Catalogue of American Amphibians and Reptiles.


Lepidobatrachus laevis

*Lepidobatrachus laevis* Budgett

Budgett’s Frog

*Lepidobatrachus laevis* Budgett, 1899: 329.
Type locality, “Paraguayan Chaco.” [Holotype not stated; designated by J. S. Budgett, Natural History Museum, London, BMNH 1919.4.23.2, renumbered as BMNH 1947.2.17.32 (Jeffrey Streicher, Natural History Museum, personal communication, 3 February 2015), an adult female (80 mm SVL), collected by J. S. Budgett in 1899 (not examined by authors)] See Remarks.

*Ceratophrys laevis* Bouleniger, 1919:533.
*Ceratophrys* (*Lepidobatrachus*) *laevis* Parker, 1931:289.
*Lepidobatrachus laevis* Moreira Sugai et al., 2013:133. *Lapsus*.

CONTENT. No subspecies are recognized.

DESCRIPTION. *Lepidobatrachus laevis* is a large ceratophryid frog with adult snout-vent length (SVL) ranging between 60–130 mm. The species is sexually dimorphic with females larger than males (Table 1). Besides overall body size, there is no sexual dimorphism in limb proportions. The head is wider than long, with head width being over half of body length. On average, head length is over 40% SVL and is rounded in front, with a wide mouth. The eyes typically have a round pupil and stick up almost vertically from the flattened top of the head. The mouth is characterized by vomerine teeth in two groups between the choanae, and two fang-like projections of the dentary bone at the front midline of the mouth. Body shape is round and flat, with short fore limbs (approximately half of the SVL) and hind limbs (approximately 40% of the SVL). Thigh and shank lengths are a little over a third of the SVL, while the foot-tarsal length is over half of the SVL. Fingers are free, but toes are webbed for approximately two-thirds of their length with large metatarsal tubercles. No vertebral shield is present. There is a double row of glands on the dorsum, arranged in the shape of a V with its base above the cloaca. Dorsal color ranges from gray to brown to green, sometimes with lighter yellowish, irregular vein-like patterning. Venter is white. Males possess lateral, dark vocal sacs.

The tadpole of *Lepidobatrachus laevis* is a member of the carnivorous ecomorphological guild (Altig and McDiarmid 1999a). Tadpoles range between 16–19 mm total length at four days of development (Gosner stage 26–27; Gosner 1960) and 87 mm total length around 20 days after egg deposition (Gosner stage 40+). They possess a broad head, a wide mouth, and a symmetrical pair of branchial openings. They have a single row of keratinous denticles on each jaw, covered by a scalloped anterior labium with approximately 20 labial papillae. The posterior labium is curved, with 4–9 papillae. Their skin is transparent where it comprises the opercular flaps, and above

FIGURE 1. Adult female *Lepidobatrachus laevis* from Yande Yari, Parque Nacional Kaa-Iya del Gran Chaco, Provincia Cordillera, Departamento de Santa Cruz, Bolivia. Photo by Christopher M. Schalk.
the buccopharyngeal and branchial regions, but the ventral surface is opaque. The dorsum varies in color depending on the background upon which tadpoles are raised. They possess a comparatively short but well-developed intestinal tract.

The advertisement call of *Lepidobatrachus laevis* was described by Barrio (1968b) as 1300 ms bursts of unpulsed sound with a 1700 ms internote interval. This species was described as having 20 calls/minute with a dominant frequency ranging between 800–1400 Hz, and a second harmonic of 2500–2900 Hz (Barrio 1968b). We were unable to obtain a recording of the call to analyze because *Lepidobatrachus laevis* calls at low densities and is rarely heard (N. J. Scott Jr., personal communication).

**Table 1.** Summary measurements for adult specimens of *Lepidobatrachus laevis*. Ranges of trait/SVL proportions are presented with the average values in parentheses. Individuals measured for this table were captured and released from localities in the Gran Chaco of Bolivia. Abbreviations: SVL = snout-vent length, HW = head width, HL = head length, FL = front limb length, ThL = thigh length, SL = shank length, FTL = foot and tarsal length.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Males (n=16)</th>
<th>Females (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVL (mm)</td>
<td>63-83 (76)</td>
<td>79-124 (93)</td>
</tr>
<tr>
<td>HW/SVL (%)</td>
<td>54-66 (61)</td>
<td>53-61 (58)</td>
</tr>
<tr>
<td>HL/SVL (%)</td>
<td>36-50 (42)</td>
<td>26-47 (41)</td>
</tr>
<tr>
<td>FL/SVL (%)</td>
<td>44-57 (50)</td>
<td>40-53 (49)</td>
</tr>
<tr>
<td>ThL/SVL (%)</td>
<td>28-45 (36)</td>
<td>31-42 (36)</td>
</tr>
<tr>
<td>SL/SVL (%)</td>
<td>30-38 (35)</td>
<td>29-36 (33)</td>
</tr>
<tr>
<td>FTL/SVL (%)</td>
<td>46-67 (58)</td>
<td>49-58 (53)</td>
</tr>
</tbody>
</table>

**Diagnosis.** *Lepidobatrachus laevis* has a Chacoan distribution and is sympatric with the ceratophryids *Ceratophrys cranwelli*, *Chacophrys pierottii*, *Lepidobatrachus asper*, and *Lepidobatrachus llanensis*. Though similar in size to *Ceratophrys cranwelli* (80–130 mm SVL), *Lepidobatrachus laevis* lacks the ‘horns’ present on the upper eyelids of *Ceratophrys cranwelli*. The skin is smoother in *Lepidobatrachus laevis*, which tends to be primarily grey or brown in color; the skin of *Ceratophrys cranwelli* is rougher and is green, patterned with dark brown blotches. *Lepidobatrachus laevis* is consistently much larger than *Chacophrys pierottii* (55 mm average SVL), which has granular skin and is typically green with dark spots. *Lepidobatrachus laevis* also has a flatter body shape with a wide head, while *Chacophrys pierottii* has a more rounded, erect posture and a narrower head. *Lepidobatrachus laevis* is larger than both adult *Lepidobatrachus llanensis* (65–100 mm SVL; both sexes) and *Lepidobatrachus asper* (70–90 mm SVL; both sexes). *Lepidobatrachus laevis* lacks the bony dorsal vertebral
shield that is present in *Lepidobatrachus asper* and *Lepidobatrachus llanensis*. Additionally, *Lepidobatrachus asper* has rougher skin with more dorsal tubercles; *Lepidobatrachus laevis* has smoother skin and fewer dorsal tubercles. Only *Lepidobatrachus laevis* has a V-shaped double row of glands on its dorsum. *Lepidobatrachus llanensis* possesses elliptical pupils, whereas the pupils of *Lepidobatrachus laevis* are rounded. Tadpoles of *Lepidobatrachus* have paired spiracles and lack a keratinous jaw sheath. This is in contrast to the single spiracle and keratinized jaw sheaths with denticle teeth present in *Ceratophrys cranwelli* and *Chacophrys pierottii*, though the denticle teeth often are lost in tadpoles of *Ceratophrys* spp. (Altig and McDiarmid 1999a). Tadpoles of *Lepidobatrachus laevis* also lack the nasal appendage present in tadpoles of *Chacophrys pierottii*. The tadpoles of the three species of *Lepidobatrachus* are similar morphologically, though the tadpoles of *Lepidobatrachus laevis* can reach longer total lengths (maximum length = 87 mm; Ruibal and Thomas 1988) than those of *Lepidobatrachus asper* (46 mm; Cei 1968) and *Lepidobatrachus llanensis* (56 mm; Cei 1968). In later stages of development, *Lepidobatrachus asper* and *Lepidobatrachus llanensis* begin developing the dorsal shields that distinguish adult individuals, and *Lepidobatrachus laevis* develops its characteristic V-shaped glandular pattern on its dorsum.

**PHYLOGENETIC RELATIONSHIPS.** *Lepidobatrachus laevis*, *Lepidobatrachus asper*, and *Lepidobatrachus llanensis* are the three recognized species in the monophyletic genus *Lepidobatrachus*, with *Lepidobatrachus laevis* hypothesized to be the sister taxon of *Lepidobatrachus llanensis* (Faivovich et al. 2014). *Lepidobatrachus* was initially placed in the subfamily Ceratophryinae in the family Ceratophryidae (Lynch 1982; Frost 1985; Frost et al. 2006; Pyron and Wiens 2011), but subsequent researchers found no support for the subfamily divisions within this clade (Faivovich et al. 2014; Frost 2016). Within Ceratophryinae, the *Ceratophrys* lineage diverged simultaneously with sister genera *Lepidobatrachus* and *Chacophrys* separating later (Fabrezi 2006; Faivovich et al. 2014; Maxson and Ruibal 1988).

**PUBLISHED DESCRIPTIONS.** Aside from the original description by Budgett (1899), descriptions of the adults were provided by Barrio (1968a, 1968b), Boulenger (1919), Cei (1980), Gallardo (1987), Freiberg (1954 [as *Lepidobatrachus asper*]), Hutchins et al. (2003), Nieden (1923), Mattison (2007a, 2007b), Norman (1994), Uchiyama (1997, 1999), and Weiler et al. (2013). Further descriptions of generic synapomorphies present in *Lepidobatrachus laevis* were provided by Lynch (1971, 1972). A partial description of the tadpole was provided by Barrio (1963), Cei (1980), and Parker (1931). Detailed and thorough descriptions of the tadpole and its anatomy were provided by Ruibal and Thomas (1988) and Wassersug and Heyer (1988). The only known description of the advertisement call was provided by Barrio (1968b). The distress call was discussed by Gallardo (1994).

**ILLUSTRATIONS.** Color photographs of the adults were provided by Alt and Alt (1992), Bartlett and Bartlett (1996), Coborn (1992), De la Riva et al. (2000), Earley (2014), Fabrezi and Lobo (2009), Faivovich et al. (2014), Gonzales et al. (2006), Hennessy (2010, 2016), Lavilla et al. (1995a), Malkmus (1998, 2000a, 2000b), Mattison (2007a, 2007b, 2011, 2014, 2015), Norman (1994), Scott and Aquino (2005), Schalk et al. (2013), Starosta and Moncuit (2006), Uchiyama (1997, 1999), Wang et al. (2015), and Weiler et al. (2013). A color photograph of a metamorph was published by Fabrezi et al. (2014a) and Weiler et al. (2013) and color photos of the tadpole were provided by Alt and Alt (1992), Fabrezi (2011), and Fabrezi et al. (2014a). A color photo of an adult in its cocoon was provided by Faivovich

**DISTRIBUTION.** The species is distributed across the Gran Chaco ecoregion and can be found in western and northern Paraguay, northern Argentina, and southeastern Bolivia (Map 1).

**FOSSIL RECORD.** A partial skull from Miocene-Pliocene sediments of the Monte Hermosa Formation in Buenos Aires Province, Argentina was identified as Lepidobatrachus laevis by Tomassini et al. (2011). The geographically anomalous position of the fossil relative to the modern distribution of the species is striking, but any need for explanation was removed recently when the specimen was

The renumbering of the type specimen resulted in the holotype of *Lepidobatrachus laevis* possessing two specimen numbers; the original number of BMNH 1919.4.23.2 was renumbered as BMNH 1947.2.17.32 (Jeffrey Streicher, Natural History Museum, personal communication, 3 February 2015).

**ETYMOLOGY.** There were no comments on the etymology of the species in the original description (Budgett 1899). Presumably *lepidos* from the Latin *lepidus* (= pleasant) for the perpetually ‘smiling’ mouth of this species, *batrachus* from the modern Latin *batrachia* (= amphibian) or the Greek βατραχος (= frog or toad), and *laevis* from the Latin lēvis (= slight or light) from the Greek λείος (= smooth). Compared to the other species in the genus, *Lepidobatrachus laevis* has smooth skin.

**ADDITIONAL VERNACULAR NAMES.** Guaraní, Kururú chiní (Duellman 2003); Hippo Frog, Wide-mouth Frog (Halliday 2016).

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**LITERATURE CITED**


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