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## Additions to the Known Herpetological Fauna of Costa Rica with Comments on Other Species. No. III.

BY

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ABSTRACT: This paper treats of a series of Costa Rican Salientia. Two species, *Hyla microcephala microcephala* Cope and *Eleutherodactylus monnichorum* Dunn, are reported from Costa Rica for the first time. The following species are described as new: *Dendrobates granuliferus*, *Eleutherodactylus taurus*, *Hyla legleri* and *Hyla dulcensis*. The species *Hyla monticola* Cope, long known only from the type specimen (now lost), is redescribed. Sixteen forms are illustrated with photographs.

### INTRODUCTION

The collections made in Costa Rica after the completion of my work on "The Frogs and Toads of Costa Rica,"\* include a large number of Amphibia. Certain of these have been studied and the results published in two supplemental works.\*\* Others remain unstudied.

In this, a third supplement, the following species are treated:

*Bufo holdridgei* Taylor  
*Bufo leutkenii* Boulenger  
*Bufo melanochloris* Cope  
*Dendrobates auratus* Girard  
*Dendrobates typographus* Kieferstein  
*Dendrobates granuliferus* sp. nov.  
*Eleutherodactylus monnichorum* Dunn  
*Eleutherodactylus taurus* sp. nov.  
*Hyla zeteki* Gaige  
*Hyla boulengeri* Cope  
*Hyla microcephala microcephala* Cope

\* The Frogs and Toads of Costa Rica, Univ. Kansas Sci. Bull., vol. 35, pt. 1, no. 5, July 1, 1952, pp. 577-942, figs. 1-69.

\*\* Additions to the Known Herpetological Fauna of Costa Rica with Comments on Other Species. No. I. Univ. Kansas Sci. Bull., vol. 36, pt. 1, no. 9, June 1, 1954, pp. 597-639, figs. 1-12; and

Additions to the Known Herpetological Fauna of Costa Rica with Comments on Other Species. No. II. *ibid*, vol. 37, pt. 1, no. 13, October 15, 1955, pp. 499-575, figs. 1-18.

*Hyla picadoi* Dunn  
*Hyla monticola* Cope  
*Hyla gabbi* Cope  
*Hyla alvaradoi* Taylor  
*Hyla pseudopuma* Gunther  
*Hyla legleri* sp. nov.  
*Hyla dulcensis* sp. nov.  
*Hyla eleachroa* Cope

### TAXONOMIC TREATMENT

*Bufo holdridgei* Taylor

(Fig. 1)

*Bufo holdridgei* Taylor, Univ. Kansas Sci. Bull., vol. 35, pt. 1, no. 5, 1952, pp. 607-609, fig. 3, (type locality, approx. 7500 ft., Volcán Barba Western Slope, Heredia Province, C. R.)

The type locality was revisited in 1952 by John Baker and me, but we encountered, unexpectedly, such very cold and wet weather



FIG. 1. *Bufo holdridgei* Taylor. KUMNH No. 30885. Type. Western Slope Volcán Barba, 7500 ft. elev., Heredia Province, C. R. Actual snout-vent length, 28 mm.

that we were practically incapacitated, and as a result, obtained no adequate collections there. The species was not rediscovered. A photograph of the type is given.

*Bufo luetkenii* Boulenger

(Fig. 2)

*Bufo luetkenii* Boulenger, Ann. Mag. Nat. Hist., ser. 6, vol. 8, 1891, pp. 455-456 (type locality, Cartago, Costa Rica).

A specimen, KUMNH No. 32810, taken by me at the Maribella Hotel, at the base of the Puntarenas Peninsula, Puntarenas Province, Costa Rica, is a female and not fully mature, but it seems to agree with the type description of *Bufo leutkenii* in essential points. Al-

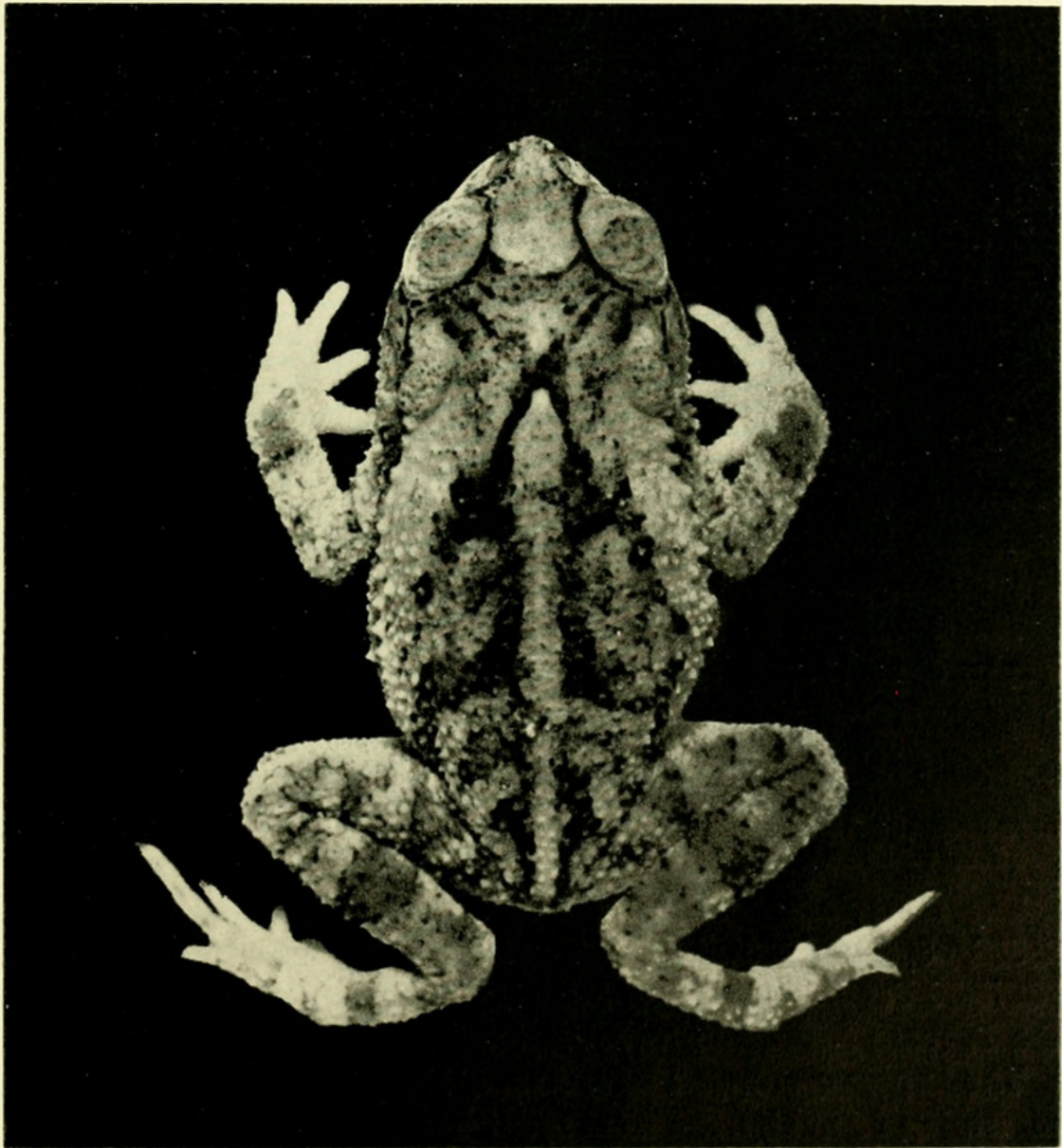


FIG. 2. *Bufo leutkenii* Boulenger. KUMNH No. 32810, Maribella Hotel, at base of the Puntarenas Peninsula, Puntarenas Province, C. R. Actual snout-vent length, 51 mm.

though a young specimen, the cranial crests are strongly developed. The supraorbital crests curve strongly, and the supratympanic and postorbital crests are high and sharply defined. The snout is compressed, truncate, with a distinct vertical ridge on tip. The parietal crests, if extended, would form a right angle.

The parotoid gland is slightly oval with a surface area not or slightly exceeding that of the tympanum. The diameter of the tympanum is slightly less than half the length of the eye-opening. The interorbital distance is slightly greater than the width of an eyelid. When the leg is laid forward the tibiotarsal articulation reaches the tympanum. A few scattered, somewhat larger tubercles are mixed with smaller tubercles on dorsum.

The subarticular tubercles on fingers are single, except the distal one on the fourth finger, which is double. The first finger is longer than the second. The palmar tubercle is large, somewhat oval, while the inner metacarpal tubercle is less than half as large in area.

The toes, unlike the type, are distinctly less than half webbed (in adult type half webbed).

When the legs are folded the heels do not touch. Two metatarsal tubercles are present, both relatively small, the inner distinctly the larger. A row of tubercles replaces the tarsal fold.

The figure given here shows the dorsal marking. The median line is only moderately distinct, while the V-shaped mark is strongly defined, the other markings less so. The parotoids are faintly yellowish, as are the tubercles below the tympanum. The cranial crests are brown, the eyelids gray. The venter is cream without any pigmentation.

This species is probably most closely related to *Bufo gemmifer* Taylor of southern Mexico.

*Bufo melanochloris* Cope

(Figs. 3, 4)

*Bufo melanochloris* Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1875, p. 100 (type locality "Eastern Costa Rica").

The following specimens are in the collection: KUMNH Nos. 28356, 30280-81, 32817-19, Turrialba, Cartago Province; Nos. 30275-79 Pacuare (between Moravia de Chirripó and Turrialba on the Pacuare River, Limón Province).

The largest specimen I have seen is No. 32819 ♂ from Turrialba, measuring 58 millimeters from snout to vent.

The vocal slits are paired. The undersides of the hands, feet, tarsi, chin, throat, and breast are blackish or brownish black with

some dark reticulation on the venter. Much of the underside of thigh is cream. A row of sharp tubercles, along the edges of the tarsus, is cream, in sharp contrast to the blackish color of the underside of the tarsus. The tarsal joint reaches the anterior edge of the eye. The parotoids are double the size of the tympanum.



FIG. 3. *Bufo melanochloris* Cope. KUMNH No. 32819. At bridge across Río Reventazón, Turrialba, Cartago Province, C. R. Actual snout-vent length, 59 mm.

When the legs are folded the heels overlap one millimeter. The toes are approximately one-third webbed.

A specimen of a small toad, No. 32809 (45 millimeters in snout-vent length), taken at the Esquinas Forest Preserve (between Palmar and Golfito) Puntarenas Province, while presenting many characters of *melanochloris*, differs in several significant points. It

is compared with my largest female *melanochloris*, measuring 42 millimeters from snout to vent.

The front part of the snout is rounded, not forming a noselike elevation with slightly depressed areas on each side; the canthi are rather sharp-edged, extending to the anterior level of the nostril, not flattened or thickened and terminating posterior to nostril; the supraocular ridge is continuous with the parietal ridge, not forming an angle where it is joined by the postocular ridge; the ridges are separated a smaller distance, and somewhat less elevated; the

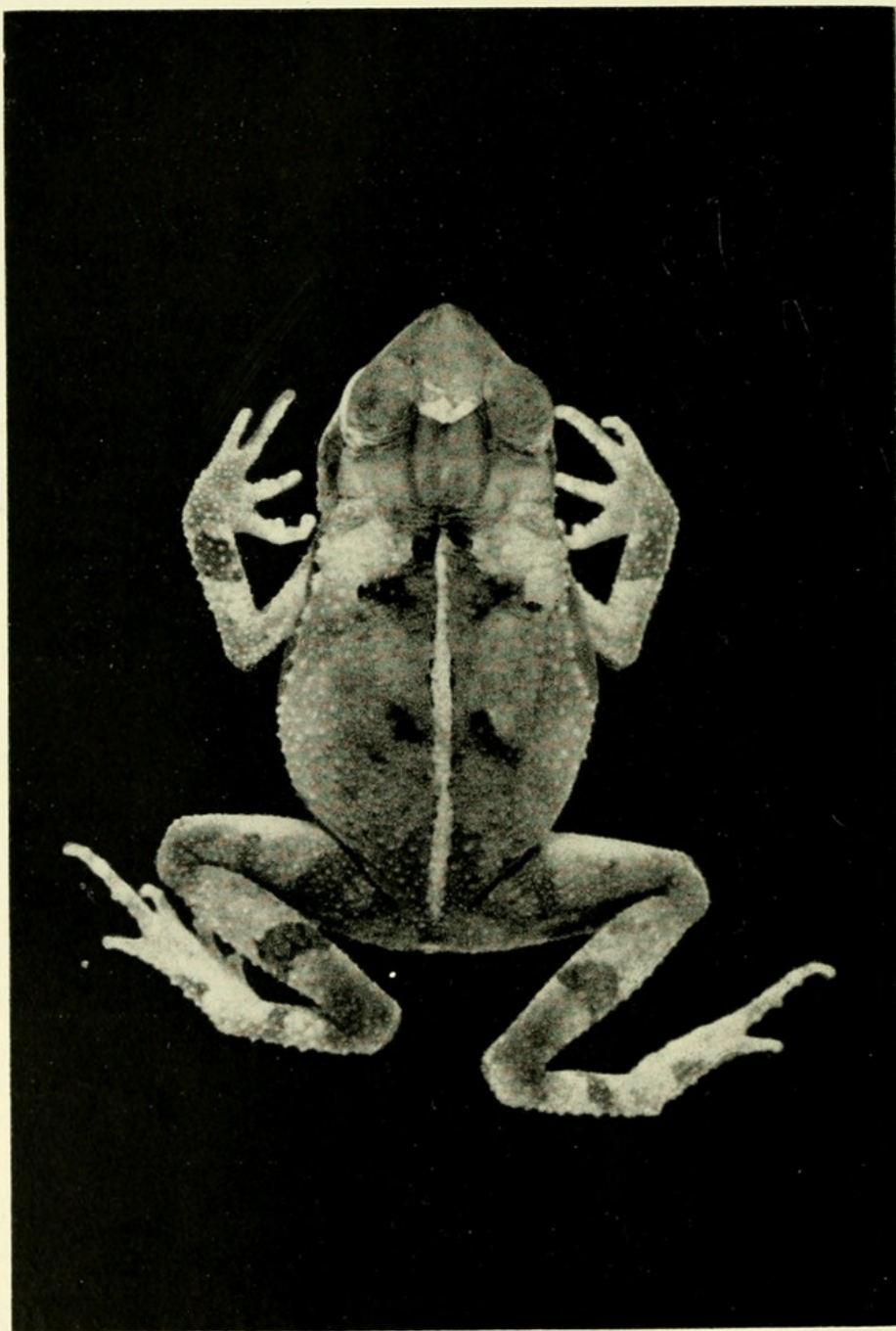


FIG. 4. *Bufo melanochloris* Cope. KUMNH No. 32809, Esquinas Forest Preserve, between Palmar and Golfito on railway. Actual snout-vent length 46 mm.

parotoids are very small, about half the size of those in *melanochloris*. The distance between the parietal and the supratympanic ridges is greater, (5 mm.: 4 mm.) and the area between is less excavated. The choanae when seen from below are nearly two-thirds concealed by the overhanging palatal shelves (not completely visible as in *melanochloris*); the region back of the eye is less elevated (6.5 mm.: 7 mm.) and the tympanum is a half closer to the supratympanic ridge.

The color is brown rather than gray green and black. The narrow interorbital band is present but otherwise the head is uniform light chocolate-brown except for a tiny cream spot below the eye. A discrete median gray-white line is present on the back behind occiput. Underside of limbs dark, the tubercles under hand and foot cream, in strong contrast. The back of the thigh is nearly uniform blackish-brown. The cross-bands on the limbs are smaller.

I suspect that the forms are related. Further material will demonstrate whether or not it represents a western subspecies of *melanochloris*. A figure of the specimen is given.

*Dendrobates auratus* (Girard)

This species has a relatively wide distribution in Costa Rica, occurring on both coasts. In living specimens there were slight color differences, and some difference in the pattern of the marking between specimens from southwestern Puntarenas Province and those on the east coast. The terminal discs on the digits average a little smaller.

One small population in the region of La Lola, Limón Province has the digital pads larger than those from the eastern coastal areas.

Specimens in the collection are from the following localities: KUMNH, Nos. 36051-57, 36348-54, Suretka; Nos. 33058-72 Mountain Cow Creek, near Banano; Nos. 33090-91, Limón; Nos. 33073-81, 33104, La Lola. All the above are from Limón Province. KUMNH, Nos. 33092-33103, Palmar; Nos. 30382-30389 Esquinas Forest Reserve on railway between Palmar and Golfito; both lots, Puntarenas Province.

*Dendrobates typographus* Keferstein

(Fig. 5, lower three)

This diminutive species is quite variable in color, especially as regards the extent of the areas occupied by red and blue. In Costa Rica it is presumably confined to the eastern lowlands. The following numbers are in the KUMNH collection: Nos. 24884-901, 30451-58, 33048-56, Los Diamantes, near Gúapiles; Nos. 33036-47,

La Lola; 33057 Mountain Cow Creek; Nos. 35935-89, 36051-103, 36355-60, 36544-50, Suretka, all from Limón Province. KUMNH Nos. 36523-43, Puerto Viejo, Heredia Province.

In the Suretka area, the outer sheath, that is shed from the leaves of a small palm, is curved so that it may accumulate rain water. This is used as a place for the deposition of eggs of this small species. More than 25 such "breeding ponds" were counted in a small area. The eggs were for the most part recently laid, although a few "ponds" had recently hatched larvae. The date was July 3, 1954.

*Dendrobates granuliferus* sp. nov.

(Fig. 5, upper three)

*Type*: KUMNH No. 43874; obtained on low mountains north of the Río Diquis, about 3 miles north of Palmar, Puntarenas Province Costa Rica, Sept. 3, 1952, by Edward H. Taylor.

*Paratypes*: KUMNH Nos. 43875-43880 topotypes, collected by John Baker, Paul Allen, and Edward H. Taylor.

*Diagnosis*: A diminutive toothless toadlike species characterized by having the entire dorsal and lateral surface of body and upper surface of femur covered with relatively large pustular granules, those in the dorsolateral regions largest; venter and greater part of undersurface of thigh with similar but somewhat flattened granules; discs on digits widened, their dorsal surface divided by an indefinite groove; hands and feet lacking trace of web. Body orange, sometimes shading to brick-red; the hind limbs usually greenish blue.

*Description of type*: Head a little narrower than body, its greatest width (7.5 mm.) almost equal to its length (7.7 mm.); canthus rostralis absent or very broadly rounded; snout short, the tip broadly rounded; nostrils lateral, not visible, seen from above; loreal region nearly vertical, slightly excavated; distance of nostril from eye (2 mm.) less than distance from midpoint of upper lip; distance between nostrils (3.1 mm.) greater than interorbital distance (2.5 mm.); width of eyelid (2.2 mm.) less than interorbital distance; length of eye-opening (2.7 mm.) greater than length of snout but shorter than its distance from tip (3 mm.); lower part of tympanum visible (when exposed by removal of skin and muscle, it measures 1.6 mm. high, 1.25 mm. wide on paratype).

Palate excavated, the small choanae completely concealed by overhanging palatal shelves when seen directly from below; no vomerine or maxillary teeth; tongue elongate, free on sides, posteriorly widened and free for two thirds of its length; vocal sac

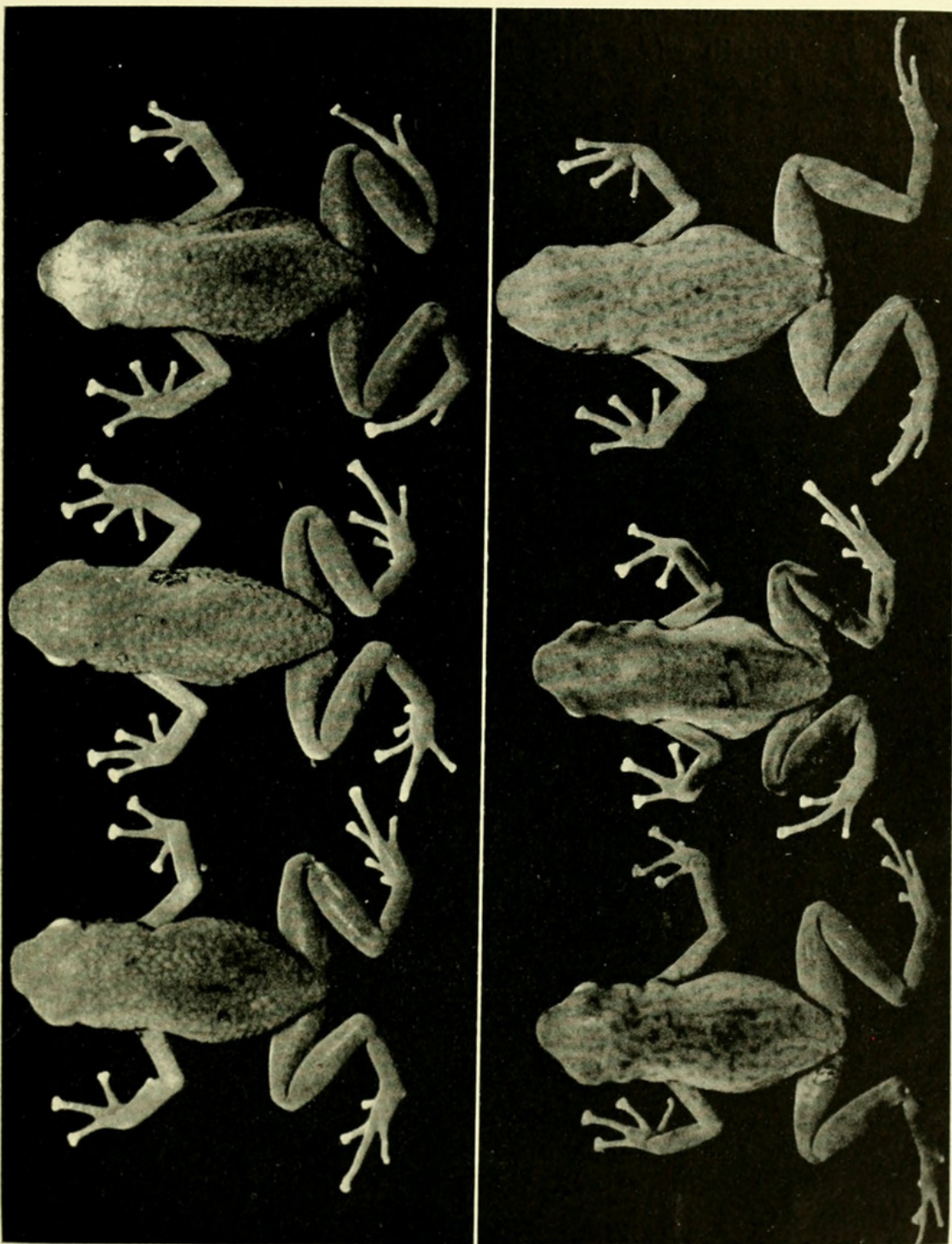


FIG. 5. Upper series of three, *Dendrobates granuliferus*. Left to right, KUMNH No. 43876, actual snout-vent length 22 mm., No. 43877, 22 mm., 43874, Type, 23 mm. All from 3 mi. N. Palmar, Puntarenas Province.

Lower series of three, *Dendrobates typographus* Kesterstein. Left to right, KUMNH No. 33040, La Lola, Limón Province; 23 mm., No. 24893 Los Diamantes, 21 mm., No. 33038, La Lola, Limón Province, 24 mm.

indicated externally by slight folds, the vocal slits large, their edges somewhat thickened.

Arm with wrist reaching end of snout; fingers completely free, with widened terminal discs, that of the third finger more than twice width of first, a fourth wider than second and fourth; first finger distinctly shorter than second; inner metacarpal tubercle small, smaller than the flattened subarticular tubercles but only about one fifth of the area of the large single palmar tubercle; a small distinct tubercle somewhat behind wrist on under surface of arm; discs normally without a terminal groove (if somewhat dehydrated a groove appears); upper surface of discs (except first) with two rounded elevations separated by a groove or depression.

Leg short, the tibiotarsal articulation reaching to latter fourth of eye; when legs are folded at right angles to body, the heels touch; toes completely without webs; toes with discs, that of fourth toe equally as large as discs on second and fourth fingers; the third extends two thirds of its length beyond fifth; first toe very short, inner metatarsal tubercle large, somewhat elongate; outer larger, rounded; an indistinct tubercle on distal part of tarsus and a slight short inner tarsal ridge ending abruptly in a rounded tubercle; upper surface of discs on third and fourth toes divided by a depression, absent in other toes;

Head with flattened tubercles on occiput and interorbital region, remainder glassy smooth; body and sides with irregular-sized pustular granules; arm entirely smooth; thigh with granules on upper surface; inner part of posterior surface of thigh and most of the posterior half of the ventral surface, the upper side of tibia and tarsus, with slight suggestion of granules; remainder of limb glassy smooth; venter strongly granular; breast minutely roughened; the throat and chin with indistinct longitudinal folds, slightly roughened and pitted; no supratympanic fold; upper part of eyelids smooth.

*Color in life:* Above generally orange, the limbs bluish to greenish blue, the color fading completely in a few days, and in preservative the specimens are nearly black, the arms and legs brownish to brownish black; under side of digital discs grayish.

*Measurements in mm.:* (Nos. 43874 ♂, 43876 ♀, 43880 ♂ respectively.) Snout to vent, 23, 22, 22; width of head (at tympanum) 7.5, 7, 7; length of head (to back of jaw angle); 7.7, 7.6, 7.6; arm, 16.2, 15.2, 15.2; leg, 29, 27.1, 29; tibia, 9.5, 9.2, 9; foot and tarsus, 13.5, 13, 13.5.

*Variation:* Females have grooves with thickened edges where the vocal slits are present in the male. The dorsal color varies between brick-red and orange, and often the limbs are nearly blue.

*Remarks:* The specimens were taken from the side of a low mountain north of the Río Diquis about 3 miles north of Palmar, Puntarenas Province. They were moving about on the forest floor in the afternoon.

Aside from the granulation on dorsum and venter, the species differs from *Dendrobates typographus* in having usually larger metatarsal and metacarpal tubercles, the heels not overlapping (overlap at least 2 mm. in *typographus*) and the terminal pads on hands are usually larger. A few specimens of *typographus* may show a few tubercles on the extreme posterior part of venter. The tarsal tubercle is smaller and less conspicuous and the dorsum is usually glassy smooth. The dorsal groove is present on all digital discs except those of inner finger and toe.

The species name is derived from the Latin *granulum*, little grain, and *ferre* to carry.

*Eleutherodactylus monnichorum* Dunn

(Fig. 6)

*Eleutherodactylus monnichorum* Dunn, Proc. Acad. Nat. Sci. Philadelphia, vol. 92, Nov. 18, 1940, pp. 105-122, pl. 2 (type locality, Valley of the Velo, Finca Lérída on the slope of Volcán Chiriquí above Boquete).

A series of specimens taken by me at Agua Buena, near Cañas Gordas, Puntarenas Province, Costa Rica, July 22, 1954, are referred to this species. They are KUMNH Nos. 37480-37486, taken in forest at an elevation of perhaps less than 2000 ft.

They differ in certain characters from typical *E. monnichorum* and may represent a lowland subspecies. I give herewith a detailed description of one of the specimens, KUMNH No. 37483.

*Diagnosis:* A medium-sized species of the genus with narrow (often broken) dorsolateral folds or ridges running from near eye to groin; hand without web, the digits without lateral ridges or fringes; fingers with terminal pads, those of the two outer, double the width of pads on two inner digits; two subequal palmar tubercles; inner toes one-third to one-half webbed, the digits usually with a slight lateral fringe; sole without supernumerary tubercles; tibiotarsal articulation reaches several millimeters beyond snout; chin and venter smooth; a broad, nearly uniform light-brown stripe covers head and body between the black dorsolateral folds; canthus rostralis marked, slightly rounded; greatest diameter of tympanum

( ♀ ) about two thirds of the length of eye-opening; tympanum of male about three fourths of eye length; vomerine teeth in two groups, not reaching level of choanae; two vocal slits, the vocal sac not or scarcely indicated externally.

*Description of KUMNH No. 37483:* Head distinctly wider than the body, the outline forming an oval; canthus rostralis distinct, the edge slightly rounding; snout slightly rounding in lateral profile,

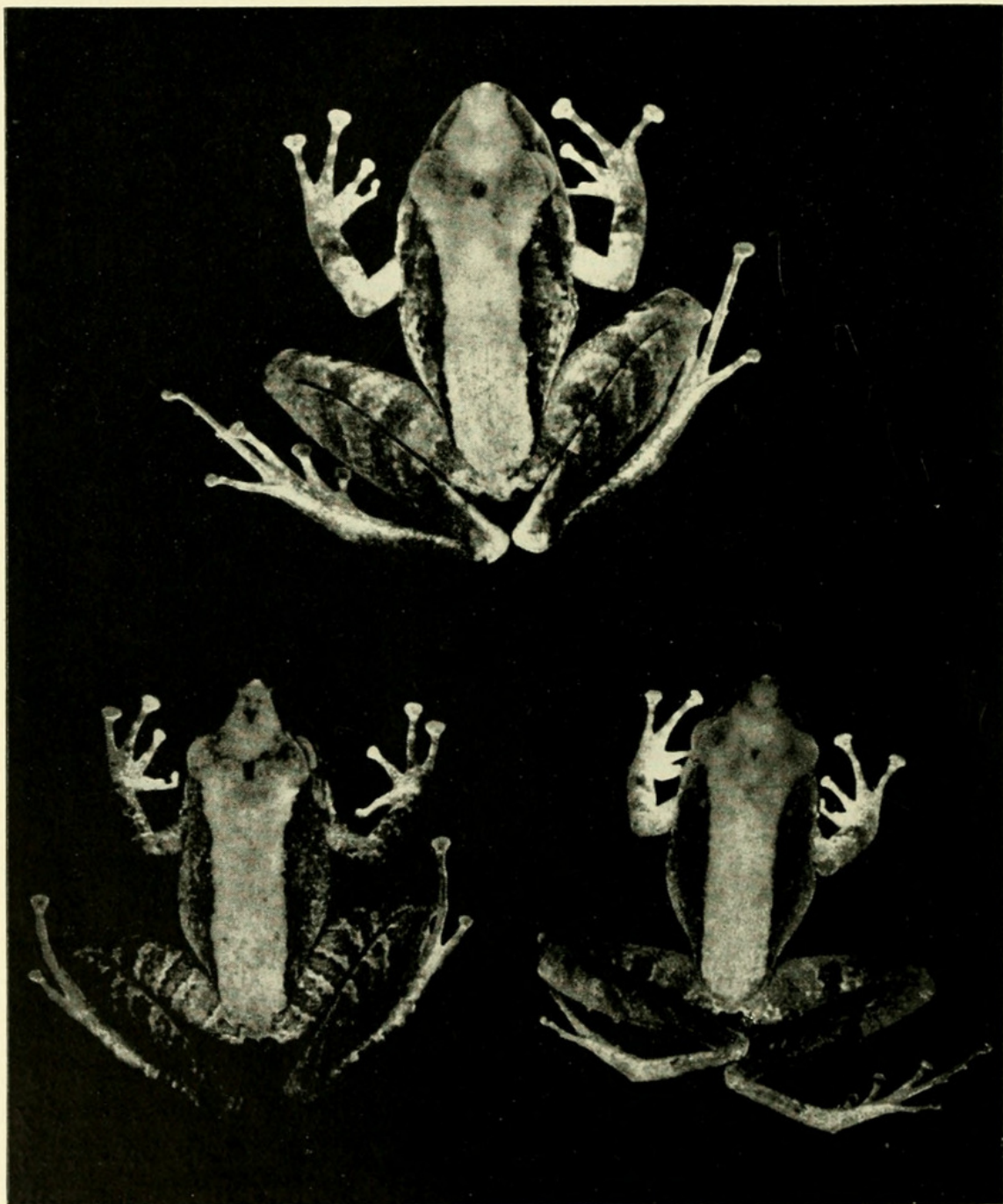


FIG. 6. *Eleutherodactylus monnichorum* Dunn. Upper figure, KUMNH No. 37483, snout-vent length 31 mm.; lower left, No. 37481, 27 mm., lower right, No. 37486, 26 mm. All from Agua Buena, near Cañas Gordas, Puntarenas Province (near Panamanian border).

the nostril distinctly closer to the median point on upper lip than to eye; loreal region shallowly concave, then sloping broadly to the lip; a slightly flattened area between nostrils. Head rather flattened but slightly deeper than snout; interorbital distance very slightly less than the greatest width of an eyelid; a pustule between orbits (usually black in color). Length of eye-opening distinctly less than distance between eye and nostril; tympanum vertically oval, its greatest diameter about two thirds of the length of the eye; a tiny lobule indicated on posterior edge of lower eyelid; a slightly curving, distinct supratympanic fold covers the upper edge of the tympanum and terminates above arm; a small glandular tubercle behind tympanum.

Tongue as broad as long, somewhat notched posteriorly, free behind for nearly one third of its length, and likewise free on the sides. (Vocal slits in males do not reach forward to the middle level of tongue.) Vomerine teeth on two somewhat triangular elevations beginning behind posterior level of the small choanae, and extending back as far as the level of the transverse palatal ridge.

Arm rather short, laid forward, the wrist reaches the tip of snout; first finger slightly shorter than second with a somewhat smaller terminal pad; the terminal pads of two outer fingers more than double the width of the pad on second; subarticular tubercles prominent; inner metacarpal tubercle larger than palmar tubercles; outer palmar tubercle divided into two subequal parts; four supernumerary tubercles on palm; a row of indistinct tubercles under forearm.

Legs long, the tibiotarsal joint reaching beyond the tip of the snout about half the length of the tibia, when limb is laid forward; when legs are folded, the heels overlap about five millimeters; inner metatarsal tubercle flat, about three times the area of outer tubercle; toes with terminal pads, intermediate in size between those of second and third fingers, those of the three middle toes larger than those of the outer finger; three inner metatarsals largely separated by a web, the two outer metatarsals not so separated, resulting in a very short web between two outer toes; inner toes webbed for nearly half their length, the digits for the most part with narrow lateral fringes; subarticular tubercles equal to or a little smaller than those on fingers; no tubercles on sole.

Above, skin appearing smooth generally save that under a lens a fine granulation is observable; the dorsolateral folds partly broken

into elongate warts of variable width; sides finely granular with some pustular tubercles, two of those above arm largest and black in color; chin and venter smooth; ventral part of thigh, and area about vent, granular; a slight abdominal fold outlines the "ventral disc."

*Color:* Above, the top of snout, interorbital region, occiput, and dorsum nearly uniform light brown to yellowish brown (approaching fawn in some specimens); a black dot between orbits; eyelids darker brown; dorsolateral fold and area just below, black; a black spot behind eye covering the supratympanic fold, and a few small black spots on upper surface of arm; fingers with dark and light bands; forearm with a single dark band; thigh and tibia with three or four dark brown or blackish bands; toes not banded; blackish on underside of foot and tarsus; venter dull flesh-white with scattered pigment on chin and breast; loreal region blackish, with some cream spots; one or two black spots on outer part of front face of thigh; back of thigh brownish with lighter flecks; a black area surrounding vent with some light flecks evident.

Measurements in mm. of *Eleutherodactylus monnichorum* Dunn

Number.....	37483	37481	37486	37482	37484	37480	37485
Sex or age.....	♀	♀	♂	♂	♂	♂	yg
Snout to vent.....	31	27	26	26	25	25	17.5
Head width.....	13.6	12	10.2	11	10.2	10	7
Head length.....	14	13	12	12.2	12	12	8.7
Axilla to groin.....	13	12	11	11	11	11.2	8.2
Snout to arm.....	11.2	10.8	10	10	10.4	10	8
Arm.....	21	17.5	16	15	17	16	11
Leg.....	67	55	49.3	48.2	48	48	32
Tibia.....	21.5	19	17	17	17	16	11
Foot and tarsus....	29.2	25	21	21	21	21	14.2

*Variation:* The dorsal coloration is similar in all. Two males have the sides almost uniformly dark while in another the color is rather light. The black interorbital spot is absent in one younger specimen.

The males have the first finger strongly swollen at the base and vocal slits are evident in the floor of the mouth. They would appear to be adult or nearly so.

*Remarks:* My specimens differ from the description of the type of *E. monnichorum* as follows: distance of nostril to tip of snout one third of the distance from the eye (not one half); there is no ridge present across the interorbital region, a single elongate wart on the scapular region (not "two parallel elongate warts on each scapular region running in and back from corner of head the outer sometimes in contact with, or a part of the dorsolateral fold"); the terminal pads on outer fingers are distinctly smaller than the tympanum in either males or females (not "as large as the tympanum in adult females"); eye length distinctly less than its distance from nostril (not "eye equals its distance from nostril").

Perhaps the most significant differences are the absence of the interorbital ridge, the eyelid wider than interorbital distance, and smaller digital pads. It is, of course, possible that my series does not represent fully grown specimens and the differences are those of age. Until this is determined the status of these specimens cannot be determined beyond question.

The type locality is no considerable distance south of Agua Buena, probably not more than 25 miles in a straight line.

*Eleutherodactylus taurus* sp. nov.

(Fig. 7)

*Type:* KUMNH No. 43866, taken at Golfito, Puntarenas Province, Sept. 6, 1953 by Edward H. Taylor.

*Paratypes:* KUMNH Nos. 43868, 43872, collected Palmar, Puntarenas Province, Sept. 2, 1952, by Edward H. Taylor; Nos. 43867, 43869-43870, 43871, 43873, Golfito, Sept. 2-6, 1953, collected by Edward H. Taylor and John Baker.

*Diagnosis:* A large somewhat toadlike form of the *rugulosa* group, characterized by a diminutive tympanum, its greatest diameter two-and-a-half times in length of eye; fingers free; toes with lateral fringes and webs extending between separated metatarsals, the depth of the web equaling half of the length of the toes; slightly widened finger discs, those on toes larger, but still smaller than tympanum; tympanum separated from eye by a distance equal to its vertical diameter; a strong tarsal fold; inner and outer metatarsal tubercles present; vomerine teeth on two elevated bony ridges behind posterior level of choanae, the teeth on the posterior borders; tongue free behind for one fourth of its length and free on sides;

choanae about as large as openings to Eustachian tubes. Skin finely granular, rough; eyelids wider than the interorbital distance. Males with elongate vocal slits and vocal sac.

*Description of type:* Head oval in outline, the width (29.5 mm.) greater than the length (26 mm.); canthi rostrales distinct, if projected would form an angle much in advance of nostril; loreal region slightly excavated, the upper part nearly vertical, then sloping broadly to lip; distance between eye and nostril (8 mm.) a little greater than distance of nostril to median point on upper lip (7



FIG. 7. *Eleutherodactylus taurus* sp. nov. KUMNH No. 43867 ♀, Golfito, Puntarenas Province. Actual snout-vent length, 76 mm. The curious mark on the back is seemingly caused by a scar.

mm.); tip of snout rounding, extending two millimeters beyond mouth; interorbital distance (5.5 mm.) less than width of an eyelid (7.5 mm.). A strong thick supratympanic fold overhangs tympanum; running nearly straight back from eye, then forming an angle, turns downward to above arm; rim of tympanum incomplete above; tympanum small (4 mm. x 3 mm.); length of eye-opening (9.1 mm.) a little greater than its distance from nostril; tympanum separated from eye by a distance of four millimeters.

Vomerine teeth along back edge of two closely approximated, elevated triangular ridges, which reach forward nearly to posterior level of choanae; palatal glands open in middle of palate about midway between anterior level of choanae and anterior end of palate; tongue about as long as wide, free on sides, free posteriorly for about one fourth of its length. (Male with vocal sacs, the slits reaching forward to near back level of tongue.)

Fingers lacking trace of web but with distinct lateral ridges, the terminal pads of fingers a little wider than the digits, those of two outer fingers larger than the two inner; a strongly elevated inner metacarpal tubercle; palmar tubercle much larger, somewhat bifid; subarticular tubercles moderately large, and four small supernumerary tubercles on palm (metacarpals); tibiotarsal articulation reaching nostril.

Leg moderate, the metatarsals, except outer, partly separated by a web, the web nearly half as long as digits measured to pads; terminal discs on three middle toes larger than any finger discs; an elongate elevated inner metatarsal tubercle about one half of length of first toe; a small outer tubercle; fringes on toes reaching from web to disc, those of third and fourth toes folded down; no supernumerary tubercles on sole; a sharply defined tarsal fold extends three fourths of the length of tarsus; heels touch when limbs are folded at right angles.

Skin above with rather fine granular pustules, and a few somewhat larger pustules growing more numerous and prominent laterally; eyelid strongly pustular, as are dorsal parts of arms and legs; chin slightly wrinkled longitudinally; breast smooth; venter transversely wrinkled with some indistinct granulation; ventral disc scarcely defined; much of area under thighs completely smooth save in region below and near vent, which is finely granular.

*Color:* Above, dark lavender-brown with a darker interorbital mark and some dim traces of other darker marks; lip with four in-

distinct cream blotches and one or two cream flecks below eye; indistinct spots or bands on thigh, tibia, and tarsus; upper parts of hand and foot with some darker marking; chin, breast, venter, lower part of sides, underarm, ventral part of thighs, and concealed part of tibia, cream-white. Undersurface of foot dark purplish-lavender; tubercles light lead color; most of underpart of hand similar; posterior part of thigh dark lavender-brown with whitish flecking or reticulation.

Measurements in mm. of *Eleutherodactylus taurus* sp. nov.

Number.....	43867	43866	43868	43869	43870	43872	43871	43873
Sex.....	♀	♀	♀	♀	♀	♀	♂	♀
Snout to vent.....	76	72	65	62	53	43	42	41
Width of head.....	31	29.5	28	27	24	19	18	17.5
Length of head.....	29	26	26	25	21	18	18	17
Snout to arm.....	28	28	22.5	23	22	18	16	15
Axilla to groin.....	30	26	27	23	22	16	14.8	15
Arm.....	43	43	40	36	34.5	27	27	24
Leg, from vent.....	115	116	105	98	92	69	70	62
Tibia.....	36	35	34	32.5	29	22	21.5	21
Foot and tarsus.....	49	49	46	45	40	29	31	28.5

*Variation:* No. 43867 has the dorsal spots a little more distinct, and the banding on arms and legs is quite distinct. Some dark flecks appear on the edge of the lower jaw. Certain of the other paratypes have the limbs paler and the posterior part of the tibia and tarsus show whitish areas between the bands. To some extent this is true in the male specimen but in the smallest female the light areas are scarcely discernible.

The tympanum of the male is larger proportionally. It is sub-circular and the greatest diameter is a little more than half the length of the eye-opening; the outer metatarsal tubercle is proportionally more elevated.

The presence of the vocal sac separates this form from other large species of the same group except *Eleutherodactylus fleischmanni*.

The tympanum is larger in that species (in male nearly as large as eye). The venter is smooth and there is less webbing between the toes; the dorsum is less rugose. There is considerable difference in the vertical range. *E. fleischmanni* is known from 4000 to 6500 ft. elevation; *E. taurus* is from sea level.

The name is derived from the Latin *taurus* = *bull*.

### *Hyla zeteki* Gaige

*Hyla zeteki* Gaige, Occ. Papers Mus. Zool. Univ. Michigan, no. 207, 1929, pp. 4-6 (type locality, Caldera Valley above Bouquete, Chiriquí Department, Panamá).

Three more specimens of the diminutive *Hyla zeteki* were taken, as follows: KUMNH Nos. 36480-81, La Palma, San José Province; No. 36942, Vara Blanca, Heredia Province. The latter specimen is a female containing numerous, much-pigmented eggs. The two former are males. The base of the first finger is swollen nearly three times the width of the antepenultimate phalanx, but there are no spinous areas indicated. Both males are infected with the larvae of a dipterous insect, No. 36481 having three. They lie under the skin along the sides of the abdomen, and one under the thigh skin. The other male has two larvae. The largest larvae are two millimeters in length.

### *Hyla Boulengeri* (Cope)

(Fig. 8)

*Scytopsis Boulengeri* Cope, U. S. Nat. Mus. Bull. No. 32, 1887, pp. 12-13 (type locality, Nicaragua).

A series of male specimens of *Hyla Boulengeri* from Suretka, Limón Province, differs from a specimen from Turrialba (1900 ft.) in having more pigment on the chin and throat and on the under-side of thighs, tibia, and feet. There are two prominent pointed tubercles on the area immediately above the vent. The inter-orbital tubercles are distinct; a row of small tubercles curving across the occiput and reaching eyelids are usually blackish, outlining a somewhat darker area. There is a row of tubercles (often broken) under the forearm. A pair of somewhat larger tubercles are present on the canthi. The nostrils are somewhat more elevated.

Specimens in the collection are as follows: KUMNH No. 24741 Turrialba, Cartago Province; Nos. 36482-88, 36699 Suretka, Limón Province; No. 37031 Banano, Limón Province; Nos. 34104-34106 from 15 km. WSW San Isidro del General, San José Province.

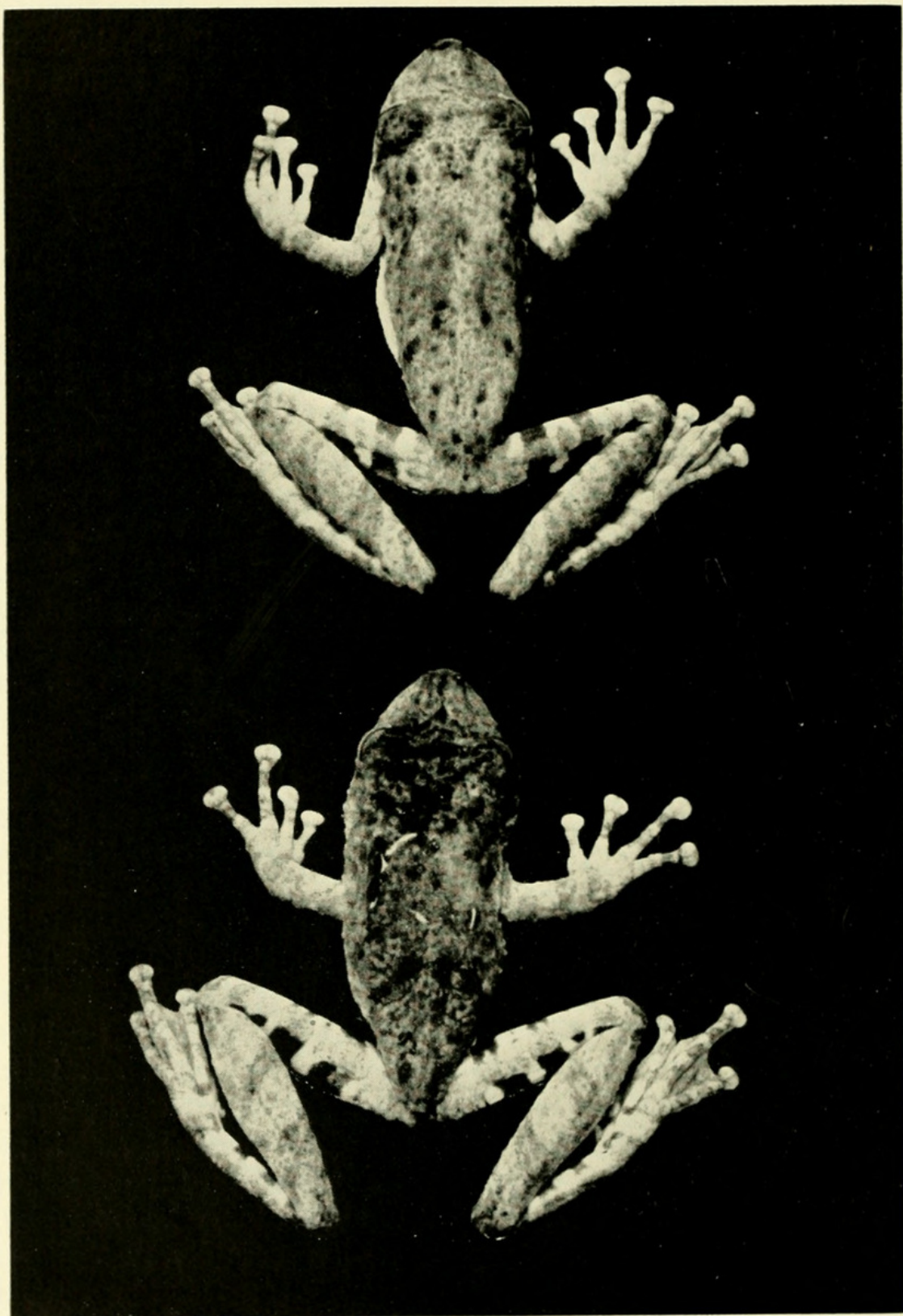


FIG. 8. *Hyla boulengeri* (Cope). Upper figure, KUMNH No. 34106, snout-vent length, 45.4; lower figure, No. 34105, snout-vent length, 45. Both from 15 km. WSW San Isidro del General, San José Province, C. R.

*Hyla microcephala microcephala* Cope

(Fig. 9)

*Hyla microcephala* Cope, Proc. Amer. Phil. Soc., Apr. 1886, vol. 23, no. 122,, pp. 281-282 (type locality, Department of Chiriquí, Panamá, "along a mountain stream").

A large series of specimens of *Hyla m. microcephala* KUMNH Nos. 32172-32206 was taken at Golfito, Puntarenas Province, and represent, I believe, the first record of the species for Costa



FIG. 9. *Hyla microcephala microcephala* Cope. Upper figure, KUMNH No. 32184 ♂; actual snout-vent length, 22.2 mm; lower figure, No. 32172 ♀, length, 28.6. Both from Golfito, Puntarenas Province, C. R.

Rica. Specimens were breeding in small temporary pools one to five inches deep, September 6-9, 1952.

*Diagnosis:* A diminutive species characterized by a very much widened third finger; a pair of brown lines from anterior part of eye running down middle of back; a narrow dorsolateral brown line; toes four-fifths webbed; outer fingers one-third to two-fifths webbed; head small; vomerine teeth between choanae not or scarcely extending behind their posterior level.

*Description of KUMNH No. 32172:* Head width (8.5 mm.) slightly greater than length (8.2 mm.), not or scarcely greater than body width; width of eyelid (1.9 mm.) smaller than interorbital width (2.6 mm.); canthus rostralis rounded, curving; loreal region slightly concave; distance between eye and nostril (2.2 mm.) equal to distance from nostril to median notch in upper lip, much less than length of eye (3.1 mm.); tympanum distinct its diameter (1.5 mm.) twice in length of eye-opening; separated from eye by a distance less than its diameter; its upper part concealed by the distinct supratympanic fold.

Vomerine teeth abnormal (normally vomerine teeth on two low moundlike swellings between choanae, closer to each other than to choanae; usually smaller than choanae and scarcely reaching their back level); tongue longer than wide, large, flat, narrowly free behind and along sides, with a slight median notch behind; palatal groove distinct, a little closer to anterior level of choanae than to front of palate; (male with a large external vocal sac; vocal slits large).

Arm brought forward, the wrist reaches end of snout. A web remnant between two inner fingers; between second and third, two-fifths webbed, to pad of second; between outer fingers about one-third webbed to pad of outer finger. Digital pads of three outer fingers large, subequal, of inner finger smaller; distal sub-articular tubercles single on first and second fingers; lateral folds on digits somewhat thickened; a large flat inner metacarpal tubercle; palmar tubercle smaller, double or bifid; no distinct skin-fold under forearm; seen from above, fourth finger widened.

Leg brought forward the tibiotarsal joint reaches the anterior level of eye. Toes almost entirely webbed to digital pads, which are smaller than those on fingers, except pad on inner; inner metatarsal tubercle elongate, oval, flattened; outer tubercle if present, indistinct. When legs are folded at right angles the heels overlap three millimeters.

Skin on head, sides, and upper part of limbs smooth; a somewhat thickened, nearly straight supratympanic fold, continuing straight back from eye, can be traced to above arm onto side (usually cream colored); chin smooth (in males a very ample vocal sac); venter with distinct granules; much of undersurface of thighs granular; a slight fold across breast interrupted mesially; small axillary web present; area about vent smooth; the muscles surrounding vent give the area an inflated appearance.

*Color in life:* On exposed surfaces, cream with scattered brownish pigment but forming two moderately distinct lines on body from eye to end of rump; a more or less distinct cream line from tip of snout along canthus rostralis, continuing behind eye to near groin; upper part of tympanum pigmented; lip cream, the loreal region brownish; a brown line present below the cream dorsolateral line, becoming obsolete posteriorly; venter and concealed surfaces cream or creamy flesh.

*Measurements in mm:* (KUMNH Nos. 32172 ♀, 32173 ♀, 32176 ♂, 32180 ♂, respectively): Snout to vent, 28, 28.7, 24.8, 25; width of head 8.5, 8.7, 8, 8.1; length of head, 8.2, 8.2, 7.7, 8; arm, 17.2, 18, 14, 13.5; leg, 43, 46, 37.5, 39; tibia, 14.8, 15.3, 12.8, 13; foot and tarsus, 20, 21.5, 17.6, 17.2.

*Remarks:* This species appears to replace *Hyla underwoodi* in southwestern Costa Rica. The latter species is common farther north in the northern part of Puntarenas and Guanacaste Province, where I obtained large series in 1953 and 1954.

It differs from *H. underwoodi* in having a different color pattern, with hand, foot, and digits more slender. *Hyla phlebodes*, a member of the same group, known from the eastern Meseta Central drainage areas, is not uncommon at Turrialba, Cartago Province. It is a smaller species with a distinctly broader head and proportionally larger eyes. A brown interorbital line is present.

The widened fourth finger is a characteristic of this group of *Hyla*.

### *Hyla picadoi* Dunn

*Hyla picadoi* Dunn, Copeia 1937, no. 3, p. 164 (type locality, a little above farm of Manuel Acosta 2140 m., Volcán Barba, Heredia Province).

A specimen of this species, KUMNH No. 36127, has been found in the Talamanca range at the Bosque Nacional (Pan American Highway), elevation about 8000 feet. The paired denticulations in the front of the lower jaws, while evident are low.

*Hyla monticola* Cope

(Fig. 10)

*Hyla punctariola monticola* Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1875, p. 106 (type locality "Cordilleras at from 5000-7000 feet" elevation, slopes of Pico Blanco, Costa Rica).

The type of this species is presumably lost. The original specimen was probably in bad condition, since it was not figured and the type description is very brief and inadequate.



FIG. 10. *Hyla monticola* Cope. KUMNH No. 36764 ♀, Cicales Creek, Suretka, Limón Province, C. R. Actual snout-vent length, 43 mm.

A species of *Hyla* which I took at Suretka in southeastern Costa Rica, at an elevation of perhaps 300 feet, agrees with the color description of *H. monticola* in being transversely banded on dorsum, a condition not normally found in other Costa Rican frogs. Other similarities and differences are discussed following the description of this specimen, No. KUMNH No. 36764 ♀, collected June 26,

1954, along Cocal Creek, Suretka, Limón Province, Costa Rica, by Edward H. Taylor.

*Diagnosis:* Related to *Hyla gabbi*. Eye longer than the distance between eye and nostril; width of eyelid less than the interorbital distance; canthus rostralis, distinct, rounded; greatest diameter of tympanum about one half of the length of eye; skin glassy smooth; tympanum smooth; a supratympanic fold; area about vent smooth; chin indistinctly granular, breast venter and under thighs with strong granules; outer fingers two-thirds webbed; two inner fingers webbed only at base; tibiotarsal articulation reaches one millimeter beyond snout; snout-to-vent length, 43 mm. Whitish on chin; venter, and under thigh, without pigment; under part of foot darkly pigmented; hands below dirty white; brownish gray above, the back with four black bars; the tibia strongly banded, the thighs less distinctly so.

*Description:* Female. The width of head (17 mm.) is greater than length (14.1 mm.); canthus rostralis distinct, rounded, if projected would form an angle with its fellow between nostrils; loreal region slightly concave, sloping rather sharply to lip; snout rounded at tip, scarcely extending beyond the edge of lip; nostril a fourth nearer to the median point on upper lip than to eye; length of eye-opening (4.8 mm.) greater than distance from eye to nostril, (4.15 mm.), shorter than snout length (6 mm.); tympanum, 2.1 mm. in vertical diameter, 1.9 mm. longitudinal diameter; supratympanic fold curving up slightly, runs from eye, back to above arm, separated from tympanum posteriorly; tongue about as long as wide, not or scarcely notched behind, without a free posterior or lateral part; choanae large (1.3 mm.); a pair of strongly elevated ridges directed backward, arise from anterior inner edge of choanae extending back beyond the level of the middle choanae, touching mesially, and each bearing at least six teeth posteriorly; palatal glands open separately much anterior to level of choanae, near midline of the palate without forming a transverse groove; openings of Eustachian tubes smaller than choanae.

Arms with a small axillary web; upper arm slender, the forearm much heavier, three outer fingers two-thirds webbed; two inner fingers with a small basal web, the digits with slight lateral ridges or fringes to tip; inner metacarpal tubercle elongate, narrow, compressed; two small subequal palmar tubercles; subarticular tubercles small, that on outer distal joint of fourth finger double; palm with numerous tubercles; leg long, the tarsal joint extending about a millimeter beyond tip of snout when leg is brought forward; toes fully

webbed, the web reaching bases of terminal discs, that on fourth toe somewhat narrowed toward the disc; discs on three outer fingers larger than those on toes, that on inner finger smaller than those on toes; metatarsal tubercle elongate, compressed, extending out from edge of foot; no outer tubercle; a slight lateral fringe on outer edge of outer toes; a distinct tarsal fold. Skin above shiny smooth; sides somewhat wrinkled, with granules on lower part; chin nearly smooth; breast indistinctly granular; belly with strong granules; under thigh granules larger, a few with small median dark dots; an area about vent smooth; an indistinct groove from behind vent passing down under thigh; tympanum smooth without granules.

*Color:* Above rather brownish to lead-gray with frontal region somewhat more brownish; a dark band between eyes, one across scapular region, one across the middle of back and one across the sacrum; tympanum brownish; an area below eye with less pigment; sides lighter with indication of some lighter spots in the groin; front of thigh nearly uniform light gray; back of thigh similar; top of thigh with some darker markings; tibiae with five blackish bars; foot dark gray above; foot dark below with considerable pigment; hand whitish below. The upper arm is white save for a dim line of grayish pigment on its outer surface.

*Measurements in mm.:* Snout to vent, 43; width of head, 17; length of head, 14.1; arm, 26; leg, 74; tibia, 26; foot, 31.2.

*Variation:* The color as given in the type description follows: "Color light grayish brown with large dark spots forming transverse bars, one between the eyes, one in front of the scapulae, one behind the scapulae, and one at sacrum. Below unspotted white. Limbs with light brown surfaces above; concealed surfaces, pale, unspotted. No inguinal spots; a few specks of brown on the sides."

Other data given on the type are: "Length of head and body .037 m. fingers not entirely free but a web extends between the outer two to the middle of the phalange. The area of the tympanum in the same, is one-fourth that of the orbit. The head is short and wide and the heel extends nearly or quite to the end of the muzzle."

It will be seen that the two specimens disagree in the degree of development of the web on hand, and the absence of the markings on the limbs. One supposes that the specimen was in bad condition perhaps dried or hardened by preservatives so the webbing may have appeared to be absent between some of the fingers.

Until specimens of *H. monticola* are obtained from the type lo-

cality the identity of this specimen may remain somewhat in doubt. The specimen described was obtained from a shrub in the shallow, fast-flowing Cocalles Creek at Suretka. *Hyla gabbi* was breeding in the stream as were certain other species of amphibians.

*Hyla gabbi* Cope

(Fig. 11)

*Hyla gabbi* Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1875, p. 103 (type locality, near Sipurio, Limón Province, SE Costa Rica).

Specimens of this large *Hyla* are in the collection from the following localities: KUMNH Nos. 28200-201 San Isidro del General and

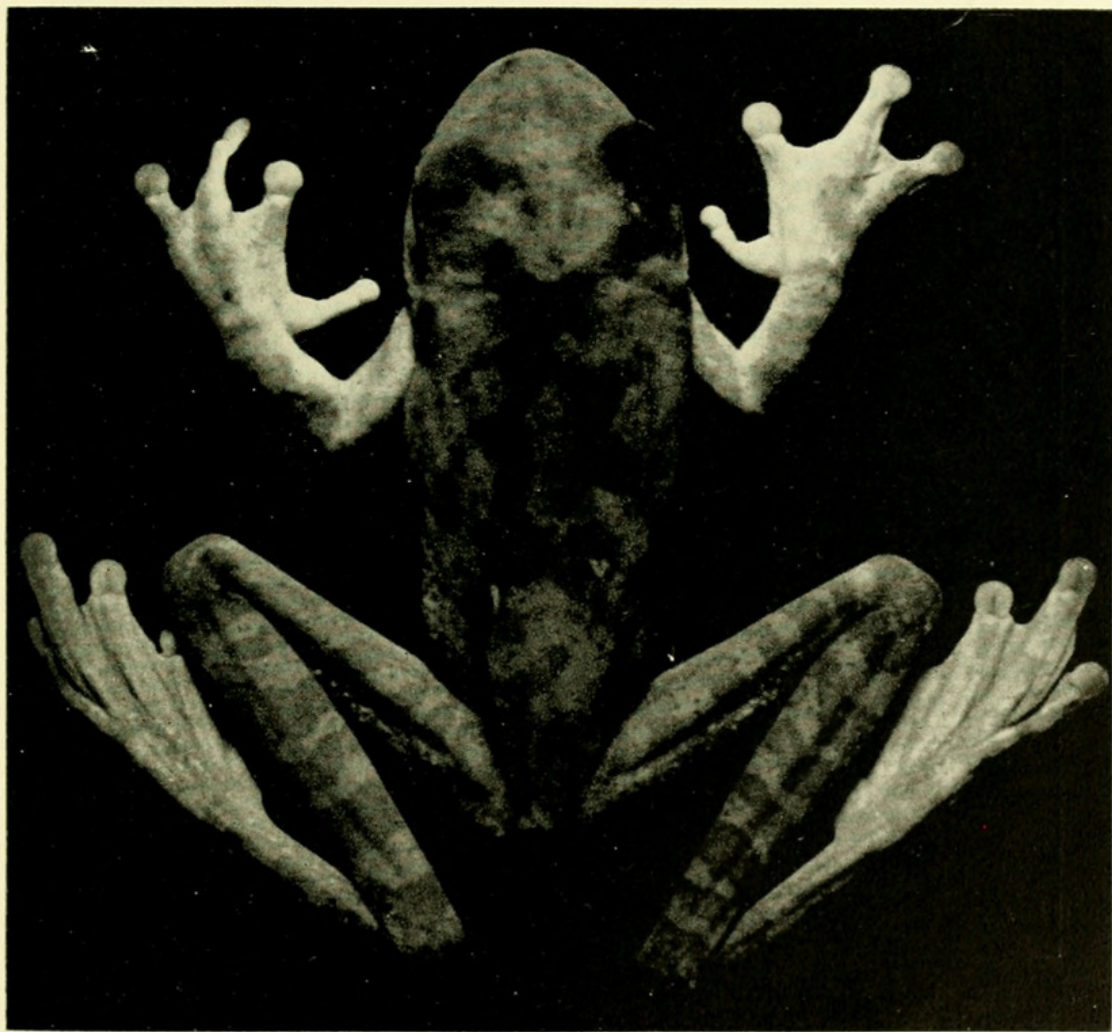


FIG. 11. *Hyla gabbi* Cope. KUMNH No. 28201, San Isidro del General, San José Province, C. R. Actual snout-vent length, 49.5 mm.

34869-75 Escazú, both, San José Province; No. 37012, IAIA, Turrialba, Cartago Province; Nos. 36764-78, 36791-93 Cocalles Creek, Suretka, Limón Province; Nos. 32994-32999, 34863, 34869-75, 36791-93 near Sarchi, Alajuela Province.

*Hyla alvaradoi* Taylor

(Fig. 12)

*Hyla alvaradoi* Taylor, Univ. Kansas Sci. Bull., vol. 35, pt. 1, no. 5, July 1, 1952, pp. 882-885, fig. 63 (type locality KUMNH Nos. 31864-65 Moravia de Chirripó, Limón Province, C. R.).

Two specimens, KUMNH Nos. 31864-65, were taken very close to the exact type locality. One, a gravid female, was ready to lay eggs, since some eggs were extruded after capture in the collecting



FIG. 12. *Hyla alvaradoi* Taylor. KUMNH No. 31865, topotype. Moravia de Chirripó, Limón Province, C. R. Actual snout-vent length, 42.3 mm.

bag. The preserved eggs measure from two and one-half to three millimeters in diameter and are without pigment.

Under a lens the dorsum shows a peppering of minute black specks with a few scattered ones on arm and leg. The venter is only faintly granular. The male has a pair of long vocal slits, the

edges of which are whitish. The pigment is slightly more evident on the back, definitely so on the limbs. The white line behind the eye is somewhat less distinct. The curious fold, arching above the vent is present in both of the topotypes.

Coloration in life of No. 31865: "Bright yellow-green above, light lines yellow becoming cream over eyes; eyes bronze-brown; throat and concealed parts of limbs, bluish-flesh; dorsal part of limbs nearly flesh-color, slightly tinted lemon-yellow; under surfaces of hands and feet canary to lemon-yellow; anal fold cream."

The color faded within a few days in preservative, leaving the specimens nearly cream-white.

The life colors of No. 31864 varied somewhat from the preceding as follows: "The dorsum is yellowish with a faint wash of green. The head is bluish green to greenish, generally a little darker on the middle and sides; venter with a whitish or yellowish white area; mental gland yellowish; concealed parts of limbs indefinite flesh; knees bluish; under surface of fingers yellowish, of toes whitish flesh without yellow." Taken June 20, 1952.

The specimens were taken from shrubs at the edge of a small stream only a few meters from where the type was taken.

### *Hyla pseudopuma* Günther

(Figs. 13, 14)

*Hyla pseudopuma* Günther, Biologia Centrali-Americana; Reptilia and Batrachia, Sept. 1906, pp. 274-275, pt. 72, figs A. and B. (type locality, La Palma, San José Province [1600 m. elev.]).

This species presents problems in identification since the color and pattern is extremely variable, the color changing from nearly blackish to a light olive in a few hours. An hourglass-shaped pattern on the back, considerably darker than the adjoining background, may be present, only to disappear somewhat later. Specimens from near the type locality usually have a dark lateral stripe even when the dorsum is a light olive.

The females are often considerably larger than the males and the "hourglass" pattern may appear as two separate darker-edged marks on a light, often fawn, ground-color.

I am presenting figures of two of these variations.

Specimens have been taken from the following localities: KUMNH Nos. 34973-80 southern slopes of Volcán Poás, elevation circa 6800 ft., Alajuela Province; Nos. 36583-96 "in bromelias," Vara

Blanca, southeastern slopes, Volcán Poás, Heredia Province; Nos. 36597-600, La Palma between Volcán Barba and Volcán Irazú 4800 ft. (in bromelias), San José Province; Nos. 34981-84 Finca Montechristo, Volcán Barba, (south slope), Heredia Province; Nos. 28192, 32276-32279, Cinchona (Isla Bonita), 4000-5500 ft. elev., Heredia Province; Nos. 32280-81 (large blotches), 32282-32291, 34971-34972, Moravia de Chirripó, Limón Province (elevation *circa* 2300 ft.).



FIG. 13. *Hyla pseudopuma* Günther. KUMNH No. 37030 ♀, Moravia de Chirripó, Limón Province, C. R. Actual snout-vent length, 44 mm.

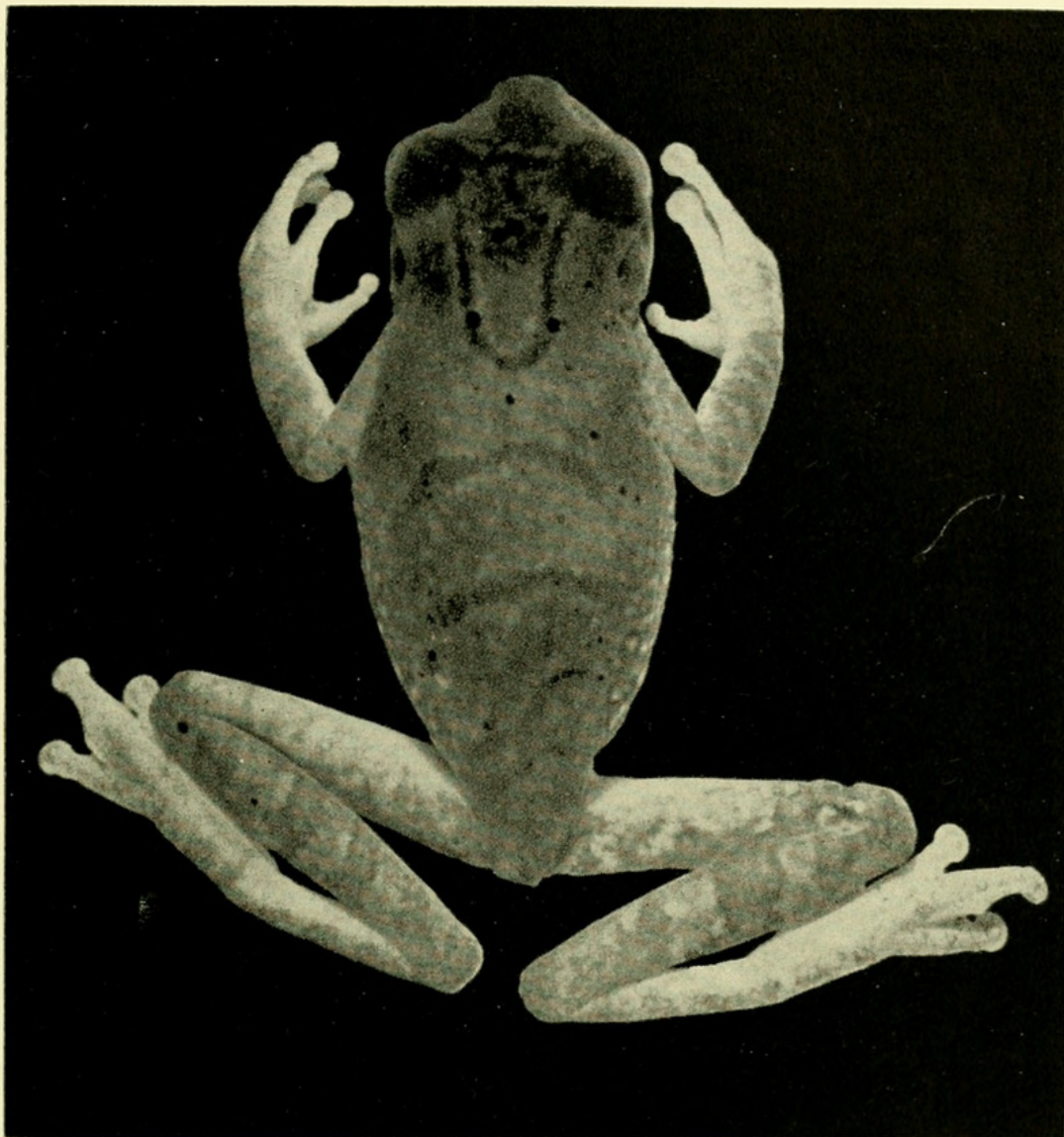


FIG. 14. *Hyla pseudopuma* Günther. KUMNH No. 32281 ♀, Moravia de Chirripó, Limón Province, C. R. Actual snout-vent length, 40 mm.

*Hyla legleri* sp. nov.

(Figs. 15-16)

*Type:* KUMNH No. 32982 ♂; collected approximately 15 km., WSW San Isidro del General, San José Province, at night with paratypes, in a small swamp, July 10, 1952, by Edward H. Taylor.

*Paratypes:* KUMNH Nos. 32981, 32983-32992 all males, same data. No. 35171, female same data; all topotypes collected by Edward H. Taylor and John Baker.

*Diagnosis:* A red-eyed species with a maximum known snout-vent length for males of 34, of female 36 millimeters; inner fingers less than one-fourth webbed; outer fingers approximately one-third webbed; toes nearly four-fifths webbed; tarsal fold not or but faintly indicated; male with vocal sac and paired vocal slits; vo-

merine teeth in two separated groups between choanae; interorbital distance greater than width of an eyelid; heel to anterior edge of orbit; venter, chin, and breast granular; tympanum about equal to area of largest finger disc; blackish to dark brown above with or without indistinct mottling; on sides the color often limited by a distinct yellow line from upper arm, along side, to groin; a cream



FIG. 15. *Hyla legleri* sp. nov. KUMNH No. 32983 ♂. 15 km. WSW San Isidro del General, San José Province, C. R. Actual snout-vent length, 33 mm.

line above vent and across heel; a fold above tympanum obscures its upper border.

*Description of type:* A slight depression on the snout behind level of nostrils to level of eyes; head wider than body, its width at tympanum (11.6 mm.) nearly equal to its length (12 mm.); length of eye-opening (3.4) about equal to distance between eye and nostril; latter a little closer to median point on lip than to eye; interorbital

space (4 mm.) greater than width of an eyelid (3.2 mm.); greatest diameter of tympanum (1.9 mm.) approximately equal to distance from eye; canthus rostralis distinct, rather sharp, curving slightly, the loreal region shallowly concave sloping broadly to lip.

Vomerine teeth on two low transverse ridges between choanae, separated from each other by a smaller distance than from choanae; choanae rather small not larger than vomerine tooth-groups; opening of palatal glands in a slightly sinuous transverse groove, much closer to front of palate than to upper level of choanae; tongue about as long as broad (6.5 mm.); a slight posterior notch indicated; vocal slits nearly parallel; vocal sac indicated externally by a transverse fold on throat in front of breast.

Arm rather short, thick, and cannot be straightened without breaking muscles; first finger distinctly shorter than second, with numerous brown spiny rugosities forming a broadly triangular area reaching to terminal pad; terminal pads of digits widened, those of three outer fingers much larger than that of first; first two fingers less than one-fourth webbed; three outer fingers about one-third webbed; inner metacarpal tubercle elongate; subarticular tubercles small, those on two outer fingers may be double or bifid; a slight fold on undersurface of forearm; toes about four-fifths webbed; inner metatarsal tubercle moderate, somewhat elevated; outer tubercle very small, indistinct; pads on toes smaller than those on three outer fingers, larger than pad on inner finger; heel reaches to front of orbit; legs folded at right angles, the heels overlap three millimeters; no tarsal fold evident.

Skin almost completely smooth above, on sides of venter, and underside of thighs; less distinctly so on breast and chin; some granules, on sides of vent, the posteriormost pustular, much the largest.

*Color in life:* Dark blackish to blackish brown above on head and body; throat grayish white; yellowish green on venter and under thigh; heels, soles, and undersurface of toes blackish green; palms greenish yellow; a short line of cream on upper arm continued on to side of body to groin; a narrow yellowish line borders upper lip; back of thighs brownish olive; eye red; a narrow cream line above vent and across elbow and heel; tibia with indistinct darker bands.

*Measurements in mm.* (Type, No. 32981 ♂ and No. 35171 ♀ respectively): Snout to vent, 33, 34, 37; width of head, 11.6, 11.9,

12.4; head length, 12, 12, 12; arm, 19, 18, 22.5; leg, 45, 48.5, 56.2; tibia, 17.2, 17.1, 18.7; tarsus and foot, 23, 22.5, 26.

*Variation:* Some of the specimens have the venter and concealed parts lemon-yellow. The cream lateral line is uneven, sometimes broken. When preserved they are dark to blackish brown, with



FIG. 16. *Hyla legleri* sp. nov. KUMNH No. 35171 ♀, 15 km. WSW San Isidro del General, San José Province, C. R. Actual snout-vent length, 37 mm.

some black spots or flecks visible on back; indistinct bands are evident on tibia.

The female specimen No. 35171 differs very markedly in color, being fawn with a flecking of brown spots often contiguous forming indefinite spots; fingers and toes with light pigmentation appearing dirty white in preservative. The yellow line, distinct on upper arm, merges with the ventrolateral coloration; yellowish cream on under surfaces. The specimen is gravid and the eggs are visible.

*Remarks:* This species would appear to be related to *Hyla nigripes* Cope taken at an elevation of 5000-6000 ft. on Pico Blanco, Costa Rica.

The nostril, however, is closer to the median point on lip than to eye; the tympanum is larger, equal to one third or more of the exposed part of eye ball; the foot is about one-third rather than half-webbed; the leg is shorter, the heel reaching only to front edge of orbit rather than beyond the snout. There is usually a cream lateral line rather than white spots in a dark reticulum.

The elevation of the type locality is probably not more than 600 ft. above sea level.

The female figured looks very different from the males. However, I find no pertinent structural differences. They were taken in the same small swamp at night, in rain.

The species is named for John Legler, Curator in Charge of herpetological collections at the Kansas University Museum of Natural History, who has greatly facilitated my study there.

*Hyla dulcensis* sp. nov.

(Fig. 17)

*Type:* KUMNH No. 32168; collected, Golfito, Puntarenas Province, Costa Rica, Sept. 7, 1952 by Edward H. Taylor.

*Paratypes:* KUMNH Nos. 32166, 32167; collected with the type, same locality, Sept. 7 and 8, 1952 by Edward H. Taylor and John Baker.

*Diagnosis:* Web barely indicated between three outer fingers; webs between first and second toes attached only at the base of first toe; other toes about three-fourths webbed; tibiotarsal joint reaches to front edge of eye; a very slight axillary web; subarticular tubercles single. Bones blue (in life).

Related to *Hyla eleachroa* but differs in its somewhat larger size (40 mm. for males) smaller finger and toe discs, the obsolete canthus rostralis, the loreal region not concave, and the choanae larger.

*Description of type:* Head somewhat flattened, its length (14 mm.) a little greater than its width at tympanum (12.9 mm.); canthus rostralis not indicated, the loreal region sloping obliquely from top of snout to lip with no (or but the slightest) concavity; nostrils lateral, the region about them swollen, with a depression between them on top of snout; in front of nostril the line of profile

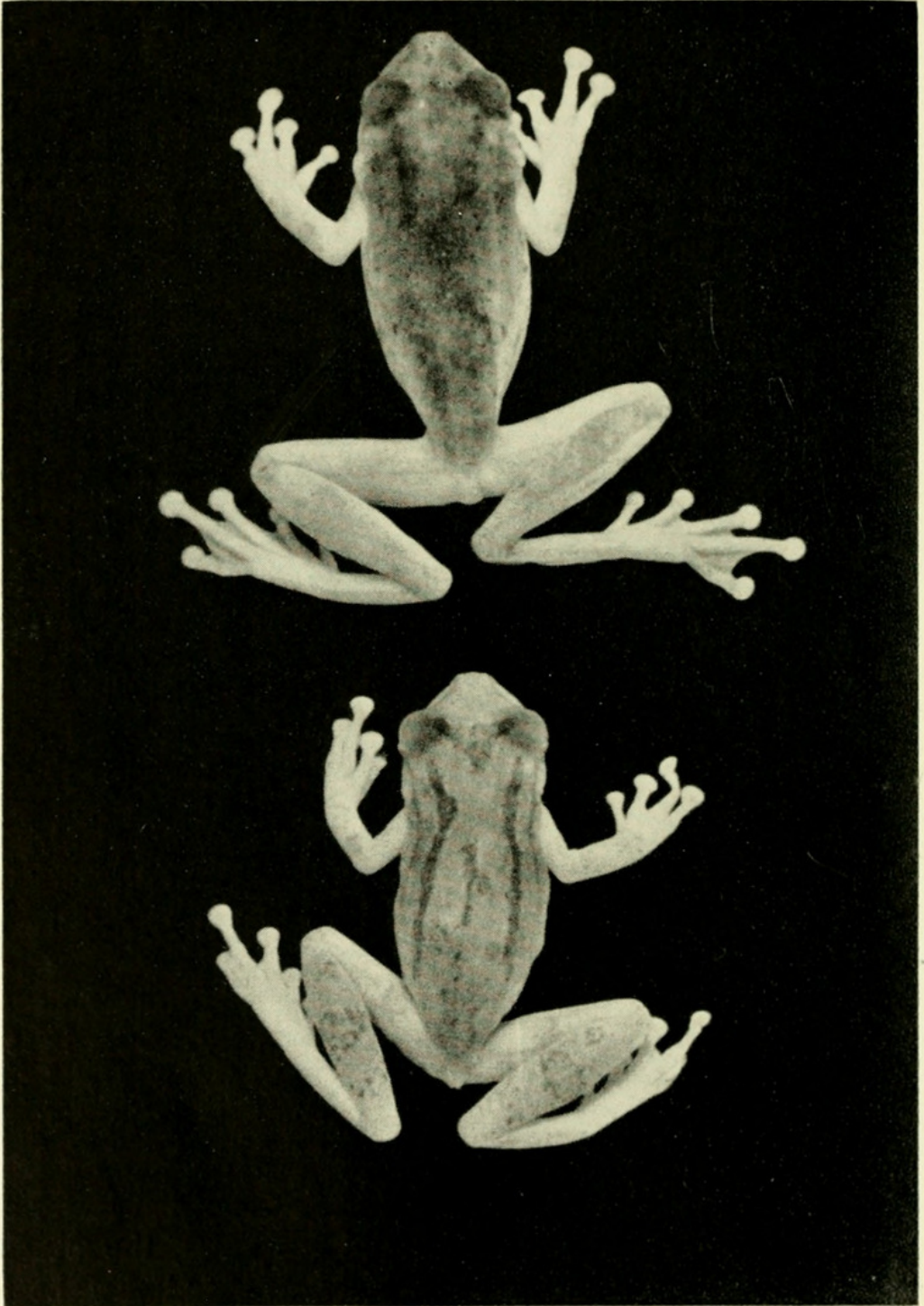


FIG. 17. Upper figure, *Hyla dulcensis* sp. nov. KUMNH No. 32168, Type; Golfito, Puntarenas Province, C. R. Actual snout-vent length, 39.5 mm.

Lower figure, *Hyla eleachroa* Cope. KUMNH No. 31804, Turrialba, Cartago Province, C. R. Actual snout-vent length, 35 mm.

curves somewhat forward then back and down to lip; snout extended beyond mouth 1.4 millimeter; length of eye opening (4 mm.) less than distance between eye and nostril (4.5 mm.); interorbital width (3 mm.) less than width of an eyelid (3.6 mm.), greater than distance between nostrils (2.6); tympanum large (2.2 high x 1.9 mm. long), separated from eye by a distance of two millimeters, its upper rim partly concealed by an ill-defined fold from eye which runs diagonally backwards and down to above arm insertion.

Vomerine teeth on two small closely approximated moundlike elevations between choanae and separated from them by a distance equal to length of one elevation, the teeth arranged in slightly diagonal lines pointing forward mesially (nearly transverse in a paratype); diameter of a choana in distance between choanae about two times (or slightly more). Openings of the vocal slits large; tongue with only a small free edge, longer than wide, not notched posteriorly; palatal glands open in a sinuous groove, much closer to anterior limit of palate than to anterior level of choanae.

Hand with a web-remnant between three outer fingers, the webs continuing somewhat as small lateral fringes or ridges; between first and second fingers only the ridges are evident; discs on fingers rather large, that on third finger as large as tympanum; subarticular tubercles large, single; inner metacarpal tubercle elongate, partly covered by the nuptial gland, which seemingly lacks horny spicules on its surface; the palmar tubercle elevated, divided mesially, the inner part a little the longer.

Legs rather short; the tibiotarsal articulation reaches the anterior edge of the eye; when legs are folded at right angles to the body the heels overlap a little more than four millimeters.

Web between first and second toes slight, attached to first in basal part only; four outer toes about three-fourths to four-fifths webbed; discs a little smaller than on fingers; inner metatarsal tubercle relatively small; the outer smaller but entirely distinct; no inner or outer tarsal fold.

Skin on dorsal surface of body and head minutely granulate or corrugate (smoother in female paratype), but nearly smooth on arms and upper parts of limbs; sides nearly smooth; skin on chin covering vocal sac much folded; a small curving fold across breast; venter strongly granulate or areolate; anterior ventral surface of thighs, and to a lesser extent the posterior surface, granulate.

*Color*.—In life, grayish brown on dorsal surfaces, the venter white; the throat sac and chin yellow; legs generally greenish yellow. In preservative, very light brown above, the pigment (in

chromatophores) rather evenly scattered over most of the limb surfaces (a narrow ventral area excepted), and the upper and under surfaces of hands and feet; upper lip cream with some scattered pigment.

The bones are blue or greenish blue in life but this color tends to fade after preservation.

Measurements of *Hyla dulcensis* and *Hyla eleachroa*

	<i>H. dulcensis</i>			<i>H. eleachroa</i>		
Number.....	32166	32167	32168	30340	30313	30326
Sex.....	♀	♂	♂	♀	♂	♂
Snout to vent.....	40	37	39	34	33.5	33
Head length.....	13.5	13.5	14	12	11.5	11
Head width.....	13.6	12.7	12.9	11	11	10.7
Length of eye.....	4	4	4	3.8	3.8	3.7
Eye to nostril.....	4.3	4.3	4.5	3.7	3.9	3.8
Arm.....	24	22	24	20	19.7	19
Leg (to vent).....	61.5	60	61.4	54	52	49
Tibia.....	21	20.5	21	17	18	17.6
Foot and tarsus.....	26.6	27	28.4	24	24	23.5

*Remarks:* This species belongs to a hylid group having the web largely eliminated between the first two toes. Other members of this group in Costa Rica are *Hyla Boulengeri*, *H. Staufferi* and *H. eleachroa*. It is probably most closely related to *eleachroa*.

The type locality Golfito meaning "little gulf" refers to the Golfo Dulce on which the town is located. The species is named for the Gulf.



Taylor, Edward Harrison. 1958. "Additions to the known herpetological fauna of Costa Rica with comments on other species. No. III." *The University of Kansas science bulletin* 39, 3–40.

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