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New Salamanders from Mexico with a Discussion of Certain Known Forms

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ABSTRACT: Seven new species of salamanders are described from Mexico: *Bolitoglossa dimidiata* (*chiroptera* group), Guerrero, Hidalgo; *Thorius pulmonaris*, Cerro San Felipe, Oaxaca, Oaxaca; *Thorius narisovalis* (related to *pennatulus*), Cerro San Felipe, Oaxaca, Oaxaca; *Ambystoma bombypella* (*tigrinum* group), Rancho Guadalupe, 14 km. east of San Martín, México; *Ambystoma ordinaria* (*tigrinum* group), near Puerto Hondo, Michoacán; *Ambystoma amblycephala* (*tigrinum* group), 15 km. W. of Morelia, Michoacán; *Siredon lermaensis*, Lake Lerma near Toluca, México.

Thorius pennatulus Cope is discussed and figures given showing variation; *Siredon dumerilii* and *Siredon mexicana* Shaw are discussed. A figure is given of an artificially transformed specimen presumably of *Siredon mexicana* Shaw. Figures are given of all new species.

A SERIES of about thirty specimens of a tiny salamander was taken in the mountains to the northeast of Pachuca, Hidalgo. The first specimens were encountered under logs, occasionally under the same logs as *Bolitoglossa multidentata* (Taylor) in the El Chico, Parke Nacional. Later they were found at a somewhat lower elevation a few kilometers north of the park, at a point about four kilometers below Mineral del Monte, known to the natives as Guerrero. It is the ruins of a great machinery factory. Although this name has appeared before in the literature of Mexican salamanders (Dunn 1926), I believe that none of the recent maps give its location.

This form has been confused with *Oedipus townsendi* in the literature, but differs from that form in having a distinctly different type of foot and hand, belonging to the *chiropterus* group of *Bolitoglossa* rather than to *Thorius*.

Bolitoglossa dimidiata* sp. nov.

(Text figs. 1 and 2)

Holotype. EHT-HMS No. 17677 ♂, Guerrero, near Mineral del Monte, Southern Hidalgo, Mexico, August 8, 1938; E. H. Taylor, collector.

Paratypes. EHT-HMS No. 17671-17676; 17678-17689; 17691-17692; 17694-17705, Guerrero and El Chico National Park. Elevation, approximately 2,660 to 3,300 meters.

Diagnosis. A diminutive form of the *chiroptera* group, the maximum size under 28 mm. from snout to vent; nostrils permanently enlarged, pointed almost directly forward; eye about as long as snout

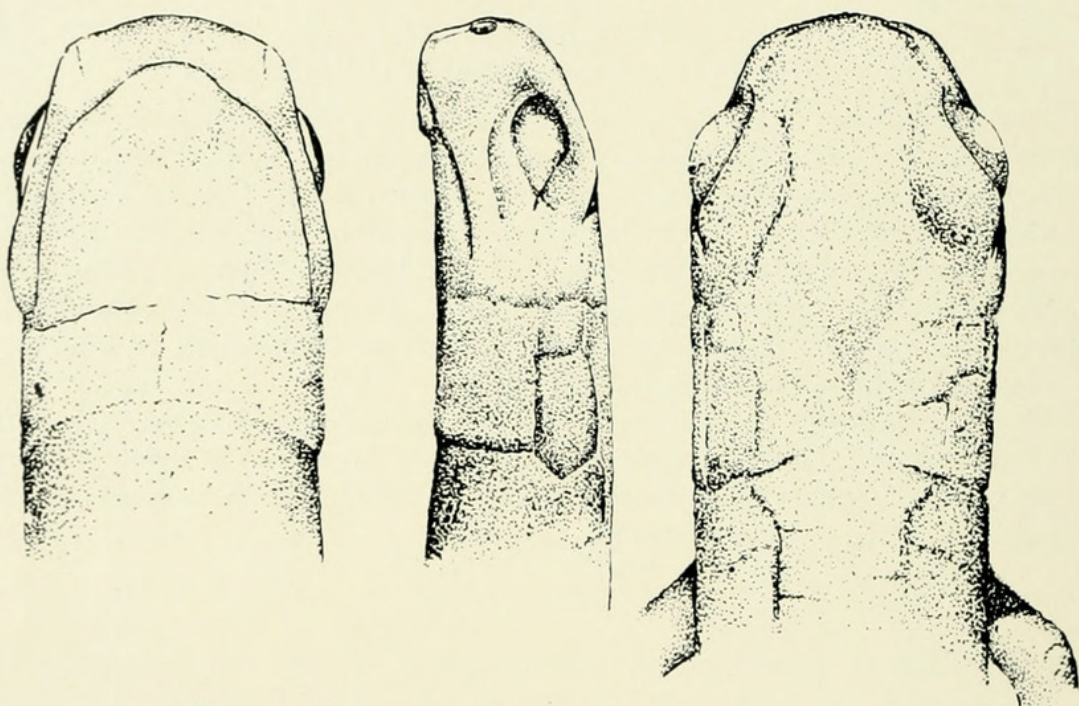


FIG. 1. *Bolitoglossa dimidiata* sp. nov. Guerrero, Hidalgo. EHT-HMS, No. 17674. $\times 7$.

or a little longer; groove from under eye does not reach edge of upper lip; limbs separated by about four (five occasionally in females) costal folds; width of head in snout to vent length about six times; first toe shorter than fifth; a projecting growth from cloaca in males.

Description of the holotype. Head rather flat between orbits and in occipital region; snout rather rounded at tip, but the curving line seen from above is broken by the subnarial swellings; no canthus rostralis; nostrils large, directed forward, their diameter contained in distance from the eye about twice; distance between nostrils (1 mm.) minutely greater than distance from eye to nostrils; inter-

* Mr. Radclyffe Roberts has informed me that *Oedipus* Tschudi (1838) for a genus of salamanders is preoccupied by *Oedipus* Berthold (1827), an Orthopteran genus.

orbital distance (1.6 mm.) greater than the width of an eyelid (1 mm.); length of eye (1.6 mm.) equal to the length of the snout (1.6 mm.); subnarial swellings relatively very large, prominent; a well-defined hedonic gland on the chin; tongue typical with a well-defined sublingual fold; four-five maxillary teeth confined to region under the subnarial swellings; three teeth pierce the edge of lip on premaxillary; mandibular teeth enlarged, irregular, seven on each side; vomerine teeth three or four on each side in two somewhat curved diagonal series not extending beyond the outer level of choanae; parasphenoid teeth in a single group, narrowed anteriorly, widening posteriorly, and notched behind; separated from the vomerine teeth by a distance about four times the diameter of a choana.

The groove below eyelid terminates below the posterior part of eye about midway between eye and mouth (not reaching lip as in most if not all of the members of the genus *Thorius*); groove running back from angle of eye more or less distinct (if slightly dried the groove appears); first transverse groove crosses down behind the mouth angle and across anterior part of throat; a well-defined nuchal fold crosses throat and is continued on sides of neck as an irregular groove; growing less distinct, it meets the groove from opposite side; on each side of the dorsolateral region of neck, connecting the two transverse grooves, are two longitudinal grooves (the upper irregular); the area between them is divided into two unequal areas by a short transverse groove which continues a little on the dorsal side of neck; thirteen costal grooves, the axillary and inguinal more or less distinct; the posterior extension of the hyoid apparatus below skin makes a broad fold on side of neck; it terminates posterior by arm insertion; a constriction on base of tail more or less developed; about twenty grooves visible on proximal part of tail; a glandular spot behind insertion of femur; cloacal walls with numerous minute papillae.

Limbs short, when adpressed, separated by about four (or slightly less) costal folds; hand with digits webbed at base, the fingers moderately widened, the terminal phalanx and part of the adjoining phalanx free in the three outer fingers; tip of first finger not free; pads on ventral surface of tips of digits swollen; foot with inner toe involved in the web; outer toe very short, but with tip protruding from web; three middle toes each with at least the outer phalanx free.

Color in life. Above uniform lavender with a small, somewhat reddish spot on the dorsal surface of the femur; below dirty cream-white with a scattering of pigment; subnarial swellings creamy white; a few minute flecks of white on sides; indication of a buff spot behind transverse groove on dorsal side of neck.

Measurements in mm. Nos. 17677, 17674; sex ♂, ♂; snout to anterior part of vent, 24.7, 23.3; anterior end of vent to tip of tail, 28.4, 25.2; head width, 4, 4; head length to nuchal fold, 6.2, 5.5; axilla to groin, 14, 13.8; arm, 5.1, 4.65; leg, 5.6, 5.5.

Variation. Males, for the most part, agree with the description; females differ in being somewhat darker in coloration above, the

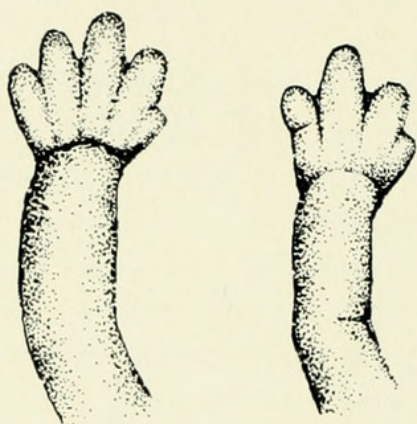


FIG. 2. *Bolitoglossa dimidiata* sp. nov. Guerrero, Hidalgo. EHT-HMS, No. 17674. $\times 7$. Foot and hand.

fawn-colored spot on the neck being usually distinct. The ventral surfaces are often much more pigmented with yellow-cream flecks visible on chin and throat.

Females differ in having larger series of jaw teeth. In No. 17700 there are 19-19 maxillary teeth; vomerine teeth, 4-4; premaxillary teeth, 6; mandibular teeth, 18-19. The nostrils in females are about the same size as those in the male type, but the subnarial swellings are scarcely noticeable. The limbs of females are proportionally shorter compared with the axilla to groin distance and are separated in adult females by about four and one-half to five folds.

The males have one or two fleshy protuberances from the postero-dorsal wall of the cloaca, the significance of which is not known. They strongly suggest some type of intromittent organ. A similar growth, less conspicuous, is present in the cloaca of *B. chiroptera*, lending weight to the suggestion of close relationship between the forms.

One specimen, No. 17674 (measurements given), has the snout broader, the nostrils directed completely forward, the eye a third longer than the snout; and there appears to be a slight difference in the character of the toes. It was collected in a lot with several others in the same pile of leaves and agrees with the others in characters not mentioned. It is likely that the differences are anomalous (figured).

There is a specimen of this species in the Harvard collection, (No. 8018) one of the type series of *Oedipus townsendi* from Guerrero, Hidalgo, and two specimens numbered No. 67654, from Hidalgo.

It can be separated from *B. multidentata* by the enlarged nostril and the much shorter legs and smaller body; from *B. chioptera* by the enlarged nostril (which remains large in the adult), and by a somewhat smaller size.

Living among the wet leaves on the ground at an elevation above 2,000 meters on the Cerro San Felipe near Oaxaca, I discovered a tiny salamander with a very large, elongated nostril which appears to be an undescribed species.

Thorius pulmonaris sp. nov.

(Text figs. 3 and 4)

Holotype. EHT-HMS No. 16684, collected on Cerro San Felipe, about 12 km. north of Oaxaca, Oaxaca, August 18, 1938, by Edward H. Taylor.

Paratypes. EHT-HMS Nos. 16676-16711, 16713-16733. Collected same locality, August 18-22, 1938, by Mr. and Mrs. Radclyffe Roberts and Edward H. Taylor.

Diagnosis. A diminutive member of the genus, with permanently enlarged, elongate-oval nostrils, placed diagonally; the groove below lower eyelid intersects the edge of lip; limbs, when adpressed, separated by 2.5-5 costal folds; 12 costal folds (13 grooves) from axilla to groin; no teeth on maxilla; parasphenoid teeth in a single group.

Description of the holotype. Adult female. Head a little wider posteriorly than the body, about as deep as body; distance between orbits a little greater than the width of a single eyelid; nostril elongate, from one-half to two-thirds the diameter of the eye; subnarial swelling not strongly indicated (prominent in males); snout narrowed anteriorly but not "pointed"; groove below eyelid intersects the mouth directly below posterior corner of eye; posterior ends of eyelids not pushed under a diagonal fold; first head groove crosses throat, and terminates on dorsal surface of the head at about level

of eye; a groove forming an arch is more or less apparent on throat, resting on the transverse groove; gular fold prominent, crossing throat, then passing somewhat diagonally across the side of the neck to the dorsal surface, but failing to meet its fellow from the opposite side; groove from behind corner of eye to first vertical groove not or barely indicated in type (more or less distinct in certain other specimens); a groove beginning behind middle of eyelid extends back irregularly to the nuchal fold; region in front of the gular fold distinctly swollen on side of neck; region between eyes

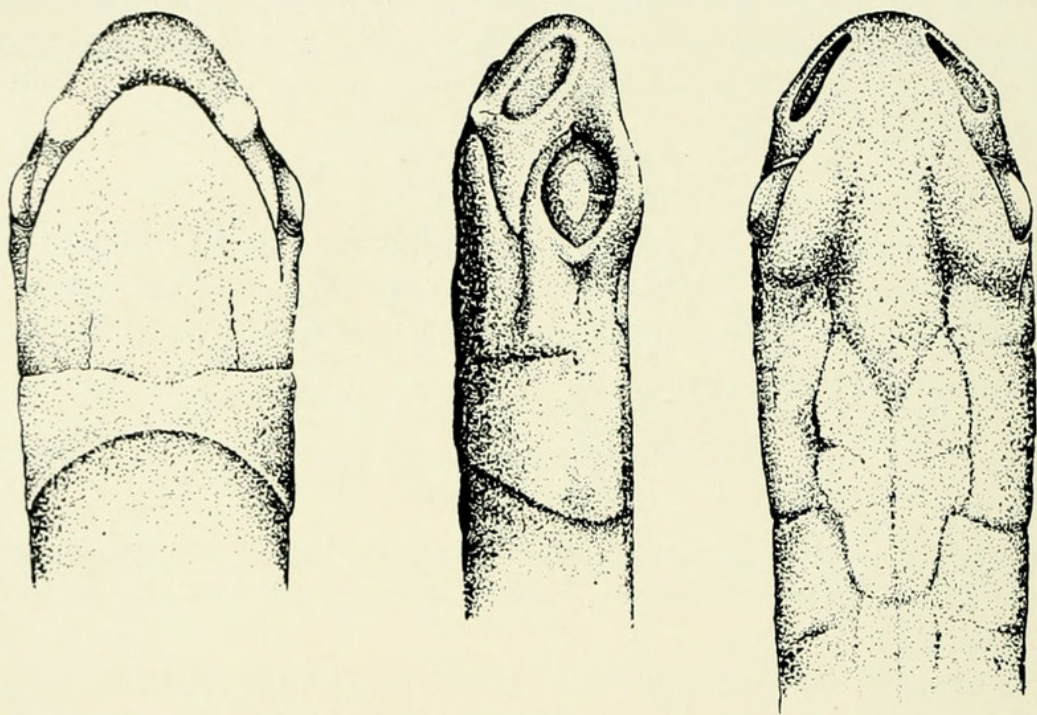


FIG. 3. *Thorius pulmonaris* sp. nov. EHT-HMS, No. 16712. Cerro San Felipe, Oaxaca.

and occipital region somewhat curving. Tongue boletoid; a free projecting sublingual fold; four premaxillary teeth; no teeth discernible on the maxilla; mandibular teeth present; twelve vomerine teeth arranged in a single elevated median patch, partly in two rows, not extending outward beyond the inner edge of choanae; the choanae are narrow slits; parasphenoid teeth in a single elongate patch which is somewhat tongue-shaped, not notched behind, the group separated from the vomerine teeth by a distance nearly equal to the width of the vomerine series.

Skin above generally smooth, but with pitting on the head; pits on snout very distinct; on back, pits are smaller, less distinct; thirteen costal grooves (including the distinct axillary and inguinal grooves); twelve costal folds; limbs small, separated when adpressed

by five folds (in males from two and one-half to four folds); cloacal walls folded (in males papillate); base of tail with a definite constriction; thirty-five grooves on tail, discernible to near tip; a small glandular area posterior to insertion of femur (a circular gland on tip of chin in males not very conspicuous externally).

Digits on the hand rather wide, the tip on first finger free from web; three middle toes free for about a third of their length, the outer and inner toes barely emerging from web; small, distinct pads present at tips on under side of digits; tail longer than head and body; the width of the head contained in distance between snout and posterior end of vent 6.1 times; length of snout slightly longer than eye; width of an eyelid a little less than interorbital distance; length of nostril three-fourths to four-fifths of eye length.

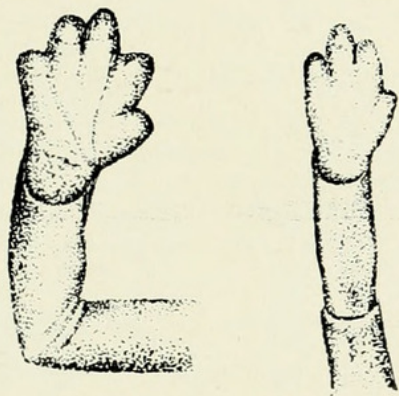


FIG. 4. *Thorius pulmonaris* sp. nov. EHT-HMS, No. 16712. Cerro San Felipe, Oaxaca. Foot and hand. $\times 7$.

Color. Above lavender-slate, below dirty whitish to lavender-brown, less heavily pigmented under tail (sometimes darker brownish or lavender below); a series of small light flecks on chin and occasional ones scattered on ventral surfaces; a few minute whitish flecks on sides; subnarial swelling and a spot on lower eyelid, whitish.

Measurements in mm. Nos. 16684, 16712, 16733; sex, ♀, ♂, ♂; snout to posterior end of vent, 24.4, 27.2, 27.5; tail from posterior end of vent, 35, 35.6, 36; width of head, 4, 4.3; 4.2; length of head, 5.3, 6.1, 6; snout to gular fold, 4.8, 5.4, 5.2; arm, 4.2, 5.6, 4.7; leg, 4.4, 4.6, 5.2; axilla to groin, 15, 14, 15.

Variation. The largest specimen has the maximum snout to (posterior part of) vent length of 27.5 mm. and a maximum total length of 63.5 mm. Males have longer snouts and shorter axilla to groin measurements, resulting in having adpressed limbs closer together. In some of the specimens the vomerine teeth are larger, varying in number from as low as four or five teeth in some males to eight in

others, always in a transverse or slightly V-shaped series. They do not seem to be separated medially and only occasionally are there two rows present.

Remarks. Specimens were found at an elevation of about 2,000 meters on the mountain under leaves and trash on the ground. They were very unequally distributed. Higher on the mountain they are replaced by *Thorius narisovalis*, a form with an enlarged nostril that is about half the diameter of the present species, and living almost exclusively under bark and logs.

The very large nostril and the great amount of surface on the nasal walls suggest that the nasal passage may be used for direct exchange of oxygen in respiration. In males the size of the nostril is only slightly larger than in females of similar length.

Thorius pennatulus Cope

(Plate XLVII, figs. A, B; Text fig. 5)

Thorius pennatulus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1869, pp. 111-112 (Type description; type locality "Orizava"); (?) Boulenger Catalogue of the Batrachia Gradientia, s. Caudata British Museum. 2d Ed. 1882, p. 79, plate 3, fig. 2.

Oedipus pennatulus Dunn, The Salamanders of the Family Plethodontidae, 1926, pp. 357, 374-376, 439, fig. 64 (*part.*); Taylor. Univ. Kansas. Sci. Bull. XXV, 1938 (1939) No. 14, pp. 293-294.

A number of specimens taken at the mountain pass about three kilometers southwest of Acultzingo have been referred to this species.

Some were found under rocks in crevices in moist clay along the edge of the old cobblestone pavement. Others were taken a few hundred feet higher in the thick moss under a lone pine tree near the summit. The behavior of the two groups of specimens was different; those taken in the moss were usually coiled in a watch-spring spiral as if imitating the spirally coiled millipeds which infest the moss and which are about the same size as the smaller salamanders. Those taken under rocks in clay were not so coiled.

In the preserving fluids, those taken in the moss seemed to become rigid and distorted at death, the musculature of the side of the head and neck appearing quite distinctly through the skin, and the posterior projection from the hyoid stands out very clearly. (See pl. III, fig. B.)

Those taken in the clay remained without distortion when preserved, showing little or no trace of the lateral neck musculature or cartilage. In these specimens the terminal part of the tail was white, which on examination proved to be due to a white parasitic worm which was just beneath the epidermis. These worms are an

immature stage in the life history of some unknown cestode. They are from two to four millimeters long. They have not been identified. No worms were found in specimens taken in the moss.

The following specimens are referred to *Thorius pennatulus*: EHT-HMS. Nos. 17731-17786; 17788-17793.

The two lots of material from this same general locality are somewhat puzzling.

They differ in the amount of pitting on the head, those from the moss being almost wholly smooth save behind eye and on neck. These specimens likewise have the vomerine teeth set on a higher ridge and the deep groove from below eye intersects the mouth at a point slightly farther forward. These may represent two distinct species, but I feel that further study on live material is necessary

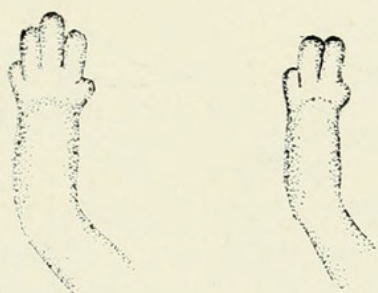


FIG 5. *Thorius pennatulus* (Cope) EHT-HMS, No. 12141; Acultzingo, Veracruz; foot and hand. $\times 6$.

to determine this point. The types are apparently lost and new topotypic material must be obtained to deal satisfactorily with these diminutive salamanders.

I have examined the specimens in the U. S. National Museum referred to this species. All are old and for the most part badly preserved. Certain ones I believe belong to different species.

USNM No. 47608 Cerro de San Felipe, Oaxaca, apparently belongs to *Thorius narisovalis* sp. nov. (A description of this specimen is given by Dr. E. R. Dunn, "The Plethodontidae," p. 375.) No. 47797 Reyes (Oaxaca?), Mexico, with an elongated oval nostril; is apparently a specimen of *Thorius pulmonaris* sp. nov.; No. 25101, Mirador, Mexico, is broken in several pieces, the head is mutilated and the limbs missing. I cannot identify it certainly with any species. Nos. 30348-30349 Tehuantepec, Sumichrast Coll. are two fragmentary specimens, at least one of which, represented by a head, belongs to a species having the "sharp snout." If this specimen actually originated in Tehuantepec it is likely that it is an undescribed form, perhaps related to the sharp-nosed salamanders

of Central and South America. The British Museum specimens listed by Dunn (*op. cit.* p. 439) from Cerro San Felipe, Oaxaca, may likewise be referable to another form.

The specimen figured by Boulenger (*loc. cit.*) if correctly drawn, cannot belong to the species at hand; the dark lateral band, whitish-margined above, and the absence of the deep groove from below eye to mouth, strongly suggests another species.

Thorius narisovalis sp. nov.

(Plate XLVII, fig. 3)

Type. EHT-HMS No. 17859; collected at an elevation of about 2,600-3,000 meters on Cerro San Felipe, 15 km. north of Oaxaca, Oaxaca, August 18-22, 1938, by Edward H. Taylor.

Paratypes. EHT-HMS Nos. 17794-17858; 17860-17870; same date, locality and collector.

Diagnosis. A diminutive species related to *Thorius pennatulus*, but differing in being larger and in having the dorsal part of head covered with relatively large pits; the groove below eye normally intersects the line of mouth slightly posterior to the posterior corner of the eye. No teeth on maxillary. Fingers and toes better developed, with a greater degree of independence, than *pennatulus*.

Description of the type. Adult female. Head not wider than the body, and less deep; the distance between the orbits less than the width of a single eyelid; nostril oval about .56 mm. in greatest diameter, its distance from the extreme tip of snout equal to less than half diameter; length of eye 1.45 mm.; a very minute fold back of eye under which the posterior part of eyelids terminate; length of eye greater than length of snout (1.3 mm.); occipital region rather flat, with slight depressions next to orbits; a groove behind eye continues to near the nuchal groove; a strong groove below eye intersects the line of mouth behind posterior corner of eye; snout somewhat narrowed anteriorly, but not "sharp" or "pointed"; subnarial swellings prominent for a female; snout projecting very moderately beyond mouth; line of mouth diagonal, angulated near narial swelling and at point of intersection with the subocular groove; a strongly defined transverse groove crosses throat and up across sides of head to dorsal surface; a groove, in the form of an arch on chin, which rests on the transverse groove; a strong nuchal fold across throat which continues diagonally backward across the side of neck to near dorsal surface where it is again directed transversely but fails to completely cross the medial part of the dorsal surface; on the side of the neck there is an elongate fold,

or ridge, which terminates posteriorly at the groove from the nuchal fold; behind this the posterior hyoid extension makes a prominent raised fold which continues to the second costal groove, the cartilage itself terminating before this point; 13 costal grooves, 12 folds; 33 folds from hind legs to tip of tail; tail constricted at base, more or less circular proximally then laterally compressed distally; a more or less distinct median dorsal groove present on body; adpressed limbs separated by six costal folds; fingers in the following increasing order of size, 4, 1, 2, 3; the toes, 5, 1, 2, 4, 3; only extreme tip of first finger free, while the two middle fingers are free for nearly half their length beyond metacarpals; extreme tip of first and fifth toes free; three middle toes free for about half their length beyond metatarsals; terminal pads on tips of digits moderately prominent. Tongue boletoid, free, a sublingual fold; three premaxillary teeth not piercing the lip; no maxillary teeth; vomerine teeth four on each side, on a strongly elevated narrow ridge; choanae small, no wider than the narrow, deep grooves emerging from them; 19-20 mandibular teeth; parasphenoid teeth in a single group narrowed greatly anteriorly, widened posteriorly without or with only a very slight posterior median notch, separated from vomerine teeth by a distance equal to the vomerine series. Dorsal and lateral regions of head strongly pitted; dorsal surface of body with the pitting less distinct; a slight wrinkling on the sides between the costal folds; tail pitted and with slight corrugation; smooth or dimly pitted on ventral surfaces.

Coloration. Reddish-brown on entire dorsal surface of body and tail; sides blackish, head dark; venter lighter, gray-brown, with a few cream dots; the dorsal and lateral markings rather strongly contrasted in life, but in preservatives are indistinct unless submerged in water.

Measurements in mm. Type, 17859; largest female, 17819; and largest male, 17854, respectively. Snout to posterior end of vent, 28.8, 31, 27.5; tail, 32.5, 40 (estimated, the tail broken and regeneration begun), 35; snout to arm, 7.8, 8, 7.5; axilla to groin, 16.8, 17.5, 16; arm, 4.3, 4.8, 4.3; leg, 4.6, 5.3, 4.8; width of head, 4.2, 4.5, 4; snout to nuchal fold, 5, 5.6, 5.15.

Variation. Adpressed limbs are separated by from four and one-half to six folds, the larger number being in larger females; the lower, in smaller males. In color some of the females are blackish above, lacking the dorsal reddish-brown mark. A few have tiny

orange-brown stripes on each side of the medial line with a separate nuchal spot.

In many specimens the subnarial swellings of females were as large as in the males. In larger males from one to three of the premaxillary teeth pierce the lip. In most of the specimens the lateral grooves of nuchal fold meet on the middorsal line. The number of segments on tail varies between 22 in the smallest specimen (15 mm. snout to end of vent), to 36 in a large female (29.5 mm. snout to end of vent). One case showed the groove, from nostril to lip, cut completely through the lip to choana.

Remarks. The specimens of this species were found under the bark on fallen trees together with *Bolitoglossa smithi* and *Bolitoglossa unguidentis* from the same locality. Only one or two were found on the ground under logs. *Thorius pulmonaris*, the other representative of the genus *Thorius* found on San Felipe, was invariably found in wet leaves on the ground, but at a lower elevation than the other species mentioned. The *Thorius narisovalis* were more active than the other species, usually starting for cover when they were exposed by the removal of the bark. When touched they would jump or throw themselves from the log to the ground and hasten to ensconce themselves under leaves or other debris. At no time did I find them passive or coiled.

Ambystoma bombypella sp. nov.

(Plate XLV, fig. 1)

—— Taylor, Univ. Kansas Sci. Bull., XXV, 1938 (1939) pl. XXIV, fig. 1.

Holotype. EHT-HMS No. 3997, collected near Rancho Guadalupe, 14 km. east of San Martín, (Asunción) México, by Edward H. Taylor.

Paratype. EHT-HMS No. 3998, collected same date and locality by Hobart M. Smith; No. 18896, 15 km. W. of Morelia, Michoacán; E. H. Taylor, collector.

Diagnosis. A medium-sized salamander with eleven costal folds; limbs overlapping more than length of hand when adpressed; a pair of metatarsal tubercles and a pair of metacarpal tubercles; tail thickened, strongly compressed, lacking a dorsal fin; fingers and toes without webs, or at least not extending beyond the metatarsals and metacarpals; tongue large, lamellae radiating somewhat; vomero-palatine tooth series broken, the vomerine series forming a median angle which reaches in advance of choanae; color brownish above, light brownish-white below.

Description of type. Head low, the line of the mouth forming a slightly sigmoid line; length of eye less than its distance from nostril; interorbital distance slightly less than length of snout; distance between nostrils less than interorbital distance; eyelid in interorbital distance three and one-half times; a slight groove behind eye can be traced back to end of the gular fold; a vertical groove crossing angle of jaw barely indicated; gular fold present; tongue broad, the lamellae radiating forward; choanae large, the diameter of one contained in the distance between them, four and one-half times.

Palatine teeth 12-10, not reaching forward to the level of the middle of choanae; vomerine teeth 15-17, the series forming a broad angle not or but scarcely separated medially; a circular depression in middle of palate about half diameter of a choana; maxillary-premaxillary teeth 56-54; mandibular teeth about 60-60; 12 costal grooves, 11 folds; no splenial teeth; limbs well developed, overlapping length of hand (in paratype, to elbow); digits flattened, terminating in fine rounded points with a very slight terminal depression of horn; phalangeal formula of fingers, 2, 2, 3, 2; of toes, 2, 2, 3, 4, 2.

Skin rather shiny or silky in appearance due to very fine reticulated striations; head with a few enlarged pits above and anterior to orbits; trace of the lateral line organs on body dimly discernible in type (more so in the younger ? paratype).

Measurements of type and paratype in mm. Nos. 3997, 3998; sex, ♀, ♀; snout to vent, 81, 67; tail, 61, 52.3; snout length, 8.4, 5.8; snout to gular fold, ventral, 20.2, 17; snout to arm insertion, 28.5, 23.5; axilla to groin, 36.5, 29.5; eyelid width, 2.1, 2.1; interorbital width, 6.8, 5.3; distance between nostrils, 5.5, 4.6; arm, 24.3, 22.3; leg, 26.6, 24.8.

Color in life. Above uniform grayish-brown to lavender-brown, with a faint, very narrow, median, dark line from shoulder to base of tail; a slight darker line follows the diagonal groove behind eyes; lower half of sides of body and tail light tan or brownish-white; abdomen grayish to brownish-white; chin cream-yellow.

Variation. A single paratype, somewhat smaller than the type, agrees in most characters. The color above is somewhat more lavender and the tail shows some indefinite darker spotting; the teeth are as follows: maxillary-premaxillary, 41-38, the series not extending so far posteriorly as in type; mandibular teeth about 48-48; vomeropalatine series, 7 + 14, — 7 + 16, the vomerine groups forming a curving series slightly broken medially; the depression in the palate

is very much wider and shallower; there is no trace of a dark line behind eye.

Remarks. The type and paratype were taken on a hillside near a small permanent artificial pond. They were under rotting logs. In the immediate vicinity I also found the single type specimen of *Ambystoma schmidtii* Taylor, a species, if one may judge by the teeth, related to *Ambystoma texanum* (Matthes). The form here described is related to the *tigrinum* group, but may be readily distinguished by the fine texture of the skin, and coloration. While resembling *Ryacosiredon* in certain characters, the absence of larval dental characters precludes an association with this genus.

Ambystoma amblycephala sp. nov.

(Plate XLV, fig. 2)

Type. EHT-HMS No. 16443, ♀, 15 km. west of Morelia, Michoacán. September 10, 1938; E. H. Taylor, collector.

Paratypes. EHT-HMS No. 16442, 16444. Topotypes.

Diagnosis. A rather large species with 11 costal grooves; caudal fin tending to disappear save for a fine ridge; web between metatarsals and metacarpals distinct; fingers free to a point near distal ends of the metacarpals; metatarsals included completely in web; phalanges free, fingers and toes with a slight fringe; limbs overlap distance equal to hand; 31 to 37 palatine and vomerine teeth on each side; teeth more or less bifid, in a low-arched transverse series; 70-80 maxillary-premaxillary teeth, in full-grown adults, on each side; mandibular teeth about same; lateral edges of tongue free.

Description of the type. Head longer than broad, much more than twice as wide as deep. Distance between eyes (7.2 mm.) less than length of snout (8.2 mm.); length of orbit (4.1 mm.) less than distance to nostril; nuchal fold distinct; a transverse groove across jaw angle. Maxillary-premaxillary series of teeth 72-70, the teeth extending some distance behind the level of the palatine teeth; mandibular teeth about as numerous; palatine and vomerine teeth in a practically continuous series on a transverse elevated ridge, which forms a very slightly elevated arch, the most anterior teeth not reaching the anterior level of choanae; about 67 teeth altogether, the tips brownish; palate with a broad, shallow medial groove, with a rounded cavity posteriorly in which the openings of the mucous glands are discernible; tongue lamellate, the plicae running longitudinally, the edge free laterally.

Skin of head with minute pits, and a few large pits on each side between orbits and running forward; and another scattered series of

large pits more or less surrounding lower part of orbit; no traces or only dim traces of the lateral line system on body. Adpressed limbs overlap length of hand; digits webbed between metacarpals and metatarsals, the web failing to reach the ends of metacarpals but completely includes the metatarsals; a very slight fringe on the sides of the digits, the tips more or less covered with a horny deposit; two metacarpal tubercles and two metatarsal tubercles; tail lacking a dorsal fin save for a slight dorsal ridge; tail as long as body, excluding head.

Color. Above, blackish; below, gray with a series of ventrolateral cream spots; the median ventral region a little darker. Breast and throat with some cream markings. Sides of the proximal part of tail of lighter color than distal part.

Measurements in mm. Nos. 16443, 16442, 16444; sex, ♀, ♀, ♀; snout to posterior end of vent, 90, 93, 64.5; tail, 71, 60, 47; width of head, 17.5, 16.5, 13.5; length of head, 18.5, 20, 16; snout to nuchal fold, 22, 22, 16.2; snout to arm, 28, 30, 27; leg, 30, 33.2, 27.1.

Remarks. All three specimens are slightly shriveled, due to having been preserved some time after death. Normal condition of the surface of the body is somewhat uncertain. The smallest specimen has a smaller number of maxillary and mandibular teeth, as is true of the young of many species, the series increasing posteriorly in older specimens as the jaw grows. The vomerine teeth form a higher arch, the anterior teeth reaching farther forward than the anterior level of the choanae. The two paratypes do not have the series of cream spots as pronounced as in type and the tails are somewhat more slender, darker, and the dorsal fin is somewhat more prominent in the younger specimen. The larvae are unknown.

From *Ambystoma bombypella* the species differs in color (probably also in skin texture) and in having a very much greater number of jaw teeth. The arrangement of the vomero-palatine series is different. In *bombypella* the palatine teeth are separated from the angular vomerine series.

From *Ambystoma ordinaria* it differs in having nearly double the number of teeth in the adults, and likewise differs in the number and arrangement of the vomerine and palatine teeth. The webbing extends between digits to the base of the metacarpals and metatarsals, which is not true in *ordinaria*. I have compared these three forms with transformed *Siredon mexicana* from which all differ in shape of head, skin character, body proportions. A figure of that form is included for comparison.

Ambystoma ordinaria sp. nov.

(Plate XLVI, figs. 1, 2, 3)

Type. EHT-HMS No. 16367, adult female, collected in a small stream at an elevation of about 9,000 feet, four miles west of El Mirador near Puerto Hondo, Michoacán, September 2, 1938. E. H. Taylor, collector.

Paratypes. EHT-HMS Nos. 16364-16366, 16367A, 16368-16370, 16372-16382, 16384-16386. Taken same place, September 2 and 3, 1938. Same collector.

Diagnosis. A rather large salamander with eleven costal grooves from axilla to groin; limbs, when adpressed, overlapping a distance equal to length of hand, or arm to elbow; digits unwebbed, free as far as from one-third to one-half of the metacarpals and metatarsals; caudal fin persistent, tips of digits more or less covered with horn; premaxillary-maxillary tooth series 39-46 on each side of jaw; 9 to 11 palatine teeth more or less separated from the vomerine series which is either in a single curved series or divided into two diagonal groups. Adults uniformly grayish-black above, somewhat lighter laterally and on belly.

Description of type. Head longer than broad, and much wider than deep; distance between the eyes (9 mm.) greater than length of snout (7.3 mm.); length of orbit (5 mm.) equal to distance to nostril; maxillary-premaxillary teeth, 47-42, the teeth extending back to the posterior level of the palatine series; the individual teeth directed mesially; palatine teeth in a group of 10-12 on each side, separated from the vomerine series by a diastema; about 27 teeth in the vomerine group, which is continuous and curving; mandibular teeth, 48-48; many of the teeth in both upper and lower series slightly bifid; tongue large, lamellated, the plicae running longitudinally; tongue free on sides.

Body about as deep as wide; head much wider than deep; arm rather short, failing to reach beyond tip of snout; digits tipped with horn, in the following order of size: fingers, 1, 4, 2, 3; toes, 1, 5, 2, 3, 4; two palmar (metacarpal) tubercles; a pair of metatarsal tubercles. Skin on head minutely corrugated and pitted; traces of the lateral-line organs on head and body inconspicuous or absent.

Color. Grayish-black above, nearly uniform; grayish on sides and venter; tips of digits blackish-brown.

Measurements in mm. Nos. 16367, ♀, 16366, ♀, 16365, ♂, snout to posterior end of vent, 86, 80.5, 68.7; tail, 76.1, 71, 60; width of head, 18.8, 17, 15; length of head, 24, 21.2, 19; depth of head, 11.8,

11, 8.3; snout to nuchal fold, 19.8, 18, 16; snout to arm, 29.2, 25.5, 21.5; axilla to groin, 38, 37.5, 28.2; arm, 26, 24.2, 24; leg, 29.2, 25, 24.

Variation. In general appearance the two adult paratypes are similar. In both, however, the third toe is slightly longer than the fourth, instead of shorter, and traces of the lateral line organs persist as a series of minute openings which are slightly elevated and which are frequently white in color; these are confined to the lateral and ventro-lateral rows, the latter continued on the breast.

In No. 16366, ♀, a few spots are also visible in the dorso-lateral row.

The male (No. 16365) has an enlarged, flattened cloacal gland. As is typical of the males of most salamanders this specimen has longer limbs, the adpressed limbs overlapping nearly to the elbow. In all the specimens the caudal fin is only slightly narrower than the fleshy part of the tail.

Larvae. In the larval specimens, all collected with the type in a tiny stream, near its headwaters, I find two groups of larvae which I interpret as normal and neotenic forms. The entire series ranges from tiny specimens 25 mm. (snout to posterior part of vent) in length, to the large neotenic forms 87 mm. long. The specimen having the greatest length contains fully developed eggs in the ovaries which are equally as large, and similarly colored to those present in the type specimen.

The younger larvae have the lateral line organs in three series, a dorsolateral, a lateral, and a ventrolateral, the last continued onto the breast. These are usually conspicuous due to the presence of white or cream spots about their external openings. In many larger and some of the smaller larvae the light spots are wanting. In some of the larvae the tails are longer than head and body.

Another variation is evident in the vomerine series. Part of the longer and shorter tailed forms have the teeth in a continuous arch; and part have the series distinctly divided. This variation is evident too in the transformed specimen. The type, a female, differs from the other adult male and female. The adults were taken under water with the larvae.

Two larval specimens are figured with the type. It is possible the type transformed from a neotenic specimen, the two other adult specimens from subadult larvae. In the very young larvae (25 mm.) the dorsal fin extends to the shoulders but it has disappeared on body when the larvae have reached about 40-45 mm., the caudal fin terminating abruptly near insertion of the hind legs.

The differences between this form and *Ambystoma amblycephala*

are discussed under that form; from *bombypella* it differs in the character of skin, coloration and the arrangement of the palatine and vomerine teeth.

I am not certain whether the small stream in which the specimens were found, empties into the drainage system of the Balsas river or that of the Lerma (Rio Grande) river. The elevation was about 9,000 feet, and may be near the divide between the two systems.

Siredon mexicana (Shaw)

(Plate XLV, fig. 3)

Gyrinus mexicanus Shaw, Naturalist's Miscellany Vol. 9, 1798, pls. 343, 344.

Siredon humboldtii Duméril and Bibron, Erp. Gén., Vol. 9, pp. 176-181.

Ambystoma mexicanum Lafrentz, Abh. Ber. Mus. Natur-Heimat. Natur. Ver. Magdeburg, Bd. VI, Heft 11, 1930, pp. 95-105, pl. II, fig. 1; Wolterstorff, *op. cit.* pp. 135-138, figs. 4, 5.

This species, the form of *Siredon* longest known, appears to be confined, normally, to certain lakes and swamps of the Valley of Mexico. A series of ten were purchased at Lake Xochomilco in 1938. These are EHT-HMS Nos. 18946-18955.

Description. A large neotenic salamander with head broader than long. The maxillary-premaxillary teeth vary from 42-51 on each side of jaw, the teeth extending slightly behind the posterior level of choanae; mandibular teeth 48-52 on each side, the posterior teeth of the series somewhat enlarged; palatine teeth in straight, nearly parallel series, containing from 8 to 16 teeth, the smaller number in the older specimens; vomerine series consist of from 24 to 32 teeth on each side, the series directed diagonally forward, but are separated medially by a distance somewhat less than half the length of a single series. The teeth are often arranged in short diagonal rows rather than in a serial line; vomerine teeth separated from the palatine by a diastema; 28 to 38 splenial teeth, the posterior teeth arranged in short diagonal series of three or four teeth. The smaller numbers are in the older specimens. (In very old specimens it may be that most of the splenial teeth are lost or covered by the gums.)

Skin moderately smooth, the pitting on head and body rather indistinct or obsolete in most cases, the head occasionally with a few small craterlike pits; occasionally the skin has a slightly granulated appearance. The dorsal fin inserts anteriorly at a point more than a centimeter behind the posterior gill insertion; anteriorly the fin is a little more than a low fold, but on tail it rises to a height of several millimeters; tail sharply pointed at distal end; limbs, when adpressed, overlapping about the length of the foot, or less in females filled with eggs; digits including the distal part of the

metatarsals and a still larger part of the metacarpals, free, the digits flat and pointed. A pair of metatarsal tubercles and a pair of metacarpal tubercles normally present, but one or another may be absent. Males have an enlarged cloacal gland, which is reduced in females.

Measurements in mm. Largest male, 18954, largest female, 18950; snout to posterior end of vent, 132, 125; tail, 95, 85; snout to arm, 43; 45; axilla to groin, 58, 62; width of head, 33, 37; length of head, 44.4, 45; arm, 36, 38; leg, 40, 38; nuchal fold free, 8, 10.

Transformed adult. (Field Museum Natural History No. 19179.) I do not have the history of this specimen. The label states "Mexico City, Mexico, Coll. Emil Witschi, July 1933." Mr. Karl Schmidt states that he believes that the specimen was artificially transformed.

This specimen is squat, the body short, plump, and the head very short and wide. The tail is much shorter than head and body; distance between the eyes (10.2 mm.) distinctly longer than snout (7.4 mm.); a few faint traces of pits are discernible; nostrils rather narrow, elongate, the distance between them greater than their distance from the eye.

Maxillary-premaxillary teeth 63-63; palatine teeth 7-7 on each side in a nearly straight, transverse line; vomerine teeth about 11-13, the series tending to form a very broad angle, but with a slight diastema medially; a median well-like cavity in the palate; choanae rather large; tongue large, the lamellae parallel for the most part; about 60-60 mandibular teeth.

Digits rather short, pointed, free on foot to near the distal end of the metatarsals, on hand, the distal tip of the metacarpals free; a well-developed inner metacarpal tubercle, the outer apparently wanting; a strong inner metatarsal tubercle, the outer barely indicated; digits in the following ascending order of size: fingers, 1, 4, 2, 3; toes, 1, 5, 2, 4, 3; adpressed limbs overlap the length of foot; 11 costal folds. Tail strongly compressed without trace of a membranous fin; dorsally skin smooth, but on sides of head and body, as well as on tail, it is granular.

Deep brown on dorsal surface of head, dorsal and half of the lateral region of body and on tail; yellowish, low on sides and chin; muddy yellow on abdomen. The body above and below with scattered large black spots; tip of digits light.

Measurements. Snout to posterior end of vent, 87.5; tail, 67.2; snout to foreleg, 29; axilla to groin, 45; width of head, 25.2; length of head, 27; snout to nuchal fold, 20.2.

Siredon dumerilii* (Dugès)

Siredon Dumerilii Dugès, La Naturaleza I, 1879-1880, pp. 241-244, pl. V, figs. 1-12. Type description; type locality, Pátzcuaro, Michoacán; Ann. Sci. Nat. (5) Zoöl. Ser. V. 15, Art. 17, 1887, 2 pages; Cope, Bull. U. S. Nat. Museum No. 34, 1889, p. 84; Velasco, La Naturaleza, IV, 1879, p. 215.

Ambystoma tigrinum (part) Günther, Biol. Cent. Amer. Batr., Dec., 1901, p. 295; Boulenger, Cat. Batr. Grad. s. Caud. Batr. Apoda British Mus., 2 ed., 1882 p. 43-45 part.

Ambystoma dumerili Lafrentz, Abh. Ber. Mus. Nat. Heimatk. Nat. Ver. Magdeburg, Band VI, Heft II, 1930, pp. 92-94, pl. III, fig. 2; Wolterstorff, *op. cit.* pp. 139, text figs. 6, 7, 8, 9, 10.

This very striking species is known only from Lake Pátzcuaro, Michoacán. It is unknown in a transformed state.

Diagnosis. A large perinnibranchiate; reddish-violet mixed with brown, much lighter below. Body short, flattened somewhat; head much flattened; 12 costal folds; four gill openings; three gills; adpressed limbs overlap the length of foot; ventral fold on neck free medially for 5 mm; large number of shallow crater-like pits on head, neck and to a much lesser extent elsewhere on back, sides, and venter, giving surface a somewhat corrugated appearance; fingers united by a web involving proximal phalanx.

Description. USNM. No. 16201. (Reputed to be from Guanajuato, México, Dugès, collector. It is possible that this specimen may have actually been before Dugès when he described the species. He designates no type. It seems certain that this specimen originated in Lake Pátzcuaro and was sent to the U. S. National Museum from the Guanajuato locality by Dugès.)

Head broad and flat, its length about a fifth longer than broad; to edge of the "ventral fold" 29 mm. Ventral fold has a free edge medially for about 5 mm., maxillary-premaxillary tooth series 64-63 (counting an occasional missing tooth); palatine teeth 24-23, vomerine teeth, 37-38; the vomero-palatine series nearly continuous on the left side, the two series separated medially by a short distance; about 50-48 splenial teeth; mandibular teeth 70-89.

The dorsal fin arises about 10 mm. back of the level of arm insertion; on body, it is very low, but on the tail reaches a height of 6 mm. above, and about 3.5 mm. below tail. The maximum width of the tail near base is 16 mm. including fins.

The webbing on foot includes the first (proximal) phalanx of each toe, the toes terminating in points; a small inner metatarsal tubercle, the outer if present is not discernible; a small inner metacarpal tubercle; hand with the web extending slightly farther than on toes; the pits on the dorsal, lateral, and ventral part of head are conspicuous, giving the head a corrugated appearance in the occipital

* After this paper went to press, a new genus, *Bathysiredon*, was proposed for this species.

region; region back of nuchal fold likewise pitted and corrugated; a few scattered pits evident on body.

Color. The specimens are faded so that the general color is dirty creamy white. In life the color was probably reddish-violet.

Measurements in mm. USNM. Nos. 16201, 16202, 53361, respectively; snout to anterior end of vent about 123, 140, 111; tail, 86, 102, 97; axilla to groin, ?, 68, 57; arm, ?, 49, 37; leg, ?, 36, 48; head width, 40, 44, 30; head length, 50, 54, 40; distance between eyes, 17, 18, 14; between nostrils, 11, 10, 9.

Variation. In the smallest specimen USNM. No. 53361, the tooth formula is: maxillary-premaxillary teeth, 46-54; palatine, 15-13; vomerine, 46-36; splenial, 48-48; mandibular, 65-70. In this specimen the small outer metacarpal tubercle is present.

Siredon lermaensis sp. nov.

(Plate XLVIII)

Type. EHT-HMS No. 22578, Lake Lerma, east of Toluca, México, September 16, 1939, by E. H. Taylor and H. M. Smith (purchased from fishermen); adult.

Paratypes. EHT-HMS No. 22586, topotype, adult; 15436-15440; 22571-22586 topotypes; larvae.

Diagnosis of adult. A large salamander; the body somewhat compressed; gray-black to black above and below; about 60 maxillary-premaxillary teeth on each side; vomero-palatine series continuous, forming a broad angle (failing to meet by a narrow space), about 20 on each side; head much longer than wide; tongue laterally with black pigment; limbs overlap length of hand; tail length equal to distance from gular fold to anus; low, thin fin on tail; toes not webbed; 11 to 12 costal folds; skin of throat folded.

Diagnosis of larva. A large (often neotenic) larval type, four gill slits, three gills; 12 costal folds; dorsal fin originating on back of head, anterior to posterior level of gill origins; limbs overlap a distance greater than length of hand; digits not webbed; the membranes between the metacarpals and metatarsals not or but slightly excised; metatarsal and metacarpal tubercles; about 50-60 maxillary-premaxillary teeth on each side of jaw; vomero-palatine series 30-12, the smaller number being on the palatine; a series of teeth on the splenial; body strongly compressed, the surface glands on body enlarged giving a granular appearance.

Description of type. Head large, its length (34 mm.) nearly 1.26 times the width (27 mm.); length of snout, 9 mm.; interorbital

distance, 10.2 mm.; length of orbit, 6.5 mm.; distance between nostrils, 8.5 mm.; a strong constriction (groove) behind head with a somewhat thickened region in front on sides, a continuation of the gular fold which crosses the back of throat; skin of chin with longitudinal folds; a groove below eye marking the thickened fold at corner of mouth; mouth narrow, the angle of the opened mouth not reaching much beyond middle of eye; maxillary-premaxillary tooth series (counting an occasional missing tooth), 128, about half of this number on each side; about 138 mandibular teeth; vomero-palatine series beginning behind middle of choanae and running diagonally forward to middle of palate, forming an obtuse angle, failing to meet opposite series by a space equal to diastema between two teeth; choanae small, widely separated; no trace of splenial teeth; anterior part of tongue lamellate or plicate, the plicae tending to radiate; sides of tongue pigmented. A deep median pit on palate.

Skin generally smooth, but in parts it may appear slightly granular especially on sides; eleven rather distinct costal folds, the axillary and one following not clearly discernible; anal region somewhat swollen, the walls of the cloaca papillate; tail fin low; not reaching to point above vent; a series of enlarged pits about eyes extending on to snout, and temporal region.

First finger shortest; second and third equal (right hand) or third longer (left hand); fingers slightly flattened, pointed, the web between metacarpals slightly excised; metacarpal tubercles rounded, flattened; toes flattened the tips pointed, the web between the metatarsals slightly excised; fourth toe slightly longer than third.

Measurements of type and larval paratypes in mm. Nos. 22578, 15437, 15439, 15438, 15440; sex, ♂, ♂, ♂, ♀, ♀; snout to posterior end of vent, 130, 135, 128, 113.2, 87.5; posterior end of vent to tip of tail, 99, 116, 109, 80, 75.3; depth of head, 19, 25, 25, 23.5, 17.5; depth of body, 29, 28, 32.1, 36, 21; depth of tail, including fin, 20, 40, 34, 31, 22; width of head, 27, 35.5, 30.4, 30, 21.5; snout to opercular flap (or gular fold), 28, 31.5, 27, 26.8, 23.5; arm, 30, 38.4, 36, 35.5, 31; leg, 41.3, 47, 42.5, 35.5, 29; axilla to groin, 59, 57.5, 51, 54, 57; snout to arm insertion, 45, 48.4, 43, 40, 30.

Color. Nearly uniform gray-black above and below; the tips of the digits gray-cream; lips lighter than head; under the lens the body is regularly peppered with minute cream dots.

Description of larva, No. 15437. Body strongly compressed as high or higher than wide; width of the head about equal to the distance between snout tip and the posterior edge of the opercular

fold; distance between eyes (13.5 mm.) greater than distance between nostrils (11.2 mm.); depth of head (25 mm.) more than half the length of head (from tip of snout to the base of last gill, 44 mm.); large pits on head, about eyes, the angles of the jaws, and to a lesser extent on snout, discernible but not conspicuous; dorsal, lateral, and ventral sides of the body, and sides of tail granular; the summit of each granule with a minute pit.

Dorsal fin arising on the back part of head, continuing as a low, somewhat thickened fold along the back, rising to a height of six millimeters between hind legs, and on tail to a maximum of about ten millimeters; cloacal region (male) greatly swollen, the walls thickened and heavily papillate; adpressed leg reaches the elbow of the adpressed arm; fingers flattened, terminating in points; a slight web is evident between the distal ends of the metacarpals and metatarsals, and sometimes suggesting a slight fringe along the side of digit (if the digits are slightly dessicated); an inner and an outer metacarpal tubercle; similar metatarsal tubercles; the edge of the opercular fold is free for 15 millimeters on the median ventral line; eleven costal folds (12 grooves), between axilla and groin.

Maxillary and premaxillary teeth about 60-60; vomero-palatine tooth series practically continuous (12-36; 12-33), slightly diagonal, arching anteriorly, but separated medially by a distance less than one-sixth the distance between the choanae; mandibular teeth about 60-60; splenial teeth about 16-16 with a rather large hiatus in the middle of the series.

Color in life. Deep purplish-black. The summit of the granules light; the corners of the mouth, and the tips of the digits lighter.

Variation. The measurements given above show age and sex variation. The smaller paratypes are more or less lavender above and often somewhat creamy lavender below. The lateral line organs may have lighter spots about them, and the throats may be dirty cream. In some of the smaller specimens the teeth may be somewhat irregular and the splenial series may not have penetrated the gums. In the old, neotenic specimens most of the splenial teeth have been shed. No trace of them is present in the transformed specimens.

Remarks. The larvae of this form differs from *Siredon dumerelii* Dugès in having a much narrower, less flattened head, a more rounded snout, a deeper, more robust tail, a laterally, compressed body; the gular fold free for a greater distance on median ventral line, the pitting on the head less conspicuous; the body more robust;

no break (or a very slight one) in the continuity of the vomeropalatine tooth series, while the combined series is separated medially by a wider distance. The color is very dark, almost black.

From *Siredon mexicana* (Shaw), the species differs in having a more robust, more laterally compressed body and tail; in having the dorsal fin originating farther forward on head (in *mexicana* behind level of insertion of arms), in the lack of spotting on body, and in a smaller series of splenial teeth.

It is significant that these forms are each in a different drainage system. *S. mexicana* is connected with the Rio Panuco system to the Gulf of Mexico (formerly underground drainage?); *S. dumerilii* with the Cuitzeo-Patzcuaro system (underground); *Siredon lermaensis* with the Rio Lerma-Rio Santiago system to the Pacific.

This species is used for food. It is regularly offered for sale in the markets of Toluca and perhaps elsewhere during the fishing season.

PLATE XLV

FIG. 1. *Ambystoma bombypella* sp. nov. EHT-HMS, No. 3997; near Rancho Guadalupe, 14 km. east San Martín, Asunción, México.

FIG. 2. *Ambystoma amblycephala* sp. nov. EHT-HMS, No. 16443. Type. 15 km. west of Morelia, Michoacán.

FIG. 3. *Siredon mexicana* Shaw. FMNH. 19179.

PLATE XLV



PLATE XLVI

FIG. 1. *Ambystoma ordinaria* sp. nov. EHT-HMS, No. 16381. Larva.
Topotype. 55 mm. snout to end of vent.

FIG. 2. *Ambystoma ordinaria* sp. nov. EHT-HMS, No. 16368. Larva.
(older) Topotype. Snout to vent, 70 mm.

FIG. 3. *Ambystoma ordinaria* sp. nov. EHT-HMS, No. 16367. Type.
Adult female, near Puerto Hondo and El Mirador, Michoacán.

PLATE XLVI

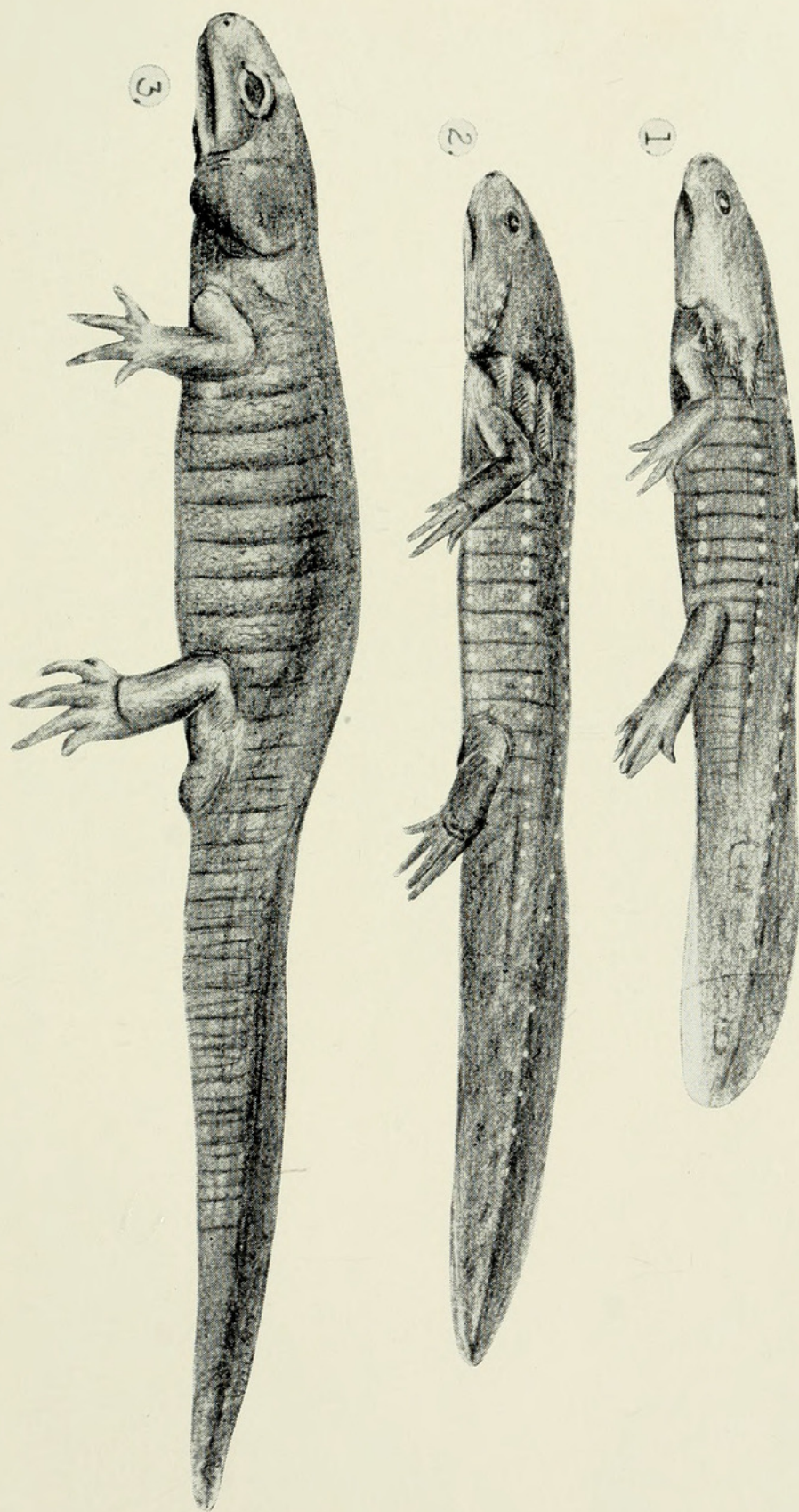


PLATE XLVII

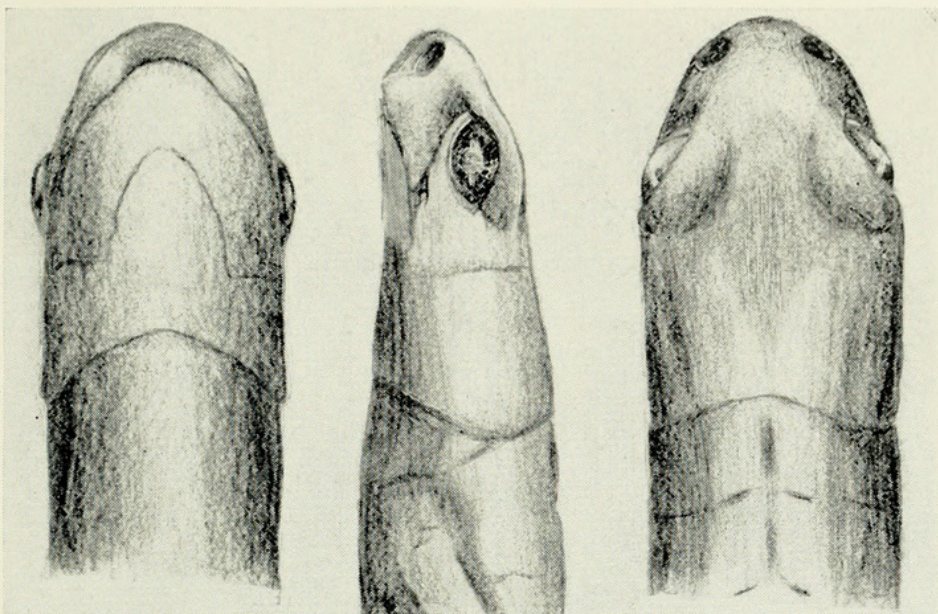
FIG. A. *Thorius pennatulus* Cope EHT-HMS, No. 12141; two miles southwest Acultzingo, Veracruz. $\times 7$.

FIG. B. *Thorius pennatulus* (Cope) EHT-HMS, No. 17751. $\times 7$. Two miles southwest Acultzingo, Veracruz.

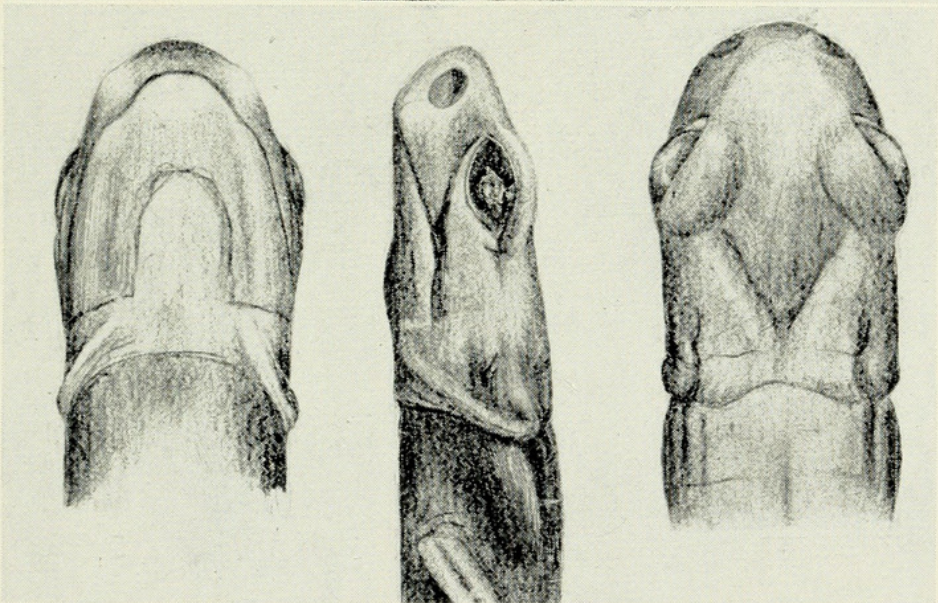
FIG. C. *Thorius narisovalis* sp. nov. Type. $\times 7$. Cerro San Felipe, near Oaxaca, Oaxaca.

PLATE XLVII

A



B



C

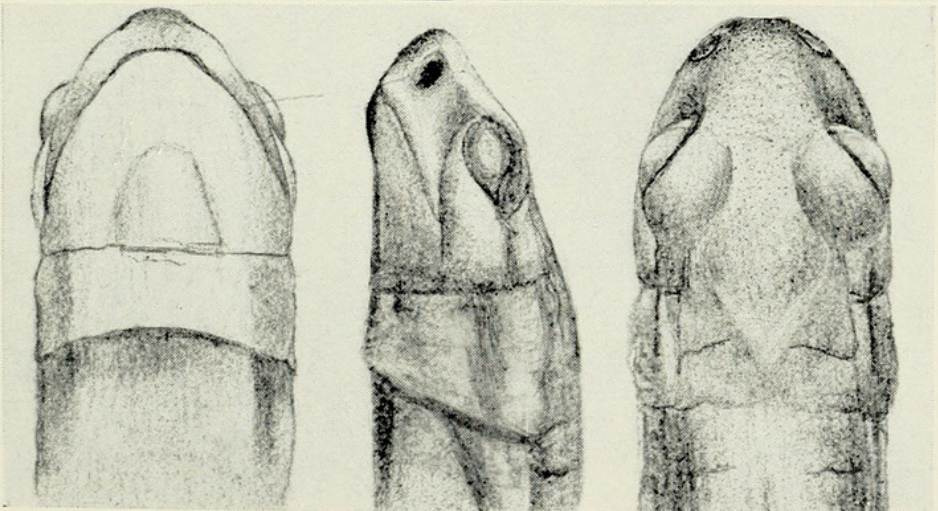
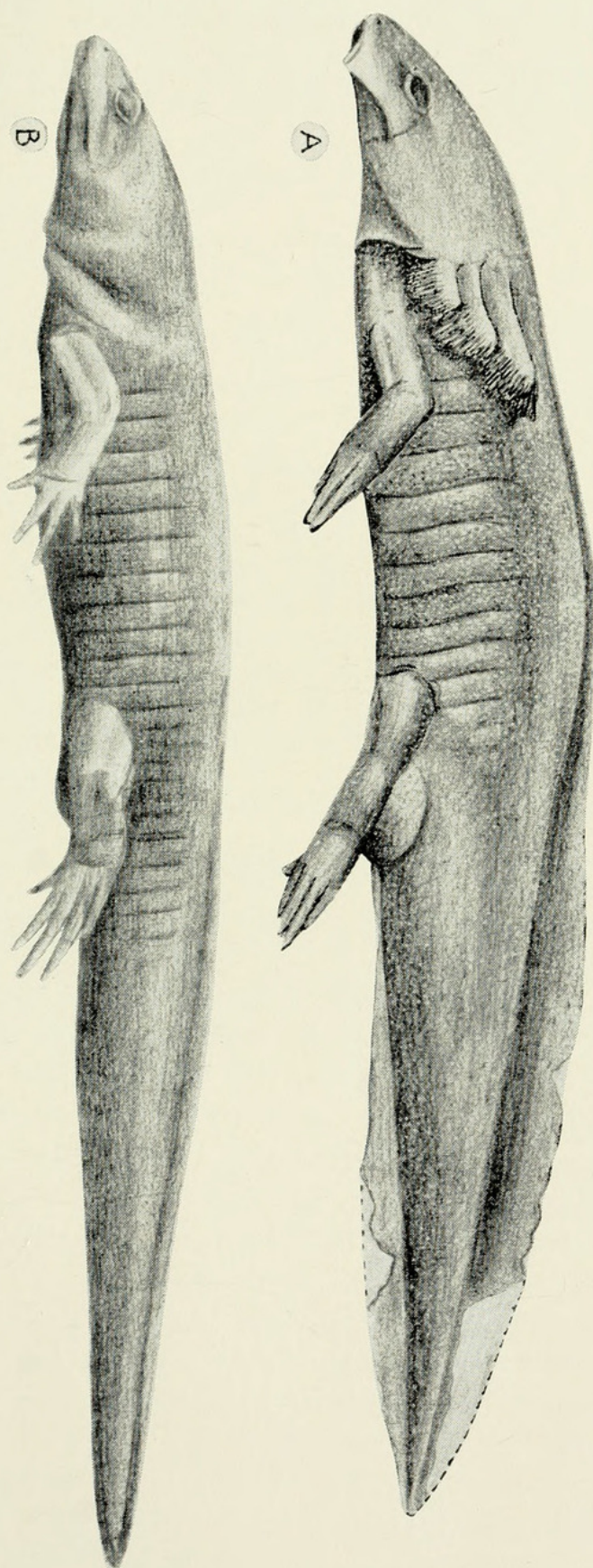


PLATE XLVIII

FIG. A. *Siredon lermaensis* sp. nov. EHT-HMS, No. 15437; Lake Lerma, near Toluca, México. A larva.

FIG. B. Same. Type. EHT-HMS, No. 22578; Lake Lerma, east of Toluca, México. $\times 1$.

PLATE XLVIII





Taylor, Edward Harrison. 1940. "New salamanders from Mexico, with a discussion of certain known forms." *The University of Kansas science bulletin* 26(12), 407–439.

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