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NATURAL HISTORY NOTE

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Defensive dance: A new waving frontal display by the vine snake *Chironius brazili*, with a link to video evidence

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Predation is a major cause of mortality in natural populations and consequently drives the evolution of antipredator defensive mechanisms in reptiles (Vitt & Caldwell, 2009). In snakes, the defensive repertoire includes crypsis, immobility, rapid escape responses, the use of conspicuous deimatic (startling) signals and different kinds of retaliation (e.g. Greene, 1988; Gregory, 2016; Tan et al., 2024). Defensive responses tend to escalate, as stated by Pope (1946): "Snakes are first cowards, then bluffers, and last of all warriors". The diversity of defensive mechanisms in snakes is a subject of continuing research, as novel types of defences, or variations of documented behaviours, are discovered (Vitt & Caldwell, 2009). Here we describe and document with video evidence (BHS video, 2025) a previously unreported antipredator defensive mechanism in the vine snake *Chironius brazili* Hamdan & Fernandes 2015, a colubrid snake endemic to Brazil.

Chironius brazili occurs in savannas and gallery forests of the Cerrado biome, in the states of Goiás, Federal District, Minas Gerais, São Paulo, Paraná and Rio Grande do Sul (Hamdan & Fernandes, 2015; Nogueira et al., 2019). The species was described after a taxonomic review of *Chironius flavolineatus*, and differs from its congeners by a combination of several morphological characteristics, including hemipenis, skull, scutelation and colouration (for more information, see Hamdan & Fernandes, 2015). Information on the natural history and behaviour of *C. brazili* is scarce.

On 13 January 2025 at 16:08 h, VC and SI found an adult *C. brazili* of unknown sex, on a rocky hiking trail in the upper

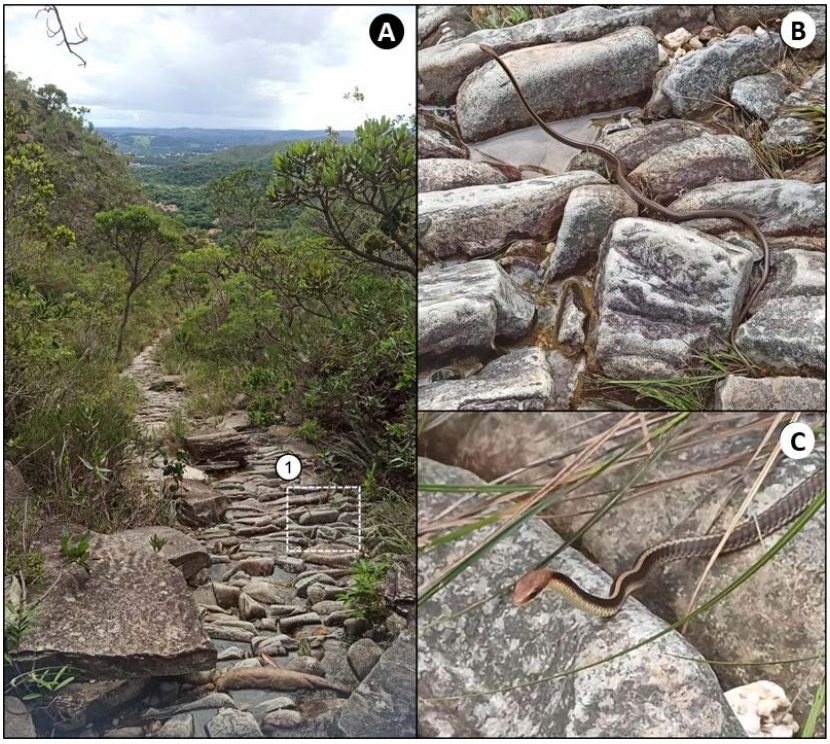

Figure 1. Habitat of occurrence and defensive behaviour of an adult *Chironius brazili* - **A.** The rocky trail where the observation was made (box), **B.** *C. brazili* as observed at the beginning of the encounter, **C.** Frame from the video showing the individual wavering the first third of the body to produce the sideways, serpentine-like aerial, and ground movements (see BHS video, 2025)

portion of the Trilha dos Escravos (-19.312600, -43.604200; 1,006 m a.s.l.), in the vicinity of the Serra do Cipó National Park, municipality of Santana do Riacho, Minas Gerais, Brazil. The local phytophysiognomy is characterised by a combination of rocky outcrops with shrubby vegetation, forest enclaves and Cerrado vegetation. Local air temperature at the time of the observation was 27 °C, and the day was cloudy.

VC and SI were descending the trail (Fig. 1A) when VC noticed the snake at a distance of approximately 3 m, with the first third of its body above ground, head and neck elevated, in a stationary posture (Fig. 1B; BHS video, 2025). When VC approached slowly to document the behaviour, the snake readily redirected its body towards VC and started to display a conspicuous defensive behaviour, interspersed with serpentine escape movements in the rocky-paved section of the trail. The behaviour consisted of successive sideways, aerial and ground serpentine-like undulatory movements with the first third of the body. The wavering movements started immediately posterior to the snake's head extending from the neck to the anterior part of the body that touched the ground, whereas the head itself and rest of the body remained stationary (Fig. 1C). During 12 minutes of observation, the snake repeated the behaviour four times, at durations that lasted from a few to 44 seconds, in varied intensity. The behaviour escalated as two other observers (tourists descending the hiking trail) approached the area and stopped to observe at a distance estimated at 2.5 metres, further away than the distance from which the snake was being videoed. The snake was not molested and after 12 minutes of observation it escaped from the rocky-paved section of the trail toward the adjacent shrubby vegetation.

We interpret the actions of *C. brazili* as a deimatic behaviour, defined by Tan et al. (2024) as a "…. sudden release of a signal to startle the predator and pause or slow its attack". Deimatic behaviours are widespread among snakes, and several of them have already been reported for colubrid species, such as tail vibration, mouth gaping, frontal display, gular inflation, head elevation and neck S-coil (Martins et al., 2008). The defensive behaviours of *Chironius* species include gular inflation, gaping, cloacal discharge, tail vibration, and striking (Marques et al., 2015; 2017; 2019; 2023). As for *C. brazili*, the only report says that its defensive response is similar to that observed in *Chironius diamantina*, which includes gaping, S-posture and attempting to bite (Fernandes & Hamdan, 2014; Hamdan & Fernandes, 2015). The deimatic behaviour reported herein for *C. brazili* may be classified as a frontal display and has some similarity to that described for the viper *Echis carinatus*, which shows this "sidewinding" motion with the anterior part of the body while rubbing its keeled scales to produce a rasping sound (Ionides & Pitman, 1965), except that *C. brazili* does not rub its smooth scales.

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