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Possible axanthism in *Rhinella ornata* from Paraguay

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Resumen: Posible axantismo en *Rhinella ornata* (Amphibia: Bufonidae) de Paraguay. Se presenta un reporte de posible axantismo en el bufónido, endémico de la ecorregión del Bosque Atlántico, *Rhinella ornata*, lo que a su vez representaría el primer registro de esta aberración cromática en Paraguay. El individuo no demostró señales de haber sufrido dificultades por padecer la aberración, y se ofrecen algunas posibles explicaciones del por qué, relacionado con su ecología e historia natural.

For a long time known as "blue variant" or "blue frogs" (Berns & Uhler, 1966), amphibians showing abnormally blue or partially blue colouration are now known to exhibit axanthism. Axanthism occurs when the xanthophores themselves, or the carotenoid vesicles of the xanthophores, are wholly or partially absent, or non-functioning (Berns & Narayan, 1970; Vitt & Caldwell, 2014; Henle *et al.*, 2017), allowing the colouration of the underlying iridophores to reflect short light wave lengths, and resulting in blue or grey colouration in areas of skin that are usually orange, yellow or red (Berns & Narayan, 1970; Bechtel, 1995).

First reported by Liu (1931) for two species of the Ranid genus *Pelophylax* Fitzinger, 1843 in China, it has since been reported from at least 32 species in nine families of Amphibia (Amblystomatidae: 1 species; Salamandridae: 3 species; Alytidae: 1 species; Bufonidae: 5 species; Craugastoridae: 1 species; Dicroglossidae: 1 species; Hylidae: 7 species; Ranidae: 12 species and Rhacophoridae: 1 species) (Rivera *et al.*, 2001; Jablonski *et al.*, 2014; Martínez-Silvestre *et al.*, 2016; Hall *et al.*, 2018; Lindemann *et al.*, 2019; Chilote & Moreno, 2019; Araujo *et al.*, 2020). However, there are only two, very recent, reports from

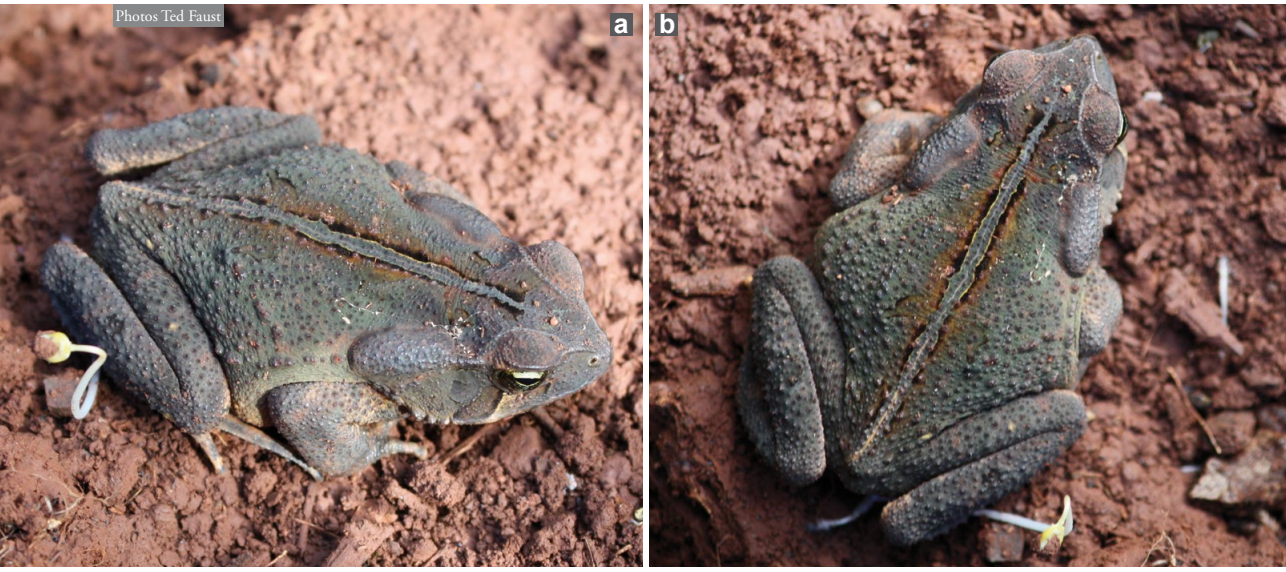

Figure 1: a) Lateral view and b) dorsal view of axanthic *Rhinella ornata*, Estancia Nueva Gambach, Itapúa department, Paraguay.
Figura 1: Vistas a) lateral y b) dorsal del individuo de *Rhinella ornata* axántico, Estancia Nueva Gambach, departamento de Itapúa, Paraguay.

South America, in *Melanophryniscus estebani* (Bufonidae) from Argentina and in *Dendropsophus minutus* (Hylidae) from Brazil (Chilote & Moreno, 2019; Araujo *et al.*, 2020). Axanthism may be partial or complete and the cause is probably congenital (Jablonski *et al.*, 2014).

In this note we provide the first record of possible axanthism in the Atlantic Forest endemic toad *Rhinella ornata* Spix, 1824 (Bufonidae) which would represent the first report of the aberration from a Paraguayan amphibian. An adult individual (SV approximately 65 mm) was found by day under a log at Estancia Nueva Gambach (26°38'S / 55°39'W; 917 masl), Itapúa department, Paraguay, and photographed by TF on 29 and 30 May 2008 (Figure 1). It showed extensive bluish colouration over much of the body, with the exception of the dark mid-dorsal markings and traces of the normal facial pattern. The typical colouration of this species is pale straw-brown, with a whiter medial stripe bordered with black and/or reddish-brown (Weiler *et al.*, 2013); and the sides of the head are reddish-brown with a whitish "teardrop". Some individuals may be more strongly brown, black or yellowish in colour, in which case the "normal" pattern may be more or less conspicuous (Figure 2). Another possible explanation for this unusual colouration is a metabolic effect caused by temperature or light levels (Hewer 1923) but despite temperatures being rather cold on these days (< 10º C) this explanation was considered less likely as: 1) the individual was encountered on successive days in the same place, and 2) eleven other toads of this species that were found over the same two days all exhibited "normal" colouration.

The survival rates of herptiles with chromatic abnormalities are lower in diurnal species (Sazima & Di Bernardo, 1991) which depend on cryptic colouration for survival more so

Figure 2: Examples of variation shown by *Rhinella ornata* at the same locality, Estancia Nueva Gambach, Itapúa department, Paraguay.
Figura 2: Ejemplos de la variación individual de *Rhinella ornata* de la misma localidad, Estancia Nueva Gambach, Itapúa department, Paraguay.

than do nocturnal species (De Paula & Toledo, 2014). *Rhinella ornata* is a terrestrial, forest leaf litter toad that is active both by day and by night and its colouration is often considered to provide protection through crypsis (Ferreira, 2015). However, this was an apparently healthy, adult individual, showing no signs of failed predation or other injuries that might suggest repeated threats to its survival. The colouration of the species is naturally variable, with some individuals much darker than others (Figure 2), so we suggest that the abnormal blue colouration exhibited by this individual need not present a threat to its survival in the naturally low-light environment of the Atlantic Forest undergrowth that it inhabits. Furthermore, anurans of the genus *Rhinella* have prominent parotid glands that rapidly secrete bufogenine and bufotoxin compounds which act as a skin chemical defence against predation attempts (Jared *et al.*, 2009; Bovo *et al.*, 2014; Rojas-Padilla *et al.*, 2018). Consequently, naturally low predation levels of this species probably allow it to overcome the minor survival handicaps that this chromatic aberration may have otherwise caused.

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Report of albinism in a western iberian endemic newt

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Resumen: El albinismo se ha citado como anomalía genética para diversas especies de anfibios de la península ibérica, siendo extraños los casos dada la baja supervivencia de individuos con estas características en la naturaleza. En esta nota, mostramos un macho adulto de tritón ibérico (*Lissotriton boscai*) encontrado en una balsa artificial en la Sierra de Quilamas, en Salamanca, y que mostraba albinismo completo.