

# DISTRESS CALL OF *SMILISCA BAUDINII* (HYLIDAE) DURING PREDATION BY *LEPTODEIRA POLYSTICTA* (DIPSADIDAE) IN CHIAPAS, MÉXICO

## LLAMADA DE AUXILIO DE *SMILISCA BAUDINII* (HYLIDAE) DURANTE LA DEPREDAIÓN POR *LEPTODEIRA POLYSTICTA* (DIPSADIDAE) EN CHIAPAS, MÉXICO

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**Resumen.**— Las serpientes del género *Leptodeira* son depredadoras de anuros. Aquí reporto un evento de depredación de la rana arborícola mexicana *Smilisca baudinii* por *L. polysticta* y proporciono información cuantitativa de la llamada de estrés emitida por la rana. Además, comparo este evento con la información de las presas reportadas para algunas especies del género *Leptodeira*.

**Palabras clave.**— Anura, bioacústica, comportamiento defensivo, depredación, Serpentes.

**Abstract.**— *Leptodeira* snakes are frog predators. Here I report the predation of the Mexican treefrog *Smilisca baudinii* by *L. polysticta* and I provide quantitative data on the distress call emitted by the treefrog. Besides, I compare some *Leptodeira* species' prey information based on previous records.

**Key words.**— Anura, bioacoustic, defensive behavior, predation, Serpentes.

The Small-spotted Cat-eyed Snake (*Leptodeira polysticta*) is a nocturnal colubrid that inhabits lowlands up to 2000 m from Nayarit and southern Veracruz, México, to central Costa Rica (Duellman 1958). *Leptodeira polysticta* was formerly recognized as a subspecies within *L. septentrionalis* (Daza et al. 2009, Barrio-Amorós 2019) until Campbell (1998) recognized as a distinct species, known to feed on a wide variety of frogs (adults and eggs), lizards, and fishes (Cabrera-Guzman et al. 2009; Tepos-Ramírez et al. 2019). Here I report a predation event of a Mexican treefrog (*Smilisca baudinii*) by *L. polysticta* in Chiapas, Mexico, and I also describe the distress call of *S. baudinii* during predation.

The event was observed during field work near el Triunfo Nature Reserve in Rosarito la Piñuela, Escuintla municipality (15.388103° N, -92.578147° W, WGS84, 362 m a.s.l.) on June 14th 2017 at 02:06 a.m. Frog and snake individuals were approximately at the height of 1.8 meters, in a medium-size tree (ca. 6 meters in height) located in the small rural settlement of few houses near the main dirt road, no ponds were observed nearby. The event was noticed due to the frog's notorious distress call, whose call

was quite different from the background soundscape. The snake grasped the frog from the posterior position of the frog's body, and the tree frog inflated as defensive behavior (Fig. 1). No other *S. baudinii* individuals were observed in the same locality.

A call was recorded from less than a meter away from the frog, with a digital recorder (Tascam DR-40) and a unidirectional microphone (Sennheiser K6/ME 66). The call was stored as a wave file at a sampling rate of 44.1 kHz and an amplitude resolution of 16 bits. The frog's temperature was measured directly with a digital thermometer (Benetech GM300, resolution 0.1°C). A total of 18 calls were recorded in a two-minute recording period. The recording was deposited (in WAV format) in the Biblioteca digital de Sonidos de Anfibios de México del 'Museo de Zoología Alfonso L. Herrera' (MZFC-HEC-4356). Call properties were obtained using the software Raven Pro 1.4 (Bioacoustics Research Program, 2011). The spectrogram, oscillograms and power spectrum was constructed using Seewave v. 1.6 package (Sueur et al. 2008) with a Blackman algorithm, a window size of 5 ms, and 80% overlap. Data provided for calls include mean ±



**Figura 1.** Registro visual del evento de depredación de *Smilisca baudinii* por *Leptodeira polysticta*.

**Figure 1.** Visual record of predation event of *Smilisca baudinii* by *Leptodeira polysticta*.

standard deviation. The distress call of *S. baudinii* was previously onomatopoeically described as a long, high-pitched cry by Duellman and Trueb (1966) from a male caught by *L. maculata* in Charapedo Michoacán, México. Here I provided detailed quantitative information of such call type.

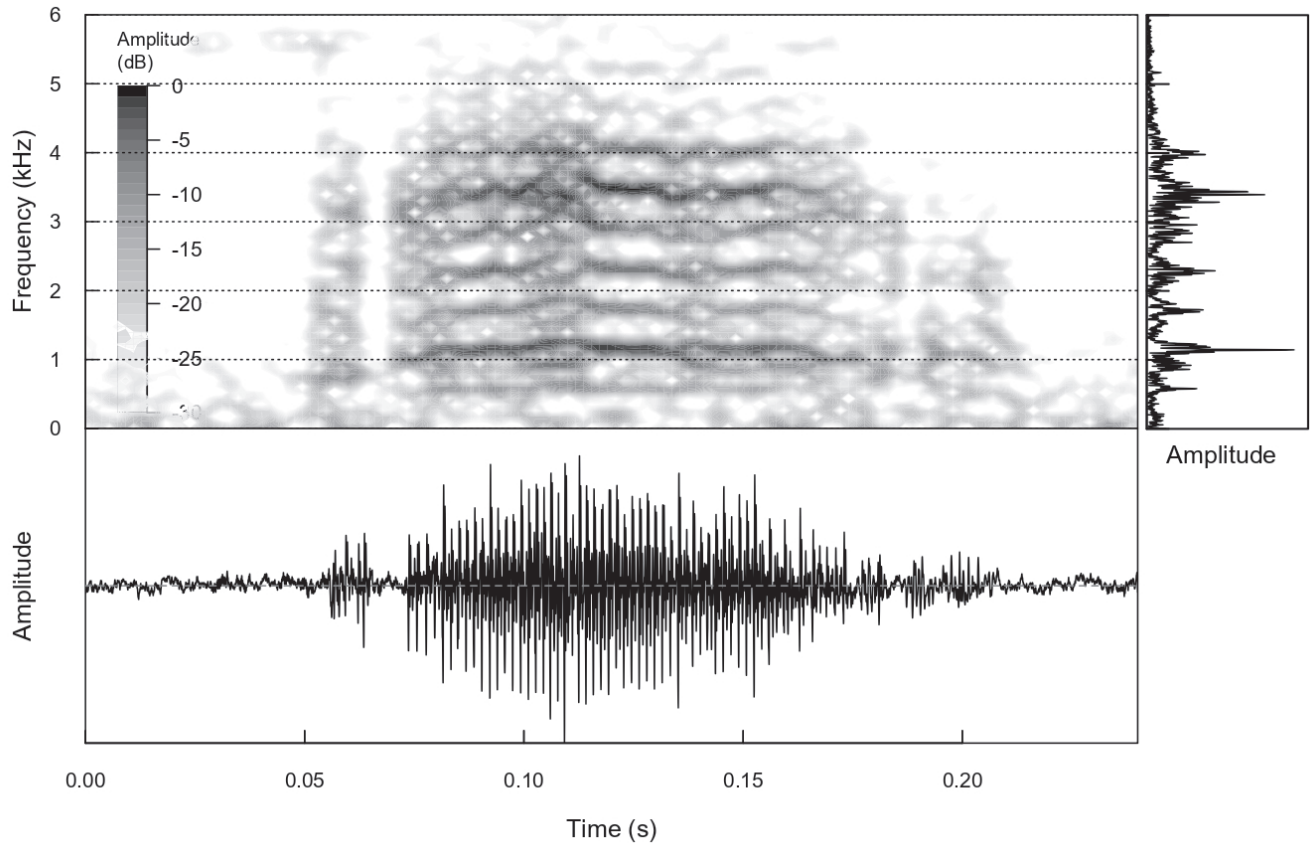
Following the classification of Köhler et al. (2017), the call is a dense harmonic single note (Fig. 2) of a duration of  $0.174 \pm 0.034$  s with a bimodal dominant frequency at  $1244.6 \pm 94.4$  Hz and  $3042.6 \pm 406.4$  Hz, respectively. The 90% of energy is located between  $358.1 \pm 299.5$  Hz and  $3664.0 \pm 495.8$  Hz. The call exhibits a series of pulses at a rate of  $600.8 \pm 74.2$  pulses per second. This distress call may interfere in the predation event by frightening the predator (including the inflating behavior) or attracting other animals (in this case, other potential predators and/or pirates), enhancing the frog's chances of escape (Toledo et al. 2014).

Frog predation by *Leptodeira* species is known by fortuitous observations or by the stomach content of road-killed specimens (i.e., Köhler et al. 2016). Due to their wide distribution and abundance, *S. baudinii* may represent a significant prey resource for co-occurrent *Leptodeira* snakes. Indeed, predation of *S. baudinii* by *L. septentrionalis* was reported in Veracruz, Mexico (Aguilar-López et al. 2019) and Cayo District, Belize (Platt et al. 2016); Duellman and Trueb (1966) reported predation by *L. maculata* in Michoacan state in Mexico and, Köhler et al. (2016) found remains of *S. baudinii* inside a *L. frenata* specimen from

Quintana Roo, México. However, it is the first record of predation of *S. baudinii* by *L. polysticta*. On Los Tuxtlas, Veracruz, Mexico there are predation records of *Smilisca cyanosticta* by *L. polysticta* and *L. septentrionalis* (Bello-Sánchez et al. 2018, Hernandez-Ríos et al. 2011), and a predation record of *Craugastor cf. loki* by *L. polysticta* (Cabrera Guzman et al. 2009). Similarly, a *L. septentrionalis* swallowing a *Leptodactylus bolivianus* was observed on the Refugio de Vida Silvestre, Golfito in Puntarenas, Costa Rica (Dehling 2009).

Frogs constitute a significant component of the diet of multiple snake species, and the frog abundance can be related to snake community composition and occurrence (Wells 2007, Zipkin et al. 2020). Considering the difficulty of monitoring snakes in the wild, the information of predation events like the one provided here can be the basis for more extensive studies about the structure and dynamic of anurans and snake communities (Toledo 2005).

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**Figura 2.** Espectrograma (arriba), oscilograma (abajo) y espectro de potencia (derecha) de la llamada de socorro de *Smilisca baudinii* siendo depredada. Tamaño de la ventana = 512, tasa de muestreo = 44.1 kHz, temperatura corporal = 22.0°C.

**Figure 2.** Spectrogram (top), oscillogram (bottom) and power spectrum (right) of the distress call of *Smilisca baudinii* being predated. Window size = 512, sampling rate = 44.1 kHz, body temperature = 22.0°C.

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