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DIVING BEHAVIOR IN THE NEOTROPICAL WHIPSNAKE *CHIRONIUS CARINATUS* (LINNAEUS, 1758) (SQUAMATA: COLUBRIDAE)

COMPORTAMIENTO DE BUCEO EN LA SERPIENTE LÁTIGO *CHIRONIUS CARINATUS* (LINNAEUS, 1758) (SQUAMATA: COLUBRIDAE)

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Resumen.– Documentamos por primera vez el comportamiento de buceo e inmersión prolongada (> 15 minutos) para la serpiente látigo Neotropical *Chironius carinatus.* Este reporte es de la Sierra Nevada de Santa Marta, Departamento del Cesar, norte de Colombia, y resalta que el conocimiento de los hábitos y el uso del hábitat de esta serpiente conspicua sigue siendo fragmentario.

Palabras clave.– Colombia, hábitos acuáticos, serpientes terrestres, Serpentes, Sierra Nevada de Santa Marta.

Abstract.– We document for the first time diving behavior and long-term immersion (> 15 minutes) for the Neotropical whipsnake *Chironius carinatus*. This report is from the Sierra Nevada de Santa Marta, Cesar department, northern Colombia, and highlights that knowledge of the habits and habitat use of this conspicuous snake remains fragmentary.

Key words.– Aquatic habits, Colombia, Serpentes, Sierra Nevada de Santa Marta, terrestrial snakes.

The habitat is one of the most notable life-history traits of an organism because it encompasses most outputs from the selective forces that have influenced its evolution. For example, within aquatic and arboreal snakes, there are modifications that are remarkably similar among species of the same habitat, but dissimilar among species of different habitats (e.g., tail length). However, they share gravity as one of the most important selective evolutionary agents, although it acts in opposite directions in each type of habitat, deeply impacting the cardiovascular and respiratory physiology performance, as well as the entire body plan of both semi-aquatic and arboreal snakes (Lillywhite, 1987, 2014; Guimarães et al., 2014; Sheehy et al., 2016). Thus, the discovery of new habitat occupancy or use by a species significantly contributes to understanding the evolutionary paths and the adaptive performance of organisms.

The snake genus *Chironius* Fitzinger, 1826 is a Neotropical squamate clade that currently includes 24 species distributed from Central America (northern Honduras) to southern South America (northeastern Argentina and northwestern Uruguay), inhabiting several forested and open ecosystems (Dixon et al., 1993; Hollis, 2006; Torres-Carvajal et al., 2018; Uetz et al., 2024). All *Chironius* species, commonly known as sipos, are among the most conspicuous terrestrial, semi-arboreal and arboreal snakes in Central and South America due to their large size, diurnal foraging activity, and mild to very aggressive behavior when they are disturbed (Dixon et al., 1993).

Most species inhabit riparian forests, frequently occupying microhabitats such as the ground, shrub branches, and tree branches along streams (Dixon et al., 1993; Rojas-Morales & Marín-Martínez, 2022). Interestingly, some individuals of *C.*

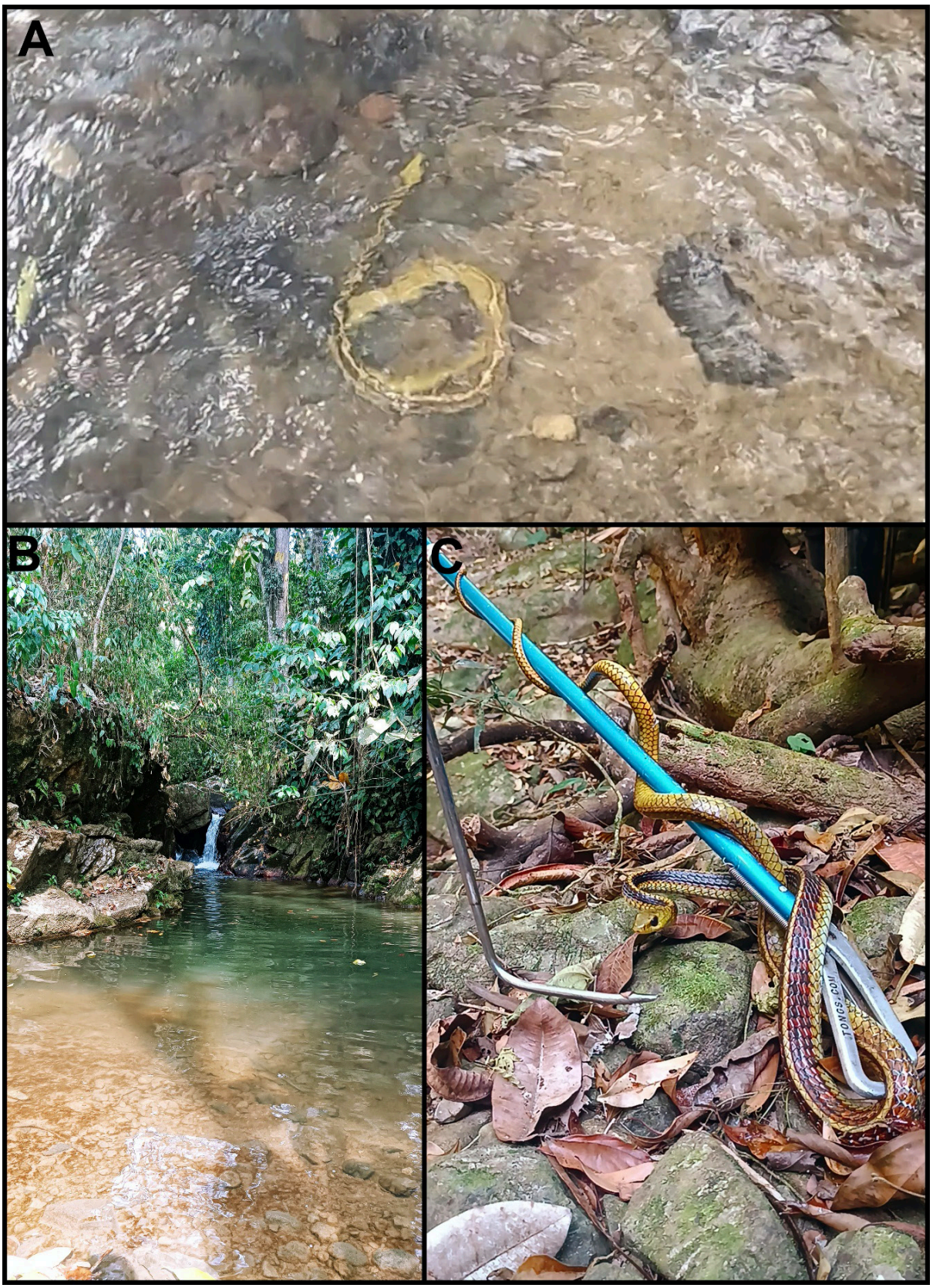

Figura 1. (A) Comportamiento de buceo en *Chironius carinatus* en (B) una quebrada sin nombre que drena de la Sierra Nevada de Santa Marta, Vereda Casa de Zinc, Corregimiento Nuevo Colón, Municipio de Pueblo Bello, Departamento del Cesar, Colombia. (C) Captura del espécimen después de 17 minutos de inmersión.

Figure 1. (A) Diving behavior in *Chironius carinatus* at (B) an unnamed stream that drains from the Sierra Nevada de Santa Marta, Vereda Casa de Zinc, Corregimiento Nuevo Colón, Municipio de Pueblo Bello, Departmento del Cesar, Colombia. (C) Collecting the specimen after 17 minutes of immersion.

diamantina Fernandes & Hamdan, 2014, *C. fucus* (Linnaeus, 1758), *C. flavolineatus* and *C. grandisquamis* (Peters, 1869) have been reported swimming and/or diving as an antipredator response when disturbed or threatened (Fernandes & Hamdan, 2014; Mascarenhas et al., 2020; Rojas-Morales & Marín-Martínez, 2022); to our knowledge, other *Chironius* species, including *C. carinatus* (Linnaeus, 1758), have no reports of aquatic habits.

On 28 January 2024 at an unnamed stream that drains from the Sierra Nevada de Santa Marta, finca La Bendición, Vereda Casa de Zinc, Corregimiento Nuevo Colón, Municipio de Pueblo Bello, Departmento del Cesar, Colombia (10.806389° N, 73.223611° W; 891 m a.s.l.), at 14:45h, an adult male *C. carinatus* (SVL: 1125 mm, TL: 465 mm, Weight: 464.2 g) was observed diving (Fig. 1, see Appendix). The snake was quite coiled approximately 30 cm under water, fully exposed near the shore of the stream, resembling the known body posture for the species of the genus *Chironius* when sleeping on tree branches. For 17 minutes, the snake was observed under water, performing slow movements, displacing the head and the first third of the body side-to-side, and afterwards returning to the initial coiled position. The total diving time was not possible to determine because at the moment of the encounter the snake was already diving, but at least during 17 minutes of observation before capturing the snake, it never took its head out of the water.

Diving behavior has rarely been documented in terrestrial or arboreal snakes (Mascarenhas et al., 2020) and when this behavior has been reported, it was always associated to escape or foraging responses. We document for the first time diving behavior and long-term immersion (> 15 minutes) for *Chironius carinatus*, suggesting that our knowledge about the habits and habitat use of this conspicuous snake is still fragmentary. Although the specimen was quite appeased when encountered, suggesting a spontaneous diving behavior, we were unable to rule out the possibility that it had been startled by a predator before we found it and had consequently taken up a position under water. We suggest that experimental studies should be carried out to better understand the defensive repertoire of sipo snakes, and to test aquatic behaviors potentially related to their thermal ecology and physiology.

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APPENDIX

Video of the diving behavior in *Chironius carinatus* available at: https://youtu.be/eRvEbLOR7_U

APÉNDICE

Vídeo del comportamiento de buceo en *Chironius carinatus* disponible en: https://youtu.be/eRvEbLOR7_U