

Mannophryne trinitatis (Trinidad Stream Frog)

Family: Aromobatidae (Stream Frogs)

Order: Anura (Frogs and Toads)

Class: Amphibia (Amphibians)



Fig. 1. Trinidad stream frog, *Mannophryne trinitatis*.

[<http://calphotos.berkeley.edu>, downloaded 27 October 2012]

TRAITS. The Trinidad stream frog, *Mannophryne* (previously *Colostethus*) *trinitatis* was placed in the genus *Mannophryne* based on the distinguishing feature of a dark colour around the throat (Duellman and Trueb, 1986). The dorsal surface of the frog is brown with the flanks being dark or mottled. The adult males have a grey throat (as seen in Fig. 1) with visible lateral vocal sacs that allow them to call very loudly. In addition, they have nuptial pads on the inside of the thumbs which become more obvious in the breeding season. Females, on the other hand, have a bright yellow throat (Fig. 2). As such they are sometimes called the yellow-throated frog. They rely on cryptic colouration for defence unlike those of the family Dendrobatidae which rely on their toxicity and have warning colours. They are small diurnal frogs, growing up to about 2.5

cm in length with female frogs generally being the larger of the two sexes (Wells, 2007). Male snout-vent length is about 19.4 mm and that of the female is about 21.5 mm. A characteristic feature of the frog is the male vocalizations used during courtship and parental care shown by the male.

ECOLOGY. Both males and females of the Trinidad stream frog are found in rocks in mountain streams, usually in undisturbed, moist montane forests (IUCN et al, 2006). The genus *Mannophryne* is distributed throughout tropical South and Central America. *M. trinitatis* is endemic to (found only in) Trinidad, where they are concentrated mainly in the Northern and Central Ranges. In the Northern Range they usually occupy mountainous territory with it being possible for their range to descend to sea level. In the Central Range however, they are usually found around Tamana Hill and their range does not descend to sea level (Jowers and Downie, 2004). Due to their limited geographic range (less than 20 000 km²) and decline of habitat, the Trinidad stream frog is thought to be a vulnerable species (Wells, 2007).

SOCIAL ORGANIZATION. The females of the species are involved in territorial defence, defending territories of up to 1 m² (Duellman and Trueb, 1986). Territories are set up around rocks, boulders and stream beds. Defence involves perching on top of large boulders and assuming an upright posture with their bright yellow throats pulsating (Zug et al, 2001). This is done to challenge intruders to enter their territory. If this signal given by the female *M. trinitatis* is ignored, then physical contact usually follows with *M. trinitatis* standing on her hind leg and grappling foes (Zug et al., 2001). The female will attack any sex but particularly other females (Fig. 3). She will even attack males that are carrying tadpoles. Females however, are not the only ones who engage in fights. The male of the species may also engage in grappling fights with other males usually if trying to court the same female. After fighting, the loser becomes light brown in colour immediately as a sort of surrender (Zug et al., 2001). Males court females from a distance using their colour and acoustic vocalizations. This safeguards the male from being attacked by non-receptive females. If however, the female is receptive she will leave her territory and approach a calling male, following him to oviposition sites that may be a rock crevice or leaves some distance away from the site of calling. Sometimes male and female couples may engage in elaborate tactile interactions.

FORAGING BEHAVIOUR. Adults feed on small insects and arthropods. These include giant *Drosophila* (*D. hydei*) and the cowpea beetles (*Callosobruchus chinensis*). Juvenile animals may feed on small *Drosophila* with vestigial wings (*D. melanogaster*). The tadpoles are herbivorous and feed on leaf litter and algae. The males are found to actively feed while attending clutches (Duellman and Trueb, 1986). A study by Downie et al. did not show any evidence that foraging was reduced relative to calling males or that the burden of carrying young affected them (Wells, 2007).

COMMUNICATION. Communication in the Trinidad stream frog is usually shown by the males. Primary vocalizations (advertisement calls) are calls lasting about 10-20 seconds and are produced about once per several minutes. When a female approaches a male, however (about 10-15 cm), the interval between the calls is reduced and the number of notes per call group is increased (Duellman and Trueb, 1986). They also communicate through visual means - the male of the species changes colour from pale brown to black when interested in a mate and maintains

this dark colour while calling. As explained previously, the female frogs communicate information about territoriality. Zug et al. (2001) states that they perch on rocks and pulsate their yellow throats as a signal for intruders to stay away.

SEXUAL BEHAVIOUR. Sexual maturity can be reached about five months after metamorphosis. In this species, a sex role reversal exists whereby females defend territories. In addition to which, the males care for the young. Males of the *M. trinitatis* change colour from pale brown to black when calling. This change occurs within a matter of one to ten minutes with the same occurring for the reverse change at the end of calling (Duellman and Trueb, 1986). They normally give a two note advertisement call but combine these into a continuous trill when females are approaching (Fig. 4). This has been recorded to be a 50% increase in the number of notes delivered per minute (Wells, 2007). If the female is receptive she will leave her territory and approach a calling male, following him to oviposition sites that may be a rock crevice or leaves some distance away from the site of calling. There is no record of oviposition in territory. Females lay clutches of about 2 to 12 eggs with egg size generally 3.50 mm. The eggs take about 21 days to develop.

PARENTAL CARE. The males tend eggs, carry tadpoles (Fig. 5) and select deposition sites. The tadpoles are carried from terrestrial nests to water. Males have been observed depositing tadpoles on wet leaf litter when suitable pools were not available but they are generally deposited in pools with slow flow rates and that do not contain *Rivulus hartii* or *Macrobrachium carcinus*, a fish and shrimp species respectively (Wells, 2007). Males also select pools which are large and have a good food supply and provide refuge in the form of leaf litter (Jowers and Downie, 2005). After this, tadpoles would take about 56 days to develop.

ANTI-PREDATOR BEHAVIOUR. Tadpoles of *M. trinitatis* mainly fall prey to *Rivulus hartii* and *Macrobrachium carcinus* found mainly in the Northern Range in Trinidad. It is rare, however, for the two predators to be found in the same stream (Jowers et al, 2006). Male *M. trinitatis* have been found to deposit tadpoles in pools that do not have these predators. It is further suggested that the tadpoles may be carried long distances and for long periods in an effort to avoid predators (Downie et al, 2001). Studies have also shown that there is variation in preference for pools that already contain tadpoles and pools that do not (Jowers and Downie, 2005). Additionally, in a study done by Jowers et al. (2006), investigating tadpole avoidance of predators, it was concluded that tadpoles mainly use chemical means and that there was a specific response to *R. hartii* but not to *M. carcinus*. Finally, when exposed to predators for the first time, tadpoles gave strong responses suggesting inheritance of the behaviour (Jowers et al, 2006).

JUVENILE BEHAVIOUR. Unlike adults, tadpoles are herbivorous. After metamorphosis, they will eat almost any food. They mature within five months and sometimes less (Kenny, 1969).

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Fig. 2. Sexual dichromatism in *M. trinitatis*.

[<http://www.frogshot.co.uk> , downloaded 6 November 2012]



Fig. 3. Aggressive behaviour and communication in *Mannophryne trinitatis*: two females fighting over a territory.

[Fig. 8.14 of Wells (2007)]

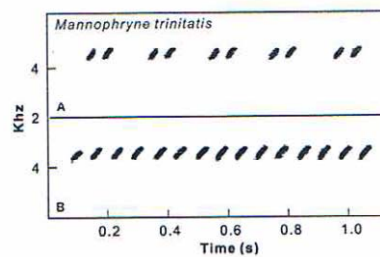


Fig. 7.9. Sound spectrograms of (A) the advertisement call and (B) a courtship trill of *Mannophryne trinitatis*. From recordings by the author.

Fig. 4. Sound spectrograms showing difference in advertisement call and courtship call of *Mannophryne trinitatis*.

[Fig. 7.9 of Wells (2007)]



Fig. 5. Male *M. trinitatis* transporting tadpoles.

[<http://www.arkive.org>, downloaded 15 November 2012]

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