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A New Species of *Elosia* (Amphibia, Salientia) from Mt. Duida, Venezuela

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On examining some specimens of frogs collected by G. H. H. Tate on Mt. Duida in 1928, I found four that, at first glance, seemed to belong to *Eleutherodactylus*, but closer examination revealed them to be a new species of the Brazilian genus *Elosia*. I am aware of Myers' (1962) detailed and authoritative analysis of the names *Elosia*, *Hylodes*, and *Eleutherodactylus* and accept the priority of *Hylodes* over *Elosia*. However, to bring into use a name that has been, for more than 60 years, applied to what is presently known as *Eleutherodactylus* would only worsen the taxonomic problems that are involved. Therefore, the name *Elosia* is used, until a decision by the International Commission on Zoological Nomenclature is reached. The name *Elosia duidensis* is used for this interesting frog from the Guayanan tepui.

Elosia duidensis, new species

TYPE: A.M.N.H. No. 23190, a female from the summit at Vegas Falls, 4600 feet, Mt. Duida, Venezuela; collected by G. H. H. Tate on January 10, 1929.

DEFINITION: Relatively small species of *Elosia*, with rounded, indistinct canthus, rounded snout, sloping loreal region, fleshy, toothlike protuberance at tip of lower jaw, small and indistinct tympanum, eye diameter

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equal to snout length, and disks considerably broader than digits and larger than tympanum.

DESCRIPTION: Head broader than long; snout rounded; tongue oval, one-third free behind; vomerine odontoids short, oblique, between and behind choanae, converging posteriorly and extending only slightly beyond vertical of inner margin of choanae; distinct fleshy "tooth" at tip of lower jaw and hole for its insertion at tip of upper; interorbital space slightly narrower than an upper eyelid; eye diameter slightly greater than distance between eye and nostril; canthus not well defined, rounded; loreal region sloping, concave; tympanum indistinct, only lower margin apparent; its diameter less than one-half of length of eye; no supratympanic fold; inner metacarpal tubercle oval, outer imperceptible; subarticular tubercles small, not prominent; fingers free, but with lateral fringes along margins; first two fingers much smaller than others, first considerably shorter than second, which is shorter and has smaller disk than fourth; metatarsal tubercles small, almost imperceptible; disks with dorsal pad divided by cleft; distinct fold across knee and another across heel; toes about one-third webbed, encompassing a little more than two free phalanges on outer toe, and with lateral fringe that extends to disks; disks of toes with divided pad above; pads broad, medially in contact and covering tip of disks; heel of adpressed hind limb extending beyond eye but not to nostril. Skin above, including upper eyelids and limbs coarsely granular; flanks and loreal region granular. Below, coarsely granular on throat, chest, and belly; thighs with flattened granules; tibia and tarsal segments smooth; two or three glandules at angle of jaw.

COLOR: Above, very dark brown, almost black, with obscure, darker blotches on hind limbs. Below, grayish brown, hind limbs with scattered aggregations of melanophores.

MEASUREMENTS (IN MILLIMETERS): Snout to vent length, 28.2; head length, 10.2; head breadth (at angle of jaw), 11.5; femur, 15.1; tibia, 15.1; foot, 13.0

PARATYPES: The following specimens are designated as paratypes:

A.M.N.H. No. 23194, from Agua Linda Brook, Mt. Duida; male; belly areolated, not coarsely granular as are remaining ventral surfaces of body; loose, subgular vocal sac; heel reaching to nostril; fold across knee not distinct; throat infuscated; snout subovoid rather than rounded; vomerine teeth more transverse and less distinct; loreal region not so sloping and head narrower and less flattened than in type; snout to vent, 22.9; head length, 7.8; head breadth, 8.7; femur, 12.5; tibia, 12.5; foot, 9.0.

A.M.N.H. No. 23192, from same locality as type, seemingly a female but in external appearance resembles male paratype described above; heel reaching between eye and nostril; tympanum indistinct, showing only part of anterior margin; color brown above, with two large, obscure markings on anterior part of back and two smaller ones behind these; limbs with distinct cross bars, and belly grayish brown; snout to vent, 22.5; head length, 8.3; head breadth, 9.0; femur, 12.2; tibia, 12.0; foot, 9.9.

A.M.N.H. No. 23195, from Agüita Waterfalls, Mt. Duida, immature, 16.3 mm. from snout to vent, very similar to individuals of *Prostherapis*; interorbital space broader than in adults; loreal region much less sloping; second finger almost as long as fourth; skin almost smooth above; tympanum not apparent; vomerine teeth visible, but not distinctly.

COMPARISON WITH OTHER SPECIES: *Elosia duidensis* appears to be smaller than all other species of *Elosia*. It also differs from all species in having a small, poorly defined tympanum, a rounded canthus, a sloping loreal region, stouter, broader digits, with disks larger than the tympanum, broad disk pads, a fleshy "tooth" at the tip of the lower jaw, a normal (not projecting) snout, and, apparently, a single vocal sac. It differs further from *E. aspera* Müller in having the eye diameter as long as the snout, in lacking white spots on the sides, and in lacking a sharklike snout. *Elosia lateristrigata* Baumann and *E. megalhaesi* Bokermann have two dorsolateral folds, a distinct tarsal fold, smooth dorsal and ventral surfaces, narrow fingers, and small disks. *Elosia glabra* Miranda Ribeiro has been considered a synonym of *E. lateristrigata* by Cochran, but Bokermann (1966) listed it as a good species.

In *Elosia nasus* (Lichtenstein) the snout projects, the tympanum is large, and the flanks are very tubercular. This species is very similar to *E. aspera*.

Elosia perplicata (Miranda Ribeiro) is similar to *E. nasus*, but it is more slender and has smooth skin (although there are pores over the entire dorsal surface) and longitudinal granular ridges running from the eyes to the inguinal region. In this species the nostrils are midway between the eye and tip of the snout, the knee extends anteriorly slightly beyond the snout, and the tympanum is three-fifths of the eye diameter.¹

Elosia pulchra Bertha Lutz differs from other forms, according to its author, "in its beautiful coloration and by the form of the fingers, which are relatively slender, fimbriated and provided with a rudimentary

¹I have not seen this species. The description is translated directly from the original description.

web in the toes" (Bertha Lutz, 1951, p. 706).

Elosia mertensi Bokermann is similar in general body shape to *E. aspera*. It has a distinct canthus, the tympanum is one-half of the eye diameter, the disks are one-third of the size of the tympanum, the first finger is longer than the second, there is a distinct tarsal fold, and the eyes are very protuberant. It is more closely related to *E. aspera* than to any other species, but it is distinguishable from that species by its larger size (type, 56 mm.), protruding eyes, the position of the tympanum adjoining the eye, and different coloration.

REMARKS: The finding of *Elosia* in the mountains of southern Venezuela is zoogeographically interesting. Most members of the genus are limited to southern Brazil, and only *Elosia nasus nasus* extends as far north as Bahia. (Bokermann, personal communication, considers the records from Bahia uncertain.) *Elosia* seems to be restricted mostly to streams in mountain slopes not below about 500 meters. The probability that any member of the genus will be found in the Amazon drainage system between Bahia and southern Venezuela seems to be quite remote. Furthermore, *E. nasus*, the apparently northernmost Brazilian species, seems not to be closely related to *Elosia duidensis*. We may thus presume that the various species of the genus *Elosia* are the surviving representatives of a genus that once occupied an extensive territory formerly including the Amazonian region. If, as it is often believed, the cerros or mountain fauna of southern Venezuela is post-glacial in origin, we must suppose that the presently known discontinuity of the genus occurred during or after Pleistocene times. The factors that contributed to the separation are, however, obscure, and any attempt to explain the absence of *Elosia* from Amazonia must await additional information. The reader is, however, referred to Tate (1939) and Rivero (1964) for more information on the faunal movements in the region concerned.

The Duida species of *Elosia* is more eleutherodactyloid than any of the other members of the genus. *Elosia aspera*, *Elosia nasus* and, apparently, *Elosia mertensi* (*non vide*) seem to be also, but the other Brazilian forms are more dendrobatoid than eleutherodactyloid. The genus *Eleutherodactylus* is poorly represented in southern South America; it is much more common in the northern and western regions (Andes) of the continent. If *Elosia* is derived from eleutherodactylid stock, the event may have taken place in northern South America, where the genus *Eleutherodactylus* is more common and where the most eleutherodactyloid *Elosia* is known to occur. It is true that *Eleutherodactylus* is also scarce in the Guayanian region of Venezuela, but considerable affinity has been found

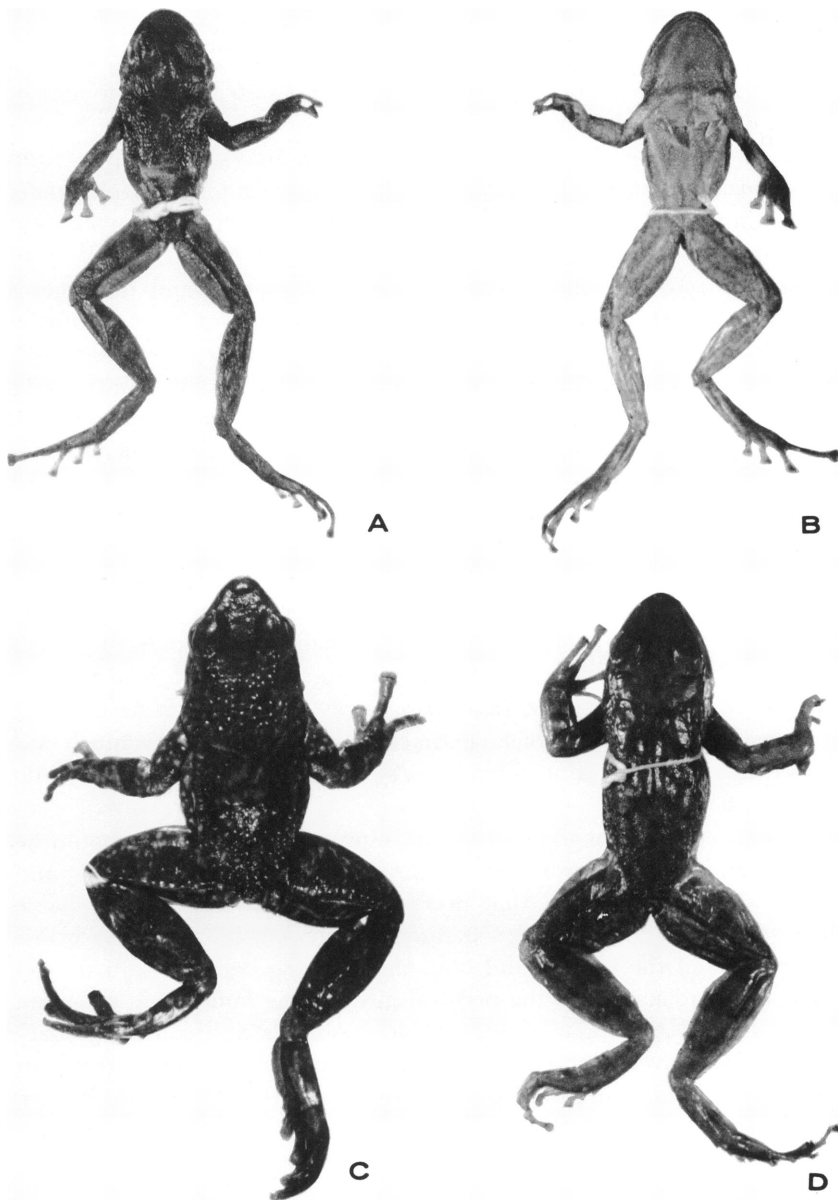


FIG. 1. A, B. *Elosia duidensis*, type, A.M.N.H. No. 23190, from Vegas Falls, Mt. Duida, Venezuela. A. Dorsal view. B. Ventral view. C. *Elosia lateristrigata*, A.M.N.H. No. 52187, from Teresopolis, Rio de Janeiro, Brazil. D. *Elosia nasus*, A.M.N.H. No. 17422, from Rio de Janeiro, Guanabara, Brazil.

to exist between the altitudinal forms of birds and mammals from the Andes and the Guayanan cerros (Chapman, 1931; Tate, 1939), and it is not improbable that the ancestors of *E. duidensis* may be found, or may have existed, in the Andean region.

Noble (1931, p. 504) thought that *Elosia* may have arisen from *Eupsophus* (*Borborocoetes*), but in the latter genus the terminal phalanges of the fingers are simple, the atlas vertebra is anteriorly convex, and the larval development is partially terrestrial. In *Elosia*, as well as in *Eleutherodactylus*, the terminal phalanges are T-shaped, and the atlas is concave, but the larval development is aquatic in *Elosia* and terrestrial (more advanced than in *Eupsophus*) in *Eleutherodactylus* (Gallardo, 1965, pp. 83-84). *Batrachyla*, which is placed together with *Eupsophus* among the leptodactylids with a convex atlas, has T-shaped phalanges and thus represents, according to Gallardo (1965, p. 83) a convergence toward the genus *Eleutherodactylus*.

An interesting feature is the fleshy, toothlike protuberance at the tip of the lower jaw of *Elosia duidensis*. The species of *Eleutherodactylus* with which the author is familiar do not have it, but its presence is apparently general in *Leptodactylus*, *Eupsophus*, and several other leptodactylids. It seems possible that this seemingly unimportant, fleshy knob may have considerable taxonomic significance. If it does, one may be inclined to believe that *Elosia* evolved well down at the base of the *Eleutherodactylus* branch, perhaps at a stage not very much advanced beyond the *Batrachylinae* (*Eupsophus* and *Batrachyla*) of Gallardo (1965, p. 83).

Griffiths (1959) thought that the ancestors of dendrobatids should be sought among the ranids rather than among the leptodactylids and cited as evidence the fact that in *Prostherapis* (*Hyloxalus*), the probable stem genus, the thigh complex is ranoid, there is a bursa angularis oris at the angle of the mouth, and both the breeding behavior and the development and nature of the pectoral girdle show some ranid affinities. He considered the digital scutes of dendrobatids and some leptodactylids to be convergent, and recalled that identical pads are present in petropedetic ranids and in *Crossodactylus*, a genus that he did not believe was related to dendrobatids.

Although well documented, Griffiths' views need further confirmation. Superficially some individuals of *Elosia* strongly resemble dendrobatids, and some dendrobatids, such as the recently described giant (for the group) *Prostherapis riveroi* Donoso-Barros, greatly resemble *Elosia*. This similarity, however, may only reflect adaptive features of frogs with similar habits and may not demonstrate relationship.

The possibility that the dorsal pads of the Mt. Duida and south Brazilian forms may have been convergently acquired cannot be ignored. In fact, apart from the fimbriated digits, cleft pads, and sexual dimorphism, there is little in common between the two forms. There are distinctive differences between them: indistinct tympanum, indistinct metatarsal and metatarsal tubercles, rounded canthus, and fleshy tooth at the angle of the jaw in the species from Duida. Such differences are to be expected if the populations have been separated long enough. The present geographic separation should not be disturbing, because similar affinities between the Guayanan and south Brazilian forms have been demonstrated among mammals (Tate, 1939) and birds (Chapman, 1931).

Because only four specimens of *Elosia duidensis* are available, and nothing is known about the life history of this species, it is preferable to allocate it to the genus *Elosia* pending additional information.

LOCALITIES: The following description of the localities where *Elosia duidensis* was collected has been taken from Chapman (1931), who copied from Tate's notes:

Vegas Falls: "A station some two miles to the west of Central Camp [at 4000 feet in the Mt. Duida plateau] on the trail to Savanna Hills [at 4000 feet in the center of the Mt. Duida plateau] whose chief feature is a water-fall some 50 feet in height and perhaps 50 feet in breadth. Olalla was stationed here for about a week in February with the hope that he might find material peculiar to the place. Owing to the width of the stream and the fact that at this time of the year the water is extremely low, considerable open space occurs in its bed. Its banks, however, are fringed with the customary brush-forest of the interior of the plateau. A few hundred yards to the northwest much firmer ground than the usual yielding humic soil is reached, and accompanying this there is some change in the vegetation—the forest becoming more open and more easily penetrated. Also, certain sedges and bromeliads occur which are not found in the higher parts."

Agüita Waterfalls: Agüita Camp, at 3250 feet, was described as follows: "A camp half-way up a slope which averages 40 degrees. The forest is transitional from tropical to subtropical but contains a high percentage of subtropical trees. This percentage increases as the slope is ascended. The station is placed within one of the re-entrant valleys of Duida and for this reason its rainfall is markedly heavier than that of nearby Caño Seco Camp. Agüita is well within the cloud forest belt.

"From Agüita considerable collecting was done as high as First Ridge which has an altitude of 4000 feet; no station could be established here

because of the absence of water.”

No reference was found for Agua Linda Brook.

REFERENCES

- BAUMAN, F. VON
1912. Brasilianische Batrachier des Berner Naturhistorischen Museums. Zool. Jahrb., Syst., vol. 33, no. 2, pp. 87-172, figs. 1-4, 3 pls.
- BOKERMANN, WERNER C. A.
1956. Una nueva especie del género *Elosia* del sudeste de Brasil (Amphibia Salientia, Leptodactylidae). Neotropica, vol. 2, pp. 81-84, figs. 1-8.
1964. Una nueva especie de *Elosia* de la Serra da Mantiqueira. *Ibid.*, vol. 10, pp. 102-107, figs. 1-5.
1966. Lista anotada das localidades tipo de anfíbios brasileiros. São Paulo, Serviço de Documentação, RUSP, pp. 1-183, 3 maps.
- CHAPMAN, FRANK
1931. The upper zonal bird-life of Mts. Roraima and Duida. Bull. Amer. Mus. Nat. Hist., vol. 63, pp. 1-135, figs. 1-42.
- GALLARDO, JOSÉ M.
1962. Los géneros *Eupsophus* y *Batrachyla* (Anura, Leptodactylidae) en la Argentina y la verdadera identidad de *Paludicola illota* Barbour. Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," vol. 8, pp. 113-122, figs. 1-2.
1965. A propósito de los Leptodactylidae (Amphibia Anura). Papeis Avulsos Dept. Zool., Sec. Agr., São Paulo, vol. 17, pp. 77-87.
- GRIFFITHS, I.
1959. The phylogeny of *Sminthilus limbatus* and the status of the Brachycephalidae (Amphibia Salientia). Proc. Zool. Soc. London, vol. 132, pp. 457-487, figs. 1-18, pls. 1-4.
- LICHTENSTEIN, MARTIN HINRICH CARL
1823. Verzeichniss der Doubletten des zoologischen Museums der Koenigliche Friedrich-Wilhelms Universitat. Berlin, pp. 1-118, pl. 1.
- LUTZ, ADOLPHO
1931. Contribution to the knowledge of Brazilian batrachians. Mem. Inst. Oswaldo Cruz, vol. 24, pp. 223-249, pls. 64-67.
- LUTZ, BERTHA
1951. Nota prévia sobre alguns anfíbios anuros do Alto Itatiaia. O Hospital, vol. 39, pp. 705-707.
- MERTENS, ROBERT
1927. Neue Froschlurche aus Rio Grande do Sul, Brasilien. Bl. für Aquarien- und Terrarienk., vol. 38, no. 2, pp. 1-4, figs. 1-6.
- MIRANDA RIBEIRO, ALÍPIO
1926. Notas para servirem ao estudo dos Gymnobatrachios (Anura) brasileiros. Arch. Mus. Nac. Rio de Janeiro, vol. 27, pp. 1-227.
- MÜLLER, LORENZ
1924. Neue Batrachier aus Ost-Brasilien. Senckenbergiana, vol. 6, pp. 169-177.
- MYERS, GEORGE S.
1962. The American leptodactylid frog genera *Eleutherodactylus*, *Hylodes* (= *Elosia*) and *Caudiuverbera* (= *Calyptocephalus*). Copeia, pp. 195-201.

NOBLE, G. K.

1931. *The biology of the Amphibia*. New York. xiii + 577 pp., figs. 1-174.

RIVERO, JUAN A.

1964. The distribution of Venezuelan frogs. V. The Venezuelan Guayana. *Caribbean Jour. Sci.*, vol. 4, pp. 411-420, fig. 1, 1 map.

TATE, GEORGE H. H.

1930. The Cerro Duida region of Venezuela. *Geogr. Rev.*, vol. 22, pp. 31-52.

1939. The mammals of the Guiana region. *Bull. Amer. Mus. Nat. Hist.*, vol. 76, pp. 151-229.

