

***Leptodactylus lauramiramae*, a distinctive new species of frog  
(Amphibia: Anura: Leptodactylidae) from Rondônia, Brazil**

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**Abstract.**—A new species of frog is described from Rondônia, Brazil. The new species shares most features with the genus *Leptodactylus*, although externally it resembles species of *Physalaemus* as much as species of *Leptodactylus*. The new species is provisionally assigned to the genus *Leptodactylus*, the definition of which must be expanded to include an areolate belly and small osteoderms lying above the vertebral column in order to accommodate the new species. The new species is known only from a single cerrado enclave in a predominantly Amazonian rainforest landscape.

One of us (RIC) participated in two POLONOROESTE herpetological expeditions organized and led by P. E. Vanzolini (Vanzolini 1986), Museu de Zoologia, Universidade de São Paulo. On one of these expeditions, RIC collected three adult females of a frog that appeared to belong to the genus *Leptodactylus* but clearly did not belong to any recognized species in the genus.

Upon external examination of the specimens in the laboratory, WRH was not convinced the frogs belonged to the genus *Leptodactylus*, as they bore as much external resemblance to some members of the genus *Physalaemus* as to members of the genus *Leptodactylus*.

We delayed further research on these specimens in the hopes that additional materials would become available, particularly adult males and tadpoles. The available morphological, myological, and osteological data indicate that the new species is most closely related to the genus *Leptodactylus*, although it has two features previously unknown for the genus. We provisionally include the new species in the genus *Leptodactylus*, realizing that additional data may overturn the generic allocation.

Methods

Museum abbreviations follow Leviton et al. (1985). MZUSP 132773 was cleared-and-stained using the double-staining technique for cartilage and bone (Dingerkus and Uhler 1977). Measurement data were taken with a dial calipers to the nearest 0.1 mm following the definitions in Heyer et al. (1990). Stereo x-ray negatives were prepared for MZUSP 132772.

***Leptodactylus lauramiramae*,  
new species  
Fig. 1**

**Holotype.**—MZUSP 132772, an adult female from Brazil, Rondônia, north end of the town of Vilhena, km 16, 12°43'S, 60°07'W (coordinates for Vilhena). Collected by Ronald I. Crombie on 6 December 1985.

**Paratypes.**—MZUSP 132773, an adult female (cleared-and-stained) collected 4 December 1985; USNM 509521, an adult female collected 6 December 1985. Both specimens collected by Ronald I. Crombie at the type locality.

**Diagnosis.**—*Leptodactylus lauramiria-*

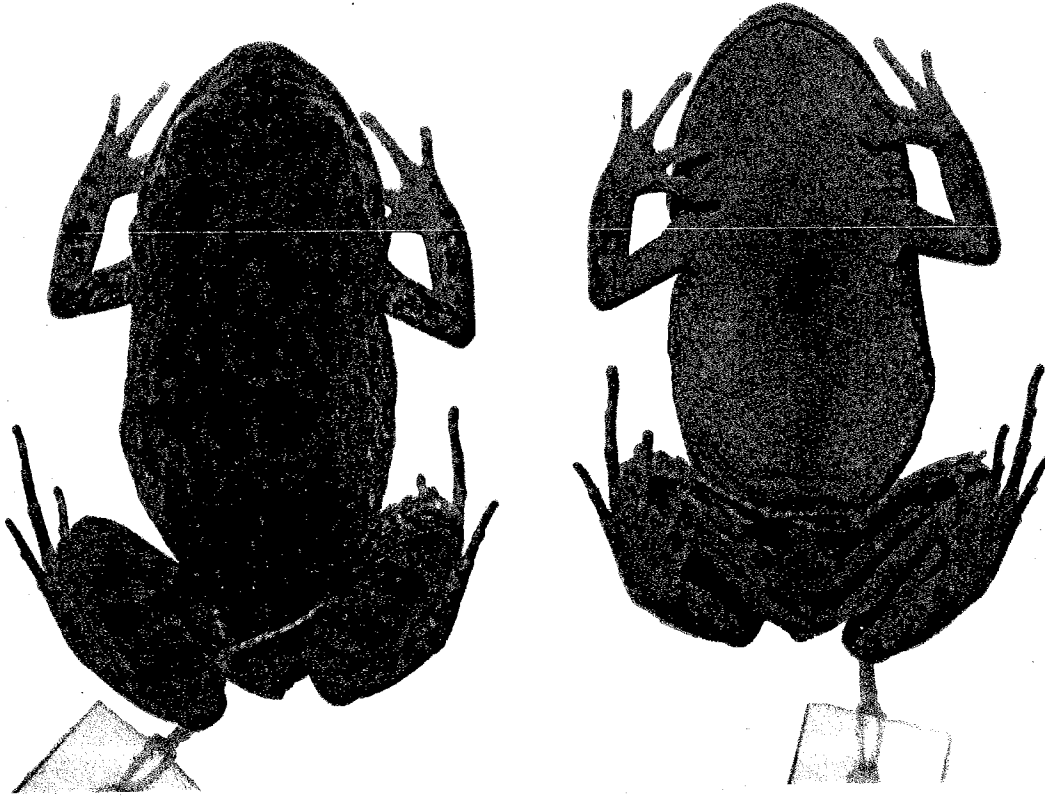


Fig. 1. Holotype of *Leptodactylus lauramiramae* (MZUSP 132772).

*mae* is a small species with free toes (toes lacking web, lateral fringes or ridges) that would only be confused with members of the *Leptodactylus fuscus* species group as currently understood. *Leptodactylus lauramiramae* is distinguished from all other members of the genus in having an areolate belly; the belly is smooth in the other species.

*Description of holotype.*—Snout rounded from above and in profile views; canthus rostralis indistinct; lores shallowly concave-obtuse in cross section; tympanum round, moderate size, diameter about  $\frac{3}{4}$  eye diameter; vomerine teeth in two short transverse series between and posterior to choanae, separated medially by  $\frac{1}{3}$  length of a single vomerine tooth series; finger lengths  $II \cong IV < I < III$ ; fingers weakly ridged laterally; no ulnar ridge; dorsal texture somewhat warty, more so posteriorly; su-

pratympanic fold distinct from eye to shoulder; series of warts in a line laterally from tympanum level behind arm insertion area to groin on upper flanks; subcommisural gland distinct; ventral disk fold weakly defined anteriorly and posteriorly only; throat and chest texture smooth, belly and under thighs areolate; toe lengths  $I < II < V < III < IV$ ; toes free of ridges or fringes; subarticular tubercles pungent, moderately developed; no metatarsal fold; tarsal fold weak, extending  $\frac{1}{2}$  length of tarsus; upper shank texture with scattered low white pustular tubercles; outer tarsal texture smooth; sole of foot with many low, light pustular tubercles.

Dorsum pattern lichenose with indications of paired dark scapular spots, dark sacral bar and two medial pairs of indistinct dark spots posterior to sacrum. Upper lip mottled with hint of darker suborbital bars.

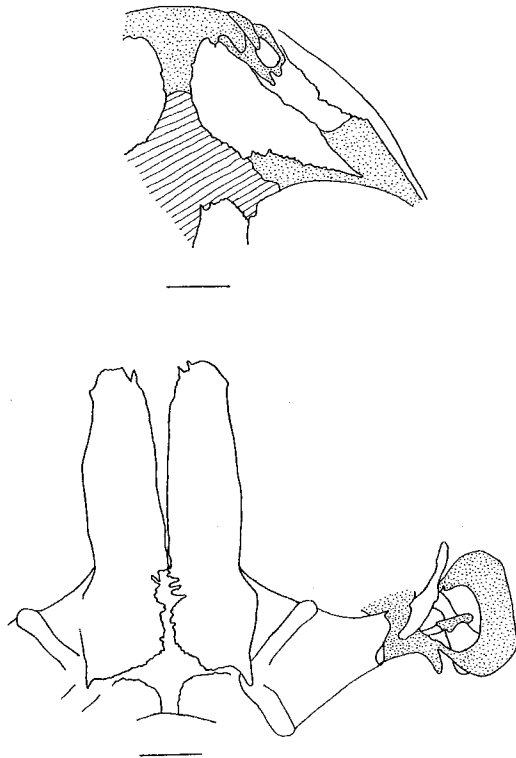


Fig. 2. Dorsal view of anterior and posterior portions of the skull of *Leptodactylus lauramiramae* (MZUSP 132773). Stippling = cartilage; hatching = calcified cartilage. Scale bars = 1 mm.

Commissural gland light, prominent. Flanks mottled cream, tan, and brown. Upper limbs mottled with faint cross stripes/bands. Throat and chest light with scattered melanophores. Belly uniform cream. Posterior surface of thigh with bold light and dark mottle, with some distinct light spots, no light thigh stripe.

SVL 31.2 mm, head length 11.3 mm, head width 11.6 mm, eye-nostril distance 3.1 mm, tympanum diameter 2.5 mm, thigh length 10.9 mm, shank length 11.5 mm, foot length 12.1 mm.

*Variation.*—The SVL range of the three females is 29.5–31.2 mm.

The basal subarticular tubercles of the fingers are noticeably larger and more pungent than the proximal tubercles. The metacarpal tubercles are large and pronounced; the outer is slightly larger and more ovoid

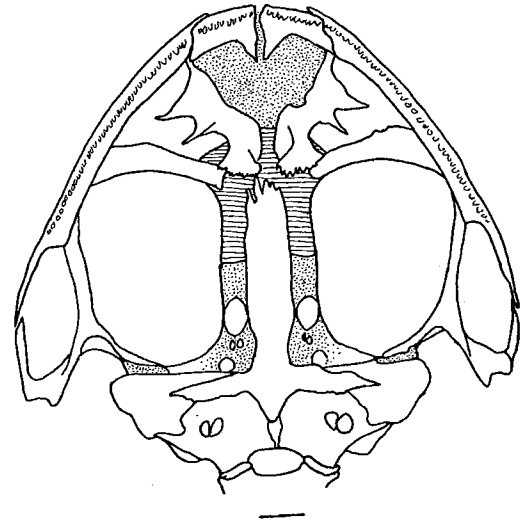


Fig. 3. Ventral view of skull of *Leptodactylus lauramiramae* (MZUSP 132773). Stippling = cartilage; hatching = calcified cartilage. Scale bar = 1 mm.

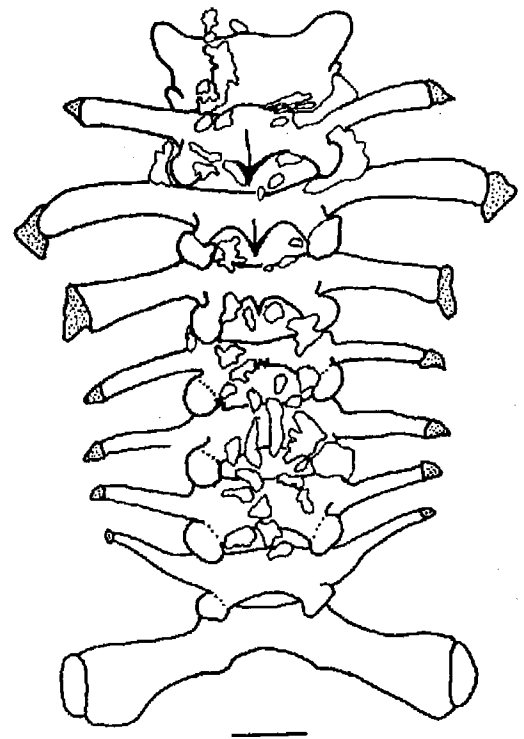


Fig. 4. Dorsal view of vertebral column of *Leptodactylus lauramiramae* (MZUSP 132773). Stippling = cartilage. Scale bar = 1 mm.

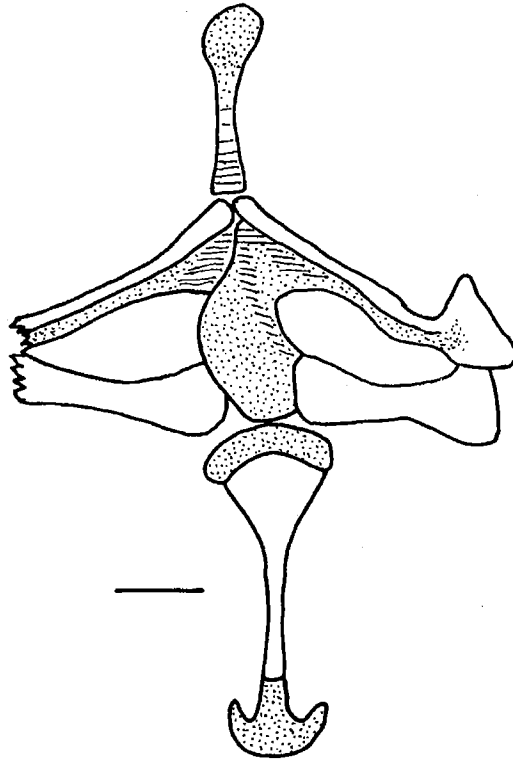


Fig. 5. Ventral view of pectoral girdle of *Leptodactylus lauramiriamae* (MZUSP 132773). Stippling = cartilage; hatching = calcified cartilage. Scale bar = 1 mm.

than the inner. The outer metatarsal tubercle is rounded and pronounced, slightly but noticeably smaller than the elongate, pronounced inner metatarsal tubercle. (Tubercle features described from USNM 509521.)

The dorsal pattern of the two paratypes consists of a few irregular small dark blotches, essentially a reduced pattern as exhibited by the holotype. The posterior thigh pattern of USNM 509521 is boldly mottled without distinct light spots.

*Color in life.*—USNM 509521. Dorsum reddish brown; warts, particularly posteriorly, slightly more intensely colored. Darker dorsal marks dull brown. Tympanum with white center. Lateral warts and perianal tubercles pinkish; limbs slightly less intensely colored, more pale brick red. Orange-yellow in groin and concealed limb



Fig. 6. Terminal phalanx of toe IV of *Leptodactylus lauramiriamae* (MZUSP 132773). Scale bar = 1 mm.

surfaces. Venter white, purplish on limbs and indistinctly marbled with gray, particularly along jaw line. Iris gold above, undistinguished dark below.

*Myology.*—Muscles from both thighs of all three specimens were removed as tissue samples and stored in PPS solution for molecular analysis. The following muscle characteristics were observed in MZUSP 132773 prior to clearing and staining. The *depressor mandibulae* originates from three slips, two large slips from the dorsal fascia, squamosal and otic region, and a small slip from the *annulus tympanicus* (DFSQat notation of Starrett 1968). The *adductor mandibulae posterior subexternus* is present, the *adductor mandibulae externus superficialis* absent ("s" condition of Starrett 1968). The *geniohyoideus medialis* is continuous medially, dividing posteriorly where the posteromedial processes of the hyoid articulate with the body of the hyoid; the *hyoglossus* is completely covered ventrally by the *geniohyoideus medialis*. The

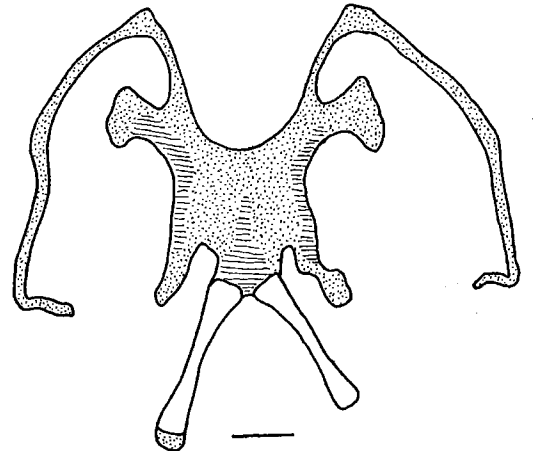


Fig. 7. Hyoid apparatus of *Leptodactylus lauramiriamae* (MZUSP 132773). Stippling = cartilage; hatching = calcified cartilage. Scale bar = 1 mm.

*sternohyoideus* origin inserts in a narrow band near the lateral edges of the hyoid. The *geniohyoideus lateralis* attaches to the hyale, indicated by a lateral flaring of the muscle. The *anterior petrohyoideus* inserts entirely on the edge of the hyoid apparatus. The *omohyoideus* inserts on the hyoid body and fascia between the posteromedial and posterolateral processes of the hyoid.

All of the above muscle conditions occur in at least some species of *Leptodactylus*.

*Osteology*.—Most osteological features observed in MZUSP 132773 (Figs. 2–7) also occur in at least some species of *Leptodactylus*. Of particular note, the frontoparietals are somewhat reduced (Fig. 2) as seen in other small species of *Leptodactylus* (Ponssa 2002), the occipital condyles are broadly separated from each other (Fig. 3), the posterior sternum has a bony style (Fig. 5), the quadratojugal is complete, articulating with the maxilla (Fig. 3), and the ilium has a distinct dorsal crest (not figured).

There is one feature previously unknown in the genus: a series of small, irregular osteoderms above the entire spinal cord (Fig. 4). The x-ray negatives of the holotype also show the presence of osteoderms.

*Etymology*.—The species is named for Laura Miriam Heyer, daughter of WRH. Laura previously had a species of *Leptodactylus* named for her, which had to be placed in the synonymy of *L. furnarius* (see Heyer and Heyer 2004).

*Habitat*.—Collected from under trash in cerrado.

*Distribution*.—Known only from the type locality.

#### Discussion

The new species occurs in a mosaic landscape of Amazonian rainforest and cerrado habitats, wherein there are numerous cerrado enclaves within the general forest domain (see Vanzolini 1986 for description and discussion). *Leptodactylus lauramiramae* was collected from one of the cerrado enclaves. There is nothing strikingly unusu-

al from a distribution/habitat perspective about the other amphibians collected with *L. lauramiramae*.

The two features observed in *L. lauramiramae* that are unknown in all other species of *Leptodactylus* could possibly be adaptations to a dry environment. The areolate seat patches characteristic of frogs in general function as a primary means of hydration, with water being absorbed through the seat patch by contact with a moist substrate (Duellman and Trueb 1986:199–200). The areolate belly of *L. lauramiramae*, if as vascularized as the seat patch, would provide a much larger hydration area for the frog. Osteoderms are thought to function to decrease evaporative water loss (Duellman and Trueb 1986:201). Although the small sizes of the osteoderms in *L. lauramiramae* would not seem to make an appreciable difference with regard to water loss, that is the only function that strikes us as plausible. Arguing against the possible function of water balance adaptations is the fact that there is a diverse group of *Leptodactylus* species characteristic of cerrado habitats, none of which have areolate bellies nor osteoderms.

At present, the morphology and distribution of *Leptodactylus lauramiramae* raise more questions than provide insights.

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P. E. Vanzolini (MZUSP) invited RIC to participate in the field work in Rondônia. RIC wishes to thank Celso Morato de Carvalho (Universidade Federal de Sergipe, Aracaju, Brazil), Charles W. Myers (AMNH), Francisca Carolina do Val (MZUSP), and P. E. Vanzolini for making the field work pleasant and productive. Steve Gotte (Biological Resources Division, U.S. Geological Service, stationed at USNM) cleared-and-stained MZUSP 132773. Kenneth Tighe (USNM) prepared the x-rays of the holotype. Addison Wynn (USNM) reworked the digital files of the figures to publication quality. P. E. Vanzo-

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