* and its relatives extend from Guinea to Ethiopia to South Africa, in an

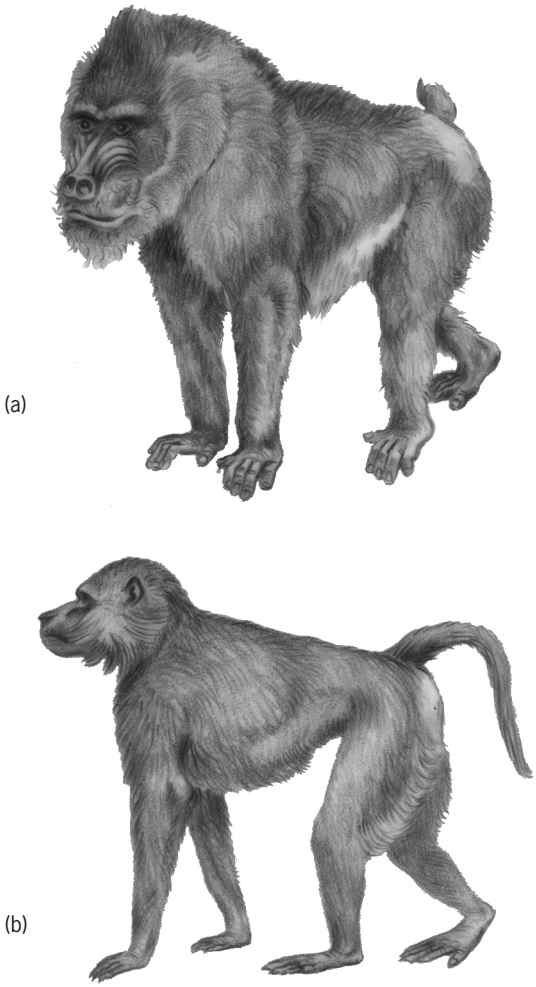

Fig. 4. Two large Old World cercopithecoid monkeys. (*a*) Mandrill. (*b*) Baboon.

L-shaped belt of savannah and open woodland. The body and limbs are more slender than the mandrill's (Fig. 4*b*), but the size is similar. Troops are often led by a coalition (central hierarchy) of high-ranking males and contain 30 to 200 members of all ages. In some varieties, especially the hamadryas, large troops sleep together but divide during the day into one-male "harems" of 4 to 14 animals for feeding. Other varieties of social organization may depend on local environmental conditions. Another form, commonly called the gelada baboon, is *Theropithecus*, a very distinctive genus, whose fossil record goes back to about 4 Ma. Today, it is restricted to the Ethiopian highlands, where it lives in one-male groups on rocky gorges. It eats mostly grasses.

Mangabeys. There are four species of this group, all in central Africa. Two sets of species are recognized, the *torquatus* and *albigena* groups, which were long placed in the single genus *Cercocebus*. One feature which linked them to each other is the presence of deep depressions or fossae in the bone below the orbit. Recent studies of molecular biology as well as limb bones and teeth have argued that these two groups are not, in fact, each other's closest

relatives, and suggested that they be placed in separate genera. *Lophocebus albigena* and relatives are almost entirely arboreal, with long tails and long fore- and hindlimbs that make them excellent climbers. They are thought to be evolutionarily linked to the baboons and geladas. *Cercocebus torquatus* and relatives may be more terrestrial, using their strong forelimbs to search through leaf litter, much as do their putative relatives, the mandrills. Both groups of mangabeys are shy animals that live in troops with one or several male leaders and are frugivorous to omnivorous. It is not yet clear whether the suborbital fossae found in mangabeys were evolved independently or inherited from a common ancestor whose other cercopithecine decendants lost this feature.

Guenons. These are the dozen or so species of monkey in the genus *Cercopithecus*. The vervet (*C. aethiops*) is one of the most common of all primates in Africa, where it is widely distributed throughout the grasslands, being equally at home on the ground and in trees. Its yellow-brown fur often has a greenish tinge, and the males engage in a "red, white, and blue" display of the perineal region. The mona monkey (*C. mona*) is typical of guenons found in the forested areas of west and central Africa. Several species may inhabit a single type of tree, avoiding competition by vertical spacing and slightly different diets, including fruits, some leaves and insects, as well as tree snails. These more arboreal guenons hardly ever come to the ground; they are agile climbers and leap between treetops. Most groups appear to be of the harem variety, with additional males peripheralized. The closely related patas monkey (*Erythrocebus*) is a highly terrestrial parallel to baboons. The little-known Congo forest form *Allenopithecus* (the swamp monkey) is in some ways a link between the *Cercopithecus* and the baboon-macaque groups.

Langurs. These animals are slender, long-tailed members of the subfamily Colobinae, which are found in forested areas of southern Asia and Indonesia. They may live in large troops or small ones with a single male leader. Two genera of "typical" langurs are now recognized: *Presbytis* for the smaller, mainly island species, and *Semnopithecus* (including *Trachypithecus*) for the larger, mostly mainland forms. Seven species of *Presbytis* occupy peninsular Malaysia, Sumatra, Borneo, eastern Java, and many smaller islands such as the Mentawais. They are excellent leapers and show little size difference between the sexes. *Semnopithecus* species range from Sri Lanka and India into China, through Malaysia and onto Sumatra, Java, Borneo, and some other Indonesian islands. They tend to leap less and are more quadrupedal, with moderate to strong sexual size dimorphism. Eight to ten of these species are placed in the subgenus *Trachypithecus*, while the subgenus *Semnopithecus* includes only the Indian langur, *S. entellus.* This is probably the best-known species of the group and the most terrestrial of living colobines. It superficially resembles the spider monkey, but of course lacks the prehensile tail. The entellus langurs are common in India up to altitudes of 13,000 ft (4000 m) and are considered sacred by Hindus. It has been observed that males of *P. entellus* and other langurs may kill infants in a troop when ousting a previous leader male. The "adaptive" versus "aberrant" nature of this pattern is debated.

An unusual Asian colobine is the proboscis monkey, *Nasalis larvatus*, found only in Borneo. This is a powerfully built animal that stands about 2.5 ft (83 cm) tall; a large male may weigh up to 52 lb (23.5 kg). The unusual nose, which may function as a resonating chamber during male calling, is a swollen pendant structure up to 3 in. (7.6 cm) long that, at rest, hangs down over the mouth. These animals live in troops of about 20, feeding on mangroves and palm leaves. They are expert swimmers and have been observed far out to sea. Other related species have upturned noses, such as *N.* (*Simias*) *concolor* of the Mentawai Islands and *Pygathrix* (*Rhinopithecus*) *roxellana*, the snub-nosed monkey, which is an inhabitant of Tibet and south China and may spend a large part of its life in regions of perpetual snow. The douc langur, *Pygathrix nemaeus* of Indochina, is in some ways intermediate between the snub-nose and species of *Presbytis*.

Colobus. In Africa the Colobinae is represented by two genera, one of which has two marked subgenera. All are forest-dwelling leaf eaters with rudimentary thumbs (those of the Asian colobines are short but present). The black-and-white *Colobus* has five species, including *C. polykomos* and *C. guereza*, which have long been hunted for their magnificent pelts. They live in troops of 5–15 with a single male leader and defend a small territory. The genus *Procolobus* includes the so-called red and olive colobus monkeys. *Procolobus* (*Piliocolobus*) *badius*, the red colobus, does not exhibit territorial behavior but lives in multimale groups of 20–50 in a larger home range and has more varied dietary preferences. All these forms range across equatorial Africa. Less is known of the much smaller olive colobus, *P. verus*, restricted to west Africa.

New World species. The New World monkeys or ateloids occupy forested areas from southern Mexico to Argentina. They are divided into two main groups, or families (their major characteristics are given in the table). All are arboreal, including a few with prehensile tails; there is no living form, nor any evidence of a fossil form, that has come to the ground habitually. The fossil record of platyrrhines is sparse but documents early diversification of the main lineages, as opposed to the successive replacements seen among catarrhines. The oldest known ceboid, *Branisella*, dates back 26 million years and may be related to the Cebidae. A cebine, apparently close to squirrel monkey ancestry (*Dolichocebus*), and pitheciines related to owl monkeys (*Tremacebus*) and titis (*Homunculus*) inhabited southern Argentina between 17 and 20 Ma. *Chilecebus* was found in 20-million-year-old deposits in northern Chile and may be a relative of *Dolichocebus*. In Colombia, 13-million-year-old deposits at La Venta

have yielded forms very close to the living night, squirrel, saki, spider, and howler monkeys and to marmosets. Brazilian cave deposits dated between 100,000 and 10,000 years ago yielded fossils of two large ateline species in the 1990s. Two or three distinctive genera also inhabited the islands of Jamaica, Cuba, and Hispaniola during the past 10,000 years.

The marmosets were previously thought to be very primitive forms (with claws rather than nails and simple teeth) uniquely separate from all other ceboids. However, research has shown them to be specialized sap feeders, with secondarily evolved clawlike nails and reduced dentition. They share common ancestry with the cebines, which has resulted in the classification of Cebidae and Atelidae as employed here.

Marmosets. The subfamily Callitrichinae consists of a number of small-sized species of four or five genera. Most eat insects and fruits, and live in family, or pair-bonded, groups of male, female, and offspring. Births may occur twice a year, and twins are common, so that up to eight young may be born in the 2 years the offspring spend with their parents. Both sexes share equally in the care of the young, the male especially carrying them when traveling. Several forms, particularly the brightly colored golden lion marmoset (*Leontopithecus rosalia*), are severely endangered species.

Capuchins. The family name of the Cebidae comes from the capuchin monkey, *Cebus*, which lives in forested areas from Honduras to Argentina in troops of up to 30 individuals (**Fig. 5**). Capuchins are extremely agile leapers and runners in their arboreal habitat. They are omnivorous, feeding on small birds, insects, grubs, leaves, and fruits, and often raid plantations for fruit and grain. Studied in captivity, they have been observed to use simple tools, make drawings, and paint. They have a partly prehensile tail, but it is rather different from that of the atelids.

The squirrel monkeys, *Saimiri*, are close relatives and some of the most widely distributed animals of South America. They are relatively small animals, living in troops of up to 100 individuals, apparently "dominated" by females, with older males peripheralized.

Titis. Three species of *Callicebus* are found in South America in the region of the Amazon, where they live in the finer branches of the high forest trees. These animals are about the size of a squirrel, are omnivorous, and live in family groups of five or six. They are strongly territorial, and the adults are very dependent on one another, often sitting (or sleeping) side by side on a branch with tails intertwined. A close relative is *Aotus*, the owl or night monkey, the only nocturnal platyrrhine (or anthropoid, for that matter).

Sakis and uakaris. This group of little-known pithecines comprises rainforest dwellers and fruit eaters. The sakis have long hair and a bushy tail. There are four species, found in the Guianas and the Amazon basin: *Pithecia monachus*, the hairy saki; *P. pithecia*, the pale-headed saki; *Chiropotes satanas*, the black-nosed saki; and *C. albinasus*, the white-nosed saki. Sakis do not thrive in captivity, and have been known to die simply from the shock of being moved from one cage to another.

Fig. 5. Capuchin monkey (*Cebus*).

The three species of uakari, genus *Cacajao*, are relatively rare and occur in restricted ranges. They are found high in the tops of trees, and are timid animals which rarely descend to the ground. The head and face are a bright scarlet, and the tail is short and of little use as a balancing organ.

Howler monkeys. All six species of the howler are included in the genus *Alouatta*. They range from South America into Central America and are among the largest of the New World monkeys. Males reach 15–20 lb (7–9 kg). They are primarily leaf eaters that can hang by their prehensile tail to reach food, much of which they drop after eating partially, and they spend most of their day resting. This is now seen to be an adaptation to processing the large quantity of toxic secondary compounds in their food. Plants which taste bad (that is, are potentially poisonous) may be discarded, while long rest periods allow the howler's stomach to detoxify the hard-to-digest leaf

Fig. 6. Spider monkey (*Ateles*).

proteins consumed. Their most unusual characteristic is the howling voice, which is perhaps used to space the troops of 20 to 30 from each other. It can be heard from miles away. The enlarged, cavernous vocal apparatus is a trumpetlike bony box that is accommodated by the enlarged lower jaw and throat.

Spider and wooly monkeys. Comprising three genera, these monkeys also have prehensile tails but often lack an external thumb. Four species of spider monkey, *Ateles* (**Fig. 6**), are often found alongside howlers, but they are more active and concentrate on eating fruit, insects, and fewer leaves. They range between Mexico and Bolivia in groups of 15 to 50, with either one or several adult males. The wooly monkeys, *Lagothrix*, are like heavyset spider monkeys, but do not lack a thumb, while the rare wooly spider monkey, *Brachyteles*, is similarly built and lacks a thumb, as do the spiders. *See* APES.

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Bibliography. G. Davies and J. F. Oates (eds.), *Colobine Monkeys: Their Ecology, Behaviour and Evolution*, 1994; E. Delson et al. (eds.), *Encyclopedia of Human Evolution and Prehistory*, 2d ed., 2000; J. G. Fleagle, *Primate Adaptation and Evolution*, 2d ed., 1998; J. G. Fleagle and W. S. McGraw, Skeletal and dental morphology supports dyphyletic origin of baboons and mandrills, *Proc. Nat. Acad. Sci. USA*, 96:1157–1161, 1999; N. G. Jablonski (ed.), *The Natural History of the Doucs and Snub-nosed Monkeys*, 1998; N. G. Jablonski (ed.), *Theropithecus: Rise and Fall of a Primate Genus*, 1993; R. F. Kay et al. (eds.), *Vertebrate Paleontology in the Neotropics*, 1997; W. G. Kinzey (ed.), *New World Primates: Ecology, Evolution and Behavior*, 1997; A. L. Rosenberger, Evolution of feeding niches in New World monkeys, *Amer. J. Phys. Anthropol.*, 88:525–562, 1992; N. Rowe, *The Pictorial Guide to the Living Primates*, 1996; F. S. Szalay and E. Delson, *Evolutionary History of the Primates*, 1979.

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