

Contemporary record and photographs of the rarely seen and poorly known Mona Blindsnake, *Antillotyphlops monensis* (Schmidt, 1926), with comments on its ecology and conservation

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Isla de Mona is a small island (57 km²) located approximately 70 km west of Puerto Rico. The island is home to a number of endemics, including plants (Lammers and Proctor, 1994), birds (Liu, 2015), amphibians (Joglar, 1998), and reptiles (Rodríguez-Robles et al., 2015). Due to its unique geology and geographic location in the Mona Passage, the majority of research published on the island is focused on the geomorphic and anthropological history of its caves and karst, with less attention on its flora and fauna (Frank et al., 1998; Nieves-Rivera et al., 2020). Species here are often rare, endemic to this island, and infrequently studied, probably due to the difficulty in accessing the island (Frank and Benson, 1998; Perotto-Baldivieso et al., 2009; Rojas-Sandoval et al., 2016; Garcia-Sais et al., 2020).

Blindsnakes in the genus *Antillotyphlops* occur across Puerto Rico and its satellite islands, the Turks and Caicos Islands, the U.S. and British Virgin Islands, and the Lesser Antilles (Rivero, 1998; Hedges et al., 2014). The Mona Blindsnake, *Antillotyphlops monensis* (Schmidt, 1926), occurs only on Isla de Mona, and is thought to be morphologically distinct from other Antillean

species in the genus by having fewer average numbers of middorsal scale rows and longitudinal scale counts (Thomas, 1976; Hedges and Thomas, 1991; Hedges et al., 2014). *Antillotyphlops monensis* has been recorded in the western lowlands of Mona Island but there are very few data addressing its existence on any other part of the island, or any information on its ecology, behaviour, or abundance (Thomas, 1976).

Although *A. monensis* was previously listed as Rare (1986–1994) and Endangered (1996), in 2019 the IUCN listed this species as Least Concern due to the lack of threats throughout its protected, albeit very restricted, range (Joglar, 2019). Current records of this species are from specimens deposited in collections and, to our knowledge, this is the first contemporary record of *A. monensis* in the wild with photographic evidence (Fig. 1). Other species of *Antillotyphlops* (*A. annae*, *A. catapontus*, *A. dominicanus*, *A. geotomus*, *A. granti*, *A. guadeloupensis*, *A. hypomethes*, *A. monastus*, *A. naugus*, *A. platycephalus*, and *A. richardi*) are listed by the IUCN (last assessed in 2015) as Data Deficient (2), Vulnerable (1), Near Threatened (3), Endangered (1), and Least Concern (4) (IUCN, 2023). The vast majority of recorded specimens of these species since 1990 are *A. hypomethes* (Least Concern), and since 2013 only 14 research-grade occurrences have been recorded across all species on iNaturalist. The only other report of *A. monensis* has been a note on its predation by a Snowy Egret (*Egretta thula*), otherwise no other modern published records exist for this species (Hernández-Prieto, 1987).

We found an individual of *A. monensis* on 8 November 2021 at 15:29 h on the dirt under a small log of Australian Pine (*Casuarina equisetifolia*) at Playa Sardinera (18.0868°N, 67.9410°W; Fig. 2). The air temperature was approx. 27.7°C and it had not rained in at least the previous week. The surrounding area is populated by juvenile and adult Mona Rock Iguanas (*Cyclura stejnegeri*), Green Iguanas (*Iguana iguana*), Black

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Land Crabs (*Gecarcinus ruricola*), and Caribbean Land Hermit Crabs (*Coenobita clypeatus*). The individual was approximately 200 mm long, with a snout–vent length of 196 mm and a tail length of 4 mm (maximum total length for the species = 203 mm; Hedges et al., 2014). The individual appeared to be healthy and no deformities or abnormalities were observed, aside from some minor dorsal scale damage (Fig. 1). Another *A. monensis* was observed by CEFH but not documented further in 2017 under an Australian Pine near the same area.

Species conservation in the Caribbean is of critical importance, as the region is a hotspot of biodiversity and at extreme risk of climatic and anthropogenic threats (Myers et al., 2000). Although Isla de Mona is managed and protected by the Puerto Rico Departamento de Recursos Naturales y Ambientales [Department of

Natural and Environmental Resources], the island is inhabited by invasive cats, rats, goats, and pigs (Joglar, 2019). Despite the fossorial nature of blindsnakes, which offers some protection against threats, invasives still pose a risk to the health and habitat of *A. monensis* (Hernández-Prieto, 1987; Joglar, 2019). Invasives are a continuous threat to a number of species on Isla de Mona as their activities have been shown to negatively affect species on multiple trophic levels, from physically altering the available habitat to contributing to population declines of plants and animals in the ecosystem (Holmes et al., 2019; Figuerola-Hernández et al., 2021). Initiatives to eradicate invasive mammalian species like these are critical for the survival of most Mona Island reptiles, including *A. monensis*, and for the conservation of island biota across the Caribbean (Holmes et al., 2019).



Figure 1. *Antillotyphlops monensis* from Isla de Mona. Photos by Nahira Arocho-Hernández and Danielle Rivera.



Figure 2. Map of Isla de Mona marking the location where *Antillotyphlops monensis* was observed (Map data 2023 Google: Imagery 2023 Airbus, CNES / Airbus, Data CSUMB SFML, CA OPC, Maxar Technologies, U.S.G.S., USDA/FPAC/GEO).

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References

- Figueroa-Hernández, C.E., Toomey, R.S., III, Kambesis, P., Herrera-Giraldo, J.L., Holmes, N.D. (2021): Persistence of Audubon's Shearwater (*Puffinus lherminieri*) and Bridled Tern (*Onychoprion anaethetus*) in cave breeding refugia on Mona Island, Puerto Rico. *Journal of Caribbean Ornithology* **34**: 81–84.
- Frank, E.F., Benson, R. (1998): Vertebrate paleontology of Isla de Mona, Puerto Rico. *Journal of Cave and Karst Studies* **60**: 103–106.
- Frank, E.F., Wicks, C., Mylroie, J., Troester, J., Alexander, E.C., Carew, J. (1998): Geology of Isla de Mona, Puerto Rico. *Journal of Caves and Karst Studies* **60**: 69–72.
- García-Sais, J.R., Williams, S.M., Sabater-Clavell, J., Carlo, M. (2020): Puerto Rico Coral Reef Monitoring Program: Isla de Mona Survey 2020. Boquerón, Puerto Rico, USA, Department of Natural and Environmental Resources.
- GBIF [Global Biodiversity Information Facility] (2023): *Antillotyphlops monensis*. GBIF Occurrence Download. Available at: <https://doi.org/10.15468/dl.hp3guf>. Accessed on 24 May 2023.
- Hedges, S.B., Marion, A.B., Lipp, K.M., Marin, J., Vidal, N. (2014): A taxonomic framework for typhlopoid snakes from the Caribbean and other regions (Reptilia, Squamata). *Caribbean Herpetology* **49**: 1–61.
- Hedges, S.B., Thomas, R. (1991): Cryptic species of snakes (Typhlopidae: *Typhlops*) from the Puerto Rico Bank detected by protein electrophoresis. *Herpetologica* **47**: 448–459.
- Hernández-Prieto, E. (1987): Natural history notes. *Typhlops monensis* (Mona Island Blind Snake). *Predation. Herpetological Review* **18**: 76.
- Holmes, N.D., Spatz, D.R., Oppel, S., Tershy, B., Croll, D.A., Keitt, B., et al. (2019): Globally important islands where eradicating invasive mammals will benefit highly threatened vertebrates. *PLoS ONE* **14**: e0212128.
- Joglar, R. (2019): *Antillotyphlops monensis*. The IUCN Red List of Threatened Species 2019: eT22606A77336201.
- IUCN [International Union for the Conservation of Nature] (2023): The IUCN Red List of Threatened Species. Version 2022-2.

- Available at: <https://www.iucnredlist.org>. Accessed on 24 May 2023.
- Lammers, T.G., Proctor, G.R. (1994): *Lobelia vivaldii* (Campanulaceae: Lobelioideae), a remarkable new species of Sect. *Tylomium* from Isla de Mona, Puerto Rico. *Brittonia* **46**: 273.
- Liu, I.A. (2015): Conservation genetics and genetic mating system of the yellow-shouldered blackbird (*Agelaius xanthomus*), an endangered island endemic. *Conservation Genetics* **16**: 1041–1053.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., Fonseca, G.A. da, Kent, J. (2000): Biodiversity hotspots for conservation priorities. *Nature* **403**: 853–858.
- Nieves-Rivera, Á.M., Zegarra Vila, J.P., Figuerola Hernández, C.E., García-Hernández, J.E., Schizas, N.V. (2020): Recent and historical explorations of the underwater section of Cueva del Agua, Punta Los Ingleses, Mona Island (Puerto Rico), with a new faunal record. *Life: The Excitement of Biology* **8**: 4–22.
- Perotto-Baldivieso, H.L., Meléndez-Ackerman, E., García, M.A., Leimgruber, P., Cooper, S.M., Martínez, A., et al. (2009): Spatial distribution, connectivity, and the influence of scale: habitat availability for the endangered Mona Island rock iguana. *Biodiversity & Conservation* **18**: 905–917.
- Rivero, J.A. (1998): *Amphibians and Reptiles of Puerto Rico*. San Juan, Puerto Rico, USA, University of Puerto Rico.
- Rodríguez-Robles, J.A., Jezkova, T., Fujita, M.K., Tolson, P.J., García, M.A. (2015): Genetic divergence and diversity in the Mona and Virgin Islands boas, *Chilabothrus monensis* (*Epicrates monensis*) (Serpentes: Boidae), West Indian snakes of special conservation concern. *Molecular Phylogenetics & Evolution* **88**: 144–153.
- Rojas-Sandoval, J., Meléndez-Ackerman, E.J., Fumero-Cabán, J., García-Bermúdez, M., Sustache, J., Aragón, S., et al. (2016): Long-term understory vegetation dynamics and responses to ungulate exclusion in the dry forest of Mona Island. *Caribbean Naturalist* **1**: 138–156.
- Thomas, J.P.R. (1976): Systematics of the Antillean blind snakes of the genus *Typhlops* (Serpentes: Typhlopidae). Unpublished PhD thesis, Louisiana State University, Baton Rouge, Louisiana, USA.