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Tadpoles of Mexican Anura

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ABSTRACT: Tadpoles of the following species are described and figured: *Scaphiopus multiplicatus* Cope, *Agalychnis dacnicolor* (Cope), *Rana pustulosa* Boulenger, *Rana montezumae* Baird, *Hypopachus caprimimus* Taylor, *Hypopachus alboventer* Taylor. *Plectrohyla matudai* Hartweg is discussed. A remarkable tadpole is described and figured without placing it in a species or genus. The eggs of *Agalychnis callidryas* are described.

THE EHT-HMS collection contains numerous series of Mexican tadpoles which have been accumulating during the past ten years. Some thirty species have been identified, with reasonable certainty; and drawings are being prepared, as occasion permits, so that certain details of this stage of their life history can be made known to others. Certain other species have been tentatively identified on the basis of probability, taking into consideration the fauna in the locality where they were found and the adult species taken in their particular breeding pool at various times. Frequently tadpoles can be referred to a given genus or family on the basis of generic similarity. However, this is not always possible. I am ignorant of even the family relationship of the species which I here describe, and figure.

GENUS? sp?

(Plate I, figs. 2, 2a, 2b)

The tadpoles of this species have been obtained two different years from a temporary pool near La Venta, Guerrero. The species is gregarious, the larvae moving usually in a ball-like mass, coming to the surface and submerging as if the mass was revolving. They keep to the deeper water (3 feet). None was taken near the edge of the water where most tadpoles are accustomed to feed.

The dates of collection of this form are, No. 27692A, July 30, 1937, and No. 27692, July 4, 1938. Specimens from both lots are in about the same stage of development.

Description of tadpole (from EHT-HMS No. 27692 consisting of about 130 specimens).—Head and body somewhat longer than broad; the snout flattened, truncate; the lips thin, the lower lip bending in and covered by upper; no horny beak; no series of labial teeth present; no papillae surrounding edges of lips; a single, sharply pointed dermal spine directed forward from near the edge of the lower lip; width of mouth opening about equal to half width of head; palate and floor of mouth with only a few tiny papillae, scarcely discernible; two shallow pockets in front of gills; nostrils dorsal, nearer the level of the eyes than edge of mouth, narrowly separated, the distance between them equal to about half their distance from eye; eyes small, lateral; skin largely transparent so that in lateral and ventral view the coiled intestine, the gills, and the heart are visible; the pericardium is pigmented; on underside of head there is visible a heavily pigmented transverse band of muscle that lies about as far forward as the level of the eyes; spiracula bilaterally symmetrical, sinistral and dextral, opening lateroventrally; the distance between eye and spiracle nearly twice distance of eye to mouth. Caudal fin transparent, arising near middle of back, low anteriorly, attaining its greatest height above and below at the middle, tapering to a fine point at tip; terminal portion of intestine included in the ventral part of caudal fin, the anal opening being medial at the edge of the fin; limbs small, flattened. Other details of the anatomy are indicated in the figures.

Measurements in mm.—Total length, 41; length of head and body, 17; width of body, 11.3; distance between eyes, 9.3; distance between nostrils, 2; length of tail, 31.

Color.—The body wall is transparent, and the coloration is largely that of the internal organs, which are greenish-olive in life. The tail musculature has some scattered pigment, the fin clear, transparent, without color.

Remarks.—In the presence of a spiracle on each side of the body and in the presence of a dermal spine, this tadpole differs from the other tadpole species in the collection.

Mrs. Helen T. Gaige in her paper "Some Reptiles and Amphibians from Yucatan and Campeche, Mexico," mentions a tadpole from Piste, Yucatán, which is thin-lipped, and lacking a horny beak and teeth. She suggests that the species may be *Tetraprion petasatus*.

That species is as yet unknown in Guerrero. However, *Diaglena reticulata*, a recently described species of a genus believed to be related to *Tetraprion*, may occur, since it comes from the Tehuantepec region in Oaxaca. Double spiracles occur in certain PIPIDAE.

Plectrohyla matudai Hartweg

A recent paper by Hartweg and Orton, 1941, describes two tadpoles from Mt. Ovando, Chiapas, believed to be those of species of the genus *Plectrohyla*, either *Plectrohyla sagorum* Hartweg or *Plectrohyla matudai* Hartweg. The authors were unable "to correlate each of the larval forms with the adults of the correct species."

The tadpoles (both species) were said to have been taken at an elevation of approximately 1,800 meters from a stream on Mt. Ovando at the same elevation where adults of the two species were collected in August, 1937.

Dr. and Mrs. Hobart M. Smith, who visited Mt. Ovando April 15-18, 1940, rediscovered the two species, and collected a series of adult specimens as well as a series of tadpoles and transforming young. These latter have been sent to me by Doctor Smith, calling my attention to the fact that the tadpoles will identify Hartweg and Orton's figures 1 and 2.

Smith did not find the two species of *Plectrohyla* in the same habitat. He recognized the two species in the field, noting differences in their calls and in habitat. One form, designated as the "sharp-nosed species" (= *Plectrohyla sagorum* Hartweg), was found in bromelias at 5,000 feet and higher, that representing the approximate elevation at which bromelias begin to appear on the mountain. Apparently none was found in any other habitat. The other species which he mentions, as the "rough-skinned form" or the "ravine form" (= *Plectrohyla matudai* Hartweg), was found in small streams from about 2,800 feet up to about 6,000 feet elevation. The call of this form is noted as sounding "like a couple of rocks struck once under the water, just a single note"; while in the bromeliad form, the call is a "croak—that sounds somewhat like the spoken word drawn out a little."*

Smith obtained with his *P. matudai* a series of transforming young together with tadpoles at Las Nubes (approximately 2,900-3,000

* In the description of *Plectrohyla matudai*, Hartweg states, "no external vocal sac in the male"; of *Plectrohyla sagorum* he states "males with a vocal sac"; he later states, "*P. matudai* differs from *P. sagorum* in the absence of vocal sacs in the males, . . . I found that the vocal sacs are equally developed in both species taken by Smith, and suspected that they might have been overlooked by Mr. Hartweg in his *P. matudai*. I communicated with him and he writes as follows: "*P. sagorum* has well-developed vocal sacs but *P. matudai* has no external evidence of vocal sacs, although 'vocal sac openings' are present."

feet). These include tadpoles in which the hind legs are just beginning to form, up to individuals that have lost the labial beak and teeth, with well-developed limbs, and only a remnant of the tail. These tadpoles agree in most details with the form which Hartweg and Orton designate as *Plectrohyla* "Form a." It has the same typical fanglike serrations on the upper beak with the smaller secondary serrations as is shown in figure 2. The serrations on the lower jaw are, for the most part, small and uniform, but the posterior serration is enlarged. It seems reasonably certain that *Plectrohyla* "Form a" is the larval form of *Plectrohyla*† *matudai*.

Hartweg‡ obtained the two forms of tadpoles in an area and at an elevation where Smith found the ranges of the two adult species overlapping. The finding of tadpoles transforming in the middle of April in the dry season, and again in the latter part of August, during the rainy season, shows that the breeding season of *Plectrohyla matudai* occurs more than once during the year, or continues for several months.

Agalychnis dacnicolor (Cope)

(Plate II, figs. 2, 2a, 2b; Plate III, fig. 2)

The eggs of this species are usually deposited on the leaves of plants (preferably large, smooth leaves) near the edge of water pools or on branches overhanging the water. I have on occasion found eggs placed on the earth a few inches above the water in pools where no trees or plants were available.

The eggs, green in color, are encased in thick gelatinous capsules which adhere to each other and to the plants or other substrata where they are deposited. When the young hatch they are washed by rain or fall into the water, and develop as ordinary tadpoles.

The egg-laying season apparently continues for some weeks, since in several collections of these tadpoles, newly hatched young and large tadpoles with the hind limbs beginning to appear, were found in the same pool.

Description of tadpole (from a lot collected at Km. 363 near Ocotito, Guerrero).—Body and head nearly twice as long as wide, the head not wider than the body; eyes very large, laterally placed, the distance between them nearly equal to width of head, and much

† The use of the name *Plectrohyla* for the genus of Hylid frogs having a spine on the pollex is open to question. I strongly suspect that *Plectrohyla* is a synonym of *Hypsiboas* Wagler. The genotype of *Hypsiboas* is *Hyla langsdorffii* Duméril and Bibron. I have no specimen of that species at hand to judge whether the two are congeneric.

‡ The date of collection is not specifically mentioned by Hartweg and Orton, but it is inferred that these tadpoles were taken on about the same date as the adults (August 28-30, 1941).

greater than their distance to middle point of snout tip; distance between nostrils greater than their distance to mouth, much nearer tip of snout than eye; tail musculature begins near middle of body; tail narrowing gradually to a pointed tip; the caudal segments not distinct throughout; dorsal part of the caudal fin which begins somewhat back of the beginning of the musculature is low at first then rises to its greatest height for the middle third of the tail, then narrows gradually on the posterior third; ventral part of caudal fin begins its greatest elevation at base of tail and maintains it for nearly two-thirds of length of tail, where it tapers gradually to a narrow tip.

Anus dextral; spiracle sinistral, not forming a tube, opening ventrally, its distance from eye nearly same as distance between eye and tip of snout; width of mouth a little more than one-third width of head, the lips short, rather thin, bordered by a single (usually) row of papillae, save for the medial part of the upper lip, which is smooth.

Horny beak well-developed, the edges of upper and lower parts of beak bordered by fine denticulations; upper lip with a continuous transverse series of labial teeth, followed by a shorter series on each side of the upper part of beak; lower lip with three series of labial teeth, the outer a little shorter than other two, the inner broken medially; on the lips on each side of the beak, are groups or series of papillae.

Color.—Above flesh color with bright-blue markings; paired symmetrical dark marks on top of head and dark spots above eyes and behind nostrils; a darker area at beginning of dorsal musculature often touching the dark spots on head; tail musculature with some pigmentation, fin with very sparse pigment.

Measurements in mm.—Head and body, 22.5; total length, 52.6; greatest depth of tail including fins, 11.2; distance between eyes, 9; snout to base of tail, 10.

Remarks.—The tadpoles of this species may readily be recognized even when quite young by the bluish coloration which is not known in other genera of Mexican frogs (but may be present in other *Agalychnis*). The bluish color fades rapidly and no trace of it is evident in my preserved material.

No newly transformed young have been found during the summer months, so I presume that they transform in September or October. One collection made by Dr. Hobart M. Smith, October 30, 1936, at a point 30 Km. south of Chilpancingo contains five tadpoles. The tails are beginning to shorten; the legs are from 25 to 32 mm. long; the arms are still concealed. The horny beak and labial teeth have

been lost in all but one specimen. The color in life is green above with numerous clear cream spots, while below the color is creamy yellow.

Agalychnis callidryas

Freshly laid eggs of *Agalychnis callidryas*, a much smaller species, were obtained near Tierra Colorada, Veracruz, July 16, 1932. The greenish eggs of this species were deposited in the same manner as those of *A. dacnicolor*. However, the individual eggs are a little smaller and the masses scarcely a third as large. Dr. Hobart M. Smith collected an egg mass of this species at San Andres Tuxla, Veracruz, September 9, 1935. In the mass there are 95 eggs, which were taken with the curled-up leaf on which they were laid. The label states "egg mass entire."

Scaphiopus multiplicatus Cope

(Plate II, figs. 3, 3a, 3b; Plate III, fig. 3)

The type locality of this species, "Valley of Mexico," state of México, México, is to be sure somewhat indefinite as the extent of the *valle* is variously understood. However, I believe that the tadpoles obtained at El Guardia in the mountains near the continental divide, southwest of Mexico City may be regarded as topotypic. The series EHT-HMS No. 27692 consists of some 75 specimens, perfectly preserved except for life colors. The shallow pool where they were collected was formed in an excavation where the earth had been removed for road building. The elevation is approximately 10,000 feet. Some adult specimens and one partly transformed young were found under rocks in the immediate neighborhood. Most of the specimens have the hind legs more or less developed.

Description of tadpole (from EHT-HMS No. 27692, El Guardia, Mexico).—Head and body large, the head somewhat angular in profile; the snout more or less truncate; eyes small, dorsally placed, the distance between eyes equal to their distance from tip of snout, or about one-third the greatest width of head; nostrils small, situated rather close together, the distance between them about equal to their distance from eyes. Tail with moderate musculature, longer than head and body, the fin well developed above and below, upper part of fin arising at base of tail, low anteriorly, reaching its greatest height at about the middle; muscular portion not wider than fin, tapering to a point posteriorly; spiracle sinistral, forming a slight tube, opening lateroventrally; distance between spiracle and eye greater than distance between eye and tip of snout; anus medial,

opening in the lower edge of the caudal fin, which has a tendency to form a slight fold either to right or left.

The width of mouth is as great as or a little less than the distance between eyes; the lips are a little thickened, protruding slightly, the edges bordered by two continuous rows of papillae save for a short diastema in the middle of upper lip; at this point there is a smooth flap or area bordered by a short row of labial teeth; horny beak strongly developed, the upper and lower parts bordering jaws have their edges finely serrated (the serrations smaller and much more numerous than indicated in the figures).

Upper labial teeth with the very short median series mentioned, followed on each side of the upper part of beak by three series of teeth, the outer somewhat sinuous, more than double length of second, almost meeting in the middle, third row very short, the teeth smaller than in preceding rows; lower edge of lower lip with a median series, then follow three series on each side, the first minutely separated in the middle, the second and third shorter, widely separated, the third less than half length of second; a few additional papillae at corner of mouth fold.

When mouth is opened widely a median palatal tubercle is observable; a small circular moundlike tongue is visible behind lower jaw surmounted by two irregularly shaped papillate structures; bordering the inner part of jaw are three irregular papillae, two pointing somewhat medial, the other downward. On palate and on lower floor of mouth numerous small papillae, more or less regularly placed; in front of the gills an elevated continuous muscular flap present. These latter characters are only visible when the sides of head are cut open.

On many of the specimens the skin of the posterior dorsal part of the abdomen tends to wrinkle or pucker somewhat, across base of tail.

Color.—Olive to olive-gray on head with a somewhat darker median area between eyes and about nostril (not pronounced in specimen figured); an indefinite lighter line back of head crossing body (variable in its distinctness). Abdominal region blackish above and below, the intestine rarely visible save in youngest tadpoles; musculature of the tail grayish-brown with the segments definitely marked in younger, indefinitely indicated in oldest specimens; the fin is completely transparent, what appears to be pigment is clotted blood in the blood vessels. Underside of legs usually unpigmented, dorsal surface with indistinct transverse bands.

Measurements in mm. of figured specimen.—Total length, 34.2;

head and body, 15.2; tail from posterior part of abdomen, 19; greatest depth of body, 8.2; width between eyes, 3.3; width of mouth, 2.7. Another specimen with the legs about half the size of the figured specimen has these measurements: total length, 51; head and body, 21; tail from posterior part of abdomen, 30; greatest depth of body, 11; between eyes, 3.8; width of mouth, 3.

Remarks.—The specimen chosen for illustration has the tail a bit shorter than younger tadpoles, since the process of resorption seems to have begun. In many of the specimens tooth rows become strongly sinuous. Some of the specimens are a little less angular about the head.

A young specimen nearly transformed, with the arms as well as legs distinct, the tail reduced to a stub less than length of body, has a snout-to-vent length of 20 mm.

A few other specimens, having the legs at the same stage of development as the larger, measured tadpole, are variably smaller.

Arthur N. Bragg* has recently studied larvae of *Scaphiopus*, *bombifrons* and *S. hammondi* and finds that there is marked difference between them. He points out the fact that certain previous authors have confused the tadpoles and shows that the form with a hooked beak and notched lower mandible is actually *hammondi*.

If Bragg is correct, then *multiplicatus*, the form herein described, differs so greatly from *Scaphiopus hammondi* in the larval characters, that it does not seem probable that a subspecific relationship exists between them. In consequence I shall regard them as distinct species.

Rana pustulosa Boulenger

(Plate I, figs. 1, 1a, 1b; Plate III, fig. 4)

This species is represented in the collection by two lots as follows: EHT-HMS No. 27690, a series of ten tadpoles from young to transforming stages, taken at Km. 142, to the north of Taxco in Morelos, July 16, 1936; and No. 27689, a series of 26 tadpoles with one transformed young, taken at Km. 133 near Huajintlán, Morelos, June 27, 1938. Adults of *R. pustulosa* were taken at the latter locality at the time the tadpoles were taken.

Description of tadpole (from lot No. 27689).—Head and body somewhat flattened, much longer than wide; eyes large, dorsolateral, the distance between them less than length of snout; nostrils small, widely separated, the distance between them almost as great as that

* Bragg, Tadpoles of *Scaphiopus bombifrons* and *Scaphiopus hammondi*. The Wasmann Collector, Vol. 4, No. 3, Apr., 1941, pp. 92-94.

between eyes, situated equidistant between eye and median tip of snout; spiracle forming a slight "tube," sinistral, laterally placed; anus dextral; musculature of the ventral body wall showing more or less distinct septa; musculature of tail beginning near middle of body, much wider than the fin anteriorly, tapering to a point posteriorly; fin narrow above and below at base of tail, widest near the beginning of posterior third.

Mouth moderately large, with a strong horny beak; both upper and lower parts thick, with the edges strongly denticulated; upper lip bearing teeth on its edge, lacking papillae for most of its width, its corners, however, with rather free papillate edges; lower lip bordered by a single or partially double row of papillae; upper labial teeth arranged as follows: a transverse arched series anterior to beak; four series on each side of beak diminishing in width posteriorly; lower lip with two outer (usually) unbroken transverse series followed by a third which is interrupted medially; near corners of mouth two short somewhat isolated series on each side.

Color.—Head and body more or less uniform dark olive-brown above and on sides; ventrally lighter with a median darker stripe and narrow transverse lines which seem to mark septa in the musculature of the body wall; tail musculature with a slight scattering of pigment; tail fin transparent save for distinct scattered spots of brown, which likewise occur on the tail musculature.

Measurements in mm. of figured specimen.—Total length, 65; head and body, 24; tail from anus, 40; head width, 12.5; depth of body, 11; depth of tail with fin, 11.5; distance between eyes, 5; distance between nostrils, 4.2.

Remarks.—When the palate and floor of the mouth are exposed by cutting back from mouth along the side of head, the following characters are discernible: On anterior part of palate a group of papillae or tubercles roughly arranged in an H-shape; the large transverse choanae with minutely tuberculate edges; a very large spinose or tuberculate papilla arising from the outer anterior edge, and a smaller one from the inner posterior edge; closely following the choanae are three spinose papillae directed somewhat mediad; following this is a thin elevated ridge with a denticulate edge and spinose on anterior and posterior surfaces; behind this the palate covered with numerous tiny spinose papules or papillae varying greatly in size; on the posterior part of the palate on either side are two angular pigmented areas; within the lower part of beak on lower jaw is a small tongue anlage bearing two elongate spinose papillae

which are contiguous; at the back edges of the jaw on each side is a flattened papillae; the floor of the mouth papillate; a free cartilaginous flap in front of the gills edged with papillae or projections of various shapes arranged symmetrically.

The largest tadpole of the series has a total length of 72 mm.; the snout to anus length being 24.2 mm.; in this specimen the hind legs measure 26 mm.; a completely transformed specimen measures 28 mm., snout to vent.

The second lot of specimens EHT-HMS No. 27690 (10 specimens) contains young tadpoles as well as individuals nearly completely transformed.

Rana montezumae Baird

(Plate III, figs. 1, 5)

Two lots of material certainly identified as *Rana montezumae* have been collected. These are EHT-HMS Nos. 27717 (lot of 35, containing young tadpoles, some beginning transformation, and others in which the process is complete), San Diego, near Texcoco, D. F., August 23, 1939; 27718 (lot of 9 young and half grown), Km. 74 west of Toluca, September 11, 1939.

Description of tadpole (from lot No. 27717).—A large, robust form, the head much narrower than body; eyes dorsolateral, not visible from below, the distance between them very slightly greater than their distance to the tip of snout; nostrils nearly equidistant between the eye and tip of snout, close together, the distance between them less than their distance to either eye or tip of snout; spiracle lateral, sinistral, its distance from eye a little greater than distance between eyes; anal opening dextral. Tail musculature with well-defined segments, begins on middle of back; dorsal fin begins midway on back, rather low at first, then rising to its greatest height at beginning of middle third of tail; dorsal fin at widest part narrower than tail musculature, but wider than the ventral part; legs at this stage of development longer than head and body.

Sides of mouth and lower lip with a loose fringe of varying width bordered by a single row of papillae; a few additional papillae near corners of mouth; upper lip somewhat thick-edged bordered by a continuous row of labial teeth; behind this is a short row of teeth on each side but somewhat in front of beak; three unbroken toothrows on lower lip, the outermost shortest, all in front of beak.

Color.—Above greenish-olive, the color continued on the sides of head; abdominal region black on sides; chin, greenish or yellowish flesh; intestine visible through the abdominal wall; tail muscles, and

fins rather greenish-yellow at base becoming black posteriorly, with a few indistinct lighter dots.

Measurements in mm. (of figured specimen).—Total length, 112; head and body, 40; tail from base of limbs, 62.5; length of dorsal fin, 90; greatest height of tail and fins, 36; width between eyes, 11; eye to spiracle, 12; height of the dorsal part of caudal fin, 8.5.

Remarks.—In younger specimens the tail is dark olive, but lacks the black color of some of the older tadpoles. At the time when the arms appear the tail may still be as long as the head and body. Two transformed young, tail completely absorbed, measure 33 and 34 mm., respectively, from snout to vent.

Hypopachus caprimimus Taylor

(Plate II, figs. 1, 1a, 1b; Plate III, fig. 7)

I have collected the following lots of tadpoles of this species: EHT-HMS Nos. 27699 (lot of 7), July 23, 1936, 9 Km. south of Mazatlán (Km. 337-338), Guerrero; 27700 (lot of 3), July 27, 1936, Km. 363, near El Ocotito, Guerrero; 27707 (lot of 7), July 27, 1936, Agua del Obispo, Guerrero (Km. 350½).

The tadpoles of the genus *Hypopachus* lack a horny beak and labial teeth. The upper lip forms a pair of connected flaps that cover the lower lip. The cartilage of the upper jaw is wanting and there are no external nostrils until transformation. The spiracle opens near the anus and is usually slightly dextral.

Description of tadpole (from EHT-HMS No. 27701, near El Ocotito, Guerrero, July 27, 1936).—Tadpole banjo-shaped; head and body together a little longer than wide; eyes large, lateral, widely separated, the distance between them greater than their distance from tip of snout; no external nostrils; head somewhat wedge-shaped; tail musculature not or barely showing the septa, tapering to a point; dorsal fin begins only slightly in advance of lower, is narrow at first, then rises to its greatest elevation near the middle; the musculature of the tail wider than either fin. Spiracle opens near anus, the two openings being very closely associated if not actually continuous sometimes; leg anlage indicated as a bud.

Mouth about half width of the head, upper lip forming a pair of somewhat fleshy flaps which bend down and under snout, their bases separated medially by a small rounded space through which may be seen the narrow, somewhat V-shaped lower jaw, which has a raised somewhat irregular edge; the flaps are bordered by minute papillae. No horny beak or labial teeth.

Color.—Above closely reticulated with dark brown, appearing nearly uniformly colored; two tiny blackish dots on snout; venter blackish-brown anteriorly, the posterior part lighter with numerous cream spots or reticulations; tail brown with an irregularly edged cream stripe arising at its base, and extending nearly half its length; tail fin more or less pigmented, the pigment forming irregular brown spots.

Measurements in mm. (of specimen figured).—Total length, 21; head and body, 9; width of head at eyes, 5.6; width of body, 5.6; tail, 12.4; greatest width of tail and fin, 4; width of mouth, 1.9; leg, 1.

Remarks.—Although there are no external nostrils, usually two darker flecks are visible where the nostrils will appear later at transformation.

That these tadpoles actually belong to *Hypopachus caprimimus* has not been established beyond doubt. So far as I know no other species of the MICROHYLIDAE occurs in southern Guerrero save *Microhyla usta* (Cope). No specimens of that form were taken about these pools, while adults of *Hypopachus caprimimus* were found in each case.

Stuart (Proc. Biol. Soc. Washington, Vol. 54, pp. 125-128, Sept. 30, 1941) describes *Hypopachus simus*, also a truncate-snouted species whose tadpole, judging by the description, has mouth parts similar to the species here described. His tadpole specimens were unquestionably *simus*.

Until the tadpoles of *Microhyla usta* are known some doubt must remain regarding the tadpoles here described as *Hypopachus caprimimus*.

Hypopachus alboventer Taylor

(Plate I, figs. 3, 3a, 3b; Plate III, fig. 6)

Tadpoles of *Hypopachus alboventer* were found in temporary pools at Km. 133 near Huajintlán, Morelos. They were taken with the tadpoles of *Hyla smithi*, *Agalychnis dacnicolor*, and *Rana pipiens* var. In nearby pools and rivulets tadpoles of *Hyla arenicolor* and *Rana pustulosa* were collected. The date of collection for the species is, EHT-HMS No. 27701, July 16, 1936, lot of three tadpoles.

Description of tadpole.—General form banjo-shaped, the body a little wider than head; head-body length greater than its width; snout somewhat rounded in lateral profile, not wedge-shaped; eyes lateral, widely separated, the distance between them much greater than the distance to the middle of snout tip; nostril absent; spiracle opening near anus, slightly dextral, the opening apparently continu-

ous with that of anus; upper lip cartilage absent; edge of lip forming a double flap, smooth, lacking fringe of papillae; lower jaw very narrow, slightly V-shaped; no horny beak or labial teeth.

Dorsal part of caudal fin begins in advance of the lower part, relatively narrow, and about same height above and below, much narrower than the tail musculature; segmentation of tail musculature scarcely distinguishable; legs in figured specimen small.

Color.—Above brown to chocolate brown, nearly uniform, slightly lighter on sides; venter brownish with numerous irregular light cream spots; tail and dorsal fin spotted and marbled with brown; a lateral cream stripe with irregular edges arises at base and continues nearly half length of tail.

Measurements in mm. (of figured specimen).—Total length, 28; head and body, 11.5; width of head at eyes, 6; greatest width of body, 8; tail, 17; depth of tail and fin, 4.8; width of mouth, 3.3; leg, 3.9.

Remarks.—Tadpoles of *Hypopachus alboventer* resemble externally the tadpoles of *H. caprimimus*. However, the very different character of the upper lip will serve to distinguish the two forms (see figures), if the latter species is correctly identified.

Owing to the rather striking similarity in body form of the various species of *Hypopachus* one would normally expect to have relatively minor differences in the larvae.

PLATE I

FIGS. 1, 1a, 1b, *Rana pustulosa*. Actual length, 65 mm.

FIGS. 2, 2a, 2b, Genus sp.? Actual length, 41 mm.

FIGS. 3, 3a, 3b, *Hypopachus alboventer*. Actual length, 28 mm.

PLATE I

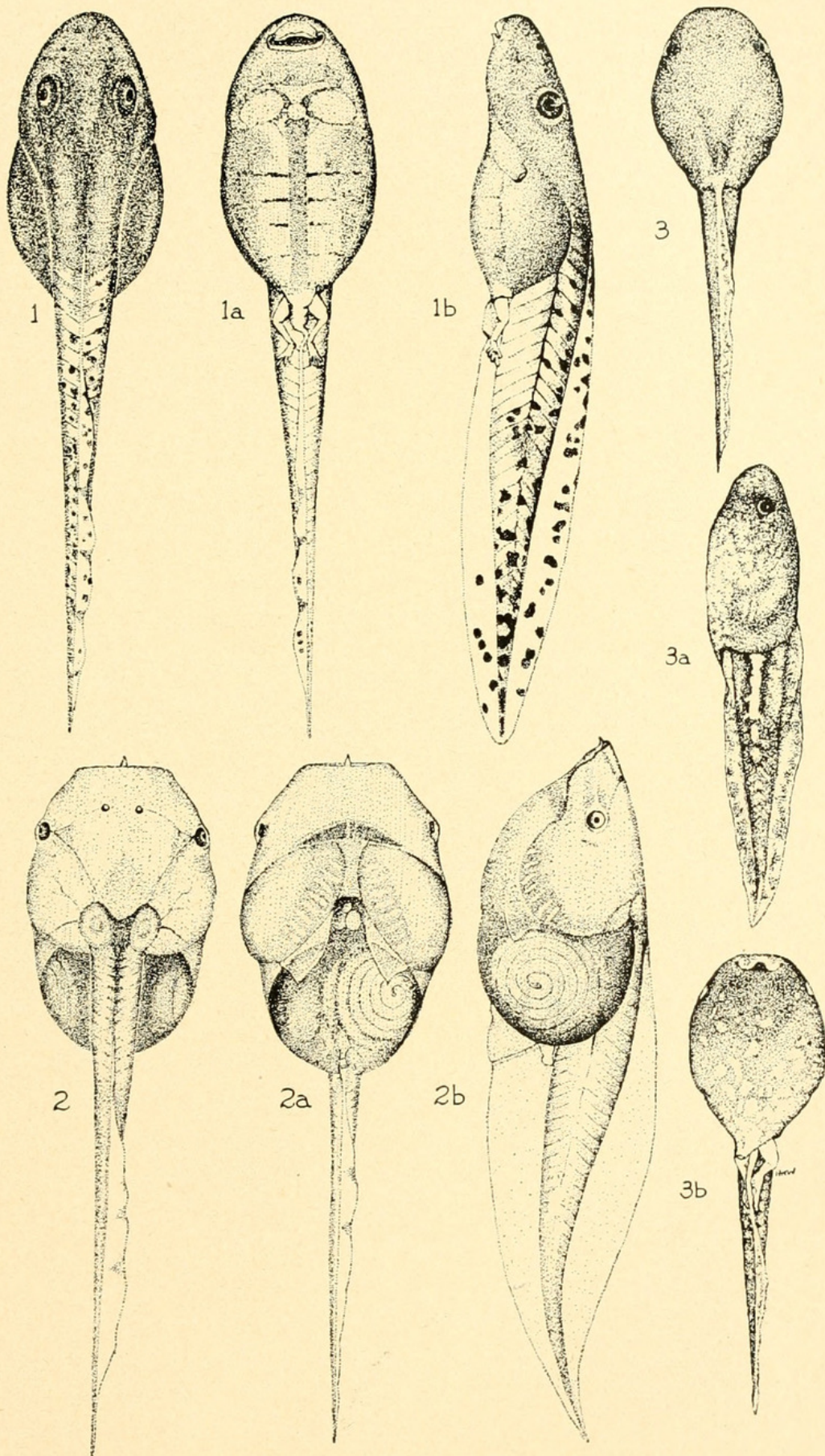


PLATE II

FIGS. 1, 1a, 1b, *Hypopachus caprimimus?* Actual length, 21 mm.

FIGS. 2, 2a, 2b, *Agalychnis dacnicolor*. Actual length, 52.6 mm.

FIGS. 3, 3a, 3b, *Scaphiopus multiplicatus*. Actual length, 34.2 mm.

PLATE II

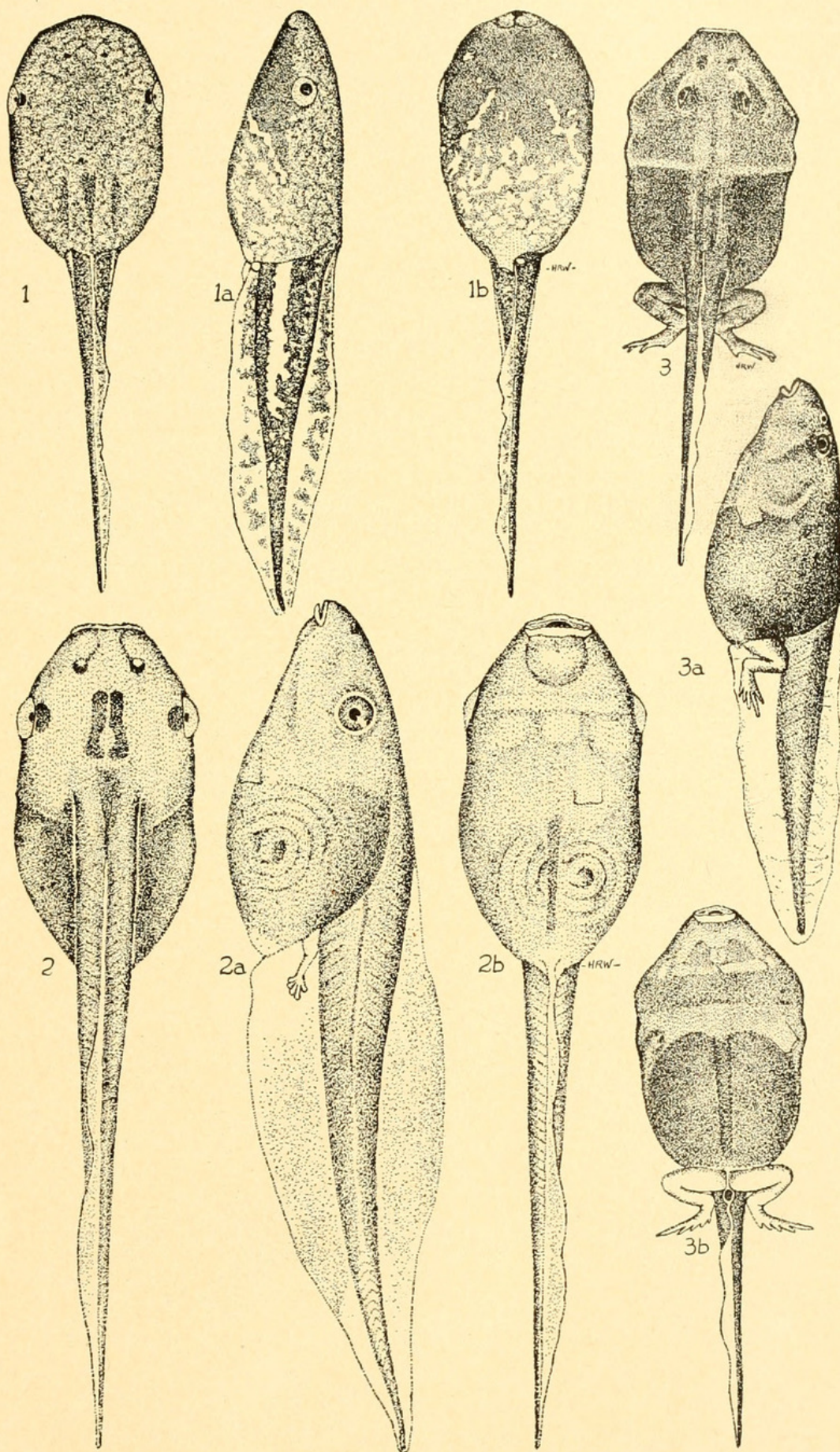
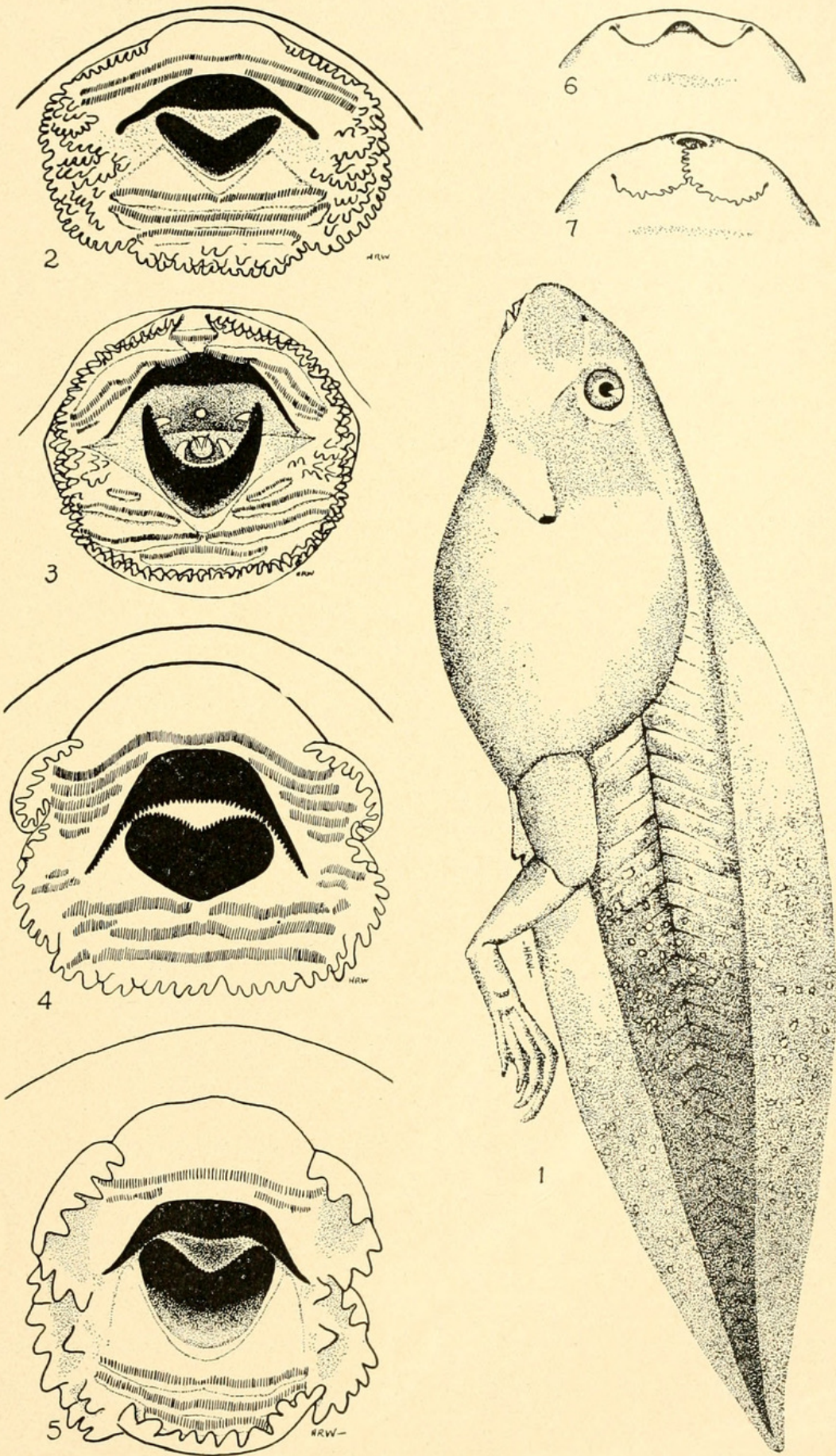


PLATE III

- FIG. 1. *Rana montezumae*. Actual length, 112 mm.
FIG. 2. *Agalychnis dacnicolor*. Mouth enlarged.
FIG. 3. *Scaphiopus multiplicatus*. Mouth enlarged.
FIG. 4. *Rana pustulosa*. Mouth enlarged.
FIG. 5. *Rana montezumae*. Mouth enlarged.
FIG. 6. *Hypopachus alboventer*. Mouth enlarged.
FIG. 7. *Hypopachus caprimimus*. Mouth enlarged.

PLATE III





Taylor, Edward Harrison. 1942. "Tadpoles of Mexican Anura." *The University of Kansas science bulletin* 28, 37–55.

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