

## LEPTODACTYLUS LONGIROSTRIS (ANURA: LEPTODACTYLIDAE): ADVERTISEMENT CALL, TADPOLE, ECOLOGICAL AND DISTRIBUTIONAL NOTES<sup>1</sup>

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(With 5 figures)

Heyer (1978) recently summarized available information on *Leptodactylus longirostris* Boulenger, 1882, and commented on the uncertain provenance of the types. Boulenger's specimens were ostensibly from Santarém, Brasil (an Amazonian Port), and differed in several minor respects from other *L. longirostris*, a species considered to be centered on the Guiana Shield. Santarém was suggested as a shipping port for material collected further north on the Rio Mapuera or Rio Trombetas. This was a plausible idea since Santarém, at the juncture of the Rio Tapajós and Rio Amazonas, was a common port call for early Amazonian explorers. Recently, however, *L. longirostris* was rediscovered at the type locality and other sites 250-300 km further south on the Rio Tapajós.

Herein, we compare the newly collected Amazonian frogs with samples from the Guianan Shield, describe larval morphology, compare the call structure of Amazonia and Guianan frogs, and present new ecological observations.

### ECOLOGY AND DISTRIBUTION

During a survey of the amphibians of the Parque Nacional da Amazônia on the Rio Tapajós in January-February 1979, two specimens of *L. longirostris* were collected. The species called nightly and often during afternoon rains in the grassy

cut-over area around the Acampamento Uruá (4° 37' S, 56° 15' W), but the ventriloquial nature of the call and the impenetrability of the calling sites made collection of specimens difficult. After several hours of searching, one male (USNM 234050) was finally tracked to a small "arbor" at the base of a dense grass clump in a roadside ditch. The frog sat on the mud substrate, but was completely covered by an arch of grass, much like a rodent runway. Slight disturbances caused a cessation of calling by the four to six males in the chorus. The silence often lasted 40 minutes or more. When finally confronted by the collector peering in the front of the calling arch, the frogs rapidly escaped through a rear exit. The ditch frequently flooded during heavy rains, but no evidence of *Leptodactylus* nests or larvae were found; the ditch invariably dried up after several days of only light showers.

Once the call had been identified, *L. longirostris* was later heard at several localities along the Transamazon Highway in the park. Choruses were small (3-10 individuals) and always in open areas, usually near one of the many roadside ponds. Calling males were well spaced (2-5 m distant) and seemed to prefer the grassy edges of ditches or depressions which drained into the ponds rather than similar areas nearer the water. A larger gravid female (MZUSP 56075) was collected crossing the road at 20:00 hrs, heading towards a chorus around the lago at km 70 (= road km SSW of Itaituba along the Transamazon Highway).

Between 1979 and 1981, the Uruá areas was

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"developed" and considerably more *L. longirostris* activity was found during a follow-up survey in January-February 1981. Several males still called in the ditch where they were heard in 1979, but larger choruses (10-12 individuals) were found calling around temporary puddles in a nearly bare strip of ground between the runway and the forest (see Figure 1). The area had been scraped clean during the construction of a broad path from the acampamento through the forest to a picnic spot overlooking the rapids (Cachoeira Uruá). Males called from the few clumps of grass that had grown up around the edges of the puddles and from a grassy embankment 3 m distant.

*Leptodactylus longirostris* penetrated the forest along the 5 m wide "cachoeira" trail and sporadic calls were heard near the shelter overlooking the rapids. Here the trail narrowed to pass between a precipitous dropoff down to the river and an equally steep embankment up to the forest; this artificial open area was almost a "road cut" through the forest. The vegetation consisted of short grasses, scattered shrubs and piles of debris that resulted from the bulldozing of the trail through the scrubby second growth. Water

seeped constantly across the trail from the embankment above, creating a boggy area.

In February 1981, shortly after leaving the park, *L. longirostris* were heard calling from reeds and grasses at the edge of a shallow pond/hog wallow in the city of Santarém. The calling sites were similar to those observed in the park, but were closer to the water. Maximum depth of the pond was only 0.5 m (with an additional 20-30 cm of soft mud), although the amount of aquatic vegetation indicated that the pool was semi-permanent. Only four to five *L. longirostris* called here in the midst of huge choruses of other species of frogs (*Bufo marinus*, *B. [granulosus] goeldii*, *Hyla raniceps*, *H. sp.*, *Ololygon sp.*, *Leptodactylus fuscus*, *L. ocellatus* and at least one other unidentified frog). No vouchers were obtained.

The new records from the Rio Tapajós indicate that the species Boulenger described as *longirostris* occurs on, but is not limited to, the Guiana Shield (Figure 2). Further, there is no reason to doubt that Santarém was the locality from whence the type specimens were collected. The specimens from the Rio Tapajós are the first records south of the Rio



Fig. 1 - Habitat at Uruá, Parque Nacional da Amazônia, Brasil, where *Leptodactylus longirostris* were recorded.



Fig. 2 - Distribution map of *Leptodactylus longirostris*. Political boundaries shown for Venezuela, the Guianas, and Brasil, with some rivers in Brasil also indicated. Dots are previously reported localities, the square is the type locality, the triangle the side of the specimens reported herein for the first time.

Amazonas and further collecting may reveal a wider distribution than is presently known. The present distribution is an uncommon pattern.

### MORPHOLOGICAL VARIATION

Heyer (1978) noted that the types of *L. longirostris* were larger and had narrower heads and longer legs than the non-Brasilian specimens provisionally assigned to *longirostris*. The additional material indicates that adult Brasilian *L. longirostris* (including the types) indeed are larger than non-Brasilian adults (Figure 3). Whereas the female lectotype (BMNH 76.5.26.4) was previously the largest known *longirostris*, MZUSP 56075, a 51.6 mm adult female, is now the largest known individual. In terms of size, the types do not now differ from

other Brasilian specimens. A comparison of head width to snout-vent length for Brasilian and Surinam specimens (Figure 3) shows the narrow-headedness in the type series to fall well within individual variability for the species. The same pattern of variation exists for other proportions (e.g., foot length, Figure 3). The geographic variation in size, not shape related.

The recent specimens include a series of very young individuals. These specimens are distinctive in having some or all of a light upper lip stripe highlighted in brilliant white. The adults lack this highlighting and, in some, the upper lip stripe is indistinct (see Fig. 57 in Heyer, 1978). Otherwise, the dorsal patterns and generally non-tuberculate upper tibia, posterior tarsus, and sole of foot of the recently collected specimens match the descriptions given in Heyer (1978).

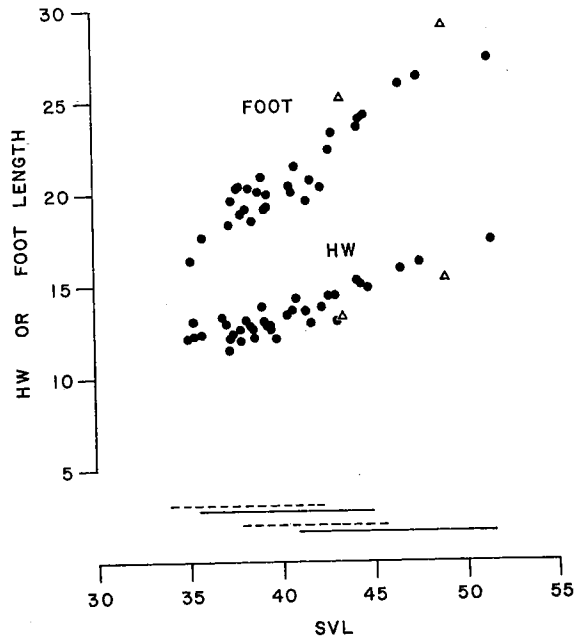


Fig. 3 - Upper portion of figure -- Foot length and head width (HW) each plotted against snout vent length (SVL). Dots are all Brazilian specimens plus 10 males and 10 females from Surinam; open triangles are type specimens of *L. longirostris*. Lower portion of figure -- Size ranges for adult *L. longirostris*. Dashed lines are Brazilian specimens, solid lines are all other specimens. Upper pair of lines are males, lower pair are females.

### ADVERTISEMENT CALL

The call of *L. longirostris* from Venezuela was previously reported by Rivero (1971) and repeated in Heyer (1978). Two additional recordings are now available from: (1) Kayser Mountains, Nickerie, Surinam (recording made by M. S. Hoogmoed) and (2) Parque Nacional da Amazônia (Rio Tapajós), Pará, Brasil.

The calls of all three samples are similar in being short, frequency modulated calls of single notes, repeated often, and presumably non-pulsatile in nature (Venezuelan call not available for waveform analysis) (Table 1, Figure 4 and Fig. 2 of Rivero, 1971 or Fig. 58 of Heyer, 1978). The calls differ most notably in dominant frequency ranges. Ambient temperatures are not available for two of the three samples, so it is unknown how much of the frequency variation can be accounted for by temperature differences. The individual males for two of the three samples are not available, so it is impossible to relate size differences with frequency differences. The available call data are not instructive in determining whether the differences observed could represent enough differentiation for the calls to act as species coding signals. For the moment, we interpret the calls conservatively and consider the calls as representative of a single biological species.

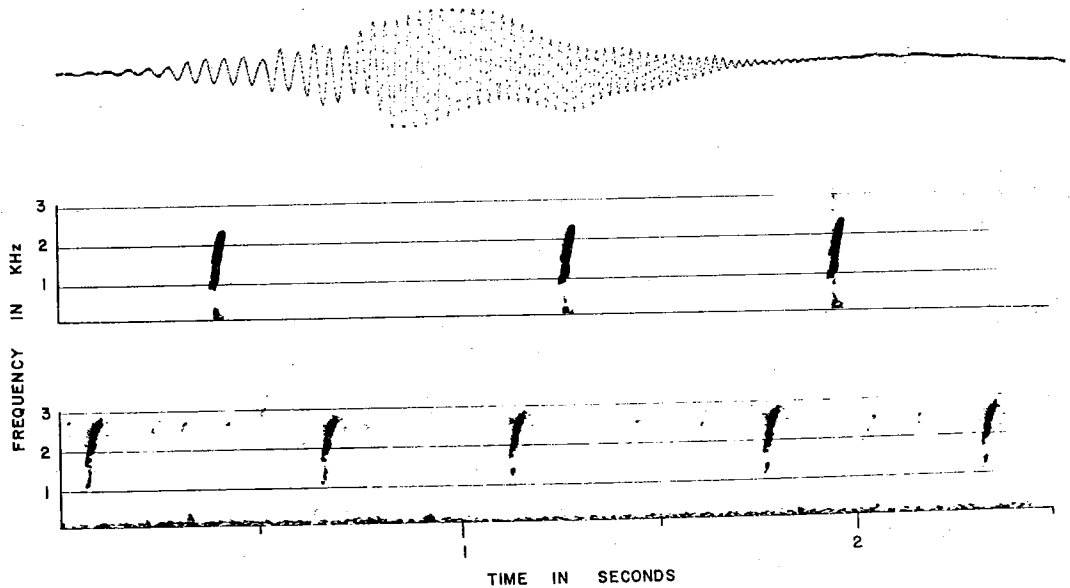


Fig. 4 - Waveform and audiospectrograms of *L. longirostris* calls. Waveform of single call of *L. longirostris* from Uruá, Pará, Brasil (same as first note in audiospectrogram immediately below). Total length of signal analyzed with wave form of call is 0.053 s. Upper audiospectrogram from recording made at Uruá, Pará, Brasil on 16 January 1981, air temperature 25.8°C, specimen USNM 234051. Lower audiospectrogram from recording made at airstrip Kayser Mountains, Nickerie, Surinam on 31 July 1968, 1800 h. Specimen not captured.

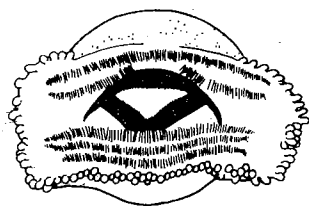
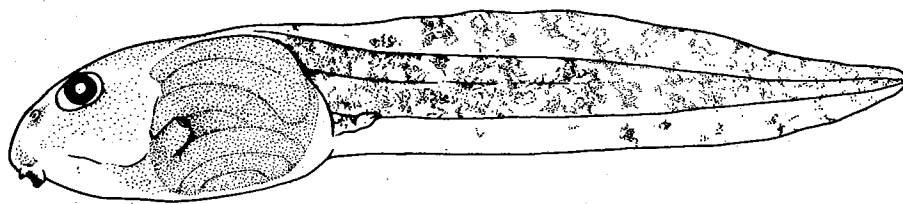


Fig. 5 - Larva of *L. longirostris*, lateral view above, mouthparts below, based on specimen from lot USNM 234059, total length 26.0 mm.

## EGGS AND LARVAE

All egg and larval data were collected from the Parque Nacional da Amazônia on the Rio Tapajós.

### Reproductive Biology

On 18 January 1981, a foam nest was found in a boot print in the shaded and cool boggy area along the cachoeira trail. It measured approximately 9 x 7 cm and it had been laid sometime during the previous evening. By the morning of 19 January, a large chunk had been removed from the top of the nest, probably by a mammal, and no trace of foam or eggs remained by the following morning. Larvae and metamorphs occurred from our first visit (15 January to our last (4 February). The larvae at this locality lived in 1-2 cm of water and could slither through grass and even across short expanses of open mud into other sections of the bog.

Two kinds of leptodactylid postmetamorphs occurred in this area: a smaller (12.5 mm), darker, more clumsy froglet and a larger (15.5 mm), olive green, agile froglet that was obviously *L. longirostris*. However, when held in captivity for 2-3 days, the darker individuals changed into typical olive *L. longirostris*. Perhaps adverse environmental conditions forced early metamorphosis, resulting in the smaller froglets.

Larvae were also found in the runway puddles

where conditions were totally different from the cachoeira bog. The runway puddles contained, at best, small mats of filamentous algae and were exposed to full sun. The rains of the wet season of 1981 were exceptionally sparse and late; these puddles nearly evaporated on several occasions. Maximum depth was only 20 cm and water temperatures (taken at 1300 h) reached 41.4°C (air temperature 33.3°C). *Leptodactylus* larvae (both *L. longirostris* and *knudseni*) showed obvious distress at these temperatures and floated motionless near the surface. Specimens removed from these puddles usually revived, but those collected in a smaller pool (4 cm deep, temperature 42.0°C) were dead. Two species of hylids however, endured temperatures of 41.5 - 42.0°C for six days, and the ponds usually dried up before the larvae died.

TABLE I

Comparison of advertisement call characteristics for three samples of *Leptodactylus longirostris*.

	Dominant Frequency Range in Hz	Note Duration in s	Note Repetition rate/s
Venezuela	1500-3600	.08	1.4
Surinam	1150-3000	.05-.06	2.0
Brasil	940-2500	.04-.06	1.4-2.0

### Larval Morphology

Typical pond type habitus, spiracle sinistral, anus median, oral disk entire with anterior papillary gap, denticle formula with split tooth row posterior to beak abutting, one or two rows of papillae.

Eye moderate, diameter 11-14% head-body length (HBL), oral disk width 19-24% HBL, anterior oral papilla gap 38-57% oral disk width, 22-43 denticles in single split denticle row anterior to beak, HBL 32-39% total length, total length, stage 38, 35.1 mm.

Head-body with suffusion of melanophores, rather uniform dorsally, becoming scattered on lower sides and absent ventrally; dorsal tail fin and tail musculature blotched, ventral tail fin clear or blotched posteriorly (Figure 5). (Description based on 10 individual specimens from USNM 234060, ranging from Gosner stages 27-41.)

### DISCUSSION

The differences in morphology and advertisement calls between the Brazilian and Guianan/Venezuelan populations are slight and considered to encompass the variability of a single species. Too few specimens exist in collections at this time to detail the nature of the variation, i.e., whether the variation shows a smooth or step cline.

*Leptodactylus longirostris* at the Parque Nacional da Amazônia demonstrates how an open formation associated species (see Heyer, 1978, or Heyer and Maxson, 1982, for definition) can follow forest clearing and penetrate, but not invade, the forests. This ecological distribution pattern must have had broad geographical consequences during the Pleistocene when much of the area today occupied by *L. longirostris* experienced large scale expansion and contraction of wet closed forest (Heyer and Maxson, 1982).

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### ABSTRACT

Differences in morphology and advertisement call between Brazilian and Venezuelan/Guianan populations of *Leptodactylus longirostris* Boulenger are examined and the variation falls within the limits of a single biological species. New records confirm the presence of the species at the type locality, considered questionable by Heyer (1978), and provide a significant new distribution records south of the Rio Amazonas. The larvae of *L. longirostris*, described for the first time, are similar to other members of the *L. fuscus* species group. Field data for *L. longirostris* larvae suggest a critical thermal maximum of about 42° C.

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