

## Predation of the swamp racer *Palusophis bifossatus* by the caiman *Caiman yacare* and by the otter *Lontra longicaudis*

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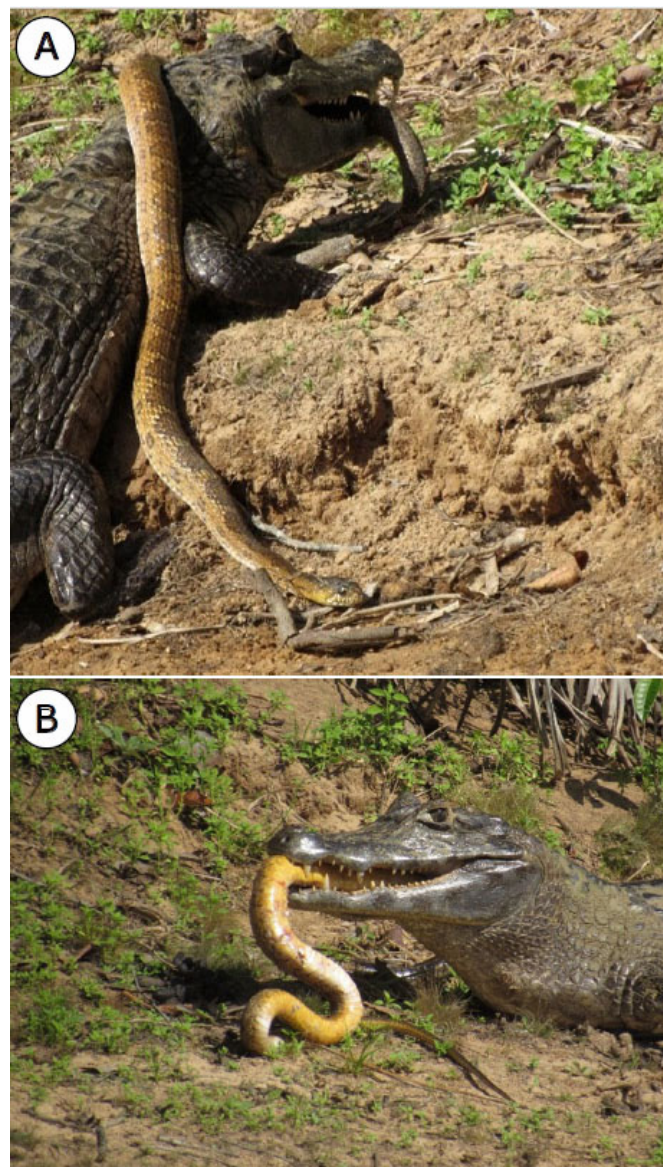
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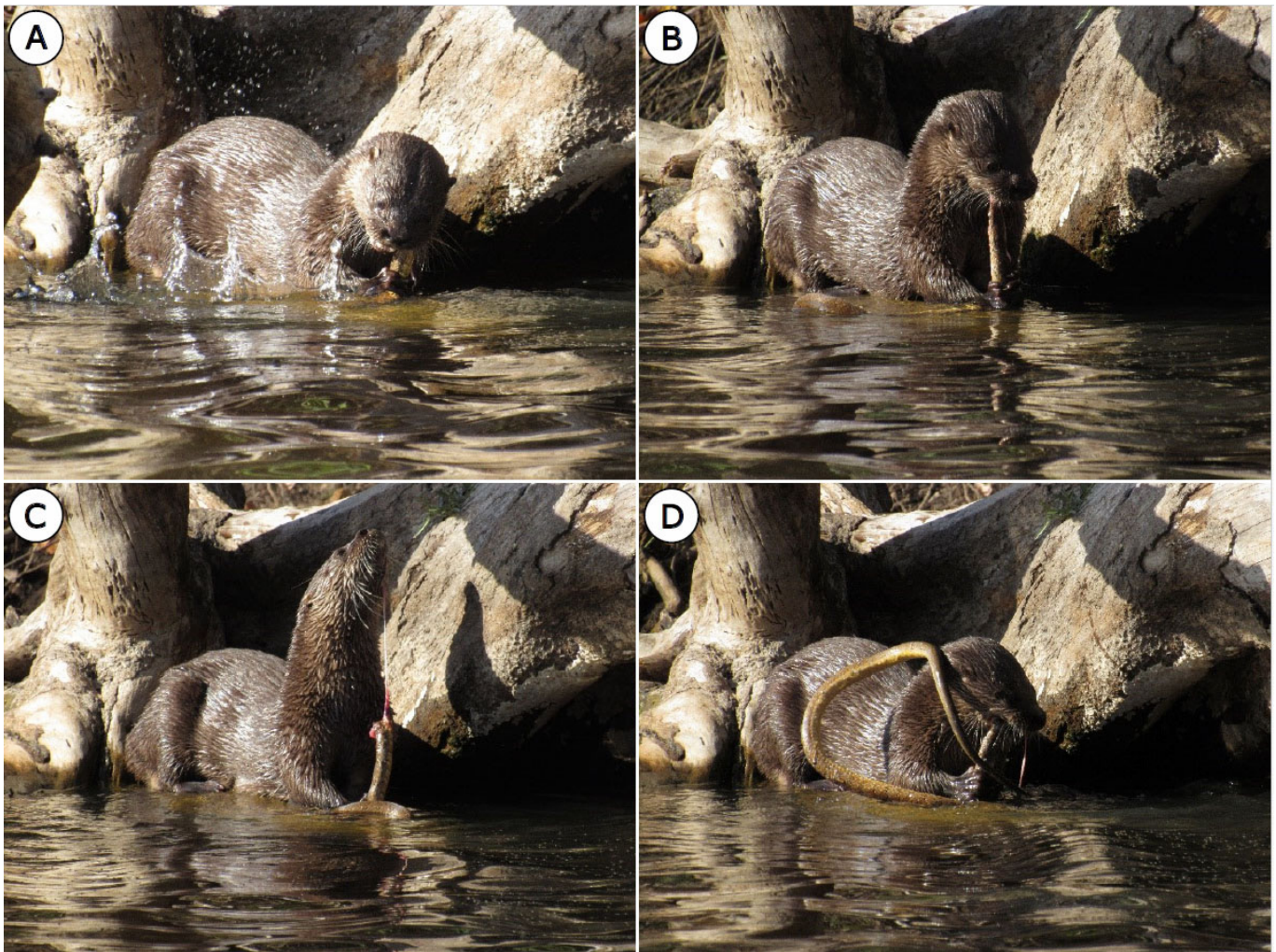
Most Brazilian caimans are generalist feeders (Barreto-Lima et al., 2021). The yacare caiman, *Caiman yacare* (Daudin, 1801), the most abundant central Brazil wetland species (Pantanal), has a varied diet (Santos et al., 1996). The same is noted for the Neotropical otter, *Lontra longicaudis* (Olfers, 1818) (Mustelidae) a generalist, diurnal predator (however, see Carrasco et al., 2020 for other observations on this behaviour) historically considered as piscivorous, although it occasionally feeds on mammals, birds, reptiles and amphibians (see Muanis & Oliveira, 2011 for diet and variations, although see Rheingantz et al., 2012 for other comments). This species also consumes invertebrates, such as crustaceans, molluscs and insects, albeit to a lesser extent (Colares & Waldemarin, 2000; Gori et al., 2003), in addition to some vegetable matter (Gori et al., 2003).

Here we report the swamp racer *Palusophis bifossatus* (Raddi, 1820) being preyed upon by two large predators, *C. yacare* and *L. longicaudis*, along the banks of the Rio Negro river at the Barranco Alto Farm in the municipality of Aquidauana, Mato Grosso do Sul, Brazil. The region is typically seasonal with humid summers and dry winters and composed of gallery forests, savannas and semi-deciduous forests. The local wet season ranges from November to March, with high rainfall rates from December to February, while the dry season ranges from April to October, with July being the driest month (Nunes et al., 2021). This system determines local river and water body flooding events.

During a morning boat excursion on the Rio Negro river on 21 July 2022 at 09:56 h, an adult *C. yacare*, measuring approximately 2 m in length, was observed on the river bank close to the water's edge (-19.587778° S, -56.174444° W) with an adult snake (*P. bifossatus*) in its mouth (Fig. 1A). The caiman was not moving. The swamp racer was apparently still alive, occasionally moving its head, although its movements were slow and subtle. The expedition then continued downriver. On its return about half an hour later (10:28 h), the *C. yacare* still had the snake in its mouth but had swallowed half of its body, head first (Fig. 1B). The snake's belly exhibited injuries caused by the caiman's teeth. Following this observation, the caiman was left undisturbed. Complete ingestion was not observed but was expected given the extent of ingestion at the second sighting.



**Figure 1.** Adult *Caiman yacare* consuming an adult Swamp Racer *Palusophis bifossatus* on the banks of the Rio Negro river (Barranco Alto Farm, Brazil) - **A.** Caiman has captured the swamp snake by the tail, **B.** Caiman with half of the preyed snake's body in its mouth. The snake was swallowed headfirst and exhibited belly injuries caused by the caiman's teeth



**Figure 2.** A Neotropical Otter *Lontra longicaudis* consuming an adult Swamp Racer *Palusophis bifossatus* on the banks of the Rio Negro river (Barranco Alto Farm, Brazil) - **A.** The otter holding the snake with its front paws and biting its head. **B., C.** and **D.** The otter feeding on the snake from head to tail, tearing off pieces to chew on

One week later, on 28 July 2022, during another morning boat trip on the Rio Negro river (-19.582500° S, -56.162778° W), between 08:44 h and 08:50 h an adult *L. longicaudis* was seen apparently hunting under roots at the base of the riverbank. At the same time, a swamp racer was noted inspecting a hole in the riverbank about 40 cm above the otter's location, also apparently foraging. At this moment, the typical sound of a baby yacare caiman calling its mother was heard (the specimen was not seen), which seemed to come from the hole the snake was exploring. The otter had not yet seen the snake. When it did, it immediately reacted and caught it. The snake attempted to escape but without success. The otter grabbed the snake with its front paws and began biting its head (Fig. 2A). The otter then retired to a calm place near the trunk of a fallen dead tree beside the riverbank and spent the following minutes feeding on the snake (Fig. 2), from head to tail. As with the caiman, the scene was observed without disturbance.

Snakes comprise a resource occasionally exploited by both otters (Vázquez-Maldonado & Delgado-Estrella, 2022) and crocodylians (Barreto-Lima et al., 2021). Evidence-based sampling methods (e.g. stable isotopes, bones, scales and/or

teeth in otter latrines and stomach remains in crocodylians), for many groups, including reptiles, enable the identification of food items at a taxonomic level higher than genus or species (e.g. Santos et al., 1996; Gori et al., 2003), with the result that snakes as prey items may be underreported.

The predation of snakes by *L. longicaudis* in coastal south Brazil environments includes aquatic species, such as the dipsadids *Erythrolamprus semiaureus* (Cope, 1862) (Colares & Waldemarin, 2000) and *Helicops infrataeniatus* (Jan, 1865) (Quintela et al., 2012). These water-dwelling snakes may also be a relatively important food for crocodylians, despite usually occurring at very low frequencies (Barreto-Lima et al., 2021). However, to date swamp racers have not been reported as food for yacare caiman, and although their high population density is remarkable and they are widely distributed throughout the Pantanal biome, this is the first predation event recorded for this species. Thus, the opportunistic records reported herein indicate *C. yacare* and *L. longicaudis* as predators of *P. bifossatus*, contributing to basic natural history data and food web interactions between species that inhabit freshwater environments and their surroundings.

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## REFERENCES

- Barreto-Lima, A.F., Santos, M.R.D. & Nóbrega, Y.C. (2021). Tratado de crocodilianos do Brasil. 1ª ed. *Instituto Marcos Daniel*, Vitória, Brazil. 641 pp.
- Carrasco, T.S., Lima, R.C., Botta, S., Machado, R., Simões-Lopes, P.C., Ott, P.H. & Secchi, E.R. (2020). Temporal and individual variation in the diet of the Neotropical otter, *Lontra longicaudis* (Olfers, 1818) (Carnivora, Mustelidae), as revealed by stable isotope analysis of vibrissae. *Mammalian Biology* 100: 505–520.
- Colares, E.P. & Waldemarin, H.F. (2000). Feeding of the Neotropical River Otter (*Lontra longicaudis*) in the Coastal Region of the Rio Grande do Sul State, Southern Brazil. *IUCN Otter Specialist Group Bulletin* 17(1): 6–13.
- Gori, M., Carpaneto, G.M. & Ottino, P. (2003). Spatial distribution and diet of the Neotropical otter *Lontra longicaudis* in the Ibera Lake (northern Argentina). *Acta Theriologica* 48: 495–504.
- Muanis, M.C. & Oliveira, L.F.B. (2011). Habitat use and food niche overlap by Neotropical Otter, *Lontra longicaudis*, and Giant Otter, *Pteronura brasiliensis*, in the Pantanal Wetland, Brazil. *IUCN Otter Specialist Group Bulletin* 28(A): 76–85.
- Nunes, A.P., Soriano, B.M.A., Fernandes, F.A., Severo Neto, F., Pellegrin, L.A., Salis, S.M. et al. (2021). Plano de manejo da reserva particular do patrimônio nacional da fazenda Nhumirim. *Embrapa Pantanal Documentos* 170: 1–84.
- Quintela, F.M., Artioli, L.G.S. & Porciuncula, R.A. (2012). Diet of *Lontra longicaudis* (Olfers, 1818) (Carnivora: Mustelidae) in three limnic systems in Southern Rio Grande do Sul State, Brazil. *Brazilian Archives of Biology and Technology* 55(6): 877–886.
- Rheingantz, M.L., Oliveira-Santos, L.G., Waldemarin, H.F. & Caramaschi, E.P. (2012). Are otters generalists or do they prefer larger, slower prey? Feeding flexibility of the Neotropical otter *Lontra longicaudis* in the Atlantic Forest. *IUCN Otter Specialist Group Bulletin* 29: 80–94.
- Santos, S.A., Nogueira, M.S., Pinheiro, M.S., Campos, Z., Magnusson, W.E. & Mourão, G.M. (1996). Diets of *Caiman crocodilus yacare* from different habitats in the Brazilian Pantanal. *The Herpetological Journal* 6: 111–117.
- Vázquez-Maldonado, L.E. & Delgado-Estrella, A. (2022). Diet of *Lontra longicaudis* in La Sangría Lagoon, México. *Therya Notes* 3: 125–132.

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