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THE STATUS OF *LEPTODACTYLUS PUMILIO*
BOULENGER (AMPHIBIA, LEPTODACTYLIDAE)
AND THE DESCRIPTION OF A NEW SPECIES
OF *LEPTODACTYLUS* FROM ECUADOR

By W. RONALD HEYER

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THE STATUS OF *LEPTODACTYLUS PUMILIO* BOULENGER (AMPHIBIA, LEPTODACTYLIDAE) AND THE DESCRIPTION OF A NEW SPECIES OF *LEPTODACTYLUS* FROM ECUADOR¹

By W. RONALD HEYER²

ABSTRACT: *Leptodactylus pumilio* Boulenger, 1920, is shown to be a junior synonym of *Eleutherodactylus parvus* (Girard). The *Pentadactylus* species group of *Leptodactylus* is redefined and a new species of this group is described from Amazonian Ecuador. The presence of dorsolateral folds combined with the uniformly black coloration of the posterior surface of the thigh distinguish the new species from the other members of the group. The karyotype of the new species has a diploid number of 22 bi-armed chromosomes with no secondary constitutions. A key to the species of the *Pentadactylus* group is provided.

INTRODUCTION

A preliminary analysis of a cross sectional representation of the genus *Leptodactylus* indicated that the species could be grouped into five species assemblages (Heyer, 1968). I am presently analyzing each of these groups in detail (e.g., Heyer, 1970). As in all long-term projects, data are gathered continuously on all groups. The purpose of this paper is to report two findings that are outside of my current main project. First, examination of the holotype of *Leptodactylus pumilio* indicates a nomenclatural change is necessary. Second, a new species of the *Pentadactylus* group is described from specimens recently collected in Amazonian Ecuador.

ACKNOWLEDGMENTS

Several people have helped in the research and preparation of this report. Alice G. C. Grandison was a gracious hostess during my brief visit to the British Museum (Natural History) (BMNH). Philip A. Silverstone, Natural History Museum of Los Angeles County (LACM), kindly photographed the type of *Leptodactylus pumilio*. Keith A. Berven, Pacific Lutheran University, helped with the field work in Ecuador. Don Johnson, Director of the Summer Institute of Linguistics in Ecuador, allowed us to undertake field work at their institute base camp of Limoncocha during the summer of 1971. John W.

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Wright, LACM, aided in the chromosome analysis and reviewed the manuscript. Research support from NSF grant GB-27280 is gratefully acknowledged.

Leptodactylus pumilio

Figure 1

In February of 1969, I had the opportunity to examine the type of *Leptodactylus pumilio* at the British Museum (Natural History). The specimen was originally catalogued as 1914.3.20.7 but has been recatalogued as 1947.2.17.35. The salient features of the type (Fig. 1) are: 1) The sternum has a cartilaginous plate; 2) Fingers III and IV have small disks, the toes have large disks; 3) The finger and toe disks have peripheral grooves, the upper surfaces are undivided; 4) The tympanum is not visible on the left, barely visible on the right; 5) The tarsus is smooth; 6) There is a dark triangular patch under the vent. Members of the genus *Leptodactylus* are characterized in part by having a bony style in the sternum, disks (if present) without peripheral grooves, and (usually) a tarsal fold. The holotype clearly



FIGURE 1. Dorsal (left) and ventral (right) views of holotype of *Leptodactylus pumilio* (= *Eleutherodactylus parvus*), BMNH 1947.2.17.35, from Teresópolis, Brasil.

is not a member of the genus *Leptodactylus*, but of the genus *Eleutherodactylus*. The holotype was collected in Teresópolis, Brasil, where fortunately, few species of *Eleutherodactylus* occur. The dark seat patch is characteristic of *Eleutherodactylus parvus* (Girard, 1853) and a comparison of the holotype of *L. pumilio* with specimens of *E. parvus* in the collections of the British Museum convinced me that they are conspecific. *Leptodactylus pumilio* Boulenger is thus a junior synonym of *Eleutherodactylus parvus* (Girard).

THE NEW ECUADORIAN SPECIES

During two months of field work in the upper Amazon basin, a series of juvenile frogs of a new species of the genus *Leptodactylus* were collected. With the exception of *Leptodactylus laticeps*, they are the most distinctively colored species of *Leptodactylus* in life. As the species is so distinctive and apparently has not been collected previously, I prefer to describe the new species based on the juvenile specimens rather than await collection of adults.

The new species belongs to the *Pentadactylus* species group as provisionally defined earlier (Heyer, 1968). The group is in need of thorough revision to determine the status of the *L. pentadactylus* and *L. pentadactylus*-like populations. In addition to the new species described below, the species group consists of: *L. laticeps* Boulenger, 1918; *L. pentadactylus* (Laurenti) 1768 (probably a composite); *L. rhodomystax* Boulenger, 1883; *L. rhodonotus* (Gunther), 1868; *L. rugosus* Noble, 1923; *L. sypfax* Bokermann, 1969. Members of this group have noticeable fringes on the toes as juveniles, but the fringes are absent in adults. The adult character state of free toes separates members of the *Pentadactylus* group from members of the *Melanonotus* and *Ocellatus* groups which have extensive toe fringes as adults. Species of the *Marmoratus* group are small, never exceeding 29 mm SV; species of the *Pentadactylus* group are large, greater than 60 mm SV. The most distinctive characteristic that separates members of the *Pentadactylus* group from the *Fuscus* group is the presence of thumb spines and chest spines (usually) in males of members of the *Pentadactylus* group. Male members of the *Fuscus* group lack thumb and chest spines. Members of the *Fuscus* group are moderate sized, only one species reaching 65 mm SV. Members of the *Pentadactylus* group have broad, rounded snouts from above, members of the *Fuscus* group have more pointed snouts.

For the new species I propose the name:

Leptodactylus knudseni, new species

Figure 2

Holotype.—LACM 72117, a juvenile female from Limoncocha, 0° 24'S, 76° 37'W, Provincia de Napo, Ecuador. The specimen was collected in a pasture, in a decaying log (15 cm diameter) at 14:38 hrs on 3 August 1970 by Keith A. Berven and W. Ronald Heyer. Elevation 260 m.

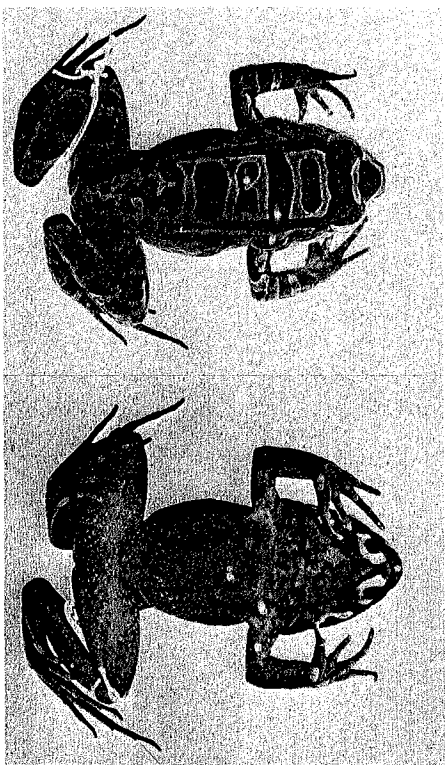


FIGURE 2. Dorsal (left) and ventral (right) views of paratype of *Leptodactylus knudseni*, LACM 72133, from Limoncocha, Provincia de Napo, Ecuador. Specimen is 62.5 mm SV.

Topoparatypes.—LACM 72118-149 (32 specimens), collected by Keith A. Berven and W. Ronald Heyer between 7 June and 4 August 1971.

Diagnosis.—In life, *Leptodactylus knudseni* is the only member of the *Pentadactylus* group with prominent chartreuse markings on a black background. In preservative, *L. knudseni* can be recognized by the presence of a pair of dorsolateral folds which differentiates it from *L. laticeps*, *L. rugosus*, and *L. sylvax* all of which lack dorsolateral folds. The posterior surface of the thigh is uniformly black in *L. knudseni* marbled in *L. pentadactylus* and *rhodonotus*, and distinctly light spotted on a dark background in *L. rhodonotus*.

Description of Holotype.—Snout ovoid from above, rounded in profile; canthus rostralis distinct; loreal concave; tympanum distinct, greatest diameter 5/6 eye diameter; vomerine teeth in two arched series extending posterior to choanae; finger lengths in order of decreasing size III > I > II = III, first finger much longer than second; inner metacarpal tubercle large, ovoid, smaller than heart-shaped outer metacarpal tubercle; dorsal surfaces shagreened, upper surface of tibia scattered with white tipped tubercles; one pair of weak dorsolateral folds extending from eye to sacrum, another pair of folds extending from posterior angle of eye over tympanum to angle of jaw, diffuse gland at angle of jaw; ventral surfaces smooth, belly disk fold distinct; toe tips not expanded; sides of toes with visible fringe, not extensively developed; subarticular tubercles moderately developed; outer metatarsal tubercle distinct, rounded, about two-thirds length of elongate inner metatarsal tubercle, tarsal fold distinct, extending 5/6 length of tarsus; no metatarsal fold; lower

surface of tarsus scattered with white tipped tubercles; sole of foot smooth except for three or four white tipped tubercles on outermost edge of sole.

Measurements (in mm).—Snout-vent (SV), 63.2; head length, 22.9; head width, 22.8; interorbital distance, 5.0; greatest diameter of tympanum, 4.8; diameter of eye, 6.1; eye-nostril distance, 5.0; femur, 24.6; tibia, 27.4; foot, 30.8.

Coloration in preservative.—Dorsal surfaces black with light gray patterns, side of head light gray with dark triangles on upper lip, the dark triangle under the eye extending to the eye; the light gray of the side of the head bordering the lower half of the tympanum; tip of snout with light gray stripe bifurcating at nostrils, extending along canthus rostralis, continuous with light stripe on outer edge of eyelid and light interorbital bar; dorsum with light cross bars, breaking down posteriorly; dorsolateral fold dark; upper arm with light cross bars; upper femur and tarsus with irregular light cross bands; upper tibia with light pattern surrounding dark central area; chin bordered with alternating dark and light blotches; venter profused with melanophores scattered with small light dots (visible under magnification, melanophores contracted); bottom of tarsus and sole of foot black; posterior surface of thigh uniform black.

Variation.—The paratypes range in size from 32.8 to 62.5 mm. The variation (minimum-mean-maximum ± 1 standard error) in measurement ratios (expressed as per cent) among the type series is: head length/snout-vent, 36-38.7-40 ± 1.0 ; head width/snout-vent, 35-38.2-40 ± 1.4 ; femur/snout-vent, 40-43.0-46 ± 1.4 ; tibia/snout-vent, 39-43.3-46 ± 1.6 ; foot/snout-vent, 47-50.3-55 ± 2.0 . The color pattern is similar among all the paratypes, the greatest variation occurring in the degree of light marking on the dorsum in the sacral region. In several specimens the melanophores are expanded on the belly, producing a black belly with small light dots.

The color in life of specimen LACM 72118 was typical of other specimens in the type series: posterior surface of thigh jet black; upper surfaces of legs with barely discernible, yellowish green cross bands; belly gray with lighter punctations; chin with yellow marks along edge; dorsum with greenish yellow bands enclosing brownish green areas which are black bordered; iris gold-yellow above, rusty gold below; head mostly yellowish green.

Karyotype.—Twenty-four cells were examined from marrow and spleen tissue of specimens 72145, 72147, and 72148. The slides will be deposited in LACM. The terminology used is that defined by Patton (1967). Several chromosomes are borderline in their classification and vary according to their state of contraction. Three pairs of metacentrics (Fig. 3, chromosome pair numbers 1, 4, 9), 4 pairs of submetacentrics (Fig. 3, numbers 2, 5, 10, 11), and 4 pairs of subtelo-centrics (Fig. 3, numbers 3, 6, 7, 8) are common. The Fundamental Number is 44; there are no secondary constrictions. An analysis of the karyotypic variation found within the genus is in progress and will be reported on separately. Preliminary results indicate that the karyotype of

L. knudseni is similar to the karyotypes of other members of the Pentadactylus and Ocellatus groups.

Ecology.—Two individuals were taken from a selectively logged secondary forest. The primary forest at Limoncocha is Tropical Moist Forest according to Holdridge's classification (1964). The other specimens were collected in a pasture (Fig. 4). All specimens were taken from under cover during the day: one from bark, five from under boards, 21 from under logs ranging in diameter from 15 to 70 cm, five from within rotten logs ranging in diameter from 15 to 30 cm. Other species of *Leptodactylus* collected in sympatry with *L. knudseni* at Limoncocha were *L. discodactylus*, *mystaceus*, *pentadactylus*, and *wagneri*. Further ecological aspects of the five sympatric *Leptodactylus* will be reported in a later paper by Heyer and Bellin.

Eymology.—The new species is named for Dr. Jens W. Knudsen, who was the most important influence in my decision to be a professional biologist, and who continues to encourage my research efforts.

Remarks.—*Leptodactylus knudseni* raises the number of recognized species from Ecnador to 10. The other nine species as summarized by Heyer and Peters (1971) are: *Leptodactylus discodactylus*, *hyaedactylus*, *labrosus*,

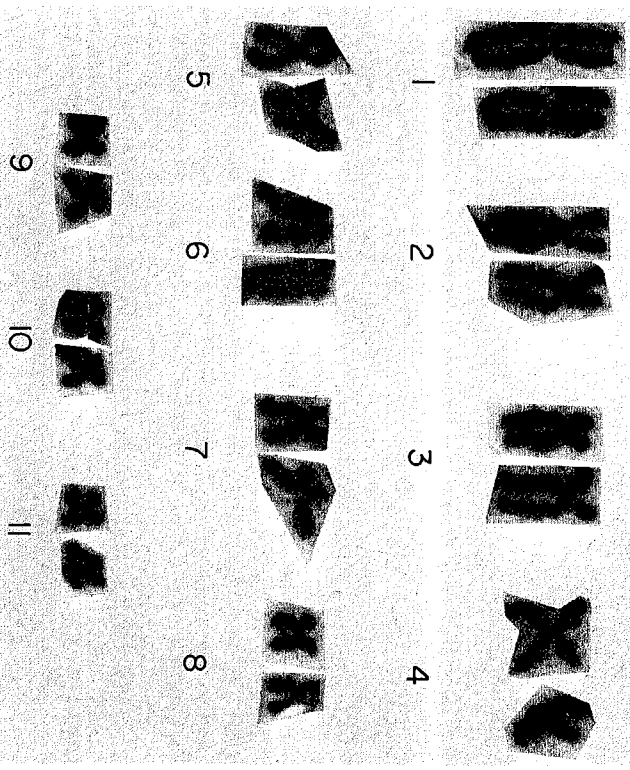


Figure 3. Karyotype of *Leptodactylus knudseni*. Marrow and spleen preparation from LACM 72147.

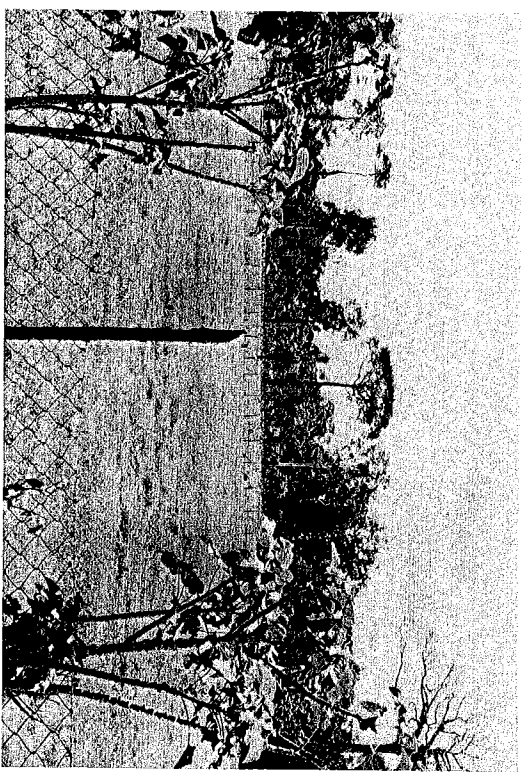


Figure 4. Pasture habitat at Limoncocha where most specimens of *Leptodactylus knudseni* were collected. Note selectively logged secondary forest in background.

melanorotus, *mystaceus*, *pentadactylus*, *rhodomystax*, *ventrinaculatus*, and *wagneri*.

Specimens of *Leptodactylus knudseni* will key out to couplet 5 in Heyer and Peters (1971: 169). The uniformly colored posterior surface of the thigh of *L. knudseni* will separate it from the variously patterned posterior thigh surfaces of *L. mystaceus*, *hyaedactylus*, and *ventrinaculatus*.

A PRELIMINARY KEY TO THE SPECIES OF THE PENTADACTYLUS GROUP

- 1A. Dorsal pattern of large discrete dark spots on a lighter background (Argentina) *L. laticeps*
- 1B. Dorsal pattern variable, never with distinct spots 2
- 2A. Dorsolateral folds lacking 3
- 2B. A pair of dorsolateral folds 4
- 3A. Dorsum very rugose; males with a single thumb spine (Guayana shield) *L. rugosus*
- 3B. Dorsum warty, not rugose; males with two thumb spines (Brasil, Mato Grosso) *L. sypfax*

