

Notes on the second male specimen of the cryptozoic snake *Geophis damiani* Wilson, McCranie, & Williams, 1998

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The genus *Geophis* (Squamata: Colubridae: Dipsadinae) is currently comprised of 47 species of secretive semifossorial snakes distributed across nearly every terrestrial habitat from Mexico to northern South America (Downs, 1967; Wilson and Townsend, 2007; Savage and Watling, 2008). Five members of the genus are known to occur in Honduras: *Geophis damiani* Wilson, McCranie, and Williams, *G. fulvoguttatus* Mertens, *G. hoffmanni* (Peters), *G. nephodrymus* Townsend and Wilson, and *G. rhodogaster* (Cope), two of which (*G. damiani* and *G. nephodrymus*) are endemic to that country (Townsend, 2009). *Geophis damiani* was originally described based on a single adult male (USNM 498356) from disturbed cloud forest at 1750 m on the leeward side of Refugio de Vida Silvestre Texiguat, where it was collected beneath a sawn mahogany plank (Wilson et al., 1998). A second specimen, an adult female (USNM 559598), was later collected at the same locality (McCranie and Castañeda, 2004), and together with the holotype constitutes the only comparative material available for this taxon. A third specimen assigned to *G. damiani* (UF 142543), from 1550 m elevation at the same locality, consists of an egg and partially-developed snake embryo that

possesses a similar color pattern as adult specimens of *G. damiani* (Townsend, 2006).

On 29 July 2010, we collected an adult male *Geophis damiani* (Fig. 1; USNM 573999) during survey work around La Liberación (15.53396°N, 87.29209°W) on the windward side of Refugio de Vida Silvestre (RVS) Texiguat, Departamento de Atlántida, Honduras. This is the third adult specimen and second adult male specimen known for this taxon. The snake was found at 22h30 while active in the bottom of a deep, trench-like trail (Fig. 2) at 1,075 m elevation in moderately disturbed Premontane Wet Forest (Holdridge, 1967). The snake had apparently fallen into and become trapped inside the trench, which was about 2 m deep at the collection site and over 3.5 m deep in some places (Fig. 2). This locality lies around 10 km NNW of the previously reported localities, and the elevation of the new record is 475 m below the previously-known lowest elevational distribution attributed to this species, 1,550 m (based on UF 142543, an egg and embryo), and 605 m below the lowest verified elevation for the species (1,680 m; USNM 559598). All previously reported localities for *G. damiani* are in the Lower Montane Wet Forest formation (Holdridge, 1967). We provide the following morphological data and color notes for USNM 573999, and compare it to the two previously known specimens of *G. damiani*: USNM 498356, an adult male, and USNM 559598, an adult female. We also discuss its conservation status.

Geophis damiani Wilson, McCranie, and Williams, 1998

Dorsal scales in 15–15–15 rows, smooth throughout length of body; apical pits absent; ventrals 133; subcaudals 43; segmental count 176; snout-vent length 202 mm, tail length 53 mm, tail length/total length ratio 0.208.

Head slightly distinct from neck; snout extending

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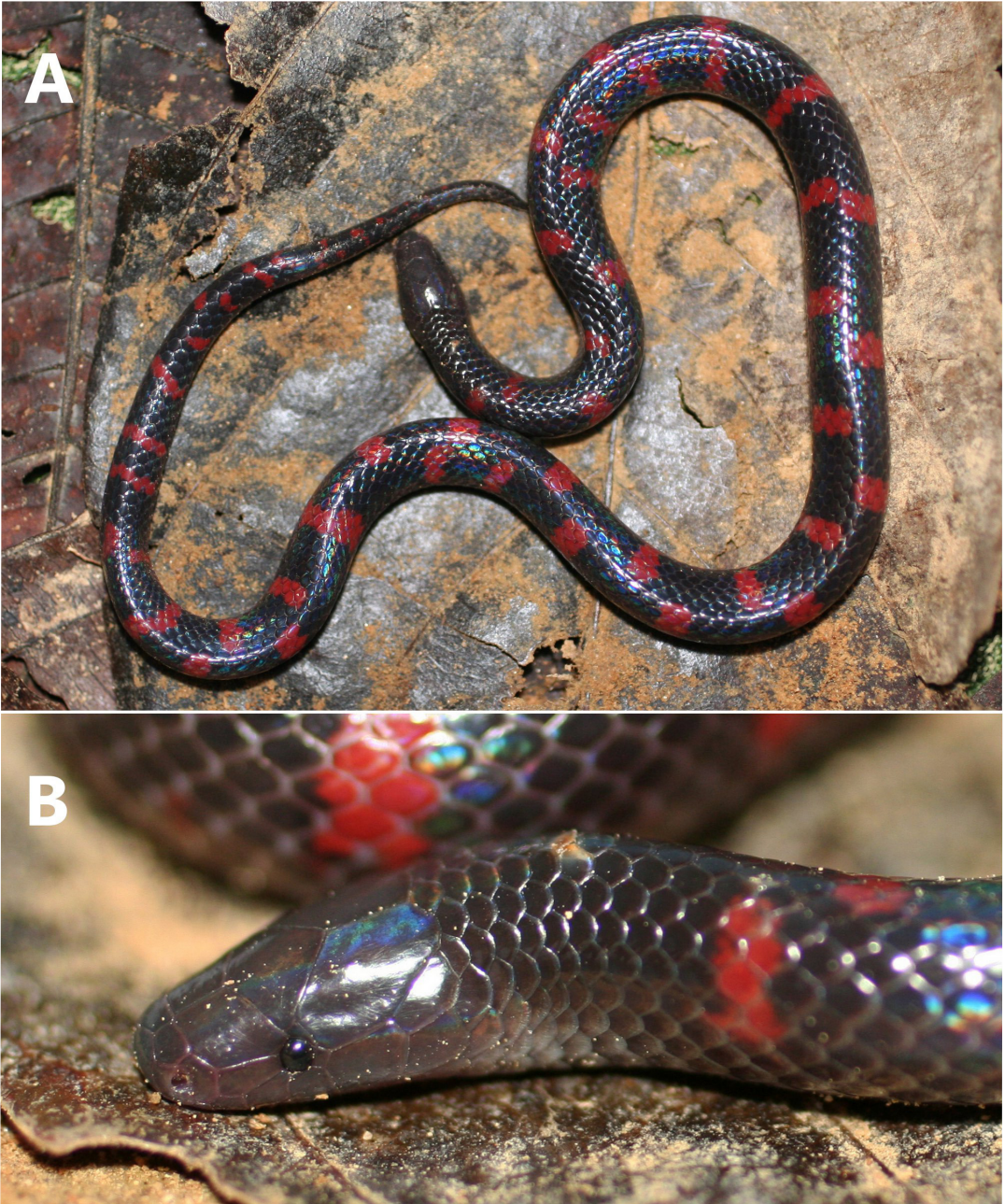


Figure 1. A. Dorsal aspect of male *Geophis damiani* (USNM 573999) from La Liberación, Refugio de Vida Silvestre Texiguat, Honduras. B. Close-up view of head of USNM 573999.

beyond the anterior end of the lower jaw; lower jaw does not reach to the level of the posterior portion of the rostral, leaving rostral and first pair of infralabials exposed in ventral aspect; rostral wider than high, extending posteriorly in dorsal view between internasals, portion of rostral visible in dorsal view 0.26 times the length of its distance from the frontal, equal in length to

internasal common suture, with posterior termination at anterior edge of nostril; internasals 1.57 times as wide as they are long, angular anteriorly, contacting the prenasal and postnasal laterally, their length 0.54 times as long as prefrontal common suture, their common suture 0.38 times as long as prefrontal common suture; prefrontals contacting postnasal, loreal, and orbit laterally, their



Figure 2. Deep trench-like trail in the vicinity of La Liberación, Refugio de Vida Silvestre Texiguat, Honduras; *Geophis damiani* (USNM 573999) was collected at the bottom of this trail, which acts as a pitfall trap for terrestrial animals.

length 0.7 times snout length, their common suture 0.48 times the frontal length; frontal 6-sided, 1.15 times as wide as long, angulate anteriorly, in moderate contact with supraoculars (length of frontal-supraocular contact 0.5 times supraocular length, 2.0 times prefrontal-supraocular contact length), supraocular moderate in size, somewhat triangular, in contact with postocular, 0.47 times as long as loreal; parietals 1.44 times as long as broad, their length 0.51 times the length of the head (as measured from tip of snout to posterior edge of parietals), their common suture 0.81 times as long as frontal; single postocular, roughly equal in height and length, smaller than supraocular; nasal divided; postnasal length 1.29 times that of prenasal length; combined length of prenasal and postnasal 0.94 times the length of the loreal; loreal 1.89 times as long as deep, contained 1.94 times in snout length, 1.89 times as long as eye horizontal diameter, dorsal margin straight; eye small, contained 3.67 times in snout length, its vertical diameter 1.11 times its distance from lip; supralabials 6/6; first supralabial contacting rostral, prenasal, and postnasal; second supralabial contacting postnasal and loreal; third supralabial contacting loreal; third and fourth supralabials entering orbit; fourth supralabial contacting

postocular; fifth supralabial the largest, contacting the postocular, parietal, and posterior temporal; lip exposure of third supralabial 1.43 times that of second supralabial, lip exposure of fifth supralabial 1.17 times that of fourth supralabial, lip exposure of sixth supralabial 1.07 times that of fifth supralabial; anterior temporal absent; one posterior temporal, separating sixth supralabial from parietal; posterior temporals separated from each other by four nuchals, three medial and one on left side contacting shorter posterior temporal; mental 2.17 times as broad as long, rounded anteriorly, separated from chinshields by first infralabials; infralabials 6/6; first infralabials broadly in contact between mental and anterior chinshields; first, second, and third infralabial broadly contacting the anterior chinshield; fourth infralabial narrowly contacting anterior chinshield and broadly contacting posterior chinshield; anterior chinshields 1.82 times as long as broad, 1.25 times as long as posterior chinshields; posterior chinshields in contact; three medial gular scales present.

Coloration for USNM 573999 after about one month in preservation: dorsal ground color dark gray, becoming somewhat paler laterally; no nuchal band present; dorsal surface with five red crossbands and 14 pairs of laterally offset red partial bands, 1-3 scale-lengths wide; dorsal surface of tail with three red crossbands, four of laterally-positioned red spots, and some irregular red blotches near the distal portion of the tail; ventral surface cream colored with dark pigment from dorsal scales covering one-third to two-thirds of each ventral scale, leaving a narrow strip of pale pigment down the midventral line; mental, infralabials, and chinshields gray with pale posterior edges; subcaudals dark gray with pale posterior edges on each scale, becoming darker posteriorly.

The everted hemipenis extends to the level of the 10th subcaudal, and is bilobed and uncapitate; sulcus spermaticus semicentrifugal, bifurcating at point of capitation; naked basal pocket on asulcate side; sulcate surface of truncus bearing small spinules, lateral and asulcate surfaces of truncus with large spines in oblique rows; apical region spinulate.

The new specimen differs from existing material in a number of relatively minor aspects. USNM 573999 is the smallest of the three specimens of *Geophis damiani* (SVL = 202 mm, versus 256-267 mm), has a relatively longer tail (tail length/total length ratio 0.208, versus 0.155-0.183), slightly fewer ventrals (133, versus 136-143) and more subcaudals (43, versus 34-41), and posterior chinshields in contact (moderately separated

by first medial gular scale in USNM 498356 and 559598). The segmental counts (ventrals + subcaudals) for *G. damiani* remains remarkably conserved based on the limited available material; despite differences in ventral and subcaudal counts among all three specimens, the segmental count for USNM 573999 is 176, one less than that of both other adult specimens (177).

Townsend and Wilson (2010) evaluated *Geophis damiani* to be Critically Endangered, based on its limited distribution and observed declines in habitat extent and quality over the past two decades. While this new record extends the range about 10 km NNW of the previously known locality, the southern edge of cloud forest habitat in RVS Texiguat, the new locality is near the northern edge of the Texiguat cloud forest and appears to simply represent the opposite edge of the distribution of *G. damiani*. Given that RVS Texiguat is one of the most imperiled endemism hotspots in Honduras due to the persistent advancement of the agricultural frontier on the southern and western edges, and that *G. damiani* has never been documented existing outside of this one cloud forest area, we continue to propose *G. damiani* be recognized as Critically Endangered by the IUCN.

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References

- Downs, F. L. (1967): Intrageneric relationships among colubrid snakes of the genus *Geophis* Wagler. Misc. Publ. Mus. Zool. Univ. Michigan **131**: 1–193.
- Holdridge, L. R. (1967): Life Zone Ecology. Revised Edition. Tropical Science Center, San José, Costa Rica.
- McCranie, J. R., Castañeda, F. E. (2004): Notes on the second specimens of *Geophis damiani* Wilson, McCranie and Williams and *Rhadinaea tolpanorum* Holm and Cruz D. (Colubridae). Herpetol. Rev. **35**: 341.
- Savage, J. M., Watling, J. I. (2008): Not so rare snakes: a revision of the *Geophis sieboldi* group (Colubridae: Dipsadinae) in lower Central America and Colombia. Zool. J. Linnean Soc. **153**: 561–599.
- Townsend, J. H. (2006): Inventory and conservation assessment of the herpetofauna of the Sierra de Omoa, Honduras, with a review of the *Geophis* (Squamata: Colubridae) of eastern Nuclear Central America. Unpubl. Masters Thesis, Univ. Florida, Gainesville. (http://etd.fcla.edu/UF/UFE0013940/townsend_j.pdf).
- Townsend, J. H. (2009): Morphological variation in *Geophis nephodrymus* (Squamata: Colubridae), with comments on the conservation of *Geophis* in eastern Nuclear Central America. Herpetologica **65**: 292–302.
- Townsend, J. H., Wilson, L. D. (2010): Conservation of the Honduran herpetofauna: issues and imperatives Pp. 460–487. In Wilson, LD, JH Townsend & JD Johnson. (eds.). Conservation of Mesoamerican Amphibians and Reptiles. Eagle Mountain Publishing LC, Eagle Mountain, Utah.
- Wilson, L. D., McCranie, J. R., Williams, K. L. (1998): A new species of *Geophis* of the *sieboldi* group (Reptilia: Squamata: Colubridae) from northern Honduras. Proc. Biol. Soc. Washington **111**: 410–417.
- Wilson, L. D., Townsend, J. H. (2007): Checklist and key to the snakes of the genus *Geophis* (Squamata: Colubridae), with commentary on distribution and conservation status. Zootaxa **1395**: 1–31.