Eleutherodactylus johnstonei (Johnstone’s Rain Frog)

Family: Eleutherodactylidae (Rain Frogs)
Order: Anura (Frogs and Toads)
Class: Amphibia (Amphibians)

Fig. 1. Johnstone’s Rain Frog, *Eleutherodactylus johnstonei*.

**TRAITS.** Johnstone’s Rain Frog (Fig. 1), also known as the Lesser Antillean Whistling Frog, is not native to Trinidad but was introduced. It is a Neotropical species that is highly adaptable and invasive (Savage, 2002). The males have snout to vent of 17-25mm while the females range in length from 17-35mm. The dorsal part of the frog is usually brown to grey tan with the presence of 1 to 2 chevrons (inverted V markings) (Fig. 2) which are darker in colour, a thin strip may be present along the middle of the back or two bold stripes (Murphy, 1997). The skin may be smooth or moderately bumpy. The head is wider than its length with relatively large eyes (diameter approximately the distance between eyes and nostril) and distinct tympanum (eardrum) on both sides of its head. The iris is gold at the top and brown at the bottom. There is no webbing between the digits (fingers and toes), and round discs are present at the end of each digit (Murphy, 1997). The first finger is longer than the second finger while the third toe is significantly shorter than the fourth toe. Nuptial thumb pads, used by some male anurans to grip the female during mating, are absent. Males have an inflatable vocal sac in the throat region which allows them to call loudly.
during mating season (Fig. 3); when deflated the vocal sac is strongly granular. The under surface is cream in colour while the posterior thigh is dark brown to grey tan in colour and is either marbled, blotched or stippled (Murphy, 1997).

**ECOLOGY.** *E. johnstonei* is found throughout the Lesser Antilles in countries such as Anguilla, Antigua, Barbados to which it is native, and Bermuda, Costa Rica, Trinidad and Tobago and Venezuela to which it was introduced. The species was found at the Port of Spain docks originally but has now spread to St Augustine, Piarco and along the Eastern Main Road, some individuals can be found in Tobago as well (Murphy, 1997). It is highly adaptive, it can be found in disturbed areas such as mowed lawns, fields, gardens, around business and homes, its presence usually coincides with human expansion. The diversity of its habitat and its success in colonizing is due to its ability to tolerate high temperatures as well as dehydration as well as it not being dependent on water for any part of its lifecycle (Murphy, 1997). They are also found in forests, mainly in clearings or gaps within the forests. It feeds on mainly ants but also feed on spiders, termites and leaf hoppers. Lizards, snakes and other frogs prey on this species (Murphy, 1997).

**SOCIAL ORGANIZATION.** No observable social organization. They are usually solitary, only coming together during mating sessions. Each male has its calling territory which it defends and attracts females to this area (Savage, 2002).

**ACTIVITY.** *E. johnstonei* is nocturnal and can be found in generally moist places during the day. It can be found in leaf litter, under rocks and pieces of wood or debris (Henderson and Powell, 2009).

**FORAGING BEHAVIOUR.** They do not hunt their prey but sit and wait for their prey to be in close proximity to jump and capture it. In captivity it was noted that it observed its prey for a period of time before attacking (Savage, 2002).

**COMMUNICATION.** This species is well known for its vocalization which is used to communicate with other individuals especially receptive females to give their location. The call of the male frog is heard throughout the year, males begin to call when they reach 17-20mm snout to vent (Henderson and Powell, 2009). The call can be described as a two note whistle where the second whistle is longer than the first. The whistle can be repeated up to 60 times per minute where the first note is approximately 70-90ms of frequency about 2kHz while the second lasts from 180-270ms ranging from 3kHz at the beginning and rising to 4kHz. There is a 1-2 second interval between each call (Savage, 2002).

**SEXUAL BEHAVIOUR.** Mating occurs throughout the year but peaks during the rainy season and June to August and occurs in leaf litter or cavities in the ground (Murphy, 1997). Individuals reach sexual maturity at about 1 year of age, the males begin to call at around 17-20mm snout to vent. The male uses its call to attract receptive females for mating. A willing female starts the courting process with physical contact with the calling male. The male then leads the female to up to four potential oviposition (egg-laying) sites or cavities; it does this by turning around and hopping away while calling towards the direction of the site or cavity (Henderson and Powell, 2009). After inspection of the sites the females choose a suitable nesting site. The female initiates mating by moving under the male, the male then holds on to the female around the armpits (axillary amplexus), perches on the female’s back or they may enter into a reverse hindleg clasp. Parental care is carried out primarily by the male although the female stays at the oviposition site a day after the eggs have been laid. After the eggs have been laid and the female moves from under the
male, the male then stays on top of the eggs and protects them from that point until 1 to 8 days after hatching. Males defend their mating sites by using displays or physically fighting (Henderson and Powell, 2009). In order to increase mating chances other males exhibit satellite behaviour where males that were not selected or do not have the desired traits occupy the territory of a desired male in the hope of acquiring a mate or opportunistic mating where males may follow calling male and the interested female into the cavity in the hopes of mating with the female instead on the calling male (Henderson and Powell 2009). Studies of the Guyanese *E. johnstonei* showed that males can fertilize 3.3 clutches of eggs per year while females produce 4.3 clutches of eggs per year.

**EGGS AND FROGLETS.** Females lay approximately 10-30 unpigmented eggs under debris at ground level (The IUCN Red List of Threated Species, 2014). The eggs are around 3mm in diameter and are covered in a thin viscid membrane. During the incubation period of the eggs, the males keep the eggs moist with clear fluids produced by the cloaca (The IUCN Red List of Threated Species, 2014) .The eggs are not laid in water since the frog does not pass through the tadpole stage externally but goes through this phase inside the egg. The eggs hatch approximately 2 weeks after being laid at this point froglets emerge from the eggs. At the tip of the froglet’s snout there is a tooth which is used to create an exit point in the egg’s membrane. The froglets have a snout to vent length of 4mm when they hatch and a short tail. After a day the short tail of the froglet disappears (The IUCN Red List of Threated Species, 2014).

**ANTIPREDATOR BEHAVIOUR.** When being attacked by a predator *E. johnstonei* jumps quickly away from the predator (Henderson and Powell, 2009). In captivity the frog was also observed pressing itself flat to surfaces in the presence of predators. During the incubation period of the eggs the male will sit on the top of the eggs, placing its venter on the top layer of eggs. When the froglets are hatching the male raises and covers the froglets that are in clumps (Henderson and Powell, 2009).

**REFERENCES**


The Herpofauna of Trinidad and Tobago. 2014. 'Eleutherodactylus johnstonei'. http://www.trinidad-tobagoherps.org/Eleutherodactylusjohnstonei.htm.


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Fig. 2. Chevron marking on *E. johnstonei*.

[http://frogcalls.blogspot.com/2012_05_01_archive.html, downloaded 16 November 2014]

Fig. 3. Inflated vocal sac of calling *E. johnstonei*.

[http://frogcalls.blogspot.com/2012_05_01_archive.html, downloaded 16 November 2014]

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