A Tale of Two Species in Tamana Caves (Trinidad, W.I.): Tropical Wolf Spider *Ancylometes bogotensis* (Ctenidae) preying upon Trinidadian Stream Frog *Mannophryne trinitatis* (Aromobatidae)

Currently there are close to 50,000 accepted species of spiders worldwide, belonging to 129 families (World Spider Catalogue 2021). Fifty-four of these families are found in Trinidad and Tobago (Sewlal and Cutler, 2003; Sewlal 2019). Spiders are emerging model organisms to study disturbance of biodiversity due to their global distribution, size, morphology, behaviour and habitat specificity (Čandek *et al.* 2019). In general, spiders display the behaviour of opportunistic predators (Vollrath and Selden 2007). It is well documented that the tropical wolf spider *Ancylometes bogotensis* (Keyserling 1877) can capture a prey much heavier and larger than itself and can move it with ease (Todelo *et al.* 2007). In Trinidad, *A. bogotensis* was reported to prey on the killifish *Anablepsoides hartii* (Deacon *et al.* 2015), the freshwater crab *Poppiana dentata* (Bhukal *et al.* 2015) and two amphibians: the bufonid *Rhinella beebei* (snout-to-vent length (SVL) 51-61mm) (White 2015) and the leptodactylid *Leptodactylus validus* (SVL 42-50mm) (Auguste *et al.* 2018).

We visited the Tamana caves located in central Trinidad (Fig. 1) on 30 April 2018 in the period 1100h to 1430h. There is a well known, relatively isolated, population of the Trinidadian stream frog *Mannophryne trinitatis* (Garman 1887) that inhabits these caves (Kenny 1969). The field trip was part of ongoing research activities carried out at the Department of Life Sciences (UWI) to identify the biologically-active components in skin secretions of frogs of Trinidad and Tobago that might confer protection against infections and predators (Mechkarska *et al.* 2018; Barran *et al.* 2020).

The entrance to the caves was humid and we noticed the presence of various bats and several arthropod species. To gain access, we had to crawl through a short narrow horizontal tunnel. The cave floor was blanketed with leaves, shrubs and twigs. There were large amounts of bat guano and slow-flowing waterways as we manoeuvred through interconnected caverns. At the end of one of those caverns, we found a population of *M. trinitatis*. This particular cavern had an open overhead space and was under the canopy of several large trees.

The Trinidadian stream frog *M. trinitatis* (also known as the yellow-throated frog and the Trinidad poison frog) is endemic to Trinidad (Murphy *et al.* 2018). They are small brown frogs with a black postocular stripe often extending onto the body, and their toes lack webbing (Fig. 2A). The females are slightly bigger, lighter in coloration with an

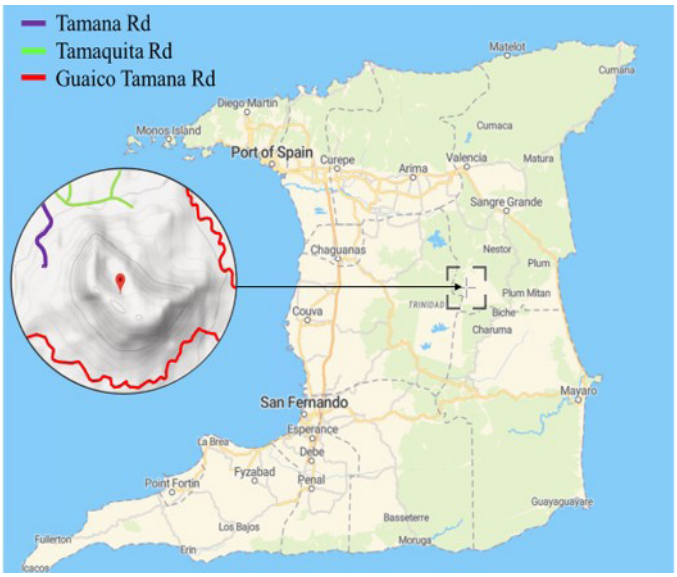

Fig. 1. A map of Trinidad including a topographic representation of Tamana caves on the North Slope of Mount Tamana (GPS 10.469818, -61.193698; elevation approximately 200-240m above sea level) (image: maptiler and Google Maps modified by Gervonne Barran).

intense yellow-pigmented throat that distinguishes them from the males (Fig. 2B). The males are darker and turn almost black when calling (Fig. 2C). This species displays parental care to increase offspring survival; the males carry the tadpoles on their backs (Fig. 2D) to protect them from desiccation of rearing pools and from predation by killifish, prawns, crabs and snakes. Because of pollution, habitat loss and habitat degradation, the frog was listed on the IUCN Red List as "vulnerable" (Angulo 2010). However, as the population is reported to be abundant and thriving, its status has been revised to "least concern" (IUCN SSC Amphibian Specialist Group 2020).

During the collection of the diurnal terrestrial frogs for sampling, we made a fortuitous observation of a predation event that took place on the cave floor. The spider, identified to be *A. bogotensis* from the photos taken, was hidden amongst a small rock formation. As the group of juvenile *M. trinitatis* dispersed while being collected, the spider lunged and captured one individual (Fig. 3). The frog showed neither signs of distress nor attempted to free itself remaining immobile, most likely because the spider paralysed it quickly. The venom of *Ancylometes rufus*, another species of the Ctenidae family, is known to have a rapid effect - paralysis occurring in 45 seconds - on an individual frog (Pinto and Costa-Fields 2017). The spider with its catch then retreated

Fig. 2. (A) Lateral view of *M. trinitatis* displaying the black postocular stripe. (B) Ventral view of yellow-throated female (left) and a male (right). (C) Calling male turning jet black. (D) Male frog carrying tadpoles on his back.

into a nearby crevice, thus precluding our observation of consumption of the prey.

The adult frogs have a SVL of ~22mm and weight of about 1.3g (Murphy *et al.* 2018). We measured the SVL of the frogs before collecting their skin secretions to confirm that they were adults. Using those measurements and the picture in Fig. 3 (bottom), we estimated the length of the spider body to be approximately 20-22mm, if measured from cephalothorax (fused head and breast) to the opisthosoma (abdomen). This indicated that the size of the prey and the body of the predator in this case were relatively similar.

This is the first report of *M. trinitatis* being preyed upon by *A. bogotensis*. Given the relatively secluded nature of the Tamana caves, and the species of bats, arthropods and frogs inhabiting it, we assumed that there were well-established food chains. Small frogs are prey species, especially for spiders that display such opportunistic behaviour as already reported. Since *A. bogotensis* is the only spider belonging to this genus found in Trinidad and Tobago, this note adds to the existing body of knowledge providing opportunities for further studies of the feeding behaviour, ecology and distribution of the species in the country.

Fig. 3. Predation on *Mannophryne trinitatis* by *Ancylometes bogotensis* in Tamana caves, Trinidad. Top: side view of the predator-prey pair. Bottom: dorsal view of the pair used for size comparison.

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