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New Caudata and Salientia from Mexico

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ABSTRACT: A series of new Salientia is described from México, as follows: *Bolitoglossa lavae*, from near La Joya, Veracruz (Caudata, Plethodontidae); *Eleutherodactylus hidalgoensis*, north of Tianguistengo, Hidalgo, *Eleutherodactylus decoratus*, six miles west of Jalapa, Veracruz, *Eleutherodactylus bolivari*, Ixtapan del Oro, México, *Syrrhophus modestus*, Hacienda Paso del Río, Colima (Salientia, Leptodactylidae); *Hyla pachyderma*, Pan de Olla, Veracruz, *Hyla beltrani*, Tapachula, Chiapas (Salientia, Hylidae); *Rana megapoda*, near Chapala, Jalisco (Salientia, Ranidae). Most of the species are figured.

Bolitoglossa lavae

(Plate XXVII, figs. 5-6)

Type.—EHT-HMS No. 28937 ♀; collected 2 miles west of La Joya, Veracruz, August 16, 1941, by Edward H. Taylor.

Paratypes.—EHT-HMS Nos. 28930-28936; 28938-29064. Topotypes collected at same time and place by Dyfrig Forbes, Gabino Garcia, and Edward H. Taylor.

Diagnosis.—A small bromeliad salamander belonging to the *chiroptera* group; tip of toes rounded, the toes touching or slightly overlapping when limbs are adpressed; 11 costal grooves, the inguinal and axillary apparently wanting; 25-26 Maxillary-premaxillary teeth on each side of jaw; vomerine teeth about 6 on each side curving strongly backwards, separated medially by a distance equal to more than distance between two teeth, and from parasphenoid teeth by a distance three times as great; parasphenoid teeth in double series separated medially by a narrow interval. In males maxillary-premaxillary teeth reduced to from three to five on each side, those of the premaxilla piercing the lip.

Description of the type.—A small species, the known maximum snout to vent measurement, 35 mm.

Head broader than body; width of head (6 mm.) contained in the distance between tip of snout and anterior end of vent (33 mm.) 5.5 times; distance between orbits, (2 mm.), much wider than an eyelid (1.3 mm.); nostril small, a slight swelling of the subnarial region on upper lip; a minute fold back of the corner of eyelid (in some specimens, when the eye is not open widely the posterior corners of the eyelid are tucked under this fold); dorsal surface of head and snout flat, strongly and uniformly pitted; snout narrowed, nearly truncate anteriorly, lacking a canthus rostralis; nuchal fold on throat curving back slightly on side of neck, then curving forward to meet its fellow on the middorsal line; a vertical groove just back of the jaw angle reaches the dorsal surface of neck; an indistinct groove connects the two vertical grooves; no groove running back from behind eye.

Eleven distinct costal grooves, the axillary groove and one in the inguinal region missing; tail not or but slightly constricted posterior to the anus; tail not especially fragile as none of the type series has the tail broken; about 36 indistinct caudal grooves behind anus; tail very slightly compressed laterally; body a little broader than high; adpressed limbs overlap the length of one costal fold; fold formed by the posterior extension of hyoid terminates at the second costal fold. A small gland behind the insertion of hind leg. Skin smooth, not puckered on sides; pits over most of body much smaller than those on head; anal opening (of female) with diagonal folds (of male, with papillae).

Limbs large, well developed, the hand and foot spread wide; digits very wide, rounded at tip, minutely narrowed some distance back from tip. The web involves the first finger completely, the proximal phalanges of each of the other fingers and part of the second; foot with the web involving first toe, the proximal phalanges and proximal parts of the second series of the other toes.

Tongue boletoid, free; a semicircular, sublingual fold; maxillary-premaxillary teeth 28 on each side (allowing for missing teeth); about the same number of mandibular teeth; vomerine teeth 6-6, lying almost wholly between the inner level of choanae, curving back strongly, the two series separated by a distance a little greater than that between two teeth; separated from the parasphenoid teeth by a distance three times as great; parasphenoid teeth in two elongate series, which are widened posteriorly; palatal membranes with considerable pigment about the posterior part of the parasphenoid teeth; posterior to the maxillary-premaxillary teeth, the gums are strongly papillate; choanae moderately large.

Color.—Above dull brownish with indistinct spotting of darker color, somewhat more concentrated in the dorsolateral region; low on the sides of head and body, and the entire ventral surface, dirty whitish (actually evenly pigmented black on creamy background); a trace of two short cream diagonal lines on dorsal surface at base of the tail.

Measurements in mm.—Snout to vent, 33; snout to arm, 10.2; axilla to groin, 18; tail, 42; arm, 10.2; leg, 10.2.

Variation.—In the very large series of paratypes there is a considerable variety in color pattern.

1. A series of about 20 have the ventral surfaces dark, the tails being usually equally dark above and below. The color above on back is dark brown or blackish, or there may be a median cream line, a pair of dorsolateral lines, of pinkish or cream, distinctly separated from the blackish lateral coloration. In practically all there is some variegation of the dorsal surface. There also may be a lighter spot on shoulders and a pair of short, light lines at the base of the tail. All of the dark specimens are young, to nearly grown, females.

2. All the remainder of both sexes are nearly equally light on the ventral surfaces but vary much in dorsal color and markings. Eight of these have the head variegated brown, the dorsolateral region dark and the back and dorsal surface of the tail nearly uniform cream. A similar number of specimens have two narrow dorsolateral lines, the back and tail, light, with numerous fine spots or reticulations. A few specimens appear nearly uniform lavender above, the sides lacking the dark areas. The larger part of the remainder are marked much as is the type. In almost all, however, there is a light nuchal spot and two short, lighter lines at base of the tail (often forming a V-shaped mark) are present.

There is little variation in the number of teeth in the adult females. Very young males resemble females in the number of maxillary teeth but in old males only three or four are present, these much enlarged. There is a slight difference in the relative lengths of the limbs, to the axilla-to-groin length, in adult males, and the overlap of the adpressed limbs is a little greater than in the type.

Remarks.—This variety of color pattern is present in most of the forms of the *chiroptera* group. It is certainly present in *xolocalcae*, *terrestris* and *multidentata*; to a lesser extent this variation occurs also in *chiroptera*, *chondrostega*, and *arborea*. Whether this condition obtains in *mosaueri* I do not know.

This species may be separated from the above species by the character of the teeth and the relatively large limbs and feet. This character seems to be associated with its arboreal habitat. All the specimens were taken from bromelias growing in the stunted forest of the lava fields west of La Joya, Veracruz.

Eleutherodactylus bolivari sp. nov.

(Pl. XXVI, figs. 1 to 4)

Type.—EHT-HMS No. 29564 ♂; collected at Ixtapan del Oro México, México, by Dr. C. Bolivar Pieltain, June 11, 1941.

Diagnosis.—A member of the *agusti* group, probably most closely related to *Eleutherodactylus tarahumaraensis* Taylor, but differing from this and other members of the group in lacking a vocal sac.

Description of the type.—A small species of the *agusti* group, the snout to vent measurement 44 mm. Body and limbs slender lacking all trace of an interdigital membrane; head a little wider than body; width of eyelid (4.2 mm.) minutely greater than interorbital distance (4.1 mm.); length of eye (5.7 mm.) greater than interval between eye and nostril (5.1 mm.); length of snout (7 mm.), greater than eye length; width of tympanum (2.6 mm.), less than its height (3.3 mm.), its greatest diameter almost half greatest diameter of eye; elevation of head immediately in front of eye equals distance between eye and nostril; canthus rostralis rounded; loreal region sloping obliquely to lip, not or very slightly concave.

Tongue longer than wide, slightly nicked behind, free for one-fourth of its length behind, and for nearly a third of its width laterally save near tip; vomerine teeth in two slightly diagonal, elevated groups which lie between, but fail to reach forward to the posterior level of the choanae; the groups closely approximated, but separated from choanae by an interval equal to more than twice the width of one group; palatal glands open medially, near the anterior level of choanae, by ten longitudinal slits.

Arms slender, rather long; first finger longer than second; tips of digits very slightly wider than the digits, the tips bulbous or swollen, lacking any trace of a transverse groove at tip; subarticular tubercles large, elevated, rounded, not pointed at top; six supernumerary tubercles; median palmar tubercle, large, elongate, elevated, lying close to, and partially joined to the posterior part of the smaller, outer tubercle; inner tubercle intermediate in size, strongly elevated anteriorly; under side of arm smooth, without pustules.

Legs slender, rather short, the tibiotarsal articulation reaching anterior corner of eye or slightly beyond; tips of toes similar to those

of fingers; subarticular tubercles smaller than those on fingers; eight supernumerary tubercles on sole and traces of intercalary tubercles; outer metatarsal tubercle more than half the area of the large inner tubercle but less elevated; no trace of a tarsal fold or outer tarsal tubercles; length of inner metatarsal tubercle more than half the interval between tubercle and tip of toe.

Skin very smooth, but with numerous, flat, smooth-surfaced tubercles visible on back and femur; an indistinct skinfold across occiput; sides somewhat more strongly tuberculate; chin, breast, and most of the venter, smooth, the lateral granulation encroaching on the latero-posterior edges of the ventral disk; no inguinal or axillary glands; ventral and posterior faces of femur with strong granulation on proximal parts and indistinct granular patches on each side of the groove, posterior to anal opening.

Color.—The ground color is light, bluish-gray with numerous blackish spots, varying in size; upper lip spotted; venter clouded with brown; limbs strongly barred with alternating broad and narrow, dark brown bands, separated by cream bands.

Measurements in mm.—Snout to vent, 44; width of head, 18; length of head, 17.5; arm, 31; leg, 64; tibia, 21.5; foot, 28.

Remarks.—The absence of the vocal sac clearly differentiates this species from the presumed related Mexican forms, *Eleutherodactylus agusti*, *cactorum*, *latrans*, and *tarahumaraensis*. *E. laticeps* differs in having a small web between the toes, and a sharp-edged tarsal fold.

This species is named for its discoverer, Prof. C. Bolivar Pieltain, a noted Spanish scientist.

Eleutherodactylus hidalgoensis sp. nov.

(Plate XXV, figs. 5 to 8; Plate XXVII, fig. 10)

Type.—EHT-HMS No. 24454 ♂; collected about 4 miles north of Tianguistengo, Hidalgo, July 3, 1940, by Edward H. Taylor.

Paratype.—EHT-HMS No. 24455 collected with the type.

Diagnosis.—Belonging in the *alfredi* group of the genus. Tibio-tarsal articulation reaches a little beyond tip of snout; tympanum less than one half the diameter of the eye. Digits dilated similar to those of *spatulatus*, but not so distinctly emarginate; vocal sac present; canthus rostralis rounded.

Description of type.—A small frog, the head as wide as body, somewhat constricted back of the head. Eyelid (3 mm.) equal to the interorbital distance (3 mm.); length of eye (4 mm.) greater

than interval between the eye and nostril (3.2 mm.); tympanum a little higher than wide, its greatest diameter (1.75 mm.) less than half the length of the eye; length of snout, 4.6 mm.

Tongue subcircular notched behind, free for one third of its length behind and widely free on the sides; openings of the vocal sacs distinct; vomerine tooth groups diagonal, elongated, lying behind the posterior level of the choanae, but between the level of their inner margins; groups are separated from the choanae by a distance more than twice as great as that which separates the two groups. The several openings of the palatal gland lie between the anterior part of the choanae; choanae much larger than area of one vomerine tooth group.

Arm moderate, the digits with much widened terminal disks, especially on outer fingers, the two outer disks with slight, medial, terminal emarginations (seen from above); first finger, with very small disk, much shorter than second finger; subarticular tubercles large, rounded; six supernumerary tubercles, some nearly as large as the subarticular tubercles; the median palmar tubercle elongate, curved, separated from the outer tubercle by a curved line; inner palmar tubercle intermediate in size but more rounded and nearly same area as middle; a row of tubercles under the forearm.

Leg moderately long, the tibiotarsal articulation reaching very slightly beyond the tip of the snout; large inner metatarsal tubercle more than twice the size of the outer, its length a little less than half the interval between the tubercle and tip of first toe; disks on toes much smaller than those of fingers; third and fifth toes reach forward to the same point; toes rather flattened with sharp lateral edges, and a trace of an interdigital membrane; toe disks with slight emargination on middle toes, all disks with transverse terminal grooves; only a faint trace of inner tarsal fold (one or two indistinct tubercles), and several irregular outer tarsal tubercles; three or four very small, indistinct, supernumerary tubercles on sole.

Skin above very rugose, with small tubercles and pustules; an indistinct, occipital fold; a semicircular fold above tympanum; no dorsal skinfolds; sides pustular or granular; these encroach on the well-defined ventral disk; chin with ample skinfolds of the vocal sac; breast wrinkled or slightly corrugated. Inguinal gland present but indistinct; no distinct axillary gland; dorsal surface of femur, tibia, and arm pustular; more medial parts of ventral and posterior faces of femur with pavement-like granules; several tubercles below and behind tympanum; apparently no paratoid gland; when legs

are folded at right angles to the body, the heels overlap one-half to one millimeter.

Color in life.—Yellowish cream above with indistinct darker markings on head, dorsum and sides; an indistinct W-shaped dark pattern back of occiput; legs barred with grayish, the lines continuous across femur, tibia, and foot when limb is folded; ventral surfaces bright greenish-yellow with a minute peppering of blackish pigment; underside of hand and foot yellowish.

Measurements of type and paratype in mm.—Snout to vent, 28.5, 22; width of head, 11.5, 8.9; length of head, 11.8, 9.4; arm, 20.2, 15; leg, 49.5, 41; tibia, 16, 14; foot, 20.5, 18.

Variation.—The single paratype is smaller but otherwise resembles the type in most characters. Both are males.

Remarks.—The specimens were obtained at night from trees by tracing their calls. The call is difficult to describe, but when first heard at some distance it resembled the querulous notes of *Rana pipiens*; and until I discovered that the sound came from trees I was certain I was trailing a *Rana*. Many individuals were heard, but the difficulty involved in ascending trees with a lantern during a shower, and then locating the frog, mitigated against acquiring a series.

The key given under *Eleutherodactylus decoratus* shows the differential characters of the members of the *alfredi* group of the genus.

Eleutherodactylus decoratus sp. nov.

(Plate XXV, figs. 1-4; plate XXVII, fig. 9)

Type.—EHT-HMS No. 28720 ♀; collected near Banderia, 6 miles west of Jalapa, Veracruz, Aug. 16, 1941 by Edward H. Taylor.

Paratype.—EHT-HMS No. 28719; collected two miles west of La Joya, Veracruz, Aug. 15, 1941, by Edward H. Taylor.

Diagnosis.—A small Eleutherodactylid of the *alfredi* group related to *E. spatulatus* (see Plate XXVII, figs. 7, 8 and 11), but differing in having a longer leg, the tibiotarsal articulation reaching considerably beyond the snout; canthus rostralis distinct, moderately sharp; tips of digits all more or less emarginate at tip (seen from above), but a little smaller than in *spatulatus* or other related forms.

Description of the type.—A small species, the known maximum size 25 mm.; width of eyelid (2.2 mm.) less than interorbital distance (3.3 mm.); diameter of the tympanum (1.25 mm.) less than half the diameter of the eye (3 mm.); diameter of eye equals interval between eye and nostril; length of snout 4.65 mm.; canthus

rostralis moderately distinct, the lines of which, if projected, intersect about half way between nostrils and tip of snout; areas about nostrils distinctly elevated, moundlike, with a broad depression between; snout pointed; loreal region broadly sloping to lip, not, or but slightly concave; the skin of the loreal region pustular and corrugated, with a few tiny tubercles below eyes; top of head very smooth; lying between the orbits and on occiput is a circumscribed, elevated, median area having somewhat the appearance of a blunt arrow, directed backwards. The entire elevation is bordered by a minute ridge.

Tongue slightly longer than broad, notched behind; free behind for more than one-third of its length, and broadly free on sides save at tip; vomerine tooth groups diagonally placed, lying behind choanae, but well within the level of the inner margins of choanae, separated from them by a distance greater than the length of one group, and from each other by less than half this distance; palatal glands open in a short, medial, transverse groove, which lies at the anterior level of choanae; choanae small, about the area of a group of vomerine teeth.

Arm rather short; fingers with widened, flattened disks, notched at the tip (seen from above), each with a distinct transverse groove at tip; no trace of interdigital membranes; subarticular tubercles large, rounded; seven supernumerary tubercles; median palmar tubercle much larger than the outer and separated from it only by a groove; inner tubercle of intermediate size.

Legs long and slender, the tibiotarsal articulation reaching beyond the snout, a distance equal to interval between eye and nostril; third and fifth toes reach forward to the same point on the fourth toe; toes rather flattened with sharp lateral edges and traces of interdigital membranes; disks of toes are distinctly smaller than finger disks; inner metatarsal tubercle compressed, strongly salient; outer tubercle more than half as large; a few supernumerary tubercles.

A very indistinct broken ridge begins behind posterior corner of eye, runs diagonally backward some distance then continues parallel to body dorsolaterally; area on back between these lines, smooth anteriorly but pustular and granular posteriorly; sides more or less tubercular or pustular; chin and breast smooth; ventral disk moderately distinct, the posterior part of which is roughened by small granules or corrugations; more medial parts of femur on ventral and posterior surfaces granular; upper surface of femur with some pustules; a trace of tarsal fold indicated by an elongate tubercle; a

slight fold above tympanum. Inguinal gland present but indistinct, its extent on the surface is discernible by the pitted nature of the skin; an indistinct paratoid gland above arm.

Color in life.—The head dark above; back bright red (faun color in preservative) between the dorsolateral ridges; sides darker, indefinitely streaked or mottled with black; lip spotted dark and light, with a larger dark spot below eye; a dark spot in supratympanic region; legs barred with brown with lighter intervals between; under surfaces of hands and feet dark; venter mottled and clouded, with dark; under surface of femur and tibia speckled brown.

Measurements in mm. of type and paratype.—Snout to vent, 25, 24; width of head, 9.7, 9.7; length of head 10.3, 10.1; arm, 17, 17; leg, 49, 47; tibia, 16, 16; foot, 19.5, 20.

Variation.—The paratype differs but little from the type. It is a male with vocal sacs. The terminal pads on the toes and fingers are a trifle larger. The length of the eye (3.4 mm.) is about equal to the interval between eye and nostril, 3.2; the width of an eyelid is about the same as the interorbital width. The tibiotarsal articulation reaches the same distance beyond the snout as in type and the diameter of the tympanum (1.4 mm.) is less than half the diameter of eye. The height of the tympanum is a little greater than its width.

The color pattern, however, differs somewhat. The light dorsal coloration, pinkish in life (clay color in alcohol) reaches to the tip of the snout; the sides are a little darker and the underside of the femur and tibia is clouded rather than speckled with dark; the dorsal surfaces of femur and tibia are strongly barred with six brown lines, and when limbs are folded the lines are continuous on femur and tibia. The elevation on the top of the head is less distinct than in type.

Remarks.—The type was obtained from a bromelia, in a tree growing from lava rocks, in company with small salamanders also new to science. The paratype was obtained in camp early in the morning, while I was preserving specimens obtained the previous night. It hopped to within ten inches of my preserving pan.

A key is given herewith to assist in distinguishing the four Mexican forms of this group. The recently described *Eleutherodactylus xucanebi* Stuart is a member of this group.

KEY TO SPECIES OF THE ALFREDI GROUP OF THE GENUS ELEUTHERODACTYLUS

- A. Vocal sac lacking; tympanum more than half (about $\frac{2}{3}$) diameter of eye, usually brown with a lighter center; tibiotarsal articulation reaches much beyond tip of snout; Western Veracruz in the region about Córdoba.....*E. alfredi* Boulenger.
- AA. Vocal sac present; tympanum less than half the diameter of eye, usually a little higher than wide, the upper part of tympanum usually blackish.
 - B. Tibiotarsal articulation reaching anterior edge of eye; above darkly mottled or spotted; usually one or two dark diagonal lines on side separated by a cream line; usually an inguinal black spot. Tips of three outer finger and three middle toes strongly emarginate (seen from above). Western Veracruz in the Córdoba region. Elevation about 2,500 ft. (See plate xxvii, figs. 7, 8, 11)*E. spatulatus* Smith.
 - BB. Tibiotarsal articulation reaching tip of snout or beyond. Emargination of disks less distinct.
 - C. Tibiotarsal articulation reaching much beyond the tip of the snout. Sides much darker than dorsum, which is reddish or pinkish in life; canthus rostralis distinct. A median elevated area on occiput and interorbital region. Between Las Vigas and Jalapa in Veracruz. *E. decoratus* sp. nov.
 - CC. Tibiotarsal articulation to tip of snout; sides are not darker than dorsum; canthus wanting or rounded. No elevated area on head. Body and sides colored alike. North Hidalgo. Elevation 4,000 ft.
E. hidalgoensis sp. nov.

Syrrhophus modestus sp. nov.

(Plate XXIX)

Type.—EHT-HMS No. 3756, collected at Hacienda Paso del Río, Colima, México, July 8, 1935 by Doctor Hobart M. Smith.

Paratypes.—EHT-HMS, Nos. 3754, 3755, 3757, 3758, collected by the same collector, same date and locality as type.

Diagnosis.—A very small species of the genus, maximum known length 21 mm. Tips of digits somewhat widened and truncate; tubercles very large; ventral disk rather indistinct; paratoid and inguinal glands present but rather indistinct; vocal sac present; eye shorter than its distance from the nostril; tympanum small, less than half the diameter of the eye; when limbs are folded at right angles to the body the heels fail to touch; tibiotarsal articulation reaches tympanum or between tympanum and eye. Skin smooth over dorsal, lateral and abdominal surfaces; interorbital distance more than double the width of an eyelid. Above generally yellowish brown or brownish gray, with an irregular broken lateral mark and several irregular dark spots on the back.

Description of the type.—Head broader than long; eye rather large, its length a very little less than its distance from the nostril, which is situated near the anterior edge of the snout; snout truncate extending but little beyond the mouth; interorbital distance double the width of an eyelid, equal to the length of the eye; tympanum not sharply distinct, its height a little greater than its width, the height more than one-third, but less than one-half of the eye length;

pupil of eye horizontal; canthus rostralis rounded, not distinct; loreal region oblique with a slight lateral depression behind nostril; tongue rather narrowed for half of its length anteriorly, then widened behind, but not emarginate, free behind for two-fifths of its length; vomerine teeth absent, the choanae widely separated, somewhat lateral and partly concealed by the overhanging jaw when seen from below; the palatal glands open in an indistinct groove between the middle of the choanae; premaxillae push down below the level of the maxillae, so that the premaxillary teeth jut down prominently.

Skin smooth on back, sides and venter, save in the inguinal region where the inguinal gland is outlined on the surface by pits and corrugations; a similar area slightly behind the tympanum outlining the paratoid gland; two small glandular tubercles at the lower posterior side of the tympanum, and a raised area above and somewhat behind the tympanum indicating, perhaps, a remnant of a supratympanic fold; tympanum indistinct, higher than wide, its height less than half of the length of the eye; vocal sac present as evidenced by ample folds of skin on the chin and breast, as well as by the vocal slits on the sides of the floor of the mouth, near the inner edge of the lower jaw; the greater part of the ventral and posterior face of the femur strongly granular; no trace of granules on the abdomen.

Limbs slender, the digits somewhat widened and truncate at the tip, the pads under the tips apparently but little developed; no trace of an interdigital membrane between fingers or toes; subarticular and supernumerary tubercles of hand strongly developed, with other small granules inserted between the tubercles; a very large prominent median palmar tubercle; no outer tubercle, the inner tubercle at the base of the first finger moderate; first finger only a little shorter than second; toes with very strongly developed subarticular and supernumerary tubercles; surface of foot between tubercles with minute granules. Inner metatarsal tubercle large, salient, its length equal to about half of the length of the first toe; outer metatarsal tubercle large, its summit directed forward. When the legs are placed at right angles to the body the heels do not touch; the tibiotarsal articulation reaches to near the posterior corner of eye.

Color.—Above generally yellowish brown with indistinct blackish spots; those on the dorsolateral region tend to form a broken longitudinal stripe, while those of the back tend to merge in the dorsal coloration; limbs and digits distinctly barred with blackish; loreal region dark, the upper lip light, this color extending up between the tympanum and the eye somewhat; the ventral surface, except for

the median abdominal region, with a fine powdering of pigment visible only under the lens; the throat has a little heavier pigmentation than the other ventral surfaces, except hands and feet, which are dark.

Measurements of *Syrrhophus modestus* sp. nov.

No.	3756	3757	3755	3758	3754
Sex	♂	♂	♂	♂	♂
Snout to vent.....	21	19	19.3	20	18
Width of head.....	7.6	7	7	7.1	6.7
Length of head.....	7.1	6.8	6.7	7	7.1
Diameter of eye.....	2.5	2.4	2.4	2.6	2.2
Snout to eye.....	2.7	2.6	3	3.3	3
Interorbital width	2.75	2.4	2.5	2.8	2.4
Upper eyelid	1.35	1.25	1.3	1.5	1.3
Foreleg	11.8	11.4	11.2	10.8	9.9
Hind leg	27	24.2	24.1	25.5	22.5
Tibia	8.3	8	7.2	8	7.2
Foot	11.8	10.5	9.9	11.3	11.5
Free part fifth toe.....	1.6	1.5	1.5	1.5	1.3
Free part fourth toe.....	4.1	4	4	4.4	3.8

Variation: The table of measurements shows some slight variations in measurements, but these are more apt to be due to the state of preservation than actual proportional differences. (If the eye is pushed down to the level of the head, it has apparently a greater length. Often the snout is apparently shortened by having been pressed against container.)

The tympanum is rather indistinct in all and in some the greatest diameter is about one third of the eye length. The snout is less truncate and more oval, extending a little farther beyond the tip of the upper lip, in one specimen.

The color does not differ, but the spots on the paratypes are often smaller and more numerous. These spots are irregular in size and position, often elongate, frequently confluent with others. The head usually lacks spots, but in one there is a slight suggestion of an interorbital bar, and there may be small flecks on the top of the head.

Hyla beltrani sp. nov.

(Plate XXVI, figs. 5 to 8)

Type.—EHT-HMS No. 29563; collected at Tapachula, Chiapas, August 1, 1941, by A. Magaña.

Diagnosis.—A medium sized hyla, the snout to vent length 44 mm.; tympanum about $\frac{2}{3}$ eye; canthus rostralis distinct; dorsal skin smooth; inner metatarsal tubercle very large, salient, contained

twice in its distance from tip of first toe; outer tubercle very indistinct; a narrow tarsal fold; toes more than half webbed. Above grayish lavender, with scattered white spots; chin spotted; posterior face of thighs reticulated brown and cream; sides cream, spotted with lavender.

Description of type.—Head narrow, not wider than body; canthus rostralis distinct but slightly rounding, the lines of the canthus if projected, intersect slightly in advance of a line connecting nostrils; loreal region concave; width of interorbital region (4.7 mm.) much greater than width of an eyelid (3.2 mm.); intercanthal and interorbital regions as well as loreal region finely corrugated; tip of snout and lip smooth; diameter of tympanum (3.5 mm.) more than $\frac{3}{4}$ of eye (4.4 mm.)

Six vomerine teeth on raised triangular areas which lie directly between the large choanae, their anterior parts nearly reaching the anterior level, their posterior edges reaching the posterior level, of choanae. The areas are closely approximated medially, and separated from choanae by a distance a little more than half the width of one area; tongue large, somewhat cordiform, very slightly emarginate, its length equals its width, free for about $\frac{1}{4}$ to $\frac{1}{3}$ of its length. The specimen is a female, and consequently lacks vocal sacs. (It is not known whether vocal sacs are present in the males.) The opening of the palatal glands in a sinuous groove, the ends of which curve down strongly.

Hand showing a small web at base of outer fingers, with first finger more or less opposed to other three; terminal pads moderately wide, those of three outer fingers slightly larger than the pads on toes; subarticular tubercle of the outer finger is not divided; two outer palmer tubercles fused; inner tubercle at base of first finger, large, salient; surface of palm indistinctly granular; a few, very indistinct tubercles on under surface of arm. (Second finger of left hand amputated.)

Toes a little more than two-thirds webbed, the fourth toe rather short; inner metatarsal tubercle large, salient, somewhat compressed, its length contained twice in its distance from tip of first toe; outer metatarsal tubercle indistinct, reaching to upper level of inner; a distinct, narrow, tarsal fold; when limbs are folded at right angles, the heels touch or overlap very minutely; the tibiotarsal articulation reaches to nostril.

Skin on anterior part of head minutely corrugated, on back very smooth; sides of body and ventral surface of abdomen strongly

granular; chin and throat indistinctly granular; a faint fold across breast; anal flap very short, with a deep medial groove behind anus, and a few indistinct granules anterior to anal flap; a heavy fold begins behind eye, passes above tympanum and is continued as a broad skinfold to groin; an indistinct fold, branches down behind tympanum to a point above arm; pupil of eye horizontal.

Color.—Dorsal coloration lavender, with a few scattered creamy white spots; sides of body cream with numerous spots of dark lavender; chin cream, speckled with brownish lavender; abdomen cream; arms and legs lavender, indistinctly barred with darker color; anterior and posterior faces of femur cream with irregular brown spots or reticulations. Top of foot cream with brownish spotting; underside of foot and heel with much dark pigment; hand cream with very little pigment. Iris black, minutely flecked with silver.

Measurements in mm.—Snout to vent, 44; width of head, 16; length of head, 17; arm, 24; leg, 69; tibia, 22.5; foot, 30.

Remarks.—The exact relationship of this frog has not been ascertained since the type is a female and significant characters such as the presence or absence of the vocal sac, and nuptial callosities or spines are unknown. I believe, however, that it is related to *Hyla phaeota*. Only the single type is known.

I take pleasure in naming the species for Prof. Enrique Beltrán, noted Mexican parasitologist, who forwarded the specimen to me.

Hyla pachyderma sp. nov.

(Plate XXVII, figs. 1 to 4)

Type.—United States National Museum No. 115029; collected at Pan de Olla, south of Tezuitlán, Veracruz, México, by Dr. Hobart Smith.

Paratypes.—U. S. N. M. Nos. 115026-115028. Same data as type.

Diagnosis.—A medium sized hyla, lacking a vocal sac. Males with spiny nuptial callosities; skin very thick, glandular, smooth; tibio-tarsal articulation to the anterior corner of eye; a breast fold present; vomerine teeth as close to the choanae as to each other; toes about three fourths (or slightly more) webbed.

Description of the type.—Head not wider than the body, short, a little wider than long; diameter of the eye (4.7 mm.) much less than length of snout (5.5 mm.); width of an eyelid (4.1 mm) equal to the interorbital width; canthus rostralis rounded; the loreal region somewhat concave between the eye and nostril; nostril equidistant from eye and the median anterior point of the upper lip; tympanum concealed by thick skin.

Vomerine teeth in two groups which lie between the large choanae, each group smaller than a choanae, separated from the choanae by a distance equal to that which separates the two groups; tongue sub-circular, very slightly free behind (about one sixth of its length); palatal glands opening in a long sinuous groove, curving forwards laterally, and backwards medially, lying about midway between the vomerine teeth and the premaxillary.

Fingers without or with only a faint trace of webbing; terminal pads moderately widened; the first finger not opposed to the other three; distal subarticular tubercles large, the proximal ones small; supernumerary tubercles rather indistinct; median and outer palmar tubercles forming a combined tripartite tubercle; inner palmar tubercle large (first finger missing on left hand); a few indistinct pustules on the underside of the forearm. Leg moderate, the tibio-tarsal articulation reaching between the eye and the nostril; a thickened, but at the same time rather indistinct, tarsal fold; toes between two thirds and three fourths webbed, the webs nowhere extending to the disks save as narrow margins; a moderately large inner metatarsal tubercle, sharply compressed on its inner edge; a free flap of skin on the inner edge of the first toe to the tubercle, and a similar flap on the two distal joints on the outer side of the fifth toe; numerous supernumerary tubercles, small and indistinct, and a small indistinct outer metatarsal tubercle; the terminal disks of the toes are smaller than those of the fingers.

Skin of the back thickened, glandular, however presenting a surface that is nearly smooth; a very strong thickened fold from the eye to above the arm insertion, curving partly over the tympanic region; chin, abdomen and most of the under surface of the femur with large granules; a fold across the breast interrupted medially; anal flap somewhat elongated, with a thickened fold running diagonally from the sides of the anus.

Color.—Above dark lead to grayish lead, the hands and feet lighter, especially the hidden parts of the digits; venter bright lemon yellow, with grayish black mottling or reticulations; chin marbled black; a few yellowish or cream flecks on the sides; part of the breast and the underside of the arms cream; a transverse series of cream spots anterior to the anus, and two somewhat elongate spots posterior to the anus; posterior face of the femur darker than the venter.

Measurements in mm.—Snout to vent, 49; width of head, 15.2; length of head, 13.3; arm, 32; leg, 72; tibia, 25; foot, 37.

Variation.—The male lacks vocal sacs, and bears a large nuptial

callosity covered with blackish horny spines. These are similar in shape to those of *Hyla robertsororum* but are very considerably larger and heavier. A row of the spinules is present on the inner edge of the second finger, and a few spinules are present on the third, at the base of the disk. The male is considerably lighter on the venter.

The row of cream spots anterior to the anus may be continued across the posterior face of the femur; the posterior side of the foot may show a number of light spots.

Remarks.—This species is related to *Hyla robertsororum* of Hidalgo, and *Hyla robustofemora* of Oaxaca. All have the glandular skin, the spiny nuptial callosities and all lack the vocal sac. When the skin is cut the glands appear as small spherical objects, set closely together, cream or yellow in color. When examined on the surface, under a lens, the skin of the dorsal and ventral surfaces shows small deep yellow spots.

The three species may be easily separated by the following key:

- A. Tympanum small, exposed; toes about three-fourths webbed. High mountains of Hidalgo *H. robertsororum* Taylor.
- AA. Tympanum concealed.
 - B. Toes fully webbed; nuptial callosities similar to those of *robertsororum* but usually darker. Cerro San Felipe, Oaxaca, Oaxaca.... *H. robustofemora* Taylor.
 - BB. Toes about three-fourths webbed. Spinules of the nuptial callosities more than double the size of either of the two preceding species. Pan de Olla, Veracruz *H. pachyderma* sp. nov.

Specimens of an undescribed frog were collected by Dr. Hobart M. Smith near Chapala, Jalisco, Mexico, during the summer of 1935, at which time a series of ten young and middle-aged specimens were obtained. Later, in 1939, he collected a second series at La Palma, Jalisco. Among this lot of eight specimens two were young while the others were very large adults.

This form is a member of the group of species which includes *Rana montezumae*, *Rana areolata*, and *Rana pipiens*, a group characterized by the presence of lateral vocal sacs which protrude behind the angle of the mouth, below the tympanic region.

Rana megapoda sp. nov.

(Plate XXVIII, figs. 1 and 2)

Type.—Edward H. Taylor-Hobart M. Smith collection, No. 3280; collected near Chapala, Jalisco, July 2, 1935, by Hobart M. Smith.

Paratypes.—EHT-HMS Nos. 3271, 3272, 3272A, 3273-3279, topotypes; U. S. National Museum Nos. 113998-114005, La Palma, Lake Chapala, March 23, 1939, Dr. and Mrs. Hobart M. Smith.

Diagnosis.—Hands and feet very large, the first finger equal to or shorter than the second; second and fourth nearly equal and but little shorter than third; toes webbed to the tips, which terminate in small but distinct rounded pads; skin of back generally smooth; tympanum small; heels do not touch; belly reticulated with dark color inclosing lighter spots.

Description of type.—Head moderately depressed, the loreal region very oblique, not concave; nostril equidistant between eye and tip of snout; head oval, seen from above, the canthus rostralis faintly indicated from eye to nostril; sides of head back of eye very oblique; interorbital width about two-thirds the width of an eyelid; length of the eye more than three-fourths the length of the snout; distance between tympanum and eye equal to distance from eye to nostril; diameter of tympanum about equal to its distance from eye; length of head to jaw angle, a little greater than head width at jaw angle. Tongue longer than wide, with two posterior papillate horns, free for about one-fourth of its length; choanae very small, transversely elongate; vomerine teeth on two rounded elevations almost wholly behind a line drawn between the choanae; the elevations much closer to each other than to choanae, each bearing five teeth; openings of the palatal glands in a straight series, midway between the vomerine teeth and the premaxillae.

Arms strong, thickened, the wrist brought forward reaches the tip of the snout or beyond; palm broadened, the fingers alongate, straight, the first not extending beyond the second, but equal to, or minutely shorter than second; second minutely shorter than fourth; third toe relatively short in proportion to others; the second and third fingers have a slight fold or ridge along the sides of their distal joints, while the first and fourth have a slight indication of a fold or ridge on the inner side of the distal joints. A small palmar tubercle on the base of the first finger; other palmar tubercles obsolete; subarticular tubercles small. Legs large, the femoral region much thickened. When the legs are folded at right angles to body the heels fail to touch by five or six millimeters; tibiotarsal articulation reaches the anterior corner of the eye. Toes almost entirely webbed, the membrane extending to the rounded terminal pad, at least on one side of the digit; outer edge of the fifth toe and the inner edge of the first with a free skin flap or fold; a distinct elongate flattened inner metatarsal tubercle, with a free outer edge; no outer metatarsal tubercle; a widened fold forms a somewhat diagonal line on the tarsus; subarticular tubercles very small, usually about half the size of the terminal pads.

Skin generally smooth on back; however, posteriorly, there are some smooth indistinct pustules; these flattened pustules are more or less evident on sides of body, and along the tibiotarsal surface. A broad dorsolateral fold begins behind the eye and continues to near the groin, passing above the tympanum.

Color.—Above and on sides grayish with indistinct fine blackish reticulation, and a few scattered elongate black spots; ventral surface cream with an indistinct brownish or grayish reticulation; limbs gray with larger black spots or transverse bars; feet somewhat darkened; dorsolateral fold cream.

Measurements of Rana megapoda in mm.

	Type						
Number	3280	113998	114001	114002	114005	114004	114003
Sex	♀	♂	♀	♀	♀	♀	♀
Snout to vent.....	82.5	117	130	142	146	148	152
Head length*	31.5	44	47.5	54	52	53.5	53
Head width	31	46.5	52	56	58	59	59
Snout length	9.2	11	12.2	14	15.4	16.2	14.5
Eye length	7.5	10	12	12.2	11	12.4	11
Interorbital width ...	3.6	5.5	7	6.8	7.8	7	8
Tympanum	5.9	7	9	9	9	9	10
Arm length	37.3	72	87	100	98	88	104
Leg	139	195	212	224	220	226	240
Tibia	41.4	58	62.5	68	69	72	75
Foot	64.3	87.5	97	101	103	103	110
Heel to 1st toe.....	36	55	59	60.5	64	62	69
Heel to 2d toe.....	45.6	66	73	78	80	78.8	80
Heel to 3d toe.....	54.4	76	86	93	92.5	93	96
Heel to 4th toe.....	64.3	87.5	97	101	103	103	110
Heel to 5th toe.....	53.3	77	85	86	90	88	96

Variation.—The dark reticulation on the ventral surface of larger specimens is more distinct than in type, inclosing very numerous small irregular spots of cream. In certain specimens the hands and feet are blackish, punctated with cream. The single male specimen is uniformly reticulated on the back and has only a single black spot; the limbs are, however, rather heavily spotted. In several specimens the dark spots are bordered by lighter color. The dorsolateral fold usually has the color of the back in the larger specimens.

The dorsolateral fold usually terminates before the groin is reached, although one specimen shows it continued back farther. There is only a faint suggestion of a posttympanic fold and this in

* Measured to jaw angle; width measured between angles of jaws.

only a part of the specimens. Some of the specimens have a few smooth tubercles behind the angle of the jaw. The smooth granulation on the sides of the body seems to be invariably present in larger specimens. The size of the terminal enlargements on the digits varies a little; however, they are often deformed or worn away. In younger specimens the head is a little longer than wide while in the older specimens the width is greater than the length.

The tympanum has an irregular shape, and its greatest diameter is usually equal to its distance from the corner of the eye in both sexes.

Remarks.—*Rana megapoda* is found in a region where *Rana montezumae* likewise occurs, and it seems almost certain that specimens that have been taken by other collectors have been referred to *R. montezumae* by various authors. The differences, however, between these two species are numerous. If specimens of the two species, having equal snout to vent measurements, are compared, it will be found that the head of *montezumae* is much shorter and narrower, the snout longer, the eye a little larger, the interorbital width a little greater, the tympanum much larger, the arm and hand shorter and more slender and the fingers smaller, with the first longer than the second. The leg, as well as its parts, is very much shorter, while the fourth toe is proportionally longer than the other toes. The skin of the back and sides will be rough and granular.

I believe *R. megapoda* to be a very much larger species than *R. montezumae*. Boulenger (Proc. Amer. Acad. Arts and Sci., 55, 1920, pp. 431-433) lists certain specimens as *Rana montezumae* measuring from snout to vent, 145, 140, and 136 millimeters, from "Lazuna del Castillo," Guadalajara. These, however, I suspect belong to *megapoda*. His description gives ample evidence that he has confused the two species.

The largest of 52 specimens of *Rana montezumae* in the EHT-HMS collection measures only 116 mm.

PLATE XXV

- FIG. 1. *Eleutherodactylus decoratus* sp. nov. Type, EHT-HMS No. 28720 ♀, Banderia, Veracruz. (Actual snout to vent length, 25 mm.)
- FIG. 2. Same, lateral view of the head, enlarged.
- FIG. 3. Same, under surface of foot, enlarged.
- FIG. 4. Same, under surface of hand, enlarged.
- FIG. 5. *Eleutherodactylus hidalgoensis* sp. nov. Type, EHT-HMS No. 24454 ♂, North of Tianguistengo, Hidalgo. (Actual snout to vent length, 28.5 mm.)
- FIG. 6. Same, lateral view of head, enlarged.
- FIG. 7. Same, under surface of foot, enlarged.
- FIG. 8. Same, under surface of hand, enlarged.

Plate XXV

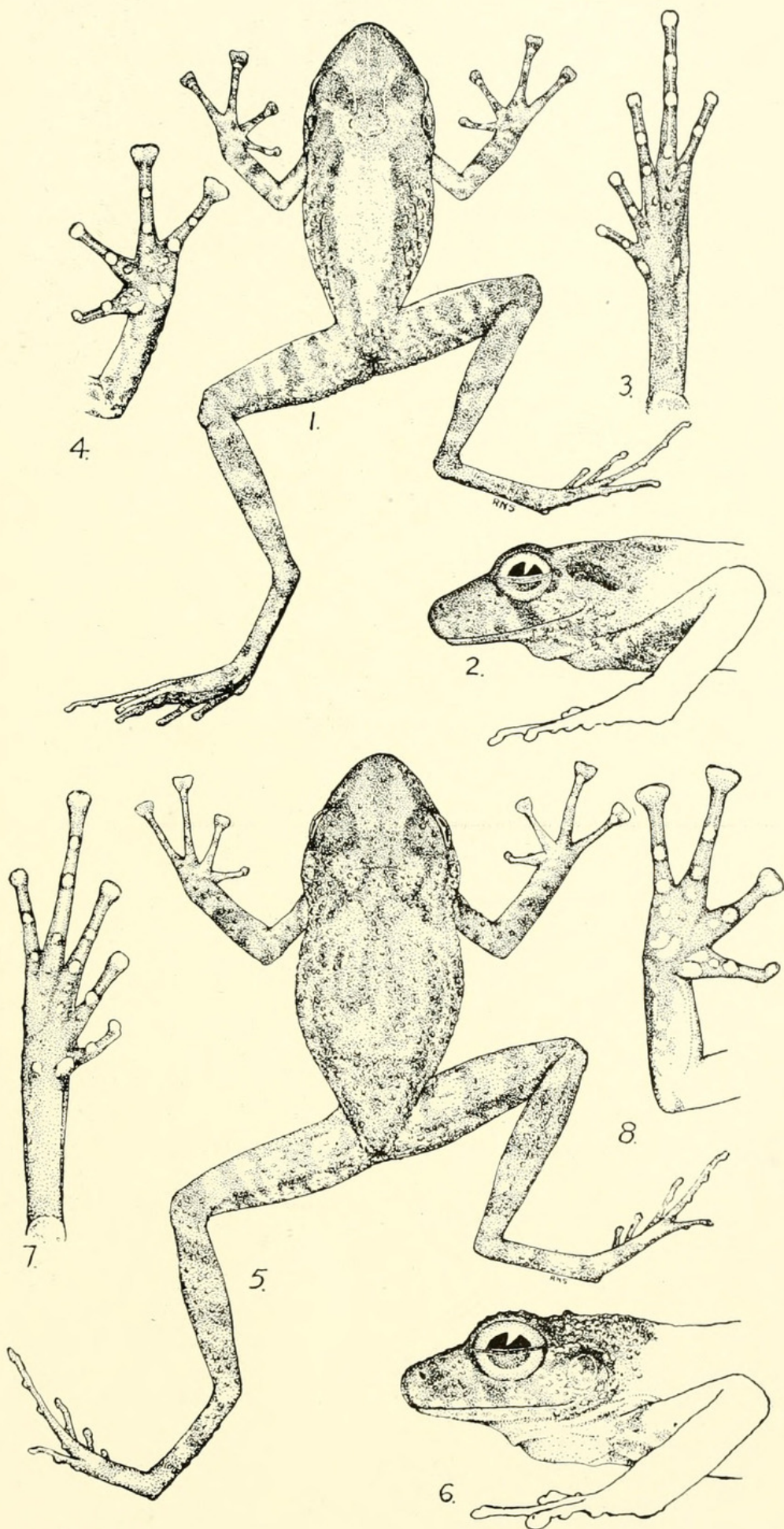


Plate XXVI

FIG. 1. *Eleutherodactylus bolivari* sp. nov. Type, EHT-HMS No. 29564 ♂, Ixtapan del Oro, México. (Actual snout to vent length, 44 mm.)

FIG. 2. Same, lateral view of head, enlarged.

FIG. 3. Same, under side of hand, enlarged.

FIG. 4. Same, under side of foot, enlarged.

FIG. 5. *Hyla beltrani* sp. nov. Type, EHT-HMS No. 29563, Tapachula, Chiapas. (Actual snout to vent length 44 mm.)

FIG. 6. Same, lateral view of the head, enlarged.

FIG. 7. Same, under side of the foot, enlarged.

FIG. 8. Same, under side of the hand, enlarged.

Plate XXVI

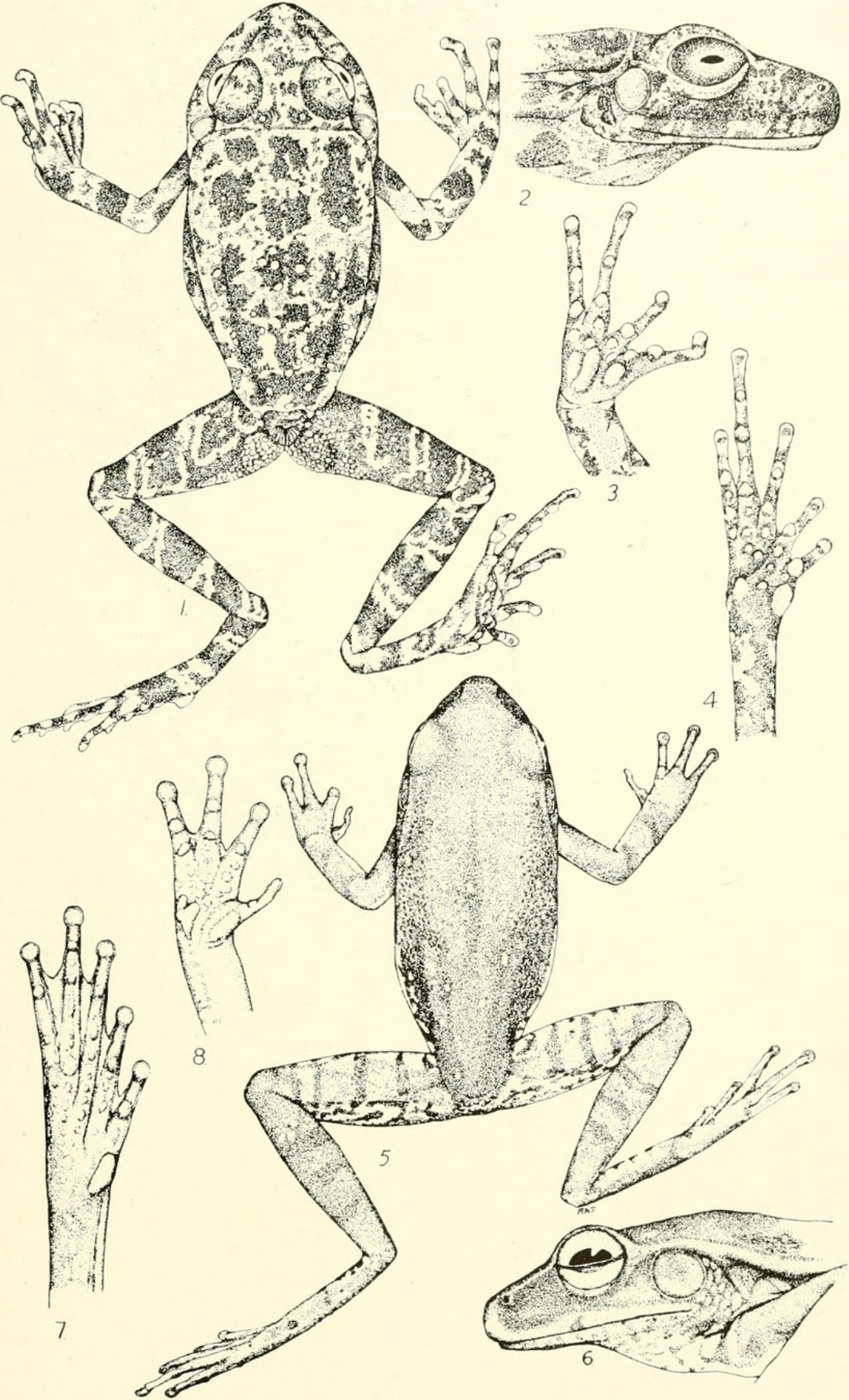


Plate XXVII

FIG. 1. *Hyla pachyderma* sp. nov. Type, USNM No. 115029 ♀, Pan de Olla, near Tezuitlán, Veracruz. Under side of foot, enlarged. (Actual length of foot, 37 mm.)

FIG. 2. Same, under side of hand. (Actual length of hand and forearm, 18.6 mm.)

FIG. 3. Same, spinules on the nuptial callosities. (Much enlarged.)

FIG. 4. *Hyla robertsoni* Taylor, spinules on the nuptial callosities, enlarged as in the preceding, showing the much smaller size.

FIG. 5. *Bolitoglossa lavae* sp. nov. Type, EHT-HMS No. 28937 ♀. Two miles west of La Joya, Veracruz. Dorsal view of foot. (Actual length of foot and tibia, 8 mm.)

FIG. 6. Same, dorsal view of hand and forearm. (Actual length, 7 mm.)

FIG. 7. *Eleutherodactylus spatulatus* Smith, EHT-HMS No. 24444. Under side of hand, enlarged. (Actual length of hand and forearm, 17 mm.)

FIG. 8. Same, under side of foot. (Actual length of foot and tarsus, 30 mm.)

FIG. 9. *Eleutherodactylus decoratus* sp. nov. Tips of digits of foot and hand, enlarged. (Specimen 25 mm. snout to vent.)

FIG. 10. *Eleutherodactylus hidalgoensis* sp. nov. Tips of digits of foot and hand, enlarged. (Specimen 28.5 mm. snout to vent.)

FIG. 11. *Eleutherodactylus spatulatus* Smith. Tips of digits of foot and hand, enlarged. (Length of specimen, 27 mm. snout to vent.)

Plate XXVII

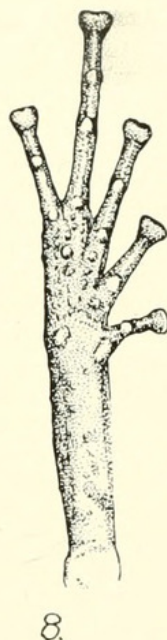
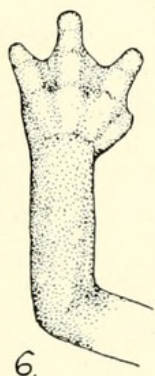
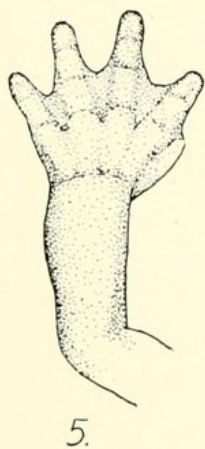
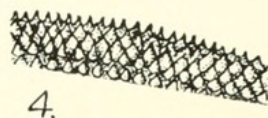
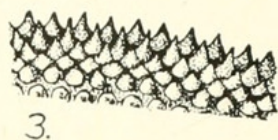
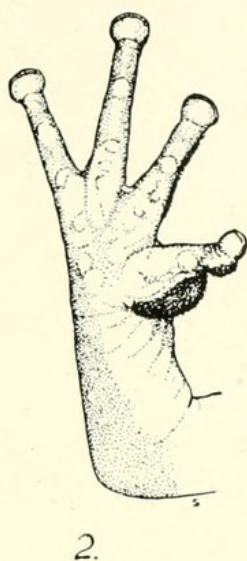
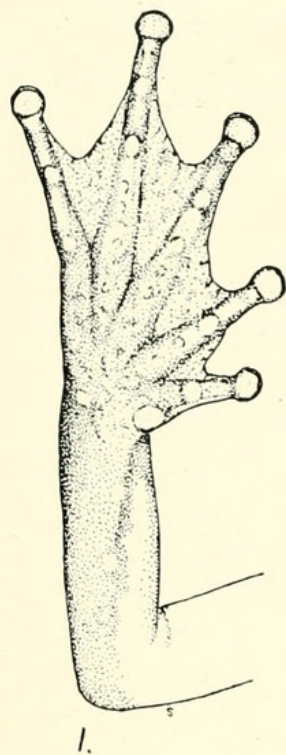


Plate XXVIII

FIG. 1. *Rana megapoda* sp. nov. Paratype, EHT-HMS No. 3271. Near Chapala, Jalisco. (Snout to vent length, 68 mm.)

FIG. 2. Same. Type, EHT-HMS No. 3280, same locality. (Snout to vent length, 82.5 mm.)

Plate XXVIII

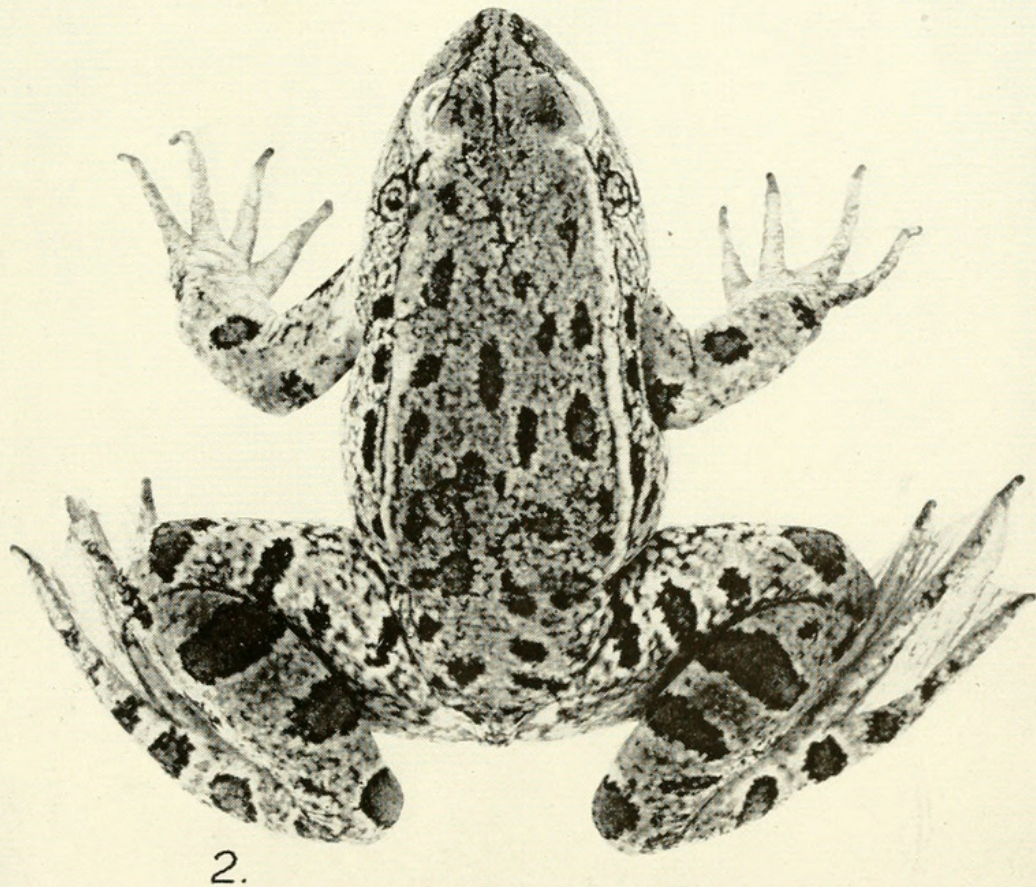


Plate XXIX

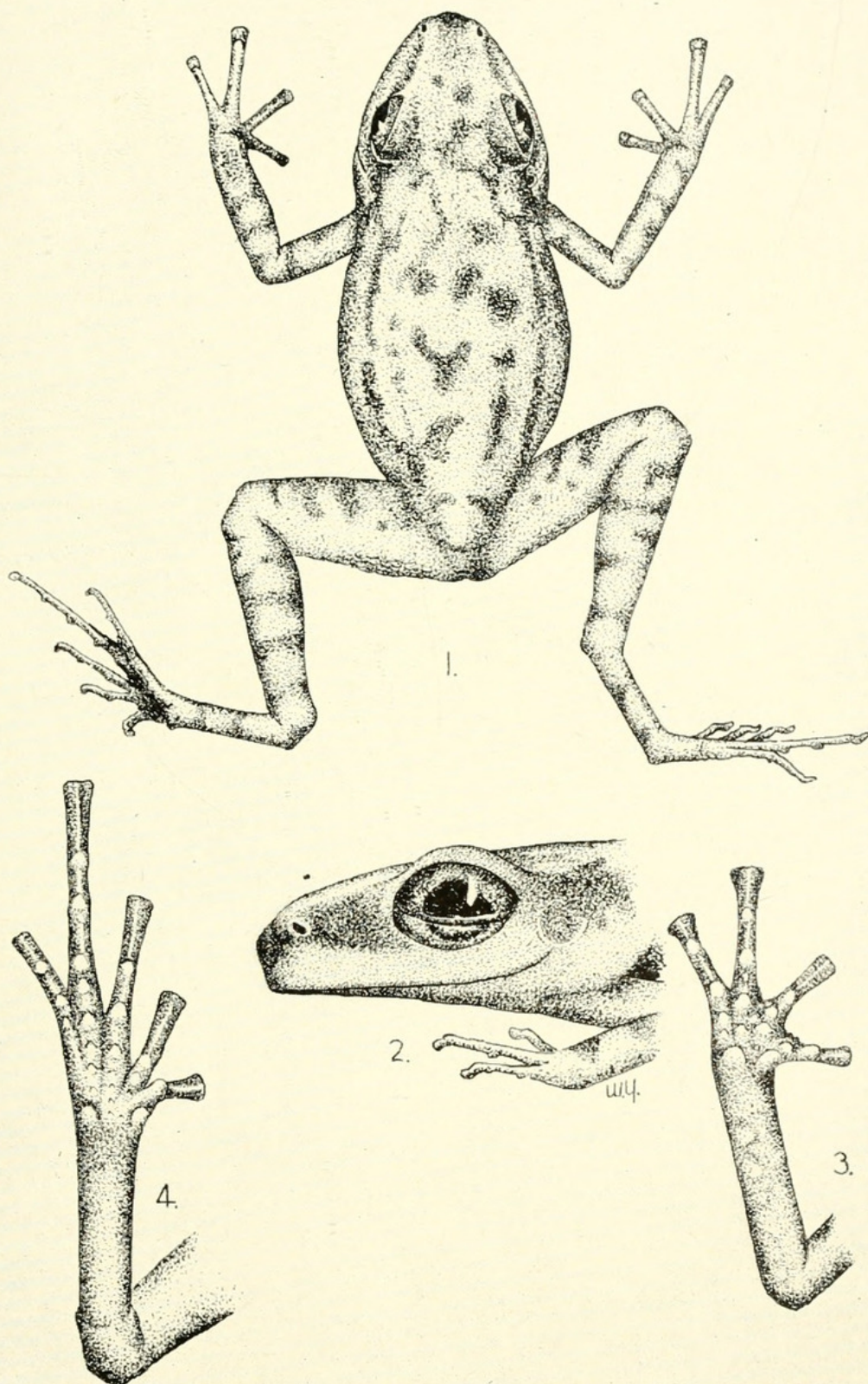
FIG. 1. *Syrrhophus modestus* sp. nov. Type, EHT-HMS No. 3756, Hacienda Paso del Río, Colima, $\times 3$.

FIG. 2. Same. Lateral view of head, $\times 5$.

FIG. 3. Same. Underside of hand, $\times 5$.

FIG. 4. Same. Underside of foot, $\times 5$.

Plate XXIX





Taylor, Edward Harrison. 1942. "New Caudata and Salientia from Mexico." *The University of Kansas science bulletin* 28, 295–323.

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