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THE FROG GENUS *LEPTODACTYLUS* IN ECUADOR

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Identification of the frogs of the diverse Ecuadorian fauna has always been complicated by the number of available names. Recent collections from Ecuador and re-examination of type material now allow proper association of names and populations in the genus *Leptodactylus*, in most cases. The purpose of this report is to indicate the present status of names that have been used for members of that genus in Ecuador, and to present information on ecology and distribution collected by one of us (Peters) during field work in Ecuador.

The following curators have provided type material or information concerning types (the abbreviations used for museum names follow in parentheses): James Böhlke, Academy of Natural Sciences, Philadelphia (ANSP); Javier Castroviejo, Instituto "José de Acosta" de Zoología, Museo Nacional de Ciencias Naturales, Madrid, Spain (MNM); Alice G. C. Grandison, British Museum (Natural History), London (BMNH); and Greta Vestergren, Naturhistoriska Riksmuseet, Sektionen for Vertebratzologi, Stockholm, Sweden (NRS). The abbreviation used for National Museum of Natural History specimens is USNM; material from the James A. Peters collection, which is deposited in the USNM, is labelled JAP. Field work in Ecuador by Peters was supported by the National Science Foundation, Grant No. G-21010. The work by Hoyer was done while he was a National Science Foundation Graduate Trainee at the University of Southern California.

## CURRENTLY RECOGNIZED ECUADORIAN SPECIES

*Leptodactylus discodactylus* Boulenger

This species, described by Boulenger (1883: 637) from Yurimaguas, Huallaga River, Peru, has been reported from Ecuador by Peracca (1904: 34). Peracca mentioned 2 localities, Papallacta and the valley of the Río Santiago. The first is almost certainly either an erroneous locality or an erroneous identification, since Papallacta lies at an altitude of about 3000 meters, on the upper edge of the cloud forest, and shares no reptile or amphibian species with the tropical rain forest. Peracca's second locality is probably valid. Heyer (1970: 7) has recently re-described this species and discussed it in detail.

This species lives in open wet areas, such as swampy meadows, where it occurs sympatrically with *L. wagneri*. The latter is usually the more abundant species.

*Leptodactylus hylaeactylus* (Cope)

The *Marmoratus* species group is composed of at least 2 species (Heyer and Silverstone, 1969: 142). Only 1 species of the group is represented in recent Ecuadorian collections, and the name *hylaeactylus* is appropriate for this population.

This species, although geographically sympatric with both *L. discodactylus* and *L. wagneri*, is not ecologically sympatric with them. It is usually found in fairly heavy rain forest, often hiding in the litter of the forest floor or beneath rocks and logs, but it can also be found actively moving about on the forest floor during daylight hours. It is sometimes found under and among rocks along larger streams. It seems to be more active during rain storms.

*Leptodactylus labrosus* Espada

*Leptodactylus labrosus* was described by Espada (1875: 36) on the basis of 2 females from Pimocha, on the Río Daule, in Guayas Province, Ecuador. Only 1 specimen is still extant at the National Museum of Madrid, although their records indicate that at one time they had both specimens. The extant specimen of *L. labrosus* is not the specimen described in detail by Espada. The surviving syntype of *L. labrosus* agrees completely in taxonomic details with recent specimens from the vicinity of Guayaquil, Ecuador. It is a member of the *Fuscus* species group, which shows the following characters: 1) without a light longitudinal stripe on the posterior thigh, 2) with a smooth tarsus and sole of the foot, 3) with 2 dark outlined dorsolateral folds, and 4) usually with an inguinal gland. *Leptodactylus curtus* Barbour and Noble (1920: 405) from northwestern Peru shares these same characters. Comparison of USNM 75990, a paratype of *L. curtus*, with the recent series of *L. labrosus* indicates that they are synonymous. In order to fix the name taxonomically, we hereby designate the extant MNM syntype (no speci-

Frog Genus *Leptodactylus*

165

men or jar number), an adult female, body length 50.5 mm, as the lectotype of *Leptodactylus labrosus*.

*L. labrosus* inhabits the xeric parts of southwestern Ecuador and northwestern Peru, and is the only species of *Leptodactylus* known from this arid habitat. In this area, however, it is completely restricted to wet areas. A specimen from Cuatro Hermanitos, 4 km WNW of Guayaquil, in Guayas Province (JAP 1743), was collected on an experimental farm, which had been irrigated to learn what exotic plants could be grown in the xeric area. It was taken in the same barrel as the holotype of *Carthophrys stoddammi scaphiopeza* Peters (1967: 105) and a specimen of *Rana palmipes*. The area around Machala, El Oro Province, although showing a low rainfall record, nevertheless is moist enough to support banana plantations and a scrub forest. The source of the moisture is the *Garrua*, a wet wind blowing in from the Pacific, which keeps the coastal area foggy and moist, even though it does not deposit enough of its moisture to register much on the rain gauges. Specimens of this species were taken on the floor of scrub forest as well as in and about drainage ditches and bushes at the Standard Fruit hacienda in Machala.

*Leptodactylus melanonotus* (Hallowell)

This species has been thoroughly reviewed by Heyer (1970: 9). This species is widespread in Central America. It occurs only in the rain forest of the northwestern corner of Ecuador. The reptile and amphibian fauna of this area is strongly Central American in its relationships.

In the list of specimens examined, Heyer (1970: 41) misspelled Caclabé (also spelled in the literature as Cachavi or Cachabí), the locality for JAP 2888-89.

*Leptodactylus mystaceus* Spix

This species has not been recorded previously in Ecuador, although its known distribution in the Amazonian Basin made its occurrence there likely. We add it to the fauna on the basis of specimens in the collection of the Museum of Natural History, University of Kansas.

*Leptodactylus pentadactylus* Laurenti

This wide-spread, easily recognized frog is the only species in the genus to occur on both sides of the Andes in Ecuador. It is ubiquitous in the rain forests. There is a marked ability for metachrosis in the adults. The juveniles are quite differently patterned than the adults, regardless of the color change sequence in the latter. The frog has a disconcerting ability to scream with the mouth wide open, producing a noise very reminiscent of the raucous "caw, caw" of a young crow.

*Leptodactylus rhodomystax* Boulenger

This species in Ecuador is apparently confined to altitudes below 350 to 400 meters on the Amazonian slopes. We have not had personal field experience with it.

*Leptodactylus ventrimaculatus* Boulenger

*Leptodactylus ventrimaculatus* was described by Boulenger (1902: 53) on the basis of 3 specimens from Buln, Ecuador. We have examined all 3 type specimens (BMNH 1947.2.17.78-80), which are in good condition. The species belongs to the *Fuscus* group. Our fresh material from northwestern Ecuador agrees with the types in having: 1) a pair of dorsolateral folds 2) the posterior surface of the thigh dark with scattered light round or elongate spots, and 3) very prominent white tubercles profused over the tarsus and the sole of the foot. Citations concerning *L. ventrimaculatus* in the literature since the type description do not appear to have been based on additional specimens. The species has been confused with *L. rhodonotus* in at least 1 collection, which may account for Ecuadorian records of that species. We have not seen *rhodonotus* from Ecuador, although the species is to be expected there. Boulenger's original description of *L. ventrimaculatus* was based on BMNH 1947.2.17.78, so we hereby designate this specimen, a female, 57 mm body length, as the lectotype of the species. The type locality is almost certainly the town called Puln, in Esmeraldas Province. It is located at 1°05'N, 78°40'W. The name has been variously given in the literature as Buln, Bulí, Bulm, Pulí and Pulñ.

*Leptodactylus wagneri* (Peters)

This species, originally described as *Plectromantis wagneri* by Peters (1862: 232), from the "Westseite der Anden in Ecuador," is found in Ecuador only on the eastern slopes of the Andes in the Amazonian basin. It is widespread in South America east of the Andes (Heyer, 1970: 20). The holotype is lost, and Heyer (1970: 21) designated the holotype of *Eleutherodactylus leptodactyloides* Andersson as the neotype of *wagneri* Peters.

The following description of the color in life was made by Peters in 1864: Dorsum olive green, with slightly lighter spots, which are almost indistinct. An indistinct triangle between eyes, outlined in black, with a lighter line between eyes anterior to triangle. Irregular black line on dorsolateral area. Very faint reddish cast on lighter green sides. Groin, thighs and lower sides faintly yellowish. Mottling on cream belly is brownish. Light areas on lip are slightly tinged with pink. A reddish-orange streak from corner of mouth and tympanum to shoulder. Scattered black spots on sides. Iris greenish golden, speckled with black.

The species is very abundant in Ecuador, and is easily collected. It lives under rocks and logs along the banks of swiftly flowing streams, and often escapes by diving into the torrent. It is also frequently found in grassy, swampy meadows near streams. There is a not too distinct ecological separation of age groups, with juveniles and young adults on the river banks, and larger, older adults in the meadows, more distant from the streams.

PRESENT ALLOCATION OF TAXA DESCRIBED  
AS *LEPTODACTYLUS* FROM ECUADOR*Leptodactylus caliginosus* Girard

Boulenger (1882: 248) recorded this species from Sarayacu. Parker (1934: 266) listed a specimen from Zamora. Both of these references are to specimens of *L. wagneri* (Peters).

*Leptodactylus curtus* Barbour and Noble

Parker (1938: 442) recorded frogs from both the Catamayo Valley and the Marañón Valley as belonging to this species. The specimens probably belong to the species *L. labrosus* Espada, at least on the Pacific slope. *L. labrosus* occurs in the dry intermontane valleys of northwest Peru in both Atlantic and Pacific drainages. At the present time we have no evidence that *labrosus* occurs on both slopes in Ecuador, and we have not re-examined Parker's specimens.

*Leptodactylus goliath* Espada

Boulenger (1882: 240) synonymized this taxon with *Leptodactylus pentadactylus* on the basis of the original description, in which Espada (1875: 57) mentioned 4 specimens from Quijos, Ecuador. We have been able to locate only 1 of these in the National Museum in Madrid. The specimen is in good condition, is probably the individual on which Espada based most of his description, and is unquestionably a *L. pentadactylus*. We hereby designate MNM specimen in jar number 328, an adult female with body length of 156.6 mm, as the lectotype of *Leptodactylus goliath* Espada, thus verifying Boulenger's synonymy, and preventing future use of the name for a different taxon if another syntype were found to belong to a different species.

*Leptodactylus hemidactyloides* Andersson

Andersson (1945: 53) described this species on the basis of 4 specimens. The specimens are unquestionably members of the very distinctive *Lithodytes lineatus* (Schneider). The largest specimen in the type series in the Naturhistoriska Riksmuseet in Stockholm is hereby designated as the lectotype of Andersson's species. It is a female, 58 mm snout to vent length, from the Río Pastaza, Ecuador.

*Eleutherodactylus leptodactyloides* Andersson

This taxon, erroneously described as an *Eleutherodactylus* by Andersson (1945: 43), has been shown to be a synonym of *L. wagneri* (Peters) by Heyer (1970: 22), who selected the holotype of Andersson's species as the neotype of *Plectromantis wagneri* Peters (l.c.: 21).

*Leptodactylus lineatus* (Schneider)

This name has been used for frogs from Ecuador by several authors. The species is currently regarded as belonging to the genus *Lithodytes*. It is widespread on the lower Amazonian slopes of Ecuador.

*Leptodactylus nigrescens* Andersson

This species, described by Andersson (1945: 57) from the Rio Napo watershed of Ecuador, has been shown to be a junior synonym of *Leptodactylus discodactylus* Boulenger by Heyer (1970: 8). Andersson based his description on 3 specimens, 2 of which appear to belong to a second genus. Heyer (*loc. cit.*: 8) has designated the single specimen of *L. discodactylus* as lectotype to prevent future confusion.

*Leptodactylus pulcher* Boulenger

This taxon, described by Boulenger (1898: 122), has been made the type species of the monotypic genus *Barycholos* Heyer (1969a: 6).

*Leptodactylus rubido* (Cope)

Boulenger (1882: 243) used this name for specimens from Canelos, Ecuador. Heyer (1969b: 3) demonstrated that this species is a synonym of *L. rhodonotus* Cuenher, which has been found only in Peru. We are not certain what species Boulenger had in hand from Canelos.

*Leptodactylus pentadactylus rubidoides* Andersson

The holotype of this subspecies is unquestionably a specimen of *L. pentadactylus*. The variation throughout the entire range of the species must be studied before certain populations can be defined as taxonomic entities. Since we recognize no subspecies within the species at the present time, *rubidoides* becomes a synonym of *pentadactylus*.

*Leptodactylus stenodema* Espada

This species was described by Espada (1975: 64) on the basis of 2 specimens, which we have examined. Boulenger (1882: 242) suggested that this might be a synonym of *Leptodactylus pentadactylus*, but indicated with a question mark that he was not certain concerning the action. We find that both syntypes are subadult *L. pentadactylus*. One specimen, MNM jar number 189, has been dissected, and formed the basis for the osteological comparisons published by Espada. The other specimen is in good condition, and was the basis of his description of external morphology. We designate this latter specimen, in MNM jar number 190, measuring 105 mm in body length, as the lectotype of *Leptodactylus stenodema* Espada.

*Leptodactylus tuberculatus* Andersson

*L. tuberculatus* Andersson (1945: 59) was based on eight specimens. The dorsum is extremely warty and tuberculate, as indicated by the specific name. The degree of rugosity seen in this series is characteristic of very few species of frogs. The distinctive combination of a warty-tuberculate dorsum, toes without webbing, and the toes not expanded into disks at the tips indicate that this species is a junior synonym of *Eleutherodactylus quixensis* (Espada).

KEY TO THE ADULT *LEPTODACTYLUS* OF ECUADOR

1. Toes with distinct lateral fringes ..... 2
1. Toes smooth or with lateral ridges, never with fringes ..... 4
2. Toes without distinct disks; if toe tip swollen, never with longitudinal grooves on upper toe tip surface ..... 3
- Toes with distinct disks, upper disk surface with longitudinal grooves ..... *discodactylus*
3. Smaller frogs, males to 33 mm, females to 40 mm; posterior surface of thigh never with light longitudinal stripe; Western Ecuador only ..... *melanonotus*
- Larger frogs, males to 61 mm, females to 81 mm; posterior surface of thigh with or without light longitudinal stripe; Eastern Ecuador only ..... *wagneri*
4. Ventral aspect of tarsus and sole of foot with conspicuous large white tubercles ..... 5
- Ventral aspect of tarsus and sole of foot smooth or with small black horny tubercles, never with large white tubercles ..... 7
5. Posterior surface of thigh mottled or spotted, never with a distinct light longitudinal line ..... 6
- Posterior surface of thigh with a distinct light longitudinal line ..... *mysiataeus*
6. Smaller frogs, males to 23 mm, females to 25 mm; vomerine teeth in transverse series ..... *hyalaedactylus*
- Larger frogs, males to 55 mm, females to 65 mm; vomerine teeth in curved series ..... *ventrimaculatus*
7. Groin and posterior surface of thigh not strikingly darker than upper thigh surface, mottled, never with distinct spots ..... 8
- Groin and posterior surface of thigh very dark with distinct light spots ..... *rhodonotus*
8. Smaller frogs, males to 58 mm, females to 61 mm; males without a black horny thumb spine ..... *labrosus*
- Larger frogs, males to 145 mm, females to 150 mm; males with single black horny spine on each thumb ..... *pentadactylus*

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