

## *Eleutherodactylus eurydactylus*, a New Species of Frog from Central Amazonian Perú (Anura: Leptodactylidae)

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*Eleutherodactylus eurydactylus* is described from the region of Panguana and Serranía de Sira in central Amazonian Perú. It is most similar to *E. diadematus* and *E. ventrimarmoratus*, and to a lesser degree, *E. altamazonicus*, *E. nigrogrisea*, *E. platydactylus*, and a species being described elsewhere. Together, these seven species, which have very large digital tips, relatively short legs, a tuberculate dorsum, a scapular “W” pattern, and leg barring, are placed in the *diadematus* group (*unistrigatus* series) of the subgenus *Eleutherodactylus*.

ALTHOUGH the neotropical frog genus *Eleutherodactylus* (approx. 500 sp.) is primarily an Andean group in South America, there is a moderate diversity of lowland species (Lynch, 1980). The lowland species tend to have wider distributions; hence, they are better known. Also, there are several lowland sites in Amazonian Ecuador and Perú which have been visited repeatedly over the years, and for which we have our best knowledge of neotropical anuran communities (Duellman, 1989). One such site is Panguana in central Amazonian Perú, on the lower Río Lullapichis near its junction with the Río Pachitea, Provincia de Pachitea, Departamento Huánuco (9°35'S, 74°56'W; 220 m elev.). Schlüter (1984) and Duellman (1989) list 12 species of *Eleutherodactylus* occurring at Panguana: *altamazonicus*, *carvalhoi*, *diadematus*, *imitatrix*, *lacrimosus*, *mendax*, *ockendeni*, *peruvianus*, *sulcatus*, *toftae*, *variabilis*, and *ventrimarmoratus*. Our comparison of specimens, originally identified as *E. diadematus* and *E. ventrimarmoratus* from Panguana and a nearby isolated range (Serranía de Sira) with material of those species from Ecuador, indicates that the central Peruvian frogs represent an undescribed species. In the following account, museum abbreviations follow standardized usage (Leviton et al., 1985), except that MHNJP (Museo de Historia Natural “Javier Prado,” Lima) has changed to MHNSM (Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos).

*Eleutherodactylus eurydactylus* sp. nov.

Figs. 1, 2

*Holotype*.—ZMH A01819, an adult female from Panguana, Departamento Huánuco, Perú, 200 m elev., collected by R. Aussem on 21 Sept. 1972.

*Paratypes*.—SMNS 7868, KU 218292, MHNSM 14000, ZIUW 8984, 8987–88, 8990, 8995, paratopotypes; NMW 4627, Serranía de Sira, 800 m; NMW 4560, Serranía de Sira, 1300 m; NMW 4608, 1380 m. The paratypes of SMNS, MHNSM, and KU were donated by SMH; original numbers SMHA01505-07.

*Associated specimens*.—NMW 4661, Serranía de Sira, 800 m (see comments below).

*Diagnosis*.—A member of the *unistrigatus* series (subgenus *Eleutherodactylus*; Hedges, 1989), characterized by an areolate venter and finger I shorter than II (Lynch, 1976). Its greatly enlarged digital tips, relatively short hind limbs, tuberculate dorsum, dorsal scapular “W” pattern, and leg barring associate *E. eurydactylus* with *E. altamazonicus*, *E. diadematus*, *E. platydactylus*, *E. ventrimarmoratus*, and a new species from north central Perú (Departamento San Martín) being described by Duellman. Among these species, *E. eurydactylus* can be distinguished from *E. altamazonicus* [14.4–23.1 mm SVL (snout–vent length), males; 23.6–33.9 mm SVL females; Lynch, 1980] and *E. platydactylus* (19 mm SVL males; 30 mm SVL females) by its visible tympanum (concealed, or partially visible in occasional specimens of *E. altamazonicus*), slightly larger body size (18.2–23.6 mm SVL males; 33.5–35.3 mm SVL females), pale (or occasionally with small spots or flecks) venter (not mostly brown or gray as in *E. altamazonicus* and *E. platydactylus*), and presence of an inner tarsal fold or tubercle. Additionally, *E. altamazonicus* has a snout with a pointed tip (rounded in *E. eurydactylus*); and *E. platydactylus* has a strongly tuberculate dorsum, and males have vocal slits (absent in *E. eurydactylus*). The new species from north central Perú differs from *E. eury-*

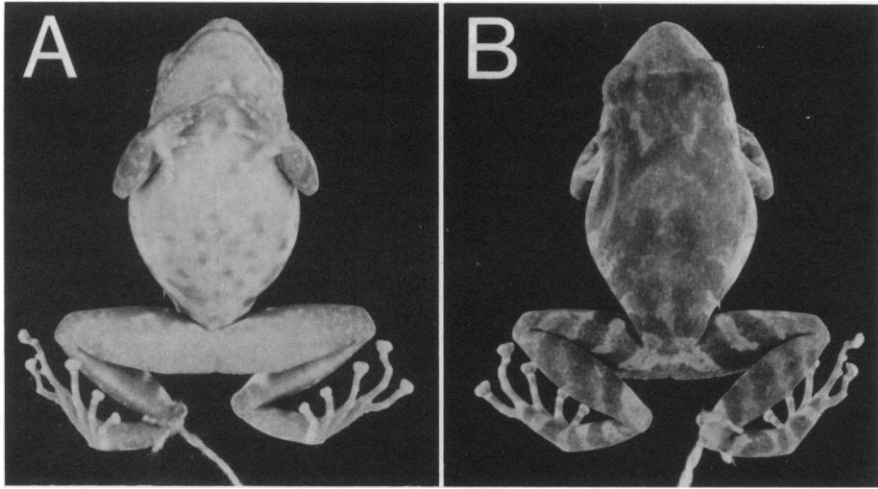


Fig. 1. *Eleutherodactylus eurydactylus*, holotype (ZMH A01819). (A) venter, (B) dorsum.

*dactylus* in being larger (22.7–25.5 mm SVL males; 38.0–38.8 mm SVL females), lacking an inner tarsal fold, having uniform brown flanks (not pale with distinct diagonal marks), and having a brown venter with pale flecks (not mostly pale with brown flecks). *Eleutherodactylus eurydactylus* is most similar to *E. diadematus* (21.4–27.4 mm SVL males; 35.4–44.5 mm SVL females) and *E. ventrimarmoratus* (17.8–25.5 mm SVL males; 33.3–43.8 mm SVL females) with which it shares the presence of an inner tarsal fold or tubercle. However, it can be distinguished from *E. ventrimarmoratus* by its smaller size, visible tympanum (not concealed), and pale or only lightly spotted or flecked venter (not boldly marbled with black; or red and black in

life). From *E. diadematus*, with which it shares the visible tympanum, it can be separated by its smaller size, narrow head (head width less than head length; head width equals head length in *E. diadematus*), and presence of a short and low inner tarsal fold (or tubercle) less than one-fifth length of the tarsus (not elevated and long,  $\frac{1}{2}$ – $\frac{1}{2}$  length of tarsus, as in *E. diadematus*). Also, *E. eurydactylus* is weakly tuberculate dorsally and weakly areolate ventrally (especially females), not moderate to strongly tuberculate and areolate, as in *E. diadematus*. One other species, *E. orphnolaimus*, could be confused with *E. eurydactylus*, although it does not appear to be closely related. It is similar in size, has a visible tympanum, and greatly enlarged digital tips.

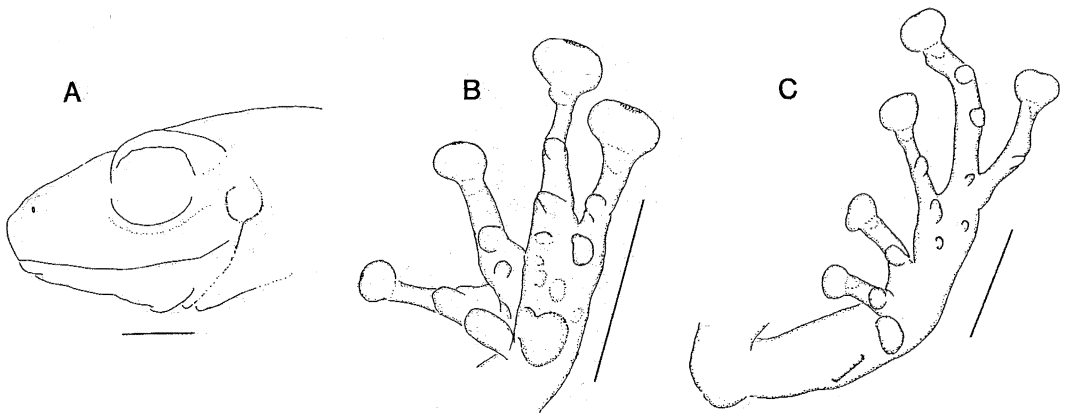


Fig. 2. Head profile (A) and ventral view of left hand (B) and left foot (C) of *Eleutherodactylus eurydactylus*, holotype (ZMH A01819). Scale bars = 5 mm.

However, *E. orphnolaimus* can be easily distinguished by its long, protruding snout with large papilla at tip, large conical eyelid tubercles, and unpatterned concealed surfaces of limbs.

*Description.*—Head as wide as body, width less than length; snout subacuminate in dorsal view, subacuminate in lateral view, not overhanging lower jaw; nostrils weakly protruberant, directed dorsolaterally; canthus rostralis moderately sharp, concave in dorsal view; loreal region slightly concave, sloping gradually; lips not flared; upper eyelid bearing small, subconical tubercles; interorbital space without or with subconical tubercles; supratympanic fold well defined, concealing upper edge of tympanic annulus; tympanum moderate-sized, round, separated from eye by a distance less than its own diameter; several postrictal tubercles, small, subconical; choanae moderate-sized, round, not concealed by palatal shelf of maxillary arch when roof of mouth is viewed from below; vomerine odontophores medial and posterior to choanae, each about the same size as a choana, oval, separated narrowly at midline; tongue longer than wide, posterior edge without notch, posterior one-half not adherent to floor of mouth; males without vocal slits.

Skin of dorsum weakly tuberculate (see Remarks), without dorsolateral folds; skin of flanks similar to dorsum; skin of venter weakly areolate, without discoidal folds; anal opening not extended in sheath; no glandular areas present; ulnar tubercles subconical; palmar tubercle bifid, larger than thenar, thenar tubercle oval, elevated; several moderate-sized subconical, supernumerary tubercles; subarticular tubercles of fingers oval and subconical, and angled outward; weak lateral ridge on finger; all fingers with expanded tips; fingertips rounded, oblong pad on ventral surface of fingertip; circumferential groove bordering distal two-thirds of finger pad; width of largest pad (III) same size as tympanum; first finger shorter than second when adpressed; heel tubercles small and subconical; small, subconical tubercles along outer edge of tarsus; inner tarsal fold (or tubercle) short, low, and poorly developed (<one-fifth length of tarsus); metatarsal tubercles elevated, inner (elongate) three times size of outer (subconical); several moderate-sized, subconical, supernumerary plantar tubercles; subarticular tubercles of toes oval and subconical; toes unwebbed; weak lateral ridge on toe; all toes with expanded tips; toetips rounded; oblong pad on ventral surface of toetip; circumferential groove bordering dis-

tal two-thirds of toe pad; heels overlap when flexed legs are held at right angles to sagittal plane.

In alcohol, dorsal ground color is grayish-tan with medium brown to dark brown markings; scapular dark brown "W," bordered anteriorly by two pale markings and posteriorly by the grayish-tan ground color; a narrow, pale interocular bar, bordered anteriorly by the medium brown snout (occasionally with some pale markings) and posteriorly by a narrow, dark brown interocular bar; lores brown like snout, side of head with two wide dark brown bars extending diagonally (one anterior, one posterior) below eye, and a dark brown supratympanic bar; dorsal surface of forelimbs and hind limbs with dark brown bars; groin region, posterior flanks of body, and anterior face of thigh pale with bold, vertical (or slightly diagonal) dark brown bars; posterior (concealed) surface of thigh uniformly dark brown and usually with small pale flecks or spots; ventral ground color white and unpatterned (e.g., SMNS 7868 and most other specimens), tan chin and light tan belly with small brown spots approximately the size of the digital tips (holotype), or pale with extensive brown flecking and small brown spots on belly (KU 218292); color notes are mainly on ZMH, SMNS, KU, and MHNSM specimens, because others appear to have faded.

*Measurements.*—For the six adult males, four adult females (including holotype), and the holotype (in that order), the measurements are (range, mean  $\pm$  2SE, in mm): SVL, 18.2–23.6 (21.2  $\pm$  0.84), 33.5–35.3 (34.7  $\pm$  0.83), 33.5; head length, 6.71–9.57 (8.53  $\pm$  0.42), 14.0–16.4 (15.3  $\pm$  1.06), 14.0; head width, 6.09–8.86 (7.87  $\pm$  0.42), 12.6–13.5 (13.1  $\pm$  0.39), 12.6; tympanum length 0.75–1.49 (1.23  $\pm$  0.11), 1.56–2.12 (1.90  $\pm$  0.24), 2.12; eye diameter, 2.85–3.99 (3.50  $\pm$  0.15), 4.45–4.99 (4.68  $\pm$  0.23), 4.99; eye–naris distance, 2.17–2.83 (2.60  $\pm$  0.09), 4.31–5.00 (4.54  $\pm$  0.31), 4.46; thigh length, 8.76–11.3 (10.4  $\pm$  0.88), 14.9–16.6 (15.7  $\pm$  0.90), 15.0; shank length, 9.09–12.1 (11.2  $\pm$  0.45), 16.3–17.6 (17.0  $\pm$  0.54), 16.3; fingertip (III) width, 0.93–1.46 (1.26  $\pm$  0.08), 1.89–2.25 (2.07  $\pm$  0.15), 2.04; toetip (IV) width, 0.81–1.35 (1.11  $\pm$  0.08), 1.92–2.33 (2.08  $\pm$  0.19), 1.95.

*Etymology.*—From the Greek; *eury*, broad, wide; *daktylos*, finger; in allusion to the greatly expanded digital tips of this species.

*Distribution.*—The four localities for *E. eurydactylus* are in a relatively small area in the extreme eastern portion of Departamento Huánuco, near the border with Departamento Ucayali (see map and discussion of area in Duellman and Toft, 1979). Elevational distribution from 200 m (Panguana) to 1380 m (Serranía de Sira).

*Remarks.*—This species is considerably variable in several traits, which initially suggested that more than one species was involved. The trait exhibiting the most variation is skin texture. Some specimens have a nearly smooth dorsum and venter (e.g., holotype) whereas others are moderately tuberculate (e.g., NMW 4608). However, two factors appear to be responsible for this variation: (1) sexual dimorphism (males are more tuberculate), and (2) the condition of preservation. The second factor is apparent when specimens in the ZMH, SMNS, KU, and MHNSM are compared with specimens of the same sex in the ZIUW series: the latter are much more tuberculate. Two other variable traits are head shape and the distinctness of the tympanum. In this case, there appears to be an elevational pattern; the lowland frogs (Panguana) have longer snouts, a nearly straight canthus rostralis, and a distinct tympanum; the upland specimens (Serranía de Sira) have shorter snouts, a more concave canthus rostralis, and a partially concealed tympanum (except NMW 4627, which has a distinct tympanum). One of the four upland specimens, NMW 4661, a small (18.2 mm SVL) adult male, is treated as an associated specimen here because it has a nearly smooth dorsum, a darker venter than usual, and a mostly concealed tympanum. Although it is possible that it is an aberrant specimen of *E. altamazonicus*, the venter is not as dark and the tympanum not as concealed as typical specimens of that species. There is a possibility that the upland specimens of *E. eurydactylus* from the Serranía de Sira represent a separate (undescribed) species, but additional specimens and comparative data on vocalization and other characteristics will be necessary to address that question.

#### DISCUSSION

The apparent relationship between *E. eurydactylus* and *E. diadematus* requires a reconsideration of the taxonomic problem surrounding the latter species, which was addressed by Lynch and Schwartz (1972). The holotype of *E. diadematus* is lost, and the type-locality is unknown. Therefore, the only information associated with

this name is that which can be gleaned from the illustration in Jiménez de la Espada (1875). Although most of the characteristics given do not distinguish between the specimens presently recognized as *E. diadematus* and the new species (*E. eurydactylus*), the larger body size of the illustrated frog (approx. 40 mm SVL) suggests that the name *E. diadematus* belongs with larger species from Ecuador and northern Perú. Also, Jiménez de la Espada never collected in central Amazonian Perú where *E. eurydactylus* occurs.

Seven species of the *unistrigatus* series, *E. altamazonicus*, *E. diadematus*, *E. eurydactylus*, *E. nigrogrisea*, *E. platydactylus*, *E. ventrimarmoratus*, and the new species from north central Perú, seem to form a group (the *diadematus* group) by their very large digital tips, relatively short hind limbs, tuberculate dorsum, dorsal scapular “W” (absent in *E. nigrogrisea*; Lynch, 1969), and prominent leg barring. Within this group (or “assembly”), *E. diadematus*, *E. eurydactylus*, and *E. ventrimarmoratus* form a well-defined subgroup by their moderate to large body size (>33 mm SVL, females) and presence of an inner tarsal fold or tubercle. It could be argued further that *E. diadematus* and *E. eurydactylus* are the most similar species pair within this trio, based on their visible tympana (concealed in *E. ventrimarmoratus* and the other species of the *diadematus* group).

#### SPECIMENS EXAMINED

*Eleutherodactylus diadematus.*—Ecuador: Napo, Lago Agrio, 330 m, KU 126141, 126143; Río Yasuni, KU 175112.

*E. altamazonicus.*—Ecuador: Morona-Santiago, north of Arapicos, USNM 204709; Miazal, USNM 204710.

*E. platydactylus.*—Perú: Ayacucho, Huanhuachayoca, 1650 m, KU 175090–91, 175093.

*E. ventrimarmoratus.*—Ecuador: Pastaza, Mera, 1140 m, KU 119806; Abitagua, 8 km NW Mera, 1300 m, 119810–11; Morona-Santiago, Limon, USNM 233417. Perú: Madre de Dios, Manú, 365 m, KU 154802.

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