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A NEW SALAMANDER OF THE GENUS *PARVIMOLGE* FROM MEXICO

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In the Museum of Comparative Zoology there is a specimen of a Mexican plethodontid salamander superficially similar to individuals of *Pseudoeurycea cephalica*. Examination indicates that it actually represents an undescribed form of the genus *Parvimolge* Taylor, which may be known as

PARVIMOLGE PRAECELLENS, new species

(Figure 1)

Type. An apparently immature female, Museum of Comparative Zoology No. 24701, collected at Hacienda el Potrero, near the city of Cordoba, Vera Cruz, Mexico, on December 24, 1940, by Archie F. Carr.

Diagnosis. A small plethodontid salamander related to *Parvimolge townsendi* by virtue of syndactylous feet, with the partially free digits having pointed tips, and by the presence of conspicuous though small glands about the middorsal line. It differs from *P. townsendi* in larger body size, greater number of teeth, and in having small nostrils. It differs from the only other species assigned to this genus, *richardi*, not only in these characters but also in having conspicuous dorsal glands.

Description. General aspect of body robust. Length of tail approximately six-sevenths of distance from snout to posterior end of vent. Head length (snout to center of gular fold) contained about four times in snout-vent distance; maximum head

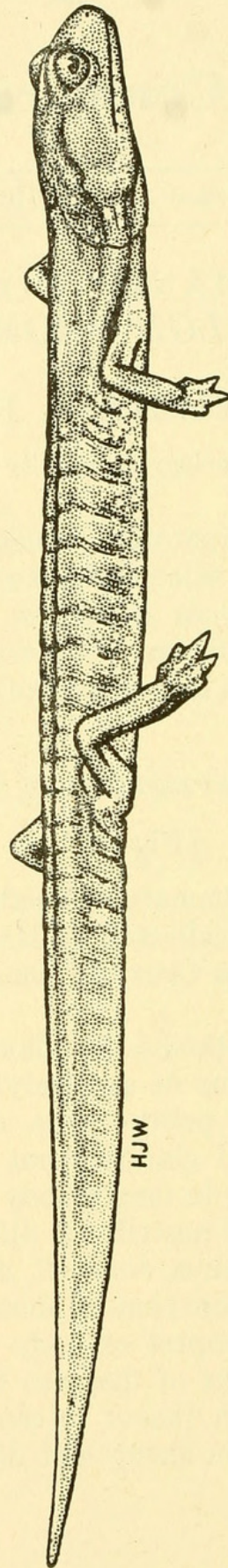


Figure 1. Type of *Parvimolge praececellens*. Actual total length about 65 mm.

width contained in same about five times. Head width three-fourths the snout-gular fold distance and nearly equalling snout-posterior angle of jaw length. Width of an eyelid less than minimum distance between eyelids. Horizontal diameter of eye greater than one and a half times snout-anterior angle of eye distance. Internarial distance four-sevenths the interorbital measurement. Viewed dorsally, the snout is gently rounded, though short in relation to anterior angles of eyes. Canthus rostralis not sharply defined, the area between anterior mid-dorsal line of head and edge of upper jaw being a gradual slope. Nostrils small with nasolabial grooves forking on weakly developed nasolabial protuberances. Snout not projecting beyond tip of lower jaw. Lower jaw semi-oval in outline, ventrally viewed. Lateral extensions of gular fold meet grooves extending from posterior angle of eye and continue dorsally to join the posterior ends of a V-shaped groove originating parietally. Epi-branchial ridge extending beyond axillary groove. A deep furrow, perhaps partially due to preservation, follows the mid-dorsal line from scapular region onto tail. The fairly thick skin of dorsum has about fifty small but conspicuous glands (presumably of the "poison" type). These glands appear to be arranged in four irregular longitudinal rows, two of them very close to midline. On the neck the middorsal rows fork and curve laterally. There are a few conspicuous glands on the tail.

Maxillary-premaxillary teeth, counting both sides, total 75. They are practically all of uniform size, those in the premaxillary position not piercing the lip. Eighty-seven mandibular teeth. Prevomerine teeth 20 on right and 23 on left side mostly in double rows which arch very slightly posteriad in approaching the midline from initial points lateral to the small choanae. Distance between prevomerine series at midline is equal to three times the diameter of a choana. Parasphenoid teeth in two oblong patches, each of which has about 70 teeth arranged in diagonal rows. Anteriorly the groups are separated by slightly more than one choanal diameter, posteriorly by about three diameters. Tongue large and free, the fleshy sublingual fold anterior to it well developed.

The moderately chunky body has twelve costal spaces. It is difficult to ascertain whether there are twelve or thirteen costal

grooves because of the contorted condition of the specimen. There are about twenty-two caudal grooves indicated posterior to the vent. Tail quadrangular in cross-section, slightly broader dorsally than ventrally. Throughout most of its length, it is deeper than broad.

Limbs slender and moderately long, hind limb slightly larger and longer than forelimb. Limbs fail to meet by about one costal space when pressed to sides of the body. Hands and feet well developed but not expansive, with slight pads ventrally. The somewhat slender, terminally free digits have pads which are discrete from the palmar pads. Innermost and outermost digits of hand and foot completely enclosed in web. Terminal phalanges of second and fourth toes and second finger free of web, while third toe and finger have almost two phalanges free. Third and fourth toes and second and third fingers noticeably pointed distally, while the second toe appears more rounded. Toes in order of decreasing length: 3, 4, 2, 5, 1; fingers in same order: 3, 2, 4, 1.

In alcohol, the ground color of dorsal surfaces of head, body, tail, and limbs is brownish-black. Ventral surfaces show a faded version of this color with some areas being almost completely unpigmented (gular fold, anterior part of chin, and palms and soles). Underside of tail light brown. Jaw margins appear mottled due to lack of pigment in spots. Bluish-white spots and blotches on lower sides of body and on tail were possibly white in life. A distinct but broken bar of this color on the head between the eyes.

Measurements (in millimeters). Snout-posterior end of vent, *c.* 35; tail, *c.* 30; snout-gular fold, 9.4; snout-angle of jaw, 7.5; snout-anterior angle of eye, 1.6; horizontal diameter of eye, 2.6; head width, 7.0; internarial distance, 2.0; interorbital distance, 3.5; arm, 8.9; leg, 9.4.

Remarks. Before commenting on relationships I wish to place on record some information on *P. townsendi* not obtainable from previous accounts (Dunn, 1922 and 1926; Taylor, 1944). The major source of the data is a series of ten specimens collected at the same time and place as the type of *P. praecellens*. Variational data for the eight alcoholic adults (MCZ 24712-19) are given in Table I. The males have two or three enlarged premax-

illary teeth, prominent mental glands, and well developed nasolabial protuberances, with more truncate snouts and with larger external narial openings than the females (average 0.3 mm. *versus* 0.2 mm.). The parasphenoid teeth groups are separated in half of the eight specimens. Counts of prevomerine tooth rows averaged 5.8 on a side. One male, not included in the average, has these teeth in an irregular patch of ten on each side. UMMZ 111305, an immature specimen (snout-vent, 15 mm.; tail, 13 mm.) from this series, has fewer teeth (prevomerine, 3-5; maxillary-premaxillary, 34; mandibular, 47) and fewer glands (31) than any of the adults of Table I. A female, UMMZ 63944, taken at Cordoba, Vera Cruz, on June 19, 1927, is larger than any recorded specimen, measuring 24 mm. from snout to vent, with a tail of the same length. The ovarian eggs are large, about 0.7 mm. in maximum diameter.

Many minor variations in color were found. The ground color was diverse shades of brown, usually lighter ventrally, and sometimes dorsally, than on the sides. The dark bars described by Dunn are most pronounced on the tail, with the most conspicuous bar or ring occurring at the weakly marked basal constriction of the tail. A herringbone or V pattern can be made out dimly in some specimens held under water; it is apparently the result of concentration of dark pigment in the costal grooves. Most of the specimens have an incomplete light bar between the eyes well indicated, but two do not. Three have some evidence of an additional incomplete anterior interocular bar. In two the rostral region appears as a brilliant white square, due to absence of dark pigment, which is slightly reduced in this area in the other specimens. The limbs, throat, and venter have scattered light, probably pigmentless, spots. Light streaks on the sides are well developed in some, practically absent in others. In one specimen the middorsal area is light brown, contrasted with dark brown dorsolaterally, which in turn is set off by a double row of light streaks or spots on the lower sides. In the same specimen there are striking dorsolateral white patches (apparently pigmentless areas) in the nuchal region.

The tenth specimen from the Potrero series, an adult male measuring about 23 mm. from snout to vent, was stained and cleared (UMMZ S-1556). The testes of this specimen were

relatively enormous and were in the bilobate condition which I have found to characterize the larger, and presumably older, classes of males in *Chiropterotriton* and *Pseudoeurycea*. The more interesting skeletal features are described here. Skull broadly elliptical, maximum width at the otic capsules three-fourths of the premaxillary-occipital condyle distance; frontals and parietals ossified completely to midline; facial lobe of maxilla large, forming with nasal bone a posterior border of nasal capsule; nasal fairly prominent, angling forward medially, about two and a half times as long as broad; prefrontal two-thirds the length and one-half the width of nasal, not participating in the margin of the nasal capsule; basally fused frontal processes of premaxilla diverge considerably forming a wide fronto-premaxillary fontanelle (a tenth of otic capsular width); these processes laterally compressed anteriorly; more posteriorly and dorsally they gradually twist until they appear horizontally flattened where the ends articulate with grooved projections of the frontal bones; two large premaxillary teeth, twenty-three teeth on each maxilla, twenty-eight teeth on each of the well ossified mandibles, eight prevomerine teeth on a side; no median suture between prevomers; parasphenoid teeth in two patches. Skull measurements (mm.) made with ocular micrometer: otic width, 2.9; premaxillary-condylar length, 4.4; prefrontal length, 0.5, width, 0.15; nasal length, 0.75, width, 0.3; fronto-premaxillary fontanelle width, 0.3. Hyoid structures as described by Tanner (1952), but second ceratobranchials definitely osseous or calcified, which is also the condition in the only cleared individual available of *Lineatriton lineola* (UMMZ S-1594). Phalangeal formula of foot, 1, 2, 3, 3, 2; of hand, 1, 2, 3, 2; eight carpals, ulnare and centrale partially fused on both hands, on left hand all ossified to some extent but on right hand radiale and carpal immediately distal to it are cartilaginous. At least seven, probably nine tarsals, four ossified on each side. Atlas weak, not ossified middorsally; only the second vertebra with a noticeable neural ridge. Long, proximally forked ribs present from second to fourteenth vertebra, fifteenth having both transverse processes but no rib. Sixteenth vertebra is the sacral, followed by two transitional postsacral or precaudal vertebrae. Twenty-three caudal vertebrae, the anterior ones with a fin-like process ex-

tending forward from the ventroposteriorly directed haemal process to the anterior edge of the vertebra. Short transverse processes, more laterally angled in the first few caudal vertebrae, more anteriorly directed farther caudad.

This account of the skeletal features is at variance with Taylor's description (1944: 223) on several points, notably the presence of the prefrontal and the ossification of the carpals and tarsals. The latter character may be variable, but the condition in this specimen does not support contrasting the cartilaginous carpals and tarsals of *Parvimolge* with the osseous ones of *Thorius*. This is especially true in view of the fact that Hilton (1946, 1948) has recorded them as cartilaginous in *T. pennatus*, and since the single cleared specimen referable to *T. dubitus* that I have examined likewise has entirely cartilaginous ones. However, I believe that most of the discrepancies between the two descriptions of *P. townsendi* may be ascribed to different types of material used, and it should also be borne in mind that the foregoing account is based on a single specimen.

TABLE I

Quantitative Characters in Mexican *Parvimolge*

		snout- vent length	tail length	costal spaces	dorsal body glands	premax- maxillary teeth	mandibu- lar teeth
<i>townsendi</i>	R	20-23	20-26		32-42	45-58	54-69
males (4)	M	22.0	22.5	3.7	39.0	50.0	61.5
<i>townsendi</i>	R	19-22	16-21		35-41	48-58	55-73
females (4)	M	21.0	19.0	4.2	38.0	53.0	64.0
<i>praecellens</i> (female)		35	30	1	50	75	87

R, range; M, mean; tooth counts are totals of both sides; measurements in mm.; costal spaces refer to number between adpressed limbs.

Relationships. *Parvimolge praecellens* is closely related to *P. townsendi*, as indicated by the foot structure, coloration, conspicuous dorsal glands, and shape of tail. A third form, *richardi*, described with reservations as a *Parvimolge* (Taylor, 1949, 1952), lacks the conspicuous glands. This fact, apparent differences in details of the foot, and the enormous disjunction in range — Vera Cruz to Costa Rica — imply that *richardi* is preferably not to be associated with *townsendi* and *praecellens*.

Determining the nature of the affinity between *P. praecellens* and *townsendi* necessitates much more material. However, the more numerous teeth, longer legs, and small nostrils of *praecellens* are probably correlated with its greater size. These characters and the smaller size of the dorsal glands appear to indicate that *praecellens* is less specialized. The morphological and ecological relationship may be of the same general type existing between sympatric large and small species in *Pseudoeurycea* and *Chiropterotriton*. Indeed, in the latter genus, *C. dimidiata* shows seemingly paedomorphic features very like those found in *townsendi*.

That *Parvimolge* is allied to *Lineatriton* as inferred by Tanner (*op. cit.*) is supported by the distinctive osseous character of the second ceratobranchials found to be common to *P. townsendi* and *L. lineola*. Nevertheless, the derivation of *townsendi* and *praecellens* was probably from a less specialized form, perhaps in the *Pseudoeurycea cephalica* group or its ancestral stock. The foot shape in very young specimens of *cephalica*, the presence of irregularly protruding poison glands on the dorsum in some forms of the group, and the guanophore-spotted, brown to black ground color in the group suggest this. The syndactylous foot structure could have become established by a paedogenetic process in *Parvimolge* stock as it differentiated from some such ancestor.

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