

# A NEW FROG (*ELEUTHERODACTYLUS*: LEPTODACTYLIDAE) FROM THE SOUTHERN PART OF THE CORDILLERA ORIENTAL OF COLOMBIA

por

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## Resumen

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Se nombran una especie nueva del grupo *Eleutherodactylus conspicillatus* de los bosques andinos bajos (740-1660 m.s.n.m) del flanco oriental de la Cordillera Oriental del sur de Colombia. La especie nueva comparte una sinapomorfía (tuberculos supra-anales) con tres especies más, *E. gutturalis* del oriente de la Amazonia, *E. lanthanites* del occidente de la Amazonia, y *E. fallax*, conocida de los bosques andinos del flanco oriental de la Cordillera Central de Colombia. La distribución de la especie nueva es consistente con una propuesta reciente sobre los límites inferiores y superiores para distribuciones andinas.

**Palabras clave:** Andes, Colombia, *Eleutherodactylus*, Especie nueva

## Abstract

A new species of the *Eleutherodactylus conspicillatus* group is named from low cloud forests (740-1660 m) of the eastern flank of the Cordillera Oriental of southern Colombia. The species shares a synapomorphy (supra-anal tubercles) with three other species, *E. gutturalis* of eastern Amazonia, *E. lanthanites* of western Amazonia, and *E. fallax* known from low cloud forests of the Cordillera Central of Colombia. The distribution of the new species is consistent with a recent proposal concerning upper and lower limits of distribution in the Andes.

**Key words:** Andes, Colombia, *Eleutherodactylus*, New species

**Introduction.** In late June of 1989, Pedro M. Ruiz suggested to the senior author that we make a quick trip to Caquetá during the holidays to see if we could collect frogs in a region hitherto ignored (for various reasons). Over a period of 4 days, we collected the upper reaches of what would come to be called the Caquetá transect. Ten months later, Ruiz revisited the area with an undergraduate field course, collecting principally in the lowlands, and Lynch and Ruiz collected again in June 1990, surveying all 21 streams between 750 and 2400 m. The result of these three salidas was an extensive collection of frogs from the lowlands in the vicinity of Florencia to the crest (Alto de Gabinete). Suárez (2000) examined the altitudinal distributions of the fauna eventhough the taxonomic work has not been completed and reported 14 species of the genus *Eleutherodactylus* along the length of the transect.

The *Eleutherodactylus conspicillatus* group was designated by Lynch (1986) for a complex of species (largely South American) previously confused with taxa of the *E. fitzingeri* group by Lynch and coworkers. Subsequently, Lynch (1994) showed that these frogs could be distinguished using a superficial character (relative lengths of the third and fifth toes) and Lynch & Duellman (1997) listed the nominate species of the *E. conspicillatus* group. Presently, 35 species are recognized. Suárez (2000) included two species of this group from the Caquetá transect, the cosmopolitan, of the northern Andes, *E. w-nigrum*, and *E. sp. 5*. *Eleutherodactylus sp. 5* represents a hitherto undescribed taxon and is of immediate interest because we are able to place it systematically.

## Materials & Methods

Terminology and measurements follow Lynch & Duellman (1997). Measurements were taken using dial calipers and a dissecting microscope. Means are reported  $\pm$  one standard error of the mean.

*Eleutherodactylus epacrus* sp. nov.

*E[leutherodactylus]* sp. 5: Suárez, 2000: 400.

**Holotype.** ICN 24115, an adult female, part of a series collected 26 June 1990 by J Lynch, P Ruiz & R Sánchez. Original number JDL 17657.

**Type-locality.** Colombia, CAQUETÁ: municipio Florencia, vereda Tarquí, km 38.8 above Florencia, 1370 m.

**Topoparatypes.** Males ICN 24121, 24123, females 24116-20, collected with holotype); females, ICN 23654-55, P Ruiz in abril 1990.

**Paratypes.** All from Caquetá, municipio Florencia: Vereda El Paraiso, km 23.1 above Florencia, 820 m (male, ICN 24087, J Lynch, 24 June 1990); vereda La Portada, km 35.2 km above Florencia, 1230 m (males, ICN 24090-93, 24096, females 24088-89, J Lynch, P Ruiz & R Sánchez, 25 June 1990), km 37.4 above Florencia, 1350 m (males, ICN 24165, 24167-68, 24171, females 24155-56, 24158-61, 24170, 24172, J Lynch, P Ruiz & R Sánchez, 25 June 1990); vereda Sucre, km 33.9 above Florencia, 1150 m (males ICN 24103-04, 24109, 24111-12, females 24099, 24106-08, J Lynch, P Ruiz & R Sánchez, 25 June 1990); entre vereda Sucre y Santa Elena, km 29 above Florencia, 1000 m (females, ICN 24113-14, J Lynch & P Ruiz, 25 June 1990); vereda Tarquí, km 39.3 above Florencia, 1410 m (male, ICN 24133, females ICN 24126, 24128, J Lynch, P Ruiz & R Sánchez, 26 June 1990), km 41.4 above Florencia, 1470 m (males, ICN 24142-46, 24148, females 24140-41, 24150, J Lynch, P Ruiz & R Sánchez, 26 June 1990).

**Referred specimens (juveniles and specimens used for karyotypes).** All Caquetá, municipio Florencia: vereda El Paraiso, km 19 above Florencia, 740 m (ICN 24173), km 21.7 above Florencia, 790 m (ICN 24086); vereda La Portada, km 35.2 km above Florencia, 1230 m (ICN 24094-95, 24097-98), km 37.4 above Florencia, 1350 m (ICN 24152-54, 24162-64, 24166, 24169); vereda Sucre, km 33.9 above Florencia, 1150 m (ICN 24101-02, 24105, 24110); vereda Tarquí, km 38.8 km above Florencia, 1370 m (ICN 23656-57, 24122, 24124-25), km 39.3 above Florencia, 1410 m (ICN 24129-32, 24134-39, 24427, 24429-30, 24465-66), km 41.4 above Florencia, 1470 m (ICN 24147, 24149), km 43.2 above Florencia, 1660 m (ICN 24151).

**Diagnosis.**—(1) skin of dorsum shagreen, that of venter smooth or with low granulations; dorsolateral folds thin; (2) tympanum present, round to oval, its length 26-35% that of eye; (3) snout subacuminate in dorsal view, round in profile; canthus rostralis sharp, straight; (4) IOD slightly greater than upper eyelid; no cranial crests; no enlarged tubercles on upper eyelid; (5) vomerine odontophores prominent, narrowly separated; (6) males with vocal slits and nuptial pads; (7) first finger longer than second, disks of outer fingers large, weakly emarginate; (8) fingers with lateral keels; (9) ulnar tubercles absent or slightly indicated; (10) prominent, nonconical, tubercle on heel, no inner tarsal tubercle or fold; tubercle on outer edge of tarsus; (11) two metatarsal tubercles, inner elongate, 6-8 times size of outer; supernumerary plantar tubercles low; (12) toes with lateral keels, no webbing; (13) dorsum brown with darker brown

markings; posterior surfaces of thighs uniform brown; throat dark with narrow raphe; (14) 24 males 21.6-27.3 ( $\bar{x}$  = 24.9  $\pm$  0.3) mm SVL, 31 females 33.3-44.7 ( $\bar{x}$  = 39.2  $\pm$  0.5) mm SVL.

*Eleutherodactylus epacrus* is most closely related to *E. fallax*, *E. gutturalis*, and *E. lanthanites*, with which it shares conical supra-anal warts (Fig. 1). *Eleutherodactylus epacrus* has a narrow raphe on the throat (wide in the other species), a prominent outer tarsal tubercle (not shared with the other species) just distal to the heel tubercle (Fig. 1), and its conical tubercle on the heel is smaller than that of *E. lanthanites* and unlike *E. lanthanites*, the skin of the dorsum is shagreen (rather than tuberculate) and dorsolateral folds are present. *Eleutherodactylus fallax* lacks tubercles on the upper eyelid and has only small tubercles on the heel. *Eleutherodactylus gutturalis* lacks heel tubercles and has larger warts dispersed over the dorsum.

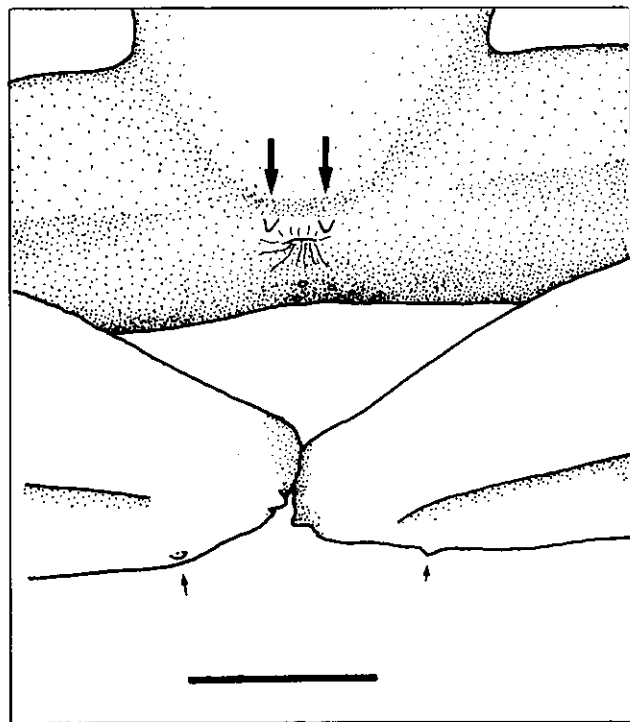
**Etymology.** Greek, *epakros*, meaning pointed at the end. The name refers to the subconical/conical tubercle on the heel as well as to the pair of small conical supra-anal warts (each place could be termed an "end").

**Description** (proportions based on nine males and nine females). Head wider than body, about as wide as long; HW in males 36.2-39.3 ( $\bar{x}$  = 37.6  $\pm$  0.4) % SVL, in females 34.2-39.8 ( $\bar{x}$  = 37.7  $\pm$  0.6) %; nostrils protuberant, directed laterally; E-N 81.6-92.3 ( $\bar{x}$  = 89.7  $\pm$  1.1) % eye length in males, 86.2-103.8 ( $\bar{x}$  = 93.3  $\pm$  1.8) % in females; canthus rostralis weakly sinuous, sharp; loreal region very weakly concave, sloping abruptly to lips; lips not flared; IOD greater than width of upper eyelid, IOD 100.0-129.6 ( $\bar{x}$  = 117.5  $\pm$  3.1) % upper eyelid width in males, 95.2-115.4 ( $\bar{x}$  = 105.6  $\pm$  2.3) % in females; upper eyelid bearing 2-4 small, nonconical tubercles; tympanum slightly higher than long, separated from eye by distance slightly greater than length of tympanum; tympanum length 26.3-38.5 ( $\bar{x}$  = 31.6  $\pm$  1.2) % eye length in males, 28.3-34.6 ( $\bar{x}$  = 30.7  $\pm$  0.8) % in females; supratympanic fold thin, ending just behind tympanum; two postrictal tubercles, nearest subconical; choanae round, not concealed by palatal shelf of maxillary arch; odontophores median and posterior to choanae, approximately twice size of a choana, subtriangular in outline, elevated, separated medially by distance 2/3 width of odontophore, bearing transverse row of up to 4-5 teeth; tongue longer than wide, posterior edge with shallow notch, posterior 1/3 not adherent to floor of mouth; males with short vocal slits posterolateral to tongue.

Skin of dorsum finely shagreen with scapular tubercles and thin dorsolateral folds (least evident posteriorly); skin of flanks bearing more numerous larger tubercles on

shagreen background; skin of venter smooth but with granulations posterolateral and posteriorly; discoidal folds evident, well anterior to groin; no anal sheath; pair of conical supra-anal warts (Fig. 1); antebrachial tubercle present but rarely any other ulnar tubercles (if present, very small); palmar tubercle bifid, much larger than oval thenar tubercle; supernumerary palmar tubercles numerous, very low; subarticular tubercles round, elevated, nonconical; fingers bearing thin lateral keels; first finger longer than second; fingers bearing obvious disks, that of thumb least dilated, those on outer fingers weakly emarginate, broader than length of tympanum; nuptial pad present on thumb of adult males.

Inner edge of tarsus lacking tubercles or folds; subconical heel tubercle; usually one outer tarsal tubercle on proximal 1/4 of tarsus (Fig. 1); inner metatarsal tubercle three times as long as wide; outer metatarsal tubercle low, about 1/4 size of inner; supernumerary plantar tubercles low, at bases of toes; subarticular tubercles longer than wide; toes lacking web but bearing faint lateral keels; disks enlarged, smaller than those of fingers, round; fifth toe slightly longer than third, each reaching to penulti-



**Figure 1.** Posterior part of body and heels of *Eleutherodactylus epacrus* (ICN 24106) illustrating the disposition of tubercles. Large arrows indicate the supra-anal tubercles; small arrows the outer tarsal tubercles. Scale equals 5 mm.

mate subarticular tubercle of toe IV; hindlimbs long, shank 51.1-59.2 ( $\bar{x}$  = 55.2  $\pm$  1.0) % SVL in males, 50.1-59.5 ( $\bar{x}$  = 53.9  $\pm$  0.9) % in females; heels overlapping when flexed hindlegs held perpendicular to sagittal plane.

In alcohol, pale to dark brown above with darker brown markings and black scapular spots; canthal-supratympanic stripe and labial bars present; anal patch black; limb bands brown except for black band on forearm, bars on shanks narrower than interspaces and oblique; ventral surfaces peppered with brown in females, lower venter nearly white in males; throat more heavily stippled and/or spotted with brown, bearing thin white median raphe; concealed surfaces of hindlimbs brown.

In life, dorsum brown to reddish-brown with darker brown spots; dorsolateral folds usually orangish or rust in color; anal patch black; chin brown with white spots and thin white line; chest white with some brown spots, lower venter gray; orange wash in groin; posterior surfaces of thighs orange-brown or reddish-brown to deep brown, sometimes with minute orange spots; iris bright copper (sometimes nearly red), with brown reticulation or black flecking.

**Natural history.** Adults and juveniles were collected easily on vegetation up to 2 m above ground along the side of the road at night but individuals were found as well in dense forests along the streams we used as trails and, with greater difficulty, away from those streams. No vocalization was traced to *E. epicrus*. Juvenile males are as large as 20.4 mm (ICN 24125) whereas the largest juvenile female (straight, thin oviducts) is 30.4 mm (ICN 24429). Females classified as young have some convolutions to the oviducts but uniformly small eggs and range in size from 32.8 mm to 34.7 mm, overlapping the lower limit of adult females. The smallest male found is 11.8 mm and the smallest female found is 13.1 mm SVL.

**Distribution.** The fieldwork in western Caquetá in 1989 and 1990 was directed toward documenting the vertical distributions of amphibians along a transect extending from above Florencia to the cumbre of the Cordillera Oriental. Streams provided points of entry into the forests along the road and we worked 21 streams between 790 and 2320 m. At nearly every collecting site between Km 19.0 and Km 43.2 (NNW of Florencia, Caquetá), we found *E. epicrus*. At the three lowest stations (740-820 m) the species was rare (single individuals found at each) and only two individuals were found at the 1000 m station. By way of contrast, collecting at streams 7 (1150 m), 8 (1230 m), 9 (1350 m), 10 (1370 m), 11 (1410 m), and 12 (1470 m) resulted in samples of a dozen or more speci-

mens per site (because our intent was not ecological, we did not preserve every individual found but rather concentrated on other taxa once we had acquired an adequate sample). The highest record is from stream 14 (1660 m) where a single specimen was found. The absence of records along streams above 1670 m (seven streams 1700-2320 m), the single record at stream 14 (1660 m), and our failure to detect *E. epicrus* at stream 13 (1530 m) suggests that we have defined rather accurately its upper distributional limit along this transect. The lower limit is less well defined. Of the eight collecting stations below stream 7, *E. epicrus* was found to be rare (1-2 individuals) at four and was not detected at four. In contrast, the species was abundant at every station between 1150 and 1470 m. These data conform well with Lynch's (1999) proposal of temperature-based upper and lower limits to the distributions of *Eleutherodactylus*. It is perhaps coincidental that the only individuals found at the two lowest stations and at the highest station are juveniles.

Ten species of the *E. conspicillatus* group are now known from the drainages of the Amazon and Orinoco in Colombia. *Eleutherodactylus conspicillatus*, *E. lanthanites*, *E. malkini*, and *E. peruvianus* are Amazonian in distributions whereas *E. vilarsi* occurs to the north and east. The other five species are piedmont frogs or properly Andean taxa.

#### KEY TO SPECIES OF THE *E. CONSPICILLATUS* GROUP FOUND IN AMAZONIAN AND ORINOQUIAN DRAINAGES OF COLOMBIA

- 1 A. Posterior surfaces of thighs bearing pale spots or reticulation ..... 2
- 1 B. Posterior surfaces of thighs unicolor (brown in preservative) ..... 5
- 2 A. Dorsolateral folds present, extending length of body ..... 3
- 2 B. Body lacking dorsolateral folds ..... 4
- 3 A. Side of head uniformly dark, throat white, underside of shank marbled with dark pigment ... *E. conspicillatus*
- 3 B. Side of head showing labial bars, throat with dark spots or marbling, underside of shank bearing pale spots ..... *E. peruvianus*
- 4 A. Toes basally webbed (webbing enclosing basal subarticular tubercles) ..... *E. malkini*
- 4 B. Toes lacking webbing ..... *E. w-nigrum*

- 5 A. Supraanal warts present ..... 6  
 5 B. No conical tubercles above anus ..... 7  
 6 A. Skin of dorsum shagreen; gular stripe narrower than digital disk ..... *E. epicrus*  
 6 B. Skin of dorsum tuberculate; gular stripe as broad as digital disk ..... *E. lanthanites*  
 7 A. Obvious, subconical tubercle on heel ..... 8  
 7 B. Heel lacking enlarged tubercles ..... 9  
 8 A. Upper eyelid bearing subconical tubercle .....  
 ..... *E. savagei*  
 8 B. Upper eyelid lacking enlarged tubercles .....  
 ..... *E. carrangerorum*  
 9 A. Tympanum 33-46 % eye length ..... *E. medemi*  
 9 B. Tympanum 54-66 % eye length ..... *E. vilarsi*

## Discussion

Although the *E. conspicillatus* group has been recognized for fifteen years, no synapomorphy has been identified for it. Our interest in describing *E. epacrus* is because we propose that the conical supra-anal tubercles represent a synapomorphy for four species. The only other synapomorphy identified for species of the *E. conspicillatus* group is the round palmar tubercle shared by other two species (Duellman & Pramuk, 1999). The paucity of identified synapomorphies probably reflects lack of study rather than paraphyly.

As is true for other species of this group, *E. epacrus* exhibits little pattern polymorphism. Two females (ICN

24089, 24141) exhibit a dorsoconcolor pattern and two males (ICN 24109, 24142) and four females (ICN 23655, 24094, 24158, 24163) have pale dorsolateral stripes. Thirty-four males and 55 females present a spotted pattern (as described above).

## Acknowledgments

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## Literature cited

- Duellman, W. E. & J. B. Pramuk. 1999. Frogs of the genus *Eleutherodactylus* (Anura: Leptodactylidae) in the Andes of northern Peru. Scientific Papers, Nat. Hist. Mus., Univ. Kansas (13): 1-78.
- Lynch, J. D. 1986. The definition of the Middle American clade of *Eleutherodactylus* based on jaw musculature (Amphibia: Leptodactylidae). Herpetologica 42: 248-258.
- . 1994. Two new species of the *Eleutherodactylus conspicillatus* group (Amphibia: Leptodactylidae) from the Cordillera Oriental of Colombia. Rev. Acad. Colomb. Cienc. Ex. Fís. Nat. 19 (72): 187-193.
- . 1999. Ranas pequeñas, la geometría de evolución, y la especiación en los Andes colombianos. Rev. Acad. Colomb. Cienc. Ex. Fís. Nat. 23 (86): 143-159.
- Lynch, J. D. & W. E. Duellman. 1997. Frogs of the genus *Eleutherodactylus* (Leptodactylidae) in western Ecuador: systematics, ecology, and biogeography. Univ. Kansas, Nat. Hist. Mus., Special Publication (23): 1-236.
- Suárez-Mayorga, A. M. 2000. Lista preliminar de la fauna Amphibia presente en el transecto La Montañita – Alto de Gabinete, Caquetá, Colombia. Rev. Acad. Colomb. Cienc. Ex. Fís. Nat. 23(supl.): 395-405.