

FIGURE 56. Dorsal views of striped (left, FMNH 128831) and unstriped (right, UPR 2641) *Leptodactylus longirostris*.

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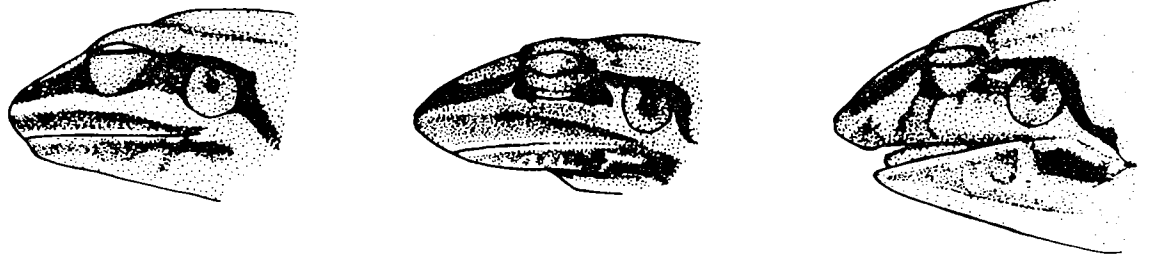


FIGURE 57. Lateral view of the heads of *Leptodactylus amazonicus* (left, lip stripe very distinct), *longirostris* (center, lip stripe moderately distinct), *poecilochilus* (right, no lip stripe, lip bar present).

SVL ratio  $.545 \pm .026$ , female  $.553 \pm .031$ ) than *laurae* (male foot/SVL ratio  $.649 \pm .039$ , female  $.628 \pm .028$ ); *longirostris* occurs in northern South America, *laurae* in mid-east and southern South America. Most individuals of *mystaceus* have distinct white tubercles on the sole of the foot; *mystaceus* occurs along coastal Brasil. Many individuals of *notoaktites* have white tubercles on the sole of the foot; *notoaktites* occurs in SE Brasil. *Leptodactylus longirostris* often has a distinct light lip stripe and lacks a dark suborbital bar, *poecilochilus* lacks a distinct light lip stripe and often has a dark suborbital bar (fig. 57).

*Adult Characteristics* ( $N = 70$ ).—Dorsum uniform or spotted, spots sometimes elongate, fused (fig. 1, A, B, C, E, J); light mid-dorsal stripe present in 17% of individuals, presence not sexually dimorphic ( $X^2 = .09$ ,  $P = .76$ ); light lip stripe usually indistinct (60%), often distinct (40%), distinctiveness not sexually dimorphic ( $X^2 = 2.94$ ,  $P = .09$ ); dark suborbital bar absent; light stripe on posterior face of thigh usually distinct (80%), sometimes indistinct (20%), more females (100%) have distinct light stripes than males ( $X^2 = 6.80$ ,  $P = .009$ ); tibia barred; usually 4 well defined dorsal folds, 6 dorsolateral folds present when light mid-dorsal stripe present; dorsal surface of tibia lacking white tubercles; pos-

terior surface of tarsus almost always (99%) lacking white tubercles, presence not sexually dimorphic ( $X^2 = .14$ ,  $P = .71$ ); sole of foot lacking white tubercles (100%); male SVL  $38.2 \pm 1.8$  mm, female  $41.8 \pm 2.4$  mm, females larger than males ( $F_{1, 68} = 49.7$ ,  $P < .001$ ); male head length/SVL ratio  $.394 \pm .012$ , female  $.387 \pm .014$ , male head longer than female ( $F_{1, 68} = 5.28$ ,  $P = .025$ ); male head width/SVL ratio  $.338 \pm .015$ , female  $.334 \pm .013$ , not sexually dimorphic ( $F_{1, 68} = 1.12$ ,  $P > .05$ ); male femur/SVL ratio  $.446 \pm .041$ , female  $.457 \pm .033$ , not sexually dimorphic ( $F_{1, 68} = 1.31$ ,  $P > .05$ ); male tibia/SVL ratio  $.512 \pm .024$ , female  $.527 \pm .031$ , female tibia longer than male ( $F_{1, 68} = 5.28$ ,  $P = .025$ ); male foot/SVL ratio  $.545 \pm .026$ , female  $.553 \pm .031$ , not sexually dimorphic ( $F_{1, 68} = 1.21$ ,  $P > .05$ ).

*Larval Characteristics*.—Unknown.

*Mating Call*.—Dominant frequency modulated between 1500–3600 hz; note duration about 0.8 s; note repetition rate 1.4 per second (from Rivero, 1971, fig. 58 reproduced here from same sonagram described by Rivero).

*Karyotype*.—Unknown.

*Distribution*.—Centered upon the Guiana Shield (fig. 55).

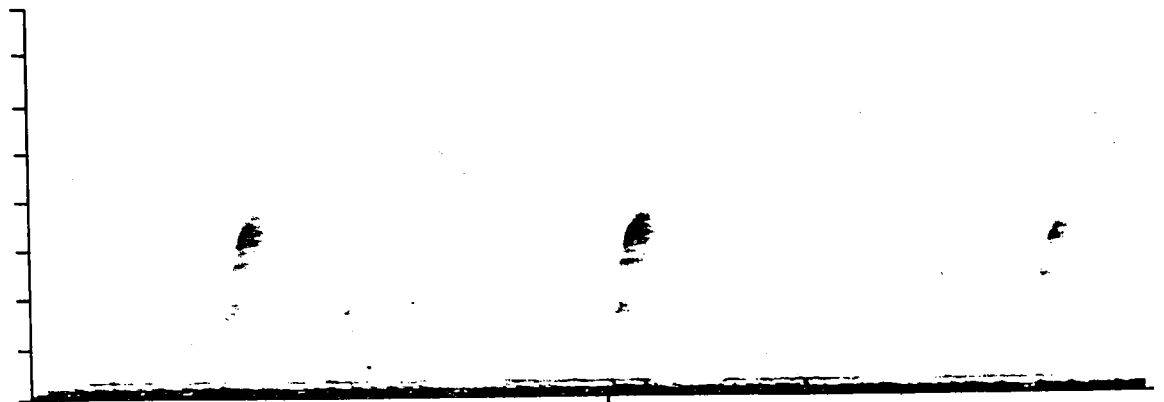


FIGURE 58. Sonagram of the mating call of *Leptodactylus longirostris*. Vertical scale marks at 1000 hz intervals. Horizontal scale mark at 1 s. Specimen from Venezuela, La Escalera (sonagram courtesy of Juan A. Rivero).

FIGURE 56. Dorsal views of striped (left, FMNH 128831) and unstriped (right, UPR 2641) *Leptodactylus longirostris*.

**BRASIL. AMAZONAS:** Ponta Negra, Negro River, MZUSP 24880; Tapera, Rio Negro, MZUSP 37518.

**PARÁ:** Igarapé Jaramacaru, Campos do Ariramba, MZUSP 28401-04; Rio Mapuera, at equator, AMNH 46189-190 (3); Rio Mapuera, R. Trombetas, AMNH 46187-88.

**GUYANA.** Kartabo, USNM 118065-66; Kuyuwini Landing, AMNH 49349-351, 49353-54 (4); upper Rupununi River, AMNH 81355-56.

**SURINAM.** Brownsberg Nature Park, Brokopondo Dist., MCZ 89648; Brownsweg, RMNH 17531, 17535; Christian Kondre, MZUSP 24758, 24761, 24765, 24767-772; Kaiserberg Airstrip, Zuid River, FMNH 128827-832, 128913-18, 128920-23, RMNH 17527 (4), 17530, 17549 (5); Krakka, RMNH 17540 (2); road between Krakka and Phedra, RMNH 17537, 17539 (2); Powakka, CM 49482, 49484, 44265, 44272, 44274; Matta, RMNH 17558; Sabakoe Creek, between Berlijn and Zanderij, RMNH 15106; Sipaliwini, RMNH 15176, 15178 (2), 17524-26, 17528-29, 17532-33, 17547, 17569; Tibiti, RMNH 17555, 17563; Troeli Cr., 6 km S Matta, RMNH 15115 (2), 15133 (4); Zanderij, MCZ 35642, MZUSP 15869-870, USNM 159066-67.

**VENEZUELA. BOLÍVAR:** km 104-151 on El Dorado-Santa Elena de Uairén Road, KU-WED 40072, 40078, 40080, 40085, 40151, 40181-82, 40208-09, 40263, 40281-87, 40381; La Escalera, Serrania de Lema, MCZ 79907, UPR 2641, 2643-45, 2647.

*LEPTODACTYLUS MARAMBAIAE* IZECKSOHN 1976

*Leptodactylus marambaiae* Izecksohn 1976:527-530, fig. 1. (Type locality, Brasil: Rio de Janeiro; Restinga da Marambaia. Holotype personal collection of Izecksohn 4123, adult male.)

**Diagnosis.**—The species with light longitudinal stripes on skin-folds on the dorsal surface of the tibia (fig. 48) (if light stripes indistinct, folds are present where stripes occur in other individuals) are *geminus*, *gracilis*, and *marambaiae*. *Leptodactylus marambaiae* has a shorter leg (e.g. tibia 50% SVL) than *gracilis* (e.g. tibia average 58% SVL in males, 57% SVL in females). At present, *marambaiae* cannot be morphologically distinguished from *geminus*. The note repetition rate of the mating call is slower for *marambaiae* (6 per second) than for *geminus* (22 per second).

**Adult Characteristics.**—Dorsum striped; mid-dorsal light stripe always present; light upper lip stripe distinct; no dark suborbital bar; light stripe on posterior face of thigh usually distinct, sometimes indistinct; tibia partially barred with light longitudinal pin stripes present; 6 well defined dorsolateral folds; upper surface of tibia lacking white tubercles; posterior surface of tarsus lacking white tubercles; sole of foot lacking white tubercles; male SVL 36.8 mm, female 40.2 mm; male head length/SVL ratio .40, female .36; male head width/SVL ratio .34, female .34; male femur/SVL ratio .44, female .44; male tibia/SVL ratio .50, female .50; male foot/SVL ratio .56, female .54.

**Larval Characteristics.**—Unknown.

**Mating Call.**—Dominant frequency modulates between 3000-3700 hz (fig. 59); call without harmonic structure; call not pulsed (fig. 60); note duration about 0.02 s; note repetition rate about 6 per second.

**Karyotype.**—Unknown.

**Distribution.**—Known only from the type locality (fig. 55).

**BRASIL. RIO DE JANEIRO:** Restinga da Marambaia.

*LEPTODACTYLUS MYSTACEUS* (SPIX) 1824

*Rana mystacea* Spix 1824:27, plate 3, fig. 3. (Type locality, Brasil: Bahia [Salvador as designated by Bokermann 1966]. Types lost.)

**Diagnosis.**—Most individual *mystaceus* have a combination of a distinct light stripe on the posterior surface of the thigh and distinct white tubercles on the surfaces of the posterior tarsus and sole of foot; these states are shared with *albilabris*, *elenae*, *fragilis*, and *latinasus*. *Leptodactylus mystaceus* have distinct dorsolateral folds (at least indicated by color pattern), *fragilis* and *latinasus* lack distinct dorsolateral folds. *Leptodactylus mystaceus* has white tubercles on the dorsal surface of the tibia, the tibia is smooth in *elenae*. *Leptodactylus mystaceus* is found in east coastal Brasil, *albilabris* occurs in the West Indies.

Some individuals of *mystaceus* lack the white tubercles on the tarsus and sole of foot (light thigh stripe present), these states are shared with at least some individuals of *fuscus*, *geminus*, *gracilis*, *laurae*, *longirostris*, *notoaktites*, and *poecilochilus*. The tubercles on the dorsal surface of the tibia distinguishes *mystaceus* from all these species.

**Adult Characteristics** ( $N = 38$ ).—Dorsum spotted or rarely uniform (fig. 1, A, C, 0); light mid-dorsal stripe usually absent (97%), presence not sexually dimorphic ( $X^2 = .08$ ,  $P = .78$ ); light lip stripe usually distinct (79%), distinctiveness not sexually dimorphic ( $X^2 = .14$ ,  $P = .71$ ); dark suborbital bar absent; light stripe on posterior face of thigh distinct (100%); tibia barred; usually 4 or 2 well defined dorsolateral folds, 6 dorsolateral folds present when light mid-dorsal stripe present; dorsal surface of tibia usually with many distinct white tubercles; posterior surface of tarsus usually with many distinct white tubercles (87%), tubercles sometimes lacking (13%), presence not sexually dimorphic ( $X^2 = .43$ ,  $P = .51$ ); sole of foot usually with many distinct tubercles (87%), tubercles sometimes lacking (13%), presence not sexually dimorphic ( $X^2 = .43$ ,  $P = .51$ ); male SVL  $42.7 \pm 2.3$  mm, female  $43.6 \pm 3.0$  mm, not sexually dimorphic ( $F_{1, 36} = 1.18$ ,  $P > .05$ ); male head length/SVL ratio  $.379 \pm .015$ , female  $.375 \pm .022$ , not sexually dimorphic ( $F_{1, 36} = .40$ ,  $P > .05$ ); male head width/SVL ratio  $.344 \pm .018$ , female  $.342 \pm .029$ , not sexually dimorphic ( $F_{1, 36} = .15$ ,  $P > .05$ ); male femur/SVL ratio  $.434 \pm .032$ , female  $.461 \pm .037$ , female femur longer than male ( $F_{1, 36} = 5.61$ ,  $.025 < P < .01$ ); male tibia/SVL ratio  $.509 \pm .015$ , female  $.517 \pm .029$ , not sexually dimorphic ( $F_{1, 36} = 1.42$ ,  $P > .05$ ); male foot/SVL ratio  $.554 \pm .022$ , female  $.548 \pm .034$ , not sexually dimorphic ( $F_{1, 36} = .42$ ,  $P > .05$ ).

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42,  $P > .05$ ).

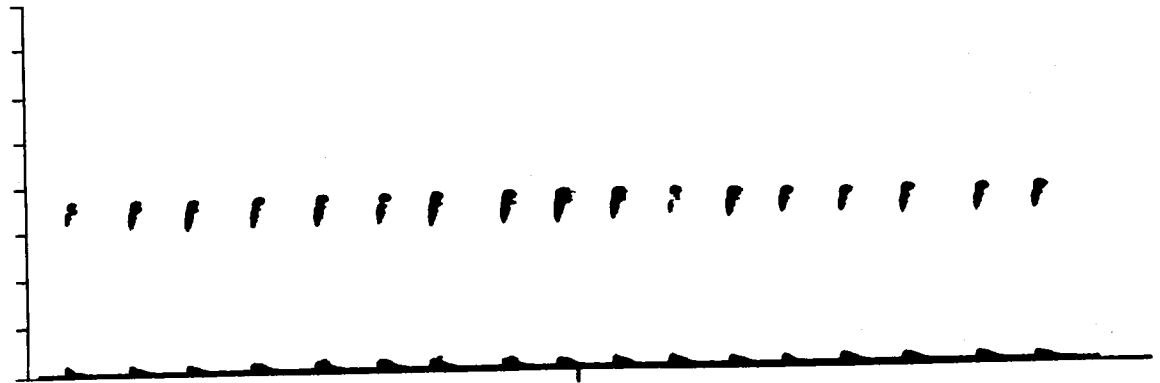


FIGURE 59. Sonagram of the mating call of *Leptodactylus marambaiae*. Vertical scale marks at 1000 hz intervals. Horizontal scale mark at 1 s. Specimen from Brasil, Restinga da Marambaia (tape courtesy of W. C. A. Bokermann).



FIGURE 60. Strip chart record of the mating call of *Leptodactylus marambaiae*. Line equals 0.01 s. See legend of Figure 59 for specimen data.

*Larval Characteristics*.—Unknown.

*Mating Call*.—Unknown.

*Karyotype*.—Unknown.

*Distribution*.—East coast of Brasil (fig. 61).

**BRASIL. BAHIA:** Copec. Ilhéus, MNRio 1724 (4), WCAB 45899–5919, 46570–6601, 47066–69; Itapetinga, WCAB 44885.

**ESPÍRITO SANTO:** Santa Teresa, CAS-SU 11787–88; São Mateus, MCZ 1298 (5).

**RIO DE JANEIRO:** Caxias, MNRio 1809 (5), 2374, 2861; Cidade dos Meninos, MNRio 1656 (3); Meriti, USNM 96222; Niteroi, Saco de São Francisco, USNM 96407–411, 99120; road to São Paulo, km 40, D. F., 97572; Serra de Friburgo, USNM 96467; Teresópolis, KU 92927–931, MNRio 397 (4), WCAB 12252.

*LEPTODACTYLUS MYSTACINUS* BURMEISTER 1861

*Cystignathus mystacinus* Burmeister 1861:532. (Type locality, Argentina. Holotype Martin-Luther-Universität, Halle (Saale), no number, male.)

*Cystignathus labialis* Cope 1878:90. (Type locality unknown. Presumed holotype USNM 31302, juvenile.)

*Diagnosis*.—The species having a combination of no light stripe on the posterior surface of the thigh and distinct white tubercles on the posterior surface of the tarsus are *bufonius*, *labrosus*, *mystacinus*, *troglydites*, and

*ventrimaculatus*. *Leptodactylus mystacinus* has distinct dorsolateral folds (at least indicated by color pattern), dorsolateral folds are indistinct or lacking in *bufonius* and *troglydites*. *Leptodactylus mystacinus* occurs east of the Andes, *labrosus* and *ventrimaculatus* occur west of the Andes.

*Adult Characteristics* ( $N = 87$ ).—Dorsum uniform, striped, or slightly spotted (fig. 1, A, C, J, K); no light mid-dorsal stripe; light lip stripe usually distinct (86%), sometimes indistinct (14%), more females (100%) with distinct lip stripes than males ( $\chi^2 = 4.10, P = .04$ ); dark suborbital bar absent; light stripe on posterior face of thigh usually absent (94%), rarely indistinct (6%), presence not sexually dimorphic ( $\chi^2 = 1.17, P = .28$ ); tibia barred; usually 2 or 4 well defined dorsolateral folds; dorsal surface of tibia with many or scattered distinct white tubercles; posterior surface of tarsus almost always (94%) with many or scattered distinct white tubercles, absence not sexually dimorphic ( $\chi^2 = .004, P = .95$ ); sole of foot usually with distinct scattered or many white tubercles (75%), sometimes absent (25%), presence not sexually dimorphic ( $\chi^2 = .41, P = .52$ ); male SVL  $53.0 \pm 4.6$  mm, female  $56.5 \pm 2.7$  mm, females larger than males ( $F_{1, 85} = 12.59, P < .001$ ); male head length/SVL ratio  $.371 \pm .013$ , female  $.358 \pm .013$ , male head

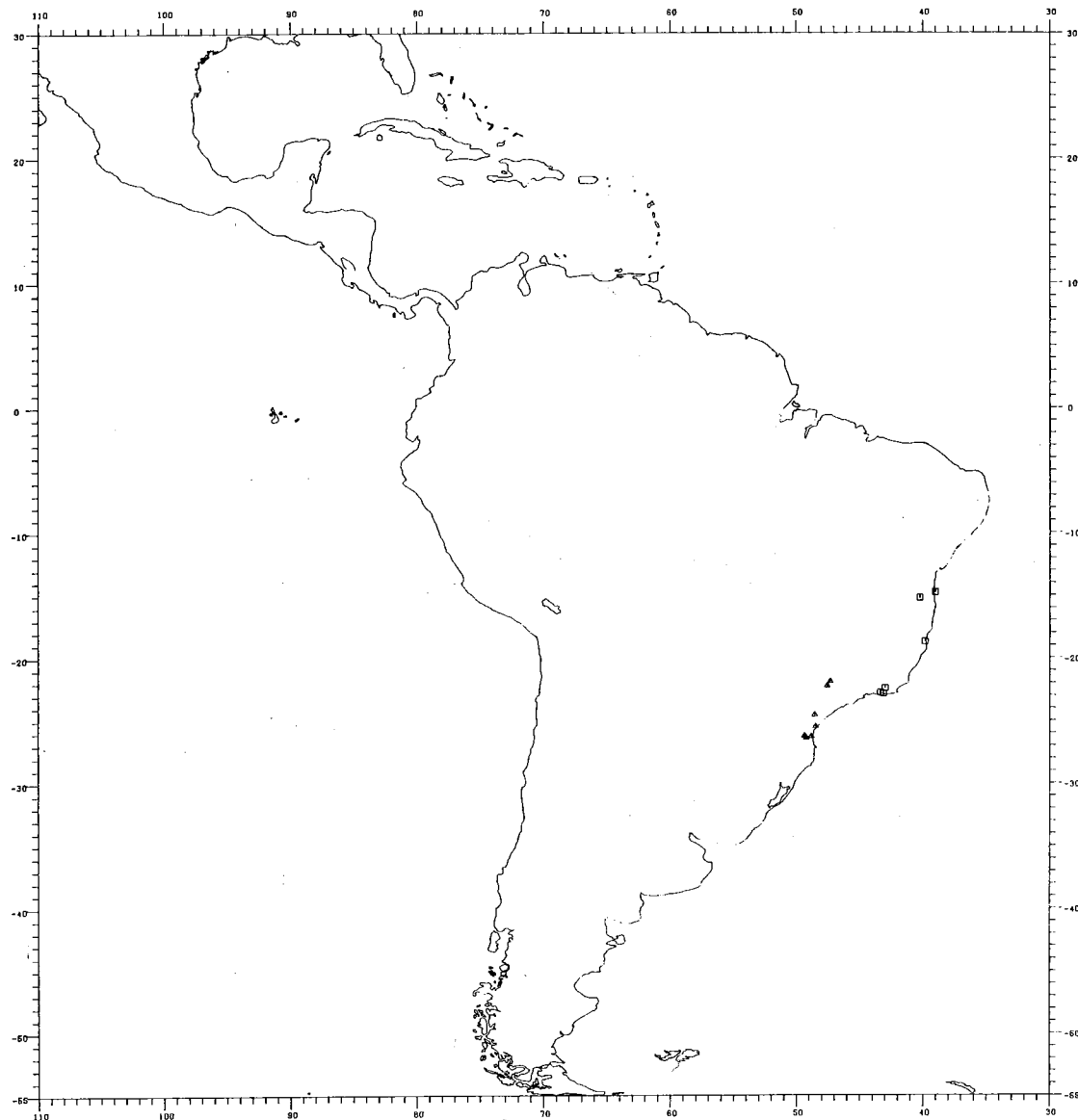


FIGURE 61. Distribution map of *Leptodactylus mystaceus* (squares) and *notoaktites* (triangles).

longer than female ( $F_{1, 85} = 18.17, P < .001$ ); male head width/SVL ratio  $.351 \pm .015$ , female  $.348 \pm .013$ , not sexually dimorphic ( $F_{1, 85} = .88, P = .94$ ); male femur/SVL ratio  $.388 \pm .023$ , female  $.389 \pm .024$ , not sexually dimorphic ( $F_{1, 85} = 1.52, P > .05$ ); male tibia/SVL ratio  $.421 \pm .013$ , female  $.416 \pm .018$ , not sexually dimorphic ( $F_{1, 85} = 2.34, P > .05$ ); male foot/SVL ratio  $.428 \pm .021$ , female  $.423 \pm .022$ , not sexually dimorphic ( $F_{1, 85} = 1.06, P > .05$ ).

*Larval Characteristics.*—Sazima (1975) described and figured the larvae.

*Mating Call.*—Dominant frequency modulates between 2200–2500 hz; note duration 0.1 s; note repetition rate 5–6.5 per second (Barrio 1965).

*Karyotype.*—Diploid number 22; 7 pair median, 3 pair submedian, 1 pair subterminal; secondary constriction on chromosome pair 11 (Bogart 1974).

*Distribution.*—Interior Brasil to and including the Gran Chaco, coastal southeast Brasil and Argentina (fig. 62).

**ARGENTINA.** BUENOS AIRES: Buenos Aires, MACN 4150.

CHACO: Ciervo Petizo, IML 243.

ENTRE RÍOS: Concepción del Uruguay, MACN 4530.

JUJUY: Sobre ruta entre Río San Francisco y La Realidad (5 km from Yuto), IML 1272; Ruta Yuto-Ledesma, IML 1273.

LA PAMPA: Conelo, MACN 1166; General Pico, MACN 4479, 4505, 4513.

MISIONES: Dos de Mayo, IML 2356; Puerto Piray, km 18,

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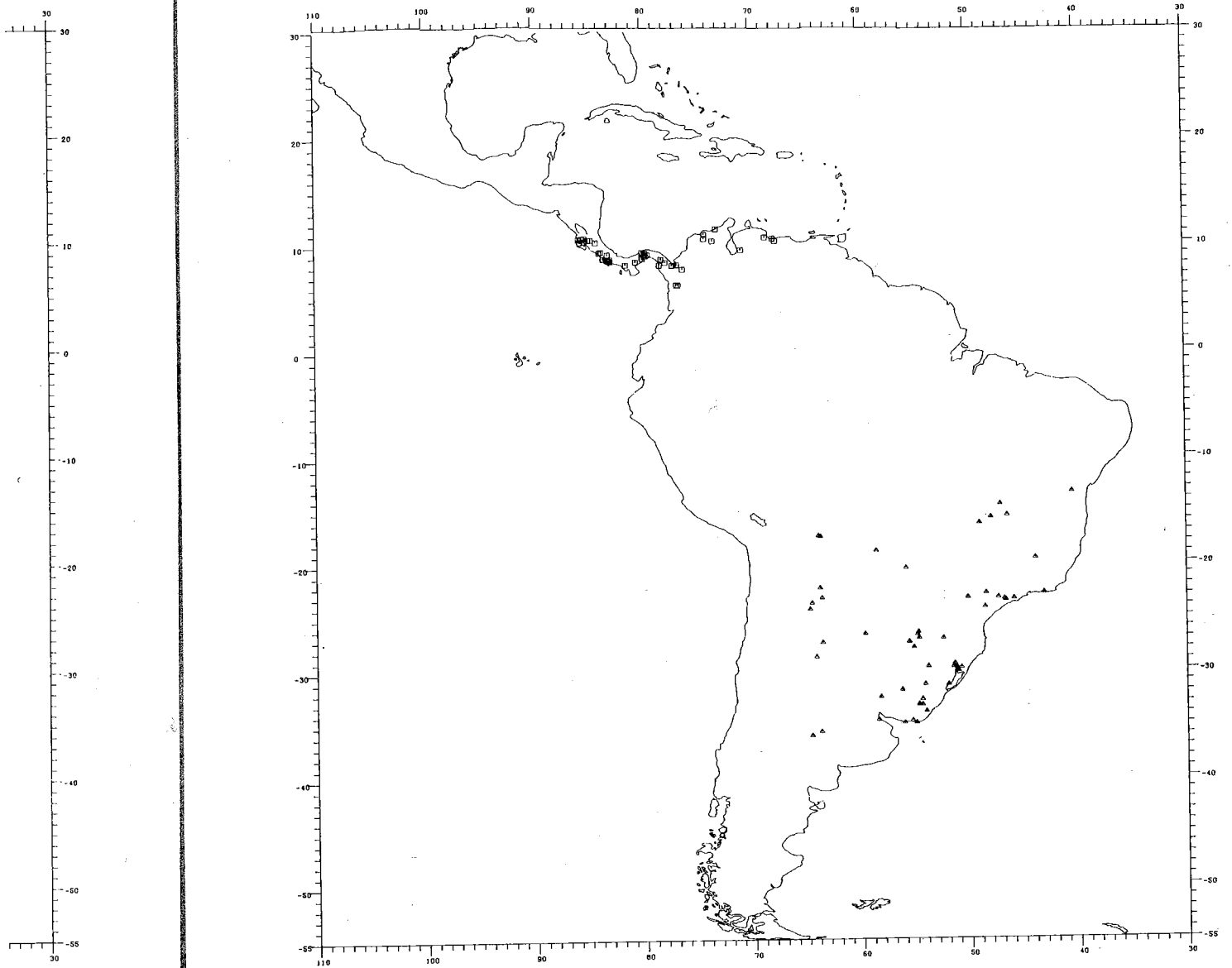


FIGURE 62. Distribution map of *Leptodactylus mystacinus* (triangles) and *poecilochilus* (squares).

MACN 2956; Río Paranay, FMNH 9462-66; 10870; San Javier, Puerto Londero, MACN 2072; Santa Ana, MACN 5548.  
 SALTA: Campo Aguaray, IML 1473; near Hickmann, IML 148, 433.  
 SANTIAGO DEL ESTERO: Caspi Corral, 96 km, IML 2188; Pajares, Simbol, Chichi Huaracunay y Guanaco, Depto. Atamisqui, IML 2230.  
 TUCUMÁN: Río Uruña, near border of Salta, IML 1428.  
**BOLIVIA.** SANTA CRUZ: Buenavista, MCZ 12897, UMMZ 66479 (2), 66480, 66488; El Carmen, CM 36097, MCZ 29986; Río Surutú, CM 3811.  
**BRASIL.** BAHIA: Maracás, WCAB 31825-28.  
 DISTRITO FEDERAL: Brasília, USNM 121292.  
 GOIÁS: Anápolis, AMNH 43847; Flôres, USNM 121270.  
 MATO GROSSO: Aquidauana, MZUSP 15800.  
 MINAS GERAIS: Lapa Vermelha, Lagoa Santa, MZUSP 15877; Urucua Riv., first waterfall, Buritís, MZUSP 25069.

PARANÁ: St. Antonio da Platina, MZUSP 24155.  
 RIO DE JANEIRO: Niteroi, Saco de São Francisco, AMNH 20308 USNM 99121.  
 RIO GRANDE DO SUL: Albardão, WCAB 16843; Bagé, WCAB 3878; 18 km S Farroupilha, FMNH 80374; Montenegro, MZUSP 16050; Pôrto Alegre, FMNH 80360-371, KU 92921-23, MZUSP 16048-49, 21688-89, WCAB 3876; 39 km N Rio Pardo, FMNH 80372-73; Sta. Maria, MZUSP 24153-54, USNM 121272, WCAB 5259; São Leopoldo, MZUSP 25478; São Lourenço, MZUSP 91, 1970; Viamão, MCZ 32695-96, WCAB 7137-178; Vila Nova, São Sepé, MZUSP 23707-08.  
 SANTA CATARINA: Nova Teutônia, MZUSP 8694-98.  
 SÃO PAULO: Botacatú, WCAB 4351; Ermelindo Matrazzo, MZUSP 8106; Faveiro, MZUSP 25423-26; Guapiara, WCAB 6119; Itu, FMNH 83235, KU 92923-24, WCAB 4306, 4311, 4314, 6223, 8230; Nova Itaperuna, WCAB 13660; Pe-

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URUGUAY. CANELONES: Carrasco, MZUSP 22640-41.

DURAZNO: 18 km NE Paloma, Arroyo del Estado, CM 57041-42.

LAVALLEJA: Río de Averías, Depto. Minas, FMNH 10400-01.

MALDONADO: Maldonado, FMNH 10155; Sierra de Animas, WCAB 7273.

ROCHA: 22 km SE Lascano, AMNH 71177.

TACUAREMBO: 3 km NE Tambores, Pozo Hondo, CM 55392-93.

30 Y 3: 8 mi E 30 y 3, FMNH 10465, 10470-72; Quebrada de los Cuervos, 45 km N 30 y 3, FMNH 10500.

#### LEPTODACTYLUS NOTOAKTITES NEW SPECIES

##### Figure 63

Holotype: MZUSP 25428, a female from Brasil; São Paulo, Iporanga. Collected by Nelson Papavero on 2 November 1963.

*Diagnosis.*—The species having a combination of a distinct light stripe on the posterior face of the thigh and a smooth posterior surface of the tarsus in some or all individuals are *amazonicus*, *fuscus*, *geminus*, *gracilis*,



FIGURE 63. Dorsal view of the holotype of *Leptodactylus notoaktites*.

*laurae*, *longirostris*, *marambaiae*, *mystaceus*, *notoaktites*, and *poecilochilus*. *Leptodactylus notoaktites* has a barred tibial pattern, the dorsal surface of the tibia has light stripes in *geminus*, *gracilis*, and *marambaiae*. Only individual *notoaktites* with a mid-dorsal light stripe have 6 dorsolateral folds; all *fuscus* and *laurae* individuals have 6 dorsolateral folds. *Leptodactylus notoaktites* has a shorter leg (e.g. male foot/SVL ratio  $.587 \pm .033$ , female  $.583 \pm .036$ ) than *laurae* (male foot/SVL ratio  $.649 \pm .039$ , female  $.628 \pm .028$ ). *Leptodactylus notoaktites* does not have the dorsal blotching of *L. fuscus*. Most *mystaceus* have white tubercles on the posterior surface of the tarsus. Some individual *notoaktites* have white tubercles on the sole of the foot, the sole of the foot is smooth in *longirostris* and *poecilochilus*. *Leptodactylus notoaktites* occurs in southeast Brasil, *longirostris* and *poecilochilus* are found in northern South America. Some *notoaktites* have a smooth sole of the foot and/or a light mid-dorsal stripe, all *amazonicus* have white tubercles on the sole of the foot and lack light mid-dorsal stripes; *amazonicus* occurs throughout the Amazon basin.

*Description of Holotype.*—Snout rounded-subelliptical from above, rounded in profile; canthus rostralis indistinct; loreal slightly concave; tympanum distinct, greatest diameter about  $\frac{1}{2}$  eye diameter; vomerine teeth in slightly arched series posterior to choanae; finger lengths in order of decreasing size  $I \approx III > II \approx IV$ ,  $I \gg II$ ; inner metacarpal tubercle oval, smaller than rounded outer metacarpal tubercle; dorsum smooth above anteriorly, warty on sides and posteriorly; 1 pair of distinct dorsolateral folds from eye to groin, 1 pair of indistinct lateral folds; ventral texture smooth; belly disk fold distinct; toe tips not expanded; toes free, lacking fringe or web; subarticular tubercles moderately developed; outer metatarsal tubercle small, round, about  $\frac{1}{4}$  oval inner metatarsal tubercle; tarsal fold indistinct; no metatarsal fold; posterior surface of tarsus smooth; sole of foot with 1 or 2 indistinct white tubercles.

SVL 56.1 mm, head length 20.6 mm, head width 18.4 mm, interorbital distance 3.7 mm, eye-nostril distance 5.0 mm, femur 27.0 mm, tibia 31.5 mm, foot 31.8 mm.

Dorsum brown with faint darker markings including an interorbital blotch and dorsal chevron; dorsolateral folds light outlined posteriorly; upper lip edge dark, bordered above by distinct light stripe from tip of snout passing under eye to angle of jaw; dark canthal stripe above light lip stripe from tip of snout to eye; venter immaculate; posterior surface of thigh mottled above, dark below with distinct light longitudinal stripe.

*Etymology.*—From the Greek *notos*, south, and *aktites*, coast dweller, in reference to the geographic distribution of the species in Brasil.

*Remark.*—This species was analyzed as south coastal *mystaceus*.

*Adult Characteristics* ( $N = 18$ ).—Dorsum spotted,

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blotched, or striped (fig. 1, A, C, O, striped pattern not figured); light mid-dorsal stripes present in 11% of individuals, presence not sexually dimorphic (Fisher's exact test  $P = 1.0$ ); light upper lip stripe usually distinct (78%), sometimes indistinct (22%), distinctiveness not sexually dimorphic (Fisher's exact test  $P = .29$ ); no dark suborbital bar; distinct light stripe on posterior face of thigh present (100%); tibia barred; upper surface of tibia lacking white tubercles; posterior surface of tarsus lacking white tubercles (100%); sole of foot usually with scattered or very few white tubercles (78%), sometimes absent (22%), presence not sexually dimorphic (Fisher's exact test  $P = 1.0$ ); male SVL  $47.4 \pm 3.4$  mm, female  $49.1 \pm 3.0$  mm, not sexually dimorphic ( $F_{1, 16} = 1.21$ ,  $P > .05$ ); male head length/SVL ratio  $.368 \pm .014$ , female  $.375 \pm .011$ , not sexually dimorphic ( $F_{1, 16} = 1.60$ ,  $P > .05$ ); male head width/SVL ratio  $.336 \pm .013$ , female  $.334 \pm .014$ , not sexually dimorphic ( $F_{1, 16} = .10$ ,  $P > .05$ ); male femur/SVL ratio  $.470 \pm .037$ , female  $.450 \pm .032$ , not sexually dimorphic ( $F_{1, 16} = 1.57$ ,  $P > .05$ ); male tibia/SVL ratio  $.533 \pm .024$ , female  $.549 \pm .021$ , not sexually dimorphic ( $F_{1, 16} = 2.11$ ,  $P > .05$ ); male foot/SVL ratio  $.587 \pm .033$ , female  $.583 \pm .036$ , not sexually dimorphic ( $F_{1, 16} = .04$ ,  $P > .05$ ).

*Larval Characteristics*.—Unknown.

*Mating Call*.—Unknown.

*Karyotype*.—Unknown.

*Distribution*.—Southeast Brasil (fig. 61).

**BRASIL. PARANÁ:** Paranaguá, WCAB 35170.

**SANTA CATARINA:** Colonia Hansa, Joinville, MZUSP 459, 1295; Humboldt (= Corupá), AMNH 15555; Rio Vermelho, WCAB 6717–723, 7929; Santa Luzia, prope Serra do Mar, MNRio 2148; São Bento, USNM 97176–78.

**SÃO PAULO:** Engenheiro Ferraz, MZUSP 25420; Iporanga, MZUSP 24149–150, 25428; Piraçununga, Cachoeira de Emas, MNRio 2107.

*LEPTODACTYLUS POECILOCHILUS* (COPE) 1862

*Cystignathus poecilochilus* Cope 1862:156–157. (Type locality, Colombia; Antioquia, Turbo. Holotype USNM 4347, male.)

*Leptodactylus quadrivittatus* Cope 1893:339–340. (Type locality, Costa Rica; Puntarenas, Buenos Aires. Holotype apparently lost.)

*Leptodactylus maculilabris* Boulenger 1896:404–405. (Type locality, Costa Rica; Guanacaste, Bebedero. Holotype BMNH 94.11.15.27.)

*Leptodactylus diptychus* Boulenger 1918:431. (Type locality, Andes of Venezuela. Holotype BMNH 94.8.31.11, female.)

*Diagnosis*.—The species having a combination of a distinct light stripe on the posterior surface of the thigh and smooth surfaces on the posterior tarsus and sole of the foot in some or all individuals are *fuscus*, *geminus*, *gracilis*, *laurae*, *longirostris*, *marambaiae*, *mystaceus*, *notoaktites*, and *poecilochilus*. The dorsal surface of the tibia lacks light longitudinal stripes in *poecilochilus*, such stripes are present in *geminus*, *gracilis*, and *mar-*

*ambaiae*. Only individuals of *poecilochilus* with light mid-dorsal stripes have 6 dorsolateral folds (fig. 64), all individuals of *fuscus* and *laurae* have 6 dorsolateral folds. The leg of *poecilochilus* is shorter (e.g. male foot/SVL ratio  $.514 \pm .029$ , female  $.508 \pm .029$ ) than *laurae* (male foot/SVL ratio  $.649 \pm .039$ , female  $.628 \pm .028$ ). *Leptodactylus poecilochilus* lacks the scattered dorsal blotches characteristic of *fuscus*, does not have a light lip stripe, and often has a dark suborbital bar (fig. 57). No *longirostris*, *mystaceus*, or *notoaktites* have a dark suborbital bar and individuals often have distinct light lip stripes.

*Adult Characteristics* ( $N = 133$ ).—Dorsum spotted, spots sometimes elongate, rarely fused (fig. 1, A, B, C, D, E) light mid-dorsal stripe present in 13% of individuals, presence not sexually dimorphic ( $\chi^2 = .35$ ,  $P = .55$ ); lip stripe indistinct; dark suborbital bar usually present (67%) or often absent (33%); light stripe on posterior face of thigh usually distinct (77%), sometimes indistinct (21%), rarely absent (2%), expression not sexually dimorphic ( $\chi^2 = 1.31$ ,  $P = .52$ ); tibia barred; usually 2 or 4 well defined dorsolateral folds present, 6 dorsolateral folds present when light mid-dorsal stripe present; dorsal surface of tibia lacking white tubercles; posterior surface of tarsus almost always lacking white tubercles (99%), presence not sexually dimorphic ( $\chi^2 = .07$ ,  $P = .80$ ); sole of foot almost always lacking white tubercles (93%), presence not sexually dimorphic ( $\chi^2 = .63$ ,  $P = .43$ ); male SVL  $44.8 \pm 2.2$  mm, female  $45.9 \pm 3.4$  mm, not sexually dimorphic ( $F_{1, 131} = 3.75$ ,  $P > .05$ ); male head length/SVL ratio  $.380 \pm .010$ , female  $.376 \pm .011$ , not sexually dimorphic ( $F_{1, 131} = 3.48$ ,  $P > .05$ ); male head width/SVL ratio  $.340 \pm .013$ , female  $.340 \pm .011$ , not sexually dimorphic ( $F_{1, 131} = .03$ ,  $P > .05$ ); male femur/SVL ratio  $.424 \pm .024$ , female  $.427 \pm .025$ , not sexually dimorphic, ( $F_{1, 131} = .32$ ,  $P > .05$ ); male tibia/SVL ratio  $.489 \pm .024$ , female  $.488 \pm .024$ , not sexually dimorphic ( $F_{1, 131} = .06$ ,  $P > .05$ ); male foot/SVL ratio  $.514 \pm .029$ , female  $.508 \pm .029$ , not sexually dimorphic ( $F_{1, 131} = 1.47$ ,  $P > .05$ ).

*Larval Characteristics*.—Eye diameter 9–14% head-body length; oral disk width 15–27% head-body width; oral papilla gap 45–65% oral disk width; 64–142 denticles on one side of split tooth row anterior to beak; head-body length 35–45% total length; total length, stage 41, 37 mm (Heyer 1970b, figs. 10, 15, 20).

*Mating Call*.—Dominant frequency modulates from 350–550 hz; call lacks harmonic structure; note non-pulsatile; note duration 0.055 to 0.080 s; note repetition rate. 1.7 per second (Straughan and Heyer 1976).

*Karyotype*.—Unknown.

*Distribution*.—Lowlands of Costa Rica to north coastal South America as far as Venezuela (fig. 62).

**COLOMBIA. ANTIOQUIA:** Belén, 2½ h upstream Pto. Palacios, Río Arquía, LACM 51090–1110, 51138–148; Finca Chibigüí, Río Arquía, LACM 51112–137; Finca Los Llanos,



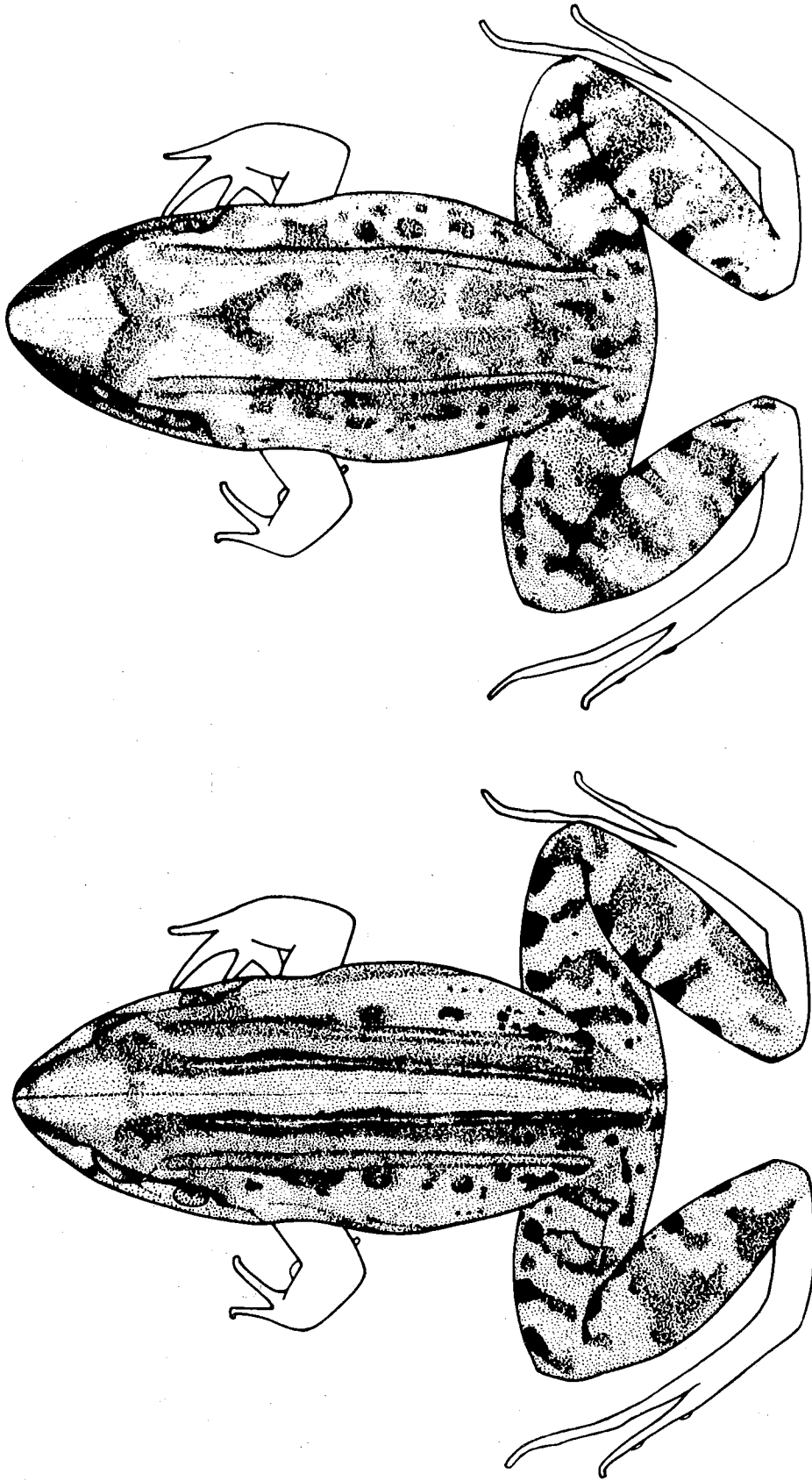


FIGURE 64. Dorsal views of striped (left, CRE 8039) and unstriped (right, LACM 51133) *Leptodactylus poecilochilus*.

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Río Arquía, LACM 51111; Pto. Palacios, Río Arquía, LACM 51089; Villa Arteaga, USNM 146437-38.

CHOCÓ: Golfo de Urabá, Unguía, FMNH 63846.

CÓRDOBA: Río Manso, trib. Río Sinú, USNM 151034-058.

GUAJIRA: Río Barbaça, UMMZ 54599, 54602-03.

MAGDALENA: Fundación, UMMZ 48505-06, 48508, 51106, USNM 102408, 102410; Río Frio, MCZ 16069; Valencia, UMMZ 54604-08.

NORTE DE SANTANDER: Río Zulia, USNM 147070, 147072-73.

COSTA RICA. ALAJUELA: 3 km W La Fortuna, CRE 8078.

GUANACASTE: Arenal, CRE 6254; Finca Comelco, 30 km NNW Cañas, UMMZ 131908; near Liberia, CRE 8207; near Playa del Coco, CRE 8143, UMMZ 129248 (2); Río Sandíllal, UMMZ 131909; 2 mi W Santa Cruz, CRE 8233; Hacienda Taboga, CRE 3086.

HEREDIA: Cariblanco, FMNH 175200.

PUNTARENAS: Coto, km 47 on rail from Golfito, CRE 176 (6), 178 (6), 180 (11); Finca Helechales, 15 km NE Potrero Grande, CRE 3126 (2), 8267-68; 6 km ESE Golfito, 10 m, CRE 7105; 8 km NE Potrero Grande, Finca del Sr. Treño, CRE 8279; near Rincón de Osa, CRE 705 (4), 750 (2), 3108, 6391 (2), 6545, 7228, 7236, LACM 53998-99, UMMZ 129258 (2); Villa Neily, 75 m, CRE 179, 8031, 8039.

SAN JOSÉ: Pozo Azul de Pirris, MCZ 7997-8001; 3 mi SSE San Isidro del General, CRE 8001; 13 mi WSW San Isidro del General, on Dominical road, 710 m, CRE 687.

PANAMA. CANAL ZONE: Cocoli, USNM 193340; Gatun, USNM 54177; near Madden Dam, FMNH 174061; near Paca, Military Road, FMNH 43577; Rosseau, KU 67960; Summit, MCZ 21834.

CHIRIQUÍ: Progreso, UMMZ 58267-272, 58275-283, USNM 118673.

COCLÉ: 1 km NE El Caño, 40 m, FMNH 22986.

DARIEN: Camp Creek, Camp Townsend, AMNH 41022; Ortiga, FMNH 170465, 170467; Río Canglón, UMMZ 125021 (3), 125022-29; Río Lara, FMNH 170304, 170392, 170436; Río Silugandí, UMMZ 113120-22 (3), 113123; Río Tuirá at Río Mono, KU 116829-831; Sambu Valley, Río Esaupe, MCZ 9161; Santa Fe Camp, FMNH 170269, 170308; S 6 VIII Camp, FMNH 170343.

PANAMÁ: Cermeño, MCZ 24880; Cerro Campana, FMNH 60500, MCZ 82072, USNM 139701; Río Itarare, FMNH 28856; Tapia, AMNH 18931.

SAN BLAS: SG VIII site, FMNH 170374.

VERAGUAS: Mojara, USNM 129841-42.

VENEZUELA. ARAGUA: near Maracay, Rancho Grande, AMNH 70688; near Ocumare, UMMZ 122374.

FALCÓN: 5 km S Palma Sola, UMMZ 55554; Soute Parriji, MCZ 25989; 19 km NW Urama, km 40, USNM field 1808, 5217, 5243, 5246.

GUÁRICO: Hato La Palmita, USNM 162702.

TRUJILLO: Sabana de Mendoza, UMMZ 57483.

#### LEPTODACTYLUS TROGLODYTES A. LUTZ 1926

*Leptodactylus troglodytes* A. Lutz 1926:149-150, plate 32, fig. 12. (Type locality, Brasil; Pernambuco, Procedencia. Holotype Adolfo Lutz collection, no number, female.)

**Diagnosis.**—The species lacking a distinct thigh stripe and having distinct white tubercles on the posterior surface of the tarsus in some or all individuals are *albilabris*, *bufonius*, *labrosus*, *mystacinus*, *troglydytes*, and *ventrimaculatus*. *Leptodactylus albilabris* usually has at

least an indication of a light stripe on the posterior surface of the thigh. *Leptodactylus troglodytes* lacks distinct dorsolateral folds; distinct dorsolateral folds (indicated at least by color pattern) occur in *albilabris*, *labrosus*, *mystacinus*, and *ventrimaculatus*. *Leptodactylus troglodytes* and *bufonius* are morphologically similar and have similar dorsal patterns (fig. 65). All individuals of *troglydytes* have distinct white tubercles on the sole of the foot, almost all *bufonius* have smooth surfaces on the sole of the foot. *Leptodactylus troglodytes* occurs in northeast Brasil, *bufonius* has a distribution centered upon the Gran Chaco.

**Remark.**—This is the species referred to as "northern *bufonius*" in the morphological analysis.

**Adult Characteristics** ( $N = 42$ ).—Dorsum with chevrons, spots, or blotches (fig. 1, A, B, C, G, L, N); no light mid-dorsal stripe; no light upper lip stripe; dark suborbital bar always present; light stripe on posterior face of thigh absent (100%); tibia barred; dorsolateral folds usually absent, 2 weak indistinct folds rarely present; dorsal surface of tibia with many distinct white tubercles; posterior surface of tarsus with distinct white tubercles (100%); sole of foot with white tubercles (100%); male SVL  $48.8 \pm 2.2$  mm, female  $49.9 \pm 1.8$  mm, not sexually dimorphic ( $F_{1, 40} = 2.67, P > .05$ ); male head length/SVL ratio  $.385 \pm .008$ , female  $.374 \pm .010$ , male head longer ( $F_{1, 40} = 16.17, P < .001$ ); male head width/SVL ratio  $.344 \pm .011$ , female  $.339 \pm .011$ , not sexually dimorphic ( $F_{1, 40} = 1.92, P > .05$ ); male femur/SVL ratio  $.400 \pm .020$ , female  $.393 \pm .015$ , not sexually dimorphic ( $F_{1, 40} = 1.38, P > .05$ ); male tibia/SVL ratio  $.406 \pm .012$ , female  $.397 \pm .014$ , male tibia longer ( $F_{1, 40} = 5.51, .01 < P < .025$ ); male foot/SVL ratio  $.395 \pm .011$ , female  $.386 \pm .016$ , male foot longer ( $F_{1, 40} = 5.38, .025 < P < .05$ ).

**Larval Characteristics.**—Unknown.

**Mating Call.**—Dominant frequency modulates from 2600-3200 hz (fig. 66); call without harmonic structure (fig. 67); call not pulsed; note duration .042 s; note repetition rate 1 per second.

**Karyotype.**—Unknown.

**Distribution.**—Northeast Brasil (fig. 68).

**BRASIL. BAHIA:** Andaraí, WCAB 43766-67; Barreiras, UMMZ 109980-81 (2); Carnaíba, WCAB 43867; Cocorobó, MZUSP 38278-79; Feira de Santana, WCAB 44085; Jeremoabo, MZUSP 38167; Maracás, WCAB 31813-824; Salvador, MZUSP 10715.

CEARÁ: Açude Amanarí, Maranguapé, MZUSP 13589; Fortaleza, WCAB 19149.

GOIÁS: Cana Brava, MZUSP 20441-42.

MINAS GERAIS: Rio Pandeiros, MZUSP 24695, USNM 121300.

PARAÍBA: Piancó, WCAB 3626, 4976.

PERNAMBUCO: Bonito, UMMZ 132461; Exú, WCAB 39218.

PIAUI: 35 km N Valença, MZUSP field 750647-652.

RIO GRANDE DO NORTE: Natal, Areia Preta, USNM 97048-49; Ponta Negra, MZUSP 25017.

SERGIPE: Areia Branca, MZUSP 37825-837.

