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PHYLLOMEDUSA BUCKLEYI BOULENGER: VARIATION,
DISTRIBUTION AND SYNONYMY

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ABSTRACT: *Phyllomedusa buckleyi* Boulenger, 1882, is the earliest available name for a small generalized species of hylid frog inhabiting the Amazonian slopes of the Andes in Ecuador. *Phyllomedusa loris* Boulenger, 1912, and *Hyla porifera* Andersson, 1945, are junior synonyms. Two other closely related species (*P. lemur* and *P. medina*), together with *P. buckleyi*, comprise the *Phyllomedusa buckleyi* group. The species are distinguished from one another by the presence or absence of a calcar and prevomerine teeth and by the color of the iris in life.

THE acquisition of five specimens of *Phyllomedusa buckleyi* from the Amazonian slopes of the Andes in Ecuador in the summer of 1968 provides the basis for a review of the systematic status of this and other nominal species. In the most recent reviews of the genus *Phyllomedusa* (Funkhouser, 1957, 1962; Duellman, 1968) different phyletic arrangements have been proposed. However, when various adaptive lines of phyllomedusines have been eliminated, one group of small generalized species remains. This group consists of four nominal species of *Phyllomedusa*: *buckleyi* Boulenger, 1882; *lemur* Boulenger, 1882; *loris* Boulenger, 1912; and *medina* Funkhouser, 1962.

Phyllomedusa buckleyi previously has been known only from the holotype, a juvenile having a snout-vent length of 32 mm and lacking prevomerine teeth (*vide* Boulenger, 1882:425). Boulenger stated that the fingers are one-third webbed and the toes one-half webbed, but his illustration (1882: pl. 29, Fig. 1) shows essentially no webbing. *Phyllomedusa loris* likewise was based on a single specimen having a snout-vent length of 46 mm, prevomerine teeth, and only rudimentary webbing on the hands and feet (*vide* Boulenger, 1912:186). Funkhouser (1957:26) referred another specimen (UMMZ 92102) to *P. loris*. Werner C. A. Bokermann called my attention to the possibility that *Hyla porifera* Andersson (1945)

might be related to the *Phyllomedusa buckleyi* group. Subsequent examination of the holotype (NHRM 1963) confirmed this suspicion. The data obtained from the recently collected specimens, from the type of *Hyla porifera*, and from the literature provide the material bases for synonymizing two nominal species, redescribing *Phyllomedusa buckleyi*, and re-evaluating the phylogenetic relationships of that species.

Phyllomedusa buckleyi Boulenger

Phyllomedusa buckleyi Boulenger, 1882, p. 425, pl. 25 [holotype, BMNH 80.12.5.230 (RR 1947.2.22.35) from Sarayacu, Pastaza Province, Ecuador; Buckley collector]. Nieden, 1923, p. 344. Lutz, 1950, p. 601, 619. Funkhouser, 1957, p. 26. Duellman, 1968, p. 6.

Phyllomedusa loris Boulenger, 1912, p. 186 [holotype, BMNH 1912.11.1.71 (RR 1947.2.22.37) from El Topo, Río Pastaza, Tungurahua Province, Ecuador; M. G. Palmer collector]. Nieden, 1923, p. 344. Lutz, 1950, p. 601, 619. Funkhouser, 1957, p. 26. Duellman, 1968, p. 6.

Hyla (Hylella) porifera Andersson, 1945, p. 81 (holotype, NHRM 1963 from Río Pastaza watershed, Ecuador; Rolf Blomberg collector).

Diagnosis.—A small species of *Phyllomedusa* having (1) expanded terminal discs on the fingers and toes, which are only barely webbed basally; (2) first finger and first toe shorter than, and not opposable to, second finger and second toe; (3) no osteoderms or elevated parotoid glands; (4) prevomerine teeth in adults; (5) small calcar; (6) palpebral membrane clear; (7) iris silver in life; (8) coloration in life consisting of pale green dorsum (brownish lavender at night), uniformly orange flanks and hidden surfaces of limbs, and uniformly yellow-orange venter.

Phyllomedusa buckleyi differs from the other members of the *buckleyi* group (*lemur* and *medina*) by possessing prevomerine teeth and a calcar in adults; *buckleyi* is like *lemur* in having a silver iris, whereas the iris is golden in *medina* (*vide* Funkhouser, 1962: 590).

Description.—(Based on four males and one female from the Cordillera del Dué, Ecuador). Snout-vent length 41.6–44.1 (42.8) mm in males; 51.0 mm in female; ratios in males: tibia length/snout-vent length 0.481–0.517 (0.497), foot length/snout-vent length 0.340–0.359 (0.348), head length/snout-vent length 0.299–0.315 (0.304), head width/snout-vent length 0.315–0.320 (0.317); proportions of female within range of variation of males, except head length/snout-vent length (0.292).

Head slightly wider than long and slightly wider than body; top of head barely convex; ratio of interorbital distance to width of head 0.331–0.356 (0.343), noticeably greater than ratio of width of eyelid to head width,

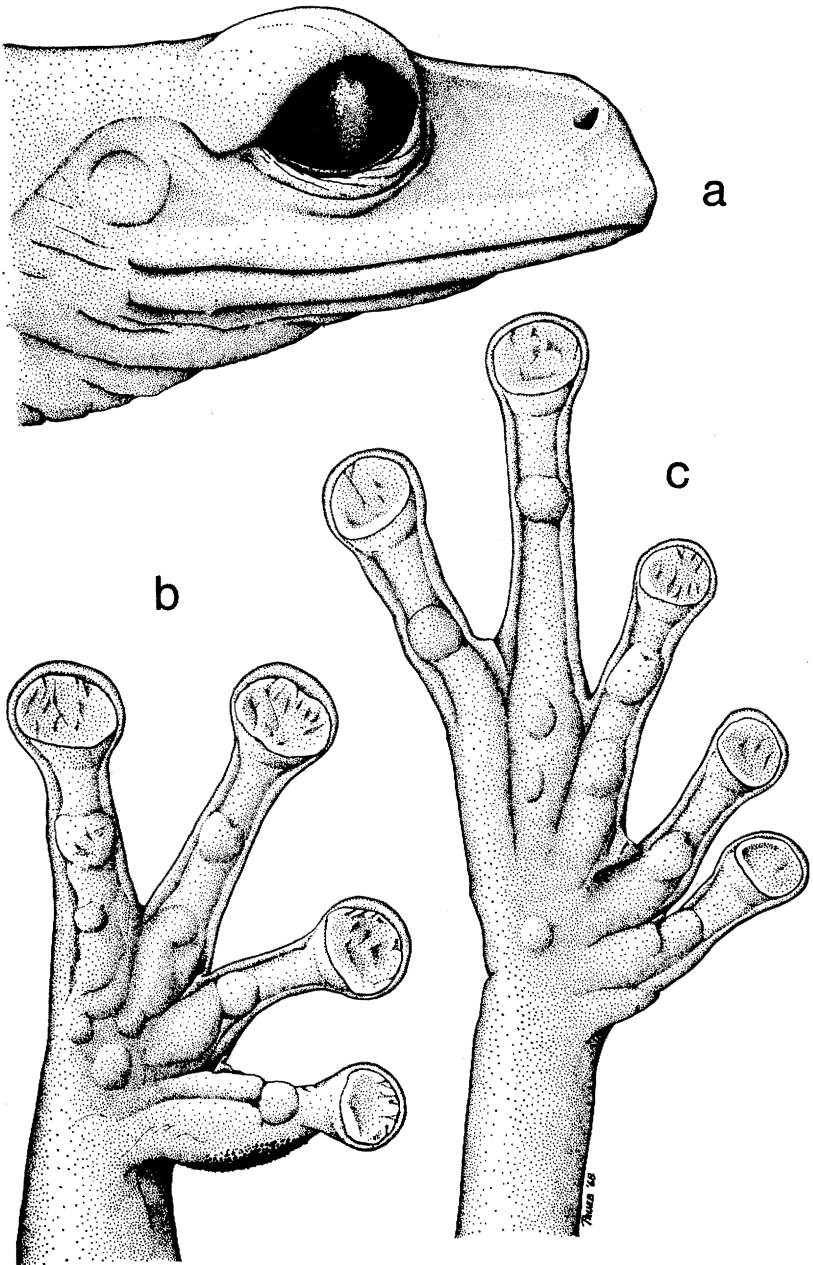


FIG. 1.—*Phyllomedusa buckleyi*, adult male, KU 121446. A. Lateral view of head. B. Palmar view of right hand. C. Plantar view of right foot. (6 \times).

0.275–0.309 (0.290). Snout in dorsal view acuminate, in lateral view inclined from nostrils to lip in males, truncate in female. Canthus rostralis slightly elevated, rounded, distinct; loreal region barely concave; lips thin and not noticeably flared. Nostrils barely protuberant and directed laterally at upper angle of snout; internarial area not depressed. Length of snout about four-fifths horizontal diameter of eye. Supratympanic fold thin, indistinct, obscuring upper edge of tympanum, and extending posteroventrally to point above insertion of arm. Tympanum barely distinct, lacking tympanic ring, situated nearly directly posterior to eye and separated from eye by a distance equal to horizontal diameter of tympanum, which is less than half the diameter of eye; tympanum/eye ratio 0.404–0.444 (0.422) (Fig. 1a).

Axillary membrane absent; upper arm slender; forearm robust; transverse dermal fold on elbow; ulnar fold low, indistinct; no distinct transverse fold on wrist. Fingers short; relative length from shortest to longest 1–2–4–3; first finger not opposable to second. Discs moderately large, that on third finger about half again diameter of tympanum. Subarticular tubercles large, subconical; distal tubercle on fourth finger bifid in three specimens; supernumerary tubercles lacking on fingers; palmar tubercle low, diffuse, bifid, pollical tubercle elongate, elevated. In males, prepollex slightly enlarged and bearing thin, horny nuptial excrescence. Faint rudiment of webbing between second and third and between third and fourth fingers (Fig. 1b). Legs moderately long and slender; heels of adpressed limbs overlapping by about one-fourth length of shank; tibiotarsal articulation extending to eye. Small, blunt calcar on heel; two or three small tubercles below calcar; inner tarsal fold present but indistinct on distal third of tarsus; row of low tubercles on outer edge of tarsus. Toes moderately short; length from shortest to longest 1–2–3–5–4; discs slightly smaller than those on fingers; subarticular tubercles large, round; supernumerary tubercles absent; inner metatarsal tubercle low, flat, elliptical; outer metatarsal tubercle small, conical. Webbing absent between first and second toes, rudimentary between second and third, and present basally between other toes (Fig. 1c).

Skin on dorsum minutely granular, nearly smooth; small granules in loreal and temporal regions; skin on throat, belly, and posteroventral surfaces of thighs distinctly granular; elsewhere skin smooth. Anal opening directed ventrally at midlevel of thighs; anal sheath long and longitudinally creased. Tongue broadly lanceolate, deeply and narrowly notched posteriorly, and free behind for about half of its length. Dentigerous processes of prevomers small, widely separated medially, postero-medially inclined between small ovoid choanae; 0–4 teeth on each process (total, both processes, 2–6) in four males; 5–7 teeth on each process (total, both processes, 10–13) in two females (including UMMZ 92102 having snout-vent length of 52 mm). Vocal slits parallel jaw posteriorly; vocal sac single, median, subgular.

Coloration in life: At night, dorsum brownish lavender; flanks creamy yellow; belly creamy white. By day, dorsum bright green with few small white spots in two individuals; green present on all dorsal surfaces of body, dorsal surfaces of forearms and third and fourth fingers, and dorsal surfaces of thighs, shanks, tarsi, and fourth and fifth toes. Upper arms, first and second fingers, flanks, anterior and posterior surfaces of thighs, inner surfaces of shanks and tarsi, dorsal surfaces of first three toes, and ventral surfaces of limbs bright orange. Belly pale orange; throat and narrow stripes on outer edges of forearms and feet white (Fig. 2). Iris pale greenish silver; palpebral membrane clear.

Coloration in preservative: Dorsal surfaces of body, forearms, thighs, shanks, tarsi, third and fourth fingers, and fourth and fifth toes bluish purple; other surfaces dull cream.

Relationships.—*Phyllomedusa buckleyi* is closely related to *P.*



FIG. 2.—*Phyllomedusa buckleyi*, adult female, KU 121449. (2×).

medina in Venezuela and *P. lemur* in Costa Rica and Panamá. The three species are alike, and differ from all other phyllomedusines, by having generalized hands and feet with rudimentary webbing, broad flat heads, no elevated parotoid glands, and unmarked palpebral membranes. Living adults of *buckleyi* and *lemur* are similar in coloration; the orange on the flanks and hidden surfaces of the limbs is more intense in *buckleyi* than in *lemur*. I have not seen living individuals of *medina*, but notes on living individuals presented by Funkhouser (1962) indicate that *medina* is not noticeably different from *buckleyi* and *lemur*, except that the iris is gold, instead of silver. The presence of prevomerine teeth in *buckleyi* and in most other phyllomedusines is suggestive that *lemur* and *medina*, which lack prevomerine teeth, are species derived from a *buckleyi*-like ancestor.

The three species in the *buckleyi* group are distinctly different from the other phyletic lines among the phyllomedusines (Funkhouser, 1957; Duellman, 1968). These three species seem to be representative of a rather generalized South American stock and probably should be accorded generic rank. I am reluctant to make any such taxonomic rearrangements until certain studies, now in progress, on the osteology and myology of the phyllomedusines are completed.

Distribution and Ecology.—*Phyllomedusa buckleyi* is known

from four localities at elevations between 400 and 1300 m in the upper Amazon Basin and on the lower Amazonian slopes of the Andes in eastern Ecuador. The species, like *lemur* and *medina*, principally inhabits montane rain forests. My specimens were obtained at an elevation of 1150 m in dense forest 2–4 August 1968; all were found at night on the limbs of low trees in a broad ravine, in the bottom of which was a small sluggish stream. Two males were heard to call—a short “cluck.”

The locality records for, and known specimens of, *Phyllomedusa buckleyi* are: ECUADOR: *Napo Province*: South slope Cordillera del Dué, above Río Coca, KU 121445–49. *Pastaza Province*: Abitagua, UMMZ 92102; Sarayacu, BMNH 1947.2.22.35; watershed of Río Pastaza, NHRM 1963. *Tungurahua Province*: El Topo, BMNH 1947.2.22.37.

Remarks.—The holotype of *Phyllomedusa buckleyi* is a juvenile having a snout-vent length of 32 mm and lacking prevomerine teeth. The holotype of *Hyla porifera* obviously is a *Phyllomedusa* and although having a snout-vent length of 39.6 mm, lacks prevomerine teeth. All other specimens herein referred to *P. buckleyi* have prevomerine teeth. Two of these specimens have only two teeth on one process and none on the other, whereas the two large females have 10 and 13 teeth. The absence of prevomerine teeth in the small individuals is not unexpected, because in many, if not all, species of hylids the number of prevomerine teeth increases with the size of the frog. The lack of other morphological differences among the type specimens of the three nominal species is indicative of their conspecificity.

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STUDIES ON BEACH LIZARDS IN VERACRUZ, MEXICO

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ABSTRACT: The distribution, activities, and foods of *Sceloporus teapensis*, *Cnemidophorus deppei deppei*, and *Cnemidophorus guttatus guttatus* were studied on the beaches at several localities near the city of Veracruz in the summer of 1965. Three ecological associations occur in the area studied above the high tide level: barren sand, low dunes with sparse vegetation, and high dunes with dense vegetation. *Sceloporus teapensis* occurred at all of the localities and in all of the associations. *Cnemidophorus guttatus* occurred in the low dune and high dune associations at all of the localities, but was most abundant in the high dune association. *Cnemidophorus deppei* occurred only in the low dune association at some of the localities. Behavior of the three species indicates that there is no interspecific social antagonism between them, although *Cnemidophorus guttatus* may occasionally prey on the other two species. Stomach analyses revealed no severe competition for food among the three species.

DUELLMAN and Wellman (1960) in their study of the *deppei* group of the genus *Cnemidophorus* reported that *C. deppei* and *C. guttatus* are geographically sympatric in some parts of Mexico, but are ecologically allopatric in that *C. deppei* inhabits open situations while *C. guttatus* inhabits shaded areas. In 1964 I briefly visited one of the areas of sympatry in southern Veracruz and decided that the interrelationships of the two species merited further studies. In July and August, 1965, five and one-half weeks were spent in southern Veracruz studying the whiptail populations for

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