

New Species of Montane Salamander of the *Bolitoglossa dunni* Group from Northern Comayagua, Honduras (Urodela: Plethodontidae)

JAMES R. MCCRANIE,^{1,2} MARIO R. ESPINAL,³ AND LARRY DAVID WILSON⁴

¹10770 Southwest 164th Street, Miami, Florida 33157–2933, USA; E-mail: jmccrani@bellsouth.net

³Medio Ambiente para el Desarrollo Sostenible, Edificio Plaza San José, 2do Nivel Boulevard, Suyapa, Tegucigalpa, Honduras; E-mail: mknorops@yahoo.com

⁴Department of Biology, Miami-Dade College, Kendall Campus, Miami, Florida 33176–3393, USA; E-mail: lwilson@mdcc.edu

ABSTRACT.—A new species of *Bolitoglossa* of the *Bolitoglossa dunni* group is described from an isolated mountaintop in western Honduras. Color and pattern are the most distinctive features of the new species. Less than 1 ha of forest remains on the isolated mountain peak at the type locality, making the new species the most endangered salamander species known in Honduras.

RESUMEN.—Una nueva especie de *Bolitoglossa* del grupo *Bolitoglossa dunni* se describe de una cumbre aislada en el occidente de Honduras. El color y el patrón son las características más distintivas de la nueva especie. Menos de 1 ha de bosque queda en la cima aislada en la montaña de la localidad del tipo, haciendo a esta especie la especies de salamandra con mayor riesgo de extinción de las conocidas para Honduras.

Currently there are nine described species in the *Bolitoglossa dunni* group recognized in Honduras (three of which occur in adjacent El Salvador and Guatemala) and three in El Salvador, Guatemala, and Chiapas, Mexico (Parra-Olea et al., 2004). In July 2003, the second author collected a small series of a distinctive species of salamander belonging to this group from an isolated mountaintop in the northern portion of the department of Comayagua, Honduras. This new species is described herein.

MATERIALS AND METHODS

All measurements were made to the nearest 0.1 mm with dial calipers under a dissecting microscope. Maxillary and vomerine tooth counts are totals from both sides. Abbreviations used are SVL (snout–vent length; snout to posterior end of vent), HL (head length), HW (head width), TL (tail length), HLL (hind-limb length), and HFW (hind-foot width). Comparative statements to other Honduran species in the *Bolitoglossa dunni* group are based on data gathered by the first author for the descriptions of other species in the group (McCranie and Cruz, 1996; McCranie and Köhler, 1999; McCranie and Wilson, 1993, 1995a,b, 1997) and summarized in McCranie and Wilson (2002). Color (capitalized) and color codes (in parentheses) for color in life follow those of Smithe (1975–1981).

Bolitoglossa oresbia sp. nov.

Figure 1

Holotype.—National Museum of Natural History, Washington, DC (USNM) 560001, an adult female from Cerro El Zarciajero, 14°43.662'N, 87°53.925'W, 1880 m elevation, Departamento de Comayagua, Honduras (Fig. 2), collected 3 July 2003 by Mario R. Espinal. Original number LDW 13594.

Paratype.—USNM 560002, an adult female, same data as the holotype.

Referred Specimen.—USNM 560003, a subadult female with the same locality and collecting data as the holotype.

Diagnosis.—*Bolitoglossa oresbia* differs significantly from all other Honduran species of the *B. dunni* group, except *Bolitoglossa diaphora* and *Bolitoglossa porrasorum* (*Bolitoglossa carri*, *Bolitoglossa celaque*, *Bolitoglossa conanti*, *Bolitoglossa decora*, *Bolitoglossa dunni*, *Bolitoglossa longissima*, and *Bolitoglossa synoria*), in having the anterior three-fourths of the subcaudal surface uniformly buff-yellow in life and yellowish-brown with only widely scattered brown flecks in preservative (numerous melanophores present on pale yellow to pinkish-cream ground color in life and conspicuous paler spots or areas on brown ground color in preservative in *B. carri*; pale yellow with ocher blotching and scattered gold flecking, pale yellow with gray and orange flecking, or pale orange with gray and silver flecking in life and cream to brown and lightly to moderately flecked with dark brown in pre-

² Corresponding Author.



FIG. 1. Adult female paratype (USNM 560002) of *Bolitoglossa oresbia* sp. nov., total length 103.5 mm.

servative in *B. celaque*; gold or silver flecking or spotting on a tan to dark brown ground color in life and heavily flecked with brown to dark brown in preservative in *B. conanti*; drab brown with or without prominent yellow spots in life and cream-colored with numerous tiny brown flecks to dark brown with numerous tiny pale iridophores and sometimes prominent white spots in preservative in *B. decora*; some shade of red in life and reddish-brown or purplish-brown in preservative in *B. dunni*; orange-rufous with numerous gray flecking in adults in life and pale brown with heavy dark brown flecking in preservative in *B. longissima*; dark grayish-brown with dirty white mottling in life and dark brown with pale brown mottling and flecking in preservative in *B. synoria*). *Bolitoglossa oresbia* also differs from these seven Honduran species and *B. diaphora* and *B. porrasorum* in having the buff-yellow of the subcaudal surfaces extending onto the ventrolateral portion of the tail or the buff-yellow of the ventral and subcaudal surfaces extending onto the ventrolateral portions of the body and tail (ventrolateral portions of body and tail same color as, or darker than, that of dorsal coloration in all nine species). In addition, most

specimens of *B. porrasorum* have dark brown subcaudal surfaces or those surfaces heavily flecked with dark brown. *Bolitoglossa oresbia* differs further from *B. porrasorum* in having buff-yellow spots on the anterior and posterior surfaces of the upper portions of the limbs (pale spots absent, but gold flecking sometimes present in *B. porrasorum*) and 64–66 maxillary teeth (71–94 in female *B. porrasorum*). *Bolitoglossa oresbia* differs further from *B. diaphora* in having well-developed subdigital pads, bluntly rounded toe tips, and nearly two segments on both sides of Toe III on both forelimbs and hind limbs free of webbing (well-defined subdigital pads absent, toe tips acutely rounded to pointed, and toes extensively webbed in *B. diaphora*).

Parra-Olea et al. (2004) also included two Guatemalan and Chiapan species (*Bolitoglossa flavimembris* and *Bolitoglossa morio*) in the *B. dunni* group. *Bolitoglossa flavimembris* differs from *B. oresbia* in having extensively webbed toes and pointed or acutely rounded toe tips (see Schmidt, 1936; Wake and Lynch, 1976), and *B. morio* has dark ventral surfaces with white flecks (see Wake and Lynch, 1982). The recently described *B. heireireias* of Cerro Montecristo in El Salvador

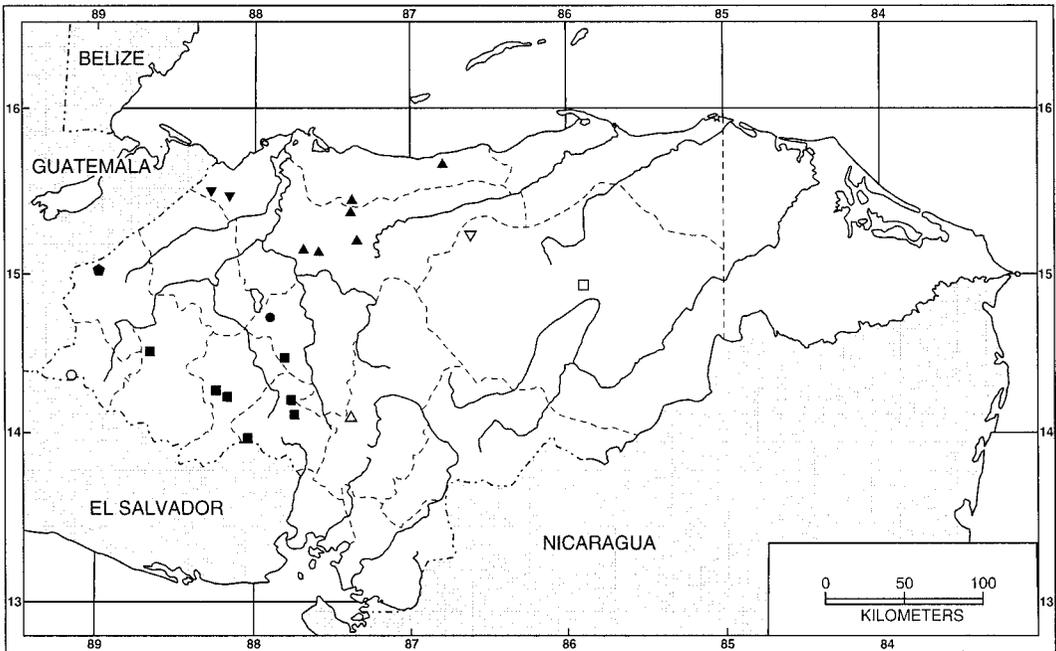


FIG. 2. Map of Honduras showing the known localities for the species of the *Bolitoglossa dunni* group in that country. Solid circle = *Bolitoglossa oresbia*; solid squares = *Bolitoglossa celaque*; solid triangles = *Bolitoglossa porrasorum*; solid inverted triangles = *Bolitoglossa conanti*, *Bolitoglossa diaphora*, and *Bolitoglossa dunni*; solid pentagon = *B. dunni* and unquestionable *Bolitoglossa conanti*; open triangle = *Bolitoglossa carri*; open inverted triangle = *Bolitoglossa decora*; open square = *Bolitoglossa longissima*; and open circle = *Bolitoglossa synoria*.

and Guatemala differs from *B. oresbia* in having gray lichenous or black dorsal blotches and a orange to rusty red subcaudal surface in life (Greenbaum, 2004).

Description of Holotype.—Snout truncate in dorsal aspect, rounded in profile, with slightly swollen tissue of nasolabial groove not projecting anteriorly past tip of snout; labial protuberances of nasolabial grooves slightly swollen; mental gland cluster absent; suborbital groove distinct; eyes slightly protuberant, not visible beyond margin of jaws when viewed from below; post-orbital groove shallow, proceeding sharply ventrally posterior to mandible, extending across throat as a poorly defined groove 3.3 mm anterior to well-defined gular fold; maxillary teeth 66, extending to level of posterior end of orbit; premaxillary teeth 6, located posterior to lip and in line with maxillary teeth series; vomerine teeth 22, in single arched series, extending to level of outer edge of internal nares; tail nearly rectangular in cross section for anterior one-half of its length, becoming rounded and tapering posteriorly; tail strongly constricted basally, swollen just posterior to basal constriction; limbs relatively slender, long, limb interval about 0.5 costal folds; digits moderately webbed, nearly two segments on Toe III of both forelimbs and hind limbs free of webbing; subdigital pads

well developed; digit tips bluntly rounded; relative length of digits on forelimbs $I < II < IV < III$, those on hind limbs $I < V < II < IV < III$; cloacal folds present.

Measurements (in millimeters) and proportions: SVL 50.8; HL 12.0; HL/SVL 0.24; HW 8.0; HW/SVL 0.16; head depth at posterior angle of jaws 5.1; eyelid length 3.3; eyelid width 1.4; anterior rim of orbit to snout (medially) 3.4; horizontal orbital diameter 2.6; interorbital distance 2.5; snout (medially) to forelimbs 15.6; distance separating internal nares 1.8; distance separating external nares 2.2; snout projection beyond mandible 0.5; axillary to groin length 22.7; snout to anterior edge of vent length 44.1; TL 41.5; TL/SVL 0.82; tail width at basal constriction 3.6; tail depth at basal constriction 4.2; length of right forelimb 13.3; length of right hind limb 13.7; HLL/SVL 0.27; right forefoot width 4.1; right hind foot width 5.9; HFW/SVL 0.12.

Color in Life.—Dorsal surfaces of head and body grayish brown with small, inconspicuous, irregularly shaped Buff-Yellow (53) spots; dorsal surface of tail grayish-brown with irregularly shaped Buff-Yellow (53) spots anteriorly; limbs grayish-brown with irregularly shaped Buff-Yellow (53) spots on anterior and posterior surfaces of upper segments; ventral surface and

anterior three-fourths of subcaudal surface uniformly Buff-Yellow (53), Buff-Yellow extending onto ventrolateral surface of tail.

Color in Alcohol.—Dorsal surfaces of head, body, and tail grayish-brown with indistinct, tiny pale brown spots on lateral surfaces of body and dorsally on tail; ventral surfaces of head and body yellowish-brown with moderate amount of grayish-brown flecking; ventrolateral surface of body with pale brown mottling; subcaudal surface yellowish-brown with widely scattered brown flecks on anterior three-fourths, brown flecks increasing in number on posterior one-fourth; ventrolateral surface of tail same color as subcaudal surface.

Variation.—Selected measurements, proportions, and tooth counts for the adult female paratype (USNM 560002): SVL 55.5; HL/SVL 0.24; HW/SVL 0.16; TL/SVL 0.87; HLL/SVL 0.26; HFW/SVL 0.12; maxillary teeth 64; premaxillary teeth 4; vomerine teeth 19. The subadult female has a SVL of 34.1.

Color in Life of the Adult Female Paratype.—Dorsal surface of head Brownish-Olive (29) with Buff-Yellow (53) markings forming incomplete dorsolateral stripes extending from snout across upper eyelid onto shoulder region; dorsal surface of body Brownish-Olive (29) with Buff-Yellow (53) blotches dorsolaterally; Buff-Yellow (53) of ventral and subcaudal surfaces extending onto ventrolateral surfaces of body and tail (USNM 560002). The remainder of the color in life was similar to that of the holotype (USNM 560001).

Color in Alcohol of the Adult Female Paratype.—Dorsal surfaces of head and body dark brown with distinct yellowish-brown dorsolateral blotches, those on head and shoulder region forming incomplete dorsolateral stripe; dorsal surface of tail dark brown with yellowish-brown spots; ventral and subcaudal surfaces yellowish-brown with widely scattered brown flecking, yellowish-brown of ventral and subcaudal surfaces extending onto ventrolateral areas of body and tail. Color in preservative of the referred specimen (USNM 560003) is similar to that of the paratype (USNM 560002).

Natural History Notes.—All three specimens of *B. oresbia* were collected inside water-containing arboreal bromeliads in Lower Montane Wet Forest (Holdridge, 1967). The type series was collected on 3 July 2003 before the unusually late rainy season had begun in earnest. Espinal and McCranie briefly visited (for approximately 1 h) the type locality on 13 September 2003 during a period of heavy rainfall. No salamanders could be found in bromeliads at that time, as the salamanders had apparently abandoned the bromeliads whose leaf axils were filled to capacity. *Bolitoglossa oresbia* appears to be one of the most endangered salamanders in Honduras,

because the forest on its isolated mountaintop is now reduced to less than 1 ha, with crop fields completely surrounding the remaining forest.

Etymology.—The specific name *oresbia* is formed from the Greek *oresbios*, meaning “living in or on mountains.” The name alludes to the montane habitats of this and all other species in the *B. dunni* group.

DISCUSSION

With the description of *B. oresbia*, the *B. dunni* group consists of 10 species occurring in Honduras, all except for *B. dunni* (Schmidt, 1933) have been described since 1993 (McCranie and Cruz, 1996; McCranie and Köhler, 1999; McCranie and Wilson, 1993, 1995a,b, 1997). An additional two Guatemalan and Chiapan species (*B. flavimembris* and *B. morio*) and one species from El Salvador and Guatemala (*B. heiroreias*) were included in this group by Parra-Olea et al. (2004). All 13 species are either restricted to Lower Montane Wet Forest and Lower Montane Moist Forest or have the major portion of their ecological range centered there (Campbell, 1999; Greenbaum, 2004; McCranie and Wilson, 2002). These forest formations are typically referred to as “cloud forest” (Wilson and McCranie, 2004b). Only *B. dunni* and *B. porrasorum* range downward into Premontane Wet Forest (McCranie and Wilson, 2002), and only *B. morio* ranges upward into Montane Wet Forest and Montane Moist Forest (Campbell, 1999).

As noted previously, the known range of *B. oresbia* is limited to less than a single hectare of forest remaining on top of Cerro El Zarcadero, giving this species the status of the most critically endangered salamander in Honduras. Nonetheless, two of the other members of this group (*B. carri* and *B. synoria*) were judged by Wilson and McCranie (2004a) to have declining populations and all species were considered to be highly vulnerable to environmental damage caused by habitat deterioration. This is the case even though several of these species are represented by populations located in the system of Honduran protected areas.

Salamanders of the *B. dunni* group are prominent members of the highly significant cloud forest herpetofauna of Honduras (Wilson and McCranie, 2004b). Seven of the 10 members occurring in Honduras are endemic to that country (*B. conanti*, *B. dunni*, and *B. synoria* are distributed marginally in El Salvador and Guatemala). We characterize the Honduran cloud forest herpetofauna as highly significant inasmuch as of 124 species known to be distributed in Lower Montane Wet Forest and Lower Montane Moist Forest (Wilson and McCranie, 2004b; McCranie and Castañeda, 2004; this paper), 50 (40.3%) are endemic to Honduras and 35 (28.2%)

are otherwise restricted to Nuclear Middle America. Thus, a total of 85 of the 124 species (68.5%) comprising the Honduran cloud forest herpetofauna fall into these two distributional categories. One of the enduring challenges to conservation biologists interested in the Honduran biota will be to safeguard the country's cloud forests from the rampage of habitat destruction associated with uncontrolled human population growth.

Acknowledgments.—Collecting and exportation permits were provided by C. González, M. Moreno, and H. Portillo of COHDEFOR, Tegucigalpa.

LITERATURE CITED

- CAMPBELL, J. A. 1999. Distribution patterns of amphibians in Middle America. In W. E. Duellman (ed.), *Patterns of Distribution of Amphibians. A Global Perspective*, pp. 111–210. Johns Hopkins Univ. Press, Baltimore, MD.
- GREENBAUM, E. 2004. A new species of *Bolitoglossa* (Amphibia: Caudata: Plethodontidae) from montane forests in Guatemala and El Salvador. *Journal of Herpetology* 38:411–421.
- HOLDRIDGE, L. R. 1967. *Life Zone Ecology*. Rev. ed. Tropical Science Center, San José, Costa Rica.
- MCCRANIE, J. R., AND F. E. CASTAÑEDA. 2004. A new species of snake of the genus *Omoadiphas* (Reptilia: Squamata: Colubridae) from the Cordillera Nombre de Dios in northern Honduras. *Proceedings of the Biological Society of Washington* 117:311–316.
- MCCRANIE, J. R., AND G. A. CRUZ. 1996. A new species of salamander of the *Bolitoglossa dunni* group (Caudata: Plethodontidae) from the Sierra de Agalta, Honduras. *Caribbean Journal of Science* 32:195–200.
- MCCRANIE, J. R., AND G. KÖHLER. 1999. A new species of salamander of the *Bolitoglossa dunni* group from Cerro El Pital, Honduras and El Salvador (Amphibia, Caudata, Plethodontidae). *Senckenbergiana Biologica* 78:225–229.
- MCCRANIE, J. R., AND L. D. WILSON. 1993. A review of the *Bolitoglossa dunni* group (Amphibia: Caudata) from Honduras with the description of three new species. *Herpetologica* 49:1–15.
- . 1995a. A new species of salamander of the *Bolitoglossa dunni* group (Caudata: Plethodontidae) from northern Honduras. *Herpetologica* 51:131–140.
- . 1995b. A new species of salamander of the genus *Bolitoglossa* (Caudata: Plethodontidae) from Parque Nacional El Cusuco, Honduras. *Journal of Herpetology* 29:447–452.
- . 1997. Two new species of salamanders (Caudata: Plethodontidae) of the genera *Bolitoglossa* and *Nototriton* from Parque Nacional La Muralla, Honduras. *Proceedings of the Biological Society of Washington* 110:366–372.
- . 2002. The amphibians of Honduras. *Society for the Study of Amphibians and Reptiles, Contributions to Herpetology* 19:i–x, 1–625, pls. 1–20.
- PARRA-OLEA, G., M. GARCÍA-PARÍS, AND D. B. WAKE. 2004. Molecular diversification of salamanders of the tropical American genus *Bolitoglossa* (Caudata: Plethodontidae) and its evolutionary and biogeographical implications. *Biological Journal of the Linnean Society* 81:325–346.
- SCHMIDT, K. P. 1933. New reptiles and amphibians from Honduras. *Zoological Series of Field Museum of Natural History* 20:15–22.
- . 1936. Guatemalan salamanders of the genus *Oedipus*. *Zoological Series of Field Museum of Natural History* 20:135–166.
- SMITHE, F. B. 1975–1981. *Naturalist's Color Guide. Part I. Color Guide*. American Museum of Natural History, New York.
- WAKE, D. B., AND J. F. LYNCH. 1976. The distribution, ecology, and evolutionary history of plethodontid salamanders in tropical America. *Natural History Museum of Los Angeles County Science Bulletin* 25:1–65.
- . 1982. Evolutionary relationships among Central American salamanders of the *Bolitoglossa franklini* group, with a description of a new species from Guatemala. *Herpetologica* 38:257–272.
- WILSON, L. D., AND J. R. MCCRANIE. 2004a. The conservation status of the herpetofauna of Honduras. *Amphibian and Reptile Conservation* 3:6–33.
- . 2004b. The herpetofauna of the cloud forests of Honduras. *Amphibian and Reptile Conservation* 3:34–48.

Accepted: 18 November 2004.