

## Consecutive breeding in human-made infrastructure by *Cruziohyla craspedopus* (Funkhouser, 1957) in Ecuador

Gil Wizen<sup>1,\*</sup>

Neotropical treefrogs spend most of their terrestrial life in the dense vegetation, and only approach water bodies during the breeding season. They lay their egg masses on leaves, branches and other objects hanging above water reservoirs, and the hatching tadpoles drop into the water to start their aquatic life (Duellman, 2001). *Cruziohyla craspedopus* (Funkhouser, 1957) is a large species of treefrog distributed in the Amazonian lowlands of Colombia, Ecuador, Peru, and Brazil (Frost, 2016). Despite its wide distribution range and stable populations (Angulo et al., 2004), this species is considered illusive and rarely observed due to its habitat preferences. It is reported to spend most of its life high in the canopy, descending to the rainforest understory only to breed (Hoogmoed and Cadle, 1991; Block et al., 2003). Previous studies have shown that this species can be lured to breed in artificial ponds for scientific research (Rodrigues et al., 2011; Turrell et al., 2016). Here I report novel observations about consecutive breeding of *C. craspedopus* in human-made infrastructure located in the Amazon Basin of Ecuador.

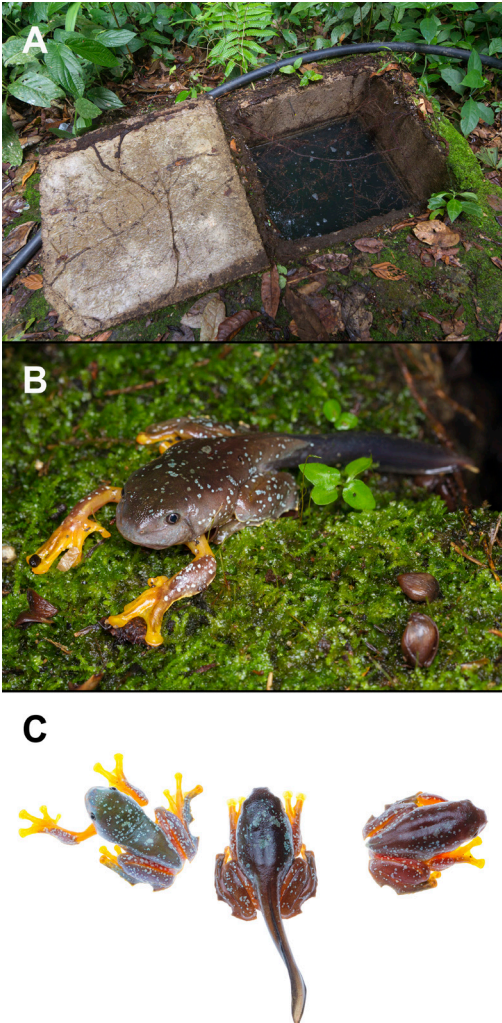
On 15 Mar 2014 at ca. 2200 h, at a private farm in the municipality of Puerto Misahuallí in Napo Province, Ecuador (1.0682°S, 77.6169°W, WGS 84; 400 m elev.; temp. 29°C), I observed two adult males of *C. craspedopus* calling on broad epiphyte leaves in close proximity to cabin showers. A year later, on 15 Mar 2015 at ca. 2200 h, while visiting the same location, I spotted two *C. craspedopus* metamorphs (SVL 42 and 47 mm) on the showers' floor, both still had their tails. Subsequently, on 15 Mar 2016 at ca. 2200 h, I found one metamorph (SVL ca. 40 mm) on a fallen palm leaf close to the water tank behind the showers, which prompted me to further check the origins of these specimens.

The water tank measures 3.5x1.5 m, 1 m deep. It has two openings, measuring 50x50 cm each, covered by cement tiles as lids (Figure 1A). One of these tiles is broken at its corner, allowing the passage of organisms such as mosquitoes (*Sabethes* spp., *Psorophora* sp.), damselflies (*Microstigma rotundatum*) and amphibians (*C. craspedopus*) into and out of the tank. A system of thin roots covers the underside of this tile and one of the tank's inner walls. The tank is used to hold the water drained from the nearby showers and toilets. While I did not take readings for water chemistry, I suspect the water is of extreme poor quality, judging by its strong soapy odour, dark blue colour tone and the oily film clusters floating on its surface. Nevertheless, dozens of *C. craspedopus* tadpoles and metamorphs were seen swimming in the water. I examined ten tadpoles as well as five metamorphs that were observed coming out of the water at night-time (Figure 1B). These specimens, similarly to the two metamorphs I found in the previous year, appeared perfectly healthy, without external signs of nutritional deficiency, disease, or morphological malformations. Within six days the metamorphs absorbed their tails (Figure 1C) and started their terrestrial activity as expected. In a subsequent visit to the farm on 8 Oct 2016 at ca. 2200 h, I spotted four *C. craspedopus* adults perching on broad leaves nearby the water tank. The following night, I spotted a pair in amplexus on a tree branch above the tank. This is the first evidence for breeding of *C. craspedopus* in human-made infrastructure on a regular basis. The observations taken over a period of three consecutive years support the existence of a stable breeding population of *C. craspedopus* that rely on the water tank as its main breeding location. It is possible that this species started utilizing human-made infrastructure for its breeding due to fragmentation or scarcity of its natural breeding habitat – tree cavities and water reservoirs occurring under fallen trees. The seemingly cryptic species may not be fully dependent on tree holes as suggested in the literature, and proves to be more

<sup>1</sup> Present address: 602-52 Park St. E, Mississauga, Ontario L5G 1M1, Canada

\* Corresponding author e-mail: gilwizen@gmail.com

adaptable than previously thought. The observations reported in this study add to previous natural history knowledge for the species and can assist researchers in locating breeding populations more easily in the future. Furthermore, caution should be practiced when demolishing abandoned human-made infrastructure for the possible damage to existing populations of amphibians breeding in these disturbed habitats.



**Figure 1.** *Cruziophyla craspedopus* breeding in human-made infrastructure, in rainforest near Puerto Misahualli, Napo Province, Ecuador. (A) Cement water tank where *Cruziophyla craspedopus* tadpoles were found, opened for inspection. (B) A metamorph, still with its tail, climbing out of the water tank. (C) Three metamorphs that were found in close proximity to the water tank.

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