



Noteworthy contributions to the knowledge on pigmentation anomalies in Tayras (*Eira barbara*) from tropical dry forest remnants in the Colombian Orinoco piedmont

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Resumen

Las tayras son mamíferos relativamente comunes y con amplia distribución en el Neotrópico, sin embargo, su historia natural se conoce parcialmente. Por ejemplo, aunque su coloración varía entre marrón oscuro y negro, existen reportes sobre anomalías en su pigmentación, y se desconocen las causas y efectos en sus poblaciones, entonces, es necesario reportar estos casos junto con información que permita entender mejor estos fenómenos. En esta nota, presentamos los registros de tayras con hipopigmentación obtenidos durante un monitoreo de biodiversidad en 15 áreas de conservación vinculadas a una estrategia comunitaria de conservación del Bosque Seco Tropical en el municipio Tame (Arauca), y discutimos la distribución de anomalías por categorías de edad, estacionalidad, periodo de actividad y sexo. El monitoreo constó de 33 cámaras trampa durante 27 meses, entre 2021 y 2024. Obtuvimos registros de 36 tayras con hipopigmentación, con mayor número de registros de adultos con xantismo, en el periodo diurno y en temporada seca. Consideramos un registro con dos individuos hipopigmentados como un valioso aporte sobre interacciones entre tayras con anomalías de pigmentación. Finalmente, resaltamos la importancia de la información sobre historia natural que se genera de los monitoreos más allá de la lista de especies e índices ecológicos.

Palabras clave: Conservación de base comunitaria, Foto trapeo, Leucismo, Xantismo

Abstract

Tayras are relatively common and widely spread mammals in the Neotropics, however, their natural history is partially known. For example, even though their pelage coloration varies between dark-brown and black, and there are reports of pigmentation anomalies,

causes and effects on their populations remain unknown. Consequently, documenting these cases is required along with relevant ecological information to improve the understanding of this phenomena. In this note we present the records of hypopigmented tayras obtained during a biodiversity monitoring in 15 conservation areas included within a community-based Dry Forest conservation strategy in the municipality of Tame (Arauca), and we discuss the distribution of this anomalies according to their age, seasonality, activity period and sex. For the monitoring we deployed 33 camera traps over a period of 27 months from 2021 to 2024. We recorded 36 tayra independent records, from which there was a highest number of adults showing xanthism, higher occurrence during the day and the dry season. We considered a record of a couple of hypopigmented individuals as a valuable contribution about interactions among tayras with pigmentation anomalies. Finally, we emphasize the importance of the natural history information generated by monitoring, beyond the species inventories and ecological data.

Key words: Camera trapping, Community-based conservation, Leucism, Xanthism

The Tayra, *Eira barbara* (Linnaeus, 1758) (Carnivora: Mustelidae), is a polytypic species widely distributed in the Neotropics, ranging from southern Veracruz (Mexico), to northern Argentina, and across most of South America in the Choco biogeographic region and east of the Andes. Seven subspecies are recognized, of which *E. b. sinuensis* Humboldt 1812, inhabits Panama, Colombia, Venezuela, and Ecuador (Presley 2000; Wilson & Mittermeier 2009). In Colombia, the species is locally known as Ulamá, Melero, Tayra, or Uмба (Rodríguez-Mahecha et al. 1995), and it is externally recognizable by its large and slender body with elongated limbs and a long brushy tail. The pelage is typically described as dark brown to black dorsal fur that shows a high contrast with a yellow, grizzled, or grayish brown neck and head; the underfur is brown, and a yellowish bright spot in the chest may be present (Suárez-Castro & Ramírez-Chaves 2015; Presley 2000; Wilson & Mittermeier 2009).

As in other mammals, the information on pigmentation anomalies in Tayras has been increase recently (Aya-Cuero et al. 2025). These anomalies correspond to alteration in the production and availability of melanin, causing changes in the coloration as melanism, albinism, piebaldism, xanthism, and leucism; all of them have been extensively revised in literature (Cotts et al. 2023; Hernández-Aguilar 2023). For this work, leucism and xanthism are pigmentation anomalies described as conditions where the individual exhibits a whiteish and yellowish fur, respectively, except for their eyes, nose and feet (Mendes Pontes et al. 2020; Aya-Cuero et al. 2025). There have been reports of coloration anomalies in *E. barbara*, such as leucism in Brazil (Tortato & Althoff 2007; Talamoni et al. 2017; Scrich et al. 2019; Pinheiro-Costa & Norris 2025), leucism in the Guyana shield in the Brazilian Amazonia (Mendes Pontes et al. 2020), and one report that includes predation and camouflage data regarding a leucistic tayra in Brazil (Sobroza et al. 2016). Recently, Aya-Cuero et al. (2025) reported eight cases of *E. barbara* hypopigmentation in Colombia, including records from savanna ecosystems in the Orinoco region from the Casanare, Vichada, and Meta departments. In this note, we aim to report new cases of tayras with leucism and xanthism from tropical dry forest remnants in the Orinoco piedmont of the Colombian Andes in the Arauca department.

Our study area is located at the eastern foothills of the Cordillera Oriental (100 – 500 masl), in the municipality of Tame in Arauca department. Comprises six private conservation areas located in six farms, corresponding to a local community conservation strategy on privately owned land in the Caribabare and Monserrate Puna Puna localities in which we registered independent records of *E. barbara* with hypopigmentation anomalies. In Caribabare, there are located five farm conservation areas, El Encanto, La Fortuna, Las Colinas, Miralindo and Villa Verde with a total of eight camera traps and in Monserrate Puna Puna locality there is one conservation area, La Envidia farm with one camera trap (Figure 1, Table 1). The precipitation regime for the study site is unimodal with a rainy season from April to November, and a dry season from December to March. The annual precipitation is 2576 mm, the relative humidity is 83%, and the annual temperature range is between 22 and 32,3°C (IDEAM 2014).

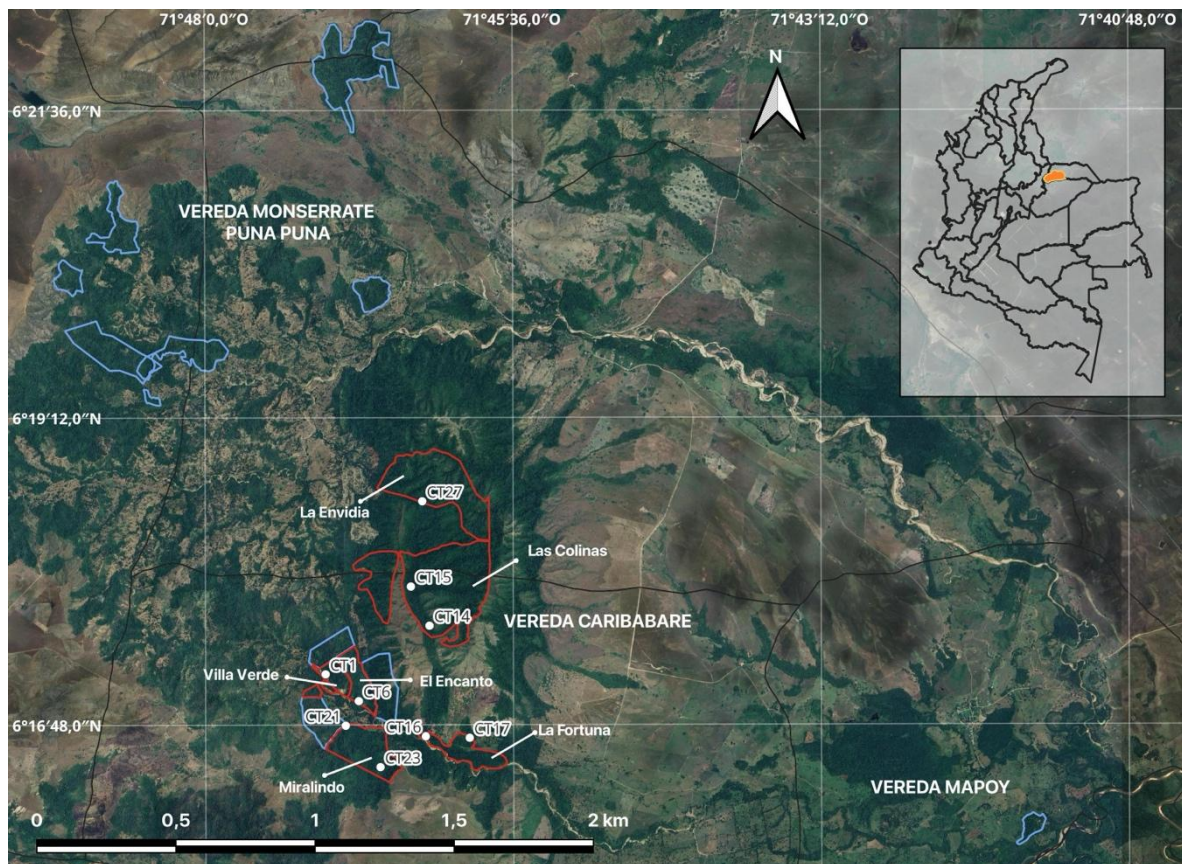


FIGURE 1. Study area location, Dry Forest private conservation areas, and Camera trap deployment in the study site: Location of the study site in Colombia shows Tame municipality in an orange polygon in Arauca department. Red polygons show private conservation areas in which we recorded *E. barbara* with hypopigmentation anomalies within the community-based conservation areas (blue polygons in which there was no registration of *E. barbara* with hypopigmentation anomalies). Regarding the red polygons, correspond to private conservation area La Envidia in the vereda Monserrate Puna Puna and Villa Verde, El Encanto, Las Colinas, La Fortuna and Miralindo in the vereda Caribabare.

The white numbered circles represent the camera trap sites where we registered *E. barbara* with hypopigmentation anomalies.

TABLE 1. Private conservation area with their respective vereda, camera trap number, the coordinate, elevation and number of independent records of hypopigmentation anomalies of *E. barbara* (the number of camera trap in Table 1, corresponds to the ones presented in Figure 1).

Vereda	Farm	Camera trap	Longitude	Latitude	Elevation	Events
Caribabare	Villa Verde	CT1	6,2866	-71,7844	310	1
Caribabare	El Encanto	CT6	6,2831	-71,7801	307	2
Caribabare	Las Colinas	CT14	6,2929	-71,7709	390	5
Caribabare	Las Colinas	CT15	6,2980	-71,7733	423	5
Caribabare	La Fortuna	CT16	6,2915	-71,7815	365	8
Caribabare	La Fortuna	CT17	6,2785	-71,7714	284	9
Caribabare	Miralindo	CT21	6,2799	-71,7818	310	2
Caribabare	Miralindo	CT23	6,2745	-71,7773	358	1
Monserate Puna Puna	La Envidia	CT27	6,3091	-71,7718	432	3

These conservation areas correspond to forest remnants of the Apure-Villavicencio Dry Forest Ecoregion into the ecosystemic transition between the moist montane forest of the eastern Andes, and the savanna ecosystems of the Orinoco Llanos (Ramos & Trujillo 2025). Most of the area has been highly degraded and fragmented by agriculture and livestock grazing, as it also suffers from natural and anthropogenic-induced forest fires. Then, conservation strategies based in local communities are important for the conservation of remaining biodiversity (Portillo-Quintero & Sánchez-Azofeifa 2010; Trujillo & Anzola 2019; Ramos & Trujillo 2025). These forests have predominance of individuals ranging between 2,5 and 19 cm DAP and heights between 1,3 and 12 m. The Leguminosae family is the best represented (26 spp), followed by Moraceae (12 spp), and Bignoniaceae (10 spp), which are recognized as some of the most important families for the neotropics typically present in the Orinoquian region. The structure of this remnants is determined by both the successional age and the previous disturbances by logging and occasional forest fires (Ramos & Trujillo 2025). These conservation efforts, and the vegetation structure and diversity, allow the remnant to provide an important fauna refugee (Ramos & Trujillo 2025).

Records were obtained during 27 months of camera trap biodiversity monitoring (December 2021 - May 2024) in a community-based conservation strategy, within the development scope of the project “Bosque de Vida” (by the agreement 785-2020, funded by Colombia Sostenible Fund, and executed by the NGO Fundación La Palmita, Centro de Investigación). We installed 33 Bushnell Trophy Cam camera traps in the 15 conservation areas within the scope of the project; every site was defined randomly and separated at a minimum of 500 m among them, installed from 40 to 50 cm from the ground with no use of bait. Cameras had a hybrid configuration, to take three photos and ten second videos and to stay active for 24 hours until next revision. The recordings obtained were reviewed and tagged manually, using the software digiKam 8.5.0 version (digiKam Team 2025), and the identification of the species followed external characters, literature available for the municipality (Castillo-Figueroa et al. 2019) and Colombia (Suárez-Castro & Ramírez-Chaves 2015). We considered as independent records those that were taken apart from each other by at least 24 hours of difference (Castillo-Figueroa et al. 2019). For every record, we aim to

determine the sex and age category, when possible, as there is scarce information on the ontogenetic changes of mustelids regarding their morphology and sexual dimorphism (Araujo Perini & Sicuro 2025).

Regarding the age category, we registered the record as an adult when the individuals were seen as a robust individual or its sexual organs were visible, and as juvenile when the individual was seen as a smaller and slenderer individual in comparison to the other records. As shown in Figure 2, regarding the sex identification, we registered the record as a male when the testicles or penis were visible, and it was a more robust individual, and as a female when there were no visible testicles and was noticeably slenderer (Kaufmann & Kaufmann 1965; Villafañe-Trujillo et al. 2018). This sex categorization was registered exclusively when either photos, videos or both, had a proper visualization of the genitalia of the individuals; when this was not the case, then the individuals were registered as undetermined sex categorization. Finally, we determined the pigmentation of every *E. barbara* record. As seen in Figure 2, when the individual had the typical dark brown to black dorsal fur it was recorded as normal coloration, when the individual had a hypopigmentation anomaly, we recorded them as either leucism or xanthism, when the record exhibits an individual with yellow-whitish colorations or orange and yellowish colorations, respectively (Presley 2000; Aya-Cuero et al. 2025). This pigmentation categorization was registered exclusively when either photos, videos or both, had a proper color visualization; when this was not the case, the individuals were registered as presenting a hypopigmentation anomaly, yet, not determined in either leucism or xanthism.

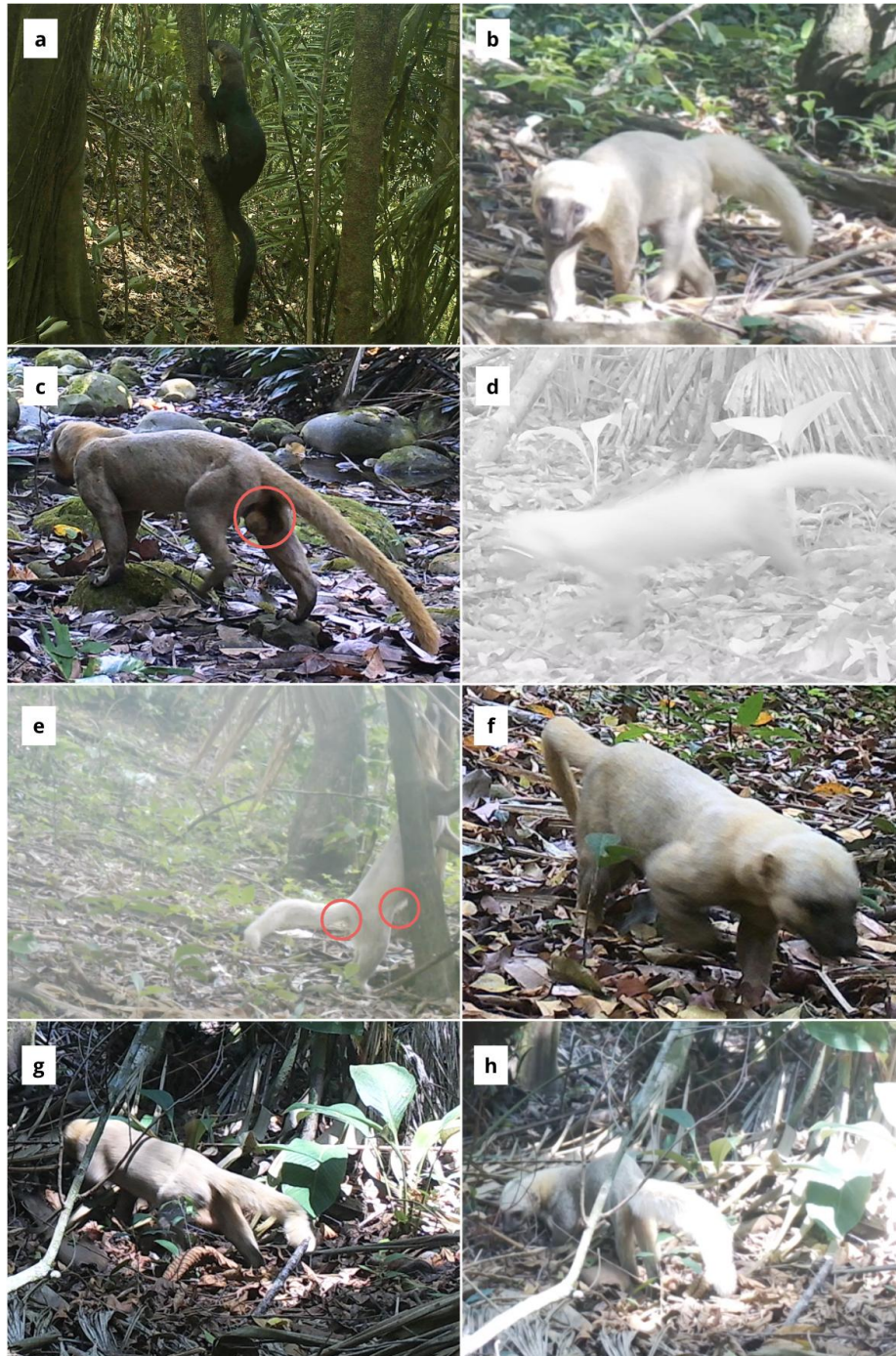


FIGURE 2. Sex and hypopigmentation anomalies identification of the *E. barbara* independent records registered in the private conservation areas of Dry Forest in Tame, Arauca. For hypopigmentation anomalies categorization, **A)** Typical coloration of *E. barbara* in the conservation areas, **B)** Leucism hypopigmentation **C)** Xanthism hypopigmentation, and **D)** Not identified hypopigmentation anomaly. For sex categorization, **C)** hypopigmented male tayra with presence of testicles (red circles), **E)** hypopigmented female tayra with absence of testicles and penis (red circles), and **F)** an hypopigmented tayra with undetermined sex categorization. For an interesting couple record, **G)** male and **H)** female/juvenile tayras with hypopigmentation anomalies in the private conservation areas of tropical Dry Forest remnants in Tame, Arauca.

We obtained a total of 7.130 independent mammal events in 20.433 camera trap-days, from which 333 (4,6%) correspond to *E. barbara* independent records, and 36 (10,8%) of them correspond to hypopigmentation anomalies events, from which 11 (3,3%) records were identified with leucism, 17 with (5,1%) xanthism, and 8 (2,4%) that could not be categorized (Table 1). These records were restricted to nine sites from 33 monitored sites (27,3%), with a sample effort of 2.693 camera trap-days. Regarding the sex of the independent records, ten (27,7%) were recorded as males, two as females (5,5%), and 24 that could not be sexed (66,7%). Regarding the age of the independent records, 31 were adults (86,1%), two possible juveniles (5,5%), and four that could not be aged (8,3%). It is necessary to clarify that we do not have the certainty that the independent records correspond to 36 individuals, however, this data provides some insights into their natural history.

For instance, the community-based conservation strategy has a total extension of 769,35 ha, which corresponds to the delimited conservation areas of the private landowners. The recordings of the tayras with hypopigmentation anomalies were recorded only in conservation areas that occur in the same centered area with a total extension of 445,12 ha (Figure 2). As it is observed in Figure 2, these areas are not completely isolated but, on the contrary, are connected between them and belong into a wider conservation area of Dry Forest, which at the same time does not have a conservation type of protected area. As we implemented an extended and significant sample effort to monitor the conservation areas, in which there is satellite and observational evidence of fragmentation and a land cover mosaic with both connected and isolated dry forest remnants, agriculture crops and grasslands. One might hypothesize that these recordings belong into one population or individuals that use exclusively this Dry Forest fragments, however, it needs to be proved and further research.

The recordings were made throughout the years, with the first one in December of 2021 and the last one in June of 2024. By analyzing the date of every independent record, we were able to determine that there are no specific months in which they always occur, on the contrary, they appeared on the camera traps throughout the year with no apparent pattern in relation to the seasonality of the region. Yet, 18 (58,1%) independent recordings occurred during months considered to belong to dry season, over the 13 (41,9%) independent recordings during rainy season. Therefore, one might say there are more chances to record hypopigmented tayras during dry season, even though there is not much information of seasonality patterns within the records of hypopigmentation in tayras (Tortato & Althoff 2007; Sobroza et al. 2016; Talamoni et al. 2017; Scrich et al. 2019; Mendes Pontes et al. 2020; Aya-Cuero et al. 2025). Regarding the timing of the records, 32 out of the 36 independent records occur only during the day (88,9%), one event occurred in the sunrise (2,8%), one event in the sunset (2,8%), and two events during the night (5,5%). So, based in Castillo-Figueroa et al. (2021) and Gómez et al. (2005), as 88,9% of the recordings were registered during the day, these hypopigmentation anomalies recordings should be categorized as belonging to diurnal individuals.

Finally, given our evidence from all the recorded events from 2021 to 2024, one might say some of these individuals thrive despite the risks that come along with having pigmentation disorders (Sobroza et al. 2016; Aya-Cuero et al. 2025). Additionally, we were able to obtain an hour-independent record of two individuals with pigmentation disorders, particularly in one of them, there is a male and a possible female or juvenile moving together, in which the female/juvenile is walking after the male (Figure 2). According to

Presley (2000) male individuals of *E. barbara* are typically seen with females, but do not remain when there is presence of a young individual, and in captivity it has been seen that the male remains yet does not bother the youngling. So, according to this recording one might infer, this is either a couple, or a male and a pup and nearby there must be the mother of the pup, yet it was not recorded. Either way, this record is no evidence of reproduction among the individuals; however, it shows the possibility of courtship, mating or at least, non-solitary hypopigmented individuals interacting intraspecifically (Pinheiro-Costa & Norris 2025).

Our results are a contribution to the identification of pigmentation anomalies in mammal individuals recorded for Colombia (Roncancio & Ramírez-Chaves 2008; Marin-Vasquez et al. 2010; Velandia-Perilla et al. 2013; Montoya-Bustamante et al. 2017; Henao-Fernandez et al. 2024; Alviz et al. 2025; Arango-Lozano & Angarita-Corzo 2025). As well as for the recent but still scarce information of chromatic anomalies in tayras in South America (Tortato & Althoff 2007; Sobroza et al. 2016; Talamoni et al. 2017; Schrich et al. 2019; Mendes Pontes et al. 2020), and in Colombia, identifying another locality in the Orinoquian region in which individuals are showing rare pigmentation (Aya-Cuero et al. 2025). Currently, there is no information on the variables that explain this phenomena, and little is known of how it presents in the sex and age ratio of a population, the effects in intraspecific and interspecific interactions, and the consequences within a population. Therefore, the results of this research, as well with the significant gap in knowledge that remains, highlight the need of keep ongoing biodiversity monitoring to present not only biodiversity inventories but also descriptive results of spatial and temporal dynamics that contribute to providing insights into their poorly known natural history, ecology, behavior, reproduction and interactions.

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