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First record of leucism in the Spix's Disc-winged Bat *Thyroptera tricolor* (Chiroptera: Thyropteridae) in Belize

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Abstract

Although chromatic disorders are widely reported in the animal kingdom, few reports of true leucism have been published in Neotropical bats. In this note we report our observations of a leucistic *Thyroptera tricolor* Spix (Spix's Disc-winged Bat) in the Maya Mountains of the Stann Creek District of Belize. Observations made between March 2023 and April 2024 at the Toucan Ridge Ecology and Education Society (T.R.E.E.S) research station recorded a group of *Thyroptera tricolor* with one leucistic male identified on three separate occasions. Our observations are the first documented account of leucism for this species and the Thyropteridae family.

Key words

Leucism, Chromatic disorders, Bats, Neotropics, *Thyroptera tricolor*, albinism

Introduction

Aberrant pelage colorations have been documented across a wide range of vertebrate taxa, including reptiles (Sanches et al. 2010, da Costa de Noronha et al. 2013), amphibians (Hemnani et al. 2021), mammals (Brito and Valdivieso-Bermeo 2016), and birds (Nogueira and Alves 2011). Chromatic disorders, such as albinism, leucism and piebaldism, are often confused with each other (Lucati and López-Baucells 2016). In albinism, both the animal's fur and retinas are affected, making the eyes appear red. In contrast, leucism results in the absence of pigmentation in the fur and skin while the eyes retain their normal color (Goslin 1942; Blair 1947; Lucati and López-Baucells 2016). Piebaldism is more commonly described in scientific literature and frequently mistaken as leucism (Marin-Vasquez et al. 2010; Velandia-Perilla 2013; Tabea Treitler et al. 2013; Mejía-Quintanilla et al. 2017; Meierhofer and Demere 2017; da Silva Reis et al. 2019). Piebaldism affects only small portions of the fur, giving it a patchy appearance (Lucati and López-Baucells 2016).

Such chromatic disorders occur in many tropical vertebrates and are considered rare in wild populations but are apparently more common in cetaceans and microchiropterans (Abreu et al. 2013). More than 450 total or partial loss of body pigmentation have been reported in bats (Lucati and López-Baucells 2016; Bernadi et al., 2019).

Here, we report the first observation of leucism in *Thyroptera tricolor* in one individual, making it the first report of a chromatic disorder for the species and family. The normal fur coloration of Spix's disc-winged bats is dark brown, sometimes reddish brown on the upperparts and ears, and underparts of the body are white or yellowish. The individual captured were uniformly white with normal-colored eyes. The distribution of *T. tricolor* heavily depends on the distribution and availability of young, rolled *Heliconia* leaves for roosting sites (Vonhof and Fenton 2004). The species is not numerous nor widespread in Belize, even in areas where *Heliconia* has been abundantly found (Miller 2009, 2021). It has only been documented from four locations and is listed as vulnerable in Belize due to this

limited distribution and roosting requirements. Among the threats are climate change and reports of localized commercial intensive harvesting of *Heliconia* leaves for tamales (Vanessa Kilburn T.R.E.E. director, Pers com).

Observations

On the morning of March 22nd 2023, while clearing up a trail at the Toucan Ridge Ecology and Education Society (T.R.E.E.S) research station located at the base of the Maya Mountains in the Stann Creek district of Belize (17.04879°N, 88.56206°W), a small group of *T. tricolor* was observed falling to the ground as their rolled roosting leaves *Heliconia* sp. (Musaceae) were cut. A field technician, Mark Faux, observed at least one completely white, leucistic individual and photographed a captured male. As the rest quickly flew away following their fall from the roost, it was not possible to determine if more than one individual were leucistic from that initial group.

Once alerted to this discovery, T.R.E.E.S staff subsequently searched for roosts in stands of *Heliconia* on multiple occasions. A roost was located on August 15th 2023, and three of five individuals were captured. These all had normal coloration; 2 were lactating females, and one was a scrotal male. No pups were found either in their roost or attached to the females. Two individuals escaped without seeing their dorsal fur coloration. Another roost was located on December 15th 2023, and a leucistic adult male was captured (Fig.1). Three other individuals escaped, and the dorsal color could not be verified. Four individuals were captured at a roost on April 19th 2024. One male was leucistic, and the remaining bats, one male, and two pregnant females had normal coloration.



Figure 1: Leucistic *T. tricolor* captured from its roost on December 15th 2023. **A.** Dorsal view, **B.** In its roost, **C.** Profile view, **D.** Closer view of the front right disc.

Discussion

Although abnormal coloration such as leucism has been found in several bat species, to our knowledge, it has never been reported in *T. tricolor* or any member of the Thyropteridae family. Therefore, our observations represent the first documented case of a leucistic Spix's disc-winged bat or with any chromatic disorder.

Leucism is more commonly reported in cave-dwelling bats versus the tree and foliage-dwelling species. This inconsistency could result from a surveying bias towards cave roosts and the difficulty locating roosts in trees and foliage (Lucati and López-Baucells 2016). This could explain why a leucistic *T. tricolor* had not been documented until now.

There are species of Neotropical leaf-roosting bats that have white pelage naturally (e.g., *Ectophylla alba* and *Diclidurus spp.*), and it is presumed this color pattern evolved as a camouflage strategy to be less visible in their leaf-tents or resemble wasp nests respectfully (Ceballos and Medellín 1988). *T. tricolor* naturally also has a white venter that we hypothesize could possibly function as the same camouflaging as those species above, while in their rolled *Heliconia* leaf roost.

Leucism could negatively affect bats' reproductive success, intraspecific interactions and increase predation events (McCardle 2012; Uieda 2000; Marin-Vasquez et al. 2010). A recent report detailing the case of a leucistic greater sac-winged bat pup (*S. bilineata*) that exhibited typical behavior and successfully integrated into its social group, showing ability to produce social calls and interact with its peers without any signs of aggression directed toward it (Fernandez et al. 2024). However, around six weeks of age, after it started foraging

independently, it failed to return to the colony one morning, suggesting it may have preyed upon, as it was not yet fully weaned.

Nevertheless, there is currently no evidence indicating that leucism significantly reduces the overall fitness of bats. Several reports document leucistic adult bats reproducing successfully, including cases of pregnant leucistic individuals (Sánchez-Hernández et al. 2010; Lucati and López-Baucells 2016; Rocha et al. 2013). Similarly, bats with other chromatic disorders, such as albinism (Brigham and James 1993; Buys et al. 2002; García-Morales et al. 2010) and piedbaldism (Talerico et al. 2008; García-Morales et al. 2012; Rocha et al. 2013), have also been observed reproducing successfully. Given the fact there are all-white bat species, this suggests that bats can avoid predation despite being entirely white.

The exact number of individuals with leucism present on T.R.E.E.S property is not currently known but we suspect only one individual captured multiple times as it was always a male the three times it was successfully captured around the same area and this species is known to be territorial (Chaves Ramírez and Chaverri 2022).

These reports, including this one, indicate that leucistic bats can live normal lives, and their appearance does not impact reproductive success or survival chances. Further follow-up will be needed to determine if the leucistic bat(s) recorded on the property were the same individuals who moved from one ephemeral roost site to another over time or were distinct individuals and if there are multiple leucistic individuals or not living around the same territory, continue documenting their social life with a chromatic disorder such as leucism.

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Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

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Competing interests

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