

NOTA BREVE / SHORT NOTE

## ANOMALIES IN THREE FROG SPECIES FROM EASTERN AMAZONIA

### Anomalías en tres especies de ranas de la Amazonía Oriental

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Received: 15<sup>th</sup> March 2023. Revised: 28<sup>th</sup> August 2023. Accepted: 31<sup>th</sup> August 2023.

Associate editor: Xavier Marquinez

Citation/ citar este artículo como: Pedroso-Santos, F., Kaefer, I.L., Costa-Campos, C. E. (2024). Anomalies in Three Frog Species from Eastern Amazonia. *Acta Biol Colomb*, 29(1), 146-148. <https://doi.org/10.15446/abc.v29n1.107302>

#### RESUMEN

Reportamos anomalías en tres especies de anuros pertenecientes a dos familias: Craugastoridae (*Pristimantis gutturalis* y *P. chiastonotus*) y *Rhinella castaneotica* (Bufonidae). Todos los registros fueron encontrados en dos unidades de conservación, un área protegida bien conservada de selva amazónica en el estado de Amapá, Amazonía oriental. Las anomalías detectadas fueron anoftalmía (caracterizada por la ausencia de uno o ambos ojos) en *P. gutturalis* y *P. chiastonotus*, y braquidactilia (dígito acortado) en *R. castaneotica*. Se necesitan más estudios ecotoxicológicos de las poblaciones de anuros en áreas protegidas para investigar las causas de las anomalías.

**Palabras clave:** anomalías, conservación, *Pristimantis*, *Rhinella*.

#### ABSTRACT

We reported anomalies in three anuran species belonging to two families: Craugastoridae (*Pristimantis gutturalis* and *P. chiastonotus*), and Bufonidae (*Rhinella castaneotica*). All records were found in two conservation units, a well-preserved and protected area of the Amazonian rainforest in the state of Amapá, eastern Amazon. The anomalies detected were anophthalmia (characterized by the absence of one or both eyes) in *P. gutturalis* and *P. chiastonotus*, and brachydactyly (digit shortened) in *R. castaneotica*. Further ecotoxicological studies of anurans populations in protected areas are needed to investigate the causes of anomalies.

**Keywords:** abnormalities, conservation, *Pristimantis*, *Rhinella*.

Morphological anomalies, both skeletal and non-skeletal, have been reported in natural populations of amphibian anurans from a variety of habitats around the world (Henle et al., 2017a). In Brazil, some previous studies have described these anomalies, and most have focused on specific taxa (e.g., Pedroso-Santos et al., 2020; Souza et al., 2021). Among anomalies in anurans, brachydactyly (defined as normal number of metatarsals but an abnormal number of phalanges) are the most widespread and relatively common in semi-aquatic and terrestrial species, as well as anophthalmia (characterized by the absence of one or both eyes) in juveniles and post-metamorphic individuals (Henle et al., 2017a,b; Souza et al., 2021). Herein we report two records of anophthalmia in the genus *Pristimantis* Jimenez de la Espada, 1870 and one of brachydactyly in the genus *Rhinella* Fitzinger, 1826 in eastern Amazonia, Brazil.

Specimens of *P. gutturalis* were found in 2021 during surveys at Parque Nacional Montanhas do Tumucumaque (1.2699°N, 2.4389°W), and specimens of *P. chiastonotus* and *R. castaneotica* were found in 2022 at Parque Natural Municipal do Cancão (0.9027°N, 52.0049°W), both in the municipality of Serra do Navio, state of Amapá, Brazil. Both areas are inserted in the Amazonian rainforest, particularly in upland (non-flooding) primary forest with closed canopy and emergent trees, with climate tropical monsoonal (Am) (according to the Köppen-Geiger classification; Álvares et al., 2013).

On 07 September 2021, we found an anophthalmic *P. gutturalis* adult male (unvouchered specimen) with a missing left eye and a normal right eye (Fig. 1A). The second anophthalmic individual (*P. chiastonotus*; HERPLAP 3836; SVL = 32.8 mm) was registered on 30 April 2022, with missing right eye (Fig. 1B), and on 29 June 2022, we found an adult male *R. castaneotica* (HERPLAP 3913; SVL = 30.0 mm) showing brachydactyly in the right hindlimb (Fig. 1C-D). Classification of anomalies followed Henle et al. (2017b). The specimens were deposited in the Herpetological Collection of Universidade Federal do Amapá, Brazil.

To our knowledge, the data presented here demonstrate the first records of brachydactyly on *R. castaneotica* and anophthalmia on the frogs *P. chiastonotus* and *P. gutturalis*. According to Souza et al. (2021), brachydactyly is common in semi-aquatic and terrestrial species such as toads of the genus *Rhinella*. On the other hand, the occurrence of only one anomaly (eye colouration abnormal) in the family Craugastoridae (*P. reichlei*) suggests that anomalies both skeletal and non-skeletal may be rare in arboreal species (see Souza et al., 2021). Therefore, our data reinforce that anecdotal records are important for better knowledge about abnormalities in anurans.

In addition, both protected areas are well-preserved, and, therefore, the causes of the anomalies recorded here are unknown. While cases of anomalies in urban and perturbed



**Figure 1.** Anomalies in three frog species from eastern Amazonia. In parentheses, voucher number of Herpetological Collection of Universidade Federal do Amapá, Brazil. A - *Pristimantis gutturalis* (unvouchered specimen) and B - *Pristimantis chiastonotus* (HERPLAP 3836) both with anophthalmia. C and D - *Rhinella castaneotica* (HERPLAP 3913) with brachydactyly.

areas are related to factors such as chemical contaminants (e.g. Ferrante and Fearnside, 2020), the cases within protected areas could be related to intrinsic genetic and developmental imperfections (Lunde and Johnson, 2012). In this sense, we suggest that all individuals were probably affected during the embryonic developing stage. Thus, future ecotoxicological studies of amphibian populations in protected areas are needed to investigate the causes of anomalies, which will provide important input for the conservation of the anuran population.

## AUTHORS PARTICIPATION

FPS and CECC collected the data; FPS and CECC wrote the original draft; CECC and ILK revised the final draft.

## ACKNOWLEDGMENTS

This study is part of the results of the “História Natural de Anfíbios Anuros na Amazônia Oriental”. We are grateful to the colleagues of “Laboratório de Herpetologia” for the assistance on the fieldwork. Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) for providing collection permits (SISBIO # 48102-5). CECC thanks to the Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq for the research grant (Proc. 307697/2022-3).

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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