

LEPTODACTYLUS RIVEROI, A NEW FROG SPECIES
FROM AMAZONIA, SOUTH AMERICA
(ANURA: LEPTODACTYLIDAE)

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Abstract.—A new species of the frog genus *Leptodactylus* is described based on specimens from scattered localities in Amazonia. The new species has characteristics which bridge the morphological gap between the previous definitions of the *melanonotus* and *ocellatus* species groups.

Rivero (1968) recognized that a collection of 27 individuals of *Leptodactylus* from Caño Iguapo, Venezuela represented a distinctive species of *Leptodactylus*, different from those he had treated previously in the "Salientia of Venezuela" (1961). In the 1961 publication, Rivero questionably included the species *L. rhodomystax* in the Venezuelan fauna, based on a single juvenile in the collections of the American Museum of Natural History. At the same time he pointed out that Boulenger's (1883) description of *L. rhodomystax* was based on a juvenile. Rivero later (1968) concluded that the series of specimens from Caño Iguapo represented *L. rhodomystax* Boulenger. Boulenger's *L. rhodomystax* is a different species, however (Heyer 1979), leaving the species Rivero recognized as distinct without a name. In recognition of Dr. Rivero's contributions, we describe the species as

Leptodactylus riveroi new species

Fig. 1

Holotype.—USNM 232400, an adult male from Colombia; Vaupes; Timbó, 01°06'S, 70°01'W, elevation 170 m. Collected by William F. Pyburn and J. K. Salser, Jr., 25 May 1973.

Paratypes.—UTACV 3888-3898 (Colombia; Vaupes; Timbó); UTACV 3721 (Colombia; Vaupes; Wacará); UTACV 3792, 4295, 4319, 6025, 7971-7974 (Colombia; Vaupes; Yapima).

Referred specimens.—All non-Colombian specimens listed in the distribution section.

Diagnosis.—*Leptodactylus riveroi* has extensive toe fringing and thumb spines in the males, characteristics shared with members of the *Leptodactylus melanonotus* and *ocellatus* groups. *Leptodactylus riveroi* has a pair of low dorsolateral folds, indicated in preservative by a black border, extending from behind the eye to a point near the posterior end of the body above the groin; *L. dantasi*, *melanonotus*, *podicipinus*, *pustulatus*, and most *wagneri* lack dorsolateral folds. Some *L. wagneri* have short indications of dorsolateral folds, but they are never as extensive as those of *L. riveroi*. The light stripe from under the eye to the shoulder, uniformly found in *L. riveroi*, is not present in *L. dantasi*, *melanonotus*, *ocellatus*, *podicipinus*, *pustulatus*, and most *wagneri*. Some *L. wagneri* have a light stripe under the eye to the angle of the jaw, but the outlines of the stripe



Fig. 1. Watercolor of *Leptodactylus riveroi* by William F. Pyburn.

are usually vague and the stripe is not as clearly defined as in *L. riveroi*. *Leptodactylus bolivianus* often have distinct light canthal stripes, but the stripes begin well forward of the eye, not under it as in *L. riveroi*. The uniform or faintly blotched dorsal pattern and single pair of dorsolateral folds of *L. riveroi* differ from the distinctly spotted dorsal patterns and at least 4 dorsolateral folds of *L. chaquensis*, *macrosternum*, *ocellatus*, and *viridis*. Male *L. riveroi* further differ from all other *Leptodactylus* (males of *L. dantasi* not known) in lacking vocal slits.

Specimens of *L. riveroi* are most likely to be confused with *L. bolivianus*, *rhodomystax*, and *wagneri*. The light lip stripes of *L. riveroi* and *L. rhodomystax* are similar, but *L. rhodomystax* has no toe fringing in adults and the back of the thigh has distinct, discrete light spots, rather than the mottling found in *L. riveroi*. In addition to the differentiating characteristics listed above for *bolivianus* and *wagneri*, *L. bolivianus* lacks the red-orange ventral glands found in *L. riveroi* and most adult *L. wagneri* are smaller than adult *L. riveroi*.

Description of holotype.—Snout subovoid from above, rounded in profile; canthus rostralis rounded; lores concave in cross section; tympanum large, distinct, almost same diameter as eye diameter; no vocal slits; vomerine teeth in two arched series, approaching each other medially, posterior and medial to choanae; first finger just longer than second, second about equal to fourth, third much longer than others; fingers with lateral fleshy ridges; thumb with 2 cornified nuptial spines; arm not especially hypertrophied; no ulnar ridge; dorsal texture smooth; a pair of low dorsolateral folds, demarcated by black pigment laterally, folds extending from back of eye to back of body above groin, moderate supratympanic fold present; ill-defined parotoid glands present, sides of body generally glandular, red-orange glands in large blocks on throat, most of belly, and ventral surfaces of limbs; venter smooth, ventral disk fold indistinct; no chest spines; toe tips not expanded; toe fringe extensively developed; subarticular tubercles moderately developed; extensive metatarsal flap of skin; tarsal fold distinct, extending about $\frac{7}{8}$ length of tarsus, just not continuous with toe fringe of first toe; upper tibia with many white tipped tubercles; posterior surface of tarsus and sole of foot with many black tipped tubercles.

Snout-vent length (SVL) 62.8 mm, head length 25.0 mm, head width 23.2 mm, interorbital distance 5.5 mm, eye-nostril distance 7.1 mm, femur 26.7 mm, tibia 29.9 mm, foot 35.8 mm.

Dorsum essentially uniformly brown (in preservative) between dorsolateral folds and in upper snout area; faint darker interorbital mark, straight anteriorly, indistinct posteriorly; two indistinct dark central blotches; dark, broken canthal stripe from nostril to eye; upper lip indistinctly marked, lighter area under eye becoming distinct light strip under tympanum, extending to beyond angle of jaw, ending in shoulder region; sides of body brown with darker spots above, with a lighter indistinct band between side and belly; upper limbs indistinctly barred; ventral surfaces boldly mottled with dark and light, overlain by red-orange glandular areas, posterior surface of thigh boldly mottled with red-orange and black-brown.

Variation.—Rivero (1968) gave the range of sizes of his sample as 29.0–72.5 mm, but did not indicate ranges of males and females within that sample. In the specimens we have examined, males range 52.2–62.8 mm and females 67.8–81.0 mm SVL. The ranges of body proportions among adults are: head length/SVL

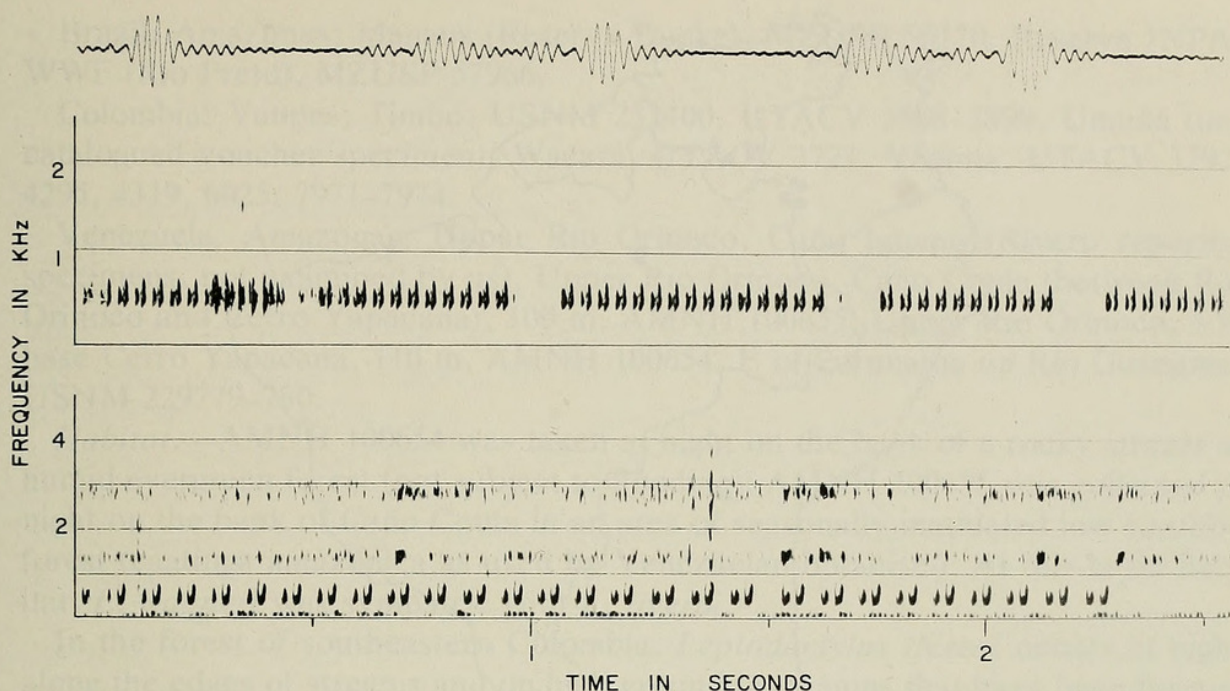


Fig. 2. Advertisement call of *Leptodactylus riveroi*. Wave form of filtered call as shown in top audiospectrogram, showing end of one note and two complete notes. Length of entire signal is 0.214 s. Upper audiospectrogram of bandpass filtered call, $\frac{1}{3}$ octave at 500 Hz. Note that time axis is twice that of lower audiospectrogram. Lower audiospectrogram unfiltered call. All recordings from Colombia: Vaupes; Timbó, recorded on 28 May 1973 at about 21:30 h by W. F. Pyburn and J. K. Salser, Jr. Water temperature 24.0°C, air temperature 25.8°C. Specimen UTACV 3890 calling from burrow in a swamp.

38–48%, head width/SVL 35–37%, interorbital distance/SVL 8–10%, eye–nostril distance/SVL 10–11%, femur/SVL 40–46%, tibia/SVL 46–48%, and foot/SVL 53–57%.

There is little intraspecific variation in pattern or morphology among the individuals at hand. In some of the specimens, the tarsal fold is continuous with the outer toe fringe of toe one.

Rivero (1968) gave the following color notes from the Venezuelan individuals: dorsolateral folds at times maroon or cream red; the line that goes from the eye to the shoulder, and also at times the loreal area (although never as pronounced) ranges from a shade of rose to at times reddish. Charles W. Myers provided the following color data (also on Venezuelan individuals) through his notes and a color transparency: dorsal coloration basically brown, dorsolateral fold black outlined; the stripe under the eye cream anteriorly, orangish posteriorly in shoulder region; rear of thigh mottled black and yellowish brown; ventral surfaces mottled yellowish white and light brown; iris pale bronze, with reddish brown horizontal stripe, lower part of iris below stripe darkened by heavy black venation.

In life, specimens from southeastern Colombia are dark purplish brown on the dorsum and sides. Black bands cross the upper surface of the forearms and thighs, and irregular black spots occur on the upper surfaces of the shanks and on the sides of the body. Some specimens have a row of black spots above the groin that is partially concealed by the leg when the frog is at rest. Black reticulations or mottlings cover the posterior thigh surfaces and there is an interocular black



Fig. 3. Known distribution of *Leptodactylus riveroi*. Political boundaries indicated for Brazil, Colombia, and Venezuela.

bar. A bright cream lip stripe begins below the eye and extends posteriorly along the lower edge of the tympanum to the base of the upper arm. As the lip stripe approaches the arm base, it may gradually turn to orange. The lore is creamy gray, somewhat darker than the lip stripe. The edge of the upper lip is black crossed by one or two narrow cream bands. The dorsolateral fold is gray-bronze and its lower edge is marked by a broken or continuous black line. Large orange-yellow glandular areas cover most of the ventral surfaces, which are also marked with dark gray reticulations.

Advertisement call.—The call is quiet and consists of approximately 9–28 notes with a duration of from 0.7–2.3 s. Each note consists of two major pulses and the entire note has a duration of 0.04–0.05 s. The dominant frequencies range from 360–750 Hz to 360–830 Hz. There appears to be frequency modulation within each major pulse and the note is intensity modulated with the second pulse the loudest. There is no harmonic structure (Fig. 2).

Distribution.—The species is thus far known from the following localities (Fig. 3):

Brazil: Amazonas; Manaus (Reserva Ducke), MZUSP 50170, Reserva INPA-WWF (Rio Preto), MZUSP 57966.

Colombia: Vaupes; Timbó, USNM 232400, UTACV 3888–3898, Umuñá (uncatalogued voucher specimen), Wacará, UTACV 3721, Yapima, UTACV 3792, 4295, 4319, 6025, 7971–7974.

Venezuela: Amazonas; Upper Río Orinoco, Caño Iguapo (Rivero reported specimens, not examined by us), Upper Río Orinoco, Caño Cotúa (between Río Orinoco and Cerro Yapacana), 100 m, AMNH 100655, Upper Río Orinoco, SW base Cerro Yapacana, 110 m, AMNH 100654, E of Purunama on Río Guaname, USNM 229779–780.

Habitat.—AMNH 100654 was taken at night on the bank of a rocky stream in humid evergreen forest (not subject to flooding); AMNH 100655 was collected at night on the bank of Caño Cotúa in an area of seasonally inundated low scrubby forest (caatinga amazónica as used by Venezuelan botanists). At this latter habitat, *L. wagneri* was sympatric with *L. riveroi*.

In the forest of southeastern Colombia, *Leptodactylus riveroi* occurs at night along the edges of streams and on high ground in swamps that have been formed by flooding. When disturbed, it leaps directly into the water, but may turn and swim back to the bank where it emerges onto the land and sits quietly among dead leaves. In daylight, *L. riveroi* is occasionally found along forest trails away from water.

J. K. Salser, Jr. and the junior author found a calling male (USNM 232400) about 2100 h, 25 May 1973 by locating the source of the sound the animal produced. The frog called from the concealment of an underground cavity connected to the surface by a slanting tunnel near the edge of a swamp. The cavity was intersected by roots and contained a small pool. A regular sequence of quiet, closely spaced, low-pitched notes emanated from the cavity.

Another male (UTACV 3890) recorded (Fig. 2) 28 May 1973 at the same locality called from an underground chamber essentially like that of USNM 232400. The chamber was covered over by roots, dead leaves and humus. It contained a pool of water 25 cm deep and was located in a hillock surrounded by the water of the swamp. An adult female (UTACV 3891) sat on another hillock 2 m from the calling male.

Discussion

Leptodactylus riveroi demonstrates characters that straddle the previously defined *L. melanonotus* and *ocellatus* groups. The only characteristic that separated the two groups was the presence of well defined dorsolateral folds in the *ocellatus* group. Thus, on this basis, *L. riveroi* would be a member of the *ocellatus* group. However, the species has an overall habitus and color pattern strikingly similar to *L. wagneri*, a member of the *melanonotus* group. The unique condition in *L. riveroi* of having no vocal slits in males confuses the question of the precise relationships of *L. riveroi*. The call structure of *L. riveroi* stands out in its distinctiveness and is unlike any other *Leptodactylus* known. At the least, *L. riveroi* shows that there is no clear cut morphological distinction between the *L. melanonotus* and *ocellatus* groups. An albumin sample of *L. riveroi* is available and the

micro-complement fixation analyses of *Leptodactylus* albumin including the sample of *L. riveroi* will be reported elsewhere (Maxson and Heyer, in prep.).

Acknowledgments and Museum Specimen Citation Symbols

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