

Short Note

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First report of a leucistic Brown Agouti (*Dasyprocta variegata*) in Bolivia

<https://doi.org/10.1515/mammalia-2024-0101>

Received July 9, 2024; accepted August 14, 2024;

published online September 2, 2024

Abstract: Cases of anomalous coloration are regularly reported in Neotropical mammals, including the rodent family Dasyproctidae (agoutis and acouchis) where leucistic and albino individuals have been observed. Here, we document the first case of leucism in the Brown Agouti (*Dasyprocta variegata*) in Bolivia. During a camera trap survey of the Barba Azul Nature Reserve, we obtained footage of a Brown Agouti with a completely white body. Additional pictures of this individual revealed that it has black eyes, indicating leucism instead of albinism. Previous observations (since 2017) of a white agouti in the area suggest that these anomalously colored individuals can survive in the wild. Rare observations of top predators suggest a relatively low predation pressure in the area. We had only one record of a South-American Puma (*Puma concolor*) during our camera trap survey. Hence, leucistic individuals of a common prey species might also be indicative of the dwindling population densities of top predators in the region.

Keywords: aberrant coloration; camera trap; Bolivia; leucism; predation; neotropics

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In mammals, coat coloration plays an adaptive role in several processes, such communication, camouflage and thermoregulation (Caro and Mallarino 2020). Occasionally, individuals with anomalous coloration are observed. In general, researchers discriminate between albinism, leucism and melanism (Abreu et al. 2013; Miller 2005). Albinism concerns the complete absence of pigmentation across the body, resulting in a white coat color. Body extremities, such as the ears and the nose, also lack pigmentation and eyes often show a red or pink color (Oetting and Adams 2018). Leucism involves total or partial absence of pigmentation across the entire body, but the eyes and body extremities still have dark or blue pigmentation (Brito and Valdivieso-Bermeo 2016). Melanism concerns the darkening of coat coloration caused by excessive production of melanin (Romero and Tirira 2017; Romero et al. 2018).

Cases of rare anomalous coloration can provide insights into the physiological underpinnings and potential functions of particular coat patterns, making their reporting in the scientific literature relevant (Hubbard et al. 2010). A review by Abreu et al. (2013) uncovered only 198 cases of anomalous coloration in Neotropical animals, but new observations of anomalously colored animals are regularly published (e.g., Dalapicolla et al. 2020; García-Casimiro and Santos-Moreno 2020; Landis et al. 2020; Leandro-Silva et al. 2022; Stumpp et al. 2019). Most cases involved cetaceans and bats, probably because these animal groups are closely monitored and relatively easy to detect (Abreu et al. 2013). Smaller animals, such as rodents, are underrepresented in these reports (but see Beninato Bustamante et al. 2020; Brito and Valdivieso-Bermeo 2016) which can be explained by the difficulty of observing them and higher predation rates on prey species with aberrant color patterns (Abreu et al. 2013). Romero et al. (2018) estimated that albino individuals are known for less than 2 % of rodent species.

Within the rodent family Dasyproctidae (agoutis and acouchis), several individuals with anomalous coloration have been reported, including a leucistic Azara's Agouti (*Dasyprocta azarae*) in Brazil (Oliveira 2009) and both leucistic and albino Black Agoutis (*Dasyprocta fuliginosa*) in

Ecuador (Piaguaje et al. 2021; Valenzuela 2019). In addition, an albino Central American Agouti (*Dasyprocta punctata*) was reported from Honduras (Elvir-Valle et al. 2021). In this paper, we add another case to the list of anomalously colored agoutis with the first record of a leucistic Brown Agouti (*Dasyprocta variegata*) in Bolivia. We follow the taxonomic proposal of Teta and Reyes-Amaya (2021) which discriminate between Central American and Brown Agouti.

The observation of the leucistic Brown Agouti occurred during a larger survey of the Barba Azul Nature Reserve, centrally located in the Beni department in northern Bolivia and the Llanos de Moxos tropical savanna ecoregion. The Barba Azul Nature Reserve covers an area of ca. 11,000 ha and supports a variety of habitats, including wetlands along the river Omi, forest islands, riverine gallery forests, seasonally flooded tropical savannas and cerrado (Hordijk et al. 2019). Between the 30th of May 2022 and the 14th of July 2022, we deployed camera traps (Reconyx HP2X Hyperfire – Reconyx Inc, WI, USA) in 10 forest islands ranging in size from 0.5 to 55 ha (Figure 1, Supplementary Table S1). For most forest islands, two camera traps were placed. After two weeks, these camera traps were replaced within the forest island, resulting in four sampling points per forest island. For three forest islands (Isla Maneche, Fortaleza and Bambuces), only one camera trap was installed and replaced, resulting in two sampling points. Camera traps were placed on trees, at a height of 60 cm from the ground (based on expert opinion: Miguel Martínez Díaz, personal communication).

In total, a sampling effort of 335 trapping days based on 31 camera point locations resulted in the recording of 1,636 mammals (of which 1,043 wild mammals), representing 17 species from 14 families (Table 1). The most observed species

were South-American Coati (*Nasua nasua*), Collared Peccary (*Dicotyles tajacu*) and Brown Agouti. Rare animals were Tamandua (*Tamandua tetradactyla*), Crab-eating Fox (*Cerdocyon thous*), Ocelot (*Leopardus pardalis*), Crab-eating Raccoon (*Procyon cancrivorus*), and South-American Puma (*Puma concolor*). Among the 370 pictures of Brown Agouti, we observed one individual with a completely white body (Figure 2A) which was observed several times in the forest island Isla Barba Azul (coordinates of the camera trap: S13°44'56.8 W66°06'00.5), an open forest dominated by Motacú Palm (*Attalea phalerata*). This camera trap footage was, however, not the only observation of a white-bodied agouti in the Barba Azul Nature Reserve. A more recent picture (taken in September 2023) clearly showed an agouti with black eyes, pointing to a leucistic coloration pattern (Figure 2B and C). Since 2017, employees of the Asociación Armonía have spotted white-bodied individuals in the forest islands Isla Barba Azul and Isla Salitral (Tjalle Boorsma, personal communication). The latest recorded sighting occurred in February 2024 (Luz Natalia Mercado Callaú, personal communication). Unfortunately, we cannot verify whether all these observations concern the same individual. There might be several white agoutis in the reserve (Steffen Reichle, personal communication).

The observation of a leucistic Brown Agouti in the wild is surprising. Animals with aberrant coloration patterns often suffer from health risks, such as bad vision (Creel et al. 1990; Garipis and Hoffmann 2003) or deficient immune systems (Griffiths 2002; Scheinfeld 2003) in albinos. Although these health issues have been mainly described in humans, they also occur in animals. For example, Puicón et al. (2023) reported the development of a cellular carcinoma in an albino Central-American Agouti that was bred in captivity in

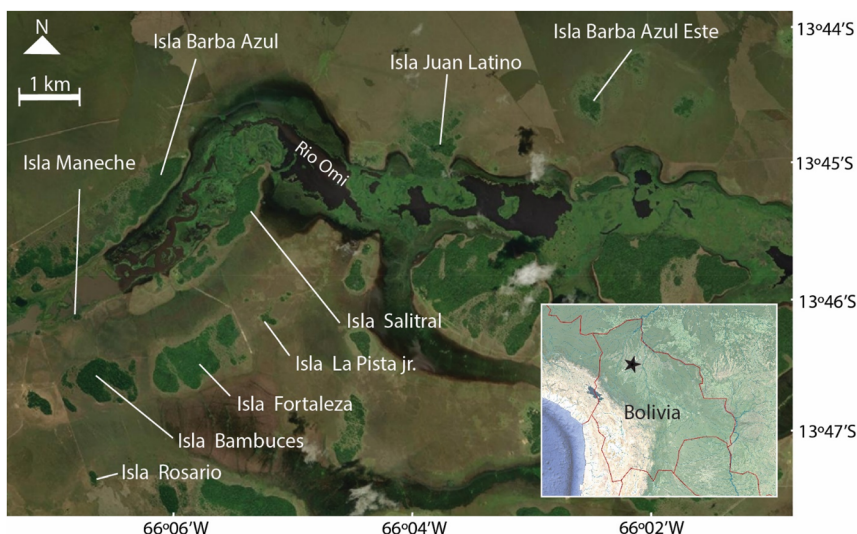


Figure 1: An overview of the study area (Barba Azul Nature Reserve, Bolivia) and the 10 forest islands that were surveyed using camera traps (see Supplementary Table S1 for the coordinates of all camera traps).

Table 1: Results of the camera trap survey with number of recorded individuals for all 17 species over the different forest islands.

Family	Species	Forest islands										Total			
		Bambuces	Barba Azul	Fortaleza	La Pista jr.	Maneche	Rosario	Salitral	Barba Azul Este	Barba Este	Juan Latino				
Bovidae	Cattle <i>Bos taurus</i> ^s		104				21					9	205	70	409
Dasyproctidae	Brown Agouti <i>Dasyprocta variegata</i>	3	234	25				101				6		1	370
Tayassuidae	Collared Peccary <i>Dicotyles tajacu</i>	56	104	2	28	1	41	10	64				8	6	320
Suidae	Feral Pig <i>Sus scrofa</i> ^a		24	9	2	31		87						31	184
Procyonidae	South-American Coati <i>Nasua nasua</i>	33	67	12	3	1	7	47						2	172
Caviidae	Capybara <i>Hydrochoerus hydrochaeris</i>					60									60
Cervidae	Grey Rocket deer <i>Subulo gouazoubira</i>	6	4	4	1		10		20			2		2	47
Dasypodidae	Nine-banded armadillo <i>Dasybus novemcinctus</i>		8		3	6		5	2				2	1	27
Cuniculidae	Paca <i>Cuniculus paca</i>	2		9				3							14
Didelphidae	Southern opossum <i>Didelphis marsupialis</i>		3	1			1	5							10
Chlamyphoridae	Six-banded armadillo <i>Euphractus sexcinctus</i>		2				2	1						2	7
Myrmecophagidae	Giant anteater <i>Myrmecophaga tridactyla</i>						1	1					1		7
Myrmecophagidae	Tamandua <i>Tamandua tetradactyla</i>		1					1							4
Canidae	Crab-eating Fox <i>Cerdocyon thous</i>							2							2
Felidae	Ocelot <i>Leopardus pardalis</i>													1	1
Procyonidae	Crab-eating Raccoon <i>Procyon cancrivorus</i>												1		1
Felidae	Puma <i>Puma concolor</i>								1						1

The scientific names are based on the Mammal Diversity Database (2023). ^aIndicate domesticated or feral species.



Figure 2: Photographic evidence of a leucistic Brown Agouti at the Barba Azul Nature Reserve, Bolivia. (A) Camera trap picture of a leucistic Brown Agouti in the Isla Barba Azul forest island. (B) Picture of a leucistic Brown Agouti taken in September 2023. (C) Zooming in on the head revealed that the eyes are not red, ruling out the possibility of an albino individual. © Steffen Reichle (pictures 2B and 2C).

San Martín, Peru. In addition to these health risks, albino and leucistic individuals are probably more susceptible to predation due to their conspicuous coloration (Abreu et al. 2013). We could not directly quantify predation pressure in our study site, but the rare observations of top predators during our camera trap survey (only one record of a South-American Puma) suggest a relatively low predation pressure in the area. Moreover, the presence of cattle in the study region might deter predators from visiting the forest islands in the grazed areas. Hence, one or more individuals of a common prey species with such conspicuous coloration could unfortunately also be indicative of the dwindling population densities of top predators in the region.

Acknowledgments: We thank two anonymous reviewers whose comments greatly improved the quality of our manuscript.

Research ethics: Not applicable.

Author contributions: Edward Smits, Jente Ottenburghs and Peter van der Sleen conceived the idea. Edward Smits, Mark van Leeuwen and Miguel Martínez Díaz conducted the camera trap survey. Tjalle Boorsma and Luz Natalia Mercado Callaú provided logistical support. Jente Ottenburghs wrote the manuscript with input from all co-authors. The authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Competing interests: The authors state no conflict of interest.

Research funding: None declared.

Data availability: The raw data can be obtained on request from the corresponding author.

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Supplementary Material: This article contains supplementary material (<https://doi.org/10.1515/mammalia-2024-0101>).