

## *Cnemidophorus lemniscatus* (Rainbow Whiptail)

Family: Teiidae (Tegus and Whiptails)

Order: Squamata (Lizards and Snakes)

Class: Reptilia (Reptiles)



**Fig. 1.** Rainbow whiptail, *Cnemidophorus lemniscatus*.

[<https://www.flickr.com/photos/vhobus/6717385289/>, downloaded 2 October 2014]

**TRAITS.** As hatchlings, rainbow whiptails have nine pale white longitudinal stripes with intervening dark blue or brown regions. Each primary stripe is labelled as either being ventrolateral, lateral, dorso-lateral or paravertebral. The vertebral or mid dorsal stripe is the least defined and deeply coloured positioned between the paravertebral stripes. The lower pair of stripes on each sides (ventrolateral and lateral) differ from the upper pairs (dorsolateral and paravertebral) by their irregular margin with fused spots (Buterfield et al., 2009). Moreover, the juvenile's hind legs are covered by distinct spots. Henceforth, females retain the juvenile pattern whilst males become brilliantly coloured during adulthood (Mojica et al., 2003) (Fig. 1). These teiids have marked sex-colour dimorphism with females (65mm SVL) smaller than males (88mm SVL) in snout-vent length and head size. This contributes to the differences in body mass of the sexes. Males have yellow ventral surfaces, turquoise tails and flanks, blue-green face and throat with white spotted sides (Montgomery et al., 2011). The male rainbow whiptail is known as five stripes due to remnants of ventrolateral and lateral pairs of stripes.

**ECOLOGY.** *Cnemidophorus lemniscatus* are neo-tropical, heliothermic and terrestrial species of lizard found in open sunny zones on sandy beaches and along banks of rivers about one to ten miles from the water edges (Mojica et al., 2003). Their habitat ceases at the fringe of trees and shrubs or exposed rock (Montgomery et al., 2011). The habitat found in forested areas has shaded littered ground floor with compact soil unsuitable for use by whiptails. If *C. lemniscatus* is present along forest trails or human environs this is incidental (Montgomery et al., 2011). These lizards have a wide distribution forming part of the herpetofauna of South America, Central America and the Caribbean (Suriname, Guyana, Brazil, Nicaragua, and on Manzanilla beach in Trinidad and Tobago) (Mojica et al., 2003). Their habitat preference is due to their need for high sun exposure and food availability. These lizards have a low niche breath (Montgomery et al., 2011) feeding mostly on arthropods (96%, termites Isoptera, beach fleas Amphipoda, beetles Coleopteran, spider Hymenoptera & caterpillars) and plant material (4%, flower and seed).

**SOCIAL ORGANIZATION.** *Cnemidophorus* lizards are non-territorial which correlates with their sparse distribution (Dickinson and Fa, 2000) leading to enlarged home range (Ribeiro et al., 2011). Social structure is not present in these teiids with an apparent variation in the presences of males over some months of the year (Mojica et al., 2003). However, competition for females creates aggression with some males retaining juvenile colour and pattern to avoid agonistic interactions. Aggressive interaction is also seen amongst females. These interactions usually result in dismissal of one individual from the vicinity. These con-specific contests can cause tail autonomy and during regrowth, energy is then partitioned for growth not reproduction affecting the lizard social status and home range size (Dickinson and Fa, 2000).

**ACTIVITY.** *Cnemidophorus lemniscatus* are diurnal and actively foraging lizards with level of activity varying with time of day (Montgomery et al., 2011). The activity of rainbow whiptails and other ectotherms rely on the intensity of irradiance. *Cnemidophorus lemniscatus* are mostly active during the morning period but when solar radiance is too high at midday causing them to move in between vegetation. These lizards are seen in the afternoon emerging again in open areas to forage or thermoregulation (Mojica et al., 2003). The use of these substrates is primarily associated with predator avoidance, reproduction and foraging activities. Vitt and Pianka (2004) mention that their high levels of activity correlates with their high body temperature exceeding 40°C.

**FORAGING BEHAVIOUR.** As active foragers, *C. lemniscatus* is always looking for a source of food and pursue moving insects (Mojica et al., 2003). The use of tongue extrusion aids rainbow whiptail in locating arthropods and fruit sap. They require large amount of food so uses the daylight to locate it. *Cnemidophorus* lizards are considered to have skull modifications i.e. more flexible for jaw prehension of prey and a tongue capable of chemical transfer of information from external environment to lizard sensory system (Vitt and Pianka, 2004). *Cnemidophorus* uses environmental chemical cues to locate, identify and accesses food sources, interspecific and intraspecific interactions. The ability to identify these chemical signals are enhanced by increased frequency of tongue flickering in Teiids (Cooper et al., 2000) as they search a new habitat.

**COMMUNICATION.** According to Cooper et al. (2000), *Cnemidophorus* use their tongue in intraspecific interactions. Ribeiro et al. (2011) mention that brightly coloured males and cloacal rubbing is seen as a form of male-female communications through numerous signals such as tactile (substrate vibration), auditory (sound produced by stirring the underbrush and grains of sand against leaves), visual (male passes over burrows opening so that females can see him) and chemical (by means of femoral pores) cues.

**SEXUAL BEHAVIOUR.** After reaching maturity, *Cnemidophorus lemniscatus* return to mating zone, sandy areas in which males' bright colours and large size attract females. Males compete for female through agonistic encounters with the larger brilliantly coloured male usually winning the contest. The large headed males ferociously bite during fights (Mojica et al., 2003 and Montgomery et al., 2011). Males gain maturity at 48 mm SVL and females at 51mm SVL. As non-territorial lizards, whiptails show sequential polygyny as males actively search for females and retain guard for about 2-4 days (females receptive periods) insuring successful mating (Ribeiro et al., 2011) because females can mate with several males during breeding season. According to Ribeiro et al. (2011) males initiate cloacal rubbing against the floor at one of the burrows once he has notice a female in a holding. The unique figure 8 performances of cloacal rubbing entails wagging of pelvic regions in a rhythm involving the posterior trunk region, pelvis, hind legs and base of tail moving 10-15cm forward then reversing maintaining original spot. In about 3 minutes, the female emerges from burrow in which male climbs on top of her back pacifying her with a neck hold bringing his cloacal into contact with hers. The male position is maintained for about 2 minutes during which convulsive jerks in the pelvis region occur, known as ejaculation period. The total period of copulation last about 6 minutes (Ribeiro, et al., 2011). Reproductive period usually last for six to seven months after maturity in which female whiptails are capable of producing three clutches per year. These lizards have an aseasonal, acyclic and asynchronous reproductive activities. Females produce one to three eggs per clutch with oviduct egg width of 8.3mm and height of 15.3mm which are laid in sand borrows (Mojica et al., 2003 and Montgomery et al., 2011).

**JUVENILE BEHAVIOUR.** Neonates hatch at approximately 28mm SVL and reaches maturity at about six months after (Mojica et al., 2003). Rainbow whiptail neonates are active forager early in life, a strategy typical of teiids.

**ANTIPREDATOR BEHAVIOUR.** If *C. lemniscatus* is approached by active predators such as *Dryadophis melanolomus* (brown racer snake) it flees out of sight and runs across the beach sand into nearby vegetation. According to Montgomery et al (2011), 80% of rainbow whiptail uses this strategy for escaping active terrestrial predators. These lizards may camouflage under vegetation to avoid aerial attacks. When a foraging rainbow whiptail is disturbed by humans, it can employ one of two escape retreat behaviours. Its initial reaction is to freeze, perhaps assessing the danger, and if human continues to approach them, they run for cover. If the observer remains at a distant, these lizards would rotate head backward and observe the impending "predator". This causes rainbow whiptail to perform their characteristic hand-wave behaviours using alternating forelimbs.

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**Fig. 2.** Copulation in rainbow whiptails.

[<http://www.dailymail.co.uk/news/article-2691399/Amorous-lizards-spotted-kissing-South-American-rainforest.html/>, downloaded 17 October 2014]



**Fig. 3.** Juvenile *Cnemidophorus lemniscatus*.

[<http://www.projectnoah.org/spottings/42373025/fullscreen>, downloaded 2 December 2014]

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