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First records of the Chaco Racer, *Philodryas psammophidea* Günther, 1872, in the Cerrado of Paraguay

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The Cerrado biome is one of the most biologically rich savanna regions in the world, recognised for its high levels of species richness, endemism, and ecological heterogeneity (Myers et al., 2000; Simon et al., 2009). Stretching across central Brazil and extending into parts of Bolivia and Paraguay, the Cerrado hosts a complex mosaic of grasslands, shrublands, and forests, supporting a diverse array of vertebrate fauna, including a notable assemblage of reptiles and amphibians (Colli et al., 2002; Kier et al., 2005). Despite its ecological significance, large portions of the Cerrado, particularly in Paraguay, remain poorly surveyed, limiting our understanding of the true distribution and ecological roles of many species. This knowledge gap is especially concerning in the context of rapid land-use change and habitat degradation affecting the region (Colli et al., 2020).

Among the snake species associated with open and xeric environments in South America, *Philodryas psammophidea* Günther, 1872 stands out due to its wide distribution and ecological adaptability. This dipsadid is recognised as primarily terrestrial and diurnal, displaying opportunistic feeding behaviour that includes predation on lizards, rodents, and occasionally amphibians, particularly in arid habitats (Williams et al., 2021; Williams and Vera, 2023; Cacciali, 2024). The species is commonly reported from dry lowland habitats such as the Dry Chaco and arid savannas, with well-documented occurrences in Argentina, Bolivia, and central-western Brazil (Cei, 1993; Scolaro, 2006; Nogueira et al., 2019; Williams et al., 2021). In Paraguay, however, historical records of *P. psammophidea* have been restricted exclusively to the western region, particularly within the departments of Boquerón, Alto Paraguay, and Presidente Hayes, all characterised by semi-arid conditions (Cabral and Bueno-Villafañe, 2015; Cacciali et al., 2016). Here, we report the first confirmed records of *P. psammophidea* in the Eastern Region of Paraguay, in the Cerrado ecoregion.

On 16 September 2024, a single adult *P. psammophidea* was observed at 16:00 h in a cattle ranch area in the district of San Carlos del Apa, Concepción Department, Paraguay (-22.2193°, -57.5309°, 133 m elevation; Fig. 1). The snake was accidentally encountered while it was basking and exhibiting body-bending behaviour (Fig. 2A). It was positioned the edge of an internal dirt road in an area of sandy soil and vegetation corresponding to the Cerrado type, with the presence of typical subhumid forest species such as *Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore (Bignoniaceae), *Qualea* sp. (Vochysiaceae), and *Acrocomia aculeata* (Jacq.) Lodd. ex Mart. (Arecaceae), and an herbaceous layer dominated by *Spartina densiflora* Brongn. 1829 (Poaceae). A second individual (Fig. 2B) was documented on 10 February 2025 near the town of Sargento José Félix López, Concepción Department, Paraguay (-22.6782°, -57.1566°, 222 m elevation; Fig. 1). This area has Cerradon-type vegetation, characterised by low forests in the Cerrado ecoregion (Elten, 1972, 1978) with presence of *Anadenanthera colubrina* (Vell.) Brenan (Fabaceae), *Casearia gossypiosperma* Briq. (Salicaceae), *Cordia glabrata* A.DC. in DC. 1845 (Boraginaceae), *Handroanthus ochraceus* (Cham.) Standl. (Bigoniaceae), *Luehea macrocarpa* R.E. Fr. (Malaceae), and *Myracrodruon urundeuva* M. Allemão 1862 (Anacardiaceae) in the upper stratum, and *Acosmium subelegans* (Mohlenbr.) Yakovlev (Fabaceae), *Annona neosalicifolia* H.

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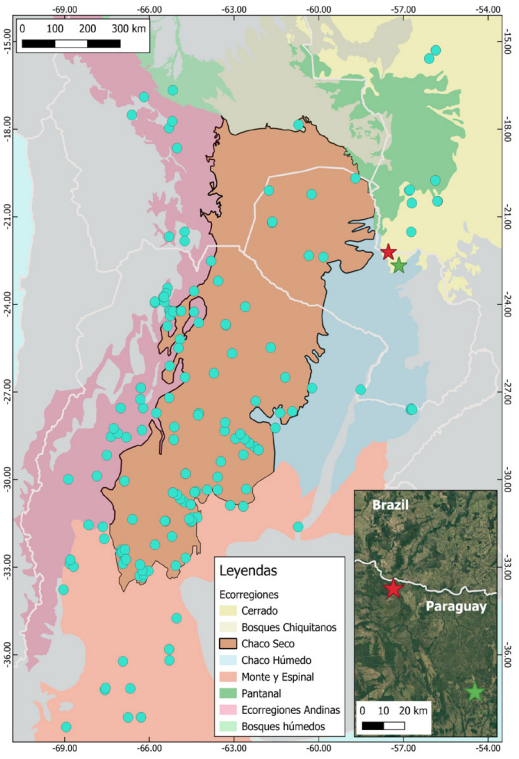

Figure 1. Records of *P. psammophidea* based on Nogueira et al. (2019; as light blue dots) and ecoregions was the species was confirmed, highlighting the border of Dry Chaco where the species is more abundant. New records are presented in stars: San Carlos del Apa (red) and near Sargento José Félix López (green).

Rainer (Annonaceae), *Celtis serratissima* Zamengo, R. B. Torres, Gaglioti & Romaniuc (Cannabaceae), *Chrysophyllum marginatum* (Hook. & Arn.) Radlk. (Sapotaceae), and *Sorocea saxicola* Hassl. (Moraceae) in the lower stratum. In both cases, the specimens were not collected, and their presence was confirmed through photographs.

Philodryas psammophidea is a medium to large-sized snake, reaching up to 1200 mm in total length, exhibiting a brown or greyish dorsal colouration, often with diffuse blotches and distinct light lateral bands, along with a continuous white ventral stripe extending to the tail (Cei, 1993; Williams and Vera, 2023; Cacciali, 2024). The colouration is consistent with the specimens recorded in this documentation (Fig. 2A, 2B).

These new records of *P. psammophidea* in the eastern region of Paraguay, specifically within Cerrado remnants of Concepción Department, represent an southward extension of 135 km from the previous known record in the Cerrado, and up to 279 km from the closer Paraguayan locality in the Dry Chaco (Fig. 1). Until now, all Paraguayan records were restricted to the arid and semi-arid landscapes of the Dry Chaco, where are found most of the records of the species regionally.

These findings align with recent reports from Argentina, Bolivia, and Brazil where *P. psammophidea* and other dipsadid snakes have been recorded in marginal, anthropogenic, or altitudinally extreme habitats (Quinteros et al., 2010; Nogueira et al., 2019; Valdez Ovallez et al., 2022; Oliveira et al., 2024). In these contexts, species typically associated with open and dry ecosystems have shown the capacity to persist or even thrive in transformed environments, suggesting either underestimation of their ecological amplitude or recent range adjustments, potentially driven by habitat modification or climatic factors (Oliveira et al., 2024). Furthermore, Oliveira et al. (2024) highlight that species such as *P. psammophidea*, which are psammophilous and distributed across the Diagonal of Open Formations (DOF), are projected to experience changes in their range under future climate scenarios. While some may lose habitat suitability, others are expected to expand into new areas.

Given these considerations, our findings underscore the importance of intensifying herpetofaunal surveys in underexplored regions of the Cerrado biome in Paraguay. Not only do such efforts fill distributional gaps, but they also provide empirical data essential for refining species distribution models and for establishing realistic conservation priorities. As pointed out by Ramalho et al. (2018) and Oliveira et al. (2024), the effective conservation of open-area reptiles will require updated and spatially comprehensive baseline data to understand species responses to ongoing environmental change.

Finally, it is important to highlight that the first individual observed exhibited a distinct body-bending behaviour (BBB) (or “kinking”), a defensive posture characterised by the formation of short, angular bends along the body that disrupt its linear silhouette. This behaviour is thought to confer crypsis by enabling the snake to mimic fallen lianas or twig fragments, thereby reducing detection by visually oriented predators (Duarte, 2012; Pokhilyuk and Maslova, 2025). Although BBB was historically considered rare and mostly associated with arboreal Neotropical snakes (Marques et al., 2006), recent studies demonstrate that it is more widespread taxonomically and ecologically

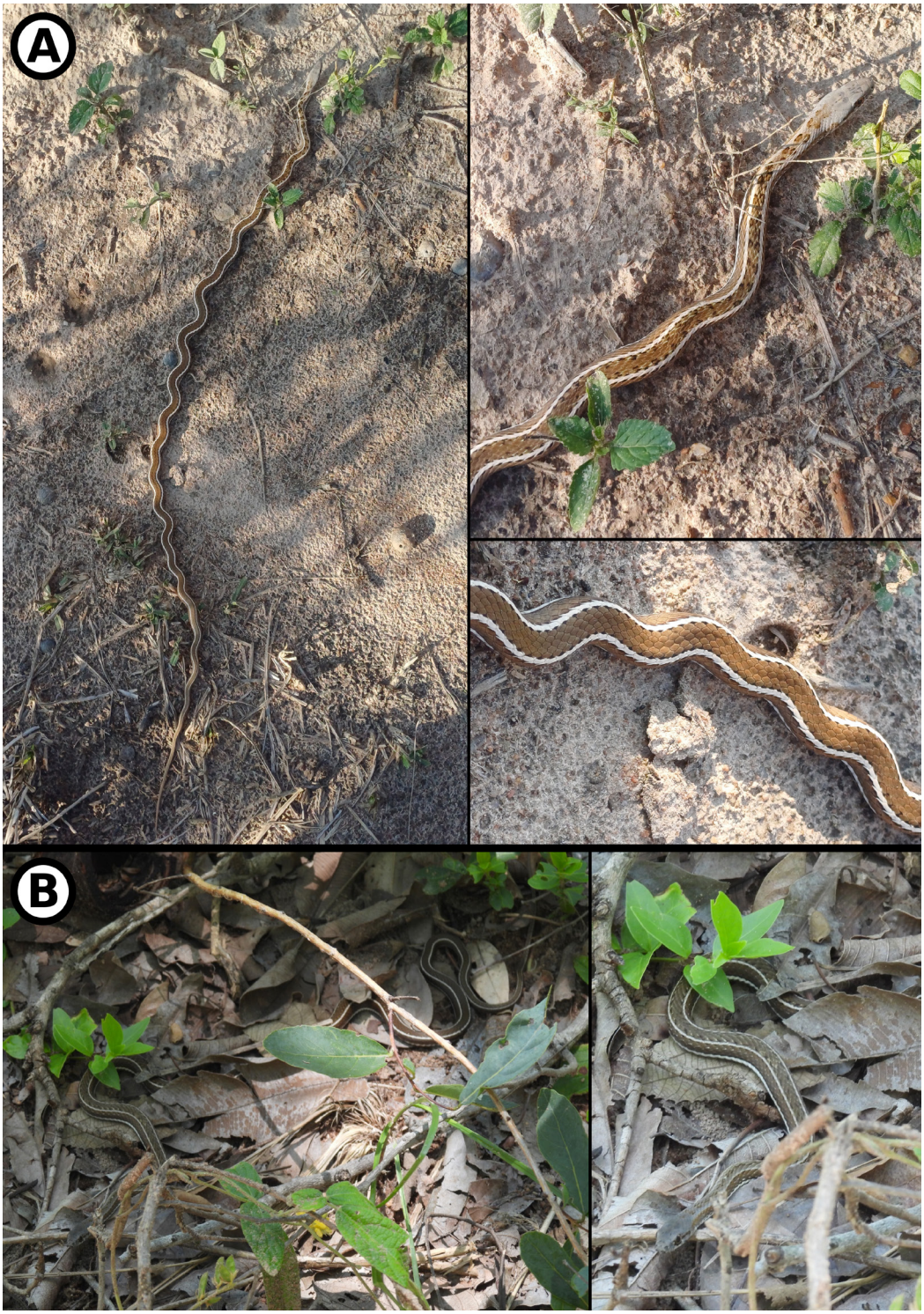

Figure 2. Individuals of the new records of *Philodryas psammophidea* in the Paraguayan Cerrado: (A) individual from San Carlos del Apa showing body bending (top right closer shot of head, bottom right close shot of the dorsum). (B) individual found near Sargento José Félix López. Photos by Matias Silvera (A) and Patricia Salinas (B).

than previously assumed, occurring in both arboreal and terrestrial species across the Colubridae and Dipsadidae, including several congeners (*Philodryas baroni*, *P. trilineata*, *P. chamissonis*) as well as *P. psammophidea* itself, with observations from Boquerón, Paraguay, and Salta, Argentina (França et al., 2020). Hence, our observation reinforces that this defensive strategy is more prevalent within the genus *Philodryas* than previously recognised.

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