



Notes on South American Salamanders of the Genus *Bolitoglossa*

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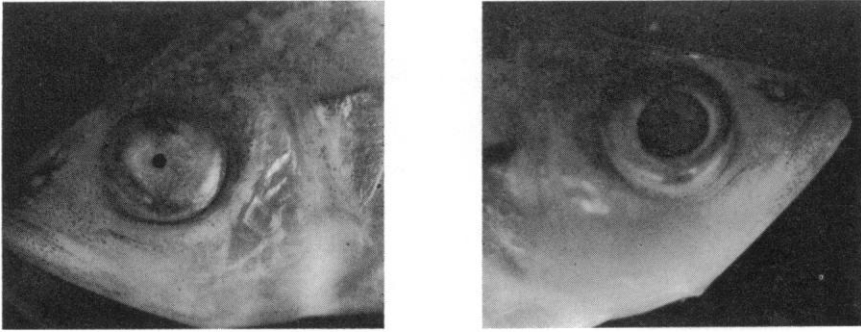


Fig. 1. A pinhole camera eye in the white crappie, *Pomoxis annularis* Rafinesque.

pinhole camera. Normal feeding and enemy avoidance could be expected. The fish appeared to be in good physical condition.

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LITERATURE CITED

- FERGUSON, M. S. AND R. A. HAYFORD. 1941. The life history and control of an eye fluke. *Prog. Fish-Cult.* 54:1-13.
- GEORGE A. MOORE AND MILTON R. CURD, *Zoology Department, Oklahoma State University, Stillwater, Oklahoma 74075.*

HERPETOLOGICAL NOTES

NOTES ON SOUTH AMERICAN SALAMANDERS OF THE GENUS *BOLITOGLOSSA*.—Since the appearance of our revision of South American salamanders (Brame and Wake, 1963), additional material has become available for study. This report includes information that significantly extends knowledge of variation and distribution for several species.

Hermano Nicéforo María, Instituto de La Salle, Bogotá, recently sent us six salamanders from the Páramo de la Rusia between the towns of Duitama (Departamento de Boyaca) and Charala (Depto. Santander), Colombia. The series is deposited in the Los Angeles County Museum. The three adult males range from 38.2 to 45.1 mm in standard length (snout to posterior end of vent); two adult females measure 51.4 and 54.1 mm. There is one juvenile. Standard length is 5.8 to 6.4 times head width in males, 6.9 times head width in females. Males have 5 to 16 maxillary teeth (totals) and females have 23 to 24. Adults have 18 to 25 vomerine teeth. Dimensions and tooth numbers are well within the range of variation for *Bolitoglossa adspersa*, but maxillary teeth are fewer than in several populations to the southwest. *B. adspersa* is somewhat variable

in hand and foot shape and webbing; these specimens are within the previously known range of variation. Webbing is slightly more extensive than in populations from the immediate vicinity of Bogotá. The new examples are almost solid black in coloration, lacking the flecking and streaking of reddish, rusty, and gold characteristic of most populations of *B. adspersa*, but resembling the population of *B. adspersa* at Páramo de Palacio, Cundinamarca, Colombia. The discovery of the Páramo de la Rusia population extends the known range to the northeast by over 80 miles (130 km), and indicates that *B. adspersa* is more extensively distributed than was previously suspected (Brame and Wake, 1963). Of greater significance, however, is the discovery that *B. adspersa* and *B. nicefori* (from near San Gil, Santander) occur in the same general region (less than 50 km apart). Because there is no convergence of the characters of the two species, this discovery lends support to the validity of *B. nicefori*, a form known from a single individual once referred to *B. adspersa* (Nicéforo María, 1958). The recently collected specimens of *B. adspersa* were found beneath rocks in the highlands, the typical habitat of the species; the holotype of *B.*

TABLE 1. VARIATION IN THE *altamazonica* SPECIES GROUP OF *Bolitoglossa*. DATA ARE PRESENTED IN FOLLOWING ORDER: RANGE; MEAN.

| Characters | <i>altamazonica</i> | <i>peruviana</i> | <i>sima</i> | <i>chica</i> |
|------------------------|---------------------|------------------|-----------------|------------------------|
| Size in mm | | | | |
| Males | 30.6-42.0; 38.4 | 29.8 | 36.7 | 40.3 |
| Females | 35.6-56.6; 42.9 | 36.1-42.3; 38.6 | 43.7-45.9; 45.1 | 38.7 (50) ¹ |
| Standard length | | | | |
| Head width | 5.8-7.3; 6.7 | 6.4-7.2; 6.9 | 6.2-6.6; 6.4 | 6.4-6.6; 6.5 |
| Maxillary teeth totals | 11-36; 22 | 33-41; 35 | 28-44; 34 | 0-4 (0) ¹ |
| Maxillary teeth | | | | |
| Standard length | 0.31-0.92; 0.54 | 0.85-1.38; 1.02 | 0.64-0.96; 0.76 | 0-0.1 |
| Vomerine teeth totals | 9-43; 17 | 12-30; 19 | 10-22; 18 | 16-31; 24 |
| Standard length | | | | |
| Foot width | 10.7-13.3; 12.0 | 10.2-13.7; 11.9 | 9.2-10.6; 9.7 | 10.1-11.4; 10.8 |
| Tail length | | | | |
| Standard length | 0.85-1.11; 0.96 | 0.72-0.92; 0.86 | 0.81-1.07; 0.93 | 0.83-1.04; 0.94 |
| Specimens | | | | |
| Males | 4 | 1 | 1 | 1 |
| Females | 10 | 4 | 3 | 1 |

¹ Data from Neill, 1965.

nicefori was taken from a bromeliad at a lower elevation (1,500 m) than is typical of *B. adspersa*.

The remaining new material is all assignable to the *altamazonica* group (Brame and Wake, 1963), the widest ranging and taxonomically most difficult group of South American *Bolitoglossa*. Through the courtesy of Dr. P. E. Vanzolini of the University of São Paulo (DZSP) and Dr. A. S. Rand, formerly of that institution, we have been able to examine important specimens from northeastern Brazil. Dr. A. E. Leviton of the California Academy of Sciences (CAS) has loaned us a recently collected individual from Peru, and Dr. C. F. Walker of the Museum of Zoology, University of Michigan (UMMZ) sent us three specimens recently collected in Ecuador. This material provides information that invites a reexamination of the status of the four species of the *altamazonica* group (*B. altamazonica*, *B. chica*, *B. peruviana*, *B. sima*).

The São Paulo material includes a juvenile (DZSP 9032) from Belém, Pará, collected by R. Damascino, an adult female (DZSP 22461) from Utinga, Belém, Pará, collected on 20 January 1960, and an adult male and female (DZSP 22463-64) from Caninde, Rio Gurupi, Pará, collected by B. Malkin in April 1963. The last locality establishes the presence of the genus in eastern Brazil be-

yond the Amazonian drainage. The record supports the suggestion (Brame and Wake, 1963) that the eastern Brazilian populations are well established and do not represent river transports from the upper Amazonian region. These specimens were captured about 130 miles southeast of the Belém region, the only other area from which salamanders are known in eastern South America.

A single large salamander (CAS 93329) was recently collected at Entrion, Ampiacu district, Provincia de Loreto, Peru, near the Colombian and Brazilian borders. It and the Brazilian specimens are all members of *B. altamazonica* as the taxon is presently understood. We have examined 16 members of the species from Colombia, Peru, Brazil, and Bolivia and can now present additional information concerning variation.

The most unusual of the five new specimens is CAS 93329, a female that measures 56.6 mm in standard length, 8.6 mm (18%) longer than the previously reported maximum size of *B. altamazonica*. The revised size range is indicated in Table 1. Standard length is from 6.2 to 7.3 times head width in the *B. altamazonica* group in general, but the Peruvian specimen has a broader head (standard length 5.8 times head width) than any other member of the group. The previously reported range in numbers of maxillary teeth in *B. altamazonica* was 11 to 26,

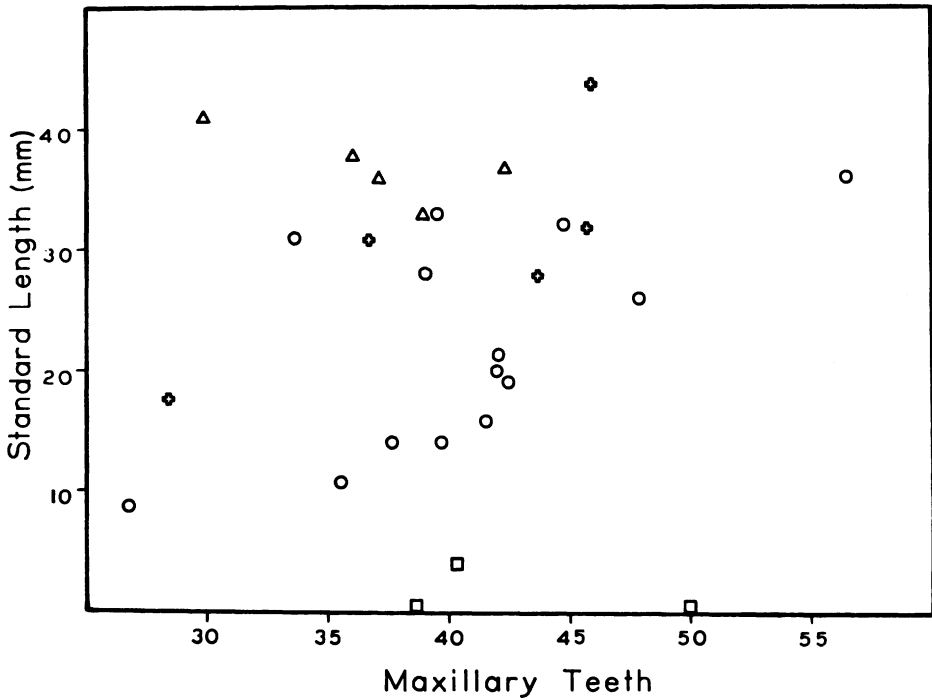


Fig. 1. Variation in maxillary dentition in the *altamazonica* group of *Bolitoglossa*. Circle = *B. altamazonica*, box = *B. chica*, triangle = *B. peruviana*, cross = *B. sima*.

mean 15; all of the new specimens have more teeth than the previously recorded maximum and the range is now 11 to 36, mean 22. The four new Brazilian specimens (31.3 to 41.0 mm standard length) have high numbers of maxillary teeth (28 to 33). Vomerine teeth number 9 to 21, mean 15, in *B. altamazonica*, with the exception of the Peruvian individual which has 43 teeth, arranged predominantly in large patches. Standard length is 11.1 to 13.3, mean 12.1 times the width of the right foot in *B. altamazonica*, with the exception once again of the Peruvian individual in which the figure is 10.7.

In most regards, CAS 93329 is outside the range of variation for *B. altamazonica*. It is by far the largest individual examined and all of the characters by which it differs from other *B. altamazonica* are correlated with size. No more than two individuals of the species are available from a single locality. Until series are available and variation of the species is understood all of the new Brazilian and Peruvian material is assigned to *B. altamazonica*. The taxon as thus defined is a heterogeneous assemblage represented primarily by single individuals from

widespread localities. We think that a single species that varies geographically is involved.

Three specimens of *B. peruviana* (UMMZ 123890-92) from 2.5 km south of Ongota (between Latas and Napo), Napo Pastaza, Ecuador, collected on 11-12 May 1963 by T. H. Hubbell, are the third, fourth, and fifth known specimens. *B. peruviana* is probably the smallest species of the genus in South America. Measurements and other pertinent comparative information are included in Table 1.

In addition to the characters included in Table 1, the species of the *altamazonica* group differ in distribution. *B. sima* and *B. chica* occur west of the Andes and *B. altamazonica* and *B. peruviana* occur to the east of the mountains. *B. chica* is best distinguished from all South American species in lacking or having very few maxillary teeth. A third specimen of *B. chica* recently collected in western Ecuador (Neill, 1965), but not seen by us, is toothless at 50 mm standard length (about 20% larger than our material). *B. peruviana* occurs in the highlands, but the other three are lowland species. *B. peruviana* is also the smallest, based on the presence of well-developed secondary

sexual characters in a male of 29.8 mm standard length. The largest *B. peruviana* female is smaller than the mean female size of *B. sima* and *B. altamazonica*. *B. peruviana* has more maxillary teeth relative to size than either *B. altamazonica* or *B. chica* (Fig. 1). *B. peruviana* and *B. chica* apparently have more vomerine teeth, relative to size, than the other two species. Most *B. peruviana* are rather dark in coloration with a whitish or light-colored spindle-shaped spot between the eyes, but the other species are more variable. *B. chica* is known to be uniformly grayish to mottled dark brown, and dorsal dark mottling is typical of *B. sima*. Dorsal mottling is present in some *B. altamazonica*, but others are streaked or uniformly dark brown dorsally.

B. sima has slightly more maxillary teeth relative to size than has *B. altamazonica* (Fig. 1), and has broader, more fully webbed hands and feet than either *B. peruviana* or *B. altamazonica*. The head of *B. sima* is broader than *B. peruviana*, relative to size, and *B. sima* is the larger species. The dendrogram presented previously (Brame and Wake, 1963:Fig. 24) still indicates our ideas concerning the relationships of the species.

It is apparent that all members of the *altamazonica* group are very closely related. No sympatry is known and determination of the number of species involved must await the collection of much additional material from the area east of the Andes Mountains.

Since this paper was written Dr. Alan E. Leviton has called our attention to an apparent error regarding the locality data of CAS 65003, a specimen assigned by Brame and Wake (1963) to *B. altamazonica* and reported from Belém, Pará, Brazil (see also Schmidt and Inger, 1951). Although the tag on the specimen reads "Pará, Brazil," records of the California Academy of Sciences indicate that it was collected in the vicinity of Pará de Minas, Minas Gerais, Brazil (lat. 19° 51'41", long. 44°36'24"), by Dr. F. X. Williams in May 1924. This locality is almost 1,300 miles south of Belém, in the drainage of the Rio San Francisco, and represents the southernmost record for any salamander. The animal differs from other members of *B. altamazonica* in having few maxillary teeth (11 at 35.6 mm standard length), but for the present we assign it to that possibly composite species. Confirmation of the existence of salamanders in Minas Gerais is needed.

LITERATURE CITED

- BRAME, A. H., JR. AND D. B. WAKE. 1963. The salamanders of South America. Los Angeles Co. Mus. Contrib. Sci. 69:1-72.
- NEILL, W. T. 1965. A third specimen of the Ecuadorian salamander *Bolitoglossa chica*. *Herpetologica* 20(4):285-286.
- NICÉFORO MARÍA, H. 1958. Sección herpetología. *Bol. Inst. La Salle, Bogotá* 45(198):1-16.
- SCHMIDT, K. P. AND R. F. INGER. 1951. Amphibians and reptiles of the Hopkins-Branner Expedition to Brazil. *Fieldiana, Zool.* 31:439-465.

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AN ANOMALOUS *RANA* FROM WESTERN NEW YORK.—On 30 April 1963 a group of our students collected the frog shown in Fig. 1 from a temporary pond six miles south of Fredonia, Chautauqua County, New York. As the picture clearly indicates, the dorsolateral fold is characteristic of *Rana clamitans*, while the tympanum is larger than is usual in this species. The body length was 102 mm; the diameter of the tympanum 13 mm. Because of these facts, and the locality where it was taken, we assumed that it was indeed a green frog.

In the laboratory, however, the frog began to call, alternating the calls of the green frog and the bullfrog (*Rana catesbeiana*) irregularly. Throughout the two weeks during which it remained alive, it called repeatedly, usually beginning with several green frog croaks, followed by several distinct bullfrog calls. We intended to record these calls on tape, but a student placed a pickerel frog (*Rana palustris*) in the aquarium on a weekend, and by Monday all the other frogs in the aquarium had died.

On careful examination, we noted some other anomalous characters. The web of the fourth toe extends to the base of the first phalanx, and is clearly more extensive than that of a green frog. The skin is rough with small tubercles, far more than in any green frog in our collection. The lower sides and femora are dusky, with partial reticulation on the femur.

Since we have been assured by Drs. John Moore and E. Peter Volpe that *R. clamitans* × *R. catesbeiana* hybrids have not been pro-