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Identity of the South American Hylid Frog *Garbeana garbei*

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Garbeana garbei Miranda-Ribeiro, 1926, is a member of the *Hyla boulengeri* complex. *Hyla lutzi* Melin, 1941, is a junior synonym of *Hyla garbei*, which is specifically distinct from *Hyla rostrata* Peters, a species inhabiting non-forest areas in Venezuela, northern Colombia, and eastern Panamá. *Hyla garbei* occurs in the rainforest in the upper Amazon Basin.

INTRODUCTION

MIRANDA-Ribeiro (1926:96) named and described a new genus and species of hylid frog as *Garbeana garbei*; he placed *Garbeana* in his subfamily "Triprioninae," which also included *Aparasphenodon*, *Corythomantis*, and *Triprion*, all genera characterized by having the head modified as a casque and having integumentary-cranial co-ossification. Miranda-Ribeiro stated that the skin was co-ossified with the skull in the unique holotype of *G. garbei*, which was obtained at Eirunepé, Rio Juruá, Estado do Amazonas, Brazil, by Sr. Garbe in March 1920.

Few references to the name exist in the literature. Lutz and Kloss (1952:648) referred a specimen from the Rio Itacoai, Estado do Amazonas, to *G. garbei*, but no additional specimens have been assigned to the species. Goin (1961:13) placed *Garbeana* as a junior synonym of *Osteocephalus* Steindachner, 1862, and stated: "*O. planiceps* is

surely a synonym of [*Osteocephalus*] *leprieuri* and I believe that *garbei* is as well." Rivero (1961:123) suggested that several nominal species, including *G. garbei*, were synonyms of *Hyla boulengeri* Cope. Bokermann (1966: 41) considered *G. garbei* to be a junior synonym of *Osteocephalus planiceps* Cope, 1874; this action followed Goin's suggestion. However, Bokermann (1968: pers. comm.) stated that his assignment was incorrect. None of the above workers provided evidence in print that they had examined the holotype of *G. garbei*. Rivero (1968) examined the holotype of *Hyla rostrata* Peters and concluded that *Garbeana garbei*, *Hyla lutzi* Melin, and *H. foliamorta* Fouquette were junior synonyms of *H. rostrata*.

I concur with Rivero that the Panamanian population named as *foliamorta* by Fouquette (1958) is not specifically distinct from the population in northern Colombia and Venezuela, to which the name *rostrata* applies. However, the type specimens of *Hyla rostrata*

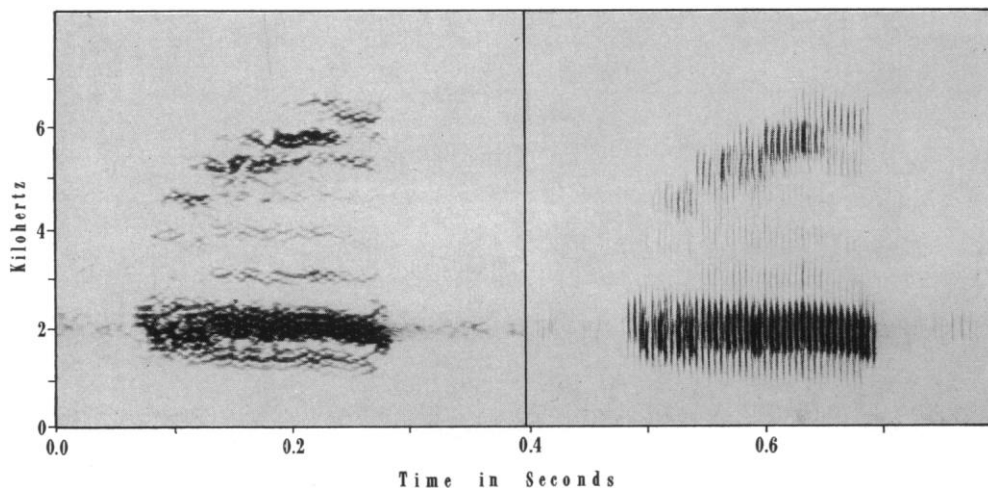


FIG. 1. Audiospectrograms of mating call for *Hyla garbei*. Left, narrow band; right, wide band. KU Tape No. 684, recorded at Santa Cecilia, Provincia Napo, Ecuador, on 14 May 1969; air temperature 23° C.

and *Garbeana garbei*, and the populations to which these names can be assigned, are different. This conclusion is based on the examination of 180 specimens referable to the two species and the type specimens of all of the taxa involved.

The holotype of *G. garbei* (DZ 277) is a gravid female with a snout-vent length of 46.3 mm and the skin of the head entirely free from the underlying cranial elements; in all other respects it matches the description given by Miranda-Ribeiro, except that the coloration has faded during the intervening 43 years. The holotype of *H. lutzi* (NMG 481) is an adult male with a snout-vent length of 42.8 mm. Comparison of the holotypes of *G. garbei* and *H. lutzi* with series of specimens from the upper Amazon Basin leaves little doubt that but one taxon is involved. The only noticeable difference between the Brazilian and Ecuadorian specimens is that the latter are slightly smaller; the largest male and female from Ecuador have snout-vent lengths of 37.6 and 43.7 mm, respectively. This minor difference in size seems to be inconsequential in view of the similarities in structure and coloration, including two features not known to be present in other members of this group of this group of *Hyla*.

The two types and all of the other specimens from the upper Amazon Basin have a small, but nevertheless conspicuous, elongate, pointed tubercle on the heel. Furthermore,

in all of these specimens there is a row of tubercles on the edge of the lower jaw; in most specimens the tubercles are most prominent posteriorly. Both of these characters are absent in other members of the group. Thus, I conclude that *Garbeana garbei* is a *Hyla* and that *Hyla lutzi* is a junior synonym of *H. garbei*.

H. garbei differs from *rostrata* (characters in parentheses) by the presence of a noticeable elongate tubercle on the heel (no tubercle), row of tubercles on lower edge of jaw (no tubercles), pale gray or white vocal sac (brown or dark gray), snout-vent length of 31.1–42.8 (\bar{x} 33.3) mm in 45 males (40.0–45.7 [\bar{x} 42.5] mm in 28 males), sharply pointed snout in dorsal profile (acutely rounded), many small tubercles on eyelids and supratympanic folds (few low tubercles on dorsum), and in several parameters of the mating call.

In general the call of *H. rostrata* is pitched much lower, has a slower pulse rate, and is repeated less rapidly than that of *H. garbei*. The following data are based on recordings of seven *H. rostrata* and eight *H. garbei*. The call of *H. garbei* consists of a single note repeated at a rate of about 140 notes/min, although the usual sequence consists only of 8–20 notes. Notes have a duration of 0.16–0.26 (0.21) of a second; the pulse rate varies from 195 to 240 (215) pulses/sec. There are usually four or five emphasized harmonics; the second of these at about 3100–3350 (3244)

Hz is dominant; in most calls three harmonics above the dominant one are also emphasized (Fig. 1). The call of *H. rostrata* consists of one moderately long note, repeated at intervals in excess of 20 sec. Notes have a duration of 0.23–1.86 (0.69) sec; the pulse rate varies from 50 to 60 (51) pulses/sec. Two harmonics are emphasized; the lower is at 912–1026 (918) Hz, and the upper is at 2736–3477 (3055) Hz (see Fouquette, 1958; Rivero, 1968; and León, 1969, for audiospectrograms of *H. rostrata*).

The following brief account summarizes the known information on the species.

Hyla garbei (Miranda-Ribeiro)

Garbeana garbei Miranda-Ribeiro, 1926:96.

Hyla lutzi Melin, 1941:36.

Hyla (*Garbeana*) *garbei*. Lutz and Kloss, 1952:648.

Osteocephalus garbei. Goin, 1961:13.

Osteocephalus planiceps (part). Bokermann, 1966:41.

Hyla rostrata (part). Rivero, 1968:134.

Diagnosis.—A moderate-sized hylid frog (♂ 43 mm, ♀ 47 mm) characterized by 1) a long, acuminate, projecting snout, 2) greatly reduced webbing between the first and second toes, 3) long slender fingers lacking webs and bearing truncate discs, 4) predominantly green or reddish brown dorsum, 5) anterior and posterior surfaces of thighs pale with broad vertical dark bars, 6) small, elongate tubercle on heel, and 7) row of tubercles along edge of lower jaw.

Characters 1, 2, and 3 above allocate the species to the *boulengeri* subgroup of the *Hyla rubra* group. Within the *boulengeri* subgroup, characters 6 and 7 are unique to *H. garbei*. In addition, the other members of the subgroup differ from *garbei* as follows: *H. proboscidea* has a fleshy proboscis; *H. rostrata* has a dark throat in adult males (white or pale gray in *garbei*) and has a predominantly brown dorsum; *H. catherinae* has a broader snout and tubercles arranged in rows on the dorsum (dorsum non-tuberculate, except eyelid, supratympanic fold, and area above insertion of arm in *garbei*); *H. acuminata*, *H. egléri*, and *H. phrynoderma* are smaller (males less than 30 mm in snout-vent length) and have terminally rounded snouts; *H. boulengeri* has a broader snout and smaller tubercles on most dorsal surfaces.

The following description is based on 52 freshly preserved specimens (45 ♂, 7 ♀) from

Amazonian Ecuador; however, measurements include those of the holotypes of *H. garbei* and *H. lutzi*.

Snout-vent length in males 31.1–42.8 (\bar{x} 33.3) mm, in females 38.0–46.3 (\bar{x} 41.0) mm. Snout in dorsal view acuminate, in lateral profile acuminate, projecting well beyond edge of lower lip; nostrils above edge of lip, protruding dorsolaterally; internarial region depressed canthus rostralis slightly elevated; loreal region barely concave; lips thick, not flared; supratympanic fold weak, covering upper edge of tympanum; tympanic ring present; diameter of tympanum about one-half that of eye; tympanum situated below midline of eye, separated from eye by distance slightly greater than diameter of tympanum.

Axillary membrane absent; row of tubercles on ventrolateral edge of forearm; weak dermal fold on wrist; fingers long, slender, bearing moderately large truncate discs; width of disc on third finger slightly greater than diameter of tympanum; subarticular tubercles moderately small, conical, non bifid; supernumerary tubercles small, indistinct, present only on proximal segments of digits; palmar tubercle large, flat, distinctly trifold; pollical tubercle large, elongate; prepollex barely enlarged, lacking nuptial excrescence in breeding males; fingers not webbed. Heels of adpressed limbs overlapping by about one-half length of shank; tibiotarsal articulation extending to point midway between eye and tip of snout; small elongate tubercle on heel; row of low tubercles on outer edge of tarsus; inner tarsal fold absent; inner metatarsal tubercle low, flat, round, not visible from above; outer metatarsal tubercle large, conical; subarticular tubercles moderately large, flat; supernumerary tubercles small, present irregularly on proximal segments of digits; toes moderately long, bearing discs noticeably smaller than those on fingers; toes about one-half webbed; webbing vestigial between first and second toes, extending from distal end of penultimate phalanx of second toe to distal end of antepenultimate phalanx of third, from distal end of penultimate phalanx of third to base of antepenultimate phalanx of fourth, and from middle of antepenultimate phalanx of fourth to distal end of penultimate phalanx of fifth toe.

Anal opening directed posteriorly at upper level of thighs; few conical tubercles lateral to anal opening. Skin generally smooth

above, except small tubercles present on eyelid, supratympanic fold, area above insertion of arm, and most pronounced on margin of lower jaw; skin of throat smooth in males, weakly granular in females; skin on belly and proximal posteroventral surfaces of thighs granular; elsewhere on ventral surfaces skin smooth.

Tongue ovoid, shallowly notched posteriorly, barely free behind; dentigerous processes of prevomers shallowly arched, narrowly separated elevations between large, quadrangular choanae; total number of prevomerine teeth 9–16 (\bar{x} 12.6 in 20 males), 14–21 (\bar{x} 17.2 in 8 females); vocal slits long, extending from posterolateral base of tongue nearly to angle of jaws; vocal sac single, median, subgular with posterolateral extensions to angles of jaws.

Coloration in preservative: Dorsum dull brown with darker brown markings, always including triangular mark on head with corners on eyelids and apex directed posteriorly; other dorsal markings usually consisting of dark supratympanic fold, indistinct bars on lips, and weak transverse bars on limbs; large dark brown marks posterodorsal to axilla in some specimens; small dark brown dashes on transverse marks posteriorly on dorsum in most specimens; anterior and posterior surfaces of thighs cream with wide vertical black or dark brown bars, usually three on each surface; webbing of feet grayish brown. Venter creamy white with brown flecks on chin, chest, flanks, and especially on shanks and feet.

Coloration in life: Dorsum pale dull green or brown with dark brown or olive-green markings; anterior and posterior surfaces of thighs yellow or pale orange with black or dark brown markings; venter creamy white; chin marked with gray flecks; iris pale creamy bronze with median horizontal reddish brown streak, palpebrum clear.

Metachrosis in the intensity of the dorsal coloration is noticeable. Usually the frogs are paler at night than by day. All living individuals observed have had yellow or pale orange on the anterior and posterior surfaces of the thighs; none had pale green.

Distribution.—*H. garbei* is known from the middle and upper Amazon Basin in Brazil, Colombia, Venezuela, Ecuador, and north-eastern Peru. I have examined the following specimens that are referable to *H. garbei*:

BRAZIL: *Amazonas*: Eirunepé, Rio Juruá, DZ 277; Manaus, NMG 481. COLOMBIA:

Amazonas: Leticia, KU 124788. ECUADOR: *Napo*: Limón Cocha, KU 99194–6, UIMNH 64857, 90065, 90801; Puerto Libre, Río Aguarico, KU 123118–9; Puerto Ore, Río Aguarico, KU 123120; Santa Cecilia, KU 104846–7, 109358–60, 111680–3, 123114–7, 125602–6, UMMZ 129319 (4). *Pastaza*: Mera, 120981–1001; Sarayacu, KU 120977–80; Shell Mera, CAS 94223, KU 99193. *Zamora-Chinchipec*: 2 km SW Cumbaraza, KU 121002–7; Zamora, KU 121008–9. PERU: *Huanuco*: Tingo María, CAS 85153. *Loreto*: Pebas, CAS-SU 3156–7, 6324, 12643. VENEZUELA: *Amazonas*: Caño Iguapo, Alto Orinoco, UPR-M 2722.

The latter specimen was referred to *H. rostrata* by Rivero (1968). I have examined specimens of *H. rostrata* from Maracay (58 in ZSM), Nirgua (3 in UPR-M), Puerto Cabello (holotype in ZMB), between Apure and Tachira (1 in UIMNH), Venezuela; El Real (2 in USNM) and Río Cauca (1 in ZMB), Antioquia, and Villavicencio, Meta (1 in AMNH), Colombia. Additionally, 46 specimens have been examined from Panama.

Apparently there are five species of the *H. boulengeri* complex in northern South America (Amazon Basin northward). *H. boulengeri* is principally Central American but also occurs in Chocoan Colombia and north-western Ecuador. *H. rostrata* is an inhabitant of sub-humid, non-rainforest environments in Panama and northern Colombia and Venezuela; it also occurs in the llanos of Colombia and Venezuela and in the Cauca Valley in Colombia. *Hyla elgeri* is known from the lower Amazon Basin and Surinam, whereas *H. garbei* inhabits the middle and upper Amazon Basin. The distinctive *H. proboscidea* is known only from Guyana and Surinam. Available evidence indicates that each of these taxa is specifically distinct from the others. Each has a distinctive mating call, except that the call is not known of the morphologically distinctive *H. proboscidea*. M. J. Fouquette has shown me two specimens from Mitú, Vaupés, Colombia, that are morphologically like *H. garbei*; however, upon comparing audiospectrograms of the frogs from Mitú with those of *H. garbei* from Santa Cecilia, Ecuador, he noted differences of a magnitude indicating specific distinctness. Thus, the possibility exists that two sibling species are being confused.

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A New *Pseudogonatodes* from Peru with Remarks on Other Species of the Genus

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Pseudogonatodes peruvianus n. sp. is described from the Rio Utcubamba Valley on the eastern slope of the Andes, Department of Cajamarca, northwestern Peru. It is most closely related to *P. furvus* of Colombia by having relatively long digits, lacking an expanded lamella and being scansorial in behavior. It is also related to *P. amazonicus* of Brazil in coloration, body size and having granular dorsals.

INTRODUCTION

THE South American gekkonid genus *Pseudogonatodes* was proposed for a single species described by Ruthven in 1915. In a recent, comprehensive review of the genus, Vanzolini (1967) recognized five species. Mechler (1968) discussed but did not formally describe a sixth species from Colom-

bia. These uniformly tiny geckos are known presently from the highlands of Colombia (*P. furvus* and *P. sp.*), from sea level to approximately 1100 m in northern Venezuela (*P. lunulatus*), the river valleys of northern Guayana (*P. guianensis*), upper Amazon Basin of Brazil (*P. amazonicus*), and the semi-arid valleys of the interandean basins of northwestern Peru (*P. barbouri*).