



# Predation on Murid Rodents by the Giant Trope, *Tropidophis melanurus* (Squamata: Tropidophiidae), with Comments on Predation of Mammals by Snakes of the Genus *Tropidophis*

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Mammals rarely have been reported in the diets of snakes in the genus *Tropidophis* (Tropidophiidae) (for reviews see Henderson and Powell 2009; Rodríguez-Cabrera et al. 2020). This might be largely attributable to the small size of most species (i.e., <600 mm SVL; Schwartz and Henderson

1991; Hedges 2002; Rodríguez-González 2020). After examining nearly a hundred prey items from eleven species of *Tropidophis*, Greene (1983) concluded that most were dietary specialists with diets based largely on frogs and lizards. He considered such prey items to have low ingestion



**Fig. 1.** An adult female Giant Trope (*Tropidophis melanurus*) when first encountered near El Nicho, Cumanayagua Municipality, Cienfuegos Province, Cuba (upper left), and regurgitating a House Mouse (*Mus musculus*) and the remains of a second rodent (upper right and below). Photographs © T.M. Rodríguez-Cabrera.

ratios (i.e., relationship between prey diameter and the snake's head diameter). The exceptionally large Giant Trope (*T. melanurus*) appears to be the only species capable of effectively consuming prey items with high ingestion ratios (Greene 1983; Schwartz and Henderson 1991; Rodríguez-Cabrera et al. 2017). Greene (1983) listed two rodents among 26 items (7.7%) found in museum specimens of *T. melanurus*. Schwartz and Henderson (1991) also mentioned "rodents (*Mus*)" in the diet of this species, but did not specify quantity. Those are the only two literature references of mammals in the diet of *T. melanurus*. However, predation on mammals is more common than previously thought. Herein we report six new cases of predation by *T. melanurus* on introduced murid rodents in central Cuba.

In all cases, we noticed a stomach bulge when we first saw the snakes. To avoid killing the animals, we forced regurgitation by palpation of the abdomen in order to obtain the dietary information (Luiselli and Amori 2016). We identified the rodents to the lowest taxonomic level possible. Three species of murid rodents (House Mouse, *Mus musculus*; Black Rat, *Rattus rattus*; and Brown Rat, *Rattus norvegicus*) are established in Cuba (Borroto-Páez 2011). Nevertheless, due to an advanced state of digestion, we were unable to identify some prey items beyond family level. We measured snout-vent length (SVL) or total length of the snakes to the nearest centimeter or, in a few cases, visually estimated total length. Datum for all coordinates is WGS 84.

In 1982, we found a large female (ca. 800 mm total length) under a pile of dry grass at Reparto Virginia, Santa Clara Municipality, Villa Clara Province (22.405739, -79.986341; elev. 120 m asl). Forced regurgitation revealed a partially digested House Mouse.

On 12 June 2008, we found an individual (ca. 600 mm total length) under a rock in a secondary grassland about 1 km west of Loma la Vigía, Placetas Municipality, Villa Clara Province (22.332506, -79.677465; elev. 200 m asl). Forced regurgitation revealed a partially digested House Mouse.

In 2013, we found an adult male (650 mm total length) under a feeder in a dovecote within the facilities of Empresa Nacional para la Protección de la Flora y la Fauna, Santa Clara

Municipality, Villa Clara Province (22.402541, -79.919374; elev. 105 m asl). Forced regurgitation revealed a partially digested House Mouse.

At 0950 h on 30 October 2014, we found an adult female (ca. 600 mm SVL) (Fig. 1) under a rock in secondary grassland by a road near El Nicho, Cumanayagua Municipality, Cienfuegos Province (22.032016, -80.112710; elev. 460 m asl). Forced regurgitation revealed a House Mouse (ca. 80 mm body length) and fragments of a second rodent in a very advanced state of digestion. At least the identified prey item was swallowed head-first.

At 2200 h on 17 October 2016, we found an adult male (550 mm SVL) active at night on the ground in the Cienfuegos Botanical Garden, Cienfuegos Municipality, Cienfuegos Province (22.125151, -80.323549; elev. 50 m asl). Forced regurgitation revealed a partially digested House Mouse and a Cuban Treefrog, *Osteopilus septentrionalis* (39 mm SVL), the latter with no signs of digestion and in a more anterior position (Fig. 2), suggesting that it was taken later. Both prey items were ingested head-first.

At 1030 h on 11 April 2021, we found an adult female (ca. 800 mm total length) under a rock in a secondary grassland about 1 km north of the Palmarito Dam, Ranchuelo Municipality, Villa Clara Province (22.367522, -80.038004; elev. 110 m asl). Forced regurgitation revealed a Black Rat with only the head partially digested (Fig. 3).

The Giant Trope is a Cuban endemic that is widely distributed across the archipelago in diverse habitats that include urban environments (Henderson and Powell 2009; Rodríguez Schettino et al. 2013; Rodríguez-Cabrera and Hernández Gómez 2021). This is the only species of *Tropidophis* that can attain SVLs >1,000 mm and body mass in excess of 800 g (Schwartz and Henderson 1991; Tolson and Henderson 1993; Rodríguez-Cabrera et al. 2021). Apparently, a minimum size of about 500 mm SVL is necessary for snakes of the genus *Tropidophis* to start consuming mammals. However, in addition to *T. melanurus*, only the Hispaniolan Trope (*T. haetianus*) has been reported to feed on rodents in nature (Schwartz and Henderson 1991). Although no reports exist, we expect that other West Indian tropes with a similar body



**Fig. 2.** A partially digested House Mouse (*Mus musculus*) and a Cuban Treefrog (*Osteopilus septentrionalis*) regurgitated by an adult male Giant Trope (*Tropidophis melanurus*) from the Cienfuegos Botanical Garden, Cienfuegos Municipality, Cienfuegos Province, Cuba. Photograph © T.M. Rodríguez-Cabrera.



**Fig. 3.** A partially digested Black Rat (*Rattus rattus*) regurgitated by an adult female Giant Trope (*Tropidophis melanurus*) from near the Palmarito Dam, Ranchuelo Municipality, Villa Clara Province, Cuba. Photograph © E. Morell Savall.



**Fig. 4.** Captive adult Giant Tropes (*Tropidophis melanurus*) exceeding 600 mm SVL that were regularly fed on lab and free-ranging House Mice (*Mus musculus*) (above and lower left) and suckling European Rabbits (*Oryctolagus cuniculus*) (lower right). Photographs © A. Hernández Gómez (upper left), J. Torres (upper right), and A.M. Rodríguez-González (below).

plan as that of *T. melanurus* (see Hedges 2002) and with SVLs around 500 mm might also sporadically include small mammals in their diets. This size can be attained by the Navassa Trope (*T. bucculentus*), which presumably is extinct; the Grand Cayman Trope (*T. caymanensis*); the Little Cayman Trope (*T. parkeri*); the Cayman Brac Trope (*T. schwartzii*); and the Jamaican Eyespotted Trope (*T. stejnegeri*) (see Henderson and Powell 2009 for a review). Although some species of the semi-arboreal ecotype (e.g., the Broad-banded Trope, *T. feicki*, and the Gracile Banded Trope, *T. wrighti*) can approach 500 mm SVL, they are much more slender than representatives of the *T. melanurus* species group (for reviews see Hedges 2002; Henderson and Powell 2009; Rodríguez-Cabrera et al. 2020; Rodríguez-González 2020) and appear not to consume rodents due to body plan and specialization for predation on anoles. Based on observations in captivity, adult *T. melanurus* readily accept rodents and even small lagomorphs (Fig. 4), whereas species of the semi-arboreal ecotype never do (pers. obs.). Giant Tropes begin to accept pinkies shortly after reaching 300 mm SVL (pers. obs.), which suggests that this species might be conditioned to consume this kind of prey before reaching adult size.

The Spotted Brown Trope (*T. pardalis*), a small, stout, ground-dwelling species (females to 287 mm SVL, males to 284 mm SVL; Henderson and Powell 2009), apparently feeds on House Mice in captivity (Polo and Arango 2011). Nonetheless, we believe that controlled conditions in captivity drove such a small snake to feed on endothermic, relatively large prey (probably pinkies).

Murid rodents are not native in Cuba (e.g., Silva et al. 2007). Therefore, the propensity of *T. melanurus* to consume small non-volant mammals could be explained by co-evolution with mammalian prey that is similar in body size and general habits to the introduced murids. In the Greater Antillean region, such mammalian prey presumably included “island shrews” of the genus *Nesophontes* (Eulipotyphla: Nesophontidae), small, terrestrial, and most likely nocturnal semi-burrowers (e.g., Silva et al. 2007; Borroto-Páez 2011; Orihuela 2014; Buckley et al. 2020; Orihuela et al. 2020), and small “spiny rats” of the genus *Boromys* (Rodentia: Echimyidae) (e.g., Silva et al. 2007; Arredondo Antúnez 2011; Borroto-Páez 2011). Both groups included species no larger than a Black Rat (e.g., Silva et al. 2007; Arredondo Antúnez 2011; Borroto-Páez 2011). These mammals are common in the subfossil record of the region

and are thought to have survived until close to or even after the first European arrival in the region in 1492 (MacPhee et al. 1999; Díaz-Franco 2004; Silva et al. 2007; Cooke et al. 2017; Orihuela et al. 2020). For predators of small, nocturnal, non-volant mammals, murids presumably serve as replacements for *Nesophontes* and *Boromys*, as indicated by abundant records from subfossil owl-pellets (for reviews see MacPhee et al. 1999; Díaz-Franco 2004; Silva et al. 2007; Borroto-Páez 2011; Cooke et al. 2017; Orihuela et al. 2020).

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