PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON
111(2):410–417. 1998.

A new species of *Geophis* of the *sieboldi* group (Reptilia: Squamata: Colubridae) from northern Honduras

Larry David Wilson, James R. McCranie, and Kenneth L. Williams

(LDW) Department of Biology, Miami-Dade Community College, Kendall Campus, Miami, Florida 33176, U.S.A.; (JRM) 10770 SW 164th Street, Miami, Florida 33157, U.S.A.; (KLW) Department of Biology, Northwestern State University of Louisiana, Natchitoches, Louisiana 71497, U.S.A.

Abstract.—A new species of *Geophis* from northern Honduras is described. It is a member of the *sieboldi* group, the largest and most geographically extensive of the seven species groups currently recognized in the genus. With the inclusion of this species, the *sieboldi* group now contains 15 species, which range from Michoacán, Mexico, to Colombia. The new species can be distinguished from the other members of the *sieboldi* group by the combined presence of 15 rows of smooth scales throughout the body, six supralabials, one supraocular, one postocular, dark gray dorsum with reddish-orange markings, and a white venter with a gray band on the anterior edge of each scale. The new species seems to be most closely related to *G. brachycephalus*.

The snake genus *Geophis* is a prominent component of the Middle American herpetofauna. Currently, 41 species are recognized in seven species groups (*chalybeus, championi, dubius, latifrontalis, omiltemanus, semidoliatus,* and *sieboldi* groups), which are distributed from Tamaulipas and Chihuahua, Mexico, to northwestern Colombia. Downs (1967) revised the genus and the following papers add to our knowledge of its species: Bogert & Porter (1966), Smith & Holland (1969), Dixon & Thomas (1974), Campbell & Murphy (1977), Webb (1977), Savage (1981), Campbell et al. (1983), Restrepo & Wright (1987), Pérez-Higareda & Smith (1988), Smith & Chiszar (1992), Lips & Savage (1994). Field work in the region of Cerro Texíguat, a wildlife refuge situated in the departments of Atlántida and Yoro in northern Honduras, has produced a single specimen of the *sieboldi* group that represents a new species, which we name below.

Methods

For ease of comparison, the methods of this paper essentially follow those of Lips & Savage (1994). The numbers in parentheses following capitalized color names in the section on coloration in life refer to the color codes in Smithe (1975).

Systematics

Geophis damiani, new species
Figs. 1, 2

Holotype.—National Museum of Natural History (USNM) 498356, an adult male from 2.5 airline km NNE La Fortuna (15°26′N, 87°18′W), 1750 m elev., Departmento de Yoro, Honduras, collected 26 Jul 1995 by D. Almendarez, J. R. McCranie, K. L. Williams, and L. D. Wilson. Original number LDW 10505.

Diagnosis.—This new taxon is a member of the *sieboldi* group, based on Downs' (1967:137–145) characterization (see Relationships) and its further explication by Lips & Savage (1994:413–414). This group of 14 species (Downs 1967, Campbell & Murphy 1977, Restrepo & Wright 1987, Smith & Chiszar 1992, Lips & Savage 1994) ranges from the southern edge of the

Mexican Plateau in Michoacán to Colombia. *Geophis damiani* can be distinguished from three of the members (*G. dunni, G. nasalis, G. sieboldi*) by having 15 dorsal scale rows, instead of 17, and smooth scales throughout the body, as opposed to some degree of keeling. *Geophis damiani* is further distinguished from all three of these species by possessing a dark gray dorsum with reddish-orange markings and a banded gray and white venter. *Geophis dunni* has a pale yellow dorsum with dark brown dorsal crossbands and an immaculate venter. Both *G. nasalis* and *G. sieboldi* have a dark brown or gray dorsum that is darkest middorsally and palest laterally, and ventrals that are white or yellowish white with brown lateral edges. The remaining 11 species (*G. betaniensis, G. brachycephalus, G. hoffmani, G. laticollaris, G. nigroalbus, G. petersi, G. pyburni, G. russatus, G. sallei, G. talamancae,* and *G. zeledoni*) all agree with *G. damiani* in having 15 dorsal scale rows. *Geophis damiani* differs in color pattern from all of these species, save for some specimens of *G. brachycephalus. Geophis betaniensis* has a reddish-brown dorsum with a black lateral stripe and a greenish-yellow venter bordered laterally with brown; furthermore, it is the only species in the group with two postoculars, instead of one. *Geophis brachycephalus* has distinctly keeled dorsal scales, except on the neck. *Geophis hoffmanni* has a uniformly dark brown to grayish-black dorsum, with a pale collar in juveniles, five supralabials (six in *G. damiani*), keeled dorsal scales above the vent, and 147–168 ventrals + subcaudals (177 in holotype of *G. damiani*). *Geophis laticollaris* has weakly keeled scales except on the neck, which are smooth, 162 ventrals + subcaudals, a dark dorsum (nearly black medially, brown laterally), except for a broad white nuchal collar, and an immaculate white venter. *Geophis nigroalbus* has tubercles on the anterior one-third of the dorsum and keeling on the posterior half, and the supraocular and postocular scales are separated by an anterior extension of the parietal (postocular and supraocular in contact in *G. damiani*). *Geophis petersi* and *G. pyburni* are distinguished from *G. damiani* in having the scales above the vent keeled and an immaculate cream to creamish-white venter. In *G. petersi* the dorsum is brown medially and pale yellowish brown laterally; in *G. pyburni* it is dark brown medially becoming somewhat paler laterally. *Geophis russatus* has weakly keeled dorsal scales on the posterior two-thirds of the body, a brick red dorsum with irregular black bars, and ≤129 ventrals (136 in the holotype of *G. damiani*). *Geophis sallei* has distinctly keeled dorsal scales, except on the neck, 156–170 ventrals + subcaudals (177 in *G. damiani*), a grayish-brown to brownish-black dorsum in which the scales of the lateralmost row of each side possess pale centers, and a usually immaculate yellowish-white venter. *Geophis talamancae* has distinctly keeled scales on the posterior half of the dorsum, a uniformly iridescent black dorsum, and a transversely banded venter in which each scale is white anteriorly and black posteriorly. Finally, *G. zeledoni* has the scales above the vent lightly keeled, a uniformly grayish-black dorsum, and a mostly black venter with scattered irregular pale markings.

Description of holotype.—Head not distinct from neck; snout elongate, rounded in dorsal outline; rostral not extending posteriorly between internasals, its length from above about ¼ its distance from frontal; internasals large, slightly shorter than suture with prefrontal; prefrontals short, their median suture about ½ length of frontal; frontal slightly wider than long, almost hexagonal, in contact with prefrontals, supraoculars, and parietals, distinctly angulate anteriorly; parietals moderately long, broad, their median suture almost equal to length of frontal; parietal separated from prefrontals by supraocular; one postocular and one supraocular in contact with the parietal on each side of the head (Fig. 2).

Nasal divided, postnasal slightly larger than prenasal, their combined length about

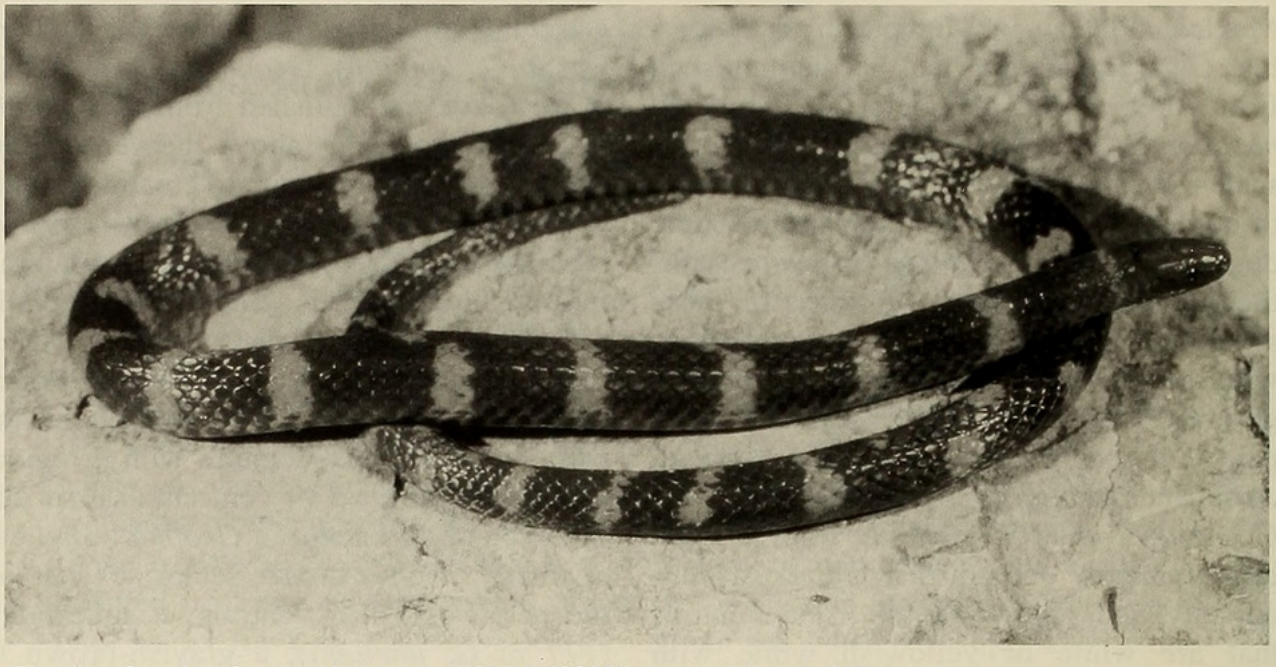

Fig. 1. *Geophis damiani,* holotype (USNM 498356), overall length 327 mm.

110% length of loreal; loreal relatively elongate, slightly less than ½ length of snout, about 1⅔ times eye diameter; eye contained about 4 times in snout length (tip of snout to anterior border of eye), its diameter about ⅔ distance of eye from lip line; supralabials 6-6, 3rd and 4th in contact with orbit on both sides, 5th in contact with parietal; posterior temporal directly about 6th supralabial, not fused with nuchal along parietal margin.

Mental rounded anteriorly, broader than long, separated from chin shields by first pair of infralabials; infralabials 6-6, first 3 and anteromedial tip of 4th in contact with anterior chin shields; anterior chin shields definitely longer than broad, longer than posterior chin shields; posterior chin shields short, separated for their length by a medial gular; 3 gulars separating chin shields (including the one separating the posterior chin shields) from first ventral.

Dorsal scale rows 15-15-15, smooth throughout, without apical pits on dorsum. Ventrals 136; vent plate entire; subcaudals 41, not including terminal scale. Ventrals + subcaudals 177. Standard length (snout-to-vent) 267 mm, tail length 60 mm, tail length 18.3 percent of total length.

Color in life: Dorsal portions of body and tail Blackish Neutral Gray (82) with 24 Flame Scarlet (15) crossbands or laterally offset pairs of half crossbands on body; first nine bands complete, next twelve divided (or almost so) and the halves offset from one another along the longitudinal axis, and final three complete; seven similar markings (both crossbands and laterally offset markings) on tail that become increasingly faint towards its tip; head Blackish Neutral Gray (82); each ventral scale Glaucous (79) on anterior portion and white on posterior portion; underside of tail Glaucous (79); iris Jet Black (89).

Color in alcohol: Dorsally very dark gray with pale red-orange markings; each ventral scale dark gray anteriorly and yellowish cream posteriorly; underside of tail colored as is venter, except that dark gray color is more extensive.

Hemipenis: Bilobed, distal portion of organ strongly capitate, calyculate, spinulate; sulcus spermaticus intermediate between centrifugal and centrolineal (Myers & Campbell 1981), bifurcation at point of capitation, each branch reaching apex; naked basal pocket on asulcate side; central portion of organ with large spines in oblique rows.

Maxilla: Extending anteriorly to middle

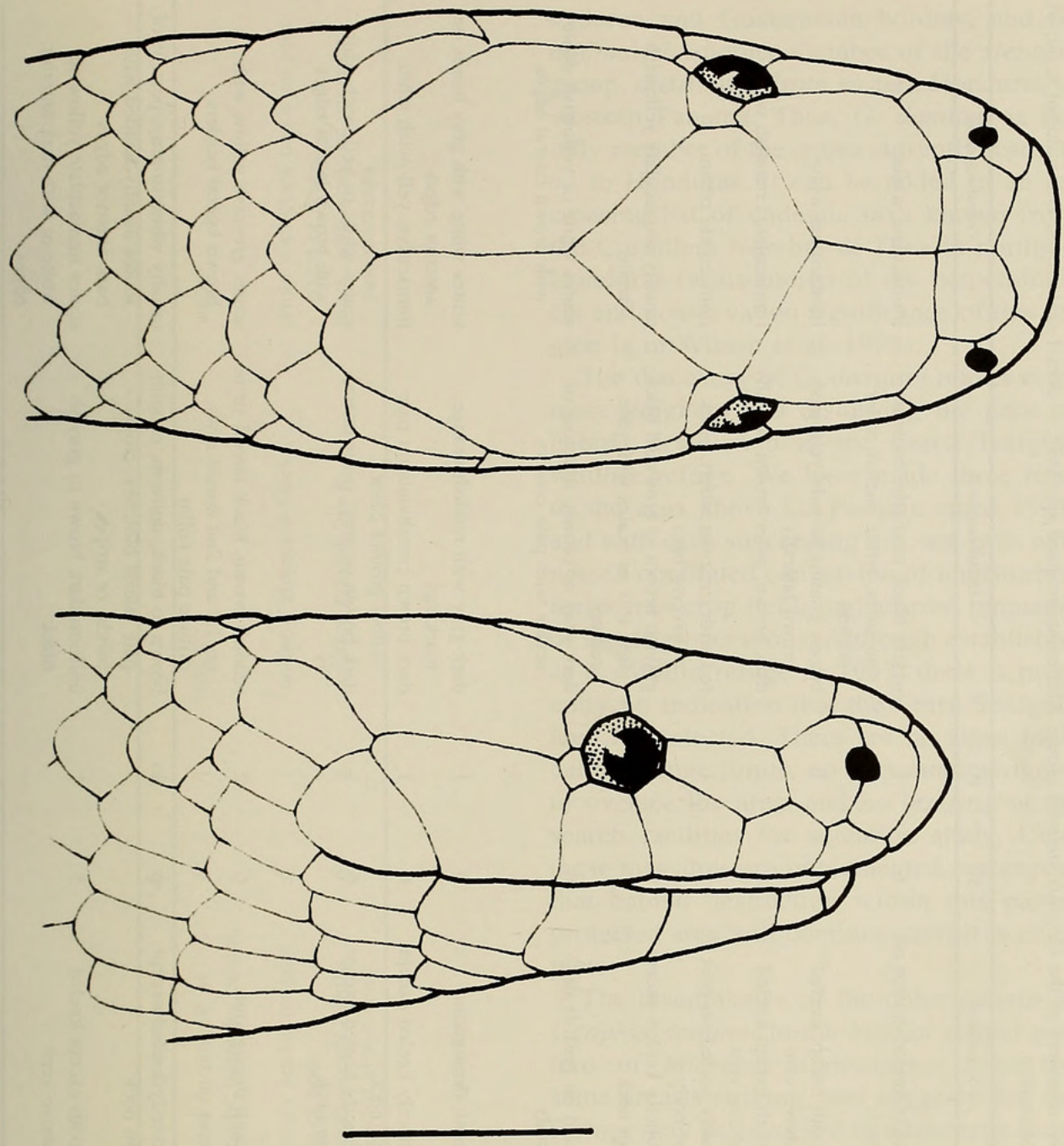

Fig. 2. Semidiagrammatic representation of dorsal and lateral head scutellation for the holotype (USNM 498356) of *Geophis damiani.* Line equals 3 mm.

portion of second supralabial, bearing 10 subequal teeth; anterior tip of maxilla toothless.

Distribution and natural history notes.—*Geophis damiani* is known only from the type locality within the limits of the Refugio Silvestre Cerro Texíguat. It was found beneath an illegally sawn mahogany plank on a steep incline in the Lower Montane Wet Forest formation (Holdridge 1967). The ground below the plank was damp. Also collected from underneath mahogany planks in the area were several specimens of the salamander *Oedipina gephyra.*

Remarks.—The description of *G. damiani* brings to three the number of species of *Geophis* known from Honduras (see Wilson et al. 1998). The other two are *G. fulvoguttatus,* a member of the *dubius* group, found in western Honduras near the Sal-

Table 1.—Some distinguishing features of the members of the *Geophis sieboldi* group. Abbreviations used are: DSR = dorsal scale rows; DS = dorsal scale; SL = number of supralabials; PO = number of postoculars.

Species	DSR	DS condition	SL	PO	Dorsal coloration	Ventral coloration
Mexican group						
G. laticollaris	15	weakly keeled except on neck	6	1	nearly black medially, browner on sides, white nuchal collar present	immaculate white
G. petersi	15	smooth except keeled above vent	6	1	brown grading to pale yellowish brown laterally	immaculate white
G. pyburni	15	smooth except keeled above vent	6	1	dark brown, paler brown laterally	immaculate creamish white
G. russatus	15	weakly keeled on post ⅔ of body	6	1	red with irregular, short, black transverse bars	immaculate cream
G. sallei	15	distinctly keeled except on neck	6	1	grayish brown to brownish black, first row of scales with pale centers	usually immaculate yellowish white
G. sieboldi	17	keeled on post. ½ of body	6	1	dark gray or brown, first row of scales with pale centers	scutes white or yellowish white with brown lateral edges
Northern Central American group						
G. damiani	15	smooth throughout	6	1	dark gray with reddish orange markings	scutes white with gray bands on anterior edges
G. dunni	17	distinctly keeled except on neck	6	1	dark brown crossbands on pale yellow ground color	immaculate yellowish white
G. nasalis	17	distinctly keeled except on neck	6	1	dark brown or gray, paler laterally	scutes white or yellowish white with brown lateral edges
Southern Central and South American group						
G. betaniensis	15	smooth throughout	6	2	reddish brown, black lateral stripe on 1st and 2nd dorsal rows, diffuse pale collar	scutes greenish yellow with brown lateral borders
G. brachycephalus	15	distinctly keeled except on neck	6	1	brown to black, uniform, or with pale lateral blotches, crossbands, or stripes	usually white to gray, post. ½ of scutes usually banded with bark anterior edges
G. hoffmanni	15	smooth except keeled above vent	5	1	uniform dark brown to grayish black	scutes immaculate yellowish white or with dark anterior edges

Table 1.—Continued.

Species	DSR	DS condition	SL	PO	Dorsal coloration	Ventral coloration
G. nigroalbus	15	keeled on post. ½ of body, tubercles on ant. ⅓	6	1	black[1]	white[1]
G. talamancae	15	strongly keeled on post. ½ of body	6	1	uniform iridescent black	white with black bands on post. edges of scutes
G. zeledoni	15	smooth except lightly keeled above vent	6	1	uniform grayish black	black, with scattered irregular pale markings

[1] Data from Boulenger, 1908.

vadoran and Guatemalan borders, and *G. hoffmanni,* another member of the *sieboldi* group, distributed from eastern Honduras to western Panamá. Thus, *G. damiani* is the only member of the genus currently restricted to Honduras. It can be added to an increasing list of endemic taxa known from the Cordillera Nombre de Dios in northern Honduras (a discussion of the herpetological and conservation significance of this region is in Wilson et al. 1998).

The discovery of *G. damiani* makes even more poignant and disturbing the pace of habitat destruction in the Cerro Texíguat wildlife refuge. We have made three trips to the area above La Fortuna since 1991, and with each succeeding trip, we have witnessed continued conversion of undisturbed forest into crop fields and scarred remnants of logging operations. Although established as a wildlife refuge in 1987, there is presently no indication that the Cerro Texíguat area is protected. There are no signs indicating refuge limits, no personnel assigned to oversee the area, and no housing or research facilities for scientific study. Until these measures are implemented, we expect that habitat destruction within this paper-protected area will continue until it is complete.

The resemblance of the color pattern of *Geophis damiani* to the bicolor ringed pattern of *Micrurus nigrocinctus* from the same area is striking, and suggests that the former may be involved in a mimicry complex with the latter, as is also the case with the local population of *Pliocercus elapoides* (Wilson, et al., 1996).

Relationships.—Geophis damiani is a member of the *sieboldi* group based on the following features (Downs 1967, Lips & Savage 1994): snout long, projecting well beyond lower jaw, rounded in dorsal outline; rostral not produced posteriorly between internasals; internasals short, their greatest length 61% of suture between prefrontals; postnasal short, width about 47% of height; prefrontals and loreals elongate; supraocular forming about posterior half of

dorsal margin of orbit; no anterior temporal; rounded mental; maxilla extending forward to middle portion of second supralabial, with 10 subequal teeth, anterior tip of maxilla toothless; hemipenis capitate with naked basal pocket on asulcate side.

Based on our study, as well as those of Smith & Chiszar (1992) and Lips & Savage (1994), the *sieboldi* group contains 15 species and is the largest in the genus. Six of these species are restricted to Mexico (*G. laticollaris, G. petersi, G. pyburni, G. russatus, G. sallei,* and *G. sieboldi*), one is restricted to Guatemala and adjacent Chiapas, Mexico, (*G. nasalis*), one is endemic to Honduras (*G. damiani*), one is known only from Nicaragua (*G. dunni*), two are endemic to Costa Rica (*G. talamancae* and *G. zeledoni*), and one is endemic to Colombia (*G. betaniensis*). Each of three species is distributed in more than a single country: *G. brachycephalus* (Costa Rica, Panama, and Colombia), *G. hoffmani* (eastern Honduras to western Panama), and *G. nigroalbus* (eastern Panama and Colombia). The distribution of this species group makes it the most geographically extensive in the genus.

Relationships among the 15 species comprising the *sieboldi* group are poorly understood, perhaps due to the mosaic of features used to discriminate among them (Table 1). The species listed in Table 1 follow the geographical groups established by Downs (1967) and expanded by current treatment. The *sieboldi* group is the most morphologically diverse, with members possessing smooth or variably keeled dorsal scales in 15 or 17 rows, and a dorsal coloration that is patternless, with dark markings on a pale background, or pale markings on a dark background.

Based on the distribution of the morphological features indicated in Table 1, *G. damiani* apparently is not closely related to the other Nuclear Central American members of the group (*G. dunni* and *G. nasalis*), both of which have 17 rows of distinctly keeled (except on the neck) dorsal scales (15 rows of smooth scales in *G. damiani*). *Geophis dunni* has a dorsal coloration of dark brown crossbands on a pale yellow ground color and an immaculate yellowish-white venter, whereas *G. nasalis* has a dark brown or gray dorsal coloration and a venter that is pale, mottled, or edged with brown (*G. damiani* has a dark gray dorsum with reddish-orange markings and a white and gray banded venter).

Among the remaining twelve species, *G. damiani* seems to resemble most closely *G. brachycephalus* from Costa Rica, Panama, and Colombia. Both taxa possess 15 dorsal scale rows, six supralabials, and one postocular. In addition, some *brachycephalus* have dorsal and ventral patterns similar to those found in *G. damiani. Geophis brachycephalus,* however, has the dorsal scales distinctly keeled except on the neck, as opposed to the smooth dorsals seen in *G. damiani.*

Similar relationships are those linking *Duellmanohyla salvavida* and *D. soralia* to the other members of the predominately lower Central American red-eyed hylas formerly allocated to the *Hyla uranochroa* group and now residing within the genus *Duellmanohyla* (Wilson & McCranie 1985, McCranie & Wilson 1986), and *Hyla insolita* to the lower Central American members of the *lancasteri* group (*H. calypsa* and *H. lancasteri*; see McCranie et al. 1993, Wilson et al. 1994, Lips 1996).

Etymology.—The specific name *damiani* is a patronym honoring our friend and field companion Damian Almendarez, a resident of El Díctamo, Olancho, Honduras, whose assistance in recent field seasons has been indispensable.

Acknowledgments

We owe a continuing debt of gratitude to M. R. Espinal, who for several years has facilitated the process of obtaining permits from the personnel of the Corporación Hondureña de Desarrollo Forestal (COHDEFOR) to allow our field work in Honduras.

We also thank K. R. Lips for her field companionship, J. C. Lee for allowing the use of his camera lucida equipment for the preparation of Figure 2, and S. W. Gotte for checking the accuracy of our description of the hemipenis.

Literature Cited

Bogert, C. M., & A. P. Porter. 1966. The differential characteristics of the Mexican snakes related to *Geophis dubius* (Peters).—American Museum Novitates 2277:1–19.

Boulenger, G. A. 1908. Descriptions of new batrachians and reptiles discovered by Mr. M. G. Palmer in south-western Colombia.—Annals and Magazine of Natural History 8, II:515–522.

Campbell, J. A., L. S. Ford, & J. P. Karges. 1983. Resurrection of *Geophis anocularis* Dunn with comments on its relationships and natural history.—Transactions of the Kansas Academy of Science 86:38–47.

———, & J. B. Murphy. 1977. A new species of *Geophis* (Reptilia, Serpentes, Colubridae) from the Sierra de Coalcomán, Michoacán, Mexico.—Journal of Herpetology 11:397–403.

Dixon, J. R., & R. A. Thomas. 1974. A dichromatic population of the snake, *Geophis latifrontalis*, with comments on the status of *Geophis semiannulatus*.—Journal of Herpetology 8:271–273.

Downs, F. L. 1967. Intrageneric relationships among colubrid snakes of the genus *Geophis* Wagler.—Miscellaneous Publications of the Museum of Zoology, University of Michigan 131:1–193.

Holdridge, L. R. 1967. Life zone ecology. Revised edition. Tropical Science Center, San José, Costa Rica, 206 pp.

Lips, K. R. 1996. New treefrog from the Cordillera de Talamanca of Central America with a discussion of systematic relationships in the *Hyla lancasteri* group.—Copeia 1996:615–626.

———, & J. M. Savage. 1994. A new fossorial snake of the genus *Geophis* (Reptilia: Serpentes: Colubridae) from the Cordillera de Talamanca of Costa Rica.—Proceedings of the Biological Society of Washington 107:410–416.

McCranie, J. R., & L. D. Wilson. 1986. A new species of red-eyed treefrog of the *Hyla uranochroa* group (Anura: Hylidae) from northern Honduras.—Proceedings of the Biological Society of Washington 99:51–55.

———, ———, & K. L. Williams. 1993. New species of tree frog of the genus *Hyla* (Anura: Hylidae) from northern Honduras.—Copeia 1993: 1057–1062.

Myers, C. W., & J. A. Campbell. 1981. A new genus and species of colubrid snake from the Sierra Madre del Sur of Guerrero, Mexico.—American Museum Novitates 2708:1–20.

Pérez-Higareda, G., & H. M. Smith. 1988. Notes on two species of *Geophis* (Serpentes) of southern Mexico.—The Southwestern Naturalist 33:388–390.

Restrepo, J. H., & J. W. Wright. 1987. A new species of the colubrid snake genus *Geophis* from Colombia.—Journal of Herpetology 21:191–196.

Savage, J. M. 1981. A new species of the secretive colubrid snake genus *Geophis* from Costa Rica.—Copeia 1981:549–553.

Smith, H. M., & D. Chiszar. 1992. A second locality for *Geophis sallei* (Reptilia: Serpentes).—Bulletin of the Maryland Herpetological Society 28:16–18.

———, & R. L. Holland. 1969. Two new snakes of the genus *Geophis* from Mexico.—Transactions of the Kansas Academy of Science 72:47–53.

Smithe, F. B. 1975. Naturalist's Color Guide. Part I. Color Guide. The American Museum of Natural History, New York. 182 color swatches.

Webb, R. G. 1977. Comments on snakes of the genus *Geophis* (Colubridae) from the Mexican states of Durango and Sinaloa.—The Southwestern Naturalist 21:548–551.

Wilson, L. D., & J. R. McCranie. 1985. A new species of red-eyed *Hyla* of the *uranochroa* group (Anura: Hylidae) from the Sierra de Omoa of Honduras.—Herpetologica 41:133–140.

———, ———, & M. R. Espinal. 1996. Coral snake mimics of the genus *Pliocercus* (Family Colubridae) in Honduras and their mimetic relationships with *Micrurus* (Family Elapidae).—Herpetological Natural History 4:57–63.

———, ———, & ———. 1998. The ecogeography of the Honduran herpetofauna and the design of biotic reserves. *In* J. D. Johnson, R. G. Webb, & O. Flores-Villela, eds., Middle American herpetology: systematics, natural history, and conservation. Texas Western Press, El Paso (in Press).

———, ———, & K. L. Williams. 1994. Commentary on the reproductive biology and systematic relationships of *Hyla insolita* McCranie, Wilson, and Williams.—Caribbean Journal of Science 30:214–221.