

- R. A. 2011. The range of the golden-mantle tamarin, *Saguinus tripartitus* (Milne Edwards, 1878): distributions and sympatry of four tamarin species in Colombia, Ecuador, and northern Peru. *Primates* 52: 25–39.
- Thorington Jr., R. W. 1988. Taxonomic status of *Saguinus tripartitus* (Milne-Edwards, 1878). *Am. J. Primatol.* 15: 367–371.
- Worton, B. J. 1989. Kernel methods for estimating the utilization distribution in home-range studies. *Ecology* 70(1): 164–168.

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## REPORT OF A PYGMY MARMOSET (*CEBUELLA NIVEIVENTRIS*) SWIMMING IN IGAPÓ FOREST FLOODWATERS

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### Introduction

Swimming occurs when an individual is partially or fully submerged in water without contacting a substrate and uses its limbs for propulsive, spatially directed movement (Kempf 2009; Bender and Bender 2013). Researchers have observed swimming behavior in 17 catarrhines and seven platyrrhines (Table 1). We found no published observations for tarsiids or lorisiforms, and only two descriptions for lemuriforms, neither of which we include because Petter and Peyrieras (1975) provided only a secondhand account and Gaide et al. (2015) were unclear about the source of the observation. Five of the seven platyrrhines are medium or large-bodied (>1 kg), while the other two are small-bodied. In most cases, individuals traversed bodies of water, while in fewer cases, individuals rescued themselves after unintentionally falling into bodies of water (Table 1). The distribution of swimming anecdotes suggests that swimming is rare in platyrrhines and even more so in its small-bodied members.

Pygmy marmosets (*Cebuella* spp.), weighing between 85 and 160 g, are the tiniest monkeys within the primate order (Soini, 1988; Ford and Davis 1992). Recent molecular and morphological studies have recognized two species of pygmy marmosets endemic to western Amazonia, *C. pygmaea* north of and *C. niveiventris* south of the Solimões River (Rylands 2009; Boubli et al. 2018; Garbino et al. 2019; Porter et al. 2021). These tiny monkeys thrive in seasonally flooded and river-edge habitats, subsisting by claw-climbing and claw-clinging in the forest understory, where they spend most of their time gouging tree trunks and consuming exudates (Soini 1988; Youlatos 1999, 2009; Jackson 2011). Even though pygmy marmosets preferentially live in wet habitats and forage precariously close to floodwaters and rivers, there have been no

swimming reports for either species. Here, we describe a juvenile southern pygmy marmoset (*C. niveiventris*) swimming in igapó floodwaters.

### Study Site

The swimming event occurred during a field study of pygmy marmoset ecology at the Tahuayo Lodge in north-eastern Peruvian Amazonia (04°18'S, 73°13'W). Located near the confluence of the Tahuayo and Blanco rivers, this facility rests in a landscape of palm swamps, flood plains that inundate from December to June, and *terra firme* habitats (Santillán and Tegnér 2015). El Chino village is 1.5 km northeast of the Tahuayo Lodge on the right bank of the Tahuayo River. Local community members subsist via fishing and small-scale farming, which has produced some deforested plots along the riverbank. Despite these anthropogenic disturbances, at least eight pygmy marmoset groups lived along the river between the Tahuayo Lodge and El Chino (Sheehan and Papworth 2019). Additionally, nine other primate species lived near the Tahuayo Lodge and surrounding areas: brown capuchins (*Sapajus apella macrocephalus*), moustached tamarins (*Tamarinus mystax*), owl monkeys (*Aotus nancymaeae*), saddle-back tamarins (*Leontocebus nigrifrons*), sakis (*Pithecia monachus*), coppery titi monkeys (*Plecturocebus cupreus*), squirrel monkeys (*Saimiri macrodon*), uakaris (*Cacajao ucayalii*), and white-fronted capuchins (*Cebus yuracus*) (updated from Santillán and Tegnér 2015).

### Observation

The swimming event occurred 0.35 km northeast of El Chino on the edge of a deforested plot in the middle of the flooding season on March 19<sup>th</sup>, 2019. CPJ was conducting preliminary observations of a potential study group with four adults and one juvenile of unknown sexes and ages. Just before the swimming event, the group was foraging for the pulp of *Inga alba* pods. To acquire this food, an individual would hold onto a terminal branch with its non-hallux toes, reach above or suspend its entire body below, and then grasp a single pod with both hands. Aligning its head parallel to the pod's transverse axis, the individual would anchor its incisors into the lateral edges and pull off a single segment of the exocarp, revealing a single seed surrounded by pulp. After removing the seed and pulp, the individual would move onto a more stable branch near the trunk and then roll the seed and pulp in its mouth before spitting it into the water below. Individuals in the group foraged for 40 minutes and then left the feeding tree. The juvenile left last.

Exiting the feeding tree, the juvenile attempted a terminal-branch leap but could not generate sufficient propulsion during the take-off phase to reach the next support because the branch it took off from was too compliant. The juvenile fell 2 m, splashed into the floodwater, and

Table 1. Published observations of swimming events by non-human primates, ordered by parvorder and then by body size.

Species	Body Size (kg)	Description	Source(s)
Platyrrhini			
<i>Cebuella niveiventris</i>	0.09-0.16 <sup>1</sup>	recovering after falling into floodwater	this study
<i>Callithrix jacchus</i>	0.21-0.31 <sup>1</sup>	fleeing zookeeper	Hershkovitz (1977)
<i>Saguinus geoffroyi</i>	0.43-0.66 <sup>1</sup>	recovering after falling into pond	Hershkovitz (1977)
<i>Cacajao melanocephalus</i>	2.71-3.16 <sup>2</sup>	recovering after falling into floodwater	Bezerra et al. (2011)
<i>Alouatta palliata</i>	3.10-9.80 <sup>1</sup>	crossing river, strait	Gonzalez-Socoloske & Snarr (2010); Herrera et al. (2015)
<i>Alouatta seniculus</i>	4.50-7.60 <sup>1</sup>	crossing river	Soini (1986)
<i>Ateles geoffroyi</i>	6.00-9.00 <sup>1</sup>	crossing river	Chaves and Stoner (2010)
<i>Ateles chamek</i>	9.33-9.41 <sup>2</sup>	crossing river	Nunes (2014)
Catarrhini			
<i>Miopithecus talapoin</i>	1.12-2.50 <sup>2</sup>	fleeing predator	Gautier-Hion (1973)
<i>Chlorocebus pygerythrus</i>	2.98-5.30 <sup>2</sup>	playing in the wild; regulating body temperature	McFarland et al. (2019)
<i>Macaca sinica</i>	3.20-5.68 <sup>2</sup>	foraging for underwater roots	Linfield (1997)
<i>Cercopithecus neglectus</i>	3.55-7.35 <sup>2</sup>	fleeing conspecific; playing in captivity	Gautier-Hion (1971)
<i>Macaca fascicularis</i>	3.59-5.36 <sup>2</sup>	crossing pond, river; regulating body temperature	Fittinghoff & Lindberg (1980); van Schaik et al. (1996); Mohammad & Wong (2019); Han (2021)
<i>Macaca radiata</i>	3.85-6.67 <sup>2</sup>	crossing pond, river; playing in the wild	Simonds (1965); Krishnan (1971); Agoramoorthy et al. (2000)
<i>Cercopithecus nictitans</i>	4.26-6.67 <sup>2</sup>	fleeing zookeeper	Gautier-Hion (1971)
<i>Macaca mulatta</i>	5.37-11.00 <sup>2</sup>	retrieving food in experiment; traveling between islands	Berman (1977); Anderson et al. (1992); Arre and Horschler (2021)
<i>Semnopithecus entellus</i>	6.91-19.20 <sup>2</sup>	recovering after falling into pond	Agoramoorthy (1986)
<i>Macaca fuscata</i>	8.03-11.00 <sup>2</sup>	playing in the wild; traveling between islands	Kawai (1965)
<i>Nasalis larvatus</i>	9.82-20.40 <sup>2</sup>	crossing river; fleeing observers	Kawabe & Mano (1972); Galdikas (1985); Salter et al. (1985); Bennett & Sebastian (1988); Yeager (1991); Boonratana (2000); Onuma (2002); Matsuda et al. (2008)
<i>Papio hamadryas</i>	9.90-21.00 <sup>2</sup>	playing in captivity	Schultz (1969)
<i>Papio anubis</i>	11.70-25.10 <sup>2</sup>	playing in the wild	Pfeyffers (2000)
<i>Theropithecus gelada</i>	11.70-19.00 <sup>2</sup>	playing in captivity	Schultz (1969)
<i>Papio ursinus</i>	14.80-29.80 <sup>2</sup>	crossing river	Cheney et al. (2004)
<i>Pan troglodytes</i>	33.70-59.70 <sup>2</sup>	playing in captivity	Bender and Bender (2013)
<i>Pongo pygmaeus</i>	35.60-78.50 <sup>2</sup>	crossing gaps between branches; playing in captivity	Russon et al. (2010); Bender and Bender (2013)

<sup>1</sup> Ford and Davis (1992)<sup>2</sup> Smith and Jungers (1997)

sank for two or three seconds before swimming towards the tree using dog-paddle strokes. It had difficulties keeping its head above water, stopped to tread water several times, struggled against the current, and took 30 seconds to swim the 1 m to the tree trunk. Upon reaching the

tree, it climbed to the nearest branch and emitted several infant-distress vocalizations. A few seconds later, an adult returned and allowed the juvenile to cling to its back; they rested for five minutes before the juvenile

dismounted. They both left the tree and regrouped with the others.

## Discussion

Primates swim for various reasons, but sometimes individuals accidentally fall into bodies of water, and the sole purpose of swimming is to avoid drowning - our anecdote is another example of a primate swimming to survive an accidental fall. CPJ has observed pygmy marmosets falling out of trees on two other occasions. In one instance, a dominant-breeding female tumbled 0.5 m to the forest floor while running down an obliquely angled trunk; in another, an independently locomoting infant dropped 1.5 m to the forest floor while attempting an upward bound. Even though pygmy marmosets are agile creatures, they may occasionally fall out of trees and face a situation where they must swim to avoid drowning. Our observation shows at least juvenile pygmy marmosets can swim well enough to rescue themselves.

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## References

- Agoramoorthy, G. 1986. A note on Hanuman langur, *Presbytis entellus* swimming: a preliminary description of a new phenomenon in India. *J. Bombay Nat. Hist. Soc.* 83: 419.
- Agoramoorthy, G., Smallegange, I., Spruit, I. and Hsu, M. J. 2000. Swimming behaviour among bonnet macaques in Tamil Nadu. *Folia Primatol.* 71: 152–153.
- Anderson, J. R., Peignot, P., and Adelbrecht, C. 1992. Task-directed and recreational underwater swimming in captive rhesus monkeys (*Macaca mulatta*). *Lab. Primate Newsl.* 31: 1–4.
- Arre, A. M. and Horschler, D. J. 2021. Swimming and diving as social play in juvenile rhesus macaques (*Macaca mulatta*). *Behaviour* 158: 529–546.
- Bender, R. and Bender, N. 2013. Brief communication: Swimming and diving behavior in apes (*Pan troglodytes* and *Pongo pygmaeus*): first documented report. *Am. J. Phys. Anthropol.* 152: 156–162.
- Bennett, E. L. and Sebastian, A. C. 1988. Social organization and ecology of proboscis monkeys (*Nasalis larvatus*) in mixed coastal forest in Sarawak. *Int. J. Primatol.* 9: 233–255.
- Berman, C. 1977. Seaside play is a serious business. *New Sci.* 73: 761–763.
- Bezerra, B. M., Barnett, A. A., Souto, A., and Jones, G. 2011. Ethogram and natural history of golden-backed uakaris (*Cacajao melanocephalus*). *Int. J. Primatol.* 32: 46–68.
- Boonratana, R. 2000. Ranging behavior of proboscis monkeys (*Nasalis larvatus*) in the Lower Kinabatangan, northern Borneo. *Int. J. Primatol.* 21: 497–518.
- Boubli, J. P., da Silva, M. N. F., Rylands, A. B., Nash, S. D., Bertoul, F., Nunes, M., Mittermeier, R. A., Byrne, H., Silva, F. E., Röhe, F., Sampaio, I., Schneider, H., Farias, I. P. and Hrbek, T. 2018. How many pygmy marmoset (*Cebuella* Gray, 1870) species are there? A taxonomic re-appraisal based on new molecular evidence. *Mol. Phylogenet. Evol.* 120: 170–182.
- Chaves, O. M. and Stoner, K. E. 2010. River crossings by *Ateles geoffroyi* and *Alouatta pigra* in southern Mexico: a preliminary report. *Rev. Chil. Hist. Nat.* 83: 435–442.
- Cheney, D. L., Seyfarth, R. M., Fischer, J., Beehner, J., Bergman, T., Johnson, S. E., Kitchen, D. M., Palombit, R. A., Rendall, D. and Silk, J. B. 2004. Factors affecting reproduction and mortality among baboons in the Okavango Delta, Botswana. *Int. J. Primatol.* 25: 401–428.
- Fittinghoff, N. A. and Lindburg, D. G. 1980. Riverine refuging in east Bornean *Macaca fascicularis*. In: *The Macaques: studies in ecology, behavior, and evolution*, D. G. Lindburg (ed.), pp.182–214. Van Nostrand Reinhold Company, New York.
- Ford, S. M. and Davis, L. C. 1992. Systematics and body size: Implications for feeding adaptations in New World monkeys. *Am. J. Phys. Anthropol.* 88: 415–468.
- Gaide, N., Pelandakis, M., Robveille, C., Albaric, O., Jouvion, G., Souchon, M., Risler, A. and Abadie, J. 2015. Necrotizing meningoencephalitis in a captive black and white ruffed lemur (*Varecia variegata variegata*) caused by *Acanthamoeba* T4 genotype. *J. Comp. Pathol.* 153: 231–235.
- Galdikas, B. M. F. 1985. Crocodile predation on a proboscis monkey in Borneo. *Primates* 26: 495–496.
- Garbino, G. S. T., Casali, D. M., Nascimento, F. O. and Serrano-Villavicencio, J. E. 2019. Taxonomy of the pygmy marmoset (*Cebuella* Gray, 1866): geographic variation, species delimitation, and nomenclatural notes. *Mamm. Biol.* 95: 135–142.
- Gautier-Hion, A. and Gautier, J. P. 1971. La nage chez les cercopithecques arboricoles du Gabon. *Rev. Ecol.* 1: 67–75.
- Gautier-Hion, A. 1973. Social and ecological features of talapoin monkeys: comparisons with sympatric cercopithecines. In: *Comparative Ecology and Behavior of Primates*, R. P. Michael and J. H. Crook (eds.), pp.147–170. Academic Press, New York.
- Gonzalez-Socoloske, D. and Snarr, K. A. 2010. An incident of swimming in a large river by a mantled howling

- monkey (*Alouatta palliata*) on the north coast of Honduras. *Neotrop. Primates* 17: 28–31.
- Han, C. Z. 2021. Biodiversity record: Long-tailed macaque swimming with infant in Upper Seletar Reservoir. *Nat. Singap.* 14: e2021009.
- Herrera, H., Escobar-Lasso, S., González-Ancín, H. and Béal, M. C. 2015. Observaciones del nado de un grupo de monos aulladores (*Alouatta palliata*) en el Océano Pacífico de Costa Rica. *Mastozool. Neotrop.* 22: 385–389.
- Hershkovitz, P. 1977. *Living New World Monkeys* (Platyrrhini): *With an Introduction to Primates*. University of Chicago Press, Chicago.
- Jackson, C. P. 2011. The positional behavior of pygmy marmosets (*Cebuella pygmaea*) in northwestern Bolivia. *Primates* 52: 171–178.
- Kabwe, M. and Mano, T. 1972. Ecology and behavior of the wild proboscis monkey, *Nasalis larvatus* (Wurmb.) in Sabah, Malaysia. *Primates* 13: 213–227.
- Kawai, M. 1965. Newly-acquired pre-cultural behavior of the natural troop of Japanese monkeys on Koshima Islet. *Primates* 6: 1–30.
- Kempf E. 2009. Patterns of water use in primates. *Folia Primatol.* 80: 275–94. <https://doi.org/10.1159/000252586>.
- Krishnan, M. 1971. An ecological survey of the larger mammals of peninsular India. *J. Bombay Nat. Hist. Soc.* 68: 503–549.
- Linfield, M. 1997. The temple troop. In: *The Natural World*, N. Nightingale (director), run time 50 min. BBC and Discovery Channel, Great Britain.
- McFarland, R., Barrett, L., Costello, M. A., Fuller, A., Hetem, R. S., Maloney, S. K., Mitchell, D. and Henzi, P. S. 2020. Keeping cool in the heat: behavioral thermoregulation and body temperature patterns in wild vervet monkeys. *Am. J. Phys. Anthropol.* 171: 407–418.
- Matsuda, I., Tuuga, A., Akiyama, Y. and Higashi, S. 2008. Selection of river crossing location and sleeping site by proboscis monkeys (*Nasalis larvatus*) in Sabah, Malaysia. *Am. J. Primatol.* 70: 1097–1101.
- Mohammad, M. and Wong, A. 2019. The daily activity budgets of long-tailed macaque (*Macaca fascicularis*) at Padang Teratak Wildlife Sanctuary, Beaufort, Sabah, Malaysia. *Journal of Tropical Biology and Conservation.* 16: 165–183.
- Nunes, A. V. 2014. Report of a black spider monkey (*Ateles chamek*) swimming in a large river in central-western Brazil. *Neotrop. Primates* 21: 204–206.
- Onuma, M. 2002. Daily ranging patterns of the proboscis monkey, *Nasalis larvatus*, in coastal areas of Sarawak, Malaysia. *Mammal Study* 27: 141–144.
- Petter, J. J. and Peyrieras, A. 1975. Preliminary notes on the behavior and ecology of *Hapalemur griseus*. In: *Lemur Biology*, I. Tattersall & R. W. Sussman (eds.), pp.281–286. Plenum Press, New York.
- Pfeyffers, R. 2000. Underwater swimming by baboons *Papio anubis* in Nigeria. *Afr. Primates* 4: 72–74.
- Porter, L. M., de la Torre, S., Pérez-Peña, P. and Cortés Ortiz, L. 2021. Taxonomic diversity of *Cebuella* in the western Amazon: molecular, morphological and pelage diversity of museum and free-ranging specimens. *Am. J. Phys. Anthropol.* 175: 251–267.
- Russon, A. E., Kuncoro, P., Ferisa, A. and Handayani, D. P. 2010. How orangutans (*Pongo pygmaeus*) innovate for water. *J. Comp. Psychol.* 124: 14–28.
- Rylands, A. B., Coimbra-Filho, A. F. and Mittermeier, R. A. 2009. The systematics and distributions of the marmosets (*Callithrix*, *Callibella*, *Cebuella*, and *Mico*) and callimico (*Callimico*) (Callitrichidae, Primates). In: *The Smallest Anthropoids: The Marmoset/Callimico Radiation*, S. M. Ford, L. M. Porter, and L. C. Davis (eds.), pp.25–62. Springer, New York.
- Salter, R. E., MacKenzie, N. A., Aken, K. M. and Chai, P. P. K. 1985. Habitat use, ranging behaviour, and food habits of the proboscis monkey, *Nasalis larvatus* (van Wurmb), in Sarawak. *Primates* 26: 436–451.
- Santillán, A. D. and Tegnér, F. 2015. Amazonian plethora: biodiversity monitoring of jaguars, pumas, primates and other flagship species of the Peruvian Amazon. Unpublished report, Biosphere Expeditions.
- Schultz, A. H. *The Life of Primates*. Universe Books, New York.
- Sheehan, R. L. and Papworth, S. 2019. Human speech reduces pygmy marmoset (*Cebuella pygmaea*) feeding and resting at a Peruvian tourist site, with louder volumes decreasing visibility. *Am. J. Primatol.* 81: e22967.
- Simonds, P. E. 1965. The bonnet macaque in South India. In: *Primate Behavior*, I. Devore (ed.), pp.175–196. Holt, Rinehart, and Winston, New York.
- Smith, R. J. and Jungers, W. L. 1997. Body mass in comparative primatology. *J. Hum. Evol.* 32: 523–559.
- Soini, P. 1986. A synecological study of a primate community in the Pacaya-Samiria National Reserve, Peru. *Primate Conserv.* 7: 63–71.
- Soini, P. 1988. The pygmy marmoset, genus *Cebuella*. In: *Ecology and Behavior of Neotropical Primates*, vol. 2, R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho, and G. A. B. da Fonseca (eds.), pp.79–129. World Wildlife Fund, Washington, DC.
- van Schaik, C. P., van Amerongen, A. and van Noordwijk, M. A. 1996. Rivering refuging by wild Sumatran long-tailed macaques (*Macaca fascicularis*). In: *Evolution and Ecology of Macaque Societies*, J. F. Fa and D. G. Lindburg (eds.), pp.160–177. Cambridge University Press, Cambridge.
- Yeager, C. P. 1991. Possible antipredator behaviour associated with river crossings by proboscis monkeys (*Nasalis larvatus*). *Am. J. Primatol.* 24: 61–66.
- Youlatos, D. 1999. Positional behavior of *Cebuella pygmaea* in Yasuní National Park, Ecuador. *Primates* 40: 543–550.
- Youlatos, D. 2009. Locomotion, postures, and habitat use by pygmy marmosets (*Cebuella pygmaea*). In: *The Smallest Anthropoids: The Marmoset/Callimico Radiation*, S. M. Ford, L. M. Porter, and L. C. Davis (eds.), pp.279–297. Springer, New York.