

DESCRIPTION OF INVASIVE EXOTIC REPTILE SPECIES
FROM THE LESSER ANTILLES



Indotyphlops braminus

(Daudin, 1803)

Common name: Brahminy blindsnake,
Flowerpot Snake.

Local name: Typhlops brame, Bootlace Snake,
Khorat Worm Snake, Khorat Blind Snake,
Brahmanen-Wurmschlange, Khorat-
Blindschlange, Culebrilla Ciega.

Order: Squamata, Family: Typhlopidae

Description

Morphology. Small sized non-venomous snake. The body is thin and is silver gray, black or purple in colour. The head is not differentiated from the rest of the body, and the eyes appear as black spots under the ocular scales. The tail has a harmless spur at its tip. The ventral side varies from gray to brown, and the scales are indistinguishable from those of the rest of the body. The scales are small, smooth and shiny, and are arranged in 14 rows along the body (Wallach, 2009).

Standard body size (snout-vent length). 95 to 203 mm (Ota et al., 1991; Wallach, 2009; Das et al., 2016; Leets-Rodriguez et al., 2019).

Sexual dimorphism. No sexual dimorphism (unisexual specces) (Ota et al., 1991).

Variations.

Possible confusion with other species. In the Caribbean, confusion is possible with other small endemic snake species, such as *Tetracheilostoma bilineatum* in Martinique, *T. breuili* in Saint Lucia and *T. carlae* in Barbados. These three species are the smallest snakes in the world (Breuil et al., 2009).

Distribution

Native. Asia: Pakistan (Balouch et al., 2016; Rais et al., 2021), Nepal (Bhattarai et al., 2018; Rawat et al., 2020), Bhutan (Das et al., 2016), India (Manhas et al., 2018; Ingle et al., 2019; Ingle, 2020), Sri Lanka, Adaman and Nicobar Islands, Bangladesh (Ahsan et al., 2015), Myanmar, Thailand (Crane et al., 2018), Malaysia (Onn et al., 2009), Singapore, Laos, Cambodia (Grismer et al., 2008; Geissler et al., 2019), Vietnam (Ziegler et al., 2007), China, Hong Kong, Japan, Indonesia, Timor Leste, Philippines (Brown et al., 1996; Venturina et al., 2020).

Introduced. Europe: Madeira, Canarias (Rato et al., 2015), Spain (Zamora-Camacho et al., 2017), Balearic Islands, Italia (Faraone et al., 2019; Paolino et al., 2019), Malta (Vella et al., 2020).

Asia: Saoudi Arabia (Burriel-Carranza et al., 2019), Oman (Carranza et al., 2018), United Arab Emirates, Kuwait, Lebanon, Irak, Iran (Rastegar-Pouyani et al., 2008; Afroosheh et al., 2010).

Africa: Libya (Bauer et al., 2017), Egypt (Ibrahim, 2013), Mauritania, Senegal, Ivory Coast, Togo, Benin, Cameroun, Gabon (Pauwels et al., 2004), Central African Republic (Chirio and Ineich, 2006), Democratic Republic of the Congo (Zassi-Boulou et al., 2004), Uganda, Kenya, Somalia, Zimbabwe, Tanzania, Zanzibar, Mozambic, South Africa, Madagascar (Andreone et al., 2003; D’Cruze et al., 2007; Gehring et al., 2010), Comores (Carretero et al., 2005; Hawlitschek et al., 2011), Mayotte, Réunion, Maurice, Rodrigues, Seychelles.

Oceania: New Guinea (Charlton and Nixon, 2020), Solomon Islands, Palaos, Nauru (McKenna et al., 2015), Australia (Parkin et al., 2021), Cocos Island, Christmas Island, New Caledonia (De Pous and Dingemans, 2009), Vanuatu (Ineich, 2009), Fiji, Micronesia, Guam, Polynesia (Ineich et al., 2017).

America: Hawaii, California, Arizona, Texas (Eversole and Daniel, 2020), Louisiana, Massachussets, Connecticut, Georgia, Florida (Krysko et al., 2009; Atkinson and Townsend, 2012; Burke and Lieto, 2019), Mexico (Flores-Cobarrubias et al., 2012; Carbajal-Marquez et al., 2013, 2015; Carbajal-Marquez and Quintero-Diaz, 2016; Banuelos-Alamillo and Carbajal-Marquez, 2016; Gonzales-Sanchez et al., 2017; Lemos-Espinal and Smit, 2020), Guatemala, Belize (Wallach, 2009), Nicaragua (Leets-Rodriguez et al., 2019), El Salvador, Honduras (Wallach, 2009; McCranie, 2015), Colombia.

Caribbean: Bahamas (Powell and Henderson, 2012), Cuba (Borroto-Paez et al., 2012), Cayman Islands (Powell and Henderson, 2012), Turk and Caicos (Powell and Henderson, 2012), Saint Croix (Powell and Henderson, 2012), Anguilla (Powell and Henderson, 2012), Saint Martin (Breuil et al., 2009; Lorvelec et al., 2007), Saint Barthélemy (Lorvelec et al., 2007), Saba (van den Burg, 2021), Saint Kitts (Powell et Henderson, 2012), Saint Eustatius, Montserrat (Snyder et al., 2019), Guadeloupe (Breuil et al., 2009; Powell and Henderson, 2012; Lorvelec et al., 2016), Martinique, Barbade (Powell and Henderson, 2012); Saint Vincent and the Grenadines (Powell and Henderson, 2012).

Uncertain status. Taiwan (Lee et al., 2019)

Biology and ecology

Habitat. *Indotyphlops braminus* can cope with a wide diversity of natural and anthropized habitats. This burrowing snake evolves in loose and moist soil, leaf litter, decaying trunks, under rocks and other debris. The species is occasionally arboreal. *I. braminus* is often found in gardens and flower pots, and plant nurseries are considered the main vector for the dispersion of the species outside its native range (Breuil et al., 2009; Rato et al., 2015; Zamora-Camacho, 2017).

Diet. Insectivore (eggs, larvae et pupae of ants and termites) (Mizuno and Kojima, 2015).

Reproduction. *Indotyphlops braminus* is a parthenogenetic species, meaning that females lay eggs that develop without the need to be fertilised.

Mature females (about 95 mm) lay one to eight eggs (Ota et al. 1991). The laying period varies depending on the locality. In subtropical regions, it occurs at the end of the wet season (Vella et al., 2020).

Behaviour. When threatened (or manipulated), the species defends itself by pushing back the threat with the tip of its tail (harmless), and can release foul-smelling musk produced via two glands at the base of the tail.

Impact and management of introduced populations

Impact. Little is known about the impact of the Brahminy Blindsnake on native ecosystems in introduced regions.

Management. To date, no targeted control measures have been established in the different regions where the species has been introduced.

Bibliographie

- Afroosheh, M., Rastegar-Pouyani, N., Rajabizadeh, M., & Kami, H. G. (2010). The Brahminy Blind Snake, *Ramphotyphlops braminus* (Daudin, 1803), a newcomer to Iran (Ophidia: Typhlopidae). *Zoology in the Middle East*, 50, 135–137.
- Ahsan, M. F., Haidar, I. K. A., & Rahman, M. M. (2015). Status and diversity of snakes (Reptilia: Squamata: Serpentes) at the Chittagong University Campus in Chittagong, Bangladesh. *Journal of Threatened Taxa*, 7, 8159.
- Andreone, F., Glaw, F., Nussbaum, R. A., Raxworthy, C. J., Vences, M., & Randrianirina, J. E. (2003). The amphibians and reptiles of Nosy Be (NW Madagascar) and nearby islands: A case study of diversity and conservation of an insular fauna. *Journal of Natural History*, 37, 2119–2149.
- Atkinson, B. K., & Townsend, J. H. (2012). *Ramphotyphlops braminus* (Brahminy Blindsnake). USA: Florida. *Herpetological Review*, 43, 307–308.
- Balouch, S., Rais, M., Hussain, I., & Akram, A. (2016). Squamate diversity in different croplands of district Chakwal, Punjab, Pakistan. *Journal of King Saud University - Science*, 28, 255–260.
- Banuelos-Alamillo, J. A., & Carbajal-Marquez, R. A. (2016). Distribution notes. *Indotyphlops braminus* (Daudin, 1803). *Mesoamerican Herpetology*, 3, 204.
- Bauer, A. M., Deboer, J. C., & Taylor, D. J. (2017). Atlas of the Reptiles of Libya. *Proceedings of the California Academy of Sciences*, 64, 155–318.

- Bhattarai, S., Pokheral, C. P., Lamichhane, B. R., Regmi, U. R., Ram, A. K., & Subedi, N. (2018). Amphibians and reptiles of Parsa National Park, Nepal. *Amphibian & Reptile Conservation*, 12, 35–48.
- Borroto-Páez, R., Bosch, R. A., Fabres, B. A., & Garcia, O. A. (2012). Introduced amphibians and reptiles in the Cuban archipelago. *Herpetological Conservation and Biology*, 10, 985–1012.
- Breuil, M., Guiougou, F., Questel, K., & Ibéné, B. (2009). Modifications du peuplement herpétologique dans les Antilles françaises : disparitions et espèces allochtones. 2ème partie : Reptiles. *Le Courrier de La Nature*, 251, 36–43.
- Brown, R. M., Ferner, J. W., Sison, R. V., Gonzales, P. C., & Kennedy, R. S. (1996). Amphibians and Reptiles of the Zambales Mountains of Luzon Island, Republic of the Philippines. *Herpetological Natural History*, 4, 1–22.
- Burke, R., & Lieto, M. (2019). Tracking the spread of six invasive amphibians and reptiles using the geographic distribution records published in *Herpetological Review*. *Herpetological Review*, 50, 1–7.
- Burriel-Carranza, B., Tarroso, P., Els, J., Gardner, A., Soorae, P., Mohammed, A. A., ... Carranza, S. (2019). An integrative assessment of the diversity, phylogeny, distribution, and conservation of the terrestrial reptiles (Sauropsida, Squamata) of the United Arab Emirates. *PLoS ONE*, 14.
- Carbajal-Marquez, R. A., Gonzalez-Quinanes, F., & Quintero-Diaz, G. E. (2015). *Indotyphlops braminus* (Brahminy Blindsnake). México: Chihuahua. *Herpetological Review*, 46, 573.
- Carbajal-Marquez, R. A., & Quintero-Diaz, G. E. (2016). The herpetofauna of Aguascalientes, México. *Revista Mexicana de Herpetologia*, 2, 1–30.
- Carbajal-Marquez, R. A., Valdez-villavicencio, J. H., & Chavez-Sanchez, T. (2013). *Ramphotyphlops braminus* (Brahminy Blind Snake). Mexico: Baja California Sur. *Herpetological Review*, 44, 110.
- Carranza, S., Xipell, M., Tarroso, P., Gardner, A., Arnold, E. N., Robinson, M. D., ... Akhzami, S. N. Al. (2018). Diversity, distribution and conservation of the terrestrial reptiles of Oman (Sauropsida, Squamata). *PLoS ONE*, 13.
- Carretero, M. A., Harris, D. J., & Rocha, S. (2005). Recent observations of reptiles in the Comoro islands (Western Indian Ocean). *Herpetological Bulletin*, 91, 19–28.
- Charlton, T., & Nixon, D. (2020). Predation on the Common Blind Snake (*Indotyphlops braminus*; Daudin, 1803) by the Brown-headed Snake (*Furina tristis*; Günther, 1858) in Central Province, Papua New Guinea. *The Captive & Field Herpetology Journal*, 4, 25–26.
- Chirio, L., & Ineich, I. (2006). Biogeography of the reptiles of the central african republic. *African Journal of Herpetology*, 55, 23–59.
- Crane, M. S., Strine, C. T., Knierim, T. K., Artchawakom, T., & Suwanwaree, P. (2018). Herpetofaunal species abundance, richness, and diversity in a dry tropical forest and agricultural matrix at the Sakaerat Biosphere Reserve, Thailand. *Herpetological Conservation and Biology*, 13, 586–597.
- D'Cruze, N., Sabel, J., Green, K., Dawson, J., Gardner, C., Robinson, J., ... Glaw, F. (2007). The first comprehensive survey of Amphibians and Reptiles at Montagne des Français, Madagascar. *Herpetological Conservation and Biology*, 2, 87–99.
- Das, A., Sharma, P., Surendran, H., Nath, A., Ghosh, S., Dutta, D., ... Wangdi, Y. (2016). Additions to the herpetofauna of Royal Manas National Park, Bhutan, with six new country records. *Herpetology Notes*, 9, 261–278.
- De Pous, P. E., & Dingemans, D. J. (2009). The first record of *Ramphotyphlops braminus* from the Isle of Pines, New Caledonia. *Applied Herpetology*, 6, 401–402.
- Eversole, C. B., & Daniel, M. (2020). *Indotyphlops braminus* (Brahminy Blondsnae). USA Texas. *Herpetological Review*, 51, 79–80.
- Faraone, F. P., Barraco, L., Giacalone, G., Muscarella, C., Schifani, E., & Vecchioni, L. (2019). First records of the Brahminy blindsnake, *Indotyphlops braminus* (Daudin, 1803), in Italy (Squamata: Typhlopidae). *Herpetology Notes*, 12, 1225–1229.

- Flores-Cobarrubias, E., Cruz-Saenz, D., & Lazcano, D. (2012). Notes on the Herpetofauna of Western Mexico 6: Amphibians and Reptiles of Hostotipaquillo, Jalisco, Mexico. *Bulletin of the Chicago Herpetological Society*, 47, 21–26.
- Gehring, P. S., Ratsoavina, F. M., & Vences, M. (2010). Filling the gaps - Amphibian and reptile records from lowland rainforests in eastern Madagascar. *Salamandra*, 46, 214–234.
- Geissler, P., Hartmann, T., Koenig, A., Ihlow, F., & Wagner, P. (2019). Herpetofauna of the Phnom Kulen National Park, northern Cambodia-An annotated checklist. *Cambodian Journal of Natural History*, 1, 40–63.
- González-Sánchez, V. H., Johnson, J. D., García-Padilla, E., Mata-Silva, V., DeSantis, D. L., & Wilson, L. D. (2017). The Herpetofauna of the Mexican Yucatan Peninsula: composition, distribution, and conservation status. *Mesoamerican Herpetology*, 4, 264–380.
- Grismer, L. L., Neang, T., Chav, T., Wood, P. L., Oaks, J. R., Holden, J., ... Youmans, T. M. (2008). Additional amphibians and reptiles from the phnom samkos wildlife sanctuary in northwestern Cardamom Mountains, Cambodia, with comments on their taxonomy and the discovery of three new species. *Raffles Bulletin of Zoology*, 56, 161–175.
- Hawlitschek, O., Brückmann, B., Berger, J., Green, K., & Glaw, F. (2011). Integrating field surveys and remote sensing data to study distribution, habitat use and conservation status of the herpetofauna of the Comoro Islands. *ZooKeys*, 144, 21–79.
- Ibrahim, A. A. (2013). The herpetology of the Suez Canal Zone, Egypt. *Vertebrate Zoology*, 63(1), 87–110.
- Ineich, I. (2009). The terrestrial herpetofauna of Torres and Banks Groups (northern Vanuatu), with report of a new species for Vanuatu. *Zootaxa*, 15(2198), 1–15.
- Ineich, I., Wynn, A., Giraud, C., & Wallach, V. (2017). *Indotyphlops braminus* (Daudin, 1803): distribution and oldest record of collection dates in Oceania, with report of a newly established population in French Polynesia (Tahiti Island, Society Archipelago). *Micronesica*, 1, 1–13.
- Ingle, M. (2020). Herpetofauna of the Amarkantak Plateau in central India. *Reptiles & Amphibians*, 27, 397–410.
- Ingle, M., Yadav, U., Bhilala, A. K., & Pawar, M. (2019). Urban herpetofauna: A case study in Ujjain City of central India. *Int. J. Sci. Res. in Biological Sciences Vol*, 6, 5.
- Krysko, K. L., Enge, K. M., Donlan, E. M., Golden, E. A., Burgess, J. P., & Larson, K. W. (2009). The non-marine herpetofauna of Key Biscayne, Florida. *Herpetological Conservation and Biology*, 5, 132–142.
- Lee, K. H., Chen, T. H., Shang, G., Clulow, S., Yang, Y. J., & Lin, S. M. (2019). A check list and population trends of invasive amphibians and reptiles in Taiwan. *ZooKeys*, 2019, 85–130.
- Leets-Rodriguez, L., Lopez-Guevara, H. J., & Sunyer, J. (2019). First country records of the invasive Brahminy Blindsnake *Indotyphlops braminus* (Daudin, 1803) (Squamata: Typhlopidae) from Nicaragua. *Revista Nicaraguense de Biodiversidad*, 45, 1–53.
- Lemos-Espinal, J. A., & Smit, G. R. (2020). A conservation checklist of the amphibians and reptiles of the State of Mexico, Mexico with comparisons with adjoining states. *ZooKeys*, 953, 137–159.
- Lorvelec, O., Berchel, J., & Barré, N. (2016). First report of the Flowerpot Blindsnake, *Indotyphlops braminus* (Daudin, 1803), from La Désirade (Guadeloupe Archipelago, the French West Indies). *Caribbean Herpetology*, 1–2.
- Lorvelec, O., Pascal, M., Pavis, C., & Feldmann, P. (2007). Amphibians and reptiles of the French West Indies: Inventory, threats and conservation. *Applied Herpetology*, 4, 131–161.
- Manhas, A., Raina, R., & Wanganeo, A. (2018). Reptilian diversity of the Bhopal Region in the State of Madhya Pradesh in central India. *Reptiles & Amphibians*, 25(2), 104–114.

- McCranie, J. R. (2015). A checklist of the amphibians and reptiles of Honduras, with additions, comments on taxonomy, some recent taxonomic decisions, and areas of further studies needed. *Zootaxa*, 3931, 352–386.
- Mckenna, S. A., Butler, D. J., & Wheatley, A. (2015). Rapid Biodiversity Assessment of Republic of Nauru. In Researchgate. Net. Retrieved from https://www.researchgate.net/profile/David_Feary/publication/292981974_Coral_Reef_Fish_Diversity_of_Nauru/links/56b3869f08ae636a540d154e.pdf
- Mizuno, T., & Kojima, Y. (2015). A blindsnake that decapitates its termite prey. *Journal of Zoology*, 297, 220–224.
- Onn, C. K., Grismer, L. L., Wood, P. L., Grismer, J. L., & Ahmad, N. (2009). Preliminary checklist of the herpetofauna of Pulau Besar, Melaka, Malaysia. *Tropical Life Sciences Research*, 20, 81–87.
- Ota, H., Hikida, T., Matsui, M., Mori, A., & Wynn, A. H. (1991). Morphological variation, karyotype and reproduction of the parthenogenetic blind snake, *Ramphotyphlops braminus*, from the insular region of East Asia and Saipan. *Amphibia-Reptilia*, 12, 181–193.
- Paolino, G., Scotti, R., & Grano, M. (2019). First detection of the “flowerpot snake” *Indotyphlops braminus* (Daudin, 1803) (Serpentes Typhlopidae) in Ischia (Italy): a new possible invasive species. *Biodiversity Journal*, 10, 321–324.
- Parkin, T., Jolly, C. J., de Laive, A., & von Takach, B. (2021). Snakes on an urban plain: Temporal patterns of snake activity and human–snake conflict in Darwin, Australia. *Austral Ecology*, 46, 449–462.
- Pauwels, O. S. G., Wallach, V., Biteau, J.-P., Chimsunchart, C., Yoga, J.-A., & O’Heix, B.-C. (2004). First record of *Ramphotyphlops braminus* (Serpentes: Typhlopidae) from Gabon, western central Africa. *Hamadryad*, 29, 138–139.
- Powell, R., & Henderson, R. W. (2012). Island lists of West Indian amphibians and reptiles. *Bulletin of the Florida Museum of Natural History*, 51, 85–166.
- Rais, M., Ahmed, J., Naveed, A., Batool, A., Shahzad, A., Bibi, R., & Sajjad, A. (2021). Field surveys along habitat gradients revealed differences in herpetofauna assemblage in Margalla Hills National Park, Islamabad, Pakistan. *Biodiversity Data Journal*, 9, 1–12.
- Rastegar-Pouyani, N., Gholi Kami, H., Rajabzadeh, M., Shafiei, S., & Anderson, S. C. (2008). Annotated Checklist of Amphibians and reptiles of Iran. *Iranian Journal of Animal Biosystematics*, 4, 7–30.
- Rato, C., Silva-Rocha, I., Gonzales-Maria, E., Rodriguez-Luque, F., Farina, B., & Carretero, M. A. (2015). A molecular assessment of European populations of *Indotyphlops braminus* (Daudin, 1803). *Herpetozoa*, 27, 179–182.
- Rawat, Y. B., Bhattarai, S., Poudyal, L. P., & Subedi, N. (2020). Herpetofauna of Shuklaphanta National Park, Nepal. *Journal of Threatened Taxa*, 12, 15587–15611.
- Snyder, S., Schmidt, R., & Tirard, N. (2019). First report of the Brahminy Blindsnake, *Indotyphlops braminus* (Daudin), from the Caribbean island of Montserrat. *Caribbean Herpetology*, 1–2.
- van den Burg, M. P., Hylkema, A., & Debrot, A. O. (2021). Establishment of two nonnative parthenogenetic reptiles on Saba, Dutch Caribbean: *Gymnophthalmus underwoodi* and *Indotyphlops braminus*. *Caribbean Herpetology*, 79, 1–5.
- Vella, A., Vella, N., Mifsud, C. M., & Magro, D. (2020). First records of the Brahminy blindsnake, *Indotyphlops braminus* (Daudin, 1803) (Squamata: Typhlopidae) from Malta with genetic and morphological evidence. *Natural and Engineering Sciences*, 5, 122–135.
- Venturina, R. E. L., Prado, Y. L. C. del, Kamir, R. A. C., Balmores, M. N., & Diesmos, A. C. (2020). A revised checklist of Amphibians and Reptiles in Camiguin Sur, Misamis Oriental, Mindanao, Phillipines. *Asian Herpetological Research*, 11, 28–43.
- Wallach, V. (2009). *Ramphotyphlops braminus* (Daudin): A synopsis of morphology, taxonomy, nomenclature and distribution (Serpentes: Typhlopidae). *Hamadryad*, 34, 34–61.

- Zamora-Camacho, F. J. (2017). On the role of plant nurseries introducing *Indotyphlops braminus* (Daudin, 1803), in Spain. *Herpetozoa*, 30, 69–72.
- Zassi-Boulou, A. G., Tchimbakala, J. G., Mavougou, L. B., & Jeckson, K. (2004). A survey of snake in the Patte d'Oie Forest Reserve (Brazzaville, Republic of Congo): an urban snake community in Central Africa. *Herpetological Conservation and Biology*, 15, 139–149.
- Ziegler, T., Hendrix, R., Thanh, V. N., Vogt, M., Forster, B., & Kien, D. N. (2007). The diversity of a snake community in a karst forest ecosystem in the central Truong Son, Vietnam, with an identification key. *Zootaxa*, 40, 1–40.