

FIRST RECORD OF ALBINISM IN TADPOLES OF *PTYCHOHYLA EUTHYSANOTA* (ANURA: HYLIDAE)

PRIMER REGISTRO DE ALBINISMO EN RENACUAJOS DE *PTYCHOHYLA EUTHYSANOTA* (ANURA: HYLIDAE)

Jimena García-Díaz¹, Daniel Nuñez-Robles¹ & Daniel Ariano-Sánchez^{1,2*}.

¹Departamento de Biología, Universidad del Valle de Guatemala, Guatemala City, Guatemala.

²Centro de Estudios Ambientales y Biodiversidad, Universidad del Valle de Guatemala, Guatemala City, Guatemala.

*Correspondence: dariano@uvg.edu.gt

Received: 2023-10-19. Accepted: 2023-12-17. Published: 2024-01-15.

Editor: Uri Omar García Vázquez, México. .

Resumen.— Describimos los primeros casos de albinismo en renacuajos de la rana de riachuelo del bosque nuboso *Ptychohyala euthysanota*. Reportamos tres renacuajos albinos de *P. euthysanota* fueron encontrados junto con renacuajos que mostraban el fenotipo típico de la especie, en la Reserva Natural “Refugio del Quetzal”, localizada en la falda sur del volcán Atitlán, Municipalidad de Santa Bárbara, Suchitepéquez, Guatemala.

Palabras Clave.— Fenotipo, Guatemala, hipopigmentación, rana de riachuelo del bosque nuboso, volcán Atitlán.

Abstract.— We describe the first cases of albinism in tadpoles of *Ptychohyala euthysanota*, the Cloud Forest Stream Frog. Here, we report three albino *P. euthysanota* tadpoles found in conjunction with tadpoles showing the typical phenotype of the species at Reserva Natural “Refugio del Quetzal”, located at the southern foothill of the Volcan Atitlán, Municipality of Santa Bárbara, Suchitepéquez, Guatemala.

Keywords.— Cloud Forest Stream Frog, Guatemala, hypopigmentation, phenotype, Volcan Atitlán.

On August 11, 2023, three albino tadpoles of *Ptychohyala euthysanota* were found in conjunction with 11 tadpoles displaying the typical phenotype of the species in a small temporary stream within Reserva Natural “Refugio del Quetzal”, located at the southern base of Volcán Atitlán, Municipality of Santa Bárbara, Suchitepéquez, Guatemala (14.5483° N, 91.1915° W; WGS84; 1,670 m a.s.l.). The habitat is a riparian cloud forest with a seasonal stream that has several water pools. The albino tadpoles were found in different pools within the stream, along with phenotypically normal tadpoles according to the descriptions of Köhler (2011). To the best of our knowledge, this is the first published record of albinism in tadpoles of *P. euthysanota*.

The albino tadpoles showed a lack of brown pigmentation on the tail musculature and the absence of the brown mark that encircles the pale crescent-shaped region on the posterior body, whereas the tadpoles with the typical phenotype did exhibit these characteristics (Fig. 1). The eyes of the albino tadpoles were depigmented, confirming complete albinism (Stark, 2022), whereas the tadpoles with the typical phenotype had

pigmentation in their eyes. Despite the phenotypic differences, both types exhibited similar chromatophore patterns and the same jaw configuration with the same number of rows of anterior and posterior teeth (4/6), confirming both phenotypes as tadpoles of *P. euthysanota* following Köhler (2011).

Albinism is not beneficial in the wild as it eliminates the mimicry provided by the normal phenotype along with more frequent malformations, thus increasing predation pressure on albino tadpoles (Henle et al., 2017). In this case, the albino tadpoles did not present any deformities in the jaw or other body parts. Both types of tadpoles exhibited similar cryptic behavior, hiding beneath litter, sediment, or rocks when detecting movement within the pools. It was observed that both types fed on organic matter found in the pools.

Volcán Atitlán recent explosive vulcanian and plinian eruptions during the period of 1826 to 1856 (Haapala et al., 2005), along with the transformation of forests into agricultural systems below 1,500 m a.s.l., could have contributed to partial



Figura 1. Renacuajo albino de *Ptychohyala euthysanota* observado en la Reserva Natural “Refugio del Quetzal” en la falda sur del Volcán Atitlán, Suchitepéquez, Guatemala a 1670 m s.n.m. el 11 de agosto de 2023, mostrando vistas de la región bucal (A), ventral (B), dorsal (C) y lateral (D). Fotos: Daniel Nuñez-Robles.

Figure 1. Albino tadpole of *Ptychohyala euthysanota* observed at Reserva Natural “Refugio del Quetzal” on the southern slope of Atitlán Volcano, Suchitepéquez, Guatemala at 1670 m elevation on 11 August 2023, showing buccal (A), ventral (B), dorsal (C) and lateral (D) views. Photos: Daniel Nuñez-Robles.

geographic isolation at this site. The relatively high presence of albino tadpoles found (three out of 14, 21%) could be due to the population’s isolation, as reduction in genetic flow has shown to be a relevant factor in hypopigmentation frequency in other vertebrates (Weyrauch & Grubb 2006). Geographic isolation reduces genetic diversity and heterozygosity, and produces scarcity of predators, making the incidence of the albino phenotype more likely despite its lack of benefit (Strachinis & Tsarouhas, 2021). We have not recorded adults of the albino phenotype at the site but after several trips to the study site, we have been able to observe that apparently the abundance of herpetofauna, especially snakes (one of the main predators of frogs), is very low. Our observations highlight the importance of

conducting studies on the population genetics of *P. euthysanota* in the Volcán Atitlán and monitoring the population to better understand the population dynamics, demographic factors, and those influencing the frequency of albinism.

Acknowledgements.- Research was done under Research Permit # DVCB 12-2021 and Collection Permit # B 01027 issued by CONAP to Daniel Ariano-Sánchez. The work carried out during this study followed the “Guidelines for use of live amphibians and reptiles in field and laboratory research” approved by the American Society of Ichthyologists & Herpetologists (Herpetological Animal Care and Use Committee 2004). We thank José Monzón, Faustino Camposeco, Francisco Carrillo

and Milvian Salcedo from CEAB-UVG and to the students of the Environmental Assessment course at UVG for their help during the fieldtrip where the specimen was discovered. Thanks to Departamento de Biología UVG for field equipment support. We also thank the anonymous reviewers for comments and suggestions that improved the manuscript.

CITED LITERATURE

- Haapala, J.M., R. Escobar, J.W. Vallance, W.I. Rose, J.P. Griswold, S.P. Schilling, J.W. Ewert & M. Mota. 2005. Volcanic Hazards at Atitlán Volcano, Guatemala. Open-File Report 2005-1403. U.S. Geological Survey, Reston, Virginia, USA.
- Henle, K., A. Dubois & V. Vershinin. 2017. Commented glossary, terminology and synonyms of anomalies in natural population of amphibians. *Mertensiella* 25:9-48.
- Köhler, G. 2011. Amphibians of Central America. Herpeton, Verlag Elke Köhler, Offenbach, Germany.
- Stark, T. 2022. Jewel among jewels: possible albinism in *Epidalea calamita* (Laurenti, 1768) spawn in the Netherlands. *Herpetology Notes* 15:597-600.
- Strachinis, I. & N. Tsarouhas. 2021. First report of albino green toads *Bufo viridis* in Greece. *Herpetological Bulletin* 155:44-45.
- Weyrauch S.L. & T.C. Grubb. 2006. Effects of the interaction between genetic diversity and UV-B radiation on wood frog fitness. *Conservation Biology* 20:802-810.

