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A NEW SALAMANDER OF THE GENUS *BOLITOGLOSSA*
FROM CHIAPAS

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IN the past 25 years the combined efforts of many herpetologists have made the Mexican herpetofauna one of the best known of any tropical and subtropical area in the world. Novelties continue to appear, however, even in some areas of easy access frequently visited by herpetologists. Such a novelty is a large and brilliantly colored plethodontid salamander from the highlands of southwestern Chiapas. Over the past eight years several specimens of this distinctive form have found their way into various museums in the United States. Each of the authors eventually acquired three specimens of the salamander which we independently recognized as an undescribed species of the genus *Bolitoglossa* (*sensu* Wake and Brame, 1963). With only these small samples available we both postponed further studies of the species in the hope that additional specimens could be found. Our pooled samples, however, provide sufficient material to characterize adequately this distinctive and zoogeographically significant addition to the Mexican fauna. In allusion to the strikingly beautiful color pattern of this species, we propose that it be known as:

Bolitoglossa resplendens, new species

HOLOTYPE.—University of Colorado Museum (UCM) 25520. An adult female collected July 24, 1961, by T. Paul Maslin, on the southwest slope of the Cerro Hueytepec, seven miles W San Cristobal de las Casas, Chiapas, Mexico (Pl. I).

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PARATYPES.—UCM 25519, collected with the holotype; UIMNH 56575, Camino a Chilel, San Cristobal de las Casas, collected April 30, 1958, by Miguel Alvarez del Toro; UMMZ 118823–24, 8 mi. SE San Cristobal de las Casas, collected August 10, 1958, by A. B. and N. K. Hooper; KU 66742, 14 km. NNW Teopisca, collected February 17, 1961, by William E. Duellman.

RANGE.—Highlands in the vicinity of San Cristobal de las Casas, Chiapas.

DIAGNOSIS.—A large *Bolitoglossa* of the "Magnadigita series" which differs from all other Mexican species of the genus by the combination of virtually unwebbed toes with truncate tips and a color pattern of black sides and venter with a sharply defined red-orange middorsal stripe. *Bolitoglossa resplendens* may be distinguished from its nearest relatives, *B. franklini* and *B. lincolni* of Guatemala, by its larger size and relatively longer body and shorter legs.

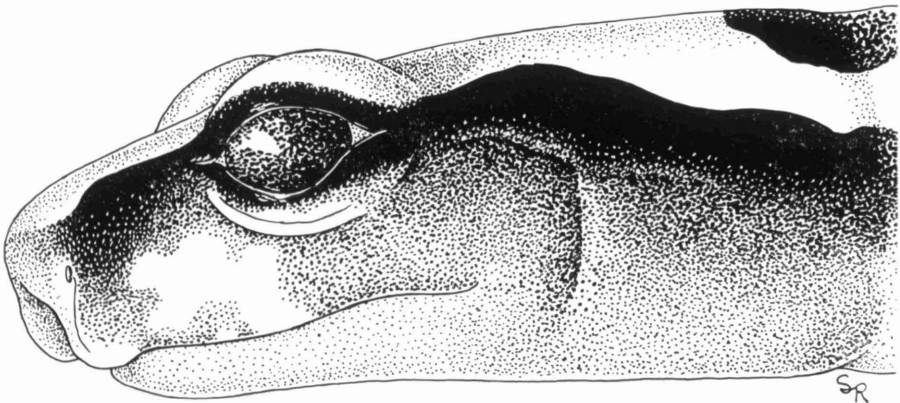
DESCRIPTION OF HOLOTYPE.—Adult female, cloacal walls plicate, hepatic glands absent. Snout truncate in lateral view, broadly rounded in dorsal view; nostril small, labial protuberance obvious but small; canthus rostralis low and smoothly rounded, not markedly angular. Snout-vent length 3.95 times snout-gular fold length. A horizontal groove extends behind eye 5.0 mm. where it joins a transverse groove which crosses the throat 8.0 mm. anterior to the gular fold and extends well above eye level on the sides of the head. Gular fold strongly developed and continuous across throat, extending dorsally as a shallow groove to the sides of the neck. Tongue boletoid, no sublingual fold. Vomerine teeth 13 (right) and 12, in a single slightly curved row. Maxillary teeth 23 on each side; premaxillary teeth total 4. Costal grooves 13 counting one each in axilla and groin; caudal grooves 26. Tail 0.87 times snout-vent length; strongly constricted at base, subcylindrical throughout length; caudal grooves deeply impressed. Post-iliac glands not evident. Limbs robust but relatively short, $3\frac{1}{2}$ costal folds between longest toes of adpressed limbs; snout-vent length 4.7 times right fore leg; snout-vent length 4.1 times right hind leg. Webbing slight, all toes and fingers partly free of web; well-developed pads on all fingers and toes. Fingers, in order of decreasing length: 3, 2, 4, 1; toes, in order of decreasing length: 3, 4, 2, 5, 1.

Ventral surfaces of body, tail, and limbs coal black; a series of red-orange blotches and spots on the ventral surface from the gular fold to the vent, the smallest spot approximately the size of the eye. Ventral

surface of tail with scattered red spots; tail tip red. Sides of head, body, and tail coal black; a broad, sharply defined red-orange dorsal stripe extending from the snout (not including the upper lip) over the upper eyelids and to the tail tip. Edges of dorsal band wavy, broken by incursions of black from sides; paired black spots on nape and a black spot between eyes. Limbs black with irregular red-orange dorsal blotches, red-orange color fading to yellowish cream in alcohol. Iris dull reddish-brown in life. General appearance, a brilliantly and distinctly bicolored red and black animal.

VARIATION.—The adult male paratypes (UMMZ 118823–24, UIMNH 56575) have conspicuous slate-gray mental glands. In UMMZ 118824 the subtriangular gland measures approximately 4.5 by 3.4 mm., with the rounded apex at the point of the chin. The nasolabial grooves of the males end in prominent, light-tipped protuberances (Fig. 1). The adult males are smaller and more slender than the females ($\delta \delta$ body lengths, 57.1, 58.7, and 62.3 mm.; $\text{♀} \text{♀}$, 75.1 and 78.4 mm.), and the tail is relatively longer in the males. The tails of the adult males range from 0.97 to 1.10 times body length; they are 0.82 and 0.87 times the body length in the adult females.

Although the details are somewhat variable, the basic red and black bicolored pattern is similar in all specimens. The red-orange dorsal stripe varies from a relatively clear-edged band of color (Fig. 2, left) to



UMMZ 118824

FIG. 1. *Bolitoglossa resplendens*, lateral view of head of adult male paratype, UMMZ 118824, 62.3 mm. snout-vent length.

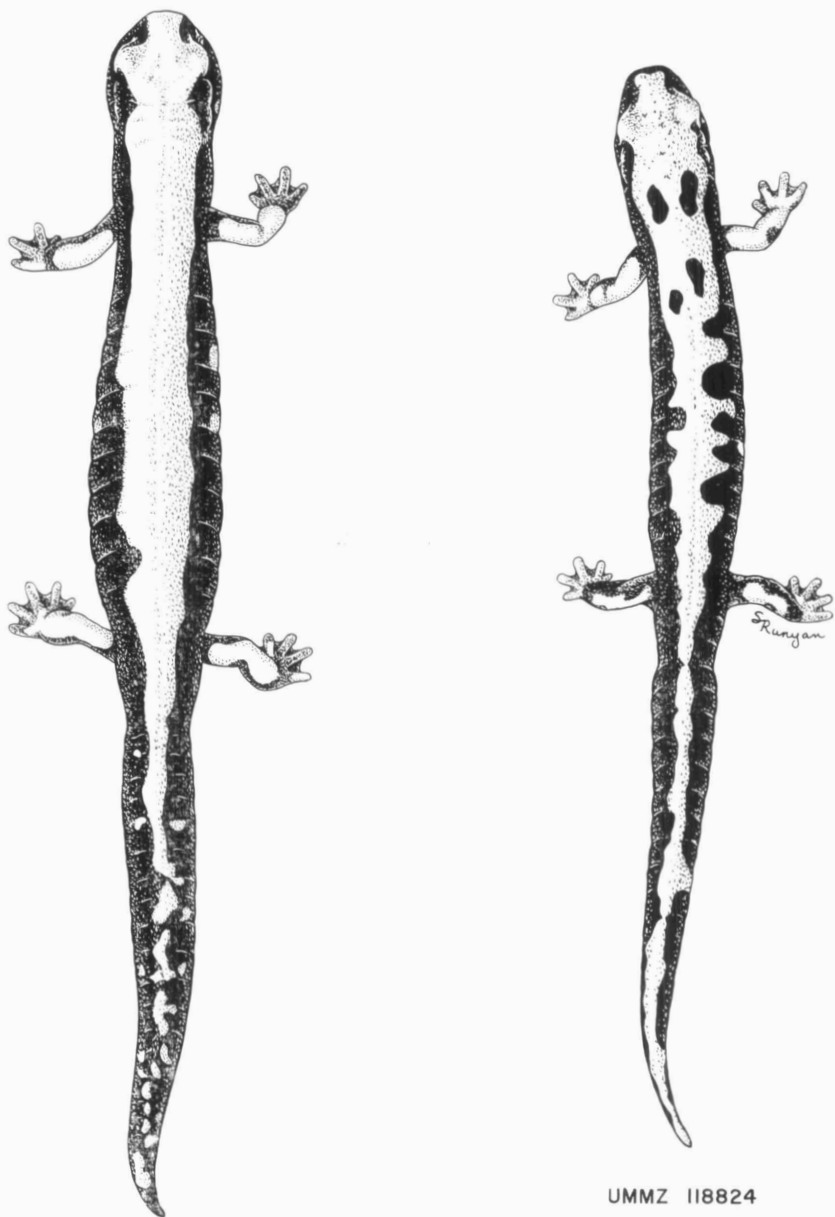


FIG. 2. *Bolitoglossa resplendens*, dorsal view of adult female paratype, KU 66742, 78.4 mm. snout-vent length, and of adult male paratype, UMMZ 118824, 62.3 mm. snout-vent length.

a ragged and very irregular pattern (Fig. 2, right). Four of the specimens show a tendency to a series of paired black spots on the nape and anterior third of the body. One (UMMZ 118823) has several large black spots enclosed in the dorsal stripe. The color pattern of the tail is usually a regular dorsal band of variable width, extending to and including the tail tip. The adult female paratype (Fig. 2, left) departs from this pattern in that the orange of the tail stripe is broken up into a series of fine spots and the tail tip is black. All of the specimens have orange ventral spots, but they are most numerous in the holotype (Pl. I, right). The amount of orange on the legs is also variable: the greatest amount is exhibited by the female paratype (Fig. 2, left). The single juvenile specimen has wide and unbroken dorsal and tail stripes faintly suffused with black pigment which masks the brilliance of the red-orange color.

The vomerine teeth range from 24 to 31, and average 27 in the six specimens. Upper jaw teeth range from 43 in an adult male (UMMZ 118824) to 59 in the largest female (KU 66742).

Radiographs of the UMMZ paratypes reveal some osteological characters of the species. All phalanges except those of the innermost toe and innermost finger are hourglass-shaped and strongly constricted medially. All of the carpals and tarsals are cartilaginous. The phalangeal formula is 1-2-3-2 for the hands and 1-2-3-3-2 for the feet. Including the atlas there are 15 presacral vertebrae; the last one has no ribs. There are 29 caudal vertebrae in each of these male paratypes. The third postsacral vertebra bears anteriorly directed lateral processes which overlap the transverse processes of the second postsacral. The tail con-

TABLE I
MEASUREMENTS (MM) FOR *Bolitoglossa resplendens*, NEW SPECIES

	Number	Sex	Snout-vent length	Axilla-groin length	Head width	Hind leg length	Snout-gular fold	Limb interval	Total length
KU	66742	♀	78.4	45.9	12.9	18.9	18.0	3+	142.1
UMMZ	118823	♂	58.7	34.4	10.4	14.4	15.3	2	115.7
UMMZ	118824	♂	62.3	36.3	10.9	14.5	16.2	2.5	127.9
UCM	25519	j	32.3	18.2	6.3	7.5	9.0	2+	54.0
UCM	25520*	♀	75.1	42.4	12.8	18.4	19.0	3+	140.1
UIMNH	56575	♂	57.1	32.0	9.3	14.0	15.0	2+	113.0

* Holotype.

striction (usual point of urotomy) lies between this specialized third and the fourth caudal vertebrae. Septomaxillae are not visible in the radiographs, and are presumed absent. Measurements and data for the entire hypodigm are presented in Table 1.

RELATIONSHIPS.—*Bolitoglossa resplendens*, *B. franklini*, and *B. lincolni* (the latter two from the highlands of western Guatemala) form a compact group both morphologically and geographically. All three species have the basic color pattern of a broad red-orange middorsal stripe on a black ground color. There is tremendous variation in this pattern in the relatively widespread *franklini*, from individuals very much like *resplendens* or *lincolni*, to individuals with a highly reticulate and nebulous pattern, or a pattern of light flecks on an otherwise completely dark dorsum. These extremes are illustrated by Schmidt (1936, fig. 19, p. 160). The few specimens of *lincolni* examined from both of the known localities in the Sierra de los Cuchumatanes are very similar to *resplendens* in pattern. Both *franklini* and *lincolni* appear to have less tendency toward ventral spotting than *resplendens*.

In the description of *lincolni*, Stuart (1943a, p. 9) distinguished the species from *franklini* by its fewer vomerine teeth and shorter legs. The type series of *resplendens* somewhat bridges the gap between *franklini* and *lincolni* in number of vomerine teeth. The ranges of variation within the species are so great, and the interspecies gaps so obscure, that vomerine tooth counts do not appear to separate the species of this complex. Relative leg length does, however, help to separate these species. *Bolitoglossa franklini*, an arboreal, bromelaid inhabitant, has relatively long legs which touch when adpressed along the sides. The legs of both *lincolni* and *resplendens* are relatively much shorter, and of the two species, *resplendens* has the shorter legs. The limb interval in *lincolni* is two at most, while *resplendens* usually has a limb interval of at least two and one-half costal spaces. Both *lincolni* and *resplendens* live under rocks, logs, and other cover on the ground.

Although the weight of evidence to this point favors a closer relationship of *resplendens* with *lincolni*, the webbing of the feet is contrary to this evidence. The three species are superficially similar in the presence of slightly webbed hands and feet having truncate fingers and toes with subterminal pads—the classical “Magnadigita” foot morphology. On close examination the feet of *lincolni* are seen to have shorter digits and more extensive palmar and plantar pads than those of either *resplendens* or *franklini*. In this single character these latter species resemble each other more closely than either does *lincolni*.

Finally, *B. resplendens* is a larger salamander than either *lincolni* or *franklini*. The largest specimen of *franklini* in the type series is a male with a body length of 66 mm. This size is approached by males and exceeded by the females of *resplendens*. The adult male holotype of *lincolni* has a body length of 44 mm., which is greatly exceeded by all known adult specimens of *resplendens*. Moreover, the largest available males of *resplendens* have simple, unlobed testes, which is probably indicative of relative youth of these individuals (Humphrey, 1922).

The phyletic relationships of these species are obscure, since the various populations currently behave as mountain isolates. On the basis of morphology, *lincolni* and *resplendens* are more closely related than either is to *franklini*. Thus, a parallel arrangement of the populations of this group is apparent: *resplendens* and *lincolni* in the interior (Atlantic Drainage) highlands from Central Guatemala to Chiapas, and *franklini* in the Pacific highlands from Volcan Pacaya to the Mexican border (Fig. 3). Stuart (1943*a*, 1943*b*) has discussed the zoogeographic position of the Sierra de los Cuchumatanes, and has indicated that there exists some faunal connection with the highlands of adjacent Chiapas. This conclusion, based on the shared distribution of *Sceloporus malachiticus smaragdinus*, *S. v. variabilis*, and *Ameiva undulata stuarti*, is strengthened by the discovery of a close relative of *B. lincolni* in the Chiapan highlands. Even though these areas are faunally related, there is a wide lowland gap between them, and highland faunal elements are effectively separated. The map (Fig. 3) shows the breadth of this gap below 2000 meters elevation. The separation between populations of cloud forest *Bolitoglossa* would be even greater. Although *B. lincolni* and *B. resplendens* are closely similar, this broad and probably completely effective barrier to gene flow prompts us to consider their morphological differences as indicative of specific divergence.

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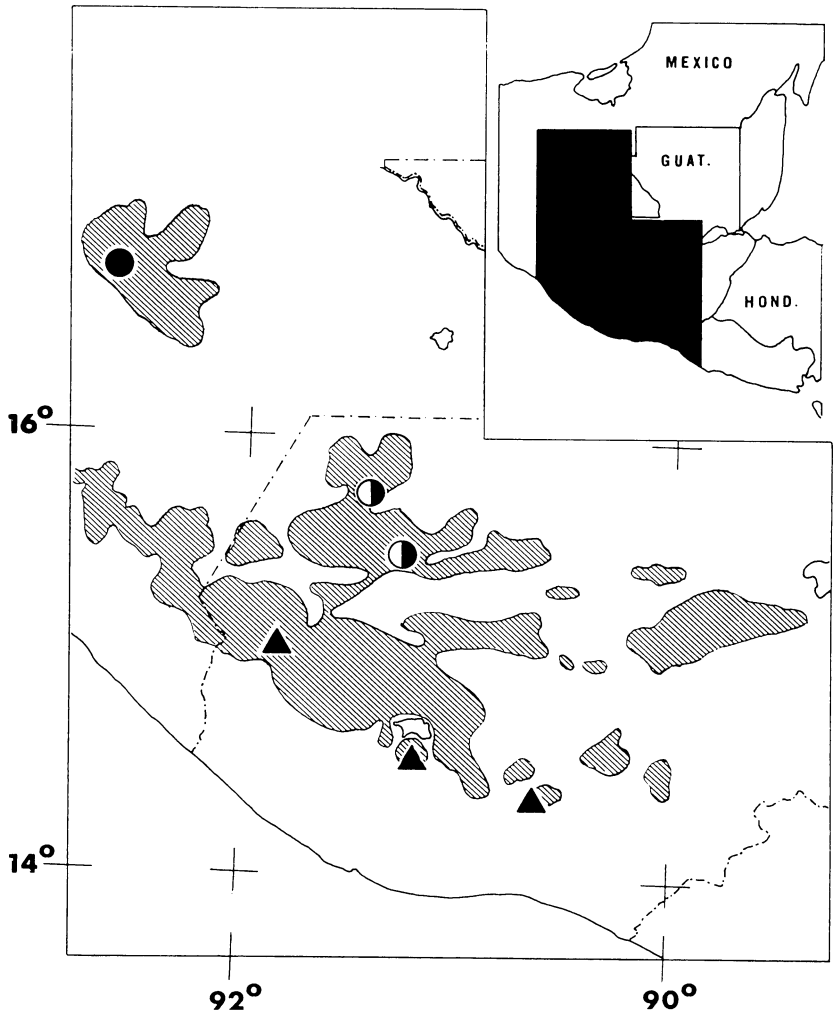


FIG. 3. Distribution of three species of *Bolitoglossa* in Mexico and Guatemala. Triangles = *B. franklini*; half shaded circles = *B. lincolni*; solid circle = all localities for *B. resplendens*. Areas above 2000 meters shaded.

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PLATE I

Bolitoglossa resplendens, dorsal and ventral views of adult female, holotype,
UCM 25520, 75.1 mm. snout-vent length.

