

ORIGINAL ARTICLE

Colour variation of *Tayra Eira barbara* (Carnivora, Mustelidae) in the Caatinga Biome, north-eastern Brazil

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Associate editor:

Héctor E. Ramírez-Chaves

<http://www.smallcarnivoreconservation.org>
ISSN 1019-5041

Abstract.

Tayras are medium-sized carnivores which typical body and limbs colour varies from brown to black, with lighter coloured neck and head. However, the coat shade can vary according to geographical location, so this study aimed to report the occurrence of lighter coat of tayra in Caatinga Biome. In the Serra das Almas Private Natural Heritage Reserve, Ceará, northeastern Brazil, ten records of Tayras were obtained, comprising three different morphs: the typical pattern for the species was the most common morph recorded followed by a brown-yellowish individual and an evenly grey individual. Considering the duration of the study and the number of records, it is suggested that the brown-yellowish morph is rare in the study area.

Keywords: coat pattern, mammal, carnivore, mustelids.

Studies on natural history have emphasized the importance of colour patterns in mammals for aspects such as camouflage, communication and physiology (Stoner *et al.* 2003). Cott (1940) postulated four mechanisms that contribute to the concealment of an animal: 1. the overall similarity of colour that refers to the similarity of the colour of an animal and its environment; 2. the similarity of variable colour: which occurs when the colour of the animal varies in response to changes in the environment; 3. obliterative shading: which refers to the coat colour of the animal with a lighter ventral surface compared to its back; and, 4. disruptive coloration: that occurs when distinct stripes or spots act to break up the outlines of an animal, disguising its shape. Regarding communication, the coloration of fur may act through anti-predatory displays, competition for territory, courtship display, and help the recognition of species and even individuals (Ortolani 1999). It has been suggested that coat coloration is related to animal physiology. Because dark coats tend to be found in hot and humid environments, although the factors responsible for this association are not clearly established (Stoner *et al.* 2003). Among mammals, carnivores have high variation of colour patterns. Considering 200 species of carnivores it is estimated 58 different colour patterns present in different parts of the body (Ortolani *et al.* 1999).

The Tayra *Eira barbara* (Linnaeus 1758) is a medium-sized carnivore (body length: 56–68 cm, tail length: 37.5–47 cm, weigh up to 11 kg; Cheida *et al.* 2011). The Tayra have a wide distribution in the Neotropics, occurring from Mexico to northern Argentina. In

Brazil, it is distributed through all biomes, including the northeast region of Brazil where the species has been not mapped (Presley 2000, Cuarón *et al.* 2016). However, there are several records from northeast region of Brazil (Guedes *et al.* 2000, Sousa *et al.* 2004, Pereira & Geise 2009, Paula *et al.* 2011, Dias *et al.* 2014, Feijó *et al.* 2016), and this study. Typically, forest-dwellers, Tayras have strong arboreal habits, using tree hollows and trunks as shelters. They feed mainly on fruit, insects, honey and small vertebrates (Presley 2000, Cheida *et al.* 2011, Rodrigues *et al.* 2013), while also being able to prey on larger mammals such as primates (Camargo & Ferrari 2007, Bezerra *et al.* 2009). Sexual dimorphism in Tayras is little evident, with males slightly larger than females and tend to have more muscled neck and shoulders (Presley 2000). The coat colour varies along its distribution, but in general the dark brown or black colour prevails in the body and limbs, contrasting with the head and neck which tend to be lighter, representing the most common pattern for the species (Presley 2000, Cheida *et al.* 2011, Feijó & Langguth 2013). The variation in colour patters of Tayras along their geographical distribution has induced the description of up to seven subspecies (Presley 2000), and nine according to Wozencraft (2005). This study presents a new lighter coat colour record of Tayra in Caatinga biome.

The Seasonally Dry Tropical Forest, nationally known as Caatinga Biome, is characterized as a semiarid environment, with xerophytic, deciduous, woody and thorny physiognomy (Costa *et al.* 2007). Along with Cerrado and Chaco, Caatinga is part of a complex of seasonal forests creating a diagonal belt in South America between two large areas of tropical rainforests, the Amazon and the Atlantic Forest (Mayle 2004, Caetano & Naciri 2011). Exclusively in Brazilian territory, Caatinga occupies an area larger than 730.000 km² in the northeast of the country (Leal *et al.* 2005), with a strong seasonal and unpredictable weather, usually with long periods of drought and high temperatures (Oliveira *et al.* 2012). This study took place in the Serra das Almas Private Natural Heritage Reserve (RNSA), a Private Natural Heritage Reserve, categorized as an advanced post of Caatinga Biosphere Reserve, awarded by United Nations Educational, Scientific and Cultural Organization - UNESCO. The RNSA is placed between Crateús, a municipality in the State of Ceará, and Buriti dos Montes, other municipality in the State of Piauí (Figure 1). Three main vegetation types are found within the limits of Serra das Almas: dense seasonal scrub (carrasco), seasonal thorn forest (arboreal caatinga), and seasonal montane deciduous forest (dry forest), and within the dry forest, there is a remnant of a mango orchard (*Mangifera indica* L.), which follows a stretch of the Melancia Stream, a perennial water course that flows inside the reserve. The data were gathered during a long-term mammal monitoring program carried out in Serra das Almas. A total of 40 sampling stations were monitored for 26 months from 2013 to 2015. Camera traps were set up along trails and close to water sources. The traps covered an area of 25 km², and simultaneously active stations were 0.5–1.0 km apart from each other. Camera traps (Bushnell® and Super Scouter®), were adjusted to record the time and date of each event

and were set to operate for 24 hours. Photographs obtained at intervals ≥ 30 min at the same station on the same day were considered independent records (Davis *et al.* 2011).

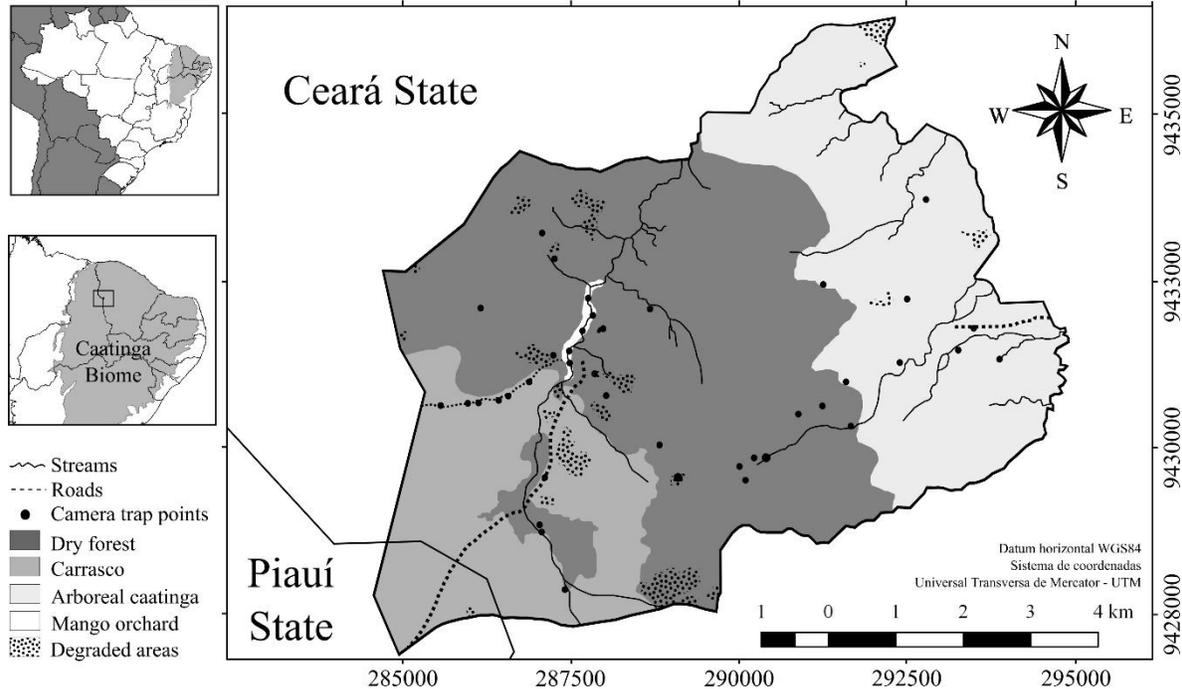


Figure 1. Study area, the Serra das Almas Private Nature Heritage Reserve, CE, Brazil. Stars indicate the points where Tayras were recorded: gray star (gray individual) and white star (brown-yellowish).

Ten records of *Tayra* were obtained, nine being of the typical morph, as described by Presley (2000) and Feijó & Langguth (2013), one record of an evenly grey individual and five of a brown-yellowish *Tayra*, the last one always in the company of one individual with the typical colour for the species (Figure 2), with a sampling effort of 4.338 traps/day.

The yellowish coat colour was already recorded in other regions of the Neotropics, including the Rio Negro basin in Amazonia (Trolle 2003) and in the National Park of Madidi, Bolívia (Tarifa *et al.* 2001). In southern Brazil, a creamy-white *Tayra* was recorded in the Biological Reserve of Sassafrás (Tortato & Althoff 2007). Despite the fact that albinism and amelanism are more common in *Tayras* than in other mustelids (Presley 2000), the almost white morph recorded by Tortato & Althoff (2007) it is not an example of albinism, once all recorded individuals had pigmented edges and eyes. Even though 50% of the records obtained in RNSA are from *Tayras* of light coat, the pictures belong to a single individual, suggesting that this morph is rare in the study area. This result differs from that observed in southern Brazil, where light *Tayras* and with typical colour had a ratio of 1:1 (Tortato & Althoff 2007).

However, Tortato & Althoff (2007) highlighted that the variation of coat colour with presence or absence of spots under the neck are not so reliable characteristics for taxonomic surveys. That idea is sound because, based only in the coat pattern, in RNSA

would occur at least three subspecies, considering the morphs recorded in this study. Following the concealment models (Cott 1940), the brown-yellowish coat of *Tayra* recorded in RNSA fits well in the overall similarity of colour pattern, at least during the most part of the year, once Caatinga vegetation loses its leaves during the dry season, which gives a pale aspect to the environment. From this condition arose the name “Caatinga” from indigenous Tupi-Guarani origin, meaning “white forest” (Prado 2003). The coat patterns of carnivores usually match with the environment in which they exist, but this association may also be an adaptation related to thermoregulation (Caro 2005). Thus, light coats are favoured in hot and open environments, once they reflect better solar radiation; grey or reddish coat is more predominant in rocky habitats, and dark colours tend to be predominant in dense forest environments (Caro 2005). In this sense, studies indicate that camouflage and communication are two key factors that influence the coloration in mammals. In addition, body coloration tends to evolve to match the background environment and that the extremities act as visible signs for conspecifics and perhaps against predators (Stoner *et al.* 2013).



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Figure 2. Record of *Tayra* (*Eira barbara*) showing one individual with typical colour, black body and lighter-coloured neck and head, and one brown-yellowish individual, both records in the Serra das Almas Private Natural Heritage Reserve, CE, Brazil.

References

- Bezerra BM, Barnett AA, Souto A & Jones G. 2009. Predation by the Tayra on the common marmoset and the pale-throated three-toed sloth. *Journal of Ethology* 27: 91–96.
- Caetano S & Naciri Y. 2011. The biogeography of seasonally dry tropical forests in South America. Pp. 23-44 in Dirzo R, Young HS, Mooney HA & Ceballos G. (Eds). *Seasonally Dry Tropical Forests: Ecology and Conservation*, Island Press, Washington D.C., U.S.A.
- Camargo CC & Ferrari S. F. 2007. Interactions between Tayras (*Eira barbara*) and red-handed howlers (*Alouatta belzebul*) in eastern Amazonia. *Primates* 48: 147–150.
- Caro T. 2005. The adaptive significance of coloration in mammals. *Bioscience* 55(2): 125–136.
- Cheida CC, Nakano-Oliveira E, Fusco-Costa R, Rocha-Mendes F & Quadros J. 2011. Ordem Carnívora. Pp. 235-288 in Reis N. R., Peracchi A. L., Pedro W. A. & Lima I. P. (Eds). *Mamíferos do Brasil*. Londrina, Brasil.
- Costa RC, Araújo FS & Lima-Verde L. W. 2007. Flora and life-form spectrum of deciduous thorn woodland (Caatinga) in northeastern, Brazil. *Journal of Arid Environments* 68 (2): 237–247.
- Cott HB. 1940. Adaptive coloration in animals. 36 Essex Street. Strand. London WC2.
- Cuarón AD, Reid F, Helgen K & González-Maya JF. 2016. *Eira barbara*. The IUCN Red List of Threatened Species 2016: e.T41644A45212151. <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T41644A45212151.en>. Downloaded on 14 September 2016.
- Davis ML, Kelly MJ & Stauffer D. F. 2011. Carnivore co-existence and habitat use in the Mountain Pine Ridge Forest Reserve, Belize. *Animal Conservation* 14: 56–65.
- Dias DM, Ribeiro AS, Bocchiglieri A & Pereira TC. 2014. Diversidade de carnívoros (Mammalia: Carnivora) da Serra dos Macacos, Tobias Barreto, Sergipe. *Bioscience Journal* 30(4): 1192–1204.
- Feijó A & Langguth A. 2013. Mamíferos de médio e grande porte do nordeste do Brasil: distribuição e taxonomia, com descrição de novas espécies. *Revista Nordestina de Biologia* 22(1/2): 3–225.
- Feijó A, Nunes H & Langguth A. 2016. Mamíferos da Reserva Biológica Guaribas, Paraíba, Brasil. *Revista Nordestina de Biologia* 24(1): 57–74.
- Guedes PG, Silva SSP, Camardella AR, Abreu MFG, Borges-Nojosa DM, Silva JAG & Silva AA. 2000. Diversidade de Mamíferos do Parque Nacional de Ubajara (Ceará, Brasil). *Mastozoología Neotropical* 7(2): 95–100.
- Leal IR, Tabarelli M & Silva JM. C. 2003. *Ecologia e Conservação da Caatinga*. Ed. UFPE, Recife, Brasil.
- Mayle FE. 2004. Assessment of the Neotropical dry forest refugia hypothesis in the light of palaeoecological data and vegetation model simulations. *Journal of Quaternary Science* 19(7): 713–720.
- Oliveira G, Araújo MB, Rangel TF, Alagador D & Diniz-Filho JAF. 2012. Conserving the Brazilian semiarid (Caatinga) biome under climate change. *Biodiversity and Conservation* 21(11): 2913–2926.
- Ortolani A. 1999. Spots, stripes, tail tips and dark eyes: Predicting the function of carnivore colour patterns in carnivores using the comparative method. *Biological Journal of the Linnean Society* 67: 433–476.

- Paula RC, Campos CB & Morato RG. 2011. Mastofauna da Bacia Hidrográfica do Rio São Francisco: Mamíferos de médio e grande porte. Pp. 266-281 in Ministério do Meio Ambiente - MMA. (Org.). *Diagnóstico do macrozoneamento ecológico-econômico da Bacia Hidrográfica do Rio São Francisco*. 1ed. MMA, Brasília, Brasil.
- Pereira LG & Geise L. 2009. Non-flying mammals of Chapada Diamantina (Bahia, Brazil). *Biota Neotropica* 9 (3): 185–196.
- Prado DE. 2005. As Caatingas da América do Sul. Pp. 3-73 in Leal I. R., Tabarelli M. & Silva J. M. C. (Eds). *Ecologia e Conservação da Caatinga*. 2ª ed. Ed. Universitária da UFPE, Recife, Brasil.
- Presley SJ. 2000. *Eira barbara*. *Mammalian Species* 636: 1–6.
- Rodrigues LA, Pontes ARM & Rocha-Campos CC. 2013. Avaliação do risco de extinção da Irapá *Eira barbara* (Linnaeus, 1758) no Brasil. *Biodiversidade Brasileira* 3(1): 195–202.
- Sousa MAN, Langguth A & Gimenez EA. 2004. Mamíferos dos brejos de altitude de Paraíba e Pernambuco. Pp. 229–254 in: Porto K. C., Cabral, J. J. P. & Tabarelli M. (Eds). *Brejos de altitude em Pernambuco e Paraíba – História natural, ecologia e conservação*. MMA/UFPE, Brasília, Brasil.
- Stoner CJ, Bininda-Emonds ORP & Caro T. 2003. The adaptive significance of coloration in lagomorphs. *Biological Journal of the Linnean Society* 79: 309–328.
- Tarifa T, Aliaga E, Ríos B & Hagaman D. 2001. *Mamíferos del Parque Nacional Madidi*. Hisbol. La Paz, Bolívia.
- Tortato FR & Althoff SL. 2007. Variações na coloração de iraras (*Eira barbara* Linnaeus, 1758 - Carnivora, Mustelidae) da Reserva Biológica Estadual do Sassafrás, Santa Catarina, sul do Brasil. *Biota Neotropica* 7(3):365–367.
- Trolle M. 2003. Mammal survey in the Rio Jauaperí region, Rio Negro Basin, the Amazon, Brazil. *Mammalia* 67(1): 75–83.
- Wozencraft WC. 2005. Order Carnivora. Pp. 532-628 in Wilson D. E. & Reeder D. M. (Eds.). *Mammal species of the world: a taxonomic and geographic reference*. The Johns Hopkins University Press, Baltimore, Maryland.