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Leucism occurrence frequency in an island population of tayra (*Eira barbara*), in Roraima, Brazil: A comparative analysis with camera trap records

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ABSTRACT

Carnivores have a wide variation of color patterns that serve both ecological and physiological functions. However, genetic mutations can lead to the appearance of unusual color patterns, which can directly influence the survival of individuals. *Eira barbara* is a mustelid usually presenting dark brown fur coloration, but anomalous color variation including leucism has been reported. Here we describe suspected leucism in an island population and compare its frequency of occurrence with previous camera trap studies. We reviewed the scientific literature to identify studies reporting leucism in this species. From an extensive camera trapping effort we report the first cases of suspected leucism in an island population of *E. barbara*. We discuss these findings in terms of the ecology and conservation of island populations of this species.

KEYWORDS: Amazonia, Mustelidae, coloration, color pattern, Maracá Island

Frequência de ocorrência de leucismo em uma população insular de irara (*Eira barbara*) em Roraima, Brasil: Uma análise comparativa com registros de armadilhas fotográficas

RESUMO

Carnívoros apresentam grande variedade de padrões de coloração que têm funções tanto ecológicas quanto fisiológicas. Porém, mutações genéticas podem levar à aparição de padrões de cores não usuais, o que pode interferir diretamente na sobrevivência dos indivíduos. *Eira barbara* é um mustelídeo que usualmente apresenta pelagem marrom escura, mas variações de cor, incluindo leucismo, foram reportadas. Aqui descrevemos a suspeita de leucismo em uma população insular e comparamos sua frequência de ocorrência com estudos anteriores de armadilhas fotográficas. Revisamos a literatura científica para encontrar estudos relatando leucismo nesta espécie. A partir de um extensivo esforço de armadilhagem fotográfica, nós reportamos os primeiros casos de provável leucismo em uma população insular de *E. barbara*. Discutimos esses achados em termos de ecologia e conservação de populações insulares dessa espécie.

PALAVRAS-CHAVE: Amazônia, mustelídeos, coloração, padrão de cores, Ilha de Maracá

INTRODUCTION

Coloration is involved in myriad life processes across the animal kingdom (Cuthill *et al.* 2017; Endler and Mappes 2017). Although the importance of coloration has been recognized for centuries, the proximate ecological and ultimate evolutionary consequences of color variation remains a focus of study and debate (Endler and Mappes 2017). There is still a lack of understanding as to how color patterns relate to function and fitness, including the direct fitness effects of color variation (Cuthill *et al.* 2017; Endler and Mappes 2017).

Following Gloger's rule, mammals are expected to have darker coloration in the tropics (Delhey 2019). This pattern results from associations between climatic variation and coloration, including the differential effects of humidity and temperature on both main types of melanin pigments – eu- and phaeo-melanin (Delhey 2019). The distribution of eumelanin (black and brown coloration) and phaeomelanin (red and yellow coloration) in the skin, hair and eyes of animals defines different color phenotypes (Prota 1980; Sánchez-Ferrer *et al.* 1995; Fertl and Rosel 2002; Hofreiter and Schöneberg 2010; Elkin *et al.* 2023).

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The complex interplay of genetic and environmental factors drives color variation (Delhey 2019). Anomalous coloration is a rare phenomenon among wild animals (Walter 1938; Fertl and Rosel 2002; Hofreiter and Schöneberg 2010; Abreu *et al.* 2013), occurring in only one in 20,000 individuals (Walter 1938). Leucism is a condition involving a partial or total lack of pigmentation causing individuals to appear partially or entirely white (Miller 2005; Acevedo and Aguayo 2008). Leucism describes a variety of phenotypes that result from defects in melanin differentiation and/or transport/migration/distribution to skin, hair, or feathers during development. Here we follow Miller (2005) and Acevedo and Aguayo (2008) in defining leucism as a condition involving the partial or total reduction of pigmentation without affecting soft tissues such as eyes and skin, which retain normal coloration. Additional terms are used to describe other phenotypically characteristic anomalous whitening in mammals (Acevedo and Aguayo 2008; Abreu *et al.* 2013; Lucati and López-Baucells 2017; Olson and Allen 2019; Hofmeester *et al.* 2021). This includes terms such as hypopigmentation (a more general term including various whitening phenotypes) and piebald (irregular patches of two or more colors). There is, however, no clearly defined basis to separate leucistic phenotypes solely on visual observation of phenotypic characteristics in mammals (Stoner *et al.* 2003; Caro 2005; Acevedo and Aguayo 2008; Abreu *et al.* 2013; Brito and Valdivieso-Bermeo 2016; Lucati and López-Baucells 2017; Olson and Allen 2019; Caro and Mallarino 2020; Hofmeester *et al.* 2021).

Among mammals, carnivores (order Carnivora) have high variation of color patterns ranging from white to black (Ortolani 1999). There are 200 species of carnivores with approximately 58 different color patterns across different parts of the body (Ortolani 1999). The ecological relevance of anomalous coloration including leucism in carnivores is still poorly understood (Olson and Allen 2019; Caro and Mallarino 2020). A recent review found that, within Mammalia, carnivores were the order with the second highest number of leucistic records (Olson and Allen 2019). Unlike albinism (lack of melanin), leucism appears to be associated with alterations in melanin transport. The genetic basis of leucism is complex, and not all cases of leucism may be caused by the same set of genes or alleles. Evidence suggests that recessive alleles are associated with leucism in some species (Bechtel and Bechtel 1985). Although abnormal coloration is frequently associated with recessive genes in mammals, further genetic research is needed to understand the specific genes involved in each case and their inheritance patterns (Hofreiter and Schöneberg 2010; Caro and Mallarino 2020; Elkin *et al.* 2023). To the extent of our knowledge, there are no studies evaluating the genetic basis of leucism in carnivores.

The association of anomalous coloration with recessive alleles (Hofreiter and Schöneberg 2010; Elkin *et al.* 2023) means an increased prevalence of anomalous colors could be expected in island populations due to inbreeding depression (Robinson *et al.* 2018). For example, elevated frequencies of leucism were registered in inbred populations by Bensch *et al.* (2000), who found an occurrence of 4.5% in a recently founded population of great reed warblers. It is however unknown how, or the degree to which, anomalous colors are expressed in island populations of mammals. The island rule states that small mammals evolve to larger sizes and large species to smaller sizes on islands, to better suit island environments (Damuth 1993). Additionally, the ecological niches on islands for large predators may be occupied by smaller carnivores, or species that were generalists in other contexts.

Mustelids are a generalist group that occupies diverse niches across the globe (Nowak 1999). It is therefore likely that mustelids are able to adapt to fit the different niches available on islands. Within the Mustelidae, leucism has been documented most frequently in the tropics, and 14 of the 18 records for mustelids were for leucistic tayras (Olson and Allen 2019). The tayra, *Eira barbara* (Linnaeus, 1758) is widely distributed across the neotropics (Presley 2000). Its coloration varies (Thomas 1900; Presley 2000; Villafañe-Trujillo *et al.* 2018), but is usually dark brown or black on the body and limbs, contrasting with the head and neck, which tend to be lighter (Emmons and Feer 1997; Presley 2000; Cheida *et al.* 2011; Feijó and Langguth 2013). Previous studies suggested that tayra coloration varies among subspecies and geographic location (Presley 2000; Wozencraft 2005). A more recent analysis, however, challenges the use of coloration for characterization of tayra subspecies (Schiaffini 2020). Anomalous coloration in tayras includes albinism (Aximoff and da Rocha 2016) and leucism (Talamoni *et al.* 2017).

Although many of the known records of leucistic tayra are from museum collections (Talamoni *et al.* 2017), there is an increasing number of new records from camera traps (Scrich *et al.* 2019). Camera traps are ideal to study the presence and frequency of abnormal coloration in wild populations, as they reduce known biases of museum specimens (taxidermy and temporal changes in coloration) and sightings (difficult to verify and compare). While anomalous coloration has been documented previously in tayra, these observations have not been presented in a standardized format, making it difficult to assess the frequency of occurrence. Here we describe suspected leucism in an island population of tayra and compare the detection frequency with previous camera trap studies.

MATERIAL AND METHODS

Bibliographic survey

We conducted a bibliographic search to identify records of tayras with anomalous coloration. We included studies from recent reviews (Talamoni *et al.* 2017; Olson and Allen 2019) and conducted additional searches in the Web of Science core collection and SciELO Citation Index databases. Searches were conducted in English, Spanish and Portuguese, using the terms (*Eira barbara* OR tayra OR mustelid OR musteildae OR carnivore OR carnivora OR carnívoro OR mustélido) AND (abnormal coloration OR anomalous coloration OR abnormal coloration OR anomalous coloration OR leucistic OR leucism OR albino OR albinism OR partial albinism OR chromatic anomalies OR coloração anormal OR coloração anômala OR leucística OR coloración aberrante OR coloración anormal OR coloración anómala OR anomalías cromáticas OR leucista).

After removal of duplicates the search resulted in 24 studies. The titles and abstracts of all studies were read and 12 were excluded that did not potentially include the study species. The remaining 12 studies were read in full text and two were excluded that did not refer to tayras with anomalous coloration. This resulted in 10 studies that presented data on anomalous coloration in tayra. We also checked the references cited within the studies and subsequent publications citing the studies using Google Scholar to search grey literature including reports and theses. This provided an additional study reporting a new location of tayra with anomalous coloration. The data (e.g., descriptions and photos) in these 11 studies were then carefully examined to check if the anomalous coloration could be classified as leucism following our definition. None of the reported cases included piebald-like phenotypes, although it remains possible that other forms of hypopigmentation could be classified as leucistic tayra. Due to the lack of a standard definition among studies, here we adopt the term leucistic to encompass the diverse definitions of anomalous whitening phenotypes reported. We analyzed and compared the records obtained by date, geographical coordinates, biome, and whether or not the individual was part of an island population.

From the studies that used camera traps we compared the detection frequency of records of leucistic animals. Here we assume that the detection frequency is proportional to the occurrence of leucism in the population. We calculated the detection frequency of leucism as the number of independent records/100 camera trap days. We considered independent records photos on the same location separated by more than one hour or in a different location (Cusack *et al.* 2015). We then compared the detection frequency of leucistic tayras between island and mainland populations. We used mainland populations to generate a 95% confidence interval of detection frequency via bootstrap randomization, where the median of the mainland detection frequencies was calculated through replacement at random over 1000 iterations. To test for a significant difference, the value obtained from the island population (leucism records/100 camera trap days) was compared to this 95% confidence interval for mainland populations. All analyses were performed in R-software v. 4.1.3 (R Core Team 2022) using the overlap package v0.3.4 (Ridout and Linkie 2009).

Camera trap survey

The records were obtained at Maracá Island Ecological Reserve (3º24'26"N, 61º29'13"W), on a 1,013.12 km^2 fluvial island in the middle of the Uraricuera River, state of Roraima, Brazil. Maracá Island Ecological Reserve was created in 1981 and is categorized by the International Union for Conservation of Nature (IUCN) as a Strict nature reserve, and as a fully protected area by the Brazilian National System of Conservation Units (SNUC in Portuguese). Maracá includes vegetation mosaics transitioning between savanna and forest formations, mostly *terra-firme* forest (Milliken and Ratter 1998). The climate is humid tropical, with an average annual temperature between 23.6 ºC and 36.6 ºC (Brasil 2015), and annual precipitation ranges between 1700 mm and 2400 mm, heavy precipitation occurs during the rainy season, which starts in May and lasts until July (ANA 2024).

We conducted camera trap surveys for nine months over two years. A total of 60 camera traps (Bushnell Trophy cam HD) were installed during two consecutive dry seasons (15 December 2018 to 20 February 2019 and 7 February to 30 April 2020) and three months of heavy rainfall (1 May to 18 July 2020). During each trapping period, the 60 cameras were installed in a grid arrangement extending across approximately 12% (129 km^2) of the reserve. The cameras were installed with a spacing of approximately 1.4 kilometers between nearest neighbors (range 1.2 to 1.4 km). Each camera was attached to a tree at a height of 30-50 cm above the ground. Excess foliage and undergrowth were removed from in front of the cameras to reduce false triggers. Cameras were installed so that there was no direct sunlight over the motion sensor, which also helped to avoid false triggers due to light variation. The camera traps were unbaited and remained continuously active 24 hours a day.

RESULTS

Bibliographic survey

We found 11 studies reporting locations of tayras with abnormal coloration on mainland Brazil, totalling 18 locations and 26 individuals (Figure 1; Table 1). Despite a long history of anomalous coloration in tayras (Thomas 1900; Talamoni *et al.* 2017), observations of abnormal coloration in live animals in nature were only reported for the first time in Brazil in 2003, when a single individual was camera trapped in Xixuau Nature Reserve, in the state of Roraima in the Amazon (Table 1). Subsequent reports were from the Atlantic Forest, Cerrado, and Caatinga biomes (Table 1). Eight individual location records were reported from the Amazon in four studies, the most recent of two leucistic individuals in Roraima (Mendes Pontes *et al* 2020).

Table 1. Records of leucistic tayras, *Eyra barbara* in Brazil, listed by federal state and biome, and whether the record was on an island. Due to the lack of a standard definition among studies, the term "leucistic" encompasses diverse definitions of anomalous whitening phenotypes. The *ad hoc* method indicates an occasional record, usually through sighting and, when possible, photographic record. Biome classification follows IBGE (2019).

State	Date	Biome	Geographic coordinates	Method	Island	Source
Roraima	2003	Amazon Forest	0°48.023’S, 6l°33.476’W	Camera trap	No	Trolle (2003)
Roraima	Feb 2008	Amazon Forest	1°17’24.6”N, 60°23’56.5”W	Line transect	No	Mendes Pontes *et al.* (2020)
Roraima	Dec 2018	Amazon Forest	3º24’26”N, 61º29’13”W	Camera trap	Yes	Present study
Roraima	Jan 2019	Amazon Forest	3º24’26”N, 61º29’13”W	Camera trap	Yes	Present study
Amazonas	2014	Amazon Forest	2°23’23.65”S, 59°52’45.96”W	*ad hoc*	No	Sobroza *et al.* (2016)
Pará	1965	Amazon Forest	1°48’0.000”S, 50°16’59.880”W	Museum specimen	No	Talamoni *et al.* (2017)
Pará	1977	Amazon Forest	1°06’57.20”S, 57°05’24.50”W	Museum specimen	No	Talamoni *et al.* (2017)
Pará	1978	Amazon Forest	1°06’57.20”S, 57°05’24.50”W	Museum specimen	No	Talamoni *et al.* (2017)
Pará	-	Amazon Forest	1°28’20.0”S, 56°22’35.5”W	Museum specimen	No	Talamoni *et al.* (2017)
Pará	2007	Amazon Forest	1°28’20.0”S, 56°22’35.5”W	Museum specimen	No	Talamoni *et al.* (2017)
Pará	1978	-	-	Museum specimen	No	Talamoni *et al.* (2017)
Ceará	2013-2015	Caatinga	5°08’24”S, 40°54’14”W	Camera trap	No	Dias (2018)
Minas Gerais	Jan 2009	Atlantic Forest	20°0’51”S, 43°29’28”W	Museum specimen	No	Talamoni *et al.* (2017)
Minas Gerais	Feb 2009	Atlantic Forest	20°0’51”S, 43°29’28”W	Museum specimen	No	Talamoni *et al.* (2017)
Minas Gerais	2012	Cerrado/Atlantic Forest	20°0’51”S, 43°29’28”W	*ad hoc*	No	Talamoni *et al.* (2017)
Minas Gerais	2016	Cerrado/Atlantic Forest	20°0’51”S, 43°29’28”W	*ad hoc*	No	Talamoni *et al.* (2017)
Rio de Janeiro	2015	Atlantic Forest	22°23’24.71”S, 44°33’52.16”W	*ad hoc*	No	Aximoff and da Rocha (2016)
São Paulo	Oct 2018	Atlantic Forest	22°18’44”S, 48°31’26”W	Camera trap	No	Greghi *et al.* (2020)
São Paulo	Feb 2019	Atlantic Forest	22°18’50”S, 48°30’50”W	Camera trap	No	Greghi *et al.* (2020)
São Paulo	Mar 2019	Atlantic Forest	22°18’50”S, 48°30’50”W	Camera trap	No	Greghi *et al.* (2020)
Paraná	2006	Atlantic Forest/Cerrado	24°12’42”S, 50° 33’26”W	*ad hoc*	No	dos Reis *et al.* (2005)
Santa Catarina	2007	Atlantic Forest	26°42”S, 49°40”W	Camera trap	No	Tortato and Althoff (2007)
Santa Catarina	Jun 2015	Atlantic Forest	27º32’48”S, 48º26’06”W	Camera trap	No	Aximoff *et al.* (2021)

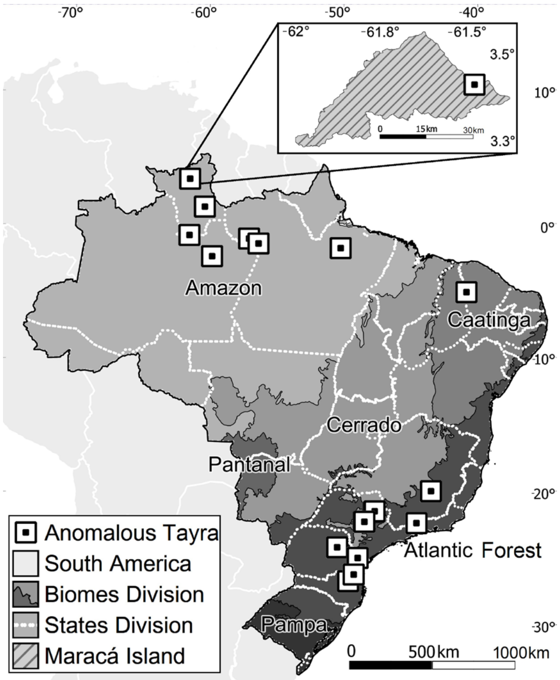

Figure 1. Location of records of leucistic tayras (*Eira barbara*) throughout different biomes and states within Brazil. The inset shows the contours and geographical coordinates of Maracá Island, in Roraima state. Squares can overlap due to the proximity of locations or when the study did not specify geographic locations for different individuals (see Table 1 for complete list).

Camera trap surveys

Overall, we obtained a total of 151 independent images of tayras (with at least 24 hours between photographs by the same camera) during 11,538 camera trap days in the two sampling periods in dry season 2018-2019 and 2020 (3,540 and 7,998 camera trap days, respectively) (Pinheiro-Costa 2022). Two images were of leucistic tayra (Figure 2), obtained during the 2018-2019 period, on December 12, 2018, at 12:40 pm, and 35 days later on January 16, 2019, at 06:29 am.

Both records showed a leucistic adult with apparently healthy body condition (Figure 2). No leucistic individual was recorded a year later during the second dry-season survey in 2020. The photographs were taken 1.4 km from each other; a distance within the home range reported by telemetry studies (5 km^2 to 24 km^2 (Konecny 1989; Michalski *et al.* 2006)). It was therefore not possible to determine if the records were from one or two individuals, as the photographs were taken from different sides, and we did not follow the tayras individually.

Six camera trap studies on mainland sites informed the overall sampling effort (Table 2) and were used to calculate the detection frequency of leucistic tayras. The median detection frequency on mainland was 0.12 (range 0.01 to 0.91 records/100 camera days). The detection frequency on Maracá (0.02 records/100 camera days) was lower than the 95% confidence interval for leucistic records on mainland sites

Figure 2. Coloration of tayra (*Eira barbara*) photographed at different camera-trap locations on Maracá Island, Roraima state (Brazil). **A** – pair with normal coloration; **B** and **C** – leucistic tayra registered a month apart, 1.4 km distant from each other. Full quality images are available at https://figshare.com/s/ebe743ecb15b32d7f25c.

Table 2. Detection frequency of leucistic tayras (*Eira barbara*) relative to tayras with normal coloration in camera trap studies in different biomes in Brazil. The term leucism here encompasses diverse definitions of anomalous whitening phenotypes (see Material and Methods for details). CT locations = number of locations monitored with camera traps; CT days = camera-trap days (number of cameras x number of sample days); N photos = number of photographs showing tayras, tayras with normal coloration, and leucistic tayras; DF = detection frequency (independent records per 100 camera-trap days); NR = not reported. Records of a species are considered independent with at least 24 hours between photographs made by the same camera.

Biome/Reference	CT locations	CT days	Coloration						Observation
			Overall		Normal		Leucistic		
			N photos	DF	N photos	DF	N photos	DF	
Amazon									
Trolle 2003	NR	NR	1	-	0	-	1	-	
Gonçalves 2013	30	1800	8	0.44	8	0.44	0	0	Leucistic tayra present (Sobroza *et al* 2016), but not recorded by camera traps.
Present study	60	11,538	151	1.31	149	1.29	2	0.02	
Atlantic Forest (Araucaria Forest)									
Aximoff *et al.* 2021, Hübel *et al.* 2021	16	7,300	236	3.23	235	3.22	1	0.01	
Atlantic Forest (other)									
Tortato and Althoff 2007	17	660	21	3.12	15	2.27	6	0.91	
Greghi *et al.* 2020	2	744	NR	-	NR	-	3	0.40	
Cerrado/Atlantic Forest transition									
Scrich *et al.* 2019	208	6,380	NR	-	NR	-	1	0.02	Record of two leucistic individuals walking together.
Caatinga									
Dias 2018	40	4,338	10	0.25	5	0.12	5	0.12	Identified as same individual. Photographed together with a normal colored individual.

(0.04 to 0.63 records/100 camera days). It was only possible to compare the detection frequency of images of leucistic individuals to those of individuals with normal coloration in four of the seven camera trap studies where leucism was recorded (Table 2). The ratio of leucistic to normal coloration records on mainland sites ranged from 1:1 (Dias 2018) to 1:236 (Aximoff *et al.* 2021; Hübel *et al.* 2021). The ratio of leucism on Maracá Island (1:75) was within this range of values from the mainland (Table 2).

DISCUSSION

Our camera-trap records provide strong evidence of leucism based on established definitions of anomalous color (Fertl and Rosel 2002). The individuals on both photographs show white color in the guard hairs, but with dark pigmentation on the body extremities (nose, muzzle, ear lobes and paw pads). Therefore both individuals can be considered to have leucism, which has been defined as a condition involving the partial or total reduction of pigmentation without affecting soft tissues such as eyes and skin, which retain normal coloration (Miller 2005; Acevedo and Aguayo 2008).

We found no evidence of increased frequency of anomalous coloration (leucism) on Maracá Island compared with mainland areas. Small and isolated island populations will most likely lead to endogamy causing recessive alleles to be expressed more frequently (Bensch *et al.* 2000). It could therefore be expected that leucism, which has been shown to result from the expression of recessive alleles in different animal groups (Bechtel and Bechtel 1985; Bensch *et al.* 2000) could appear more frequently in individuals of island populations. Yet, the occurrence frequency of leucistic tayras (0.02 photos per 100 camera trap days) on Maracá was within the range reported from mainland areas. While there are several non-mutually exclusive explanations, one possibility is genetic purging. This process occurs when natural selection exerts stronger pressure against alleles that reduce overall individual fitness (Robinson *et al.* 2018). Consequently, if the mortality rate of leucistic individuals increases, this will prevent leucism from reaching high frequencies within island populations.

While the lifespan of tayras in nature is uncertain, tayra are known to live for 18 years in captivity (Grzimek 1990). To our knowledge, the lifespan of leucistic tayras has never been documented. Individuals with anomalous coloration may have lower survival rates due to factors including greater susceptibility to predation and lower hunting success (Miller 2005). The presence of adult leucistic tayras among other individuals suggests that the anomalous coat coloration does not cause disadvantages in socialization with individuals of the same species (Dias 2018; Mendes Pontes *et al.* 2020). The individual/s we photographed on Maracá appeared to be in good physical condition, which was expected as tayras have a generalist omnivore diet (Galef *et al.* 1976; Konecny 1989; Presley 2000; Grotta *et al.* 2021). There is therefore no evidence to suggest that such anomalous coloration would negatively impact an individual's ability to obtain food resources. However, leucism could make tayras more visible and thus more vulnerable to larger, visually oriented potential predators such as jaguars (*Panthera onca* Linnaeus, 1758) and pumas (*Puma concolor* Linnaeus, 1771), both of which occur on the island (Brasil 2015).

While camera traps have great potential to monitor isolated populations susceptible to genetic inbreeding through photographic evidence of abnormal coloration, there are important caveats to our findings. Firstly, establishing more detailed insight into the occurrence and relevance of rare phenomena such as leucism will always be challenging. As leucism is rare it is hard to detect. In our study, at least 660 camera trap days were needed to record leucistic individuals. At the same time, leucism may remain undetected with an effort of 1800 camera trap days (Gonçalves 2013; Sobroza *et al.* 2016). Like many studies, our original focus was not individual identification, and there is a need for future studies to include paired camera traps to enable more robust individual identification and population size estimates (Karanth 1995). Secondly, additional genetic data is required to definitively confirm leucism (Murakami *et al.* 2022). To generate more detailed understanding of island populations, the camera traps could be complemented by additional techniques. These could include fur traps that would enable non-invasive genetic analysis (Foran *et al* 1997) and scat surveys to establish the presence of tayra in the diets of jaguar and pumas on Maracá (Klare *et al.* 2011).

As mutations in mustelid coloration are frequently reported (Olson and Allen 2019), mustelids could represent an important group for monitoring genetic inbreeding with camera traps. Yet, our comparison with previous camera trap studies revealed biases that limit the potential insights. There was clear geographic bias in reporting of leucism. It appears that anomalous coloration is infrequently reported outside Brazil and reports frequently lack metadata that enable comparative analyses. For example, a study of throat pattern variation reported eight yellow/white tayras from Guyana (museum and camera trap records) but did not present the locations of the records (Villafañe-Trujillo *et al.* 2018). In Brazil, there seems to exist a geographical bias, as we found no records of tayra with anomalous coloration from the country's central region (between latitudes 10 and 20° south), with all records coming from the south and north of the country. All camera-trap records of tayras with anomalous coloration in the Brazilian Amazon were from the state of Roraima. The lack of records from other Amazonian states was surprising as mammal surveys used camera trapping in the region (Nagy-Reis *et al.* 2020). Finally, a lack of standardized reporting limits the ability to compare results among populations from different studies.

Researchers have little incentive to report the appearance of leucistic individuals, as the majority of studies are designed to provide a general picture of the local fauna (Nagy-Reis *et al.* 2020) and monitor the state of biological diversity (Cornford *et al.* 2022). A more detailed understanding of population health, as revealed by individual differences, including anomalous coat patterns, remains a largely overlooked factor.

CONCLUSIONS

The presence of leucistic tayras on Maracá Island, as documented here, expands the known distribution of this rare phenomenon to an island population. Contrary to our initial expectations the frequency of leucism in this island population was not significantly elevated compared to mainland populations. While leucism does not appear to hinder social interaction or foraging ability in tayras, its potential impacts on predation risk and overall survival warrant further investigation. Future research complementing camera traps with non-invasive genetic sampling and individual identification would enhance our understanding of the ecological and evolutionary implications of leucism in island populations. Additionally, standardized reporting of anomalous coloration in wildlife studies is crucial for enabling meaningful comparisons and drawing broader conclusions about the factors influencing the expression and persistence of this and other anomalous traits. To ensure camera trap data can be used to its full potential we recommend increased diligence, including standardizing the analysis and reporting of anomalous individuals, even in studies where this is not the main focus.

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