

THE TADPOLE OF THE MEXICAN TREE FROG
***CHARADRAHYLA TAENIOPUS* (ANURA: HYLIDAE)**
El renacuajo de la rana arborícola mexicana *Charadrahyla*
***taeniopus* (Anura: Hylidae)**

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ABSTRACT

The tadpole of *Charadrahyla taeniopus* is described. This tadpole is a typical stream-dweller with a long depressed body, oral disc completely surrounded by marginal papillae with numerous small submarginal papillae lateral to the mouth, and several rows of teeth on the posterior labium (6–7).

Key words. Larvae, streams, Sierra Madre Oriental.

RESUMEN

El renacuajo de *Charadrahyla taeniopus* es descrito. Este renacuajo es típico habitante de corrientes de agua, el cual posee un cuerpo largo y aplanado, disco oral rodeado completamente de papilas marginales y con numerosas papilas submarginales pequeñas a los lados de la boca, y varias hileras de dientes en el labio posterior (6–7).

Palabras clave. Larva, riachuelos, Sierra Madre Oriental.

INTRODUCTION

The Mexican genus *Charadrahyla* comprises six species of large, stream-dwelling frogs that inhabit the highlands of the Sierra Madre Oriental, Sierra Madre Occidental, and the sierras of Oaxaca and Chiapas (Duellman, 2001; Campbell *et al.* 2009). One of these species, *Charadrahyla taeniopus* Gunther 1901 inhabits cloud forest between 1200 and 2100 m along the Sierra Madre Oriental in the Mexican states of Hidalgo, Puebla, and Veracruz (Duellman, 1965, 2001).

The identity of the tadpole of *Charadrahyla taeniopus* is still uncertain. Duellman (1965) assigned a tadpole from Puebla (KU 68498) with labial tooth row formula (hereafter LTRF) 2(2)/3 and one row of large submarginal papillae to *C. taeniopus*, but no conclusive

evidence (i.e., molecular or developmental) supports this hypothesis.

We collected tadpoles from various locations along the Sierra Madre Oriental in Mexico and determined they are *Charadrahyla taeniopus*. Herein, we describe the tadpole of *C. taeniopus*.

MATERIALS AND METHODS

We obtained previously undescribed tadpoles from various locations in the Mexican states of Hidalgo, Puebla, and Veracruz between March and June 2004 (see Comparative Materials). Most tadpoles were reared through metamorphosis to either juvenile and adult stages, except for few that were preserved in formalin (10%) at various developmental stages. All the transformed individuals were

unambiguously identified as *Charadrahyla taeniopus* using the diagnoses of this species provided by Duellman (1965, 2001: 445).

Tadpoles were staged following Gosner (1960). Terminology of tadpole morphology and measurements follow that of Altig & McDiarmid (1999). Museum acronyms: UMMZ = University of Michigan Museum of Zoology.

RESULTS

A tadpole in Stage 31 (UMMZ 239907) (Fig. 1) (measurement in mm): body length 16.2; maximum body width 8.9; tail length 27.3; total length 43.5; oral disc diameter (transverse) 5.4; eye diameter 1.9; interorbital distance 5.2; internostril distance 4.8; width of caudal musculature 4.9; maximum tail height 9.5; body slightly depressed; snout rounded in dorsal view and profile; eyes small (diameter of eye 11.7 % of body length), dorsal, not protuberant; nostril opening ovoid, not prominent, anterolaterally directed, located slightly closer to eye than to tip of snout; spiracle sinistral, angled 45 degrees with respect to horizontal plane of body; opening of spiracle located at midline of body, slightly closer to end of body than to tip of snout; inner wall of spiracle free from body (Altig and McDiarmid, 1999; Fig. 3.5 C); vent tube dextral with right wall displaced anteriorly (Altig and McDiarmid, 1999; Fig 3.5 F);

tail highest at anterior third of tail, gradually tapering posteriorly, ending in a narrow round tip; dorsal fin not extending onto body; dorsal fin slightly higher than ventral fin; posterior tip of tail musculature curved dorsally.

Oral disc ventral (Fig. 1), small (diameter of oral disc 60% of body width), elliptical, not emarginate, completely surrounded by marginal papillae; marginal papillae biserial anteriorly, uniserial laterally, biserial to triserial posteriorly; one nearly complete row of medium submarginal papillae anterior to A-1; clumps of 9–12 small submarginal papillae lateral to posterior rows of teeth; LTRF 2(2)/6; gap in A-2 narrow; relative lengths of tooth rows A-1>A-2>P-1-P-5>P-6; P-6 intermittent; relative length of labial teeth rows A-1, A-2, P-1, P-2, P-3>P-4>P-5>P-6; spaces between teeth rows of posterior labium gradually diminishes from anterior to posterior; oral surface of upper jaw sheath long, wide, flat to slightly convex with wide, long, well-pigmented, lateral projections; upper and lower jaw sheaths well-keratinized, gradually more pigmented toward their serrated edges; two darkly-pigmented narrow processes extend posterodorsally from the lateral edges of the upper jaw sheath; serrated edges of upper and lower jaw sheaths slightly convex and U-shaped, respectively; upper and lower jaw sheaths bearing small, round-tipped, well-defined, discrete serrations.

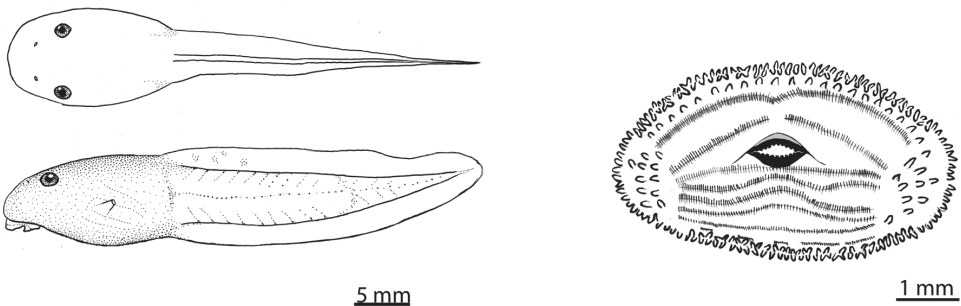


Figure 1. The tadpole of *Charadrahyla taeniopus* (UMMZ 239907): (A) dorsal and lateral views, (B) oral disc.

In preservative, body light brown, tail musculature cream; small, poorly defined spots on anterior part of dorsal fin. In life, a tadpole (UMMZ 239971–3) has body reddish brown with golden flecks, tail musculature reddish cream, and fins grayish.

Tadpoles in developmental stages later than 31 can have large blotches on tail musculature and a pigmented vent. Tadpoles in various developmental stages can have the musculature of the posterior part of the tail straight, body gray in preservative, upper jaw sheath poorly or not pigmented (UMMZ 239906–8, 239966, 239968–9, 239971–5) and poorly keratinized (i.e., with the medial part of the serrated edge slightly to sharply concave) (UMMZ 239906–8, 239972), upper jaw sheath short, serrations of upper and/or lower jaw sheaths barely distinct to absent (UMMZ 239908), P-6 continuous, row of submarginal papillae between A-1 and marginal papillae absent (UMMZ 239907), and P-1 split in two short segments and positioned on both sides of lower jaw sheath (UMMZ 239974). Tadpoles in developmental stages 26–41 can have LTRF 2(2)/5 (UMMZ 239907–8) or 2[1](2)/6 (UMMZ 239973). Tadpoles in stage 25 can have LTRF 2(2)/4–6. Some tadpoles (UMMZ 239968, 239974–5) have LTRF 2(2)/7. One tadpole has two rows of submarginal papillae anterior to A-1 (UMMZ 239979).

DISCUSSION

Duellman (1965) assigned the tadpole KU 68498 with LTRF 2(2)/3 and one row of submarginal papillae to *Charadrahyla taeniopus*. This is incorrect. This study shows that the tadpole of *C. taeniopus* has LTRF 2(2)/6–7 and it is a typical stream-dweller with body depressed, eyes dorsal, oral disc completely surrounded by marginal papillae, large number of teeth rows on posterior labium, and short teeth (Altig & McDiarmid, 1999). We think that the tadpole KU 68498 is *Plectrohyla arborescandens*, a species also

found in Tezuitlan Puebla, because it has LTRF 2(2)/3, complete marginal papillae, uniserial marginal papillae surrounding the oral disc, submarginal papillae forming one row around the mouth, and P–3 shorter than P–1 and P–2, and lacks clumps of papillae laterally to the mouth (Kaplan & Heimes, 2011).

Duellman (2001:921) assigned a tadpole with LTRF 2(2)/6 to *Plectrohyla arborescandens* Taylor 1939 but Kaplan & Heimes (2011) identified the correct tadpole of this species as one having LTRF 2(2)/3. We think that Duellman's tadpole is *Charadrahyla taeniopus* because it has the same labial tooth row formulae and clumps of lateral submarginal papillae as the tadpoles described in this study and also because it was collected near Tezuitlan Puebla, a locality where *C. taeniopus* is abundant.

Altig (1987) assigned a tadpole from Hidalgo (no museum number provided) with LTRF 2(2)/7 to *Plectrohyla charadricola* Duellman. We think this tadpole is *Charadrahyla taeniopus* because it has the same labial tooth row formula as the tadpoles from Hidalgo described in this study and because *C. taeniopus* is very common in Hidalgo.

The tadpole of *Charadrahyla taeniopus* resembles those of *C. altipotens* Duellman 1968 and *C. nephila* Mendelson & Campbell 1999 by having clumps of many small submarginal papillae lateral to the rows of teeth and by lacking rows of large, discrete submarginal papillae between teeth rows and marginal papillae (Duellman, 2001); *C. taeniopus* differs from these species by having 6–7 posterior teeth rows. The tadpole of *C. taeniopus* differs from that of *C. trux* Adler & Dennis 1972 by having two rows of teeth on the anterior labium (Duellman, 2001). The tadpoles of *C. chaneque* Duellman 1961 and *C. tecuani* Campbell *et al.* 2009 are still unknown.

We found geographic variation in the maximum number of teeth rows on the posterior labium of the tadpoles of *Charadrahyla taeniopus*. In particular, the tadpoles from Puebla and Veracruz have a maximum of 6 rows of teeth while those from Hidalgo have a maximum of 7 rows. This observation is consistent, although not conclusive, with Taylor's (1939) hypothesis that the populations of *C. taeniopus* from Hidalgo constitute a species (i.e., *C. bromeliana* Taylor 1939) different from the populations of *C. taeniopus* from Puebla and Veracruz (i.e., *C. taeniopus*).

Comparative materials: MEXICO: *Hidalgo*: between HWY 105 and Carpinteros UMMZ 239971–77, 239839–41; 15 kms from Zacualtipan on Zacualtipan-Molango rd. UMMZ 239966–70, 239835–38. *Puebla*: 14 kms. W. Huauchinango UMMZ 239708–10, 239854–55, 239906; campamento La Trucha Rio Totolapa, W. Huauchinango UMMZ 239906, 239907, 239856. *Veracruz*: near the town of Las Minas (19° 40.5' N; 97° 10.3' W) UMMZ 239979–82, 239847–52, 239983–84; reserva "Las Cañadas", near Huatusco UMMZ 239711–14, 238714–16.

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