A NEW SPECIES OF FROG (GENUS *ELEUTHERODACTYLUS*: LEPTODACTYLIDAE) FROM A CLOUD FOREST IN DEPARTAMENTO DE SANTANDER, COLOMBIA

by

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Resumen

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Se describe una especies nueva de *Eleutherodactylus* de tamaño mediano de los flancos occidentales de la Cordillera Oriental de Colombia. La especie es distintiva porque tiene un tubérculo tarsal grande. No se sabe los parentescos.

Abstract

Eleutherodactylus jorgevelosai is a moderate sized species described from the western flanks of the Cordillera Oriental of Colombia. The species is distinctive in having a prominent inner tarsal tubercle. Its relationships are not known.

In comparison to the cordilleras Central and Occidental, the Cordillera Oriental has few species of the frog genus Eleutherodactylus. **Lynch** (1984) and Rueda and **Lynch** (1983) described nine species from the region of Virolín (Santander). Other species were described by **Duellman** and **Simmons** (1977), **Lynch** (1978, 1983), and **Pyburn** and **Lynch** (1981). **Cochran** and **Goin** (1970) had reported five species from páramo and subpáramo habitats in the Cordillera Oriental and reported some other taxa under incorrect names. In contrast, **Rivero** (1984) named several new species of *Eleutherodactylus* from southwestern Venezuela, virtually on the frontier with Colombia. When I collected in Norte de Santander and Santander in 1986, I expected to find some of the rich eleutherodactyline frog fauna described by **Rivero**. Although I found a rich eleutherodactyline frog fauna, only two of the species described by **Rivero** were found in Colombia.

The collections made above Bucaramanga at the finca "El Diviso" of INDERENA include at least four species of *Eleutherodactylus* (*E. anolirex* Lynch, *E. miyatai* Lynch, *E. prolixodiscus* Lynch, and one very abundant species that is not named).

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Materials and Methods

Measurements were taken to the nearest 0.1 mm under a dissecting microscope. Individuals were sexed by gonadal examination which permits assigning relative ages to individuals (juvenile, young, and adult) based on convolutions of the oviducts and the size of the testes. Means are reported below as ± one standard error of the mean. For other terminology, see **Lynch** and **Duellman** (1980).

Eleutherodactylus jorgevelosai sp. nov.

Holotype. An adult female deposited in the amphibian collection of the Instituto de Ciencias Naturales-Museo de Historia Natural, Universidad Nacional de Colombia, number ICN 15283 (field number JDL 15380), one of a series collected by *Douglas S. Lynch, John D. Lynch,* and *Ricardo Sánchez,* 15 August 1986.

Paratopotypes. Adult males -ICN 15284, 15288, 15332, 15335-36, 15338, 15340, 15352; adult females-ICN 15286-87, 15289-92, 15833-34, collected with the holotype.

Type-locality. Departamento de Santander, Municipio de Tona (see below), finca "El Diviso" de INDERENA, Km 22 carretera Bucaramanga a Pamplona, vertiente occidental de la Cordillera Oriental, 1900-2050

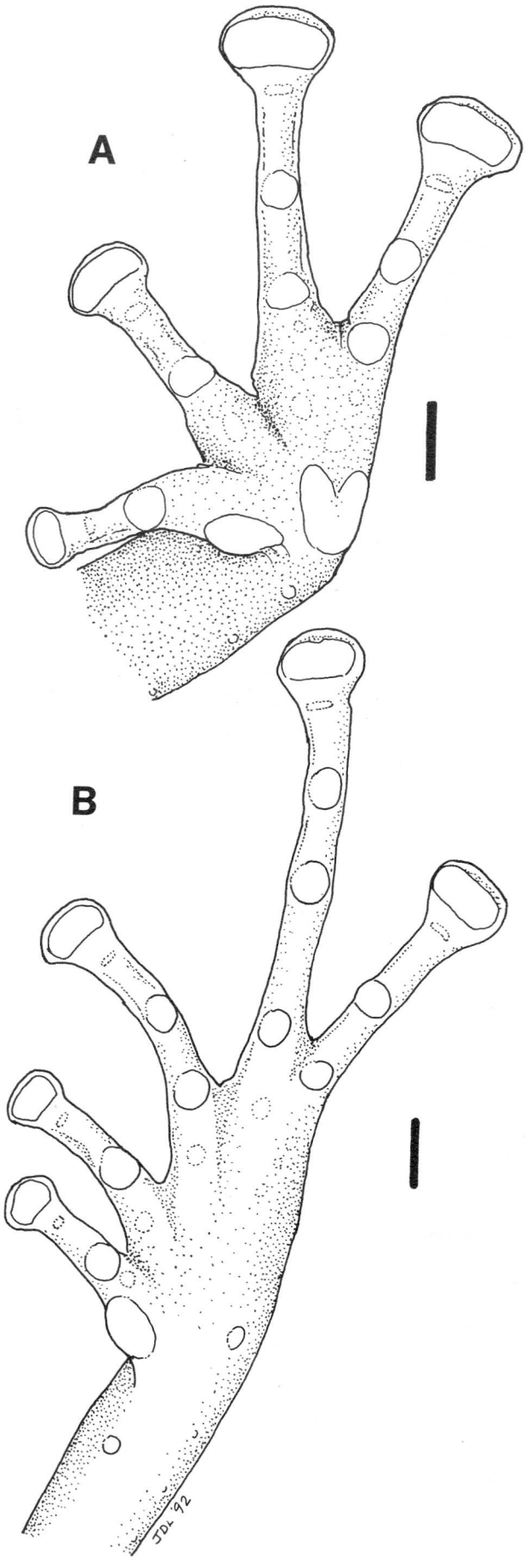

Fig. 1. Plantar views of hand (A, ICN 15291) and foot (B, ICN 15290) of *Eleutherodactylus jorgevelosai*. Scales equal 2 mm.

m alt. Although many reports for this locality use municipio de Tona, the boundaries of municipios Floridablanca and Piedecuesta are immediately adjacent to the type-locality.

Paratypes. Depto. Santander, Mpio. Tona, ca 3 km above Corcova, Km 27 carr. Bucaramanga-Pamplona, 2200 m, adult males, ICN 15361, 15363-66, 15368, 15370, 15372-73, 15375, 15377, 15384, adult females, ICN 15362, 15367, 15380-82, 15386-403, collectors *D. Lynch, J. Lynch, Pedro M. Ruiz,* and *R. Sánchez,* 16 August 1986.

Referred specimens (juveniles and poorly-preserved specimens): ICN 15285, 15293-331 (poorly-preserved, mostly adults), 15337, 15339, 15341-51, 15353-58, 15369, 15371, 15374, 15376, 15378-79, 15383, and 15385.

Etymology. The new species takes the name of my friend and folklorist, **Jorge Velosa Ruiz**, whose music and poetry bring me somuch pleasure.

Diagnosis. (1) skin of dorsal surfaces tuberculate, that of venter areolate; no dorsolateral folds; (2) tympanum round, superficial, its length 22.0-29.7% eye length in males, 23.3-32.0% in females; (3) snout subacuminate in dorsal view in males and young females, more obtuse in adult females, rounded in lateral profile; canthus rostralis prominent, weakly concave; (4) upper eyelid with a large subconical tubercle, width of upper eyelid 90.9-121.4% IOD in males, 75.5-100.0% in females; low cranial crests on lateral margins of frontoparietals; (5) vomerine odontophores prominent, subtriangular in outline; (6) males with vocal slits, glandular white nuptial pads; (7) first finger slightly shorter than second; all fingers with expanded, non-emarginate discs, broadest on fingers *III-IV*; (8) fingers bearing lateral fringes; (9) a row of 3-4 subconical ulnar tubercles; (10) subconical tubercle on heel; row of small tubercles along outer edge of tarsus; subconical tubercle on inner edge of tarsus; (11) two metatarsal tubercles, inner oval, six times size of subconical outer; supernumerary plantar tubercles present; (12) toes bearing lateral fringes, no webbing; discs of toes smaller than those of fingers; (13) dorsal surfaces brown with darker markings; posterior surfaces of thighs cream with brown spots and reticulation; venter cream with brown flecks, throat darker; (14) adults medium-sized, males 24.3-29.8 ($\bar{x}$ = 27.2 $\pm$ 0.3, n = 20) mm SVL, females 38.5-45.2 ($\bar{x}$ = 41.0 $\pm$ 0.3, n = 32) mm SVL.

Eleutherodactylus jorgevelosai is most similar to *E. cruentus*, *E. latidiscus*, *E. supernatis*, and *E. tamsitti* but differs from each of these because it has expanded discs on the first finger (Fig. 1A). It is most similar to some undescribed species from cloud forests in the northern part of the Cordillera Central. It can be distinguished from all of these species by the presence of an inner tarsal tubercle (Fig. 1B) and its coloration.

Description. (proportions are based on 13 males and 13 females); Head as wide as body in males and juvenile females, slightly narrower than body in adult

females, wider than long; HW 37.9-42.2 ($\bar{x}$ = 39.9 ± 0.3)% SVL in males, 38.5-42.9 ($\bar{x}$ = 40.4 ± 0.3)% in females; snout subacuminate in dorsal view in males and young females, obtuse in adult females, snout rounded in lateral profile; snout long, E-N 73.3-93.5 ($\bar{x}$ = 84.4 ± 1.9)% eye length in males, 80.0-100.0 ($\bar{x}$ = 91.2 ± 1.7)% in females; nostrils protuberant, directed dorsolaterally; canthus rostralis distinct, sharp, concave; enlarged subconical tubercle on upper eyelid, upper eyelid otherwise covered with small tubercles; upper eyelid width 90.9-121.4 ($\bar{x}$ = 104.8 ± 2.4)% IOD in males, 75.5-100.0 ($\bar{x}$ = 89.0 ± 2.1)% in females; lateral margins of frontoparietals upturned producing low cranial crests; frontoparietal fontanelle not exposed; supratympanic fold prominent, ending above insertion of arm, obscuring uppermost edge of tympanum; tympanum superficial, round, annulus distinct, separated from eye by distance equal 1 1/2 times diameter of tympanum; tympanum length 22.0-29.7 ($\bar{x}$ = 26.7 ± 0.6)% eye length in males, 23.3-32.0 ($\bar{x}$ = 29.3 ± 0.6)% in females; postrictal tubercles prominent, conical, larger than other tubercles on side of head.

Choanae round, 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, subtriangular to triangular in outline, prominent, each 4-5 times size of a choana, separated on midline by distance equal to less than 1/4 width of an odontophore, bearing weakly arched row of 5-8 teeth (in some individuals tooth rows are slanted anteriorly near midline); tongue 1 1/2 times as long as wide, posterior margin notched, posterior 1/4 not adherent to floor of mouth; males with long vocal slits posterolateral to tongue; external vocal sac not apparent.

Skin of dorsum tuberculate but tubercles small except for subconical tubercles on upper eyelids, between eyes, on shoulders, and near tympanum (postrictals); no dorsolateral folds; skin on venter coarsely areolate; discoidal folds well anteriad to groin; no anal sheath; forearm bearing row of 3-4 subconical ulnar tubercles; palmar tubercle bifid, much larger than oval thenar tubercle; numerous small supernumerary palmar tubercles, prominent but not pungent; subarticular tubercles round, non-conical; fingers bearing narrow lateral fringes; fringe evident as series of coalescing tubercles along outer edge of palm; fingers bearing expanded round digital discs, smallest on thumb (Fig. 1), broadest on *III-IV*; discs bearing pads, broader than long, on ventral surfaces, defined by circumferential grooves; when adpressed equally, first finger slightly shorter than second; non-spinous, glandular nuptial pad on posterodorsal surface of thumb in adult males.

Subconical tubercle on heel; row of smaller tubercles along outer edge of tarsus; prominent subconical tubercle on inner edge of tarsus, 1/4 distance between inner metatarsal tubercle and heel; inner metatarsal tubercle three times as long as wide, more than six times size of subconical, round outer; numerous plantar supernumerary tubercles, most prominent at bases of digits; toes bearing prominent lateral fringes but no webbing; toe tips expanded into broad round discs (slightly smaller than those of outer fingers) with ventral pads; heels overlapping when flexed hind limbs held perpendicular to sagittal plane; shank 55.6-63.6 ($\bar{x}$ = 58.2 ± 0.6)% SVL in males, 53.5-62.9 ($\bar{x}$ = 57.4 ± 0.7)% in females; when adpressed equally against toe *IV*, toe *V* much longer than toe *III*.

Dorsum pale to dark brown with darker markings; markings as indefinite as many small dark brown flecks or forming interorbital bars, occipital W-shaped mark, sacral chevrons; canthal-supratympanic stripe and labial bars prominent; flanks usually cream with slanted brown lines (or rows of spots); limb bands narrower than interspaces, oblique on shank; posterior surfaces of thighs cream with loose brown reticulum (or small brown spots); anal triangle black; ventral surfaces cream, usually with dense brown spotting on throat (often mottled with brown in males); undersides of thighs and shanks cream, spotted with brown.

In life, *E. jorgevelosai* has dorsal surfaces olive to brown, flecked with brown; limb bars evident or not; limb bars sometimes edged with yellow; anal triangle dark brown; posterior surfaces of thighs dull yellow-brown, flecked or reticulated with brown; venter pale greenish-yellow or pale yellow, flecked with brown; throat more heavily flecked with brown; iris bright reddish copper, reticulated with black. Frequently, individuals have rust or orange markings along the anterior one-half of the body in the dorsolateral region. A common variant has brick-red markings on the dorsum as spots or as large blotches on head and sacrum or as a complete band down dorsum or as a broad mid-dorsal raphe. Another common variant is the presence of small yellow spots of varying intensity on the dorsum and flanks.

Measurements of holotype in mm. SVL 42.8, tibia 23.5, HW 16.8, HL 15.6, chord of HL 17.0. upper eyelid width 4.3, IOD 4.9, tympanum length 1.6, eye length 5.4, E-N 5.3.

Natural history. Although *E. jorgevelosai* was exceptionally abundant on the nights of 15-16 August 1986, no calling was detected (nevertheless, the species is named for Don Jorge). No amplectant individuals were observed but one female (ICN 15403) released eggs during the night in a collecting bag. Many small juveniles were found on the same evenings.

Individuals were found on rocks, rock faces, ferns, branches, and large leaves up to 3 m above the ground along streams through primary forests. Some individuals were found also perched on tree roots under rock overhangs. At El Diviso, *E. jorgevelosai* was restricted in distribution to the stream above the small waterfall (Fig. 2) whereas the other three species of *Eleutherodactylus* were found above and below the falls as were the two *Hyla* and the two centrolenids. The stream is in a narrow V-shaped valley above the waterfall but below the waterfall, the stream opens into a broader, flat-floored valley with steep edges. Large trees are evident below the waterfall (one of which was used to ascend the waterfall in 1986). In 1992, I revisited El Diviso but

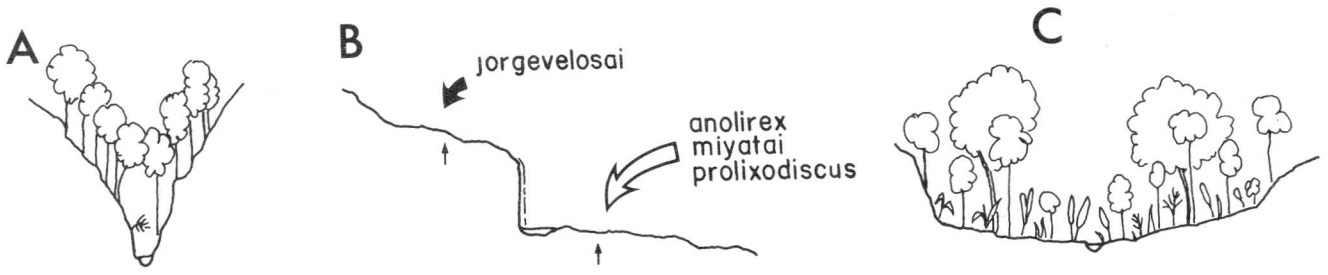

Fig. 2. Sections of stream at finca El Diviso showing distributions of *Eleutherodactylus*. (A) cross section above cascada; (B) longitudinal section, arrows point to cross sections; (C) cross section below cascada.

could not ascend the waterfall because the tree which we had used earlier had fallen. Working the area below the waterfall produced all of the species taken at El Diviso six years earlier with the exception of *E. jorgevelosai* which, presumably, was watching us from above the cascada.

In addition to the *Eleutherodactylus*, we also found *Centrolene notostictum*, *Cochranella daidalea*, *Colostethus* sp (similar to *C. palmatus*), *Hyla callipeza*, *H. denticulenta*, and *Phenacosaurus nicefori* at the El Diviso locality. El Diviso is a demonstration project and much of the finca is reforested using *Eucalyptus* and *Pinus*. Most of our fieldwork (the successful fieldwork) was carried out in patches of native forest which exist along the streams flowing down the steep valleys. The only amphibian that we found in the non-native forests was *E. miyatai*.

Acknowledgments

I greatly benefitted from the work of my field companions in 1986 and 1992 (**Douglas Lynch, Cecilia Ruiz, Pedro Ruiz,** and **Ricardo Sánchez**). The persistence of Ricardo resulted in gaining access to the stream above the waterfall where *E. jorgevelosai* was so common. This manuscript was written during my tenure as a Profesor Visitante in the Instituto de Ciencias Naturales during 1992. **María Cristina Ardila** and **Pedro M. Ruiz** extended every courtesy during my stay.

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