



The tadpole of the hylid frog *Scinax belloni* (Anura: Hylidae)

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Abstract

Scinax perpusillus group is composed by 11 species. Only *Scinax arduous*, *Scinax littoreus*, *Scinax meloi*, *S. perpusillus*, *S. tupinamba*, and *S. v-signatus*, have its tadpole described. Herein we described the tadpole of *Scinax belloni* and its internal oral features. Tadpoles of *S. belloni* were collected in bromeliads at the Parque Estadual do Forno Grande, municipality of Castelo, Espírito Santo, southeastern. Two tadpoles were reared to froglets in order to allow specific identification. The morphology of *S. belloni* tadpoles resemble the other known larvae in many aspects such as oval body in dorsal view, coloration, rounded snout in dorsal view, dorsolateral eyes, anteroventral mouth and labial tooth row formula 2(2)/3. In fact, at first sight, all known tadpoles are very similar from each other. Nevertheless, they do can be distinguished by some characters as the shape of lower jaw; number of row of labial papillae; the size of the fins; height of tail and the body; whether musculature of tail reaches its tip and if tail ends rounded or pointed. *S. belloni* tadpoles are readily differentiated from the other known *Scinax* gr. *perpusillus* species tadpoles by the presence of a dark band that goes along the dorsal and ventral fin. The internal oral morphology of *S. belloni* is also described.

Key words: Amphibia, taxonomy, morphology, internal oral morphology.

Introduction

The hylid genus *Scinax* Wagler, 1830 is widely distributed in the neotropics, occurring from Mexico to Argentina; currently, it is composed of 98 described species (Frost 2010) that are grouped in five species groups: *S. catharinae*, *S. perpusillus*, *S. rostratus*, *S. ruber*, and *S. uruguayus* (Duellman & Wiens 1992, Duellman 1993, Faivovich 2002, Frost 2010).

Peixoto (1987) proposed the *Scinax perpusillus* group for three species, *S. alcatraz* (Lutz 1968), *S. perpusillus* (Lutz 1973a), and *S. v-signatus* (Lutz 1973b). Eight additional species have since been added to this group: *S. atratus* (Peixoto 1988), *S. littoreus* (Peixoto 1988), *S. melloi* (Peixoto 1988), *S. arduous* Peixoto 2002, *S. faivovichii* Brasileiro *et al.* 2007, *S. peixotoi* Brasileiro 2007, *S. tupinamba* Silva and Alves-Silva 2008, and *S. belloni* Faivovich *et al.* 2010. All 11 species occur in the coastal region of southeastern Brazil, from the state of Santa Catarina north to the state of Espírito Santo; they inhabit both mountain regions and coastal areas, from sea level to ca. 1600 m (Frost 2010).

The last described species for *S. perpusillus* group is *Scinax* which was placed in *S. belloni perpusillus* group because it lacks webbing between Toes II-III and presumably breeds in bromeliads (Faivovich *et al.* 2010). Adult specimens of this species are different morphologically from others in the group, being comparable in snout-vent length only with the insular species *S. alcatraz*. Most specimens of this species were encountered by Faivovich *et al.* (2010) in bromeliad plants of the genus *Alcantarea* sp. These observations were made in the type-locality, the surroundings of the Parque Estadual do Forno Grande, municipality of

Castelo, Espírito Santo state, southeastern Brazil. Although this bromeliad genus has been intensely targeted for the gardening trade, the impact of this trade on *S. belloni* population is unclear (Faivovich *et al.* 2010). Herein we describe the tadpole of *S. belloni*.

At the Parque Estadual do Forno Grande, individual males were observed calling sitting on the leaves of the bromeliads with their heads pointing down, towards the interior of the plants as observed in other species (Silva & Alves-Silva 2008; Alves-Silva & Silva 2009). Adult and larval specimens of *S. belloni* were found up to 1110 m above sea level in terrestrial bromeliads, either on soil, grass or rock outcrops. Tadpoles were collected using a collecting aspirator (Silva & Alves-Silva 2008) by the author senior TSS, Aline Valadares, Diogo Koski and Paulo V. Scherrer, on October 2009 and May 2010 in bromeliad plants at the Parque Estadual do Forno Grande (PEFG; 20°31'6.67"S 41° 5'9.52"W), municipality of Castelo, Espírito Santo state, southeastern Brazil. Seven tadpoles were anesthetized with 0.5% lidocaine solution and then fixed and preserved in 5% formalin. Two tadpoles were reared to froglets in order to allow specific identification. Adults of *Scinax belloni* can be easily observed in the same bromeliads that the tadpoles were collected. Some other species are known to inhabit these same bromeliads, including *Bokermannohyla caramaschii* and *Scinax* aff. *eurydice*. Nevertheless, this is the only species from the *Scinax perpusillus* group in the area (T. Silva-Soares & R.B. Ferreira, unpublished data). The analyzed series is housed at the amphibian collection of the Museu Nacional, Universidade Federal do Estado do Rio de Janeiro (MNRJ 68881). One tadpole in the stage 33 was dissected and stained with a 1% methylene blue solution for description the oral internal features. The terminology for the oral internal features follows Wassersug (1976). Descriptions and measurements are based on tadpoles at stages 25–37 (see Gosner 1960). Nomenclature and measurements follow Altig and McDiarmid (1999). Measurements (in millimeters) were taken using a stereomicroscope to the nearest 0.1 mm.

Description of tadpole (stage 33)

Body is oval in dorsal view and is wider than deep (Figs. 1, 2). Body length is 38.3 % of the total length and tail height is 90.6% of body height. The snout is rounded in dorsal and lateral profile. Eyes are dorsolaterally located and their diameter is 14.7% of body length; distance between the eye and nostril represents 47% of the distance between the eye and snout. The nostrils are rounded, directed anteriorly, closer to the tip of snout than to the anterior edge of eye; internostril distance is 56.3% of interorbital distance; the distance between the nostril and snout is 11.8% of body length. The sinistral spiracle is short, tubular-shaped, and with the inner wall free. It is posterolaterally oriented and its opening located approximately at the midpoint of the body. Distance between spiracle and snout is 22.5% of the total length. The anal tube is longer than wide, dextral, and not attached to the ventral fin. The tail is 62.8% of the total length, being significantly larger than the body. Fins of straight edge and equivalent height. The dorsal fin originates at bodytail junction. Tail ends in a pointed tip and its musculature reaches this tip.

Mouth anteroventrally located (Fig. 2), large, with 35.3% of the body width, bordered by two rows of papilla posteriorly, and four to six (multiserial) rows of papillae laterally positioned. Labial tooth row formula 2(2)/3; the lower rows extension are equivalent among each other; Jaw sheaths strongly developed and serrated. Upper jaw sheath open U-inverted-shaped, with a small beak at its middle portion, and lower jaw V-shaped (Fig. 3).

Tadpole color. In life, the tadpoles are mostly brown dark, with minute dark pigmented melanophores scattered on all surfaces, somewhat golden on the head. Iris color is also golden. The dorsal and ventral fins have dark bands all long its extension. In preservative, the color pattern is the same, but becomes greenish gray with body slightly translucent; tail fins are kept darker than the body, but moderately opaque. Intestines are visible through skin (Fig. 2).

Measurements in mm; N = 7; stages 25–37 of Gosner 1960; mean \pm SD (ranges are shown in parentheses): Total length 18.7 ± 8.5 (11.9–32.8); Body length 7.7 ± 2.8 (4.8–11.8); Body width 5.7 ± 2.0 (3.5–8.1); Body height 3.2 ± 1.3 (1.8–5.1); Tail length 12.1 ± 5.3 (7.8–21.9); Tail height 3.0 ± 1.3 (1.4–4.8); Dorsal fin height 0.7 ± 0.2 (0.4–1.0); Ventral fin height 0.7 ± 0.3 (0.3–1.2); Internostril distance 1.5 ± 0.5 (0.8–2.0); Interorbital distance 2.4 ± 1.2 (1.2–4.5); Eye diameter 0.9 ± 0.4 (0.6–1.5); Nostril diameter $0.3 \pm$

0.1 (0.2–0.5); Eye-nostril distance 0.9 ± 0.4 (0.5–1.5); Nostril-snout distance 1.0 ± 0.2 (0.8–1.4); Eye-snout distance 2.2 ± 0.7 (1.5–3.2); Snout-spiracle distance 4.9 ± 1.9 (2.6–8.3); Oral disc width 2.3 ± 0.5 (1.6–3.1).

Internal oral features. Ventral aspect: Buccal floor triangular, wider than long; two pair of infralabial papillae present, the inner pair somewhat triangular, with a simple structure and is longer than wide, apex and margin are irregular, without long projections; the outer pair with a distinct triangular-shaped, provided with spur, located over the other infralabial papillae; lingual papillae absent; the buccal floor arena center with a distinct rounded elevation; there are about eight papillae on each side of buccal floor arena which extend from the region nearby the buccal pocket to next to the middle line arena; papillae directed to the anterior region of the arena, somewhat finger-shaped and slightly curved; the bigger papilla of the arena floor is bifurcate, chela-shaped, and located at the midpoint of the arena; the smaller papillae are conical; pre-pocket papillae absent; pustules absent on the arena surface; no distinct glandular area; ventral velum with slightly undulated margin and without projections; glottis exposed (Fig. 4A). Dorsal aspect: Buccal roof triangular, somewhat shaped as the floor; prenarial arena with distinct papillae on the center, with rounded apex; elongated choanae separated and oriented at an angle of 45° in relation to the transverse plane; distance between choanae is less than the width of the median ridge; postnarial arena without papillae, with some dispersed pustules present; simple lateral-ridge papillae, smaller than the median ridge, with thumb-shaped and irregular margin, directed to the center; the median ridge quadrangular-shaped with irregular apex; buccal roof arena without papillae; pustules are present and evenly distributed in the arena surface; no distinct glandular area; dorsal velum weakly development, without projections (Fig. 4B).

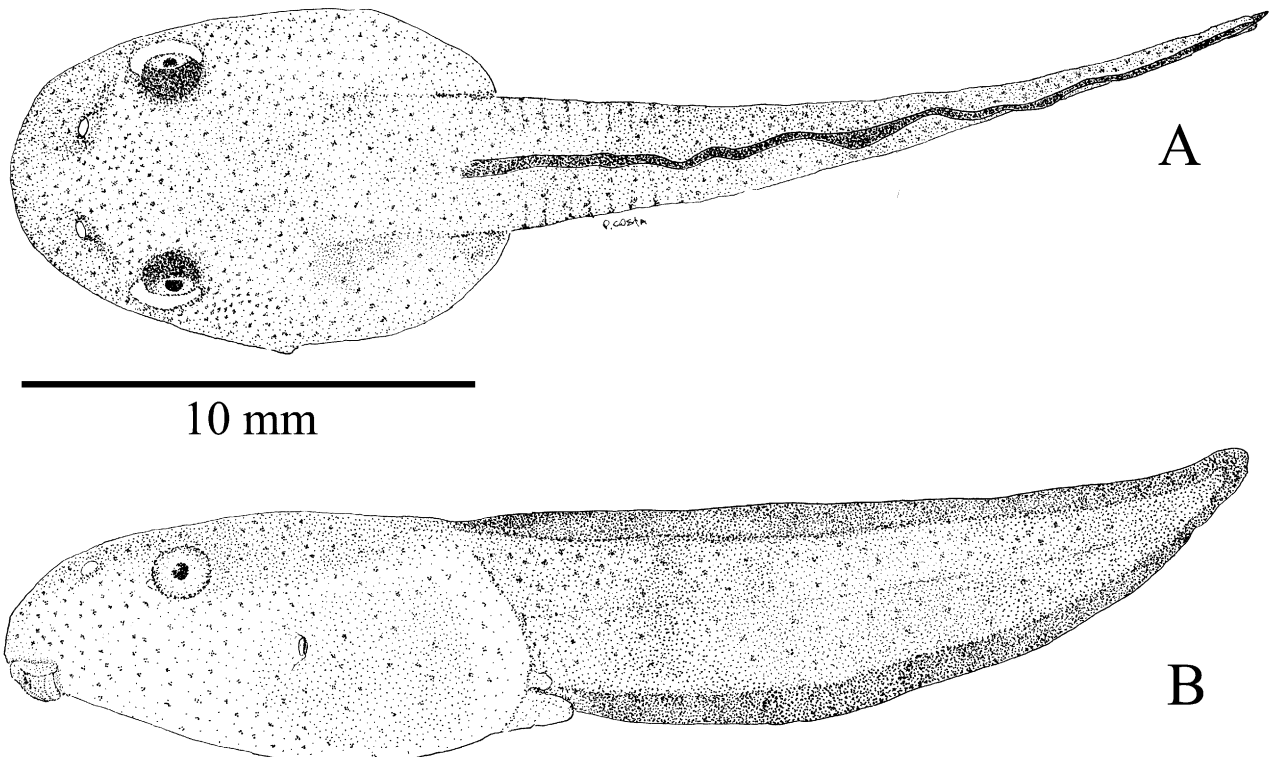


FIGURE 1. Tadpole of *Scinax belloni*, stage 33 of Gosner (1960), from Parque Estadual do Forno Grande, municipality of Castelo, Espírito Santo, Brazil: (A) Dorsal and (B) lateral views (scale 10 mm).

From the 11 species in the *S. perpusillus* group, six have the tadpole described: *Scinax perpusillus* and *S. v-signatus* by Peixoto (1987), *S. littoreus* and *Scinax melloi* by Peixoto (1988), *Scinax arduos* by Peixoto (2002), and *Scinax tupinamba* by Silva and Alves-Silva (2008). At first sight, all known tadpoles are quite similar. The morphology of *Scinax belloni* tadpoles resemble the other known larvae in several aspects, including oval body in dorsal view, general coloration, similar total length, rounded snout in dorsal and lateral view, dorsolateral eyes, anteroventral mouth and labial tooth row formula 2(2)/3. Nonetheless, the tadpole of *Scinax belloni* is easily separated from the other known tadpoles of *Scinax* gr. *perpusillus* by the presence of a dark band that goes along the dorsal and ventral fin.

Comparisons among tadpoles of the *S. perpusillus* group. In living tadpoles of *S. tupinamba*, a large yellow stripe transverse to the main body axis, located between the eyes and the nostrils (Silva & Alves-Silva 2008), is the most conspicuous diagnostic feature which differs from all the other known species. The tadpole of *S. littoreus* and *S. melloi* has only one row of labial papillae anteriorly and one or two rows posteriorly (two in *S. littoreus*), while the tadpoles of the *S. arduous* and *S. belloni* have two posteriorly and one or two anteriorly (two in *S. belloni*). The tadpoles of *S. perpusillus* and *S. v-signatus* species have two rows anteriorly and posteriorly. Although Silva and Alves-Silva (2008) presented *S. tupinamba* as having a lateral pair of rows, the species presents lateral multiserial papillae (person. observ.) alike the remaining species. The dorsal fin in *S. melloi*, *S. perpusillus*, *S. tupinamba* and, *S. v-signatus* is higher than the ventral fin, differing from *S. arduous*, *S. belloni* and *S. littoreus*, which has fins of equivalent sizes. Unlike the other species, the tail of *S. belloni* has smaller height than the body; in *S. arduous*, *S. littoreus* and, *S. melloi* the body and tail are equivalent while size and in the other species, the height of tail overcomes the height of body. The musculature of the tail does not reach the rounded tip in *S. arduous*, *S. littoreus*, *S. perpusillus*, *S. tupinamba*, *S. v-signatus* but it does reach the pointed tip of the tail in *S. belloni* and, *S. melloi*.

Regarding the internal oral morphology of *S. belloni*, this is the first species of *S. perpusillus* group that had this element described.



FIGURE 2. Tadpole of *Scinax belloni* photographed anesthetized, stage 27 of Gosner (1960), from Parque Estadual do Forno Grande, municipality of Castelo, Espírito Santo, Brazil: (A) Dorsal, (B) ventral and (C) lateral view (scale 10 mm). Photos: Ricardo Alves-Silva.

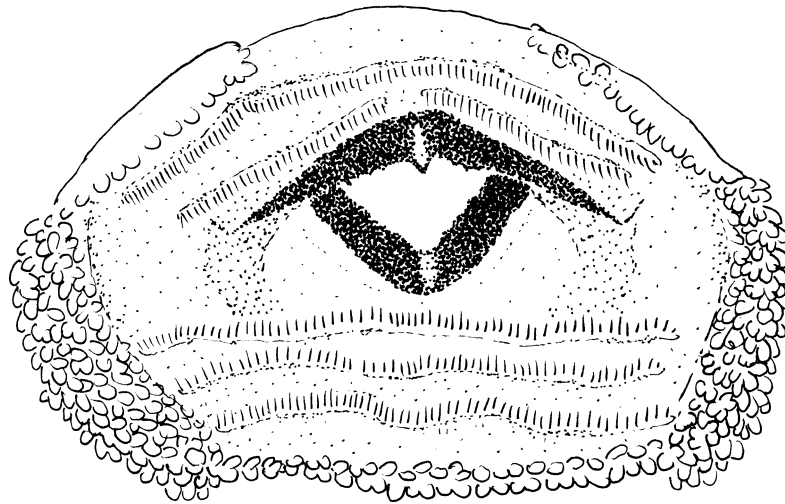


FIGURE 3. Oral disc of *Scinax belloni* (scale 1 mm).

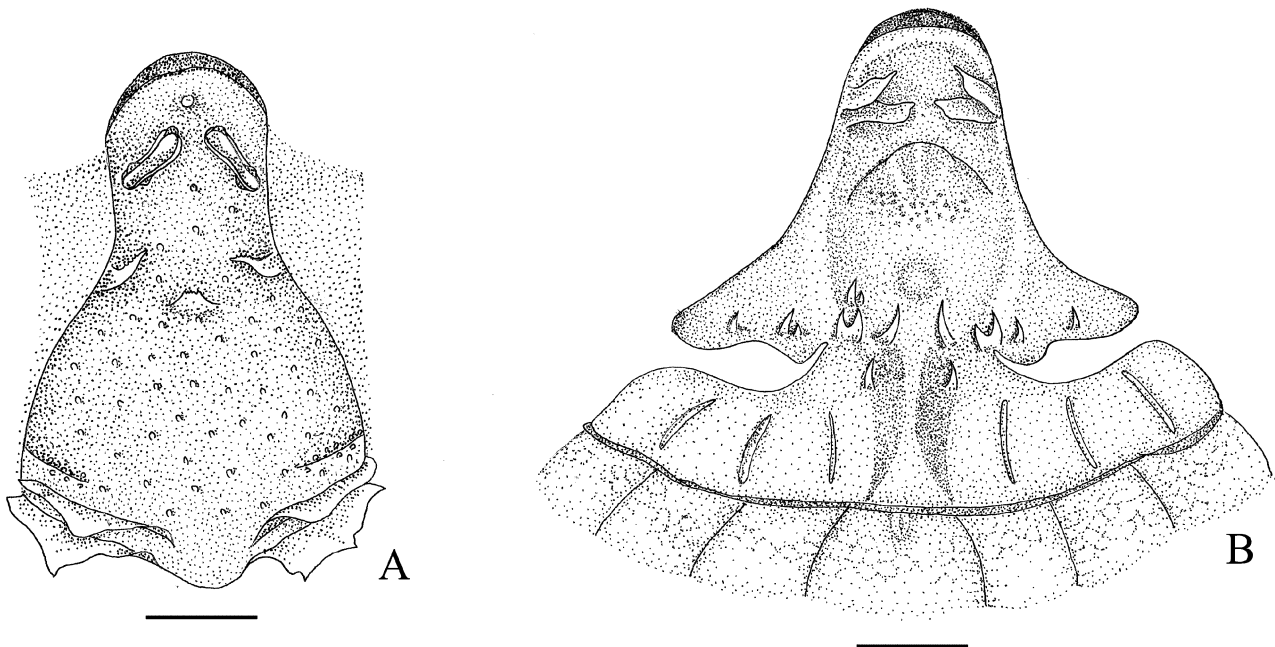


FIGURE 4. *Scinax belloni*. Morphology oral Buccal roof (A) and floor (B). Scale = 1 mm.

Bearing in mind the need for characters that could serve to define morphological synapomorphies in anurans, larval characters have proven to be important for phylogenetic and taxonomic studies (Haas 2003). For instance, the conspicuous yellow stripe between the eyes and nostrils in *Scinax tupinamba* tadpoles or the dark band present in both dorsal and ventral fins of *Scinax belloni* tadpoles as well, readily differentiate these species from the others. Tadpoles of other species of this group remain unknown are: *S. alcatraz*, *S. atratus*, *S. faivovich* and, *S. peixotoi*.

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