

## Axanthism in *Pithecopus gonzagai* Andrade et al., 2020 (Anura: Phyllomedusidae)

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### ABSTRACT

The coloration pattern in wild animals is an important characteristic for survival as well as for intra and interspecific communication, being aberrant colorations rarely observed in vertebrates. Axanthism is the lack of yellow pigmentation, and considered an infrequent anomaly, for which cases have been described in amphibians. We describe herein a case in the frog *Pithecopus gonzagai*, a species characterized by predominantly arboreal habits and widely distributed in northeastern Brazil. This is the first report of an axanthic adult specimen of *P. gonzagai*, found in the municipality of Juazeiro do Norte, Ceará, Brazil.

Key Words: Mutation; Pigment; Color aberrancy; monkey frog; Caatinga.

Coloration plays an important role in many aspects of the natural history of animals, and is often an important feature for inter and intra-specific communication (Silva *et al.*, 2020; Araújo *et al.*, 2020). Intimately linked to animal fitness, color aberrancies rarely occur in nature (Ribeiro and Gogliath, 2012; Silva *et al.*, 2020), possibly due to natural selection, since aberrant individuals may become more visible to predators (Bensch *et al.*, 2000; Rees, 2004). Axanthism is one of these uncommon aberrancies, and refers to the lack of yellow pigmentation in an individual, producing a particular phenotype in populations, which can consist of conspicuous blue, gray or abnormally dark specimens (Chilote and Moreno, 2019).

In amphibians, the most frequently described colour anomalies are albinism and leucism (Lunghi *et al.*, 2017). Although considered less

frequent, cases of animals with axanthism have been described for a large number of amphibians, such as *Bufo bufo* (Kolenda *et al.*, 2017), *Dryophytes japonicus* (Maslova *et al.*, 2018), *Melanophryniscus estebani* (Chilote and Moreno, 2019), *Dendropsophus minutus* (Araújo *et al.*, 2020) and *Smilisca baudinii* (Vásquez-Cruz and Fuentes-Moreno, 2020).

Here we study the specie *Pithecopus gonzagai* is characterized by predominantly arboreal habits, and can be distinguished from other similar species by its smaller size and color pattern, composed mainly of lemon green, which covers the entire back of the animal, white on the abdomen, and orange with black stripes on the inner portions of the hind legs and front (Caramaschi, 2006; Andrade *et al.*, 2020). The recently described species is distributed throughout the northeastern region of Brazil to the north of the São Francisco River, occupying most of

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the Caatinga and Atlantic Forest biome of the states of Alagoas, Pernambuco, Paraíba, Rio Grande do Norte Piauí and Ceará (Caramaschi, 2006; Roberto & Loebmann, 2016; Da Silva *et al.*, 2020; Andrade *et al.*, 2020).

On July 23, 2020, we found an adult axanthic specimen of *P. gonzagai* in the rural area of the municipality of Juazeiro do Norte, northeast Brazil (-7.1625383 S, -39.2808628 W). The individual presented grayish coloration on most of the body, but its usual coloration between the lower and forelimbs was preserved (Fig. 1A). The typical color pattern of the species is usually a vibrant green, with orange bars on the lower thighs (Fig. 1B). The referred specimen was observed in activity during the sunset around 5:30 pm, photographed, and returned to the site of collection.

Axanthic individuals of species with typically green coloration (resulting from the combination of yellow and blue pigments), usually present a darker, blue color pattern (Jablonski *et al.*, 2014; Martínez-Silvestre *et al.*, 2016). Consequently, axanthism is often confused with melanism as observed by Vásquez-Cruz and Fuentes-Moreno (2020).

However, the individual of *P. gonzagai* we observed presented mainly grayish color. Similar observations about darker overall coloration in cases of axanthism have also been reported for axanthic snakes, that are usually called black albinos (Borteiro *et al.*, in press).

The causes that induce axanthism are poorly understood, some factors seem to be related to endogamy, environmental stress, nutritional deficiencies, and pollution (Bensch *et al.*, 2000; Chętnicki *et al.*, 2007; Jablonski *et al.*, 2014). Additionally, the frequency of rare phenotypes could also be an indicator of putative low genetic variability in natural populations (Guevara *et al.*, 2011). This could be an explanation of our study case, since the specimen was found in an anthropized area that although rural, is surrounded by urbanization, which can somehow isolate small local populations.

Even though this chromatic aberration was reported for several species of amphibians around the world, this is the first account concerning a free-living individual of *P. gonzagai*. Future investigations are pertinent in an attempt to uncover the adaptive importance this phenotype, and the consequences on individual fitness.



**Figure 1.** Comparative dorsolateral views of Axanthism (A) and normal (B) adults of *Pithecopus gonzagai* recorded in the municipality of Juazeiro do Norte, northeast Brazil. (Photos: Mascarenhas, W.).

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