



The American Bullfrog, *Lithobates catesbeianus* (Ranidae): An Exotic Prey Item of the Cuban Endemic Giant Trope, *Tropidophis melanurus* (Tropidophiidae)

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Invasive alien species constitute a major worldwide concern in conservation biology (e.g., Vitousek et al. 1997; Clavero and García-Berthou 2005). Oceanic islands are particularly vulnerable to the effects of foreign species that break the fragile equilibrium typical of insular ecosystems (e.g., O’Dowd et al. 2003; Blackburn et al. 2004; Freed et al. 2008). When an introduced species becomes a pest, it can alter the balance in natural ecosystems and at least some native predators take advantage of that situation, shifting their diet from the scarcer native prey to the increasingly abundant exotic alternative, sometimes functioning as a biological control (see Simberloff and Rejmánek 2011 for a review).

The Giant Trope, *Tropidophis melanurus* (Schlegel 1837; Fig. 1A), is a nocturnal, constricting snake endemic and widely distributed in the Cuban Archipelago (Henderson and Powell 2009; Rodríguez et al. 2013). It is by far the largest species in the family Tropidophiidae, sometimes exceeding

one meter SVL, and the only species capable of subduing truly large prey like toads (*Peltophryne*) and giant anoles (Alayo 1951; Henderson and Powell 2009; Fong et al. 2013; Torres et al. 2014; Rodríguez-Cabrera et al. 2017). However, its diet consists largely of Cuban Treefrogs (*Osteopilus septentrionalis*) and small to medium-sized anoles (*Anolis* spp.), although small rodents and birds occasionally are consumed (see Henderson and Powell 2009 for a review; Rodríguez-Cabrera et al. 2014). This species generally employs a sit-and-wait foraging strategy and usually forages near and even in water (Fig. 1B), where its favorite prey (*O. septentrionalis*) comes to reproduce (Henderson and Powell 2009; Rodríguez-Cabrera et al. 2014). In the latter situation, other riparian species become potential prey, but no reports document this snake preying on anurans other than *O. septentrionalis*. Herein we report the first instance of predation by a Giant Trope on an American Bullfrog (*Lithobates catesbeianus*; Ranidae).



Fig. 1. The Giant Trope (*Tropidophis melanurus*) is an abundant Cuban endemic (A). It is a generalist predator that can consume a wide variety of prey items, including frogs, toads, lizards, small rodents, and birds. A common scenario after a heavy rain, when this Giant Trope was encountered employing a sit-and-wait strategy in a pond (B) while waiting for its favorite prey, the Cuban Treefrog (*Osteopilus septentrionalis*). Photographs © Rosario Domínguez (A) and Raimundo López-Silvero (B).

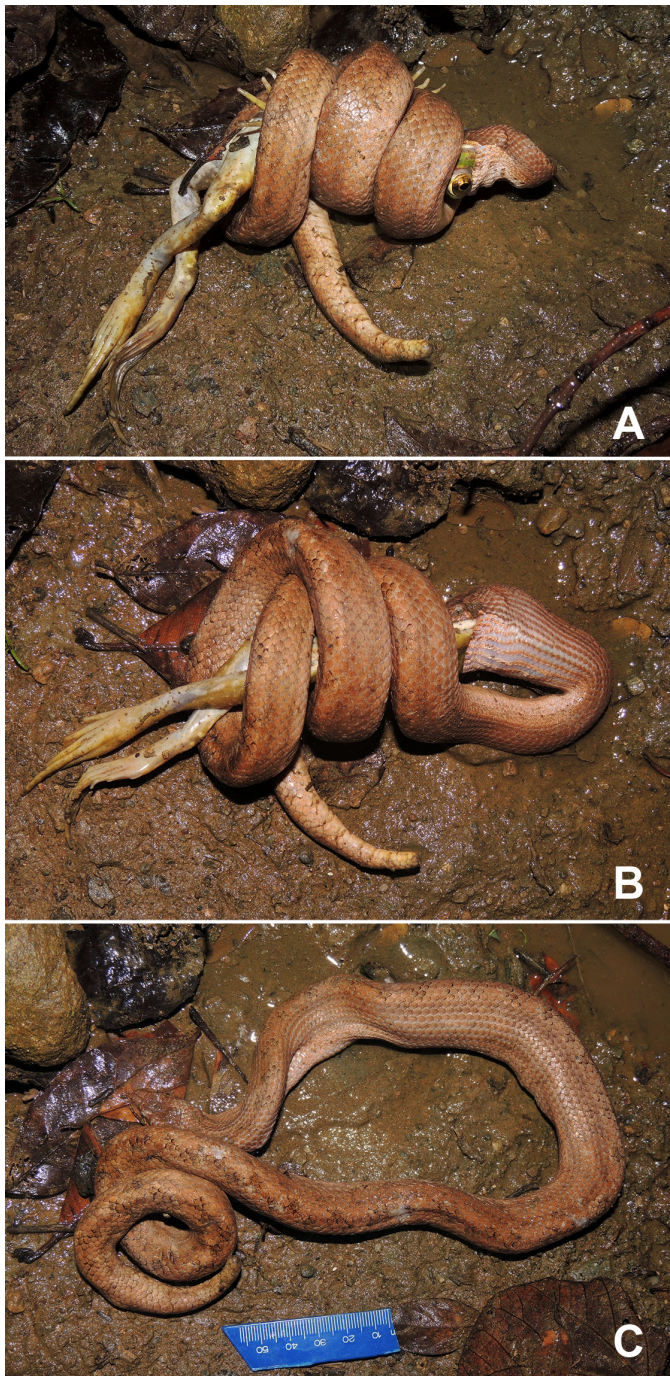


Fig. 2. Sequence of photographs showing predation on an American Bullfrog (*Lithobates catesbeianus*) by the Giant Trope (*Tropidophis melanurus*) at the “Lomas de Banao” Ecological Reserve in central Cuba. (A) When first encountered at 1050 h, (B) 15 minutes later after swallowing the head and shoulders of the frog, and (C) 30 minutes later after swallowing was completed. Photographs © T.M. Rodríguez-Cabrera.

At 1050 h on 12 April 2018 we found a medium-sized (550 mm SVL) adult male Giant Trope constricting a juvenile American Bullfrog (85 mm SVL; Fig. 2) by a tributary of the Río Banao (21°51'42.5"N, 79°34'35.4"W; 260 m elevation; datum WGS 84), about 130 m west of Bella's waterfall in the “Lomas de Banao” Ecological Reserve, Guamuhaya

Massif, Sancti Spíritus Province, Cuba (Fig. 3). Head-first swallowing took 30 minutes after the initial observation (Fig. 2A). Air temperature was 23 °C and relative humidity 100%; a heavy afternoon rain had fallen a few hours earlier.

The American Bullfrog (Fig. 4) is a very large aquatic anuran (to 270 mm SVL and 173 g in Cuba; Sampedro et al. 2003) of North American origin that has been intentionally introduced for exploitation as a delicacy into several countries where it is now successfully established (see Powell et al. 2011 for a review). Introductions in the Greater Antilles date to the early 20th century (Powell et al. 2011); in Cuba, it was first introduced between 1916 and 1917 (Borroto-Páez et al. 2015). The species was formerly widespread and very abundant in both natural and artificial bodies of water (e.g., Sampedro et al. 2003; Díaz and Cádiz 2008; Borroto-Páez et al. 2015). However, during the last 10 to 15 years, it appears to have suffered a notorious population decline, apparently after the introduction of two highly voracious Old World species of catfish in the genus *Clarias* (*C. gariepinus* and *C. macrocephalus*) in 1999–2000 (Díaz and Cádiz 2008; Borroto-Páez et al. 2015; Rodríguez-Machado and Rodríguez-Cabrera 2015). However, these frogs remain abundant at the “Lomas de Banao” Ecological Reserve, as well as in most montane freshwater ecosystems in Cuba where the catfishes have not become established (probably due of low temperature intolerance; T.M. Rodríguez-Cabrera, pers. obs.).

The American Bullfrog has many predators in its native range, including predatory fish, salamanders, other frogs (including conspecifics), snapping turtles, aquatic and semi-aquatic snakes, alligators, birds (including herons and kingfishers), and a number of mammalian species (see Casper and Hendricks 2005 for a review). However, the only predators (other than humans) reported in the West Indies are the

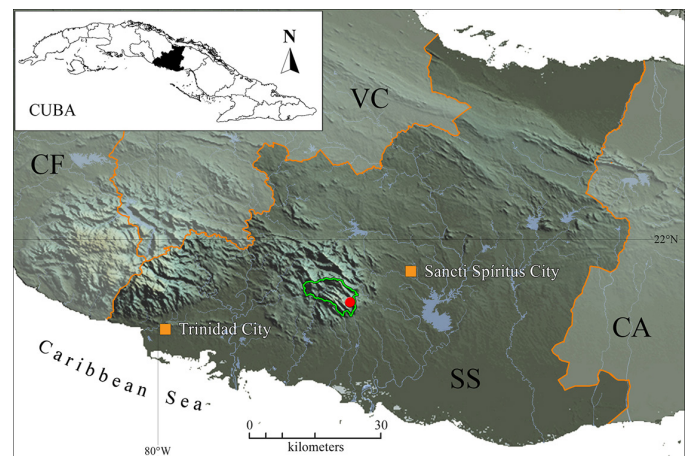


Fig. 3. Map depicting the locality (red dot) where we observed predation on an American Bullfrog (*Lithobates catesbeianus*) by the Giant Trope (*Tropidophis melanurus*) at the “Lomas de Banao” Ecological Reserve (green outline) in the easternmost part of the Guamuhaya Massif, Sancti Spíritus Province, central Cuba. Provinces: CF = Cienfuegos, VC = Villa Clara, SS = Sancti Spíritus, and CA = Ciego de Ávila.



Fig. 4. The American Bullfrog (*Lithobates catesbeianus*) is the only exotic amphibian so far successfully established in Cuba, where it was first introduced in the early 20th century. Photograph © Raimundo López-Silvero.

Cuban Watersnake (*Tretanorhynchus variabilis*) and the Barn Owl (*Tyto alba*) on Cuba and the Small Indian Mongoose (*Herpestes javanicus*) on Puerto Rico (see Henderson and Powell 2009 for a review). Herein I document the Giant Trope as the fourth confirmed predator for this exotic anuran in the West Indies. Due to the abundance of *T. melanurus* and bullfrogs in Cuba, this is likely a much more common predator-prey relationship than previously thought. The Giant Trope frequently preys on Cuban Treefrogs, both in forests and during breeding aggregations near water (Rodríguez-Cabrera et al. 2014), and the American Bullfrog seems a perfect substitute at least in the latter scenario. More studies are needed in areas where the Giant Trope and the American Bullfrog co-occur to better understand the role of this predator on populations of this frog in Cuba.

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