

# Exploring social cognition with marmosets

by Dustin M. Graham

## SCIENTIFIC NAME

*Callithrix jacchus*

## TAXONOMY

PHYLUM: Chordata

CLASS: Mammalia

ORDER: Primates

FAMILY: Callitrichidae

## General description

The common marmoset is a New World monkey originating from the northeastern coast of Brazil<sup>1</sup>. Compared with other common primate models, marmosets are very small, reaching approximately 17 cm in length and 250 grams in weight at adulthood<sup>1</sup>. They have a long tail relative to their body length and a distinct multi-color pelage of brown, grey and yellow. Unlike other primates, marmosets tend to have sharp claw-like nails, which are most likely an adaptation for their arboreal, squirrel-like locomotion among tree branches, as well as their ability to hang vertically on trees<sup>2</sup>. Marmosets have sharp incisors and specialized guts that enable them to survive on diets of plant exudates and insects when other types of food, such as fruit, are not available<sup>1</sup>. Common marmosets often chew small holes in trees to extract sap, gum and resin, as well as insects.

## Research résumé

Owing to their small size and ease of breeding in captivity, marmosets have become popular scientific models, and they are generally robust and healthy when kept under proper laboratory conditions<sup>1</sup>. Their small size allows them to be socially housed and provided with relatively large amounts of space and enriched environments that might be prohibitively difficult with larger non-human primates at most facilities. These benefits have made the marmoset a popular animal model for a diversity of fields in biomedical research, including toxicology and visual neuroscience<sup>1,3</sup>. Since the 1960s, new insights into development and behavior have continued to surprise scientists and open new avenues for important research<sup>1</sup>.

The ability to raise marmosets in the lab under rich social conditions, combined with their innate prosocial behaviors, enables scientists to use marmosets as models of social communication and behavior<sup>4</sup>. Recent work with marmosets demonstrated that this species shares several similarities of social behavior and language development with humans, despite their relatively wide evolutionary distance. Marmosets exhibit prosocial behaviors, pair-bond with mates and engage in cooperative raising of young<sup>1,4</sup>. Cooperative breeding is a particularly rare trait among primates, making humans and marmosets potentially well suited for comparative studies of social behavior. Additionally, marmoset infants rely on parental interaction to develop vocalizations, which is

uncommon to most primates but a shared feature of human language development<sup>4</sup>. The brain structure of marmosets is also similar to that of other primates, including humans<sup>4</sup>.

Taking into consideration recent developments in genetics and miniaturized brain-recording tools, marmosets are poised to become an extremely valuable model for understanding the neural basis of social cognition and language development. Although novel technologies, such as brain recording techniques and transgenics, can also be applied to other non-human primates, it remains a challenge to create behavioral paradigms with rich social structures that mimic those that accompany human development. Marmosets, therefore, will increasingly be relied upon to help bridge this gap in the ability of scientists to study the development and neural mechanisms underlying complex social behaviors, which might lead to a better understanding of neuropsychiatric disorders involving social development.

Overall, these small monkeys are ready to make a big impact on social neuroscience and the myriad of complex mental disorders that affect humans.



Kim Caesar/Nature Publishing Group

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3. Zuhlke, U. & Weinbauer, G. The common marmoset (*Callithrix jacchus*) as a model in toxicology. *Toxicol. Pathol.* **31**, 123–127 (2003).
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