

Engystomops pustulosus (Tungara Frog)

Family: Leiuperidae (Puddle Frogs)

Order: Anura (Frogs and Toads)

Class: Amphibia (Amphibians)



Fig. 1. Tungara frog, *Engystomops pustulosus*.

[http://calphotos.berkeley.edu/cgi/img_query?enlarge=0000+0000+0410+1343, downloaded 27 March 2015]

TRAITS. Male tungara frogs are approximately 30-33mm in length and the females are just a little larger, about 33-36mm. Its skin is brown in colour and is studded with warts or pustules, making this animal look much like a toad. The scientific name (formerly *Physalaemus pustulosus*) suggests this toad-like outward appearance (Ryan, 1985). It usually has dark spots on its back (Fig. 1). Its belly is smooth and white with not very much dark spotting. The vocal sacs of the male frogs are usually black and have a white line running down the middle, and its tympanic membrane (eardrum) is also studded with tubercles. Their eyes are either tan or light brown in colour with a horizontal pupil. Tadpole bodies and tails are mostly brown with dark spots as well but their tail fins are colourless.

DISTRIBUTION. This frog is found widely in El Salvador, Nicaragua, Belize, Guatemala, Costa Rica, Honduras, Panama, Trinidad and Tobago and possibly Guyana. Also, it is one of the most common frog species encountered in the lowlands of Mexico, Colombia, Venezuela and Panama (Fig. 2).

HABITAT AND ACTIVITY. The frog's usual habitat is tropical or subtropical dry forest, savanna, or grassland in low-lying areas, freshwater marshes, canals, ditches and ponds. They are inhabitants of leaf litter. They may be found in both disturbed and natural lowland and mountainous forest. They can also endure forest edges and secondary growth. Puddles and potholes may also make good locations for them. These frogs are known for night activity but they also feed during the day.

FOOD AND FEEDING. Ants and termites are common food among juveniles. Adults eat the same, termites being their primary food, and also snails, coleopterans, dipterans and isopods. Adult tungaras are eaten by freshwater turtles, fringe-lipped bats (*Trachops cirrosus*), other species of frogs, crabs, opossums (*Philander opossum*), and snakes (*Leptodeira annulata*). Tadpoles are eaten by fish, turtles and dragonfly larvae.

POPULATION ECOLOGY. Females usually don't have a preference for males who would produce simple mating calls, but they rather those who have a whine with a few chucks on the end of it. This poses a problem however, since the fringe-lipped bat uses these complex calls with the chucks to prey on the males. This is a case where sexual selection opposes natural selection (Ryan, 1985). The longest recorded time that a tungara frog has been known to survive is 18.8 years in captivity.

REPRODUCTION. Tungara frogs do not reproduce seasonally, but all year. While floating on the water, males would call out to females. When a female is attracted to a male, she usually homes into him, following his mating call (Fig. 3). In selecting oviposition (egg-laying) sites females are known to use shallow water with a vertical edge to build the nest up against. The females are known to prefer to oviposit in water where there would not be much competition, i.e., waters that do not have nests of the same species. The tungara frogs lay their eggs in foam nests in pools that usually have some kind of cover. Drying out of the eggs during periods without enough rainfall are prevented by chemicals in the foam (Ryan, 1985). Tungara nests may be laid in many different habitations, inclusive of areas that are disturbed. Reproductive activity usually varies depending on the nightly and yearly patterns of rain; *E. pustulosus* usually become more sexually active on rainy nights during seasons of little rainfall. However, during periods of adequate rainfall, they breed more when nights are dry. Reproductive activity in this species is also usually done in regions where many small bodies of water such as ponds are located. They lay a few hundred tiny eggs which are cream in colour, in a white foam nest (Fig. 4). Tadpoles hatch from eggs and leave the foam nest after about four days. If they are delayed in any way, the nest can last for up to two weeks.

BEHAVIOUR. Anti-predator behaviour: Predators, just like females of this species, prefer complex calls (with the whine and the chucks incorporated) and use the male frogs as prey, finding them by following their calls. Because of this, males would do a simple call and a compound one, changing between them based on the present risk of predation. When many males are calling at the same time, they produce what is called a chorus, in which each of them would try to produce compound calls. Calling in chorus allows the frogs to be able to minimize

the possibility of being preyed upon and at the same time, maximize the chances of them finding a mate.

Communication: Females prefer larger males, and they also prefer males that produce compound calls over others who give out simple calls. *E. pustulosus* males make choruses of their calls, one male would start a round of calls, and in sequence the others would follow. When more males join the chorus there is greater competition for females, and then the males produce more compound calls. It is believed that the male vocal sac is very important for visual communication between males and females. Male tungara frogs' vocal sacs are one of the most reflective parts of their bodies. When the females are in a reproductive state, they become much more sensitive to visual cues. The sac then becomes a very necessary part of male advertising.

APPLIED ECOLOGY. *Engystomops pustulosus* make foam nests that last for a long time to protect their tadpoles. This long-lasting effect is due to ranaspumin-2, which is a surfactant protein. A team of scientists discovered that they could build a system of artificial photosynthesis within a foam that was made using this same protein. The system was found to produce just about 10 times more biofuel per 100 acres than regular plants. The system could also be used on rooftops and on land that is not suitable for growing crops.

REFERENCES

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Fig. 2. Distribution of the tungara frog.

[<http://biogeodb.stri.si.edu/amphibians/en/species/100/>, downloaded 27 March 2015]



Fig. 3. Mating tungara frogs.

[<http://biogeodb.stri.si.edu/amphibians/en/species/100/>, downloaded 27 March 2015]



Fig. 4. Foam nest of the tungara frog.

[<http://3.bp.blogspot.com/-Zzxw3eotlk4/T9EVDvnrIfI/AAAAAAAAAB-g/aThBLKA66I8/s1600/pustulosusNest.jpg>, downloaded 27 March 2015]

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