

FIRST RECORDS OF ALBINISM IN GREYHEADED TAYRA (CARNIVORA, MUSTELIDAE) AND OCCURRENCE IN HIGH-ALTITUDE GRASSLAND IN BRAZIL

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The Greyheaded tayra (*Eira barbara* Linnaeus, 1758) (Carnivora: Mustelidae) lives in the Neotropics and occurs from southern Mexico to northern Argentina (Presley 2000). It is one of the most common medium-size carnivores in the tropical forest (Emmons & Feer 1997). The subspecies that occurs in Brazil, *Eira barbara barbara*, presents a brown body with a gray head and a yellowish spot at the bottom of the neck (Presley 2000). Throughout its distribution, some natural variations of color, as well as anomalies caused by leucism, have been identified (Presley 2000, Tarifa *et al.* 2001, Trolle 2003, Reis *et al.* 2005, Tortato & Althoff 2007). Despite being typically a forest dweller that uses floor and tree habitats, this animal can also occupy disturbed habitats and open environments (see Rodrigues *et al.* 2013). The assessment of extinction risk for the species indicated the least-concern category in Brazil and internationally (Rodrigues *et al.* 2013).

The greyheaded tayra can occur from sea level to 2,400 m altitude (Emmons & Feer 1997), but most frequently occurs up to 1,200 meters (Presley 2000). In the Itatiaia massif, which encompasses the Itatiaia National Park (INP), it is known to occur at 1,200 m altitude (Geise *et al.* 2004, Aximoff *et al.* 2015). The INP and its surroundings comprise a large remnant of preserved Atlantic Forest in the highest portion of the Serra da Mantiqueira mountain range, with altitudes ranging from 650 to 2,792 m (Barreto *et al.* 2013). The vegetation is characterized as montane (up to 1,499 m) and upper montane forests (1,500 to 1,999 m), with high altitude grasslands occurring above the tree line (Segadas-Vianna & Dau 1965, Aximoff 2011). In this short communication, we present two rare records of

the Greyheaded tayra: one in high altitude grasslands in the INP and the other of an albinic individual in the INP surroundings (Figure 1).

The INP, located in the southwest of the state of Rio de Janeiro and in southern Minas Gerais, covers an area of 28,156 ha in the Mantiqueira Mountain range in the Atlantic Forest (Oliveira-Filho & Fontes 2000), and it is considered irreplaceable for global biodiversity conservation (Le Saout *et al.* 2013). According to the INP management plan, there are 111 species of mammals in the park (Barreto *et al.* 2013). The weather up to 1,600 m of altitude is a Cwb-mesothermic *sensu* Köppen (1936), with a marked rainy season from November to March, temperatures ranging from -9.2 °C to 23.6 °C, and an annual precipitation of around 2,600 mm (Barreto *et al.* 2013).

The first record was obtained in January 2015 (14h52), when a male was photographed in high-altitude grasslands (22°23'2.53"S; 44°40'57.05"W) above 2,500 m (Figure 2a), the highest altitude recorded for tayra occurrence in Brazil. Although recent studies have identified the occurrence of greyheaded tayra over 2,400 m of altitude in Peru (Rodríguez & Amanzo 2001), Costa Rica (Mooring *et al.* 2011), Colombia (Ramírez-Mejía & Sánchez 2015) and Ecuador (Reyes-Puig *et al.* 2015), all these records were obtained in forest formations in the Andes.

Geise *et al.* (2004) studied the elevational distribution pattern of non-volant mammals in the INP and identified that species richness was higher in montane forest, at 500-1,499 m of altitude, which is in agreement with studies showing that species richness can reach its maximum at mid-elevations (Heaney

2001, McCain 2007). However, recent records revealed that some species of mammals, such as primates (Aximoff 2015, Aximoff & Vaz 2016), rodents (Abreu *et al.* 2016) and bats (Martins 2011), are using higher areas than previously known in the INP. Other species of mammals have expanded their altitudinal range in Brazil (Oliveira *et al.* 2003) and in other countries of South America (Shanee *et al.* 2014).

One of the reasons suggested to explain these new records is that higher altitudes may be associated with relatively low human pressure in the high mountains of the Brazilian Atlantic Forest (Cunha 2010, Aximoff 2015). Furthermore, Raboy *et al.* (2013)

suggest that food resources in high-altitude environments may be more abundant than previously thought. For example, according to Abreu *et al.* (2016), the rodent *Coendou spinosus* was observed for the first time feeding on the flowers of vine species in the high-altitude grasslands of the INP, at the highest altitude ever recorded. These sites may also be used for dispersal of individuals seeking new groups, as has been suggested for primates (Aximoff & Vaz 2016). The tayra, for instance, shows a pattern of long distance movements, travelling 2 to 8 km per day (Emmons & Feer 1997) inside its relatively large home range, which varies from 10 to 24 km² (Presley 2000).

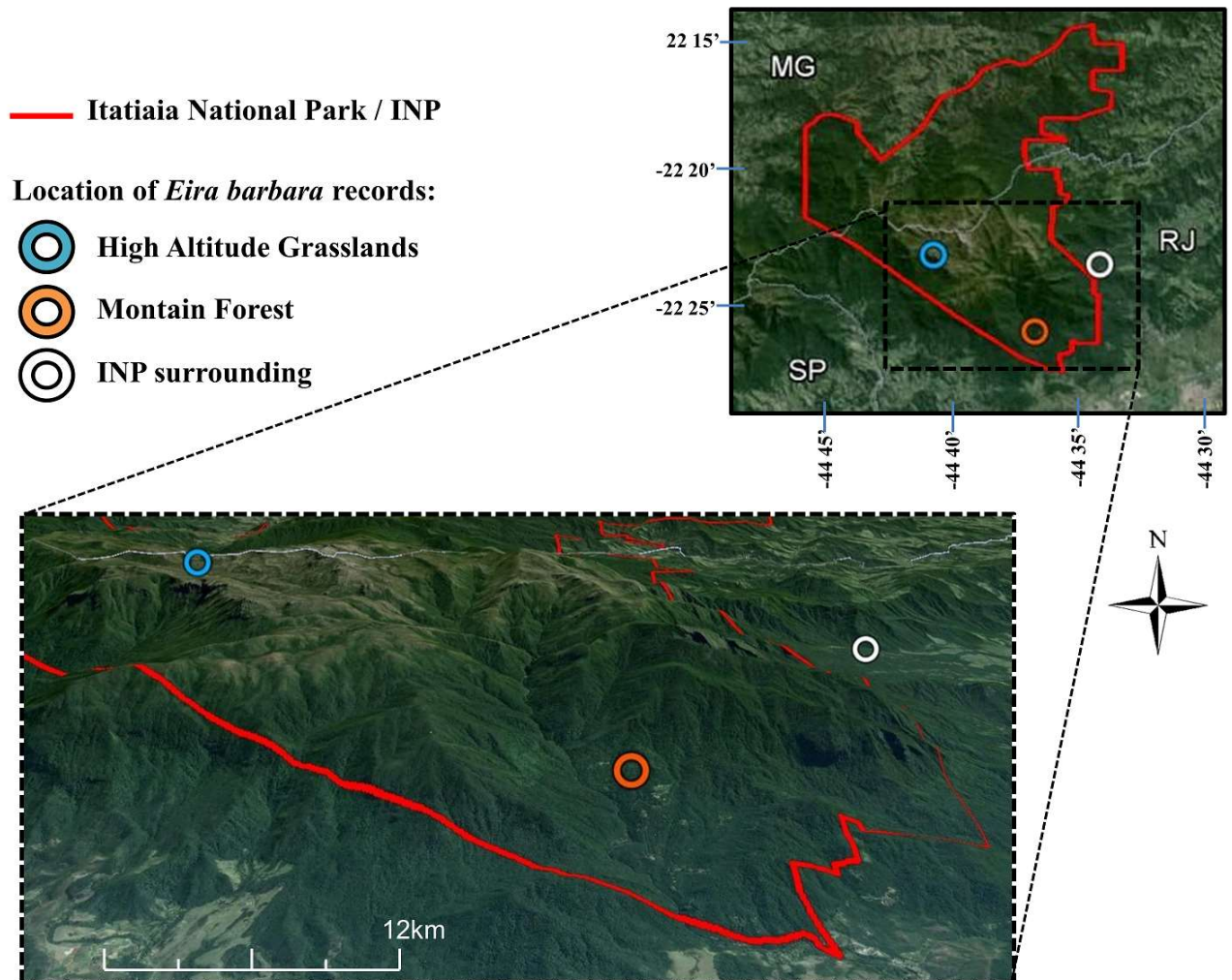


Figure 1. Location of the two new records of the greyheaded tayra on the southern slope of a mountain in the Itatiaia massif, in the Itatiaia National Park, Rio de Janeiro state. White and blue circles indicate the original records presented in this study; the orange circle identifies the area where this species was recorded by others studies (Geise *et al.* 2004, Aximoff *et al.* 2015). In the upper map, the fine white line marks the division of states (SP—São Paulo; MG—Minas Gerais; RJ—Rio de Janeiro).

The albinic tayra was sighted at 09:00 hrs in July, 2015, on the eastern edge of the INP (22°23'24.71"S;44°33'52.16"W). The individual was observed climbing an avocado tree on a private property at 790 m of altitude (Figure 2b). In general, the anomalies are identified as an excess of melanin production (melanism) or a melanin deficit (albinism). According Hofreiter & Schöneberg (2010), a

variation between these two types also exists, with a lack of pigmentation in some parts (piebaldism) or over almost the entire body, except in the extremities of members and the eyes (leucism). Records of abnormal colors that are rarely observed can transmit important information, such as the expression of a recessive gene in isolated populations (Fortes & Bicca-Marques 2008).



Figure 2. a) *Eira barbara* record in high altitude grasslands (2,500 m of altitude) in the Itatiaia National Park; and b) record of an albinic individual in the surroundings of the park, Rio de Janeiro state.

In Neotropical mammals, abnormal coloration has been identified in many groups, including marine species such as whales, dolphins and seals (Schaeff *et al.* 1999, Nascimento *et al.* 2008, Abreu *et al.* 2013), and terrestrial species such as deer, sloth and bats (Oliveira & Aguiar 2008, Oliveira 2009, Xavier *et al.* 2010), among others (see Abreu *et al.* 2013). Greyheaded tayras with leucism have been described in Guyana (Presley 2000), Bolivia (Tarifa *et al.* 2001), and in the north (Trolle 2003) and south of Brazil (Reis *et al.* 2005, Tortato & Althoff 2007). The records of albinism in wild populations are considered rare because the animals are more susceptible to predation due to increased visibility (Sazima & Di-Bernardo 1991). In addition, they have immunological deficiency, which may also result in decreased survival and reduced fecundity (Summers 2009).

Studies of animal distribution along an altitudinal gradient can provide useful information on their ecology and habitat preferences. Although various mammal surveys have been conducted in southeastern Brazil (*e.g.*, Modesto *et al.* 2008a, 2008b, Delciellos *et al.* 2012, Aximoff *et al.* 2015), knowledge of altitudinal ranges is limited. Additionally, the constant human pressures, such as fire and poaching (Aximoff 2011, Aximoff & Rodrigues 2011), indicate the need to expand mammal knowledge mainly through the development of long-term research programs at different altitudes. Despite the occasional records of color anomalies increasing in recent years (*e.g.* Abreu *et al.* 2013), the brown howler monkey at INP (Aximoff & Vaz 2016), little is known regarding the ecological and genetic implications of this condition, which may have a significant influence on the survival of animals.

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REFERENCES

Abreu, M. S. L., Machado, R., Barbieri, F., Freitas, N. S., & Oliveira, L. R. 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(1), 185-194. DOI: 10.1590/S1519-69842013000100020
- Abreu, T. C. K., Rosa, C. A., Aximoff, I., & Passamani, M. 2016. New record of feeding behavior by the porcupine *Coendou spinosus* (F. Cuvier, 1823) in high-altitude grassland of the Brazilian Atlantic Forest. *Mammalia*. DOI: 10.1515/mammalia-2016-0026
- Aximoff, I. 2011. O que perdemos com a passagem do fogo pelos campos de altitude do Estado do Rio de Janeiro. *Revista Biodiversidade Brasileira*, Número Temático: Ecologia e Manejo do Fogo em Áreas Protegidas, 2, 180-200.
- Aximoff, I., & Rodrigues, R. C. 2011. Histórico dos incêndios florestais no Parque Nacional do Itatiaia. *Ciência Florestal*, 21(1), 83-92. DOI: 10.5902/198050982750
- Aximoff, I. 2015. Confirmação da ocorrência do murequi-do-norte (Primates, Atelidae) no Parque Nacional do Itatiaia, Estado do Rio de Janeiro, sudeste do Brasil. *Oecologia Australis*, 18, 1-5.
- Aximoff, I., Cronemberger, C., & Pereira, F. A. 2015. Amostragem de longa duração por armadilhas fotográficas dos mamíferos terrestres em dois parques nacionais no estado do Rio de Janeiro. *Oecologia Australis*, 19(1), 215-231. DOI: 10.4257/oeco.2015.1901.14
- Aximoff, I., & Vaz, S. M. 2016. Bugio-ruivo (Primates, Atelidae) em campos de altitude e com anomalia na coloração no Parque Nacional do Itatiaia, sudeste do Brasil. *Oecologia Australis*, 20(1), 122-127. DOI: 10.4257/oeco.2016.2001.10
- Barreto, C. G., Campos, J. B., Schwarzstein, N. T., Alves G. S. G. & Coelho, W. 2013. Análise da Região da Unidade de Conservação. In: Plano de Manejo Parque Nacional do Itatiaia, Encartes 2 e 3. Instituto Chico Mendes de Conservação da Biodiversidade, Brasília. p. 117.
- Cunha, A. A. 2010. Negative effects of tourism in a Brazilian Atlantic forest National Park. *Journal for Nature Conservation*, 18(4), 291-295. DOI: 10.1016/j.jnc.2010.01.001
- Delciellos, A. C., Novaes, R. L. M., Loguercio, M. F. C., Geise, L., Santori, R. T., Souza, R. F., Papi, B. S., Vieira, D. R. N. R., Felix, S., Detogne, N., Silva, C. C. S., Bergallo, H. G. & Rocha-Barbosa, O. 2012. Mammals of Serra da Bocaina National Park, state of Rio de Janeiro, southeastern Brazil. *Check List* 8:675-692.
- Emmons, L. H., & Feer, F. 1997. Neotropical rainforest mammals: a field guide. 2nd ed. Chicago, IL: The University of Chicago Press: p. 396.
- Fortes, V. B., & Bicca-Marques, J. C. 2008. Abnormal pelage color in an isolated population of *Alouatta guariba clamitans* Cabrera, 1940 in South Brazil. *International Journal of Primatology*, 29(3), 717-722. DOI: 10.1007/s10764-008-9264-7
- Geise, L., Pereira, L. G., Bossi, D. E. P., & Bergallo, H. G. 2004. Pattern of elevational distribution and richness of non-volant mammals in Itatiaia National Park and its surroundings, in southeastern Brazil. *Brazilian Journal of Biology*, 64(3B), 599-612.

- Heaney, L. R. 2001. Small mammal diversity along elevational gradients in the Philippines: an assessment of patterns and hypotheses. *Global Ecology and Biogeography*, 10(1), 15-39. DOI: 10.1046/j.1466-822x.2001.00227.x
- Hofreiter, M., & Schöneberg, T. 2010. The genetic and evolutionary basis of colour variation in vertebrates. *Cellular and Molecular Life Sciences*, 67(15), 2591-2603. DOI: 10.1007/s00018-010-0333-7
- Köppen, W. 1936. Das geographische System der Klimate. In: (W. Köppen and R. Geiger, eds.) *Klimatologie*. Gebr. Borntraeger, Germany. p. 44.
- Le Saout, S., Hoffmann, M., Shi, Y., Hughes, A., Bernard, C., Brooks, T. M., Bertzky, B., Butchart, S. H. M., Stuart, S. N., Badman, T., & Rodrigues, A. S. L. 2013. Protected areas and effective biodiversity conservation. *Science*, 342(6160), 803-805. DOI: 10.1126/science.1239268
- Martins, M. A. 2011. Riqueza, diversidade de espécies e variação altitudinal de morcegos (Mammalia, Chiroptera) no Parque Nacional do Itatiaia, Rio de Janeiro, Brasil. Instituto de Biologia da Universidade Federal Rural do Rio de Janeiro. p. 62. Retrieved from http://r1.ufrj.br/labmasto/publicacoes/Mayara_Almeida_Martins_2011.pdf
- McCain, C. M. 2007. Area and mammalian elevational diversity. *Ecology*, 88(1), 76-86. DOI: 10.1890/0012-9658(2007)88[76:AAMED]2.0.CO;2
- Modesto, T. C., Pessôa, F. S., Enrici, M. C., Jordão-Nogueira, N. A. T., Costa, L. M., Alburquerque, H. G. & Bergallo, H. G. 2008a. Mamíferos do Parque Estadual do Desengano, Rio de Janeiro, Brasil. *Biota Neotropica* 8, 153-159.
- Modesto, T. C., Pessôa, F. S., Jordão-Nogueira, N. A. T., Enrici, M. C., Costa, L. M., Attias, N., Alburquerque, H. G., Pereira, B. C., Esbérard, C. E. L. & Bergallo, H. G. 2008b. Mammals, Serra da Concórdia, state of Rio de Janeiro, Brazil. *Check list* 4, 341-348.
- Mooring, M., Bryce, C., Dahl, R., Fares, A., & Stull, T. 2011. Savegre Valley Mammal Study. Progress Report 2011; p. 23. San Diego: Point Loma Nazarene University. Retrieved from http://www.pointloma.edu/sites/default/files/filemanager/Biology/Summer_Research/Moorings_Research/Savegre_Progress_Report_2011.pdf
- Nascimento, L. F., Spinelli, L. H. P., Santos Jr., E., Queiroz, R. E. M., Pansard, K. C. A., Medeiros, P. I. A. P., Gondim, M. A., Jesus, A. H., Silva, F. J. L., & Yamamoto, E. M. 2008. Atypical coloration in a specimen of estuarine dolphin, *Sotalia guianensis*, on the littoral of the state of Rio Grande do Norte, north-east Brazil. *Marine Biodiversity Records*, 1, e89.
- Oliveira-Filho, A.T. and Fontes M.A.L. 2000. Patterns of floristic differentiation among Atlantic Forests in Southeastern Brazil and the influence of climate. *Biotropica*, 32, 793-810.
- Oliveira, L. C., Câmara, E. M. V., Hirsch, A., Paschoal, A. M. O., Alvarenga, R. M., & Belarmino, M. G. 2003. *Callithrix geoffroyi* (Primates: Callitrichidae) and *Alouatta caraya* (Primates: Atelidae) in the Serra do Cipó National Park, Minas Gerais, Brazil. *Neotropical Primates*, 11(2), 86-89.
- Oliveira, H. F. M., & Aguiar, L. M. S. 2008. A new case of complete albinism in a bat from Brazil. *Chiroptera Neotropical*, 14(2), 421-423.
- Oliveira, S. V. 2009. Albinismo parcial em cutia *Dasyprocta azarae* Lichtenstein, 1823 (Rodentia, Dasyproctidae), no sul do Brasil. *Biotemas*, 22(4), 243-246. DOI: 10.5007/2175-7925.2009v22n4p243
- Presley, S. J. 2000. *Eira Barbara*. *Mammalian Species*, 636, 1-6.
- Raboy, B. E., Neves, L. G., Zeigler, S. L., & Oliveira, L. C. 2013. Occurrences of the Golden-headed Lion Tamarin (*Leontopithecus chrysomelas*) above 500 meters in Southern Bahia, Brazil and Implications for Conservation Planning. *Primate Conservation*, 26(1), 25-31. DOI: 10.1896/052.026.0108
- Ramírez-Mejía, A. F., & Sánchez, F. 2015. Non-volant mammals in a protected area on the Central Andes of Colombia: new records for the Caldas department and the Chinchiná River basin. *Check List*, 11(2), 1-6. DOI: 10.15560/11.2.1582
- Reis, N. R., Peracchi, A. L., Fandiño-Marino, H., & Rocha, V. J. 2005. Mamíferos da Fazenda Monte Alegre – Paraná. 1st ed. Londrina, PR: Eduel: p. 224.
- Reyes-Puig, C., Ríos-Alvear, G., & Reyes-Puig, J. P. 2015. Notable ampliación del rango altitudinal de Eira barbara Cabeza de Mate (Mammalia: Mustelidae). *Avances en Ciencias e Ingenierías*, 7(1), B98-B102. DOI: 10.18272/aci.v7i1.229
- Rodrigues, L. A., Pontes, A. R. M., & Rocha-Campos, C. C. 2013. Avaliação do risco de extinção da irara *Eira barbara* (Linnaeus, 1758) no Brasil. *Biodiversidade Brasileira*, 3(1), 195-202.
- Rodríguez, J. J., & Amanzo, J. M. 2001. Medium and large mammals of the southern Vilcabamba region, Perú. In: L. E. Alonso, A. Alonso, T. S. Schulenberg & F. Dallmeier (Eds.), *RAP Working Papers - Biological and social assessments of the Cordillera de Vilcabamba, Peru*. pp. 117-126. Washington: Conservation International.
- Sazima, I., & Di-Bernardo, M. 1991. Albinismo em serpentes neotropicais. *Memórias do Instituto Butantan*, 53(2), 167-173.
- Schaeff, C. M., Best, P. B., Rowntree, V. J., Payne, R., Jarvis, C., & Portway, V. A. 1999. Dorsal skin color patterns among southern right whales (*Eubalaena australis*): genetic basis and evolutionary significance. *The Journal of Heredity*, 90(4), 464-471.
- Segadas-Vianna, F., & Dau, L. 1965. Ecology of Itatiaia range, southeastern Brazil: II Climates and altitudinal climatic zonation. *Arquivos do Museu Nacional*, 53, 31-53.
- Shanee, S., Shanee, N., Campbell, N., & Allgas, N. 2014. Biogeography and conservation of Andean primates in Peru. In: N. B. Grow, S. Gursky-Doyen & A. Krzton (Eds.), *High altitude primates*. pp. 63-83. New York: Springer-Verlag.
- Summers, C. G. 2009. Albinism: classification, clinical characteristics, and recent findings. *Optometry and Vision Science*, 86(6), 659-662. DOI: 10.1097/OPX.0b013e3181a5254c
- Tarifa, T., Aliaga, E., Ríos, B., & Hagaman, D. 2001. Mamíferos del Parque Nacional Madidi. 1st ed. La Paz, BO: Hisbol: p. 187.
- Tortato, F. R., & Althoff, S. L. 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. DOI: 10.1590/S1676-06032007000300038
- Trolle, M. 2003. Mammal survey in the Rio Jauaperí region, Rio Negro Basin, the Amazon, Brazil. *Mammalia*, 67(1), 75-84. DOI: 10.1515/mamm.2003.67.1.75
- Xavier, G. A. A., Oliveira, M. A. B., Quirino, A. A., & Mota, R. A. 2010. Albinismo total em preguiças-de-garganta-marrom *Bradypus variegatus* (Schinz, 1825) no Estado de Pernambuco, Brasil. *Edentata*, 11(1), 1-3. DOI: 10.1896/020.011.0101

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