



NOTA CORTA

A wild-blue mutant of the Orange-chinned Parakeet (*Brotogeris jugularis*) from Colombia

Un mutante azul silvestre del periquito bronceado (*Brotogeris jugularis*) de Colombia

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ABSTRACT

We report an aberrant, blue-colored, Orange-chinned Parakeet from a population inhabiting an urban area in Colombia. This is the first documented record of a wild-blue mutant for this species through its natural distributional range. Our observations suggest that this mutation occurs at a very low frequency in this population and does not appear to display any selective advantage that could drive a frequency change.

Keywords: aberrant coloration, feather pigments, psittacofulvin, structural coloration.

RESUMEN

Reportamos un individuo de coloración aberrante azul del periquito bronceado en una población urbana en Colombia. Este es el primer registro documentado de un mutante azul en esta especie a lo largo de su distribución natural. Nuestras observaciones sugieren que esta mutación ocurre con una frecuencia muy baja en esta población y no parece mostrar ninguna ventaja selectiva que pueda impulsar cambios posteriores.

Palabras clave: coloración aberrante, coloración estructural, pigmentos de las plumas, psittacofulvina.

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Plumage aberration results when either pigments or structural components of the feathers are not properly integrated (Nemésio 2001). Although color alterations are widespread in captive-bred birds, they are rarely observed in wild populations where aberrant plumage is usually selected against (Ellegren *et al.* 1997, Hosner and Lebbin 2006). Indeed, pigment aberrations resulting in highly contrasting plumages are not always subject to strong selective pressure, as depicted by a high incidence of cyanistic (i.e., blue mutant) parakeets (genera *Forpus* and *Brotogeris*) in some wild populations from the littoral of São Paulo state, Brazil (Teixeira 1985). Blue phenotype is the most frequent color alteration in parrots and results from an autosomal recessive mutation suppressing the synthesis of yellow pigments, so the human eye detects the primary blue structural color (Nemésio 2001, Van den Abeele 2016).

Here, we reported a wild-blue mutant of the Orange-chinned Parakeet *Brotogeris jugularis* (Müller) from a population inhabiting an urban area in Colombia. This species has been regarded as sexually monomorphic and monochromatic—adult males and females are yellowish green to olive green—according to the human visual system (see Hilty and Brown 1986), albeit increasing reports indicating the existence of ultraviolet sexually dimorphic plumages imperceptible by humans in parrots (e.g., Morales *et al.* 2020). Ours represents the first documented record of a wild-blue mutation through the species' geographic range, which extends from southern Mexico in Central America to northern South America (Hilty and Brown 1986).

Fieldwork was conducted at Club Miramar and adjacent rural areas at Barrancabermeja municipality, Santander department, Colombia (07°04'24" N, 73°52'18" W, 73 m elevation; Fig. 1a). Surveys were conducted between April 2013 and May 2016: eight field trips in 2013, four in 2014, and two in 2016. Each field trip consisted of eight consecutive days of opportunistic observations (point counts, transect surveys, and free sightings) for at least two hours per day by two people, for a total sampling effort of ~ 448 hours. We performed additional observations during 2015 and 2016 (~ 920 h sampling effort) throughout adjacent rural areas of the municipality of Barrancabermeja, seeking additional cyanistic Orange-chinned Parakeets. The total sampling effort was of ~ 1368 hours.

On 17 June 2013 at 15:51 h, we observed an aberrantly blue-colored adult Orange-chinned Parakeet at Club Miramar, while it was searching for food on a Ceiba tree (*Ceiba pentandra* Gaertner; Figs. 1b–c). The parakeet had all feathers blue with a bluish-brown shoulder patch and a conspicuous white patch on its chin. On 22 November 2013 at 10:15 h, a cyanistic parakeet was observed on another Ceiba tree, ca. 160 m away from the first location (Fig. 1d). Later, on 20 April 2014 at 15:21 h, near the site of the first sighting, we observed a couple (cyanistic and typical-colored green phenotypes; Fig. 1e) entering multiple times into a cavity on a palm tree (ca. 15 m high), presumably for nesting. Lastly, on 15 May 2015 at 14:25 h, we recorded a blue parakeet within a conspecific flock on another Ceiba tree, ca. 104 m away from the first location. The specimen was roosting with its presumed mate, which exhibited the species' typical green coloration (Fig. 1f). Though we recorded several cyanistic parakeets during fieldwork (even on the same day), we failed to record them simultaneously. Therefore, our observations might correspond to the same bird. Intensive surveys (~ 920 hours) in adjacent rural areas of the municipality of Barrancabermeja did not yield additional records of blue phenotypes.

In parrots, green feather colors result from the juxtaposition of yellow psittacofulvin pigments and scattering feather nanostructure reflecting blue light (Berg and Bennett 2010). The blue mutation reported here is the most frequent color alteration in parrots within the family Psittacidae (Nemésio 2001). It has been reported in about 26 species (e.g., Teixeira 1985, Nemésio 2001, Pagotto *et al.* 2019, Rosas-Espinoza *et al.* 2021). Blue mutations in *Brotogeris* have been reported in wild populations of the Plain Parakeet *Brotogeris tirica* (Gmelin) and the Yellow-chevroned parakeet *Brotogeris chiriri* (Vieillot) (Teixeira 1985, Nemésio 2001). Although this color aberration is seemingly widespread within Psittacidae, it seems to occur at a low frequency in most species given the rarity of cyanistic specimens reported (Nemésio 2001, Van den Abeele 2016).

Aberrant colorations in birds are frequently associated with increased risks of predation and reduced mating success (Ellegren *et al.* 1997, Izquierdo *et al.* 2018). However, the color alteration reported here seems not to affect sexual and social interactions (e.g., Teixeira 1985, Pagotto *et al.* 2019). Indeed, our blue parakeet usually fed, preened, flocked and exhibited nesting behaviors with typical-colored

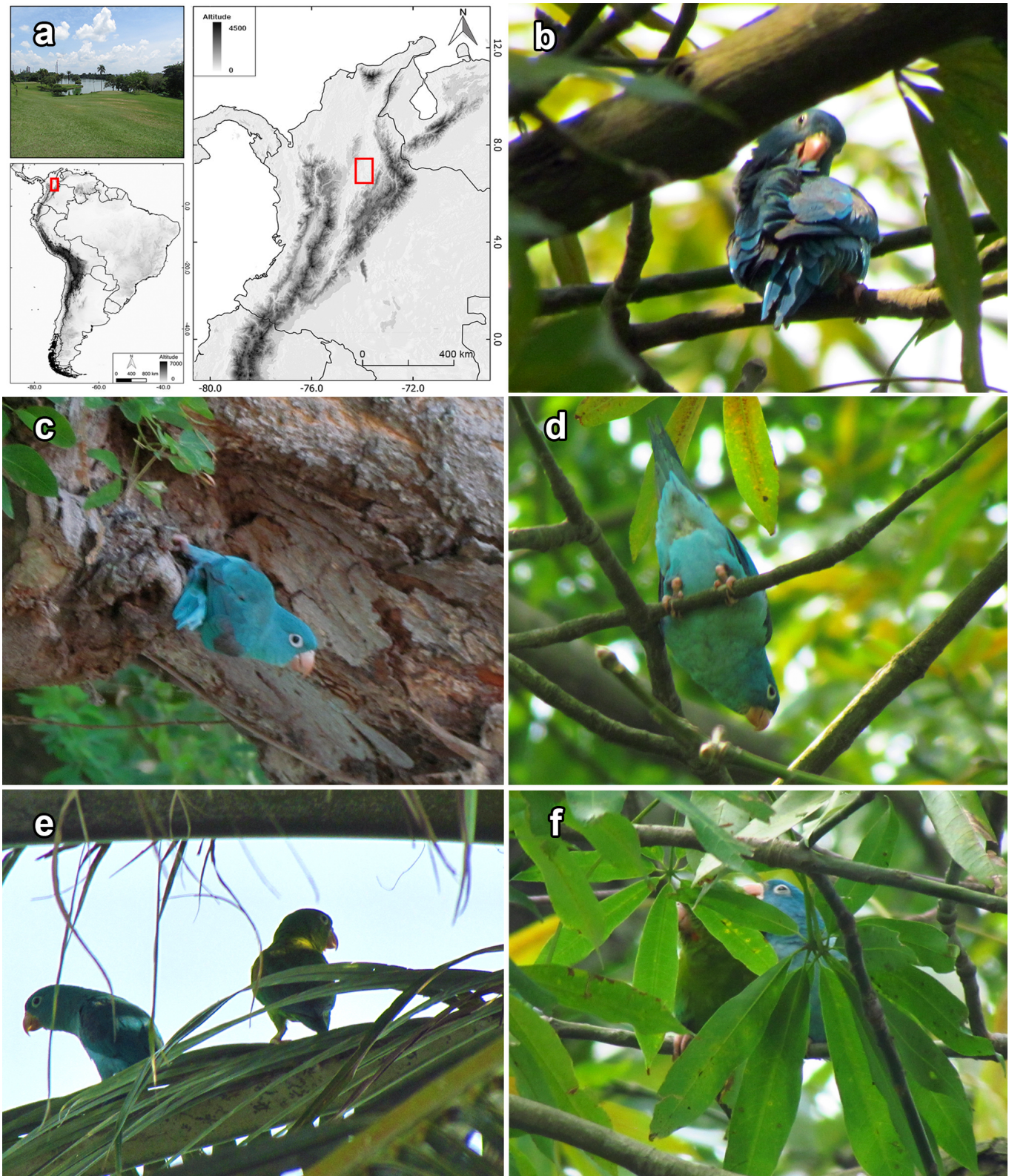


Figure 1. Wild-blue mutant of Orange-chinned Parakeet (*Brotogeris jugularis*) from a population inhabiting an urban area in Colombia. a. Study area depicting the general landscape of the Club Miramar (upper inset), where the blue parakeet was observed. b–d. Portraits showing the general coloration of the blue phenotype. e–f. Portraits showing interactions between cyanistic and typical-colored green parakeets.

red green conspecifics. The blue mutant was more conspicuous than the green forms to the human eye, suggesting that this mutation could increase the predation risk. Nonetheless, enhanced protection against predators associated with flock behavior (Tellería *et al.* 2001) might reduce predation pressure on blue mutants. Further studies are needed to corroborate these inferences and assess the potential conservation value of wild blue phenotypes.

AUTHOR'S PARTICIPATION

ER, FLMJ and JEA conceived the study; ER and FLMJ collected the data; ER led the writing with contributions from all authors.

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CONFLICT OF INTEREST

We declare we have no competing interests.

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