

## AMPHIBIA: ANURA: LEPTODACTYLIDAE

## LEPTODACTYLUS SILVANIMBUS

## Catalogue of American Amphibians and Reptiles.

Heyer, W.R., R.O. de Sá, and S. Muller. 2002. *Leptodactylus silvanimbus*.

*Leptodactylus silvanimbus*

McCranie, Wilson, and Porras

*Leptodactylus silvanimbus* McCranie et al. 1980:361. Type locality, "Belén Gualcho, Cordillera de Celaque, Depto. Ocoatepeque, Honduras, elevation 1700–1900 m [later corrected to 1500 m, Wilson et al. 1986], 14°29'N, 88°47'W." Holotype, National Museum of Natural History, Smithsonian Institution USNM 212046, an adult male, collected by Mario Efrain Villeda on 13 July 1975 (examined by WRH).

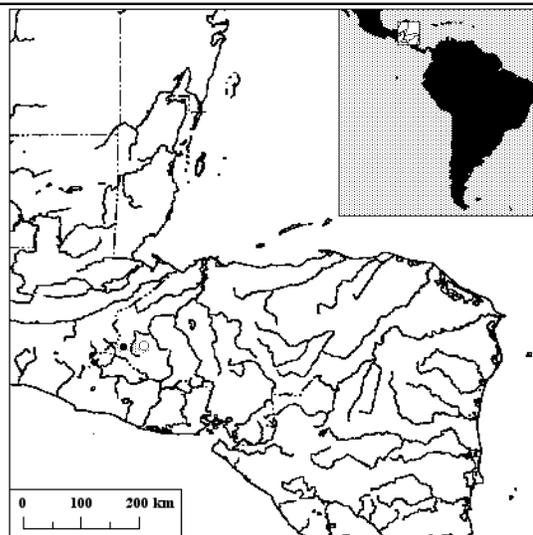
*Leptodactylus silvanimbus*: Maxson and Heyer 1988:1, 2, 5, 7, 13. *Lapsus*.

• **CONTENT.** The species is monotypic.

• **DEFINITION.** Adult *Leptodactylus silvanimbus* are of moderate sized, the head is about as wide as long, and the hind limbs are moderate in length (see **Table**; also see Heyer and Thompson 2000 for definitions of adult size and leg length categories for *Leptodactylus*). The male vocal sac is single and internal. Male forearms are hypertrophied in larger individuals. Adult males have two black thumb spines on each hand and lack chest spines. Individuals lack dorsolateral folds. The toe tips are narrow, not expanded. Females have weakly developed lateral toe fringes and males either have lateral toe ridges or weakly developed fringes. The upper shank surface is shagreened with several dark conical apices. The outer tarsus has white-tipped tubercles and small dark conical apices. The sole of the foot is mostly smooth with a few tiny dark conical apices. The upper lip is gray, paler below and behind the eye. The dorsal pattern is grayish-brown with slightly darker interorbital and middorsal blotches. The species lacks light middorsal stripes. The belly pattern is almost uniform cream. The posterior thigh surfaces are mottled; no individuals have distinct light horizontal stripes on the lower portion of the posterior thigh. The dorsal shank surfaces have irregular dark crossbands.

Larvae have a typical pond morphology and are members of the lentic, benthic guild (Altig and Johnston 1989, guild 12). The oral disk is anteroventrally positioned, entire (not emarginate), with an anterior gap in marginal papillae. A single row of marginal papillae is on either side of the anterior gap; two rows of marginal papillae occur laterally and ventrally. No submarginal papillae are present. The tooth row formula is 2(1)/3. The spiracle is sinistral and the vent tube is median. The dorsal fin ends at the body and does not extend onto it. At Gosner stages 35–36, the larval total lengths range from 42–53 mm; body lengths 17–20 mm; eye diameters are 9–11 % of the body lengths; and the widths of the oral disks are 21–25 % of the body lengths. The dorsum of the body is dark brownish gray, paler on the underside. The tail musculature is tan. The tail fins are clear with heavy brown stippling.

The advertisement call consists of a single note per call, given at a rate of 17–27/min (Heyer et al. 1996) or 40–64/min (Wilson et al. 1986). Call duration ranges from 0.15–0.17 s. The call has about 160 partial pulses/s. The frequency of the call is weakly modulated, first rising and then falling, the modulation not discernible to the human ear. The intensity of the call is weakly modulated, reaching its loudest intensity by the first quarter to third of the call and maintaining the intensity for much of the remainder. The dominant frequency is the fundamental



MAP. Distribution of *Leptodactylus silvanimbus*. The circle marks the type locality and another nearby site; the dot indicates the other locality known for the species.



FIGURE 1. *Leptodactylus silvanimbus*, USNM 509803, male, 43.3 mm SVL, Belén Gualcho, Honduras (photograph by and courtesy of James R. McCranie).

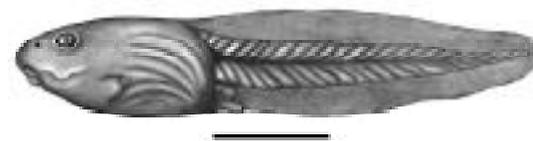


FIGURE 2. Tadpole of *Leptodactylus silvanimbus*, USNM 544379, Gosner stage 35. Bar = 1 cm.

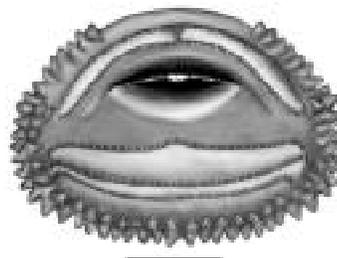


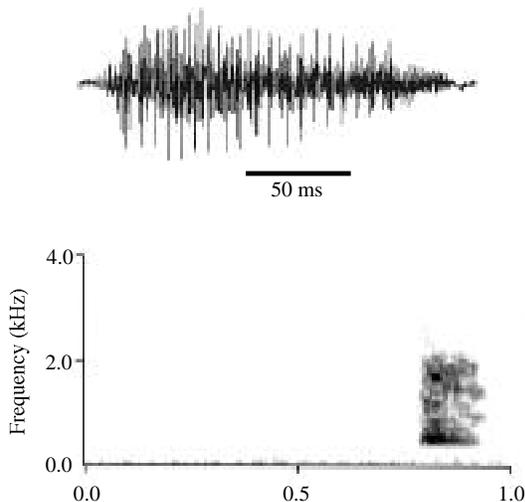
FIGURE 3. Oral disk of *Leptodactylus silvanimbus* (after McCranie et al. 1986). Bar = 1 mm.

**TABLE.** Summary measurement data for *Leptodactylus silvanimbus*, based on N = 6 males, 2 females (means are in parentheses).

Measurement	Males	Females
SVL (mm)	41–55 (45.9)	42–48
Head length/SVL (%)	32–38 (35)	36–37
Head width/SVL (%)	33–37 (35)	32–35
Thigh length/SVL (%)	40–45 (43)	42–46
Shank length/SVL (%)	43–47 (45)	45–46
Foot length/SVL (%)	47–54 (51)	50–54

frequency at the beginning of the call, 420–510 Hz, shifting from the first to fourth harmonics just after call initiation, 1310–1920 Hz. Harmonics are present.

• **DIAGNOSIS.** No set of features easily distinguishes *Leptodactylus silvanimbus* from several other species in the genus. *Leptodactylus silvanimbus* lacks dorsolateral folds, a condition that occurs in all or some individuals of *L. bufonius*, *L. colombiense*, *L. dantasi*, *L. diedrus*, *L. fragilis*, *L. griseigularis*, *L. labyrinthicus*, *L. laticeps*, *L. latinasus*, *L. leptodactyloides*, *L. lithonaetes*, *L. magistris*, *L. myersi*, *L. natalensis*, *L. pallidirostris*, *L. pascoensis*, *L. petersii*, *L. podicipinus*, *L. pustulatus*, *L. rugosus*, *L. sabanensis*, *L. syphax*, *L. troglodytes*, *L. validus*, and *L. wagneri*. The following species have discernible dorsolateral folds in most individuals (>85%): *L. colombiense*, *L. griseigularis*, *L. leptodactyloides*, *L. natalensis*, *L. pallidirostris*, *L. petersii*, *L. podicipinus*, *L. pustulatus*, *L. sabanensis*, *L. validus*, and *L. wagneri*. *Leptodactylus silvanimbus* has either noticeable lateral toe ridges or fringes and males have black cornified thumb spines, distinguishing it from the following species that have free toes (no ridge or fringe) and males lack thumb spines (or any kind of secondary sexual character on the thumb): *L. bufonius*, *L. fragilis*, *L. latinasus*, *L. troglodytes*. Only some juvenile specimens of the following species have lateral toe ridges (none have fringes): *L. labyrinthicus*, *L. laticeps*, *L. lithonaetes*, *L. myersi*, *L. rugosus*, and *L. syphax*. *Leptodactylus silvanimbus* has an unpatterned belly; *L. dantasi* has a dark belly with large, discrete light spots. *Leptodactylus silvanimbus* has narrow toe tips; *L. diedrus* has expanded toe tips, usually in the



**FIGURE 4.** Wave form and audiospectrogram displays of the advertisement call of *Leptodactylus silvanimbus* (USNM tape 317, cut 1), Belén Gualcho, Honduras.

form of small disks with a single dorsal groove on larger disks. *Leptodactylus silvanimbus* is larger (males 41–55 mm, females 42–48 mm SVL) than *L. magistris* (males 39 mm, females 28–45 mm SVL) and has extensively hypertrophied arms in the largest males, whereas the male arms of *L. magistris* are moderately hypertrophied. *Leptodactylus silvanimbus* is smaller than *L. pascoensis* (males 60–61 mm, females 52–67 mm SVL).

Most of the above comparisons involved species that occur only in South America. Given the relatively few species that occur in Middle America, *L. silvanimbus* is most likely to be confused only with *L. melanonotus* (which also occurs in Honduras). *Leptodactylus silvanimbus* is larger than *L. melanonotus* (males 32–46 mm, females 35–50 mm SVL in *L. melanonotus*), has noticeably hypertrophied arms, particularly in larger males (arms not noticeably hypertrophied in *L. melanonotus*), and has a longer advertisement call (0.15–0.17 s) than that of *L. melanonotus* (0.07–0.08 s).

• **DESCRIPTIONS.** McCranie et al. (1980) first described this species and included adult external morphology and a diagnosis. The tadpole was described by McCranie et al. (1986). Heyer et al. (1996) described the advertisement call. McCranie and Wilson (2001) provided descriptions of the adult and tadpole.

• **ILLUSTRATIONS.** Black and white photographs of dorsal and ventral views of the holotype (USNM 212046) and a dorsolateral view of the allotype (USNM 202047) are provided in the original description of McCranie et al. (1980). The photograph of the allotype clearly shows the coloration pattern of the upper surface of the frog. A color photograph is in McCranie and Wilson (2001). Illustrations of the tadpole and its mouthparts are included in McCranie et al. (1986); a lateral view of the tadpole is in McCranie and Wilson (2001).

• **DISTRIBUTION.** *Leptodactylus silvanimbus* occurs in cloud forest and moderate elevation pine forest habitats in extreme southwestern Honduras. The species is known from three localities at moderate and intermediate elevations (1470–2000 m) along the Continental Divide of the cordilleras de Celaque and del Merendón in Departamento Ototepeque, Honduras.

• **FOSSIL RECORD.** None.

• **PERTINENT LITERATURE.** *Leptodactylus silvanimbus* was first described as a “cloud forest frog” by McCranie et al. (1980), who also included a detailed description of the species’ ecological distribution. Wilson et al. (1986) clarified some of the information from their previous article and elaborated on the frog’s habitat, call, calling site, and coloration in life. Habitat and calling site information was also provided by Heyer et al. (1996), along with a detailed analysis of the advertisement call. Relationships to other species have been treated by Heyer (1998), Heyer et al. (1996), Larson and de Sá (1998), McCranie et al. (1980, 1986), and Maxson and Heyer (1988). Wilson and McCranie (1993) included tadpole characteristics in a key to the Honduran tadpoles. Wilson and McCranie (1994), and Villa et al. (1988), Harding (1983), and Glaw et al. (1998) included *L. silvanimbus* in herpetological lists of Honduras, and Middle America, the New World, and the world, respectively. Frost (1985, 2000) included the species in taxonomic compendia. Campbell (1999) included the species in a summary of distribution patterns of Middle American amphibians. Heyer and Carvalho (2000) compared the published advertisement call data of *L. silvanimbus* with the call of *L. natalensis*.

• **REMARKS.** The various authors treating the relationships of *Leptodactylus silvanimbus* (see citations in **Pertinent Lit-**

**erature)** either place it into the previously morphologically defined *L. melanonotus*, *L. ocellatus*, or *L. pentadactylus* species groups. Preliminary morphological and 12S and 16S mitochondrial DNA sequence data suggest an early divergence of *L. silvanimbus* within the genus (Heyer et al. 2002).

• **ETYMOLOGY.** The specific name comes from the combination of two Latin nouns, *silva* (forest) and *nimbus* (cloud), which refer to the species' ecological occurrence in cloud forests (McCranie et al. 1980).

• **COMMENTS.** Frank and Ramus (1995) proposed the common name "Honduras white-lipped frog" for *Leptodactylus silvanimbus*. However, the lip of *L. silvanimbus* is not white, but some individuals of *L. fragilis*, which also occur in Honduras, do have white lips. We reject the Frank and Ramus (1995) proposal as inappropriate. The people who live where *L. silvanimbus* occurs have no common name for it; we recommend not coining a common name for the species and referring to it solely by its scientific name.

The conservation status of the species is uncertain. Although the small region from which the species is known was historically covered by cloud forest or moderate elevation pine forest, the known sites are almost completely deforested. Thus, we do not know whether the habitats currently available to the species are marginal. Of the three known sites, the drainage pattern of one was significantly modified after 1980 and the species was not found there in 1995. All larvae collected in 1995 (from a single artificial pond) had deformed oral disks, but the deformities appear as likely to be developmental anomalies from chemical contamination as due to chytrid infection. Finally, too few sites have been surveyed in the formerly cloud forested habitats in the Ocotepeque region to know whether the species occurs more broadly. Even though its conservation status is uncertain, the outlook is not good for the long-term survival of *L. silvanimbus*. The species is not known to occur in any protected area in the country and the cloud and pine forest habitats in the region continue to be deforested. The species does, however, persist for at least some time in deforested habitats.

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#### LITERATURE CITED

- Altig, R. and G.F. Johnston. 1989. Guilds of anuran larvae: relationships among developmental modes, morphologies, and habitats. *Herpetological Monographs* (3):81–109.
- Campbell, J.A. 1999. Distribution patterns of amphibians in Middle America, p. 111–210. *In* W.E. Duellman (ed.), *Patterns of Distribution of Amphibians. A Global Perspective*. The Johns Hopkins University Press, Baltimore and London.
- Frank, N. and E. Ramus. 1995. A Complete Guide to Scientific and Common Names of Reptiles and Amphibians of the World. NG Publishing, Inc., Pottsville, Pennsylvania.
- Frost, D.R. (ed.). 1985. *Amphibian Species of the World: A Taxonomic and Geographical Reference*. Allen Press and the Association of Systematics Collections, Lawrence, Kansas.
- . 2000. *Amphibian Species of the World: An Online Reference*. V2.20 (1 September 2000)(<http://research.amnh.org/herpetology/amphibia/index.html>).
- Glaw, F., J. Köhler, R. Hofrichter, and A. Dubois. 1998. Amphibian systematics: list of recent families, genera, and species, p. 252–258. *In* R. Hofrichter (ed.), *Amphibians: The World of Frogs, Toads, Salamanders and Newts*. Firefly Books, Buffalo, New York.
- Harding, K.A. 1983. *Catalogue of New World Amphibians*. Pergamon Press, Oxford.
- Heyer, W.R. 1998. The relationships of *Leptodactylus diedrus* (Anura, Leptodactylidae). *Alytes* 16:1–24.
- and C.M. Carvalho. 2000. Calls and calling behavior of the frog *Leptodactylus natalensis* (Amphibia: Anura: Leptodactylidae). *Proceedings of the Biological Society of Washington* 113:284–290.
- , R.O. de Sá, J.R. McCranie, and L.D. Wilson. 1996. *Leptodactylus silvanimbus* (Amphibia: Anura: Leptodactylidae): natural history notes, advertisement call, and relationships. *Herpetological Natural History* 4:169–174.
- , —, and S. Muller. 2002. On the enigmatic distribution of the Honduran endemic *Leptodactylus silvanimbus* (Amphibia: Anura: Leptodactylidae). *In* *Ecology and Evolution in the Tropics: A Herpetological Perspective*. University of Chicago Press, Chicago (submitted).
- and A.S. Thompson. 2000. *Leptodactylus rugosus*. *Catalogue of American Amphibians and Reptiles* (708):1–5.
- Larson, P.M. and R.O. de Sá. 1998. Chondrocranial morphology of *Leptodactylus* larvae (Leptodactylidae: Leptodactylinae): its utility in phylogenetic reconstruction. *Journal of Morphology* 238:287–305.
- Maxson, L.R. and W.R. Heyer. 1988. Molecular systematics of the frog genus *Leptodactylus* (Amphibia: Leptodactylidae). *Fieldiana, Zoology, New Series* (41):1–13.
- McCranie, J.R. and L.D. Wilson. 2001. *The Amphibians of Honduras*. SSAR Contributions to Herpetology (19), Ithaca, New York.
- , —, and L. Porras. 1980. A new species of *Leptodactylus* from the cloud forests of Honduras. *Journal of Herpetology* 14:361–367.
- , —, and K.L. Williams. 1986. The tadpole of *Leptodactylus silvanimbus*, with comments on the relationships of the species. *Journal of Herpetology*, 20:560–562.
- Villa, J., L.D. Wilson, and J.D. Johnson. 1988. *Middle American Herpetology. A Bibliographic Checklist*. University of Missouri Press, Columbia.
- Wilson, L.D. and J.R. McCranie. 1993. Preliminary key to the known tadpoles of anurans from Honduras. *Royal Ontario Museum, Life Sciences Occasional Paper* (40):1–12.
- and —. 1994. Second update on the list of amphibians and reptiles known from Honduras. *Herpetological Review* 25:146–150.
- , L. Porras, and J.R. McCranie. 1986. Distributional and taxonomic comments on some members of the Honduran herpetofauna. *Milwaukee Public Museum Contributions in Biology and Geology* (66): 1–18.

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