NOTAS SOBRE

MAMÍFEROS SUDAMERICANOS

Sociedad Argentina para el Estudio de los Mamíferos

Notas sobre Mamíferos Sudamericanos 2022, vol. 4
https://doi.org/10.31687/SaremNMS22.11.2
Versión on-line ISSN 2618-4788

NOTAS SOBRE
MAMÍFEROS
SUDAMERICANOS

Color abnormalities in the Giant Anteater (*Myrmecophaga tridactyla* Linnaeus, 1758) and Southern Tamandua (*Tamandua tetradactyla* [Linnaeus, 1758]) from Brazil and Ecuador

Daniela Bôlla (1), João P. Baraldo-Mello (2), Thierry Garcia (3), and Sean Rovito (3)

(1) Rua Antônio Zago, Içara, Brazil. (2) Post-graduation Program in Ecology, National Institute for Amazonian Research (INPA), Manaus, Brazil. (3) Sumac Muyu Foundation, San Jose de Payamino, Ecuador. [correspondence: danielabolla@hotmail.com]

Citación: Bôlla, D., J. P. Baraldo-Mello, T. Garcia, & S. Rovito. 2022. Color abnormalities in the Giant Anteater (*Myrmecophaga tridactyla* Linnaeus, 1758) and Southern Tamandua (*Tamandua tetradactyla* [Linnaeus, 1758]) from Brazil and Ecuador. Notas sobre Mamíferos Sudamericanos 4:e22.11.2.

ABSTRACT
Color abnormalities are infrequent in Xenarthra, and few reports have been published. Herein we report the first record of color abnormalities in *Myrmecophaga tridactyla* and new ones for *Tamandua tetradactyla* from South America. We also highlight a record published in a local online newspaper and discuss some issues associated with these conditions.

Keywords: leucism, Myrmecophagidae, Pilosa, South America, Xenarthra

RESUMO
Anomalias genéticas que resultam em alteração de coloração não são frequentes em Xenarthra e poucos registros foram descritos até o momento. Aqui relatamos o primeiro registro conhecido dessa alteração cromática em *Myrmecophaga tridactyla* e novos registros dessas alterações para *Tamandua tetradactyla* na América do Sul. Trazemos também um registro publicado online em um jornal local e discutimos alguns dos problemas inerentes a essas condições.

Palavras-chave: América do Sul, leucismo, Myrmecophagidae, Pilosa, Xenarthra.

Abnormalities in animal coloration are mainly caused by genetic mutations involved in disorders of the melanin system, which are reflected in distinctive phenotypes (Carden et al. 1998). In mammals, these abnormalities are divided into six forms: melanism (increase of black and/or reddish-brown or altered pattern),

Recibido el 2 de junio de 2022. Aceptado el 19 de septiembre de 2022. Editor asociado: Agustín Abba.

leucism (all-white or whitish hair, pale skin; eyes and/or body extremities normally colored), piebaldism (all-white fur/skin patches; eyes always normally colored), hypomelanism (beige, brown, golden, yellowish or reddish fur; skin and eyes always normally colored), blue-eyed white morph (blue eyes, pale/white fur, stripes/spots brown/sepia/dull orange) and albinism (all-white hair, pale skin, and red eyes) (Mahabal et al. 2019).

Color abnormalities have been described for several wild species (e.g., Uieda 2000; Peña-Mondragón et al. 2018; Landis et al. 2020), but they are less frequently recorded in Xenarthrans, with few records of sloths (Xavier et al. 2010; Novaes 2020), armadillos (LaPergola 2019) and anteaters (Menegaux 1902; More et al. 2021).

Anteaters are represented by ten extant neotropical species, with seven *Cyclopes* species, two *Tamandua*, *T. mexicana* (Saussure, 1860) and *T. tetradactyla* (Linnaeus, 1758), and finally, *Myrmecophaga tridactyla* Linnaeus, 1758. The southern tamandua *T. tetradactyla* is a common and widespread species usually identified by a mostly pale tan pelage with a black vest (Wetzel 1985). The species occupy many ecoregions, from Chaco to high-altitude forests, where the individuals use mainly branches for moving (Montgomery 1985). The southern tamandua can also be found in very anthropized zones, such as agricultural fields and cities (Rosa et al. 2010).

Myrmecophaga tridactyla is a Vulnerable species that occurs in Central and South America (Miranda et al. 2014; Gaudin et al. 2018). It is the largest of the three extant Myrmecophaginae species, and it is easily distinguishable by the long dark brown to black hair in the tail and the triangle-shaped black stripes below the ears (Gaudin et al. 2018). Individuals of *M. tridactyla* occur from dry grasslands to rainforests and are usually solitary, with activity patterns varying among regions (Shaw et al. 1987).

To the best of our knowledge, there is no record of coloration abnormalities in *M. tridactyla*. The only known records are albinism for *T. tetradactyla* from the Humid Chaco ecoregion in Paraguay, from 2018 (Ríos et al. 2019) and six melanistic and one yellowish individual from Zamora Chinchipe and Morona Santiago provinces, southern Ecuador (Ríos-Alvear & Cadena-Ortiz 2019). Herein we provide four new records of abnormal coloration in anteaters: two for *T. tetradactyla* from Brazil and Ecuador and two for *M. tridactyla* from Brazil. The classification of abnormalities followed the description provided by Mahabal et al. (2019), being: "albino" when the individual shows red eyes and very pale/white fur and "leucistic" when it shows normal colored eyes and/or body edges.

Record #1: Municipality of Campos Borges, district of São José, state of Rio Grande do Sul (latitude -28.839500; longitude -53.049722), on 21 February 2021. The surrounding matrix is mainly composed by soybean and corn fields, a relatively big dam, and small and unconnected forest fragments. The body of a deceased and complete albino individual of *T. tetradactyla* was found in the margins of an artificial lagoon by a local resident (Fig. 1A). The cause of death remains unknown since there was no evidence of trauma on the body. The carcass was discarded before it could be collected.

Record #2: Bigal River Biological Reserve (latitude -0.433278; longitude -77.332889) located in the city of Loreto, Orellana Province, Ecuador, on 9 May 2019.

The Reserve shelters an old-growth Andean foothill forest, in the Eastern Andes, at 950 m a. s. l. An individual of *T. tetradactyla* with leucism was recorded by a camera trap on 5 September 2019, crossing a stream. One year and three months later, possibly the same individual was photographed climbing a tree in the forest about 2 km from the first record spot. The record was documented photographically on 22 December 2020 by a local guide using a smartphone (Fig. 1B).

Record #3: Fazenda Barra Bonita 1, locality of Arapuá (latitude -21.014556; longitude -52.101000), Três Lagoas municipality, state of Mato Grosso do Sul, on 2 August 2021. This area is within the Cerrado biome, close to the Paraná River. Locally, the surrounding matrix is highly altered by deforestation but still has more remnants than the entire region. An adult albino individual of the *M. tridactyla* was seen walking in an open grassland area inside a farmland by its employees (Fig. 2). The area is close to a forest remnant that belongs to an Area of Permanent Protection (APP). This individual has albinism, considering the eyes were red and there was no coloration in the fur or other parts. This is the first known record of albinism for this species. A veterinarian was called to search for the animal the next day, but after a week of searching, it was found dead, possibly killed by a jaguar according to the farm employees.

Record #4: Same area as record #3. On 21 August 2022 an adult female *M. tridactyla* was seen carrying an albino juvenile in an open grassland area inside the farmland while walking around the free-ranging cattle (Fig. 3). The juvenile has the same pattern as the one described by record #3, and the mother's coloration follows the pattern described for the species.

Record #5: Ilha de Itamaracá, state of Pernambuco, northeastern Brazil, on 5 July 2012. An albino individual with a very faint vest of *T. tetradactyla* and red eyes was recorded by professor G.A.A. Xavier and mentioned by Ohana et al. (2015) as a personal communication (Fig. 1C). Compared to the other records here described, this one seems to have more melanin, seen mainly on the vest.

Chromatic disorders such as the lack of melanin and other pigments can increase the harms caused by solar radiation, as well as increase predation risk, decrease mating success, and consequently reduce individual fitness (Parsons & Bonderup-Nielsen 1995; McCardle 2012). For example, the mortality of albino brown-throated sloth (*Bradypus variegatus* Schinz, 1825) newborns has already been reported for Brazil (Manchester & Jorge 2009). Albinism may be especially disadvantageous for forest and/or nocturnal mammal species, which evolved various fur colorations and patterns for camouflage purposes, such as the *Tamandua* and *Myrmecophaga* species (Caro 2005). Three from four individuals seem to be adults, which evidence that, even being disadvantageous, the color abnormality allowed them to survive until the adult age.

The cases here described from Ecuador, and northeastern Brazil reported apparently an adult and a juvenile healthy individual. Additionally, the records from Ecuador can be related to a single individual or two different ones, which in both hypoth-

eses, evidence they/it can survive as non-albino individuals. On the other hand, two individuals were dead (southern tamandua from southern Brazil and giant anteater from mid-west Brazil) and the reasons for the deaths are not clear. Any assumption may be too speculative, considering the first one had no external injury.

As far as we know, these are the first records of color abnormalities in the giant anteater (*M. tridactyla*). It is considered a Vulnerable species in Brazil (MMA 2014) and globally (Miranda et al. 2014). The abnormalities we described may make individuals an easy target for predators to spot, increasing the mortality rates by predation, which is not desirable in the case of a threatened species. Therefore, the lack of camouflage is probably the main indirect risk factor for mortality, which is concerning when it comes to small and isolated populations.

A review of chromatic disorders in Neotropical mammals (Abreu et al. 2013) reported only one record for the order Pilosa (Xavier et al. 2010), illustrating how uncommon or poorly documented such aberrations are in Xenarthra. Subsequent publications have documented albinism and melanism in the brown-throated sloth (*B. variegatus*) in Brazil (Xavier et al. 2010; Novaes 2020), from the southern tamandua (*T. tetradactyla*) in Paraguay (Ríos et al, 2019), from the northern tamandua (*T. mexicana*) in Peru (More et al. 2021) and from the nine-banded armadillo (*Dasypus novemcinctus* Linnaeus, 1758) in Mexico (LaPergola 2019). Reporting cases of color abnormalities is important to understand the genetic patterns and evolution among populations and the affected individuals' survival aspects (Tavares et al. 2019).

ACKNOWLEDGEMENTS

We thank Sr. Jurandir da Silva Mello for informing us of the record in Brazil of the southern tamandua; Sr. Valdemar Clemente da Silva from the Fazenda Barra Bonita for providing all the information and authorizing the publication of his record of the giant anteater; and the two reviewers as well as the editor for important suggestions in the manuscript.

Figure 1. Color abnormalities in different individuals of southern tamandua (*Tamandua tetradactyla*)**.** A) Record #1 made in southern Brazil; B) record #2 made in Loreto, Ecuador; C) record #5, from northeastern Brazil (photo from a local newspaper) .

Figure 2. Record #3 made in mid-west Brazil of an individual of the giant anteater (*Myrmecophaga tridactyla*).

Figure 3. Record #4 made in mid-west Brazil of an albino juvenile giant anteater (*Myrmecophaga tridactyla).*

LITERATURE CITED

Abreu, M. S. L., R. Machado, F. Barbieri, N. S. Freitas, & L. R. Oliveira. 2013. Anomalous colour in Neotropical mammals: a review with new records for *Didelphis* sp. (Didelphidae, Didelphimorphia) and *Arctocephalus australis* (Otariidae, Carnivora). Brazilian Journal of Biology 73:185–194. https://doi.org/10.1590/S1519-69842013000100020

Carden, S. M., R. E. Boissy, P. J. Schoettker, & W. V. Good. 1998. Albinism: modern molecular diagnosis. British Journal of Ophthalmology 82:189–195. http://dx.doi.org/10.1136/bjo.82.2.189

Caro, T. 2005. The adaptive significance of coloration in mammals. BioScience 55:125–136. https://doi.org/10.1641/0006-3568(2005)055[0125:TASOCI]2.0.CO;2

Gaudin, T. J., Hicks, P., & Y. Di Blanco. 2018. *Myrmecophaga tridactyla* (Pilosa: Myrmecophagidae). Mammalian Species 50:1–13. https://doi.org/10.1093/mspecies/sey001

Landis, M. B., et al. 2020. First record of albino lowland tapirs (*Tapirus terrestris* Linnaeus, 1758) in an important Brazilian Atlantic Forest hotspot. Mammalia 84:601–604. https://doi.org/10.1515/mammalia-2019-0084.

Lapergola, J. B. 2019. First Record of Albinism in the Nine-banded Armadillo (*Dasypus novemcinctus*). Caribbean Naturalist 64:1–5.

Mahabal, A., Sharma, R. M., Patil, R. N., & Jadhav, S. 2019. Colour aberration in Indian mammals: a review from 1886 to 2017. Journal of Threatened Taxa 1:13690–13719. https://doi.org/10.11609/jott.3843.11.6.13690-13719

Manchester, A., & Jorge, W. 2009. Biological data of a population of sloths (*Bradypus variegatus*) in a square of Teófilo Otoni, Minas Gerais, Brazil. Naturalia 32:81–86.

Miranda, F., Bertassoni, A. & A. M. Abba. 2014. *Myrmecophaga tridactyla*. The IUCN Red List of Threatened Species 2014:e.T14224A47441961. https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T14224A47441961.en

MMA 2014. Portaria No 444, de 17 de Dezembro de 2014. <http://www.ibama.gov.br/sophia/cnia/legislacao/MMA/PT0444-171214.pdf>

Mccardle, H. 2012. Albinism in wild vertebrates. Master Thesis. Texas State University-San Marcos, San Marcos, Texas, USA.

Menegaux, A. 1902. Catalogue des mammiferes rapportes par M. Geay de la Guyane Francaise en 1889 et 1900. Bulletin du Museum d'Histoire Naturelle Paris 8:490–496.

Montgomery, G. G. 1985. Movements, foraging and food habits of the four extant species of Neotropical vermilinguas (Mammalia: Myrmecophagidae). The evolution and ecology of armadillos, sloths, and vermilinguas (G. G. Montgomery, ed.). Smithsonian Institution Press, Washington, D.C.

More, A., J. Vallejos, I. Sánchez, J. Vallejos, R. P. Piana & R. D. Appleton. 2021. Registro de coloración anormal del oso hormiguero norteño *Tamandua mexicana* (Saussure, 1860) y notas sobre su límite sur de distribución. Revista Peruana de Biología 28:e19759. https://doi.org/10.15381/rpb.v28i1.19759.

Novaes, R. L. M. 2020. Melanism in *Bradypus variegatus* (Pilosa, Bradypodidae). Notas Sobre Mamíferos Sudamericanos 2:e20.0.37. https://doi.org/10.31687/saremNMS.20.0.37

Ohana, J.A.B, et al. 2015. Avaliação do Risco de Extinção dos Xenartros Brasileiros. Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), Brasília.

Parsons, G. J., & S. Bonderup-Nielsen. 1995. Partial albinism in an island population of meadow voles, *Microtus pennsylvanicus*, from Nova Scotia. Canadian Field Naturalist 109:263–264. https://doi.org/10.31687/saremNMS.20.0.37

Peña-Mondragón, J. L., Peña-Cuéllar, E., Hinojosa, F. J., & A. Sánchez. 2018. First confirmed record of an albino raccoon *Procyon lotor* for México. Galemys 30:71–73.

Ríos A, S. D., B. C. R. Díaz & C. P. Smith. 2019. Reporte de un ejemplar albino de *Tamandua tetradactyla* (Linnaeus, 1758) (Pilosa, Myrmecophagidae) en el suroeste de Paraguay. Edentata 20:35–38. https://doi.org/10.15560/6.1.052

Ríos-Alvear, G., & H. Cadena-Ortiz. 2019. Records of melanistic *Tamandua tetradactyla* (Pilosa, Myrmecophagidae) from Ecuador. Neotropical Biology and Conservation 14:339–347.

Rosa, C. A., Hobus, Q., & A. Bager. 2010. Mammalia, Pilosa, Myrmecophagidae, *Tamandua tetradactyla* (Linnaeus, 1758): Distribution extension. Check List 6:052–053. https://doi.org/10.15560/6.1.052

Shaw, J. H., Machado-Neto, J., & T. S. Carter. 1987. Behavior of free-living giant anteaters (*Myrmecophaga tridactyla*). Biotropica 19:255–259. https://doi.org/10.2307/2388344

Tavares, M. S., Aguiar, L. S., Salvador, C. H., & M. Galliez. 2019. Beyond the color: the implications of pigmentation polymorphism in the activity behavior of a Neotropical squirrel. Mammalia 84:294–298.

Uieda, W. 2000. A review of complete albinism in bats with five new cases from Brazil. Acta Chiropterologica 2:97–105. https://doi.org/10.4236/ojas.2014.45037

Xavier, G.A.A., M.A.B. Oliveira, A.A. Quirino, & R.A. Mota. 2010. Albinismo total em preguiças-de-garganta-marrom *Bradypus variegatus* (Schinz, 1825) no Estado de Pernambuco, Brasil. Edentata 11:1–3.

Wetzel, R. M. 1985. The identification and distribution of recent Xenarthra (= Edentata). The evolution and ecology of sloths, armadillos and vermilinguas (G. G. Montgomery, ed.). Smithsonian Institution Press, Washington.