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New Amphibians from the Hobart M. Smith Mexican Collections

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ABSTRACT: This paper contains type descriptions of four new salamanders and two new frogs from Mexico, as follows: Order Caudata, Family Plethodontidae, *Bolitoglossa nigromaculata*, Cuautlapan, Veracruz; *Bolitoglossa occidentalis*, La Esperanza, Chiapas; *Bolitoglossa xolocalcae*, Mount Ovando, Chiapas; *Bolitoglossa nigroflavescens*, Mount Ovando, Chiapas. Order Anura, Family Leptodactylidae, *Eleutherodactylus matudae*, Mount Ovando, Chiapas; *Eleutherodactylus dorsoconcolor*, Tepueyutepec, Veracruz.

A PART of the amphibians from the herpetological collections made in Mexico by Dr. and Mrs. Hobart M. Smith for the United States National Museum, have been placed in my hands for study, by that institution. The collection is very extensive and contains many novelties, certain of which are described herein.

Bolitoglossa nigromaculata sp. nov.

(Text fig. 1, A, B)

Holotype. USNM, No. 110635, Cuautlapan, Veracruz, H. M. Smith, collector.

Paratypes. USNM, Nos. 110631-110634; 110636-110639, Smith, collector; all topotypes. EHT-HMS, Nos. 24600-24621, Taylor, collector; topotypes.

Diagnosis. A medium sized species of the genus, maximum snout to vent length, 56.5 mm.; body generally blackish, the tail lighter, both with small black spots. Tail longer than snout to vent measurement; digits webbed at base; the toes broadly flattened and truncate at tips; terminal phalanx of first finger and toe free; 13 costal

grooves on side; a distinct sublingual fold; teeth on parasphenoid in two series, touching anteriorly; 22-22 vomerine teeth (maximum); about 50-50 maxillary-premaxillary teeth (♀).

Description of the type. Adult female. Head about as wide as body or a little narrower; width of head (9 mm.) contained in distance between snout and anterior end of vent, 6.28 times; head length to nuchal fold, (13 mm.) in length, 4.19 times; distance between orbits greater than width of a single eyelid; nostril small, directed forward; a faint trace of a narial swelling on edge of lip; posterior edges of eyelids tucked under a small diagonal fold; dorsal surface of head flat; snout rounding, truncate oval, lacking a canthus; nuchal fold on throat tending to form a broad angle, the apex directed forward; it extends on the side of neck, continues up as a sinuous groove and meets its fellow from opposite side on middorsal line; a vertical groove crosses jaw angle, passes behind eye and can be traced to back of head, but not to middorsal line; a groove from behind eye runs back to the preceding groove; a second groove runs from this back to the nuchal fold; 13 costal grooves, the first and last rather indistinct in type; tail constricted at base; posterior to anus 33 caudal grooves to tip, the tail not obviously compressed; depth of the body about equal to its width; adpressed limbs are separated by 1 to $1\frac{1}{2}$ costal folds; folds formed by hyoid extension terminate at the third costal fold; cloaca lined with curving folds; a small gland visible behind insertion of leg; skin between folds strongly puckered, forming numerous minute folds; pits on skin small.

Limbs well developed; digits very broad, sharply truncate at tips; a slight web extending beyond the metacarpals, to include at least basal portion of the proximal phalanges, and on third finger the web continues as a fringe to base of second phalanx; order of size in fingers, 1, 2 = 4, 3; phalangeal formula, 1, 2, 3, 2; toes in following order of size, 1, 2, 5, 3 = 4 (right) and 1, 2, 5, 4, 3 (left); phalangeal formula, 1, 2, 3, 3, 2; on foot, a web includes the proximal phalanges, but is slightly excised between these phalanges; pads at tips of digits not prominent. Tongue boletoid, relatively small, with a semi-circular, sublingual fold; maxillary-premaxillary teeth well developed, rather heavy, 48-49 (♀); vomerine tooth series, 20-21, very long, curving back, extending about one-third of their length beyond (lateral to) the choanae, separated medially by a space about equal to the space between two teeth, and separated from the parasphenoid teeth by twice that distance; parasphenoid teeth in two rather narrow diagonal series widely separated posteriorly, but contiguous anteriorly; choanae moderately large.

Color. Above on body and tail gray-black or dark lavender, nearly uniform, a few shades lighter on ventral surfaces; when submerged in water or alcohol, distinct black spots are to be seen scattered over dorsal and lateral surfaces of body and tail; a light cream spot on lower eyelid; undersurface of feet and hands dark, the indistinct pads at tips slightly lighter; an indistinct, arrow-shaped, light spot at base of the distal phalanges.

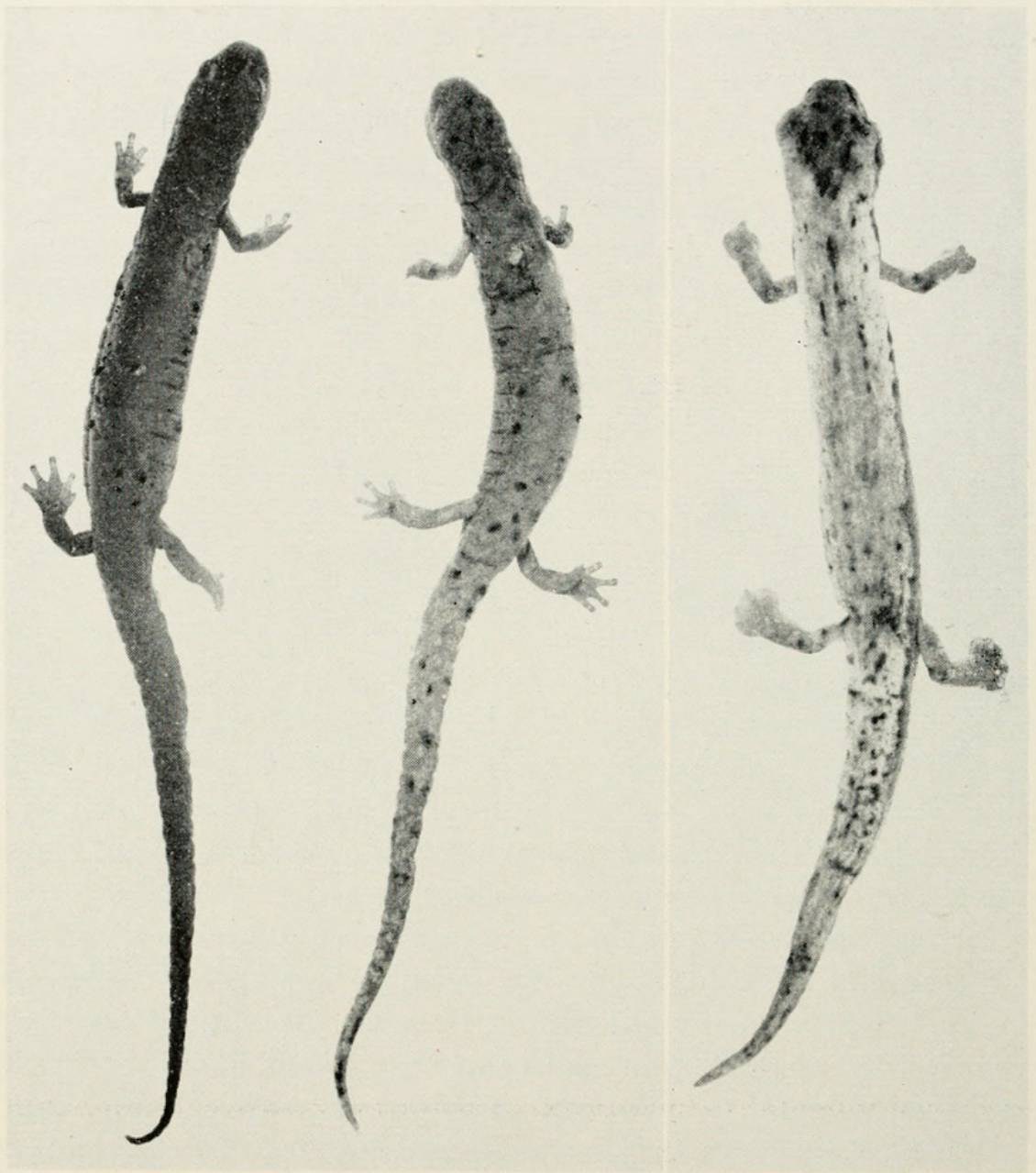
Measurements in mm. of *Bolitoglossa nigromaculata* sp. nov.:

Number.....	Type 110635	110632	110631	EHT-HMS 24620
Sex.....	♀	♀	♀	♀
Snout to anterior end of vent.....	56.5	52.4	51.2	54.4
Anterior end of vent to tip of tail.....	65.0	66.0	66.0	74.0
Snout to eye.....	3.1	3.0	2.9	3.1
Snout to nuchal fold.....	13.0	11.9	11.8	12.1
Width of head.....	9.0	8.3	8.4	8.7
Head width in head-body length.....	6.28	6.3	6.2	6.2
Axilla to groin.....	35.0	32.2	29.8	35.0
Arm.....	15.0	13.4	15.0	15.0
Leg.....	17.5	15.2	16.0	16.0
Limbs separated by folds.....	1½-2	1½-1	1½-1	2-2
Maxillary-premaxillary teeth.....	48-49	48-49	47-47	54-54
Vomerine teeth.....	20-21	17-17	19-15	19-21
Mandibular teeth.....	49-48	53-50	52-50	52-51

Variation. The series of paratypes show considerable variation in coloration. Practically all the smaller specimens have the general color grayish, gray brown, or lavender, the tail generally being grayish cream or pinkish cream, often with lighter silvery flecks; the ventral surface usually still lighter than the dorsum; silvery flecks may be present on the chin, sometimes on head and body; the venters are usually lighter than in type.

The black spots are very irregularly distributed, their distinctness depending on the depth of the ground color; limbs are often spotted and are lighter or darker, depending largely on the color of the body. In several of the younger specimens the adpressed limbs may touch, usually so in males; old males may have the four premaxillary teeth piercing the lip; in younger males they are enlarged, but do not pierce the lip. The number of teeth is less in younger specimens. The cloaca of the male has fine papillae; the sublingual fold is very far forward and has an extensive free edge; a submental gland is present in males, but it is relatively indistinct; the subnarial swellings are larger in males than in females, but much smaller than in *cephalica* or *leprosa*.

Remarks. Some years ago in studying the type and paratypes of *Oedipus leprosus* in the National Museum I noted that four species



A

B

C

TEXT FIG. 1. A and B, *Bolitoglossa nigromaculata* sp. nov., A. type, USNM, No. 110635, Cuautlapan, Veracruz, Mexico, adult female with eggs, 121.5 mm.; B. Paratype, USNM, No. 110632 ♀, 118.4 mm., same locality. C. *Bolitoglossa occidentalis*, Paratype, Finca Juarez, Chiapas, Mexico. EHT-HMS, No. 24049, 58 mm.

were represented, and in a paper (Taylor, Univ. Kansas Sci. Bull., Vol. XXV, 1938 [July 10, 1939], p. 274) I mention that two (now USNM, No. 6340) are probably representatives of a new species. It seems certain that these two specimens belong in the species here described, since they agree in practically all details.

The species is a terrestrial form and appears to be related to *cephalica* and *leprosa*. From the former it differs in the propor-

tionally longer tail, the larger series of maxillary-premaxillary teeth, and the reduced size of pits in skin. The shape of the digits and the coloration are different.

From *leprosa* it differs in having the digits truncate, widened, and more webbed at base; the vomerine and the maxillary-premaxillary tooth series are larger; the limbs are longer; the tail longer and more attenuated; the choanae are larger.

Bolitoglossa occidentalis sp. nov.

(Text fig. 1, C)

Type. USNM, No. 111085 ♀, collected at La Esperanza, Chiapas, Mexico, elevation 500 feet, April 28, 1940, by Dr. and Mrs. Hobart M. Smith.

Paratypes. USNM, Nos. 111068-111084; 111086-111093; EHT-HMS, Nos. 27176-27180, topotypes; EHT-HMS, No. 24049, Finca Juarez, Chiapas, elevation 2,500 feet; EHT-HMS, No. 26561, El Porvenir, Guatemala; Field Museum Nos. 20330, five specimens; 20397, 20399, 20712, 20713; 20760, four specimens; El Porvenir, Guatemala.

Diagnosis. A relative of *Bolitoglossa rufescens*, agreeing in the extremely inflated nasal region, absence of folds under tongue, fully palmate hands and feet, but differing somewhat in coloration and in the presence of a series of maxillary teeth.

Description of the type. Body short, limbs strong; head wider than body, rather flat; the eye (2.2 mm.) nearly equals length of snout (2.3 mm.); nostrils small with distinct subnasal swellings (smaller than those in male); eyelid rather narrow (1.5 mm.), smaller than interorbital width (2.1 mm.); width of head (5.3 mm.) contained in distance from snout to posterior end of vent (31 mm.) 5.9 times; head length to nuchal fold contained in the same distance 3.9 times. Tongue free without trace of a free sublingual fold; vomerine teeth 6-6 slightly elevated, reaching inner level of choanae, separated medially; parasphenoid teeth forming a single group, narrowed anteriorly, widened posteriorly, separated from vomerine teeth by a distance greater than that between the vomerine series; choanae small, rounded, a minute pit between choana; maxillary bone forms a broad platform, seen from below, bearing a series of five teeth on each side, which are widely separated from the three premaxillary teeth (which in male may be reduced to two teeth which pierce the lip); about 25 very small mandibular teeth present.

Skin, on head with almost obsolete pitting; on neck and back very

smooth; skin on sides wrinkled and corrugated between costal grooves, of which there are 13, but are often very indistinct, not continuing on ventral surface; posterior end of eyelids terminate under a slight diagonal fold; a groove from behind eye runs back and down, becoming continuous with a groove that crosses the angle of jaws; gular grooves pass a short distance up on sides of neck; extension of hyoid cartilage (epibranchial) makes a strong elevation in front of and above arm insertion, extending to about the third costal fold; hands and feet completely palmate, the tip of third finger and third toe free, the "web" slightly emarginate between digits; adpressed limbs separated by about 2 costal folds; cloacal opening with folded walls (papillate in males); tail with the lateral grooves obsolete; shorter than head and body.

Color. Dorsal coloration grayish to dull brownish cream with darker lavender brown markings which arise above each eye, and cross on the neck; the latter half of body is variously streaked; tail likewise streaked above; sides of head, body and tail darker, about color of dorsal markings.

Ventral surfaces light, with some scattering of pigment, sometimes leaving light flecks or tiny blotches.

Measurements of type in mm. No. 111085; sex, ♀; snout to vent, 31; width of head, 5.3; head to gular fold, 8; snout to arm, 8.8; axilla to groin, 16.2; snout to posterior end of vent, 31; tail, 17; arm, 8; leg, 7.5.

Variation. The color pattern varies considerably, but the lines arising above the eyes and crossing on neck are usually discernible; the sides of the dorsal part of the neck and the base of the tail are usually lighter than the remainder of dorsal surface. Many specimens have a darker venter with the lighter flecks distinct. In males the subnarial swelling is greater and usually the premaxillary teeth pierce the lip. The maxillary teeth vary between five and eight on each side, sometimes fewer on the very young.

The series of specimens from El Porvenir, San Marcos, Guatemala, collected by Mr. Karl P. Schmidt and examined through his kindness, are a little larger. Of the thirteen specimens from this locality, ten exceed 35 mm. in length from snout to posterior end of vent; the largest specimen, a male being 39 mm.; the largest female is 38.1 mm. and is filled with nearly ripe eggs.

The statement in Dunn (Plethodontidae, p. 48) suggests, perhaps not intentionally, that giving birth to young is the normal condition in the genus "Oedipus" = [*Bolitoglossa*, etc.]. In the large series

of Mexican species I have found no evidence in any case of oviparity. On the other hand, numerous clutches of eggs found in decaying logs, and under logs and rocks, in bromeliads, etc., point to the fact that most, if not all, Mexican forms are typically oviparous. Dunn states explicitly that *adspersus* produces living young (p. 16).

The variation of the teeth in this group is considerable. In two of the youngest specimens (24, 29 mm.) I did not find trace of the maxillary or premaxillary teeth. In one adult, one of four bearing the number Field 20330, I was unable to determine positively the presence of the maxillary teeth, although premaxillary teeth are present. In the others there were usually two premaxillary teeth, which in the males pierced the lips, the skin forming a papilla at their base. Maxillary teeth were variable in number. The following formulae were found: 5-7, 4-7, 8-9, 2-1, 3-2, 2-0, 10-11, 5-2, 4-2, 3-3; for vomerine teeth the following were counted: 7-8, 3-4, 6-7, 5-6, 9-11, 7-6, 5-5, 7-9, 6-8, 5-6. The mandibular series was large, varying between 27 and 39 on half of the lower jaw. The number of teeth in females did not exceed those in certain males. As the smaller numbers of maxillary teeth occurred in old as well as young specimens, it is possible that some of the teeth had been lost and not replaced.

Skull. While no thorough study has been made of the skull the following facts have been noticed. The frontal and parietals appear to be well ossified and maintain their shape when disarticulated; the nasals are not or but slightly ossified and extend over the large nasal capsules; the premaxillary is a short, compact element without lateral projections and forming a rather loose junction with maxilla and is, at least, partially ossified; the processes which arise from it are minute, threadlike cartilages. They touch the frontals, but lie deeply buried between the nasal capsules; the lower alveolar edge of the maxilla has a broad surface. The mandible is not well ossified, tending to curl up somewhat when dried.

Relationships. The closest relative is *B. rufescens* (Cope) which it resembles in most characters save the presence of maxillary teeth. The same skull characters obtain as far as observed.

It is possible that *Bolitoglossa colonnea* (Dunn) is also a member of this species group. It has a somewhat longer tail, a fold across the head, but agrees in numerous other characters. *Bolitoglossa striatula* (Noble) may be related also, but since I have not examined the types of either of the two latter species I cannot be certain.

When the skeletal characters of this group are better known it will probably be necessary to elevate it to the rank of a genus.

Bolitoglossa xolocalcae sp. nov.

(Plate VII; Plate IX, figs. 7-8)

Type. USNM, No. 111371. Collected at Cerro Ovando, Chiapas, Mexico, between 6,800-8,000 feet elevation, April 16, 1940, by Dr. and Mrs. Hobart M. Smith.

Paratypes. USNM, Nos. 111372-111470 and EHT-HMS, Nos. 25311-25341; 26749-26783; 27264-27271. All same data.

Diagnosis. A small bromeliad salamander with head and body flattened, the tail somewhat quadrangular in cross section, a little longer than head and body; nostril minute; hands and feet large, first finger and toe involved in web, the other digits with the distal phalanx and part of the adjoining phalanx free; parasphenoid teeth in two series; vomerine teeth numerous, large series of teeth in both jaws; a whitish bar across head between eyes.

Description of the type. Head distinctly wider than body, greatly flattened, without trace of a canthus rostralis; snout, somewhat truncate, but oval in profile; eye not strongly raised, its length (2 mm.) equal to its distance from the nostril, shorter than snout (2.45 mm.); groove below eye terminates anterior to posterior level of eye; eyelids terminate posteriorly under a small diagonal fold; line of mouth straight, diagonal to back of eye, then curving slightly; subnarial swelling very small; distinct upper extension of the hyoid forms a strongly elevated ridge on side of neck and above arm, terminating at about the level of second costal fold and from this an indistinct dorso-lateral fold continues to groin.

Tongue free with a somewhat thick, sublingual fold (prelingual); maxillary-premaxillary teeth about 36-36, with a similar number on the mandible; vomerine teeth in a somewhat irregular series, about 13-13 extending beyond outer level of the small elongate-oval choanae; parasphenoid teeth in two series, narrowed anteriorly, widened posteriorly and notched behind, widely separated from the vomerine series.

Skin above, especially on head, pitted or corrugated, as seen under a lens, and forming small, roughened, somewhat elevated areas, especially noticeable on eyelids, which are about the width of the interorbital space; a vertical groove which crosses jaw angle can be traced to the dorsal level of head; longitudinal groove behind eye obsolete (in some specimens it is distinct and continues to gular groove); an ample gular fold, the grooves emerging from its ends continue indistinctly to the median dorsal line; 11 distinct costal grooves; the inguinal and axillary grooves apparently absent, the

grooves extending across abdomen; a small glandular spot behind insertion of femur; tail slender, strongly attenuated, not or but slightly constricted at base, and apparently not fragile (practically all the paratypes have the tails intact); limbs strong, the hands and feet large, the adpressed limbs separated by one costal fold; first finger and toe included in the web; digits broad, truncate, with a terminal subdigital pad about as broad as long; greater part of two distal phalanges free of web; about thirty caudal grooves; an indistinct skin fold from jaw angle to the end of the gular fold.

Color. Above mottled brownish-lavender with a median faun-colored spot on dorsal surface of neck; a transverse cream bar crosses head and eyelids; snout surface cream with brownish flecks; a light, irregular area at base of tail, above; the dorsal surface of the tail lighter than the body; color on sides becomes gradually lighter and merges with the dirty cream color of the ventral surfaces, on which the pigment is equally distributed; limbs generally lighter than body, with an indefinite darker area at knee and elbow, enclosing a lighter area.

Measurements in mm. Snout to posterior end of vent, 36.7; tail, 39.5; total length, 56.2; width of head, 6; length of head to gular fold, 8.7; snout to forearm, 12; axilla to groin, 13.

Variation. There are two other distinctive color patterns present. A small number of specimens have a pair of dorso-lateral cream lines beginning on the eyelid, continuing back and often divided by a narrow, black line posteriorly; posteriorly they are confluent with the cream color, perhaps pinkish in life, which colors the dorsal surface of the tail; on sides below the light line is a distinct black line, gradually becoming lighter on its lower edge; the light color of the snout is scarcely discernible and the light bar may be largely obscured.

Another color variety has the back and tail pinkish cream with a pair of black dots on neck and a well-defined blackish triangle following the indistinct head bar; the snout is darker than body.

The bulk of the specimens resemble the type in markings, although there are often chevronlike markings in black on the back and tail; most of the specimens have the black triangular head marking which can barely be discerned in the type. Males have the body a little shorter and the adpressed limbs often touch or overlap slightly; the snout is a trifle longer and the head perhaps a little more flattened than in the female. The submental gland is more or less visible externally. The subnarial swellings are more prominent and the cloacal walls are papillate.

The premaxillary teeth are much enlarged, with three or four of them piercing the lip; the maxillary and mandibular teeth differ but little in general character.

In a hasty examination of the skull, one notes that the superficial bones of the brain case are fairly well ossified, while those of the nasal capsules are largely cartilage. Maxillaries and mandibles well ossified and firm while the premaxilla appears to be very flexible, its shape is that of this element in other members of the group, but its contact with the maxillary is slight.

All these specimens were obtained in bromelias.

Relationships. The probability is that this is an aberrant member of the *chiroptera* group. The flattened head is obviously an adaptation to the habitat in bromelias and is a characteristic of the recently described *Bolitoglossa arborea*. Like *chiroptera* the young have enlarged nostrils.

The species name is derived from Xolocalco, the Indian name of the Cerro Ovando.

Bolitoglossa nigroflavescens sp. nov.

(Plate VIII; Plate IX, figs. 9-10)

Type. USNM, No. 111169 ♂; collected on Cerro Ovando, at an elevation between 5,000 to 6,000 feet, April 16, 1940, by Dr. and Mrs. Hobart M. Smith.

Paratypes. USNM, Nos. 111153-111168 and 111170-111192; EHT-HMS, Nos. 26784-26799. Topotypes; same data as type.

Diagnosis. A rather large species; body somewhat flattened, the head broader than body; maximum snout to vent measurement, 57 mm.; tail, 51 mm.; two distal phalanges free from web, except first which is free only at tip of digit; digits broad, truncate; no sublingual fold; 11 costal folds; premaxillary teeth of male very greatly enlarged, piercing the lip; above grayish-black, yellowish on sides; or dark with large cream or orange spots above (greenish in life).

Description of the type. Head wider than body; lacking a canthus rostralis, flattened, the musculature of neck not visible; eye rather small (3.2 mm.), shorter than snout (3.8 mm.); nostril minute, the groove passing back from nostril and forming a right angle where the groove turns down to the much inflated subnarial swelling; end of snout slightly rounding; width of eyelids much less than interorbital width; line of the mouth straight from narial swelling to below posterior corner of the eye where it makes a slight angle and continues back, curving very slightly; the posterior ends of eyelids are tucked under a diagonal fold.

Maxillary teeth few, moderately large, about 20-20 (counting missing teeth, actually 17-14); 2 premaxillary teeth; about 38-38 mandibular teeth which are smaller than the maxillary; vomerine teeth about 10-10 (counting absent teeth) in two irregular curving series extending beyond outer level of choanae, separated medially by a distance equal to width of a choana; parasphenoid teeth large, in a single group, forming a triangle, not notched behind, and separated from the vomerine series by a distance twice as great as that between the vomerine series.

Skin with shallow pits; a groove crosses the throat which passes up across the jaw angle, not reaching dorsal surface of head; gular fold well defined, the grooves from its sides not reaching the dorsal surface of the neck; a shallow groove from the back of eye curves to meet the first vertical groove; no continuation of this groove to the gular grooves; 11 costal folds, those of axilla and groin lacking, although a depression or slight beginning of a groove is visible above anterior edge of the insertion of the femur; the upper posterior projection of the hyoid forms two strong ridges which extend to posterior level of arm insertion or a little farther; sides more or less puckered with longitudinal folds between the costal grooves; some suggestion of a longitudinal lateral fold above the costal folds; submental gland very large, biconvex, transversely placed. The tail has a slight basal constriction; limbs well developed, when adpressed the digits touch; hands and feet very large, the digits spread, the width of each greater than their distance to elbow or knee; inner toe and finger with the large rounding tip free; middle fingers and toes flattened, truncate, with two phalanges free, others with $1\frac{1}{2}$ to $1\frac{4}{5}$ free. Males with cloacal walls papillate. A fold from jaw to gular fold; a glandular area behind femur.

Color. Gray to purplish-black above, the tail darker than body; sides dull yellowish cream; the venter and under surface of the limbs dirty yellowish cream; under side of tail darker than venter; upper surface of limbs lighter than dorsum save for areas at knee and elbow.

Measurements in mm. Snout to posterior end of vent, 55; tail, 51; width of head, 9.2; length of head to gular fold, 14.3; snout to arm, 17; axilla to groin, 28; arm, 15.2; leg, 15; spread of hand, 7.2.

Variation. Females have a somewhat longer axilla to groin measurement, the limbs separated occasionally by $1\frac{1}{2}$ -1 costal fold; the lips of the cloaca are folded. Numerous specimens representing both sexes have a greater or lesser number of scattered, irregular

cream or orange spots, most frequently present on the shoulder region, along the dorsolateral region or the tail. Occasionally they are on tail and not on body.

The number of teeth in the female is greater than in the male; about 30-30 for the maxillary, 4 premaxillary, 15-15 vomerine, mandibular 40-40; there is less variation in the size of teeth in the female.

Relationship. The relationship is with *Bolitoglossa englehardti* and *macrinii*; superficially they may resemble *B. flavimembris*.

From *englehardti* it differs in being more robust, having a shorter, thicker, tail, narrower head, the vomerine teeth extending beyond choanae, and the parasphenoid teeth in a single group (double in *englehardti*), the digits have only the distal phalanges free. From *macrinii* it differs in having a much shorter axilla to groin measurement, there being four or more costal folds between the adpressed limbs, in that species.

Remarks. The large series of specimens were obtained on the mountain chiefly in the region between 6,000-6,800 feet. All were taken in bromelias; at this elevation they were replaced by the smaller bromeliad salamander *Bolitoglossa xolocalcae*.

Eleutherodactylus dorsoconcolor sp. nov.

(Plate X)

Type. USNM, No. 110619 ♀, Tequeyutepec, Veracruz, 5,600 feet elevation, H. M. Smith, collector.

Paratypes. USNM, Nos. 110615-110618, EHT-HMS, No. 24321. Same locality and collector.

Diagnosis. A member of the *rhodopis* group. A dorsolateral folds from corners of eyes, converging slightly, run to lumber region; a second fold above the tympanum to midway on side; ventral disk more or less granular posteriorly; male less than half the bulk of the female, with vocal sacs. Tympanum as large as eye; smaller and proportionally higher in females. Area between folds usually clay, brown, or brown-orange.

Description of the type. Head longer than broad (15.9 mm. to 14.5 mm.); interorbital distance much wider than eyelid (5 mm. to 3 mm.); diameter of tympanum less than diameter of eye (3.2 mm. to 4.4 mm.) (in males nearly equal); eye to nostril, 3.8 mm.; nostril to tip of snout, 2.4 mm.; distance between nostrils, equal to their distance from eye; length of snout, 6.1 mm.; canthus rostralis rounding; lores sloping somewhat to lip and slightly concave behind nostril; dorsolateral folds beginning at the corner of the eye, converge

somewhat toward the dorsal lumbar region, where they terminate at a slightly enlarged tubercle, the end turning in; this followed by two or three pairs of enlarged tubercles; a fold from above tympanum runs back along the sides, breaking up into an irregular series of tubercles, which can be traced more or less to near the groin; head and occipital region smooth; body granular posteriorly; sides strongly granular or pustular; chin smooth; ventral disk distinct, its outer and posterior parts distinctly granular; ventral surface of femurs largely granular; dorsal surface of hind limb rough, some of the pustules arranged in a slightly diagonal fashion; a small, inconspicuous gland, only a little larger than surrounding tubercles, present in the axillary region, the lumbar gland discernible as only a few flecks in the transparent skin with a few scattered pores on the surface; a strong posttympanic fold with a small glandular tubercle lying between tympanum and arm; tongue oval to sub-circular, apparently not nicked behind; vomerine teeth in two raised areas separated from each other by a distance equal to their distance from the choanae, lying between, but much posterior to, the level of choanae; (male with vocal sacs, the openings of which extending somewhat farther forward than usual).

Limbs long, the wrist extending beyond snout; the tibiotarsal articulation reaching beyond tip of snout by a distance equal nearly to half the length of the snout; subarticular tubercles very large; median palmar tubercle largest and touching smaller outer tubercle; first finger distinctly longer than second; tissue at base of first and second fingers is granular, thickened, suggestive of a web remnant; an indistinct row of tubercles on under surface of forearm; sub-articular tubercles of feet large, salient with supernumerary tubercles on sole; inner metatarsal tubercle large, generally oval, about double the size of the outer, its length in first toe less than two times; an elongate tubercle on the inner edge of the tarsus, with a slight ridge from its distal end; a slight ridge following outer edge of fifth finger reaches the tarsus and continues to heel as an indistinct series of elongated tubercles on outer edge of tarsus; a slight trace of a web evident between the first three toes; toes with very slight lateral ridges, the tips dilated somewhat, without or with only an indistinct transverse groove (unless slightly desiccated).

Coloration. Above uniform orange brown, the head slightly darker and a pair of irregular dark spots in interorbital region, more or less connected with a somewhat darker median area behind them; outer edge of the dorsolateral folds black; the sides dark, growing

lighter towards venter; groin usually not pigmented; canthus with a black line; lores dark brown; lip barred with dark spots, separated by lighter areas.

Measurements of Eleutherodactylus dorsoconcolor sp. nov. (in mm.)

Numbers	110619	24321	110618	110616
Sex.....	♀	♂	♂	♂
Snout to vent.....	39.2	27.2	25.2	25.3
Width of head.....	15.6	11.1	10.1	10.0
Length of head.....	16.2	11.5	10.4	10.0
Diameter of eye.....	4.4	3.3	3.2	3.0
Diameter of tympanum.....	3.2	3.3	3.0	2.9
Eye to nostril.....	3.8	3.3	3.1	3.0
Length of snout.....	6.1	4.5	4.5	4.3
Tympanum to eye.....	1.8	1.0	1.0	1.0
Arm.....	22.0	14.8	14.8	16.1
Leg.....	73.5	48.8	47.2	46.0
Tibia.....	23.0	16.1	16.0	15.6
Foot.....	33.3	22.3	20.8	23.2

Variation. The variation in color or the dorsum varies from light putty-color through gray-brown, dark-brown to orange-brown. In one of the males the limbs and sides are so dark as to obscure other markings. Males have more pigment on the venter; especially on chin, thighs, and sides of breast. One of the small specimens No. 110618 (snout to vent 19 mm.) has a bluish white median line.

In all, the first finger is longer than second; the tarsal tubercle present; the lumbo-inguinal gland and the axillary gland are present in all, the glands being more distinct in males. Several of the specimens have a hair-fine medial ridge, and the dorsal granules may form dim lines.

Remarks. The markings on this species are strongly reminiscent of those of *Microbatrachylus minimus* Taylor.

The specimens were taken on a long grassy slope (pasture between two wooded ridges). It was drizzling rain and they were hopping about.

Related to *dunni* and *beatae*, but differing strongly in markings.

Eleutherodactylus matudai sp. nov.

(Plate XI)

Type. USNM, No. 110626 ♀ Mt. Ovando, Chiapas, April 16, 1940; Dr. and Mrs. Hobart M. Smith, collectors.

Paratypes. USNM, Nos. 110620-110625; 110627-110630; and EHT-HMS, 24353, 24354. Same data as type.

Diagnosis. A medium sized species (maximum known size female, 40 mm.; males, 28 mm.), heavily rugose with minute pearly-topped tubercles, and a pair of sinuous dorsal folds widely separated on

back; canthus rostralis sharp, the edges slightly raised; inguinal gland small, distinct; diameter of tympanum little more than a half of the eye in females; more than four-fifths in males; first finger equal or shorter than second; ventral disk not strongly defined; tongue nicked behind; vomerine teeth well developed; some pigment in mouth and under tongue; digits somewhat dilated; no vocal sac in male.

Description of the type. Body wider than head; length of head (14.5 mm.) a little less than width (17.3 mm.); tympanum somewhat deeply sunk, its diameter (3 mm.) a little more than half eye (diameter, 5.5 mm.); distance between nostrils (4.1 mm.) a little greater than distance between eye and nostril (3.9 mm.); width of eyelid (3.6 mm.) greater than interorbital distance (3.2 mm.); length of snout, 6.1 mm.; eye to tip of snout, 7 mm.; distance of tympanum from eye (in female) equal to diameter of the former; canthus rostralis sharp, the edges somewhat raised; snout pointed, the region about nostrils rather swollen; lores rather vertical near canthus, then sloping rather broadly; a pair of dorsolateral folds start slightly back of eyelid above corner of eye and curve inward on shoulders, where they are separated by a distance of 7.5 mm.; from this point they curve and again approach, in middle of body separated by 5 mm.; from this point they curve out, and approach on rump where they are separated by 8 mm.; a well-defined supratympanic fold begins on edge of eyelid and continues to above arm, terminating in a glandular swelling; a short fold runs back above arm, and other ill-defined folds are discernible on sides and rump region; ventral disk is not clearly defined save the fold across breast; inguinal gland distinct, small, yellow; axillary gland small, indistinct, difficult to discern; chin and breast indistinctly granular; venter partially granular or areolate with transverse wrinkles or folds near median line; ventral and posterior surfaces of femurs large, areolate.

Tongue free for one-third to one-fourth of its length, subcircular, apparently slightly emarginate (somewhat distorted; paratypes show tongue to be nicked); vomerine teeth well developed, separated by a distance equal to less than half width of one group, behind, but within inner level of choanae; latter large, about equal in extent to a patch of vomerine teeth; no minute papillae evident on mouth membranes; interorbital palatal region strongly grooved.

Arms brought forward, the wrist reaches beyond snout; first finger equal to second; pads widened a little and thickened with a trans-

verse groove, usually distinct; subarticular tubercles low, flattened, rather indistinct, as are the supernumerary tubercles; median palmar tubercle flat, large; outer obsolete; inner somewhat more than half size of middle; indistinct row of tubercles on under surface of forearm; leg long, the heel reaching beyond tip of snout a distance equal to the length of snout; foot with a mere trace of a web, with narrow dermal fringes on the toes; subarticular tubercles low, flat; under surface of foot granular, but lacking trace of supernumerary tubercles; outer metatarsal tubercle relatively well developed, less than half inner, which is somewhat more than half length of first toe; no distinct tarsal fold, but the inner edge of tarsus with somewhat thickened or swollen skin, forming a rounded surface, and usually light colored (in some specimens it suggests a greatly thickened glandular fold); outer edge of tarsus with an indistinct row of granules that may be somewhat connected; when legs are placed at right angles to body the heels overlap a little; upper surface of thigh and tibia with numerous tubercular granules, often forming indistinct rows; posterior face of femur almost smooth.

Color. Above dark blackish-brown, with some indistinct lighter areas; limbs, light cream-brown, strongly banded with dark, or black-brown; sides with numerous cream spots; side of head and lip with lighter areas, the blackish color forming bands on lip; chin heavily pigmented; breast with some dark flecks and blackish reticulation; posterior surface of femur purplish-brown with cream spots, lines, or reticulation; under surface of tibia with black spots, continuations of the dorsal dark bands; foot, heel, and to some extent hand, purplish; inguinal gland yellow; scattered pigment in buccal cavity, especially two lines under tongue and on floor of mouth.

Measurements in mm.: *Eleutherodactylus matudai* sp. nov.

Number	110626	110624	EHT-HMS 24353	110625	110628	EHT-HMS 24354
Sex	♀	♀	♀	♀	♂	♂
Snout to vent	40.0	38.0	37.1	37.0	28.0	27.0
Width of head	17.3	16.0	16.1	17.0	13.5	12.7
Length of head	14.5	14.5	14.1	15.4	12.0	11.1
Diameter of tympanum	3.0	3.0	2.9	2.9	3.4	3.1
Diameter of eye	5.5	5.2	4.8	4.9	3.9	3.5
Eye to nostril	3.9	3.5	3.6	3.5	3.0	2.6
Eye to tip of snout	7.0	6.9	7.0	7.0	5.4	5.1
Length of snout	6.1	5.9	6.2	6.1	5.0	4.7
Arm	23.0	23.0	22.2	24.1	18.0	16.4
Leg	76.0	73.0	75.2	72.5	53.0	53.0
Tibia	25.5	24.8	24.0	24.2	19.0	17.4
Foot	34.0	33.0	34.1	34.5	24.2	23.0

Variation. The usual sexual dimorphism in size of body and of tympanum is strongly evident. Certain of the specimens have the canthal ridges a little more pronounced and a tiny ridge arising posterior to the nostril, converging in the frontal region, but not meeting; the supratympanic fold begins below and anterior to the corner of the eye; on the back of head the area enclosed in the glandular folds is more elevated than areas lateral to them, as if the edges of the frontoparietals were somewhat elevated (visible in figure of male). In one specimen the vomerine tooth patch is wanting on the left side (110623); the tongue is usually emarginate or notched behind and usually is more elongate than that in type.

Pigmentation inside the mouth varies. There are usually two lines visible under tongue running back; occasionally there are pigment flecks on the tongue and on roof of mouth.

The species is named for Mr. Matuda, host to Dr. and Mrs. Hobart M. Smith during their sojourn at Hda. La Esperanza, Chiapas.

It differs from other Mexican species, and appears to have its relationship with *E. biporcatus* (judging by the description), which has a similar elevation of the frontoparietal region. *E. matudae* differs in lacking the interorbital concavity, the vomerine teeth do not form an arched series, and the first finger is shorter or at most equal to second.

PLATE VII

PLATE VII. *Bolitoglossa xolocalcae* sp. nov. Paratypes. Mount Ovando, Chiapas, Mexico. Upper row, left to right, EHT-HMS, 27264, 27265, 27266, 27267; lower row, 27268, 27269, 27270, 27271; all about natural size.

PLATE VII



PLATE VIII

PLATE VIII. *Bolitoglossa nigroflavescens* sp. nov. Mount Ovando, Chiapas, Mexico. Left to right, USNM, Nos. 111174, 89 mm.; 111191, 90 mm.; Type 111169, 106 mm.; EHT-HMS, No. 26798, 96 mm.; USNM, Nos. 111162, 85 mm.; 111165, 80 mm.

PLATE VIII

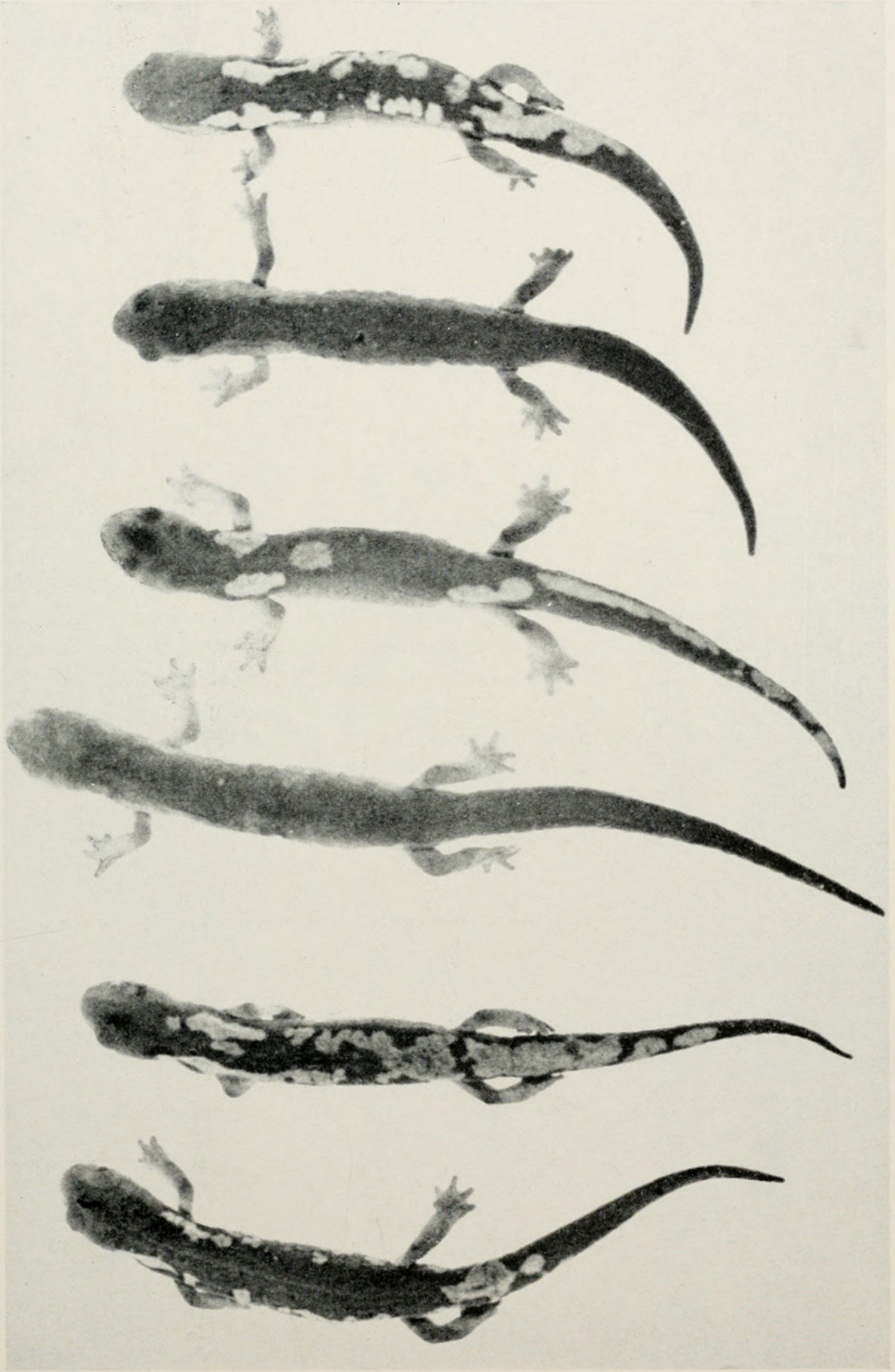


PLATE IX

PLATE IX. Figs. 1 and 2, *Bolitoglossa occidentalis* sp. nov. Field Museum No. 20330, Paratype, El Porvenir, Guatemala; hand, and foot $\times 5$. Figs. 3 and 4, same, Paratype, EHT-HMS, No. 24049, Finca Juarez, Chiapas, Mexico; hand and foot $\times 5$. Figs. 5 and 6, *Bolitoglossa nigromaculata* sp. nov. USNM, No. 6340, Paratype (one of the paratypes of *Spelerpes leprosus* Cope) "Orizava, Mexico." Figs. 7 and 8, *Bolitoglossa xolocalcae* sp. nov. EHT-HMS, No. 25331, Paratype, Mount Ovando, Chiapas, Mexico; hand and foot $\times 5$. Figs. 9 and 10, *Bolitoglossa nigroflavescens* sp. nov. EHT-HMS, No. 27263, Paratype, Mount Ovando, Chiapas, Mexico; foot and hand $\times 5$. (Ventral view.)

PLATE IX

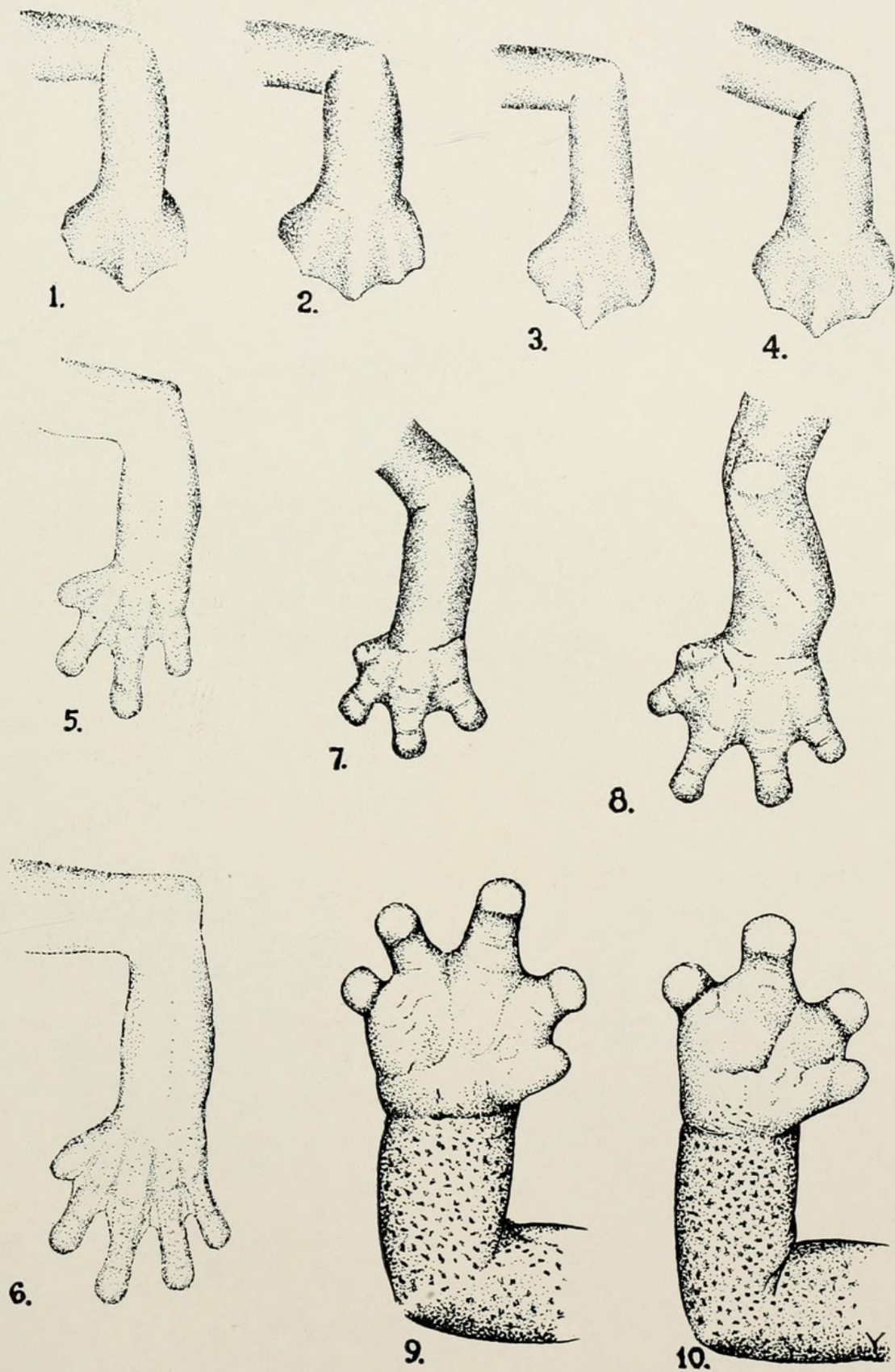


PLATE X

PLATE X. *Eleutherodactylus dorsoconcolor* sp. nov. Tequeyutepec, Veracruz, Mexico. Upper, Type, No. 110619 ♀, 39.2 mm.; lower, Paratypes; left, USNM, No. 110618 ♂; right, EHT-HMS, No. 24321 ♂. Topotypes.

PLATE X

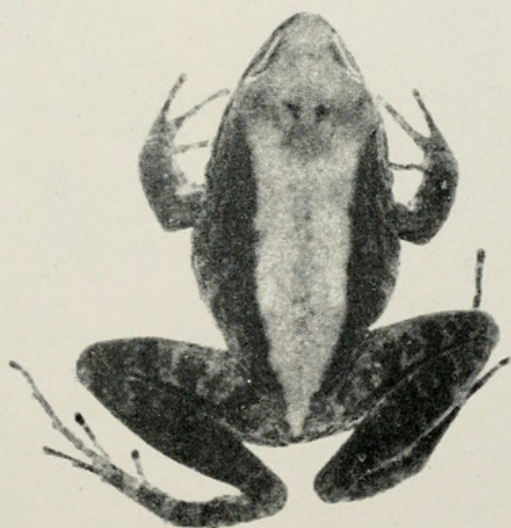
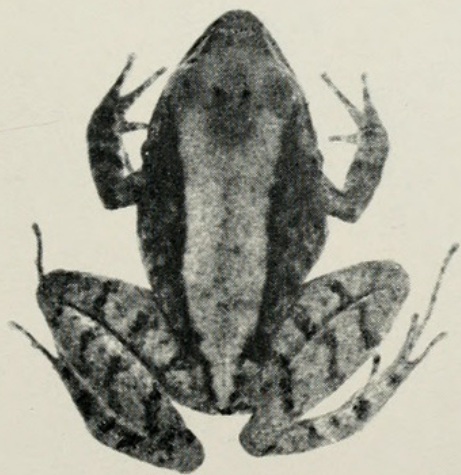
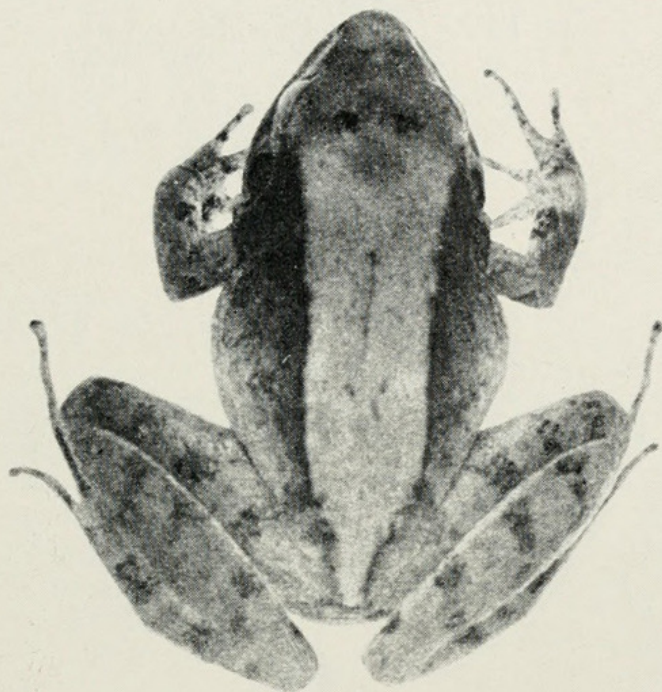
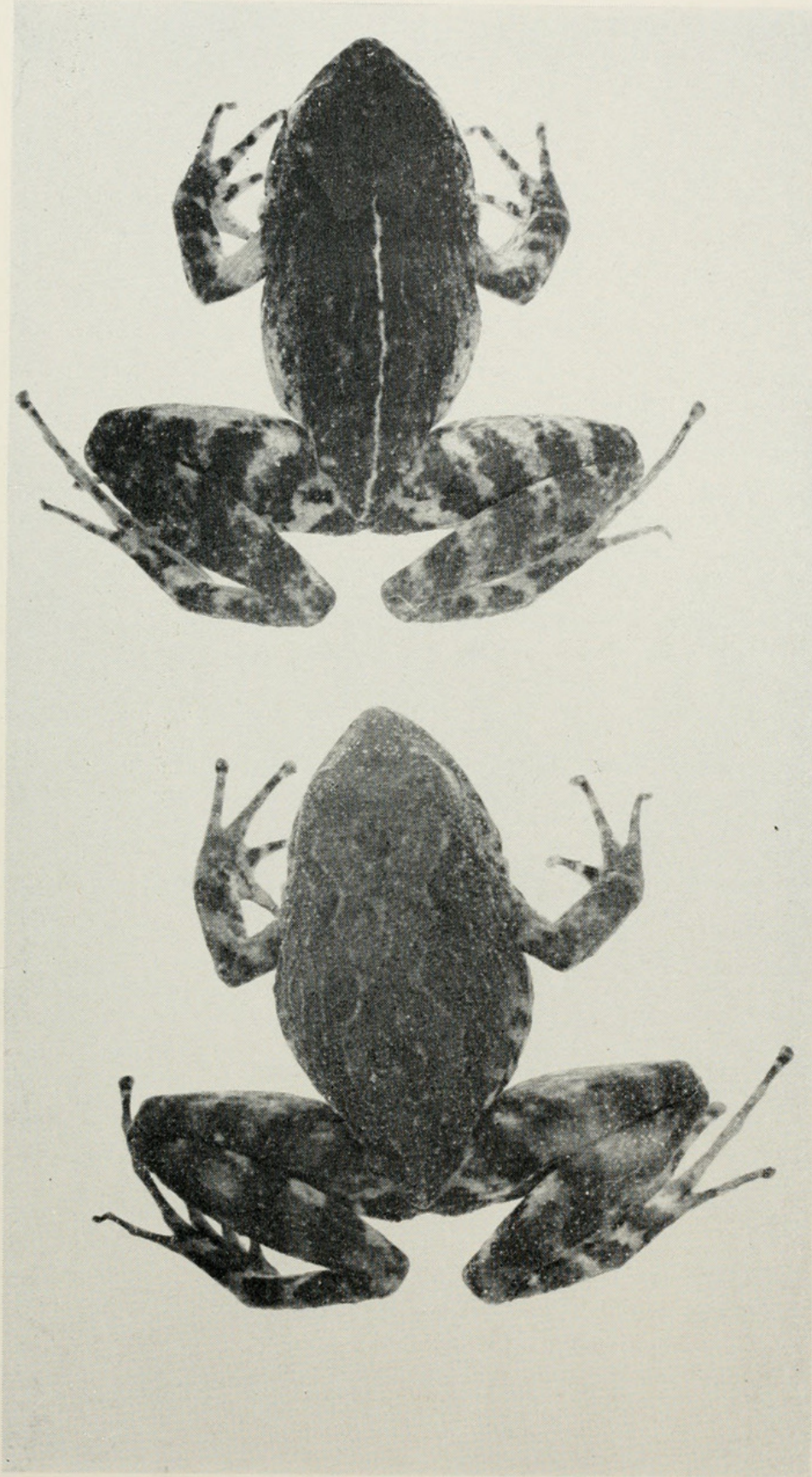


PLATE XI

PLATE XI. *Eleutherodactylus matudae* sp. nov. Mount Ovando, Chiapas, Mexico. Upper, Paratype, EHT-HMS, No. 24353 ♀, 37.1 mm.; lower, Type, USNM, No. 110626 ♀, 40 mm.

PLATE XI





Taylor, Edward Harrison. 1941. "New amphibia from the Hobart M. Smith Mexican collections." *The University of Kansas science bulletin* 27(8), 141–167.

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