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## A NEW *ELEUTHERODACTYLUS* FROM VOLCÁN SUMACO, ECUADOR

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**ABSTRACT:** A new *Eleutherodactylus*, *E. ernesti*, is described from the peak (3900 m) of Volcán Sumaco, Napo Province, Ecuador. This species is characterized by a glandular, pitted dorsal skin with heavy, glandular dorsolateral ridges, densely-warted flanks, small circular patches of glands in the axilla, groin, and on the rear thigh, a concave canthus and loreal region, a snout in profile that is dorsally anteroventrally-sloping and ventrally rounded, and tubercles present on the eyelid, ulna, and heel (paired), and around the anus, but lacking from the tarsus. It is known only from the peak of Volcán Sumaco, and its relationships are unclear.

**Key words:** Amphibia; Anura; Leptodactylidae; *Eleutherodactylus*; New species; Ecuador

EAST of the Cordillera Oriental of the Ecuadorian Andes are three highland areas with elevations exceeding 2000 m. The southernmost is the Cordillera del Condor, reaching elevations above 2500 m and separated from the main Cordillera by river valleys. The Cordillera Cutucú, attaining elevations in excess of 2000 m, lies just north of the Cordillera Condor and is also separated from the main Cordillera by river valleys. Highest and northernmost of the three upland regions is the

Volcán Sumaco. A relatively isolated volcano, it is situated at the tip of a northeasterly-curving extension of the foothills of the Cordillera Oriental and abruptly rises to 3900 m elevation. Adequate herpetological collections from these three upland regions are still lacking, not a very surprising situation given the effort required to mount an expedition to these rugged, remote and often inhospitable regions.

In 1979, Dr. T. De Vries of the Universidad Católica (Quito) flew by helicopter



FIG. 1.—Dorsolateral view of the holotype of *Eleutherodactylus ernesti* (MCZ 104089, 29.4 mm).

to the peak of the Volcán Sumaco in order to collect birds. He procured an unusual new *Eleutherodactylus*, which I describe in this paper.

In the species account, I follow the methods of Lynch and Duellman (1980) as modified by Flores (1985). The holotype was sexed by gonadal examination; adult female *Eleutherodactylus* are distinguished by convoluted oviducts and, if mature eggs are present, large, yellow ovarian eggs, while males have swollen testes and, in some species, vocal slits and/or nuptial pads. All measurements were taken to the nearest 0.1 mm using dial calipers. The following abbreviations are employed: SVL = snouth-vent length; E-N = eye to nostril distance; HW = head width; HL = head length.

*Eleutherodactylus ernesti* sp. nov.

*Holotype*.—MCZ 104089, an adult male from the peak of Volcán Sumaco, Napo Province, Ecuador, 3900 m (00°35' S, 77°37' W), taken by T. De Vries on 2 May 1979.

*Diagnosis*.—Distinguished by the glandular, pitted skin with prominent dorsolateral ridges, numerous glandular warts on the flanks, and small circular patches of glands in the axilla, groin and on the distal rear thigh (Fig. 1), the presence of prominent glandular eyelid, ulnar, paired heel, and paired subanal tubercles (Figs. 1, 2), and the distinctive head shape, with a well-defined, concave canthus, very concave loreal region, flared lips, and dorsally anteroventrally-sloping snout (Fig. 3).



FIG. 2.—Ventral view of the holotype of *Eleutherodactylus ernesti* (MCZ 104089, 29.4 mm).

(1) Skin of dorsum glandular and pitted, with glandular warty areas, numerous pits, and bearing prominent glandular dorsolateral ridge; flanks densely packed with small glandular warts; venter coarsely areolate and pitted; small circular patch of glands present in axilla, groin, and posterodistally on thigh; (2) tympanum present, its length one-fourth eye length, but annulus obscured by overlying skin; (3) snout rounded in dorsal view (approaching subacuminate), in profile, anteroven-

trally sloping dorsally, ventrally rounded; canthus rostralis well defined, concave; loreal region very concave; lips flared; (4) upper eyelid narrower than IOD, bearing several low glandular warts including a single, larger and more prominent one; (5) vomerine odontophores triangular, moderately prominent; (6) male lacks vocal slits, vocal sac, and nuptial pads; (7) first finger shorter than second; fingers bearing large, oval pads; discs enlarged, spatulate, slightly broader than long; (8) fingers lack

lateral fringes and keels; (9) three ulnar tubercles present; (10) two prominent tubercles on heel; prominent tarsal tubercles lacking; several glandular tubercles around anus, including prominent paired sub-anal tubercles; (11) two prominent metatarsal tubercles, inner oval to elongate, one to three times size of round outer; five low supernumerary plantar tubercles; (12) toes lacking lateral fringes and keels, no webbing; subarticular tubercles large, round and flattened; toe pads slightly smaller than those on fingers; (13) dorsum wood brown with dark gray markings (suprascapular W, dorsal chevrons, limb bars); rear thigh solid wood brown with small vague lighter flecks distally; throat dark gray-brown, belly buff with dense dark brown reticulum; underside of limbs buff to light brown; (14) adults moderate-sized, one male 29.4 mm.

*Description.*—Head wider than body, about as wide as long; HW 37.4% SVL; snout rounded in dorsal view (approaching subacuminate), in profile dorsally anteroventrally-sloping, ventrally rounded (Fig. 3); snout very short, E-N 67.6% eye length; nostrils not protuberant, directed anterolaterally; canthus rostralis well-defined, swollen, concave; loreal region strongly concave; lips flared; upper eyelid with several low glandular warts, including a larger, centrally prominent one, its width 62.5% IOD; weak cranial crests present; tympanum small, round, annulus concealed by overlying skin, dorsally additionally obscured by supratympanic fold continuing far posteriorly as glandular ridge, separated from eye by distance equal to slightly greater than tympanum length; tympanum length about one-fourth eye length; postriatal tubercles coalesced to form short, posteriorly projecting glandular ridge; choanae moderately large, round, widely separated (by about four times their own diameter), not concealed by palatal shelf of maxillary arch; vomerine odontophores median and posterior to choanae, separated by a distance equal to one-half choanal width, triangular, oblique, elevated, each bearing three to six teeth; tongue slightly longer than wide, cordiform, posterior border feebly

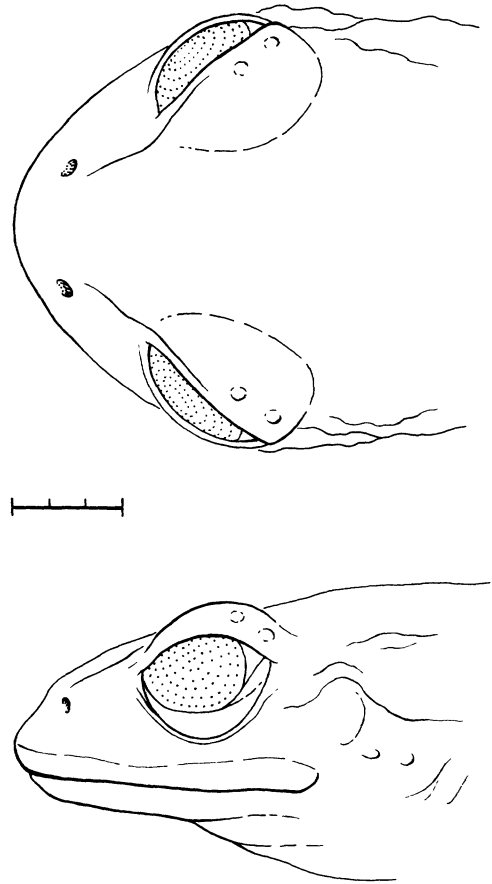


FIG. 3.—Dorsal and lateral views of the head of the holotype of *Eleutherodactylus ernesti* (MCZ 104089, 29.4 mm); scale equals 3 mm.

notched, posterior one-third not adherent to floor of mouth; males lack vocal slits and vocal sac.

Skin of dorsum pitted and with numerous glandular warts, bearing heavy, glandular dorsolateral ridges; flanks with dense concentration of glandular warts; skin of venter coarsely areolate and pitted; discoidal folds prominent; anal opening not extended, numerous prominent circum-anal glandular warts present, sub-anal pair especially conspicuous; three ulnar tubercles present; palmar tubercle bifid, about one and one-half times size of oval thenar tubercle; four distal supernumerary tubercles, large but flattened and indistinct; subarticular tubercles large, round, non-conical, somewhat flattened; fingers lack-

ing lateral fringes and keels, all with large circular discs (broader than long) on oval dilated pads; pad of third finger about two times wider than narrowest portion of penultimate phalanx; thumb shorter than second finger; males lack nuptial pads.

Heel with two prominent glandular tubercles at corners, tarsus lacking obvious tubercles; inner metatarsal tubercle oval to elongate, outer metatarsal tubercle round, extremely flattened and indistinct, from one-third to equal to the size of outer; five distal, low supernumerary plantar tubercles; subarticular tubercles large, round, flattened; lateral fringes and keels lacking on toes; toe discs slightly broader than long on oval, dilated pads, pads slightly smaller than those on outer fingers, rounded apically; shank 49.3% SVL; heels of flexed hind legs moderately overlap.

In preservative, dorsal ground color wood brown, anterior snout, loreal region and dorsal forelimbs dark gray; upper lip cream; dark gray suprascapular W, dorsal chevron, and sacral spots (five); single dark gray forearm bar and transverse anterior thigh bar, four dark gray oblique shank bars, dark gray proximolateral foot blotch; throat dark gray-brown; belly buff with dense dark brown reticulum; underside of limbs buff to light brown; rear thighs light brown with small pale flecks distally.

*Etymology*.—Named as an expression of deep gratitude to Dr. Ernest E. Williams, a most inspirational zoologist, teacher, advisor, and friend.

*Distribution*.—Known only from the type locality.

*Remarks*.—Only a single specimen of *Eleutherodactylus ernesti* is known, and normally I would be hesitant to describe a species based on a single specimen. However, this species is trenchantly distinctive, and the likelihood of collecting additional specimens from the remote, austere type locality in the near future is highly improbable. Description of this peculiar frog thus seems quite warranted.

Although no other anurans were collected with the holotype of *E. ernesti*, Lynch and Duellman (1980) listed specimens from the Volcán (also known as Cerro) Sumaco of the following species in their

review of the *Eleutherodactylus* of the Amazonian Andean slopes of Ecuador: *cornutus*, *devillei*, *galdi*, *nigrovittatus*, *peruvianus*, and *quaquaversus*. None of these is exclusively endemic to the Volcán. Of these six species, three are represented by specimens (all AMNH) with the locality "top of Mt. Sumaco," *devillei*, *galdi*, and *peruvianus*. As Lynch and Duellman (1980) indicate, it is very questionable whether these specimens were taken from the actual peak of Volcán Sumaco (at 3900 m elevation), because *devillei* has no other records above 3155 m elevation, *galdi* no other records exceeding 1830 m elevation, and *peruvianus* no other records greater than 1910 m elevation. Thus, of the other *Eleutherodactylus* species recorded from the Volcán Sumaco, only *devillei* may range high enough to come into contact with *ernesti*.

I am unaware of any other *Eleutherodactylus* with the peculiar pitted, glandular skin of *E. ernesti*. As mentioned in the diagnosis section, the pitted, glandular skin, together with the unique combination of the head features, tubercle configuration, and trio (axillary, inguinal, and post-femoral) of small, circular gland patches serve to distinguish *ernesti* from all other *Eleutherodactylus*, and make comparisons to other forms unnecessary. As mentioned above, *E. devillei* is the only known possible sympatric congener of *E. ernesti*. Although the two frogs share dorsolateral ridges and cranial crests, *devillei* is a markedly different species (*ernesti* compared in parentheses) characterized by smooth skin on the dorsum (glandular and pitted), a rounded snout in profile (anteroventrally sloping dorsally, ventrally rounded), a canthus rostralis that is not concave (concave), and tubercles lacking on the upper eyelid, heel, and beneath the anus (present). *Eleutherodactylus ernesti* keys out to *E. galdi* in Lynch and Duellman's (1980) key to the *Eleutherodactylus* of the Amazonian slopes of the Ecuadorian Andes, and hence the two might potentially be confused. Both species do share the presence of eyelid, ulnar, heel, and subanal tubercles, as well as a concave canthus rostralis, but they are otherwise dramatically different, with *galdi* (*ernesti*

compared in parentheses) characterized by a lack of dorsolateral folds (present), an absence of pitted skin (present), enlarged warts on the belly (absent), serrate frontoparietal and squamosal crests (absent), a truncate snout in profile (anteroventrally sloping dorsally, ventrally rounded), and vocal slits present in the male (absent).

*E. ernesti* exhibits the areolate venter and first finger shorter than the second characteristic of the *unistrigatus* "species group" of Lynch (1976), a group now comprised of well over 100 species. However, as with the peculiar *E. kirklandi* (Flores, 1985), *E. ernesti* does not readily fit into any of the intragroup assemblies of the *unistrigatus* group, whether one considers the Amazonian Andean slope assemblies (Lynch and Duellman, 1980) or the Northern Ecuadorian and Southern Colombian paramo assemblies (Lynch, 1981). The absence of even a superficial resemblance to other Ecuadorian *Eleutherodactylus* makes its relationships a mystery. *E. ernesti* appears to be restricted to the isolated high-elevation habitat of the Volcán Sumaco. One of the other two isolated high-elevation ranges east of the Cordillera Oriental, the Cordillera del

Condor, also has an endemic *Eleutherodactylus*, *E. condor*, which is definitely known only from the western slope cloud forests (Lynch and Duellman, 1980). Further exploration of the three isolated ranges east of the Cordillera Oriental may reveal additional endemic species.

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## A NEW SPECIES OF *AMOLOPS* (ANURA: RANIDAE) FROM YUNNAN PROVINCE, CHINA

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**ABSTRACT:** A new species of *Amolops* is described from Yunnan Province, China. Its long, projecting snout, large size (both sexes 75 mm), and gular pouches in males distinguish it from all other mainland species of the genus.

**Key words:** Ranidae; *Amolops*; China

DURING the course of field work in southern Yunnan Province (24°30' N) in 1974–1984, we have collected 73 species of anurans, 11 of them representing new species or new records for the province (Li et al., 1984). In reviewing specimens

of *Amolops* Cope (1865) from these collections, however, it became apparent that a species we listed as *A. afghanus* (Günther) is actually a new species described below. *Amolops* Cope has been defined mainly on the basis of a larval character,