

NEW RECORD OF MELANISM IN SOUTHERN TIGRINA *LEOPARDUS GUTTULUS* (CARNIVORA, FELIDAE): A RECENTLY RECOGNIZED AND THREATENED SPECIES

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Abstract: Melanism can represent examples of adaptive evolution such as camouflage and thermoregulation, which can determine the explored habitat and the periods of greatest activity of felines with this phenotype. Despite being considered relatively common, cases of melanism in *Leopardus guttulus* are rarely reported. Thus, we present a new record of melanism regarding this species in southern Brazil. The record was made with a camera-trap set near the forest edge, at a place with high light incidence. We provide an important contribution to understanding the geographic distribution of melanism in *L. guttulus*.

Keywords: conservation, genetic mutation, geographic distribution, onchilla.

NOVO REGISTRO DE MELANISMO EM GATO-DO-MATO-PEQUENO *LEOPARDUS GUTTULUS* (CARNIVORA, FELIDAE): UMA ESPÉCIE RECENTEMENTE RECONHECIDA E AMEAÇADA

Resumo: O melanismo representa exemplos de evolução adaptativa com fins de camuflagem ou termorregulação, que pode determinar o habitat explorado e os períodos de maior atividade dos felinos com este fenótipo. Apesar de serem considerados relativamente comuns, os casos de melanismo em *Leopardus guttulus* são pouco registrados. Assim, apresentamos um novo registro de melanismo em relação a esta espécie no sul do Brasil. A gravação foi realizada com uma armadilha fotográfica, perto da borda de floresta, local de alta incidência luminosa. Fornecemos uma importante contribuição para compreender a distribuição geográfica do melanismo em *L. guttulus*.

Palavras-chave: conservação, mutação genética, distribuição geográfica, felino.

Melanism is a color phenotype related to increased melanin production resulting from a genetic mutation (Majerus & Mundy, 2003; Eizirik et al., 2003). Among the melanistic pigments, pheomelanin and eumelanin are responsible for the coloring of the coat, skin, and eyes in mammals; eumelanin is responsible for black, gray, and brown pigments (Ito & Wakamatsu, 2003). For the Felidae family, melanism has been recorded in 14 of 41 known species worldwide (Schneider et al., 2012; Kitchener et al., 2017; Graipel et al., 2019; Mooring et al., 2020).

Of the four species of small cats that occur in the southern region of Brazil, melanism has been confirmed in two species (Schneider et al., 2012; Castelló, 2020), including: *Leopardus guttulus* (Hensel, 1872), and *Leopardus wiedii* (Schinz, 1821). *Herpailurus yagouaroundi* (É. Geoffroy Saint-Hilaire, 1803) and *Leopardus pardalis* (Linnaeus, 1758) have no documented cases of melanism in the region (Nowell & Jackson, 1996, Rinaldi et al., 2015; Castelló, 2020). It is important to mention that *L. guttulus* was just recently separated from *L. tigrinus* (Schreber, 1775) and considered a valid species (Trigo et al., 2013a), with the populations previously considered as *L. tigrinus* in southern Brazil corresponding to the species *L. guttulus* (Nascimento & Feijó, 2017).

L. guttulus is a small felid which occurs in the south, southeast, and central-west regions of Brazil and northeast of Argentina and Paraguay

(Oliveira et al., 2016; Nascimento & Feijó, 2017). The species belongs to the lineage of ocelots, a group that includes small and medium-sized neotropical cats with a color pattern represented by spots (Mattern & MacLennan, 2000; Johnson et al., 2006). It is classified as Vulnerable (VU) by the International Union for Conservation of Nature (IUCN), mainly due the high rates of habitat loss and fragmentation (Oliveira et al., 2016). Few reports of melanism in *L. guttulus* have been published, being restricted to studies carried along the coastal (Oliveira-Santos et al., 2012; Graipel et al., 2014) and central region of Santa Catarina (Rosot et al., 2007), and in the eastern portion of Paraguay (Nascimento & Feijó, 2017). No records of melanism had been found for this species in the rest of its distribution area.

Because of this, reporting cases of melanism for this species increases our knowledge about the occurrence of individuals with this characteristic, providing important data for future research aiming to study the distribution and frequency of this phenotype. Thus, in the present description, we present a new record of melanism in *L. guttulus* from southern Brazil.

The observation that we report occurred during a wildlife survey, carried out in the municipality of Barracão, located in the northern edge of the state of Rio Grande do Sul, southern Brazil (Fig. 1). The region is part of the Atlantic Forest Domain and is characterized by phytophysiogno-

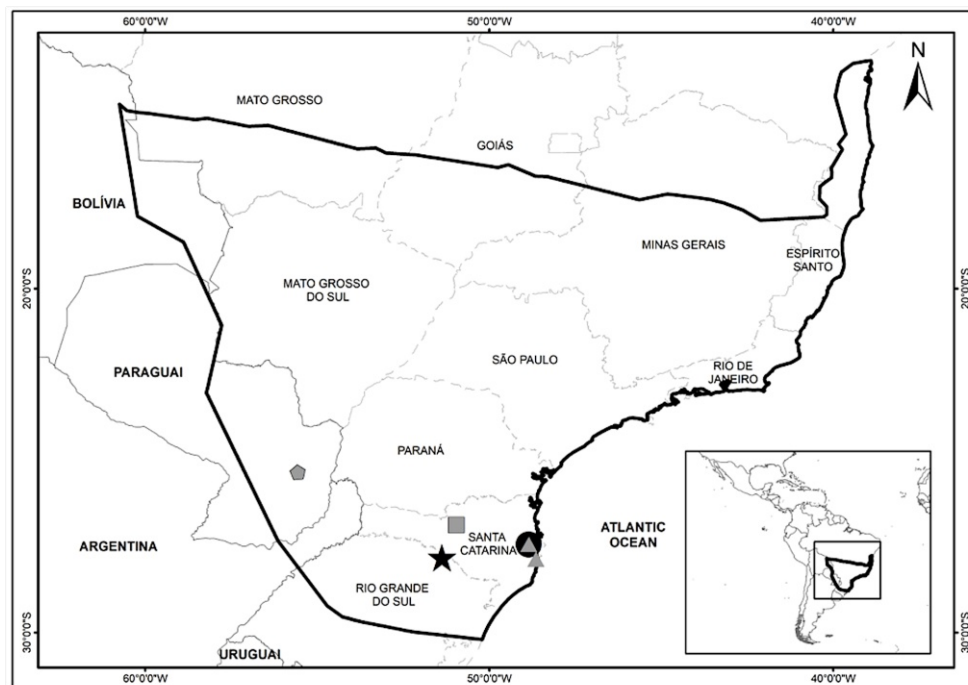


Fig. 1. *Leopardus guttulus* (Hensel, 1872) occurrence area (black line), based on Oliveira et al. (2016) and Nascimento & Feijó (2017), and geographic distribution of documented records of melanism in this species. Black star: new record; gray square: Rosot et al. (2007); black circle: Oliveira-Santos et al. (2012); gray triangle: Graipel et al. (2014); pentagon: Nascimento & Feijó (2017).

mies of mixed ombrophilous forests and natural fields (IBGE, 2012). The recording was obtained on video, with a live trap, model Bushnell Trophy Low Glow 16mp 119837C, installed next to a forest border, a place with a high luminous incidence. The site (27°49'9.53" S, 51°22'19.9" W) is in a riparian corridor which connect forest fragments larger than 100 hectares, surrounded by intense agricultural activity. We used six camera traps, distributed in three sampling areas, during three days of each season of the year, in a total of 288 sampling hours.

Our record took place on May 26, 2020, at 12:09 p.m. (Fig. 2). In the obtained images, it is

possible to observe the pattern of ring spots in the tail, in *L. guttulus* this pattern contains narrower rings and more of them, whereas in *L. wiedii* the tail rings are fewer and broader. The size of the eyes and ears are also different, being smaller in *L. guttulus* and characteristically larger in *L. wiedii* (Castelló, 2020). Such characteristics are determinant in the taxonomic classification of felines (Oliveira & Cassaro, 1999; Reis et al., 2010) and confirm that the registered individual is a melanic specimen of Southern Tigrina *L. guttulus*.

Although the occurrence of melanism for *Leopardus* species appears to be relatively com-



Fig. 2. Melanic Southern Tigrina *Leopardus guttulus* (Hensel, 1872) recorded in this study in southern Brazil.

mon, few cases have been reported in the literature. Of the information we have obtained from mammal's surveys for more than a decade in Rio Grande do Sul, southern Brazil (Kasper et al., 2007a; Kasper et al., 2007b; Peters et al., 2010; Marques et al., 2011; Hegel et al., 2012; Santana, 2012; Trigo et al., 2013b; Almeida, 2015; Kasper et al., 2016; Pertile, 2016; Silveira & Cademartori, 2017), no study mentions the record of melanic individuals of *L. guttulus*.

Contrarily, in a study conducted by Graipel et al. (2014) in the state of Santa Catarina, also in southern Brazil (almost 300 km from the pre-

sent record), 18% of *L. guttulus* observations were melanic. Mooring et al. (2020) also identified a high frequency of melanism in a population of another species of the genus in Costa Rica, where the observations of melanic individuals of *L. tigrinus* represented 32% of the known records.

The melanic forms of *L. tigrinus* also appear to be most active during the day, compared to non-melanic forms, but usually in forest with dense vegetation (Mooring et al., 2020). This behavior is probably related to camouflage, since, in closed environments, melanism makes in-

dividuals cryptic, while in open environments it makes them conspicuous (Graipel et al., 2019).

Although the melanic condition represents an evolutionary enigma for the Felidae family, there is evidence that this phenotype may be advantageous for wild populations (Silva, 2017; Graipel et al., 2019; Mooring et al., 2020). In some cases, the increase in the deposition of melanin pigments can be favored by natural selection because it serves as camouflage or thermoregulation advantages (Silva et al., 2016; Delhey, 2017; Delhey, 2019; Mooring et al., 2020). However, the lack of studies on spatial ecology and habitat use by melanic individuals make it difficult to clearly understand the effects conferred by this attribute.

The present description contributes to our knowledge about the geographic distribution of melanistic *L. guttulus* in southern Brazil. Despite the high frequency of melanic individuals for the species, making this phenotype relatively common, the number of documented cases is still emerging for an adequate understanding of the population dynamics of these individuals, especially in the state of Rio Grande do Sul, where no recent records were previously found. Thus, we strongly encourage that new records of individuals presenting melanism or other genetic mutations be published to expand the knowledge about the occurrence, frequency, and distribution of these phenotypes.

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