

First record of leucism in the volcano rabbit (*Romerolagus diazi*), endemic to México

Primer registro de leucismo en el conejo zacatuche (*Romerolagus diazi*), endémico de México

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Leucism is the total or partial loss of the pigmentation of the fur or plumage without affecting the color of the eyes, skin, and nails. During one of the daily surveillance and protection tours carried out by the Teporingos 1 community brigade, a leucistic juvenile zacatuche was recorded within the San Miguel Topilejo Community Ecological Reserve of México City, México. This note reports the first record of leucism in *Romerolagus diazi* and discusses the relevance of this finding.

Key words: Citizen Science; coloration disorder; lagomorphs; San Miguel Topilejo.

El leucismo es la pérdida total o parcial de la pigmentación del pelaje o plumaje sin afectar el color de los ojos, la piel y las uñas. Durante uno de los recorridos diarios de vigilancia y protección que realiza la brigada comunitaria Teporingos 1 realizó el registro de un zacatuche juvenil leucístico en los terrenos de la Reserva Ecológica Comunal de San Miguel Topilejo de la Ciudad de México, México. En esta nota, reportamos este primer registro de leucismo en la especie y discutimos la relevancia de este hallazgo.

Palabras clave: Ciencia Ciudadana; desorden de coloración; lagomorfos; San Miguel Topilejo.

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In nature, some organisms may have genetic disorders that affect the coloration patterns of the pelage or plumage (Bensch *et al.* 2000). One of these disorders is leucism, defined as the total or partial loss of the pigmentation of the pelage or plumage without affecting the color of the eyes, skin, and nails, as in the case of albinism (Miller 2005; Grouw 2006; Fleck *et al.* 2016; Zalapa *et al.* 2016). It has been reported that the gene MC1R is likely responsible for leucism, which encodes the melanocortin-1 receptor protein (MC1R), which regulates pigment production by encoding the melanocyte-stimulating hormone receptor (MSH; Peters *et al.* 2016). Constitutively active MC1R gene alleles are predominantly expressed and result in dark pigmentation, while dysfunctional inactive alleles are recessive and, when expressed, they produce slight or no pigmentation (Fontanesi *et al.* 2006; Peters *et al.* 2016).

Reports of mammalian leucism include the puma (Cronemberger *et al.* 2018), tapir (Tirira and Arbelaez 2020), coati (Silva-Caballero *et al.* 2014), dolphin (Hauser-Davis *et al.* 2020), bats (Zalapa *et al.* 2016; Aguilar-López *et al.* 2021;

Salas *et al.* 2021), bear (Ritland *et al.* 2001), sea lion (Acevedo and Aguayo 2008), shrew (Chetnicki *et al.* 2007; Guevara *et al.* 2011), wild boar (Samson *et al.* 2021), and field mice (Brito and Valdivieso-Bermeo 2016). This note documents the first report of a leucistic individual of *Romerolagus diazi* (Ferrari Pérez in Diaz, 1893), commonly known as zacatuche or volcano rabbit, which is endemic to México, has a restricted distribution, and is listed as an endangered species (Velázquez and Guerrero 2019).

During one of the daily surveillance and protection tours carried out by the Teporingos 1 community brigade within the San Miguel Topilejo Community Ecological Reserve, mayoralty of Tlalpan, México City, a sighting of a volcano rabbit with atypical coloration was done at El Fraile area (Figure 1). The individual was surrounded by brigade members and captured manually by one of them; it was then photographed with a mobile phone. The dominant vegetation on the sighting site is pine forest with tufted grassland; the local climate is temperate subhumid with summer rains, with mean annual tem-

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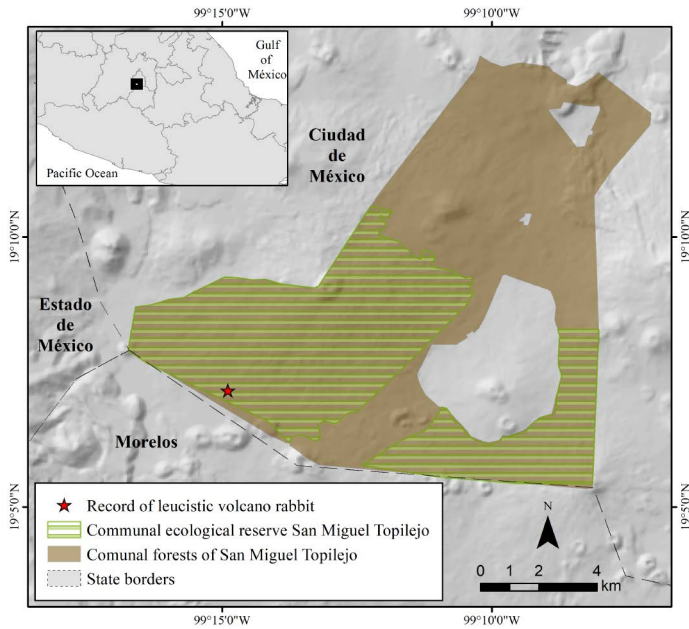


Figure 1. Study area where an individual of volcano rabbit (*Romerolagus diazi*) with leucism was registered in the El Fraile area of the San Miguel Topilejo Community Ecological Reserve, Tlalpan mayoralty, México City.

perature of 13 °C and mean annual precipitation of 950 mm (Velázquez 1996).

The individual was sighted on 23 August 2021 at around 14:00 hr at 19° 07' 9.14" N, 99° 14' 53.74" W. The specimen was found while it moved through a firebreak trench that crosses the grassland. The individual captured was a juvenile rabbit of approximately 150 mm in total length and apparently in a healthy condition, showing typical leucism traits such as the lack of pigmentation in the facial pelage (mouth, nose, and forehead near the base of the ears) and in a large part of the body, except for a portion of the right front leg, but with normally colored nails and eyes (Figure 2). The leucistic volcano rabbit was released at the site of capture.

The finding of coloration disorders is considered rare in wild populations because the white coloration may adversely affect camouflage and increase the vulnerability to predation (Sokos et al. 2018). It is known that the genetic disorder affecting pelage coloration may be associated with factors such as changes in the diet, follicle injuries, stress, inbreeding, or pollution (Hafner and Hafner 1987; Holt et al. 1995; Bensch et al. 2000; Moller and Mousseau 2001; González-Arrieta and Zuria 2015). The volcano rabbit is a habitat specialist that depends on the presence of sub-alpine bunchgrasses of the genera *Muhlenbergia*, *Stipa*, and *Festuca* (Velázquez and Heil 1996). In the Sierra Ajusco-Chichinautzin area, where the site of the sighting is located, the habitat of the volcano rabbit has been severely fragmented and degraded (Uriostegui-Velarde et al. 2018) as a result of anthropogenic activities such as agriculture, shepherding, land plundering, clandestine logging, and forest fires (Velázquez and Guerrero 2019). This poor habitat quality may have adversely affected the health of the species, as there is evidence that metabolic cortisol levels (one

of the physiological stress indicators) measured in its feces were two times higher in heavily degraded areas compared with the levels recorded in areas with good habitat quality (Rizo-Aguilar et al. 2014). Besides, habitat loss in the study area has brought about a declining population density of volcano rabbit over the past ten years (Guerrero et al. 2020).

There is a report of gregarious or sedentary individuals with leucism, a phenomenon that could be associated with small and isolated populations, as reported for shrews and birds (Bensch et al. 2000; Chetnicki et al. 2007; Contreras-Balderas and Ruiz-Campos 2011), similar to the case of the volcano rabbit. The fragmentation of natural habitats reduces structural connectivity between patches, limiting the dispersal capabilities of individuals and restraining gene flow. This ultimately leads to changes in the distribution of genetic variability among populations due to inbreeding (Gurrutxaga and Lozano 2006), with negative effects on the fitness and fertility of individuals (Hedrick 2011). Although the fragmentation of the volcano rabbit habitat in the study area has not led to loss of genetic variability, it has caused a marked genetic structuring and a reduction of effective population sizes (Montes-Carreto et al. 2020). The presence of an individual with leucism is relevant as it corresponds to an endangered species; although leucism has not been reported to date in the population of the volcano rabbit living in the Chapultepec Zoo, attention should be paid to the sighting of



Figure 2. Juvenile individual of volcano rabbit (*Romerolagus diazi*) with leucism. Photographs taken by the Teporingos 1 community brigade.

this wild individual with leucism. We recommend conducting detailed genetic studies to explore the causes of these genetic aberrations in the populations of this endangered rabbit.

Finally, the importance of the surveillance and monitoring work of community brigades is worth highlighting since this activity made it possible to document the existence of a volcano rabbit individual with leucism. Besides the biological relevance of this finding, it reaffirms the commitment of these brigades to the generation of knowledge, as well as their importance in the management of the territory and the design of biodiversity conservation strategies in México.

Acknowledgements

We appreciate the interest and support of the authorities of Bienes Comunales de San Miguel Topilejo in preparing this note. The Teporingos 1 community brigade receives financial support from the México City government for its surveillance activities at Reserva Ecológica Comunitaria San Miguel Topilejo. The Consejo Nacional de Ciencia y Tecnología (CONACyT) awarded the grant 291236 to L. M. Montes-Carreto (CVU 667266) of the Doctorate Program in Natural Sciences of the Universidad Autónoma del Estado de Morelos. We thank two anonymous reviewers for their valuable comments that enriched the content of the manuscript. M. E. Sánchez-Salazar translated the manuscript into English.

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Associated editor: Beatriz Bolívar-Cimé

Submitted: October 12, 2021; Reviewed: November 29, 2021.

Accepted: January 8, 2022; Published on line: January 21, 2022.