

FIRST RECORD OF *HYLOXALUS ANTHRACINUS* EDWARDS, 1971 (ANURA: DENDROBATIDAE) IN PERU

PRIMER REGISTRO DE *HYLOXALUS ANTHRACINUS* EDWARDS, 1971 (ANURA: DENDROBATIDAE) EN PERÚ

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The genus *Hyloxalus* is the most diverse among dendrobatid frogs (Santos et al., 2009) with 64 species currently recognized (Frost, 2024) and not least than ten species awaiting descriptions (Grant et al., 2017). This genus is defined by molecular characters and characterized by being mostly cryptically colored (except *H. azureiventris* and *H. nexipus*) and distributed throughout Panama, Colombia, Ecuador, and Peru on the Pacific coast; Andean Venezuela, Colombia, Ecuador, Peru, as well and eastern foothills of the Andes in Bolivia to Venezuela, east to the upper Amazon Basin (Grant, 2006). *Hyloxalus anthracinus* was described by Edwards (1971) and accounts were provided by Coloma (1995), Almendáriz and Orcés (2004, short account). To date, records of *H. anthracinus* have been restricted to a narrow altitudinal zone between 2,710 – 3,500 m a.s.l. on the Cordillera Oriental and the Mazán River in southern Ecuador (Coloma, 1995). The distribution lies in the Ecuadorian provinces of Azuay, Cañar (online records by Coloma et al. 2022), Morona Santiago, and Zamora Chinchipe, where the species inhabits paramo, very humid montane forest, and lower humid montane forest (Coloma, 1995).

This species is listed as Critically Endangered by Ortega-Andrade et al. (2021) and the IUCN Red list of Threatened species (IUCN, 2022, assessed on 07 October 2020). Due to a drastic population decline in the 1990s, possibly caused by the chytridiomycosis or a combination of factors, the surviving subpopulations are very small (≤ 50 mature individuals) being more vulnerable to the habitat loss or degradation (IUCN SSC Amphibian Specialist Group, 2022).

Surveys carried out in 2007 in the montane ecosystems of the Piura Department, as part of biological inventories in order to protect the headwaters of Huancabamba River, have resulted in the observation and collection of *H. anthracinus*, which we report as follows.

On September 2007, we collected one female (CORBIDI 8966) and five males (CORBIDI 8964–65, 8967–69) of *H. anthracinus* that were found by day in a paramo, calling from the base of bunchgrass, at a swamp area close to the drainage of San Antonio lagoon (4.768725° S, 79.454228° W; WGS 84), at an elevation of 3,214 m a.s.l. (Fig. 1), Huamba District, Ayabaca Province, Piura Department, Peru. These specimens are the first record of *H. anthracinus* in Peru and represent a range extension of approximately 96 km SW from the nearest locality Abra Zamora, in the borderline between Loja and Zamora Chinchipe provinces, in Ecuador (Fig. 1). The six specimens were fixed in formalin and then stored in ethanol 70 %, and are housed in the herpetological collection of Centro de Ornitología y Biodiversidad (CORBIDI), Lima, Peru.

No color photographs of the six specimens of *H. anthracinus* exist (Fig. 2), only the following field notes of live coloration taken by PJV. Dorsally, brown with two paravertebral rows of dark brown blotches, forearms darker than arms, forelimbs bearing darker diagonal bands, dorsolateral stripe absent, oblique lateral stripe present as a broad creamy tan stripe (see Fig. 2G), and flanks dark brown with a tan labial stripe. Ventrally, males with throat, chest, forelimbs, shanks, palms, and soles solid black with the axillae, belly and thighs red. In two males (CORBIDI 8965, 8969) the ventral surface of shanks was black and in the other three black with red blotches. Ventrally, the female (CORBIDI 8966) had the throat and part of the chest brownish orange and the arms, belly and thighs creamy orange.

Our specimens were easily identified as *Hyloxalus anthracinus* by the ventral black and red coloration of male specimens (PJV field notes September 2006), unique among the species of the genus. Furthermore, the specimens agree with the diagnostic characters given by Edwards (1971) and Coloma (1995) such as: disc on Finger III not expanded; Finger I = II; fringe absent on



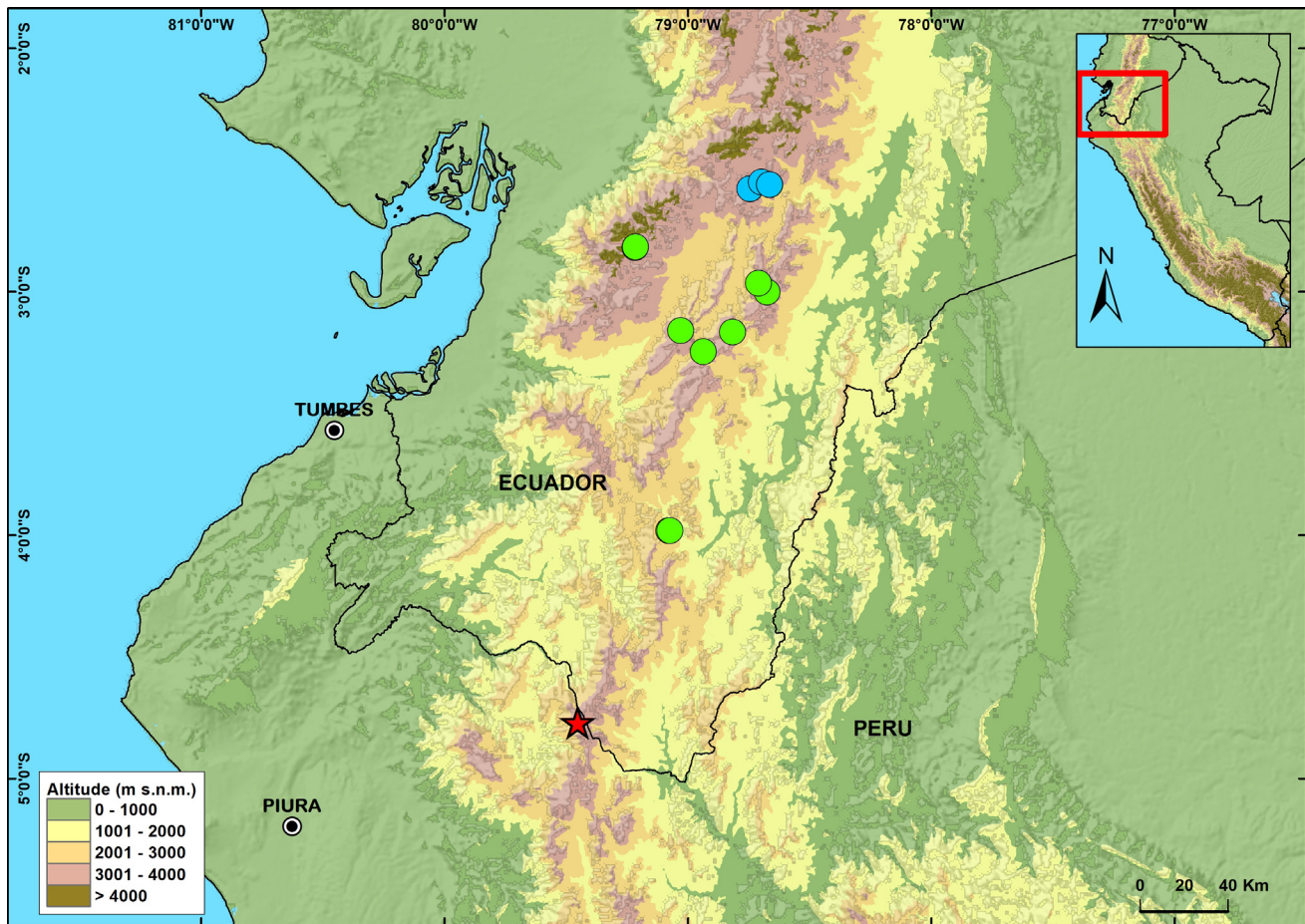


Figura 1. Distribución de *Hyloxalus anthracinus*. Los círculos representan la distribución previamente conocida [los círculos azules representan registros tomados de Coloma et al. (2022) y los círculos de color verde claro representan registros tomados de Coloma (1995)] y la estrella roja el nuevo registro de localidad.

Figure 1. Distribution of *Hyloxalus anthracinus*. Circles represent the previously known distribution [blue circles represent records taken from Coloma et al. (2022) and light green circles represents records taken from Coloma (1995)] and the red star the new locality record.

Finger II; disc on Toe IV not expanded; fringe absent on Toe IV; outer tarsal fold absent; toes unwebbed; dorsolateral stripe absent; ventrolateral stripe absent; Finger III not swollen in males; testes white; and the snout-vent length with 19.05–20.04, $n = 5$ in males and 21.73 in a female (16.2–19.0, $n = 14$ in males and 17.1–23.6, $n = 15$ in females; according to Coloma, 1995). Even our male specimens present the black arm gland, a taxonomic character reported for *H. anthracinus* by Grant et al. (2006, 2017).

Additionally, we examined four specimens of *H. anthracinus*, housed in the Museo de Zoología, Pontificia Universidad Católica del Ecuador (QCAZ), Quito, Ecuador and reported online by Coloma et al. (2022) (see Appendix I), to verify the state of diagnostic characters given by Coloma (1995). Finding the most relevant distinction between the Ecuadorian and Peruvian populations to be the presence of a well-defined narrow oblique

lateral stripe [see photos of the holotype of *H. anthracinus* in Coloma et al. (2022) and plate 2E in Coloma (1995)], a feature ill-defined in the Peruvian specimens (Fig. 2G). The oblique lateral stripe in the Peruvian population is weakly defined in its upper edge given the appearance of a broad oblique stripe. Although the oblique lateral stripe is a widely used taxonomic character in *Hyloxalus* and other genera of Dendrobatidae and Aromobatidae (Coloma, 1995; Morales, 2002; Duellman, 2004; Grant, 2006; Grant et al., 2017), we prefer to interpret the state of the oblique lateral stripe in the Peruvian population of *H. anthracinus* as geographic variation on the southern extreme of distribution, rather than evidence of a distinct taxa from Peru. Nonetheless, this needs further verification by comparison of DNA sequences of both populations. According to Grant et al. (2017), *H. anthracinus* is the sister taxa of a group that includes *H. jacobuspetersi* + *H. delatorrae*, and *H. sylvaticus* + *H. pulcherrimus*.

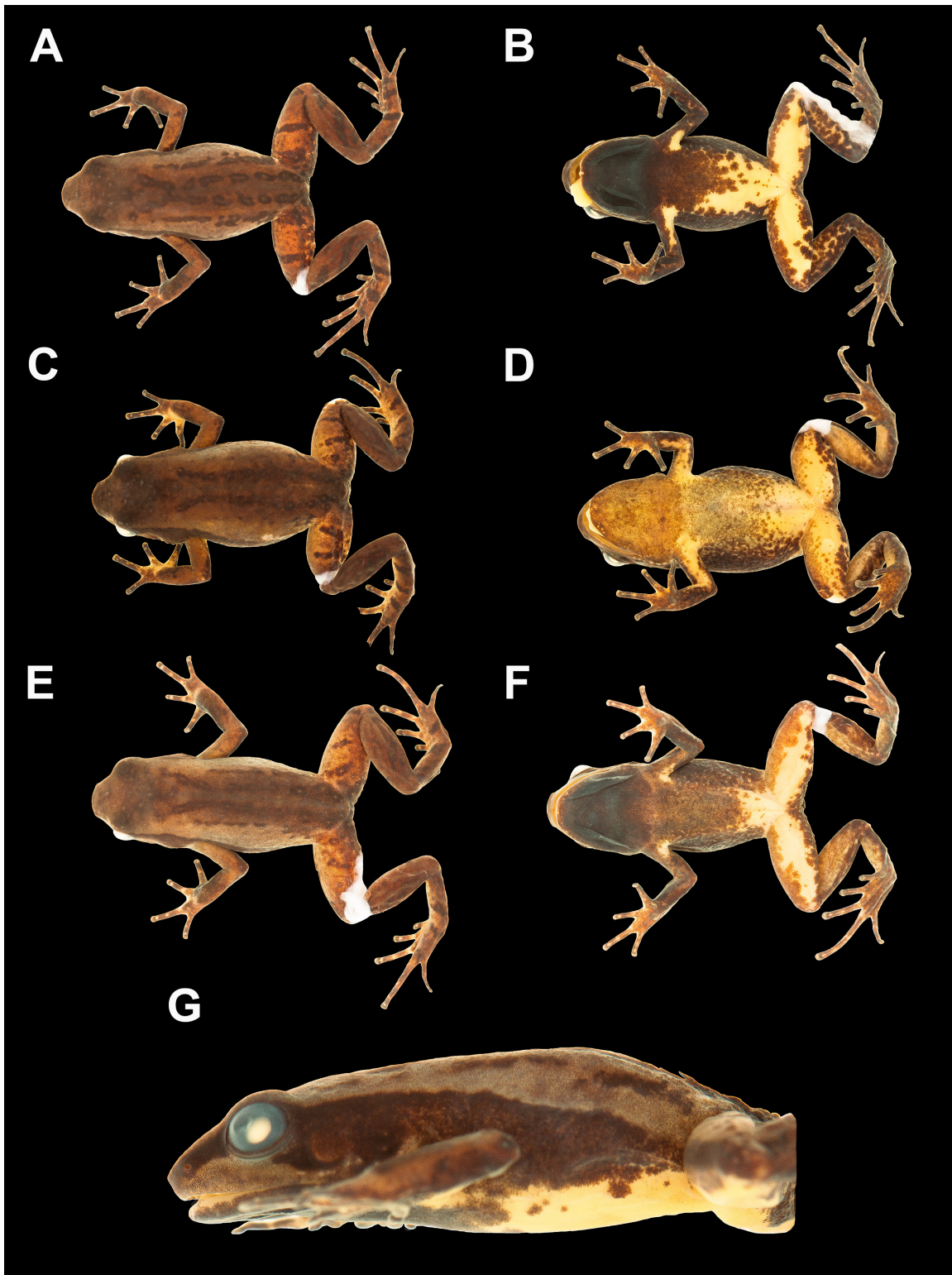


Figura 2.

Ejemplares de *Hyloxalus anthracinus* (en preservante) colectados en la laguna San Antonio, Distrito de Huamba, Provincia de Ayabaca, Región Piura, Perú. (A) vistas dorsal y (B) ventral del macho CORBIDI 8968, SVL = 19.4 mm; (C) vistas dorsal y (D) ventral de la hembra CORBIDI 8966, SVL = 21.5 mm; (E) vistas dorsal y (F) ventral del macho CORBIDI 8969, SVL = 19.5; (G) vista lateral del macho CORBIDI 8969, SVL = 19.5 mm. Foto: Pablo J. Venegas.

Figure 2.

Specimens of *Hyloxalus anthracinus* (in preservative) collected in San Antonio lagoon, Huamba District, Ayabaca Province, Piura Region, Peru. (A) dorsal and (B) ventral views of male CORBIDI 8968, SVL = 19.4 mm; (C) dorsal and (D) ventral views of female CORBIDI 8966, SVL = 21.5 mm; (E) dorsal and (F) ventral views of male CORBIDI 8969, SVL = 19.5; (G) lateral view of male CORBIDI 8969, SVL = 19.5 mm. Photo: Pablo J. Venegas.

The population of *Hyloxalus anthracinus* in San Antonio Lagoon looked healthy in 2007, with several males calling from the bunchgrass and abundance of tadpoles. After the collection of these specimens no more surveys were done in this lagoon. However, several herpetological inventories to the paramos of Piura during 2023 and begins of 2024, that even surveyed other lagoons in the vicinity of San Antonio, fail in recorded *H. anthracinus* (G. Chávez com. pers.). Likewise, although to date the area of San Antonio Lagoon and adjacent lagoons not showed more anthropogenic activities beyond cattle ranching, fires caused by livestock farmers to green pastures burn the paramo of Piura Department every year during the dry season (Jun-October). Therefore, being this a small isolated population of *H. anthracinus*, affected by continuous habitat degradation, as in the range of the Ecuadorian populations, the threat situation is the same in both countries. Future surveys are needed to confirm the survival of *H. anthracinus* and assess its population status in the San Antonio Lagoon. According to the species reported by Frost (2024), this record increases to 21 the number of *Hyloxalus* species known from Peru.

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APPENDIX

Appendix 1. Specimens examined.

Hyloxalus anthracinus.—ECUADOR: Azuay: Páramos de Matanga, 3.244° S, 78.93699° W, QCAZ 2697; Cañar: Azoguez: Parque Nacional Sangay, Reserva Mazar, 2.574616° S, 78.74554° W, QCAZ 49436–37; Cañar: Reserva Mazar, La Libertad, 2.54762° S, 78.69884° W, QCAZ 49771
