

## Description of the Tadpole of *Pseudopaludicola boliviana* (Anura: Leptodactylidae)

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The genus *Pseudopaludicola* consists of frogs of small size (< 20 mm SVL [snout–vent length]) and they are distributed in the oriental region of South America, from the north of Colombia to the Province of Buenos Aires in Argentina. Frost (2004) recognized 12 species of *Pseudopaludicola*: *Pseudopaludicola boliviana*, *P. canga*, *P. ceratophryes*, *P. falcipes*, *P. llanera*, *P. mirandae*, *P. mineira*, *P. mystacalis*, *P. pusilla*, *P. riopiedadensis*, *P. saltica*, and *P. ternetzi*. Lynch (1989) and Lobo (1994, 1995, 1996) studied the systematics of the genus exhaustively. In Argentina, the species of the genus *Pseudopaludicola* are *P. falcipes* (Hensel 1867); *P. mirandae* (Mercadal de Barrio y Barrio 1994); *P. mystacalis* (Cope 1867) and *P. boliviana* Parker 1927 (Lavilla and Cei 2001). The first citation of *P. boliviana* for Argentina was for the Province of Chaco (Lobo 1989, 1990).

*Pseudopaludicola boliviana* belongs to the *Pseudopaludicola pusilla* group, in which the included species (*P. boliviana*, *P. canga*, *P. ceratophryes*, *P. llanera*, and *P. pusilla*) have toes with T-shaped terminal phalanges. The distribution of these species in South America is widespread. *Pseudopaludicola boliviana* is distributed in disjunct regions of eastern Colombia, northern Brazil (Roraima), and southern Venezuela through Guyana to Surinam and French Guiana, eastern Bolivia, Paraguay, southwestern Brazil, and northern Argentina; *P. canga* is known only from the type locality, Serra dos Carajás, municipality of Marabá, state of Pará, Brazil; *P. ceratophryes* is known only from Leticia, Colombia; *P. llanera* in northeastern Colombia and adjacent Venezuela in the drainage of the Río Orinoco, and *P. pusilla* is distributed in the lower and middle Magdalena River valley and the Caribbean lowlands of northern Colombia and adjacent Venezuela.

In Argentina, *P. boliviana* is distributed in the provinces of Formosa, Chaco and northern Santa Fé (Lobo 1992). Recently, Duré et al. (2004) also cited this species for the Province of Corrientes, the first record east of the Paraná River. Until the present, tadpoles of species belonging to the *Pseudopaludicola pusilla* group have not been described. In this paper, we describe *P. boliviana* tadpoles from Corrientes, Argentina.

**Materials and Methods.**—The tadpole description of *P. boliviana* is based on specimens collected in a rice field located 30 km NE of the city of Corrientes (27°30'S; 58°45'W), Province of Corrientes, Argentina. Specimens (N = 16) were collected by us on 4 December 2003. A subset of those individuals (N = 10) was raised in the laboratory through metamorphosis to confirm the species identification. The remaining tadpoles (N = 6) were preserved in 10% formalin.

Descriptive terminology follows that of Altig and McDiarmid

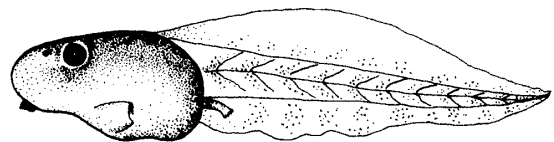
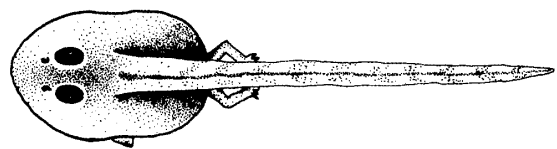
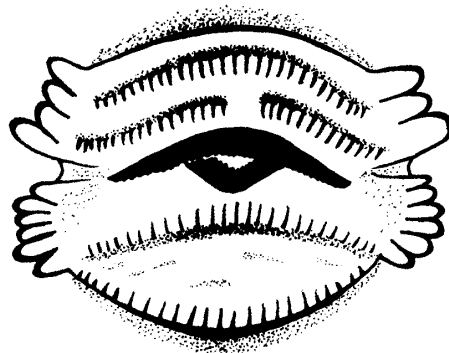


FIG. 1. Oral disc, dorsal and lateral views of *Pseudopaludicola boliviana* tadpole, CECOAL.005, from Corrientes, Argentina. Gosner stage 36. Scale line: 1 mm, 5 mm, and 5 mm (top to bottom).

(1999) and Kehr and Williams (1990). The morphometric variables considered are those suggested by Kehr et al. (2004). Measurements were taken with dial caliper and recorded to the nearest 0.1 mm; these variables are abbreviated as follows: TL (total length), BL (body length), TaL (tail length), BW (body maximum width), BWE (body width at eyes), BWN (body width at nostrils), BH (body

maximum height), FH (fin height), TMH (tail muscle height), RSD (rostr–spiracular distance), SPD (spiracular–posterior distance), FN (fronto–nasal distance), NO (narial–ocular distance), N (nostril diameter), E (eye diameter), EN (extranarial distance), IN (internarial distance), EO (extraorbital distance), IO (interorbital distance), ODW (oral disc width), RG (rostral gap), MG (mental gap). Tadpoles were staged using Gosner's table of normal development (Gosner 1960). Drawings were made with the aid of a camera lucida attached to a Wild M3C stereomicroscope.

**Results and Discussion.**—The specimen illustrated (CECOAL 005) (Fig. 1) is at Gosner stage 36 and has the following measurements in mm: TL = 18.8, BL = 7.0, TaL = 11.8, BW = 4.8, BWE = 4.3, BWN = 3.4, BH = 3.8, FH = 4.2, TMH = 1.7, RSD = 4.5, SPD = 2.8, FN = 1.0, NO = 0.4, N = 0.1, E = 1.0, EN = 1.0, IN = 0.8, EO = 2.4, IO = 0.9, ODW = 1.3, RG = 0.9, MG = 0.9. Table 1 summarizes the measurements of tadpoles in different stages collected at the same time with the tadpole described here.

Tadpoles of *P. boliviana* have an ovoid body, wider than high (BW/BH = 1.3). Snout rounded in lateral and dorsal views; nostrils dorsal, located nearer eyes than snout; eyes dorsolateral. Spiracle single, sinistral, and ventrolateral, visible in dorsal view; vent tube 1.8 mm long, positioned and opening medially; tail 63% of total length; the maximum tail fin height is greater than that of the body; dorsal fin extending slightly onto body, and is higher than ventral fin; tail tip pointed-rounded.

Oral disc positioned anteroventral to ventral; single row of 3–4 large marginal papillae on each side of the rostral gap and six large marginal papillae on each side of the mental gap, with a small gap separating the two groups of marginal papillae on each side; mental gap 0–0.6 times lower than rostral gap; labial tooth row formula 2(2)/2 (Fig. 1); labial teeth, with two to four cusps; length of tooth rows: A1 = 0.9 mm, A2 = 1.0 mm, gap of A2 = 0.2 mm; P1 = 1.1 mm, P2 = 0.9 mm; upper jaw sheath approximately 0.7 mm long; upper jaw sheath and lower jaw sheath serrated; upper jaw sheath broadly arch-shaped, lower jaw sheath V-shaped.

In life, dorsally, the body is brown with scattered dark spots; small dark spots start at the caudal musculature; two dark spots on each eyelid; iris with scattered golden spots; laterally, body pale brown, and base of spiracle pigmented; the caudal musculature with small bands darker among each muscular package; the dorsal fin clearer than ventral fin; ventral fin with scattered golden spots and melanic bands; ventrally, intestinal coils not visible, intestinal area with golden color; throat with scattered golden spots. In preservative, body light olive or gray with small dark and reticulate spots; throat semitransparent and intestinal coils barely visible through skin; tail fins transparent with small, black patches of melanin mainly on the ventral fin.

This is the first tadpole described for a species of the *Pseudopaludicola pusilla* group. In Corrientes, in the same area

TABLE 1. Measurements (in millimeters) of *Pseudopaludicola boliviana* tadpoles from Corrientes, Argentina. The individuals (N = 5) were collected together with the tadpoles described in the text. Tadpoles were staged according to Gosner (1960).

| Morphometric variables              | Stage |      |      |      |      |
|-------------------------------------|-------|------|------|------|------|
|                                     | 30    | 31   | 41   | 41   | 41   |
| TL (total length)                   | 9.6   | 10.4 | 19.3 | 18.4 | 19.6 |
| BL (body length)                    | 3.8   | 4.2  | 7.0  | 6.8  | 7.1  |
| TaL (tail length)                   | 5.8   | 6.2  | 12.3 | 11.6 | 12.5 |
| BW (body maximum width)             | 2.7   | 2.7  | 5.2  | 4.7  | 4.8  |
| BWE (body width at eyes)            | 2.3   | 2.5  | 4.3  | 4.1  | 4.2  |
| BWN (body width at nostrils)        | 1.8   | 2.0  | 3.2  | 2.9  | 3.2  |
| BH (body maximum height)            | 2.1   | 2.3  | 4.0  | 3.6  | 3.5  |
| FH (fin height)                     | 1.6   | 1.6  | 3.4  | 3.7  | 3.9  |
| TMH (tail muscle height)            | 0.6   | 0.8  | 1.8  | 1.6  | 1.3  |
| RSD (rostr–spiracular distance)     | 2.2   | 2.9  | 4.3  | 4.4  | 4.6  |
| SPD (spiracular–posterior distance) | 1.3   | 1.2  | 2.5  | 2.4  | 2.5  |
| FN (fronto–nasal distance)          | 0.5   | 0.7  | 1.0  | 0.9  | 1.0  |
| NO (narial–ocular distance)         | 0.2   | 0.2  | 0.2  | 0.4  | 0.3  |
| N (nostril diameter)                | 0.1   | 0.2  | 0.3  | 0.2  | 0.2  |
| E (eye diameter)                    | 0.6   | 0.6  | 1.2  | 1.1  | 1.2  |
| EN (extranarial distance)           | 0.6   | 0.6  | 1.5  | 1.2  | 1.2  |
| IN (internarial distance)           | 0.5   | 0.4  | 0.8  | 0.8  | 0.9  |
| EO (extraorbital distance)          | 1.5   | 1.4  | 2.9  | 2.7  | 3.0  |
| IO (interorbital distance)          | 0.5   | 0.5  | 1.0  | 0.9  | 1.0  |
| ODW (oral disc width)               | 0.6   | 0.7  | 1.3  | 1.2  | 1.1  |
| RG (rostral gap)                    | 0.5   | 0.6  | 1.0  | 0.9  | 1.0  |
| MG (mental gap)                     | 0.3   | 0.6  | 0.7  | 0.6  | 0.6  |

where *P. boliviana* is very common, there were also developing tadpoles of *P. falcipes*. Lamentably, information is scarce about the morphology of *P. falcipes* tadpoles and only the oral disc features are well detailed (Barrio 1945, 1953; Cei 1980). The differences between the tadpoles of these two syntopic species are: (1) *P. falcipes* without mental gap (*P. boliviana* present) and, (2) *P. falcipes* with labial tooth row formula 2(2)/3 (*P. boliviana* 2(2)/2). Lavilla and Cei (2001) cited two additional species occurring in the Province of Corrientes: *Pseudopaludicola mystacalis* (Cope 1867) and *P. mirandae* Mercadal de Barrio and Barrio (1994). The tadpoles of these species are unknown.

Until now, considering the tadpole described here, there are only three species of the genus *Pseudopaludicola* with the tadpoles described: *P. boliviana* (described here), *P. falcipes* (Barrio 1945, 1953) and *P. ternetzi* (Lobo 1991). In reality, the tadpole described by Lobo (1991) was considered a posteriori as *P. ternetzi* (Lobo 1994) because this author described this tadpole as *P. mystacalis*. It is probable that *P. ternetzi* is not present in Argentina as its known range is otherwise restricted to Goias, Brazil; nevertheless we will compare the morphological features between *P. boliviana* and *P. ternetzi* tadpoles: (1) both tadpoles share the same labial tooth row formula 2(2)/2; (2) *P. ternetzi* lacks a mental gap (*P. boliviana* present) and, (3) total length and body lengths are similar in the two tadpoles (stages 36–37) (*P. ternetzi*: 20.8

mm and 7.3 mm respectively; *P. boliviana*: see Table 1).

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