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FIRST RECORD OF LEUCISM IN *Coendou spinosus* (RODENTIA, ERETHIZONTIDAE)

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Abstract: Leucism is a pigmentary anomaly that results in a white or yellowish fur in mammals. Here we report the first observation of a leucistic individual of *Coendou spinosus* (Rodentia; Erethizontidae) in a mangrove area during a wildlife monitoring program in the industrial district of Rio de Janeiro municipality. Leucistic condition may increase predation pressures in some species and impact population dynamic. Reports of color anomalies are important to increase the number of official observations and enable the understanding of the causes and consequences of such anomaly.

Keywords: anomalous pigmentation; Atlantic Forest; Rodent; porcupine.

Mammals' color pattern depends on the presence and distribution of pigments along the animal body (Hofreiter & Schöneberg 2010). Leucism is the total or partial absence of these pigments in the entire body, thus the animal presents an almost white or yellowish fur (Miller 2005, Acevedo & Aguayo 2008, Abreu *et al.* 2013). Further, contrary to albinism in which eyes and body extremities are pink due to blood flow, leucistic animals retain some pigmentation in these regions (Miller 2005, Acevedo & Aguayo 2008).

Although relatively rare at the population level, many mammal species have been recorded with abnormal color, such as marine and terrestrial carnivores (*e.g. Otaria flavescens* in Acevedo & Aguayo 2008; *Arctocephalus australis* in Abreu *et al.* 2013; *Eira Barbara* in Aximoff & Rosa 2016; Talamoni *et al.* 2017), ungulates (*e.g. Ozotoceros bezoarticus* in Rodrigues *et al.* 1999; *Mazama gouazoupira* [rufa] in Oliveira 2009a) and primates (*e.g. Alouatta guariba clamitans* in Aximoff & Vaz 2016; Callithrix jacchus and *C. penicillata* in Aximoff *et al.* 2019). Specifically for rodents, most records of individuals with abnormal color occur in small, rat-like species (*e.g. Proechimys [Trinomys] albispinus* in Pessôa & Reis 1995; *Delomys dorsalis* in Cademartori & Pacheco 1999; *Akodon mollis*, *Nephelomys albigularis*, *N. moerex*, *Transandinomys talamancae*, *Thomasomys auricularis*, *T. taczanowskii*, *T. paramorum* and *Mesomys hispidus* in Brito & Valdivieso-Bermeo 2016; *Abrothrix longipilis* and *A. olivaceus* in Rubio & Simoneti 2019), but it is also observed in medium-sized species (*e.g. Dasyprocta azarae* in Oliveira 2009b).

Here we report an observation of a leucistic individual of *Coendou spinosus* (Cuvier, 1823) (Rodentia; Erethizontidae; Figure 1) on December 2nd, 2022 in a mangrove area in the neighborhood of Santa Cruz, Rio de Janeiro municipality, Brazil (22º 54' 57.817" S, 43º 47' 32.272" W; Figure 2). The individual was sighted opportunistically during a wildlife monitoring activity to study environmental health after the implementation of a power line

Figure 1. Lateral (a) and dorsal (b) view of leucistic color pattern and lateral view of normal color pattern (c) in *Coendou spinosus*, Rio de Janeiro, Brazil.

structure. Given the record's opportunistic nature we could not measure the individual's body length nor identify its sex, however lateral and dorsal views were photographed (Figure 1a and 1b) and, concerning body size, the individual seemed to be an adult or almost adult (330– 370 mm; Patton *et al.* 2015). Other species of the genus *Coendou* have been reported with leucism (Romero-Briceño & González-Carcacía 2020) or even albinism (Romero *et al.* 2018; Pommer-Barbosa *et al.* 2022), but to our knowledge color anomaly have never been reported for *Coendou spinosus*, such as albinism or melanism.

The species is part of the Erethizontidae family, which has its body covered with spines that protects the animal from predators (Figure 2). Normal colored individuals present a dark to light brown fur and vivid yellow spines (Figure 1c). In Brazil, it is distributed in humid tropical and subtropical Atlantic Forests from Espírito Santo to Rio Grande do Sul states, although it is also observed in similar environments in Argentina, Paraguay and Uruguay (Voss 2015). Not much is known about its diet but the species from Erethizontidae family feed mainly on vegetal matter, such as new leaves, flowers and fruits (Roze 2012, Voss 2015, Abreu *et al.* 2016, Batista-da-Silva *et al.* 2019). Reported predators of *Coendou* sp. are the ocelot (*Leopardus pardalis*; Arias-Alzate *et al.* 2017, Griffiths *et al.* 2020), the harpy eagle (*Harpia harpyja*; Costa & Nunes 2017) and domestic dogs (Campos *et al.* 2007, Martinez et a. 2022, Díaz *et al.* 2023). Although being characterized as mainly nocturnal (Voss 2015), the individual was observed while climbing a tree during the afternoon, at 15:18 h.

Different environmental pressures may favor the occurrence of anomalous pigmentation, such as pollution, which induces the occurrence of mutations (Moller & Mousseau 2001). The individual was observed in a mangrove area connected by land, rivers and water channels to an industrial district where several industrial activities take place, such as production of catalysts and additives for the oil industry and steel. Also, the history of local watershed contamination by pesticides and of irregular expansion of urban areas frequently related to low levels of sanitation (Tubbs Filho *et al.* 2012), may influence the occurrence of anomalous pigmentation.

Small population size and degree of isolation may also influence the occurrence of such anomalies

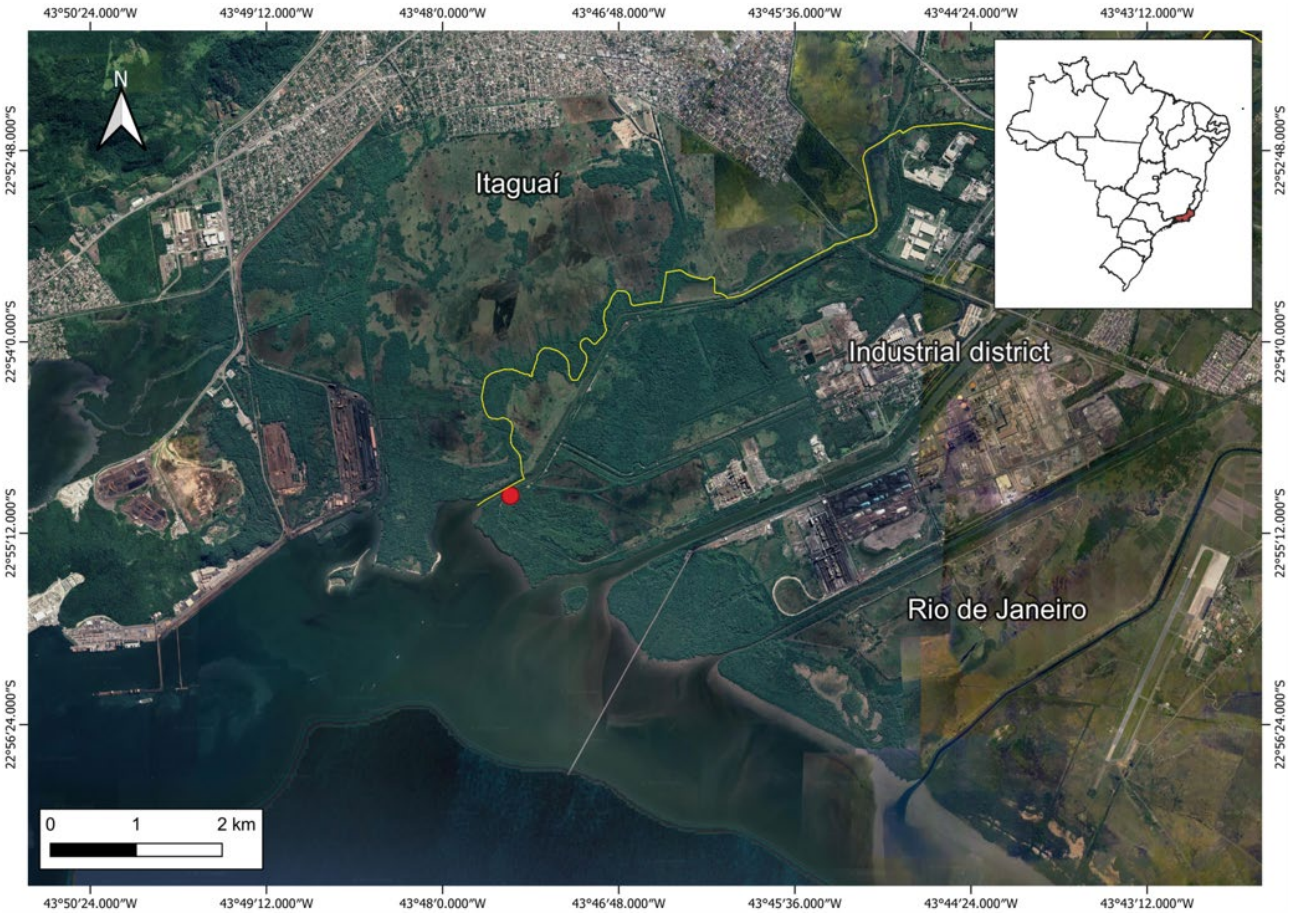

Figure 2. Location of the recorded leucistic individual of *Coendou spinosus* in Rio de Janeiro, Brazil (red dot). Boundary between municipalities of Rio de Janeiro and Itaguaí is indicated by a continuous yellow line.

through increased inbreeding and consequently greater occurrence of recessive alleles (Aximoff & Vaz 2016, Brito & Valdivieso-Bermeo 2016). For more than 40 years the study area has been isolated from the closest large remnant of Atlantic Forest in the region due to the settlement of a large highway (BR-101) in the 1960's (Brasil 1964) and the development of the Itaguaí municipality. This kind of isolation may have considerably reduced gene flow between the study area and other forest remnants and forced inbreeding in the local population. Besides, habitat modifications in the study area have occurred throughout the years whether with forest expansion or suppression, which may have led to changes in population size and thus reinforced inbreeding and increased recessive alleles occurrence (Google 1985-2023).

Neither pollution nor habitat fragmentation and isolation were reported on two previous records of anomalous pigmentation on species of the *Coendou genus* (Romero-Briceño & González-Carcacía 2020, Pommer-Barbosa *et al.* 2022) and those features cannot be observed in those studies' area through satellite imageries. On the other hand, Romero *et al.* (2018) have recorded an albino *Coendou rufescens* in a fragmented agricultural landscape but environmental effects on this anomaly were not discussed. Normal colored individuals of *Coendou spinosus* have already been observed in our study area, thus possible effects of population size and isolation or polluted conditions on animal's color pattern are not ubiquitous and may indicate this record as one of the low frequency occurrences expected from genetic mutation and recombination. Further investigation is needed to better understand if the frequency of these occurrences matches the expectation by normal genetic changes and, if not, which are the environmental causes for the occurrence of these anomalies.

Anomalous colors, such as leucism, may increase predation pressure in some species since individuals with this condition are more easily seen by visually oriented predators (Sazima & Di-Bernardo 1991). However, for species with low number of predators, nocturnal habits or defensive

morphological structures, such as spines, greater predation pressures due to anomalous color may not occur (Sazima & Pombal 1986, Sazima & Di-Bernardo 1991, Rodrigues *et al.* 1999). This may explain how an individual with such a conspicuous color pattern may have managed to survive and grow to a seemingly adult size. Further, given the area's history of habitat modification and its isolation to large forest remnants (Google 1985-2023), common natural predators of *C. spinosus* may be absent, thus allowing this individual to survive.

Understanding the effects of environmental factors and predation pressure on leucistic individuals is crucial to monitor possible population trends resulting from this anomaly. The records of individuals with anomalous colors are still rare, thus, the present study joins some others to increase the number of records of animals with anomalous color and, together with the environmental features in which it was recorded, allow a better understanding of the causes and consequences of this trait.

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