

TWO NEW SPECIES OF EARLESS FROGS ALLIED TO *ELEUTHERODACTYLUS SURDUS* (LEPTODACTYLIDAE) FROM THE PACIFIC SLOPES OF THE ECUADORIAN ANDES

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Abstract.—Two new species are described from cloud forests in western Ecuador. *Eleutherodactylus surdus* is redescribed and the purported Colombian subspecies is accorded specific status. The relationships among the five species of the *surdus* assembly are reviewed.

Eleutherodactylus surdus was named by Boulenger (1882) on the basis of one specimen from the Andes of western Ecuador and another from "South America." The species was rediscovered in high cloud forests in Imbabura and Pichincha provinces, Ecuador, in 1967 and 1968 and briefly mentioned by Lynch (1970) who compared it with two species he thought allied. Cochran and Goin (1970) named *Eleutherodactylus surdus cabrerai* from the northern reaches of the Cordillera Central in Colombia. Lynch (1979) compared *E. surdus* to *E. baryecus* from the eastern slope of the Andes in Ecuador. Lynch and Duellman (1980) considered *E. baryecus* and *E. surdus* the only named members of the *surdus* assembly of the *unistrigatus* group of *Eleutherodactylus*.

Fieldwork by William E. Duellman in 1975 and additional surveys by me in 1977 and 1978 revealed the presence of two other species on the western slopes of the Andes in Ecuador. One of these species was considered an undescribed trans-Andean representative of the *pugnax* assembly of the *unistrigatus* group by Lynch and Duellman (1980).

Eleutherodactylus baryecus Lynch, *E. pugnax* Lynch, and *E. surdus* (Boulenger) (but not *E. surdus cabrerai* Cochran and Goin) are distinctive in lacking ears (tympanum, plectrum, and *cavum tympanicum*). Both of the new species described below lack ears as well. Ear loss has occurred elsewhere among *Eleutherodactylus* (e.g., *E. anotis* Walker and Test, *E. colodactylus* Lynch, *E. ruidus* Lynch) but is tentatively considered evidence of relationship among *E. baryecus*, *E. pugnax*, *E. surdus*, and two new species. Discovery of the new species requires that *E. surdus* be redescribed.

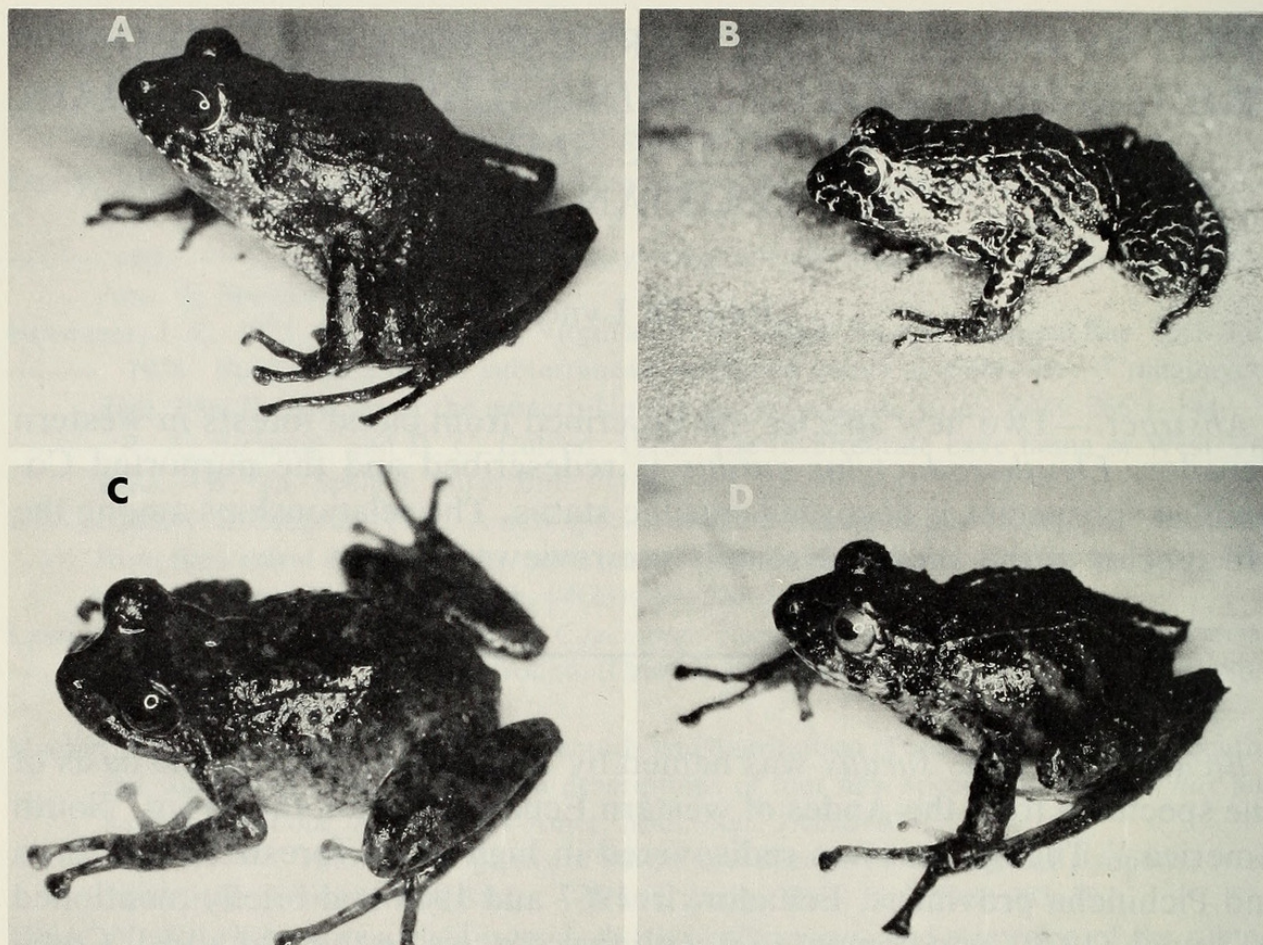


Fig. 1.—Pacific versant species of the *surdus* assembly of *Eleutherodactylus*. (A) *E. surdus*, female, 48.3 mm SVL, KU 179000; (B) *E. surdus*, ca. 30–40 mm SVL, not preserved, from Los Alpes; (C) *E. duellmani*, female, 44.6 mm SVL, KU 179252; (D) *E. sobetes*, female (holotype), 41.3 mm SVL, 179389.

Materials and Methods

Measurements were taken as described by Lynch and Duellman (1980); unless stated otherwise, data refer to adults. Maturity in males was assumed if the testes were enlarged and in females if convoluted oviducts or enlarged eggs were present. The following abbreviations are used: SVL (snout–vent length), HW (head width), IOD (interorbital distance), and E–N (eye to nostril distance). Statements given in the diagnoses are not repeated in the descriptions unless a qualification is required. All specimens are deposited at the University of Kansas Museum of Natural History (KU). The abbreviations AMNH and BM(NH) refer to American Museum of Natural History and to British Museum (Natural History), respectively.

Status of Colombian Populations

Cochran and Goin's (1970:401) casual remark that *Eleutherodactylus surdus cabrerai* is obviously related to the Ecuadorian *E. surdus* requires cor-

rection. Their description and illustrations of *cabrerai* adequately contradict their assertion of close relationship. *Eleutherodactylus cabrerai*, new combination, differs from *E. surdus* in having a fully developed ear concealed beneath the skin, in having pustular skin on the dorsum, in lacking cranial crests, and in having small, widely separated vomerine odontophores. Four males (AMNH 14012, 14014–15, 14026) are 18.0–28.6 mm SVL and lack vocal slits. Two gravid females (AMNH 14008, 14011) are 35.3–37.1 mm SVL.

Eleutherodactylus surdus (Boulenger)

Fig. 1A–B

Hylodes surdus Boulenger, 1882:212, pl. 14. fig. 3. [Cotypes.—BM(NH) 60.6.16.106 (reregistered as 1947.2.17.25) and 71.4.16.46 (reregistered as 1947.2.17.26), former from W Ecuador (Fraser) and latter from South America].

[*Eleutherodactylus surdus*] *surdus*: Cochran and Goin, 1970:339–401.

Diagnosis.—1) skin of dorsum smooth (some warts on upper flanks), that of venter areolate; dorsolateral folds absent or very feebly developed; 2) tympanum absent; 3) snout ovoid to subacuminate in dorsal view, round in profile; snout short, E–N < eye length; canthus rostralis sharp; 4) cranial crests present; 5) vomerine odontophores massive, oval in outline; 6) males lacking vocal sac and slits; no nuptial pad in males; 7) first finger shorter than second; broad discs on all fingers; pads on II–IV; 8) fingers with narrow, keel-like lateral fringes; 9) ulnar tubercles not evident; 10) knee, heel, and tarsus lacking tubercles; 11) outer metatarsal tubercle indistinct, $\frac{1}{5}$ size of oval inner; supernumerary plantar tubercles at bases of toes; 12) toes with thick lateral fringes, not webbed; discs and pads like those of fingers except smaller; 13) gray above with indefinite brown markings on dorsum; facial markings prominent; venter cream with brown marbling, throat nearly uniform brown; posterior surfaces of thighs brown with white spots; groin brown with vertical cream bars; underside of shank boldly barred; 14) adults moderate-sized, SVL of males 24.5–36.9 mm ($\bar{x} = 31.1 \pm 1.2$ [± 2 standard errors], N = 34), of females 40.4–50.5 ($\bar{x} = 45.1 \pm 1.5$, N = 13).

Eleutherodactylus surdus differs from most other species of the genus in the absence of the ear but is similar in size and habitus to *E. baryecus* and the two species described below. Both of the new species have warty skin on the dorsum and each has distinct dorsolateral folds. Each has more fleshy lateral fringes on the fingers. *Eleutherodactylus baryecus* has a more rounded snout, distinct brown markings on the dorsum, and lacks lateral fringes or keels on the fingers.

Description.—Head narrower than to as wide as body, much wider than

Table 1.—Proportions (as percentages) of some frogs of the *surdus* assembly of *Eleuthero-*
dactylus. First line gives range, second gives mean $\pm$ 2 standard errors and N (in parentheses).

	Tibia/SVL	HW/SVL	Eyelid/IOD	E–N/eye
<i>E. duellmani</i> ♂	48.9–58.8	35.4–41.1	78.8–129.6	59.0–79.5
	54.6 $\pm$ 1.0 (32)	37.8 $\pm$ 0.6 (32)	102.3 $\pm$ 4.3 (32)	69.6 $\pm$ 1.9 (32)
<i>E. duellmani</i> ♀	47.8–59.9	35.7–41.1	81.6–126.2	61.5–80.2
	54.2 $\pm$ 1.5 (17)	38.7 $\pm$ 0.6 (17)	105.7 $\pm$ 4.9 (17)	70.3 $\pm$ 2.5 (17)
<i>E. sobetes</i> ♀ (2)	56.0–57.3	40.3–41.4	80.0–108.7	84.1–88.2
<i>E. surdus</i> ♂	53.0–61.4	33.6–40.3	68.8–108.6	70.8–83.3
	58.0 $\pm$ 0.9 (34)	37.9 $\pm$ 0.6 (34)	87.4 $\pm$ 4.4 (28)	76.9 $\pm$ 2.6 (11)
<i>E. surdus</i> ♀	53.4–62.6	35.4–39.5	75.0–100.0	73.2–81.5
	58.1 $\pm$ 1.5 (13)	37.3 $\pm$ 0.6 (13)	81.6 $\pm$ 4.4 (13)	78.1 $\pm$ 2.9 (5)

long; snout ovoid to subacuminate (smaller individuals) in dorsal view; nostrils small, weakly protuberant, directed dorsolaterally; loreal region weakly concave, sloping abruptly to lips; lips not flared; interorbital region furrowed, broader than upper eyelid; no tubercles on upper eyelid; supratympanic fold distinct, ending above forearm; subconical postrictal tubercles anterior to end of supratympanic fold; choanae relatively small, not concealed by palatal shelf of maxillary arch when roof of mouth is viewed from directly above; vomerine odontophores median and posterior to choanae, oval (rarely faintly triangular) in outline, large, separated on midline by distance equal to an odontophore breadth, each 3 times size of a choana, bearing 5–6 teeth in a clump or indefinite transverse row; tongue longer than wide, its posterior border not notched, posterior $\frac{1}{3}$ not adherent to floor of mouth; males lack vocal slits; in many preserved males the loose skin on the throat suggests the presence of vocal sacs but none was found.

Skin of dorsal surfaces smooth except for some roughening (fine ridges) on lower back; flanks becoming areolate ventrally with scattered small warts on upper flanks; throat smooth; discoidal folds distinct; anal opening not extended in sheath; no anal warts.

Ulnar tubercles not evident except for small antebrachial; palmar tubercle bifid, twice as large as oval thenar tubercle; supernumerary palmar tubercles pale, indefinite, flattened; subarticular tubercles low, round; discs broader than long; tip of thumb scarcely wider than digit; fingers III–IV bearing broad, apically rounded pads, about twice as wide as digit below pad, that on II smaller; all fingers long; thumb of breeding males not swollen nor bearing nuptial pad.

Tubercles normally absent on tarsus but in some individuals a faint row of smaller outer tarsal tubercles and an indistinct tubercle just proximal to the inner metatarsal tubercle are evident; inner metatarsal tubercle twice

as long as wide; plantar surface bearing supernumerary tubercles at bases of toes II–IV; subarticular tubercles longer than wide, moderately elevated; toes bearing prominent, thick lateral fringes coalescing at toe bases; toes not webbed; pads of toes bear broad discs, apically rounded; heels of flexed hind legs overlap; heel of adpressed hind leg reaches to anterior edge of eye or nostril.

Coloration.—Dark gray to gray-brown above with indistinct brown to nearly black markings (interorbital bar, scapular and sacral chevrons); canthal-supratympanic stripe and labial bars black edged with white; limb bars indistinct; anal triangle rarely evident; throat brown with white flecks along jaw; venter cream, heavily marbled with brown; undersides of thighs brown with cream spots; underside of shank and top of tarsus cream, barred with black; anterior surfaces of thighs and groin cream with broad vertical black bars; posterior surfaces of thighs dark brown with white spots (smaller than thumb pad).

In life, *E. surdus* is light to dark brown (sometimes with a greenish to reddish-orange wash) with darker brown markings. The side of the head and flanks have a suffusion of yellow. The throat is heavily pigmented with brown; the venter is dirty white and heavily reticulated and spotted with black or dark brown. The groin and concealed surfaces of the limbs are dirty white with brown markings (or brown with dirty white spots and bars). The iris is reddish-brown with black flecks. Some individuals have yellow flecks on the dorsal surfaces.

Variation.—In small individuals a dorsal color pattern is usually evident (see Boulenger, 1882:pl. 14, fig. 3) but the pattern is essentially obliterated in adults. Variability in proportions is summarized in Table 1.

Natural history.—In 1967 and 1968, *E. surdus* was abundant along the roadcuts at 'Los Alpes,' a construction site on the Aloag-Tandapi road. The forests extended virtually to the roadside and the newly exposed rock walls were continuously dripping water. By 1977, this site had dried appreciably and the forests were cut back well away from the road. Casual search did not yield specimens of *E. surdus*.

At La Delicia (Otavalo–Apuela road), *E. surdus* was found at night perched on moss-covered banks along the edge of the road or on dirt banks along streams. The forests still occur near the road. *Eleutherodactylus surdus* was not found along heavily wooded forest streams (where *E. duellmani* was encountered).

Reproductively active animals (enlarged eggs/swollen testes) were found in January, March, June, and July.

Distribution.—Known only from upper cloud forests (2,500–2,700 m) in western Ecuador. ECUADOR, *Prov. Imbabura*: La Delicia, 2,700 m, KU 130888–90, 179000–16. *Prov. Pichincha*: Los Alpes, 2,500 m, KU 111385–94, 117584–617.

Eleutherodactylus duellmani, new species

Fig. 1C

Holotype.—KU 179325, an adult male, one of a series collected at the waterfall on the Quebrada Zapadores, 5 km ESE Chiriboga, Provincia Pichincha, Ecuador, 1,920 m, on 9 July 1977 by John D. Lynch.

Paratypes.—KU 165913–21, 179316–24, 179326–37, from the Quebrada Zapadores (between bridge and first waterfall).

Diagnosis.—1) skin of dorsum and flanks bearing many small flat warts, that of venter areolate; dorsolateral folds reaching sacrum; 2) tympanum absent; 3) snout ovoid in dorsal view, rounded to truncate in profile; snout short, E–N < eye length; canthus rostralis moderately sharp; 4) interorbital region furrowed; 5) vomerine odontophores large, subtriangular in outline; 6) males lacking vocal sac and slits; males with small, indistinct, nuptial pad on thumb; 7) first finger shorter than second; broad discs on all fingers; pads on II–IV; 8) fingers with lateral fringes; 9) ulnar tubercles not distinct; 10) small tubercles on heel and outer tarsus; large tubercle on inner edge of tarsus; 11) outer metatarsal tubercle not always evident, inner oval, at least 8 times size of outer; few supernumerary plantar tubercles, indistinct; 12) toes with lateral fringes, webbing (not enclosing basal subarticular tubercles), broad discs, large pads; 13) brown above with diffuse brown markings; venter gray to cream with diffuse cream spots or brown reticulation; 14) adults moderate-sized, SVL of males 24.9–36.0 mm ($\bar{x} = 31.2 \pm 1.2$, N = 32), of females 36.6–45.8 ($\bar{x} = 41.8 \pm 1.3$, N = 17).

Eleutherodactylus duellmani is most similar to *E. baryecus* Lynch, *E. pugnax* Lynch, *E. surdus* (Boulenger), and *E. sobetes* (described below) but differs from *E. baryecus* and *E. surdus* in having warty (not smooth) skin on the dorsum and in having short dorsolateral folds. It differs from *E. pugnax* in having only basal webbing of the toes and in lacking an inner tarsal fold. From *E. sobetes*, *E. duellmani* differs in lacking fleshy canthal ridges, in having an incomplete dorsolateral fold, and in having more numerous flat warts on the dorsum. The iris is brown in *E. duellmani* and orange in *E. sobetes*.

Description.—Head narrower than (large females) to as wide as body, much wider than long; snout ovoid in dorsal view (intermediate between subacuminate and round); nostrils minute, not or only slightly protuberant, directed dorsolaterally; canthus rostralis evident but rounded and concave; loreal region concave, sloping abruptly to lips; lips not flared; tubercles on upper eyelid, none especially prominent; supratympanic fold obscured by subconical to conical warts; large conical postrictal tubercles; choanae relatively small, round, not concealed by palatal shelf of maxillary arch; vomerine odontophores massive, each 3–4 times size of a choana, lying medial

and posterior to choanae, roughly triangular in outline, bearing transverse row of 4–6 small teeth, odontophores separated on midline by distance equal to odontophore width; tongue longer than wide, its posterior border not notched, posterior $\frac{1}{5}$ not adherent to floor of mouth.

Skin of dorsal surface beset with many warts, those toward head separated, those caudad more nearly juxtaposed; tubercles form dorsolateral folds; similar tubercles on limbs and flanks; anal opening not extended in sheath; skin of throat areolate; discoidal folds ill-defined, lying antieriad to groin.

Ulnar tubercles not distinct from tubercles on dorsal and lateral surface of forearm; palmar tubercle bifid, about size of elongate thenar tubercle; supernumerary palmar tubercles low, distinct, smaller than subarticular tubercles which are elevated, broader than long, weakly bifid; thumb lacking pad or pad only slightly dilated; pads on II–IV broadly dilated (largest on III and IV), round apically on I–II, weakly emarginate on III–IV; males lacking swollen thumbs but with small, white nuptial pads on thumbs.

Small tubercle on knee, one conical (and several nonconical) tubercle on heel, 2–3 subconical tubercles on outer edge of tarsus, and an elongate tubercle (or short fold) on inner edge of distal one-third of tarsus; inner metatarsal tubercle twice as long as wide; outer metatarsal tubercle minute, less than $\frac{1}{8}$ size of inner, not visible in some individuals; a few small supernumerary plantar tubercles below toe IV; fringe along outer edge of sole; fringes coalesce at bases of toes, but webbing only encroaches onto proximal half of basal subarticular tubercles (except on toe V); subarticular tubercles broader than long, flat, not bifid; discs much broader than long, on expanded pads; toe pads apically round with only vague suggestion of emargination; heels of flexed hind legs overlap slightly.

Coloration.—Dark brown to pale yellow brown above with brown occipital W, sacral chevron, interorbital bar; canthal-supratympanic stripe and labial bars distinct on dark specimens (edged with cream) but vague on pale specimens; warts on lower back pale (nearly cream); flanks lack pattern, upper flanks darker, lower flanks cream; anal triangle gray to brown; thigh bars broadest proximally (much broader than interspaces); shank bars oblique, wider than to as wide as pale interspaces; innermost fingers and toes cream, without markings; posterior surfaces of thighs brown with a few cream flecks; ventral surfaces gray to cream, finely peppered with brown; throat darker than venter; undersides of limbs finely mottled with brown.

In life, *E. duellmani* is usually brown (pale to dark) above and gray to dirty cream below. Dorsal markings are normally obscure except for vague brown blotches and orange warts on the lower back and hind limbs. The iris is chocolate brown with black reticulations and a faint red horizontal streak. The posterior surfaces of the thighs vary from dull yellow to brown with dull yellow spots. The face and flanks usually bear small white spots.

The venter normally has diffuse cream spots or vague brown reticulation. Some individuals (mostly juveniles) are green above. A green tinge is evident in many adults.

Measurements of holotype in mm.—SVL 32.3; shank 18.6; HW 13.0; head length 11.1; upper eyelid width 3.2; IOD 2.7; eye length 4.9; E–N 3.2.

Etymology.—The species is named for William E. Duellman who first collected it and across whose trails I have trod in quest of Andean frogs.

Natural history.—*E. duellmani* prefers well-watered microhabitats. At the type locality, many individuals were seen perched on wet rock faces in the spray zone of the waterfall. Fewer individuals were seen on vegetation downstream. Above the type locality (14.8 km ESE Chiriboga), I found nine specimens beneath leaves, dirt, and rocks in a seep off the cliffside. The frogs were in the water in the spaces between rocks and organic debris. Searching 100 m on either side of the seep in less mesic habitats revealed no frogs. Along the Colombian border (ca. 14 km [airline] SE Maldonado) many frogs were found in a large seep on a hillside. Frogs were mostly found beneath rocks in the water and many escaped by jumping into the small streams. Both of these sites were inspected only in the daytime. At La Delicia on the Cordillera de Intac, *E. duellmani* was found only at night perched on branches and leaves immediately above (0.1–0.5 m) small streams.

Gravid females and males with swollen testes (and thumb pads) were collected in January, April, May, June, and July (in both dry and wet seasons). The largest juvenile male examined is 26.9 mm SVL (KU 179292). The largest juvenile female (oviducts not convoluted) is 38.1 mm SVL (KU 179285).

Distribution.—Upper cloud forests (1,920–2,700 m) in northwestern Ecuador. The following have been examined (in addition to the types): EC-UADOR, *Prov. Carchi*: 14 km SW (airline) Maldonado, 2,500 m, KU 179251–72, 179274–95; *Prov. Imbabura*: La Delicia, 2,700 m, KU 179296–315; 9 km SE Tandayapa, 2,150 m, KU 165905–09; *Prov. Pichincha*: 14 km W Chiriboga, 1,960 m, KU 165910–12; 14.8 km ESE Chiriboga, 2,410 m, KU 179338–46.

Eleutherodactylus sobetes, new species

Fig. 1D

Holotype.—KU 179389, an adult female, obtained at the Quebrada Zapadores, 5 km ESE Chiriboga, Provincia Pichincha, Ecuador, 1920 m, on 9 July 1978 by John D. Lynch.

Paratype.—KU 179390, taken syntopic with holotype.

Diagnosis.—1) skin of dorsum smooth with many small pustules, that of venter coarsely areolate; pungent tubercles on upper eyelid; thin dorsolat-

eral folds present; 2) tympanum absent; 3) snout subacuminate in dorsal view, round in profile; snout short, $E-N < \text{eye}$; canthus rostralis sharp; 4) cranial crests present; 5) vomerine odontophores massive; oval in outline; 7) first finger shorter than second; broad discs on all fingers; pads on II–IV; 8) fingers with thick lateral fringes; 9) ulnar tubercles indistinct; 10) conical heel tubercle; thin ridge with small tubercles on outer edge of tarsus; 11) two metatarsal tubercles, inner oval, 5–6 times size of outer; supernumerary plantar tubercles present at bases of toes; 12) toes with lateral fringes; broad discs on dilated toe pads; 13) pale brown with bold dark brown markings above; dorsolateral folds cream; venter cream with brown spots peripherally; posterior surfaces of thighs brown; iris orange in life; 14) adults moderate-sized, one adult female 41.3 mm SVL.

Eleutherodactylus sobetes is most similar to *E. surdus* (Boulenger) but differs in having the skin of the dorsum punctuated by pustules, in having pungent tubercles on the eyelid, knee, and heel, and in having a fleshy canthal ridge.

Description.—Head as wide as body, wider than long; nostrils not or only slightly protuberant, directed dorsolaterally; canthus rostralis sharp, slightly concave, its sharpness accentuated by canthal ridge; loreal region weakly concave, sloping abruptly to lips; lips not flared; upper eyelid bearing several pungent but small tubercles; one pungent tubercle between eyes; temporal region swollen, supratympanic fold replaced by ridge of low tubercles; postrictal tubercles subconical; roof of mouth vaulted so that when examined from directly above choanae are seen obliquely and appear small; choanae oval in outline, not concealed by palatal shelf of maxillary arch; vomerine odontophores 3–4 times size of a choana, lying medial to and posterior to choanae, separated on midline by distance equal $\frac{2}{3}$ width of an odontophore, bearing a transverse row of 3–6 large, pointed teeth; tongue longer than broad, its posterior border not notched, posterior $\frac{1}{4}$ not adherent to floor of mouth.

Skin of dorsum smooth but beset with many small pustules which sometimes coalesce to form short ridges, that of flanks same but grading into uniform areolation towards edge of venter; pustules poorly expressed on side of head and on snout; a pair of thin dorsolateral folds extending from posterolateral corner of eye to above groin (curving medially at about level of forelimb); skin on limbs smooth with occasional tubercles (especially on shank); anal opening not extended in sheath; skin below and lateral to vent coarsely areolate, that of throat and venter areolate (but less coarse than that below vent) except in center of breast (nearly smooth); discoidal fold well anteriad to groin.

Ulnar tubercles present but not different from pustules on dorsal surfaces, except antebrachial larger; a tubercle on elbow; palmar tubercle strongly bifid (or divided into 2 tubercles, median one twice size of outer); median

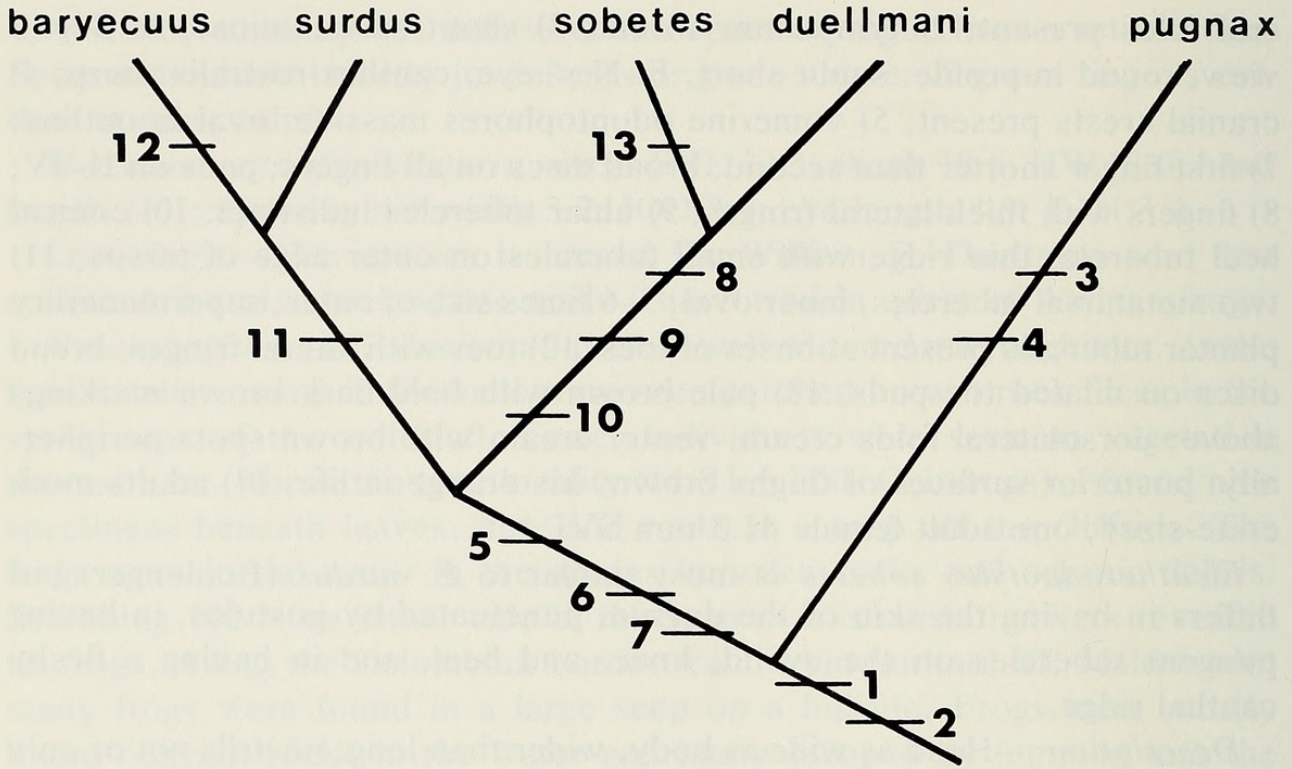


Fig. 2.—Postulated relationships within the *surdus* assembly of *Eleutherodactylus*. Traits are numbered (see text, p. 337).

palmar tubercle as large as oval thenar tubercle; numerous supernumary palmar tubercles, especially below fingers III–IV, smaller and less pungent than subarticular tubercles which are round, elevated; fingers bearing fleshy fringes (also present on outer edge of palm and finger IV and on inner edge of thumb); pad on thumb scarcely developed, those on fingers II–IV broad, rounded apically; largest pads on fingers III–IV; fingers relatively long.

A subconical tubercle on knee; an indistinct tubercle on inner edge of tarsus just proximal to inner metatarsal tubercle which is twice as long as wide, not compressed; outer metatarsal tubercle subconical; supernumerary plantar tubercles low, at bases of toes I–IV, sometimes with additional smaller tubercles lying proximal to other; subarticular tubercles round, pungent, more distal tubercles (toes III–V) smaller than basal tubercles; toes bearing fringe-like fleshy folds along lateral margins (including I and V) which coalesce basally forming rudimentary webbing (not encroaching on basal subarticular tubercles except on V); toe pads smaller than those of outer fingers but otherwise identical; heels of flexed hind legs barely overlapping.

Coloration.—Pale brown (almost dark cream-brown) above with dark brown markings including interorbital bar which joins an occipital W and with a sagittal ramus reaching toward snout; three chevrons on back, anteriormost long; dorsolateral folds cream, separating flank and dorsal patterns; flanks cream, bearing 3 slanting dark brown bars; canthal-supratym-

panic stripe and labial bars dark brown; limb bars oblique on shank, all relatively narrower than pale interspaces in paratype, more blotchy and broader than in holotype; upper arm with little brown pigment; anal triangle and posterior surfaces of thighs brown; groin and anterior thigh surface brown but with small brown spots scattered about; ventral surfaces dirty cream with brown spots towards periphery (and scattered over throat in holotype); undersides of thighs and shanks cream with gray vermiculation, of tarsus and to lesser extent forearm dark brown.

In life, *E. sobetes* is dark brown and dull olive-yellow. The posterior surfaces of the thighs and groin are pale violet. The venter is dirty yellow with brown markings. The iris is bright orange.

Measurements of holotype in mm.—SVL 41.3; shank 23.6; HW 17.1; head length 13.8; upper eyelid width 3.8; IOD 4.8; eye length 5.1; E–N 4.5.

Variation.—The paratype is a juvenile female. Its measurements are: SVL 34.4, shank 19.2, HW 13.8, head length 11.4, upper eyelid 3.4, IOD 3.7, eye length 4.4, E–N 3.7.

Etymology.—Greek, *sobetes*, meaning a frightener, reflecting my first impressions on seeing the frog with bright orange eyes (I conjured up an image of a goblin).

Natural history.—The holotype was found sitting on a branch 1 m above the forest floor in a wet forested alcove beside the Quebrada Zapadores. The paratype was sitting on low vegetation (fern-like encrustations) beside the stream.

Relationships within *surdus* Assembly

Five species are assigned here to the *surdus* assembly within the *unistriatus* group of *Eleutherodactylus*, combining the *pugnax* and *surdus* assemblies (Fig. 2) recognized by Lynch and Duellman (1980). The synapomorphies of the assembly are (1) the loss of the ear and (2) development of a short snout. *Eleutherodactylus pugnax* is postulated to be the most primitive member of the assembly and is specialized in having (3) toe webbing and (4) a tarsal fold. The remaining four species share the following apomorphies: (5) an angular canthus, (6) cranial crests, and (7) large vomerine odontophores. *Eleutherodactylus duellmani* and *E. sobetes* share three apomorphies, (8) thick fringes on the fingers, (9) dorsolateral folds, and (10) warty skin on the dorsum. *Eleutherodactylus baryecuu*s and *E. surdus* share (11) smooth skin on the dorsum. The remaining apomorphies are unique, (12) no finger fringes and (13) canthal fold (Fig. 2).

Literature Cited

- Boulenger, G. A. 1882. Catalogue of the Batrachia Salientia s. Ecuadata in the collection of the British Museum.—2nd ed. Taylor & Francis, London. 503 pp.

Cochran, D. M., and C. J. Goin. 1970. Frogs of Colombia.—U.S. Natl. Mus. Bull. (288):1–655.

Lynch, J. D. 1970. Identity of two Andean *Eleutherodactylus* with the description of a new species (Amphibia: Leptodactylidae).—J. Herpetol. 3:135–143.

———. 1979. Leptodactylid frogs of the genus *Eleutherodactylus* from the Andes of southern Ecuador.—Univ. Kansas Mus. Nat. Hist. Misc. Publ. 66:1–62.

———, and W. E. Duellman. 1980. The *Eleutherodactylus* of the Amazonian slopes of the Ecuadorian Andes (Anura: Leptodactylidae).—*Ibid.*, in press.

School of Life Sciences, The University of Nebraska, Lincoln, Nebraska 68588.



Lynch, John D. 1980. "Two new species of earless frogs allied to *Eleutherodactylus surdus* (Leptodactylidae) from the Pacific slopes of the Ecuadorian Andes." *Proceedings of the Biological Society of Washington* 93, 327–338.

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