

FIELD NOTE

Stepping stones facilitate river crossings by *Myrmecophaga tridactyla* in the north-eastern Brazilian Amazon

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Abstract The ability of giant anteaters (*Myrmecophaga tridactyla*) to swim has been documented in the literature, but observations in the wild are scarce. Here, we document an observation recorded on 26 September 2017 when an adult *M. tridactyla* was seen crossing a 150 m wide river in the north-eastern Amazon, Brazil. The individual successfully crossed the river using a combination of swimming and walking over large rocks that were exposed during the dry season. It appears likely that the individual chose the river section with large rocks to help it to cross the river. We discuss that rocks may play a role in the facilitation of river crossings by giant anteaters and other mammals, especially during the dry season when the river level is lower, thus creating more rapids and more exposed rocks that can be utilized.

Keywords: Amazonia, behavior, giant anteater, mammal, swimming

Uso de pedras para facilitar o cruzamento de rios por *Myrmecophaga tridactyla* no nordeste da Amazônia Brasileira

Resumo A capacidade de nadar em tamanduás-bandeira (*Myrmecophaga tridactyla*) já foi reportada na literatura, mas observações em campo são escassas. Nós documentamos uma observação registrada em 26 de setembro de 2017, quando um *M. tridactyla* adulto foi visto atravessando 150 m de um rio largo no nordeste da Amazônia, Brasil. O indivíduo cruzou o rio usando uma combinação de natação e caminhada sobre grandes pedras que ficam expostas durante a época da seca. Aparentemente o indivíduo escolheu a seção de rio com grandes pedras para facilitar o cruzamento. Nós discutimos que pedras desempenham um papel importante, facilitando cruzamentos dos rios para tamanduás-bandeira e outros mamíferos, especialmente durante a estação seca, quando o nível do rio é menor criando mais corredeiras e mais pedras expostas que podem ser utilizadas.

Palavras-chave: Amazônia, comportamento, mamífero, natação, tamanduá-bandeira

The giant anteater (*Myrmecophaga tridactyla* Linnaeus, 1758) is a large insectivorous mammal from the family Myrmecophagidae and is classified within the order Pilosa (Wilson & Reeder, 2005). It is a terrestrial species found in a range of habitat types from tropical forest to the xeric Chaco within South and Central America (Eisenberg & Redford, 1999; Miranda *et al.*, 2014). Giant anteaters are locally uncommon to rare, especially in Central America and the southern parts of their range (Miranda *et al.*, 2014). In fact, the giant anteater is recorded as the most threatened mammal in Central America due to the extirpation of populations from many countries (Miranda *et al.*, 2014). It is also found in low numbers in South America and has been classified as Vulnerable (VU A2c) by the IUCN (Miranda *et al.*, 2014) and in Brazil (MMA, 2008). Within Brazil the giant anteater is Regionally Extinct in the states of Santa Catarina (Cherem *et al.*, 2004), Rio de Janeiro (Bergallo, 2000), and Espírito Santo (Chiarello *et al.*, 2007). It is classified as Critically Endangered in Paraná (Mikich & Bernils, 2004) and in Rio Grande do Sul (Fontana *et al.*, 2003), but is likely to be categorized as Regionally Extinct in the next update of this latter state's Red List (Miranda *et al.*, 2014).

Due to the low densities of the giant anteater within its distribution range, coupled with its solitary habits (Eisenberg & Redford, 1999), the literature on the ecology and behavior of this species in the wild is still scarce, with observations mostly obtained from open areas, such as grasslands and savannahs (Shaw *et al.*, 1985; Young *et al.*, 2003; Mourão & Medri, 2007; Braga *et al.*, 2010). While *M. tridactyla* is a terrestrial species, it is considered a

relatively strong swimmer (Miranda *et al.*, 2015), capable of crossing wide rivers (Nowak, 1999). However, swimming records for this species in the field are scarce.

In this study, we present information on an observation of an adult giant anteater crossing a river, using a combination of swimming and stepping stones in a continuous forest area in northern Amazonia. We also discuss the use of rocks, exposed along waterways during the dry season, in facilitating river crossings.

The study was conducted on the border of the Floresta Nacional do Amapá (FLONA), a sustainable use protected area of approximately 412,000 ha, located in the center of the state of Amapá in north-eastern Brazilian Amazonia (0°55'29"N, 51°35'45"W; **FIG. 1**). FLONA is adjacent to continuous undisturbed forests and maintains the full community of mid-sized and large-bodied vertebrates (Michalski *et al.*, 2015). This protected area experiences low levels of anthropogenic perturbations, in part because only a few families live on the reserve border (Michalski *et al.*, 2012), and the nearest city, Porto Grande, is located 46 km downstream. Within the protected area, the Falsino river is the most undisturbed section of river upstream from Porto Grande, with the lowest number of houses and boats (Oliveira *et al.*, 2015).

We used a motorboat and followed a standardized boat census protocol in order to conduct long-term surveys of mid- to large-bodied vertebrates along waterways within FLONA (Pitman *et al.*, 2011; Laufer *et al.*, 2012; Oliveira *et al.*, 2015). During one of these surveys we observed an adult *M. tridactyla* crossing the Falsino river. The observation of the giant anteater at the Falsino river (1°04'28"N, 51°30'20"W) was recorded by a team of five observers at 10:40 hr on 26 September 2017. The giant anteater crossed the river at one of the widest sections, which differed from neighboring narrower stretches of river by the presence of a number of large and exposed rocks (**FIG. 1C**). The individual was observed climbing out of the water onto a large rock, and making its way across the rock (**FIG. 2A**). The *M. tridactyla* was an adult and clambered out of the water as we approached; it appeared to have already crossed approximately 110 m from the south-east bank to the rock. As we approached it on the rock it returned to the water (**FIG. 2B**), proceeded to swim 56 m across the river to the north-west river bank, calmly rose out of the water, scaled the sloping river bank, and disappeared into the forest (**FIG. 2C–F**). The giant anteater swam strongly, with its head and snout held out of the water (**FIG. 2F**). While the *M. tridactyla* swam well it did not seem to swim easily, perhaps due to the low river level at this time of year and the formation of strong rapids within the river, making it more difficult to cross.

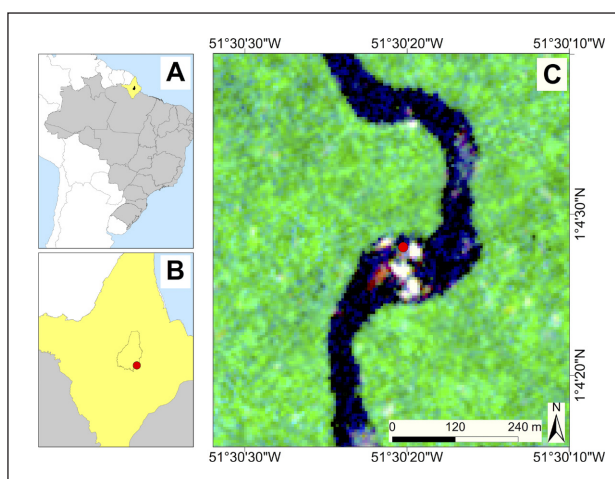


FIGURE 1. Location of the study region in the Floresta Nacional do Amapá (FLONA), Amapá state, eastern Brazilian Amazon. **A.** Amapá State in Brazil; **B.** FLONA (black polygon) in Amapá State; **C.** RapidEye image (Tile ID 2239512, 10 September 2015) showing where *Myrmecophaga tridactyla* (red circle) was observed crossing the Falsino River. Green, blue, and white areas represent forest, open-water, and rocks, respectively.

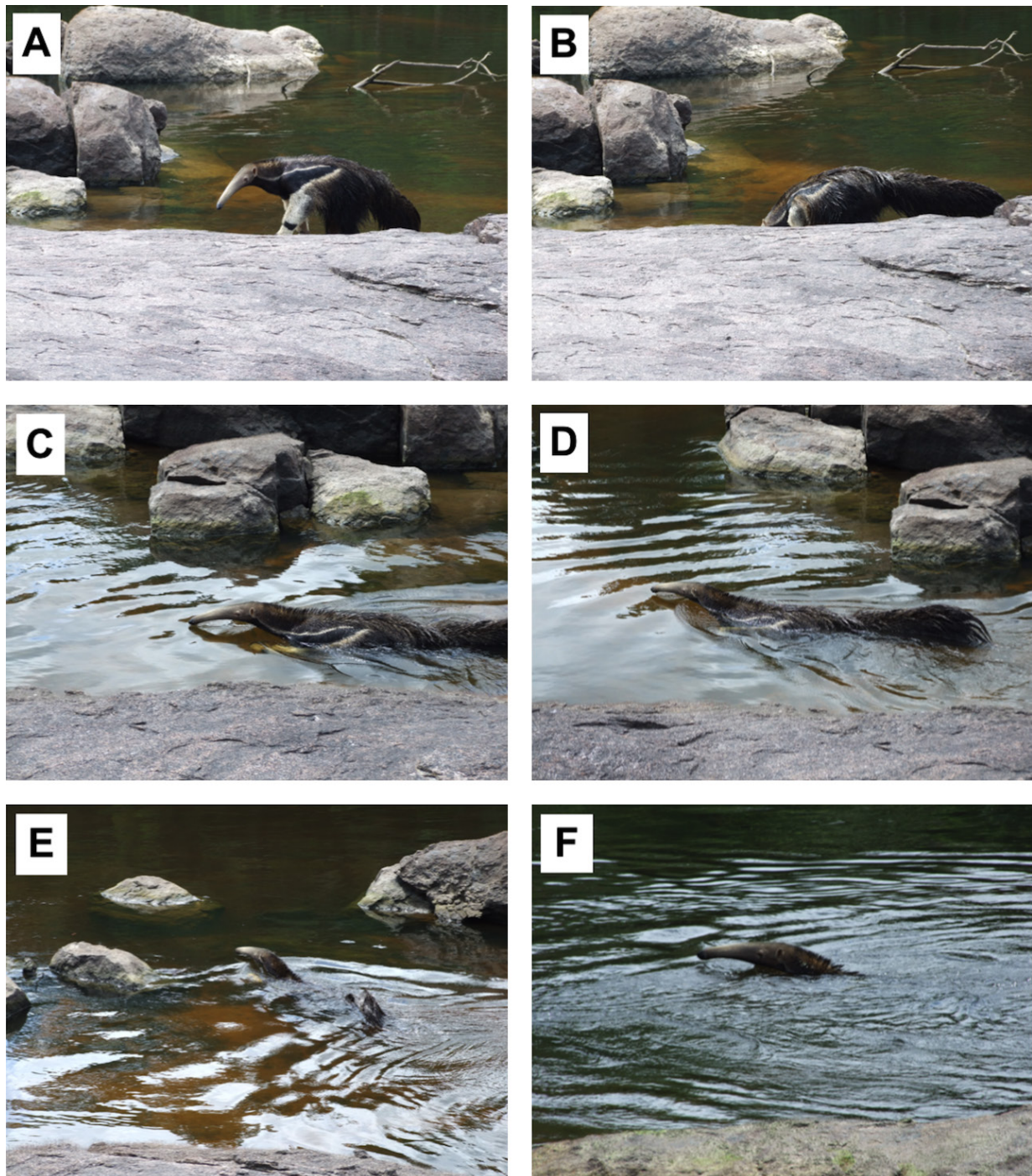


FIGURE 2. A sequence of photos (A–F) to show the movement and swimming of the giant anteater (*Myrmecophaga tridactyla*) observed along the Falsino River on the border of FLONA, eastern Brazilian Amazon. It started on the rock after climbing out of the water (A) then began to make its way across the rock before turning and retreating into the water to swim across the rest of the river (F).

When it was first spotted the giant anteater was on the rock, perhaps using it as a resting place. It could therefore be suggested that these rocks may facilitate the movement of giant anteaters across the river. This could especially be true for the drier months such as September when the river water levels are particularly low, thus exposing more rock

surfaces. On average in September the mean water level is normally about 4.05 m, which is lower than the wet season average of 7.00–8.00 m from February to May (data from 1981–2006; ANA, 2017).

Due to the rarity and low densities of *M. tridactyla* it is difficult to observe the behavior of this

species in the wild, especially in forested habitats. Indeed, the giant anteater was one of the species of mid-sized and large-bodied vertebrates with the lowest number of detections recorded during a camera trap study conducted in the same area (Michalski *et al.*, 2015). Some reports regarding its swimming habits exist (Nowak, 1999; Miranda *et al.*, 2015) although they are scarce and not detailed. This sighting could perhaps open up further research to address questions related to the swimming behavior of the giant anteater, as well as the use of rocks to facilitate river crossings. For example, there are sections of the Falsino river that have less or no exposed rocks. Thus, it is possible that giant anteaters may have some knowledge of the river sections with higher exposure of rocks. A similar proposal was made by Esser *et al.* (2010) based on an observation of swimming by a Northern tamandua (*Tamandua mexicana*). To test this hypothesis parts of the river with and without exposed rocks could be monitored by camera-traps during the dry season.

Giant anteaters may not be the only species to exploit stepping stones in order to cross rivers. One obvious benefit of doing so would be to increase gene flow and reduce population isolation.

ACKNOWLEDGEMENTS

Funding was provided by the National Academy of Sciences and the United States Agency for International Development through the Partnership for Enhanced Engagement in Research (<http://sites.nationalacademies.org/pga/peer/index.htm>), award number AID-OAA-A11-00012 to DN. Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) and the Universidade Federal do Amapá provided logistical support. LM was financially supported by the European Commission through the program Erasmus Mundus Master Course – International Master in Applied Ecology (EMMC–IMAE) (FPA 2023-0224 / 532524-1-FR-2012-1-ERA MUNDUS-EMMC). SS was funded by a National Council for Scientific and Technological Development (CNPq) PIBIC studentship (Process 126366/2017-9). AV was funded by a Brazilian Ministry of Education (CAPES) MSc studentship. FM received a productivity scholarship from CNPq (Process 301562/2015-6) and a CNPq research grant (Process 403679/2016-8). We thank IBAMA for authorization to conduct research in FLONA (IBAMA/SISBIO permit nº 49632-1). We thank Alvin Pantoja and Cremilson Alves Marques for field assistance as well as identification and sightings of species in the field.

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Received: 29 November 2017; Accepted: 6 February 2018