

Predation by an Oliver's Parrot Snake *Leptophis coeruleodorsus* on a Veined Tree Frog *Trachycephalus typhonius* in Trinidad, West Indies

Oliver's Parrot Snake *Leptophis coeruleodorsus*, previously *L. ahaetulla coeruleodorsus* (Murphy *et al.* 2013), is a large, slender, arboreal and diurnal snake inhabiting forests and forest edges of eastern Colombia, Venezuela and Trinidad and Tobago (Murphy 1997, Boos 2001, Mumaw *et al.* 2015, Murphy *et al.* 2018, de Albuquerque and Fernandes 2022). It reportedly preys on frogs, lizards, snakes and small birds (Mole and Urich 1894, Mole 1924, Beebe 1946, Oliver 1948, Emsley 1977, Boos 2001, Hayes 2002, Murphy *et al.* 2013, Mumaw *et al.* 2015), but few of its prey have been identified to genus or species; Oliver (1948) identified a Boddaert's Tropical Racer *Mastigodryas boddaerti* from an unknown locality, Hayes (2002) identified three species of birds in Trinidad, Murphy *et al.* (2013) identified a *Thecadactylus* gecko in Trinidad and Mumaw *et al.* (2015) identified an Emerald-eyed Tree Frog *Boana crepitans* and a Greater Hatched-faced Tree Frog *Sphaenorhynchus lacteus* in Venezuela. Mumaw *et al.* (2015) also reported an Oliver's Parrot Snake attempting to prey on a Veined Tree Frog *Trachycephalus typhonius*, previously *Phrynohyas venulosa* and *T. venulosus* (Faivovich *et al.* 2005, Lavilla *et al.* 2010), in Venezuela until it was interrupted by a human observer. In this note, I provide the first documentation of an Oliver's Parrot Snake successfully preying on a Veined Tree Frog.

During the morning of 8 May 2009, a participant in a bird banding workshop heard the distress calls of a frog and spotted a large snake (approximately 1.5 m) with a large frog in its mouth at the William Beebe Tropical Research Station in Simla, Arima Valley, Trinidad (10°41'33.66"N, 61°17'21.88"W). The snake was wrapped around a branch about 8 m above the ground and the frog was grasped by its posterior half. As the frog struggled and emitted distress calls, its weight pulled the snake downward until it was hanging only by its tail (Fig. 1). I climbed up a masonry wall under the tree to obtain a closeup of photos within 2 m of the snake. When the snake detected my presence, it dropped down to a lower branch within 1 m of me and began to regurgitate the frog, which was covered with mucous secretions (Fig. 2). After taking a few more photos, I climbed down the wall and the snake resumed swallowing the frog. After completely swallowing the frog within an hour of our initial observation, the snake climbed higher up into the tree and vanished from our sight.

The snake was identified as an Oliver's Parrot Snake by the combination of its slender body, bright green back, copper lateral stripe, black stripe through the eye, and creamy white ventral surface (Fig. 2; Murphy 1997, Boos 2001,



Fig. 1. An Oliver's Parrot Snake dangling from a limb while grasping a Veined Tree Frog in its mouth.

Murphy *et al.* 2018). The frog was identified as a Veined Tree Frog by its paired lateral vocal sacs (Fig. 2), unique among Trinidad's tree frog species (Murphy 1997, Murphy *et al.* 2018).

Snakes of the genus *Leptophis* (taxonomy of the *L. ahaetulla* complex follows de Albuquerque and Fernandes 2022) specialize in preying on tree frogs of the family Hylidae, which comprised 83% of their diet ($n = 106$) in an early study of all taxa combined (Oliver 1948). Tree frogs comprised 90% of the diet ($n = 60$) of the Giant Parrot Snake *Leptophis ahaetulla* in northern Brazil (de Albuquerque *et al.* 2007) and 63% of the diet ($n = 16$) of the parrot snake *Leptophis marginatus* in northeastern Argentina (López *et al.* 2003). It is possible that Oliver's Parrot Snake likewise preys predominantly on tree frogs despite the scarcity of reports.

The Veined Tree Frog has toxic mucous secretions that



Fig. 2. An Oliver's Parrot Snake beginning to regurgitate a Veined Tree Frog. The bright green back, copper lateral stripe, black stripe through the eye and creamy white ventral surface characteristic of an Oliver's Parrot Snake are visible. The paired lateral vocal sacs of the Veined Tree Frog distinguish it from all other tree frog species in Trinidad.

are an antipredator strategy (Delfino *et al.* 2002, Rigolo *et al.* 2008). Although toxic skin secretions successfully foiled predation attempts by a Black-skinned Parrot Snake *Leptophis nigromarginatus* (Yeager *et al.* 2019), a Central American Indigo Snake *Drymarchon melanurus* (Leary and Razafindratsita 1998) and an Ashmead's Banded Cat-eyed Snake *Leptodeira ashmeadii* (Manzanilla *et al.* 1998), the Veined Tree Frog has been successfully preyed upon by several species of snakes, including the parrot snake *L. marginatus* (Prado 2003, de Albuquerque and Di-Bernardo 2005, Clegg 2015), Pacific Coast Parrot Snake *Leptophis diplotropis* (García-Mata *et al.* 2020), Mexican Parrot Snake *Leptophis mexicanus* (Henderson *et al.* 1977), Yellow-bellied *Liophis Erythrolamprus poecilogyrus* (da Silva *et al.* 2003), the Brown Sipo *Chironius fuscus* and potentially other species of the genus *Chironius* (Roberto and Souza 2020, Dias-Silva *et al.* 2021). It remains unknown why the toxic mucous secretions are an effective defense against

some snakes but not others.

The distress calls of frogs may also function as an antipredator strategy to startle a predator such as a bird or mammal, warn conspecifics of danger, or attract competing predators who might attempt to prey on the predator or steal the prey, facilitating the victim's escape (Hödl and Gollmann 1986, Schuett and Gillingham 1990, Hopkins and Folt 2019). In this instance and in four previous cases (Leary and Razafindratsita 1998, Prado 2003, Clegg 2015, Yeager *et al.* 2019) the distress calls of the Veined Tree Frog attracted the attention of humans. After hearing the distress calls of a Veined Tree Frog seized by a Central American Indigo Snake, Leary and Razafindratsita (1998) observed at least 17 Veined Tree Frog emerging within a 3 m radius from the crevices and cavities of a tree and orienting towards the distressed frog, presumably in response to its distress calls. These observations suggest that the distress calls of Veined Treefrogs may effectively warn conspecifics and attract secondary predators.

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