

Cebids (Cebinae)

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The cebids are small to medium Neotropical primates (600 grams to 4 kilograms) and include three genera in ascending order of body weight: *Saimiri* (squirrel monkeys), *Cebus* (gracile capuchin monkeys), and the recently recognized genus *Sapajus* (robust capuchin monkeys). Capuchins and squirrel monkeys diverged over 13 million years ago (Lynch Alfaro, Silva, and Rylands 2012). Squirrel monkeys and gracile capuchins occur in the tropical forests of Central and South America, while robust capuchins are restricted to South America. Cebids are arboreal quadrupeds, although there is variation in the amount of time spent leaping and time spent on the ground (Fleagle and Mittermeier 1980). The squirrel monkey tail is long and nonprehensile, helping with balance during locomotion and feeding, while capuchins have long, semiprehensile tails. The cebid dental formula is 2:1:3:3/2:1:3:3; all digits have flat nails.

Capuchins and squirrel monkeys inhabit various habitats, including primary rainforest, deciduous dry forest, swampy lowland areas, riverine areas, and mosaic habitats with anthropogenic disturbances; they do well in areas of secondary growth, perhaps due to their high consumption of insects. Where they are sympatric, *Sapajus* and *Saimiri* can form mixed-species associations, traveling and foraging together. The cebids consume fruit and animal prey (invertebrates and occasionally small vertebrates and eggs). Some species are more insectivorous than frugivorous (Janson and Boinski 1992), and *Sapajus* are able to obtain nuts and encased fruit due to their strong jaw morphology and ability to use tools. Both capuchin and squirrel monkeys live in multi-male/multi-female groups, but differ greatly in group size, composition, and social structure. Generally, squirrel monkeys have larger home ranges and day ranges than do capuchins,

although some of the robust capuchins may show home ranges over 300 hectares (Izar et al. 2012).

Squirrel monkeys are distributed widely in the Amazon basin, with disjunct populations occurring in Central America. Eight species are currently recognized: *Saimiri oerstedii* in Central America, and seven South American forms: *S. boliviensis*, *S. sciureus*, *S. collinsi*, *S. ustus*, *S. vanzolinii*, *S. cassiquiarensis*, and *S. macrodon*. Three of the six species are endangered. All species have a black coloration around the mouth, and white “masks” around their eyes, forming an arched pattern. Squirrel monkeys are the most seasonally breeding of Neotropical primates (Di Bitteti and Janson 2000), with a polygamous mating system. During breeding season, males gain water and fat weight on the shoulders, arms, and torso, acquiring a “fatted appearance” (DuMond and Hutchison 1967). Male fattening is associated with seasonal changes in androgen levels, and may have evolved via sexual selection. After gestation, which lasts approximately 150 days, the female gives birth to an expensive neonate which is 16–20 percent of her weight. Juveniles grow slowly and reach sexual maturity relatively late for their body size. The social organization of *Saimiri* is extremely diverse; in some species, males dominate females; in others, females dominate males; and in others, females and males are co-dominant. Dominance hierarchies may also exist within each sex. Dispersal patterns also vary, with some species exhibiting female philopatry, while in others both sexes disperse (Zimble-de Lorenzo and Stone 2011).

The genus *Cebus* (which previously encompassed gracile and robust capuchins) was recently reorganized into *Cebus* (gracile, untufted forms) and *Sapajus* (robust, tufted forms). Gracile and robust capuchins diverged approximately 6.2 million years ago, possibly due to the formation of the Amazon River which led to their separation (Lynch Alfaro et al. 2012). Gracile capuchins include *C. capucinus*, *C. albifrons*, *C. olivaceous*, and the critically endangered *C. kaapori*. These capuchins have a wide range over Central America and northern South America, and longer limbs relative to their body size compared with robust

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capuchins. They lack morphological adaptations for opening hard nuts. Group sizes in *Cebus* are generally between 16 and 21 individuals. Males are dominant over females, and both sexes display linear dominance hierarchies. Dominant males sire the majority of infants in the group. Females will often form coalitions to displace the alpha male. Long-term field studies on white-faced capuchins (*C. capucinus*) indicate that female dispersal is rare, while males show parallel dispersal, with multiple emigration events over their lifespan (Fragaszy, Visalberghi, and Fedigan 2004).

Robust capuchins include *Sapajus apella*, *S. flavius*, *S. libidinosus*, *S. nigritus*, and *S. xanthosternos*. *Sapajus* does not occur in Central America, but ranges in almost all South American biomes, including tropical forests, mangrove forests, and the semi-arid areas of Brazil. Gracile capuchins (e.g., *C. kaapori*) and *S. apella* can occur in mixed-species association in areas of sympatry. There are significant differences in the skulls of robust and gracile capuchins; male *Sapajus* have a sagittal crest, which is lacking in male *Cebus*. Canines in *Sapajus* are shorter and more robust, and the strong mandible and thick tooth enamel allows them to consume hard nuts and palm fruit. All robust capuchins have a tuft of fur on their head and dark fur along their “sideburns.” Compared to the other cebids, robust capuchins show a very flexible diet, perhaps due to their capacity to exploit more diverse resources and to use tools. In northern Argentina and dry forest areas of Brazil, *Sapajus* will spend much of their time on or near the ground while opening encased fruits with heavy rocks. Similar to *Cebus*, group sizes in the robust forms vary from 8 to 20 individuals. Males are dominant over females; dominant males usually show higher mating success and subordinate males often remain at the group’s periphery. Depending on the species, females may be philopatric or transfer from their natal group (Izar et al. 2012).

SEE ALSO: Capuchin Monkeys (*Sapajus* and *Cebus*)

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