



INTRODUCED SPECIES

Establishment of the Introduced Brahminy Blindsnake (*Indotyphlops braminus*) on Abaco Island, The Bahamas, with Notes on Potential Niche Overlap with the Native Cuban Brown Blindsnake (*Typhlops lumbricalis*)

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The Brahminy Blindsnake (*Indotyphlops braminus*) is a globally introduced species with populations occurring in Africa, the Middle East, Asia, Australia, Oceania, Europe, and the Americas (Wallach 2009; Uetz et al. 2021). While phylogenetic evidence suggests that *I. braminus* originated in India, native range boundaries remain unknown due to the worldwide distribution of the species (Hedges et al. 2014). Like other scolecophidians, *I. braminus* is rarely encountered due to its small size and fossorial behavior (Wallach 2009). Because *I. braminus* is the only species of snake known to reproduce solely via parthenogenesis (Wynn et al. 1991; Booth and Schuett 2016), the arrival of a single individual to a previously uncolonized region is all that is required for a new population to become established. These traits have facilitated the rapid spread of the snake over vast geographic dis-

tances while concealed in soils associated with potted plants (Bamford and Prendergast 2017).

The islands of The Bahamas are home to four native species of scolecophidians (Bahaman Slender Blindsnake, *Cubatyphlops biminensis*; Inagua Blindsnake, *Cubatyphlops paradoxus*; Bahamian Threadsnake, *Epictia columbi*; and Cuban Brown Blindsnake, *Typhlops lumbricalis*) in addition to the introduced Brahminy Blindsnake, which has been documented previously only on New Providence (Buckner et al. 2012; Giery 2015; Uetz et al. 2021). At 2240 h on 10 June 2021, an adult Brahminy Blindsnake (mass 1.48 g, SVL 149 mm; Fig. 1) was found on Friends of the Environment property in Marsh Harbour, Abaco Island, The Bahamas (26.5318276°N, -77.0586308°W; WGS 84). The snake was located beneath a wooden board on a substrate of sandy soil



Fig. 1. A non-native Brahminy Blindsnake (*Indotyphlops braminus*) found at Marsh Harbour, Abaco Island, The Bahamas on 10 June 2021 (left). The snake was located beneath a piece of wooden debris in a hurricane-damaged yard immediately adjacent to coppice dry forest habitat (right). Photographs by Tyler DeVos.

and pine needles. This cover object was one of many pieces of hurricane-related debris scattered around the property, and was positioned under a patch of vegetation near a boundary between open yard and adjacent coppice (Fig. 1). Gentle disturbance of soil near the board under which the snake was found revealed the presence of an ant colony, a likely food source. The identity of the snake was confirmed by Coleman Sheehy III at the Florida Museum of Natural History (photographic voucher FMNH 192204). A separate iNaturalist observation of two Brahminy Blindsnakes between the Abaco towns of Little Harbour and Cherokee during May of 2019 (observation 25603612; Ueda 2021) suggests that *I. braminus* has been established on Abaco Island for at least two years.

The presence of *I. braminus* on Abaco adds to a rapidly growing list of non-native reptiles and amphibians currently established on the island. Breeding populations of the North Caribbean Bark Anole (*Anolis distichus*), Bahamian Green Anole (*Anolis smaragdinus*), Eastern Narrow-mouthed Frog (*Gastrophryne carolinensis*), Indo-Pacific Gecko (*Hemidactylus garnotii*), Tropical House Gecko (*Hemidactylus mabouia*), Mourning Gecko (*Lepidodactylus lugubris*), Red Cornsnake (*Pantherophis guttatus*), and South American Cane Toad (*Rhinella marina* sensu lato) have all been reported from Abaco Island, along with isolated sightings (not necessarily indicative of breeding populations) of the Cuban Giant Anole (*Anolis equestris*), Common Gartersnake (*Thamnophis sirtalis*), and non-native slider turtles (*Trachemys* spp.) (Knapp et al. 2011; Buckner et al. 2012; Giery 2013; Giery et al. 2017, 2019; Johnson and Knowles 2017; Reynolds and Giery, in press). As with *I. braminus*, these introductions are most likely due to unintentional transportation of wildlife in building materials and landscaping plants, including plants imported from the United States as well as those moved between islands within The Bahamas. To a lesser degree, tourism and intentional release/translocation of pets have also been noted as contributing factors (Knapp et al. 2011; Giery 2017; Reynolds and Giery, in press). In 2011, 26% of terrestrial herpetofaunal diversity across all Bahamian Islands consisted of non-native species (Knapp et al. 2011). This number has since increased with the establishment of additional reptiles and amphibians, and is increasing on individual islands — such as Abaco — as non-native species continue to spread among adjacent islands.

While the presence of *I. braminus* on Abaco Island will likely remain unnoticed by the majority of the island's human residents, expanding populations of the new snake may compete for resources with Abaco's only native scolecophidian, *Typhlops lumbricalis*. In addition to utilizing the same subterranean habitats, both species are thought to feed nearly exclusively on ants and termites (Webb et al. 2001; Mizuno and Kojima 2015). Indeed, observation of a native Cuban Brown Blindsnake burrowing in the same location at which

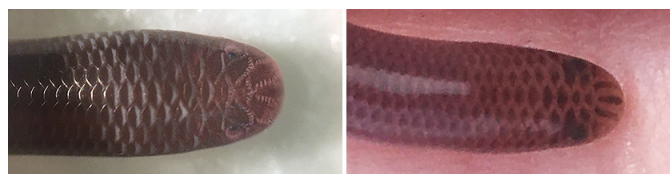


Fig. 2. Head-scale arrangement pattern of the introduced Brahminy Blindsnake (*Indotyphlops braminus*) (left) compared to the native Cuban Brown Blindsnake (*Typhlops lumbricalis*) (right). Photographs by Tyler DeVos.

the Brahminy Blindsnake was found (three days prior to the observation reported herein) provided a clear demonstration of physical (and almost certainly dietary) niche overlap between *I. braminus* and *T. lumbricalis* on Abaco. The ability of the Brahminy Blindsnake to compete with sympatric scolecophidians is further enhanced by its hardy nature (dry and anthropogenically altered habitats are readily tolerated) and parthenogenetic reproductive strategy (Wynn et al. 1991; Williams et al. 2020). All other factors being equal, parthenogenetic populations of *I. braminus* can be expected to grow at faster rates than those of sexually reproducing native scolecophidians simply because an all-female population is capable of producing greater numbers of offspring than an identical population in which only half of the individuals are female (Case and Taper 1986).

For the reasons outlined above, monitoring of both interactions between and shifts in local ratios of these two cryptic snakes may be a worthwhile endeavor, both for the sake of herpetological conservation in The Bahamas and as a contribution to broader knowledge of invasion ecology. To aid in this process, photographs of the unique head scale arrangements of both species are provided in Fig. 2. Coloration of *I. braminus* is quite variable (ranging from a distinctive black to a brown similar to that of *T. lumbricalis*), so an examination of head scalation is often necessary to distinguish between species (Dominguez and Diaz 2011; Hedges et al. 2014). Given its cryptic and highly invasive nature, we suspect that *I. braminus* is established more broadly within The Bahamas — or will be in the coming years. Future surveys should investigate the distribution of *I. braminus* throughout the archipelago, paying special attention to nurseries and highly manicured landscapes such as golf courses.

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