Occasional Papers of the Museum of Natural Science, Louisiana State University

Volume 1 | Number 78 Article 1

11-2002

Variations in the xenodontid water snake *Helicops scalaris* Jan, and the status of *H. hogei* Lancini

Douglas A. Rossman

Number 78 November 2002

OCCASIONAL PAPERS OF THE MUSEUM OF NATURAL SCIENCE

LOUISIANA STATE UNIVERSITY
BATON ROUGE, LOUISIANA 70803

VARIATION IN THE XENODONTID WATER SNAKE *HELICOPS SCALARIS* JAN, AND THE STATUS OF *H. HOGEI* LANCINI

By Douglas A. Rossman[1]

Helicops scalaris was described (Jan, 1865) on the basis of an adult male specimen from Venezuela with no specific locality data. This individual, the holotype, was subsequently figured by Jan and Sordelli (1868), the illustration reproduced here as Fig. 1. The first report of a specific Venezuelan locality is that of Müller (1892) for "Maracaybo." The species was first reported from Colombia by Posado-Arango (1889) without reference to a specific locality. Boulenger (1893) briefly reviewed the characteristics of *H. scalaris* based on the holotype and on a second male specimen from Rosario de Cúcuta, Colombia. The only additional morphological data in any subsequent publication appear to be those given by Amaral (1933) for a female specimen from Cúcuta.

Nicéforo Maria (1942) listed four Colombian localities for *Helicops scalaris,* and presented a recognizable photograph of a banded-morph female specimen. Amaral (1935) suggested the possibility that *H. scalaris* might prove to be a subspecies of *H. polylepis*, and Medem (1968) and Dugand (1975) implied that *H. danieli* might prove to be conspecific with

[1]Curator Emeritus, Museum of Natural Science, Louisiana State University, Baton Rouge, LA 70803, USA; Research Associate, Department of Biology, Luther College, Decorah, IA 52101, USA (mailing address); and Research Asssociate, Milwaukee Public Museum, Milwaukee, WI 53233, USA.

H. scalaris. Medem's difficulty in distinguishing between the two taxa is evident from the list of Colombian localities he attributed to *H. scalaris*; all but one of them (Cúcuta) lie outside the known range of that species and are localities where *H. danieli* is known to occur (Rossman, 2002). My purpose is to present a comprehensive summary of variation in meristic, mensural, and color pattern characters in *H. scalaris*, and to comment upon the relationship between that species and *H. hogei*.

MATERIALS AND METHODS

In the course of this study, I examined 40 preserved specimens of *Helicops scalaris*. Meristic data were recorded for all undamaged specimens, but head length measurements were omitted for specimens having a snout-vent length less than 300 mm to avoid possible effects of allometry. Meristic counts included: ventrals (V); subcaudals (SC); supralabials (SL); infralabials (IL); anterior temporals (AT); dorsal scale rows (DSR) at the level of V10, at midbody, and two V anterior to the anal plate; and prediastemal maxillary teeth (Mx). Mensural characters included: tail length/total length (T/TL); head length/snout-vent length (HL/SVL); eye diameter/frontal length (ED/FL); frontal length/parietal length (FL/PL); muzzle length/frontal length (ML/FL); muzzle width/frontal length (MW/FL); anterior frontal width/frontal length (FW/FL); posterior frontal width/anterior frontal width (FWP/FW); prefrontal length/internasal length (Prf/In); anterior/posterior chinshield length (ACS/PCS); dorsal loreal length/ventral loreal length (LD/LV); loreal height/ventral loreal length (LHt/LV); ventral loreal length/muzzle length (LV/ML); and total nasal length/muzzle length (TN/ML). All of the preceding ratios are expressed as percentages. I also calculated width of the outermost dorsal scale row/width of the vertebral row (DSR 1/VR), but expressed it as an absolute value rather than as a percentage. All counts and measurements were made by the methods described in Rossman *et al.* (1996).

REDESCRIPTION OF *Helicops scalaris* JAN, 1865

Holotype.— An apparently unnumbered adult male in the collection of the Museo ed Instituto di Zoologia Sistematica della Universita di Torino, Italy. The specimen no longer exists (Orsetta Elter, pers. comm.), but fortunately it was clearly described by Jan (1865) and well illustrated by Jan and Sordelli (1868); thus there is no confusion about assignment of the name and no need for designation of a neotype.

Type-locality.— Venezuela; no specific locality.

Etymology.— The species name, *scalaris*, is from the Latin, meaning "of or relating to a ladder." Presumably the name refers to the dorsal pattern.

Definition.— A moderate-sized (maximum recorded SVL 650 mm) species of *Helicops* characterized by having: a maximum of 21 DSR at midbody; the single internasal usually (ca. 81%) in contact with the rostral; a comparatively small number of V (♀♀ 113-125, ♂♂ 110-119); a moderately large number of SC (♀♀ 67-81, ♂♂ 83-95); DSR 1 barely wider than the vertebral row; the dorsum with 3-5 rows of irregular dark blotches, the vertebral blotches larger than the laterals, and all 3 usually fused longitudinally on the neck to form short, broad stripes; the venter light medially with 2 rows of brown pigment forming either an irregular checkered pattern or broad ventrolateral stripes, at least anteriorly. The combination of a blotched dorsum, 21 DSR at midbody, and fewer than 126 V readily distinguishes *H. scalaris* from all other species in the genus except for *H. hogei* (see discussion below).

Variation.— Meristic and mensural variation is summarized in Tables 1 and 2. Many characters exhibit sexual dimorphism--some slight (e.g., relative head length, relative width of DSR 1), some pronounced (e.g., relative tail length, number of SC). Males tend to have fewer V and IL, but

more SC. Females tend to have a proportionately shorter tail, smaller eye, shorter PCS, and wider DSR 1.

Reduction in the number of DSR from 23 to 21 results from either fusion of rows 4 and 5 or loss of one or the other. The point of reduction lies 11.5% of body length posteriorly (as determined by V location) in the five specimens examined for this feature. Reduction from 21 to 19 rows results from fusion of rows 4 and 5 or 3 and 4, or the loss of row 4 or 5 (point of reduction at 61% of body length). Reduction from 19 to 17 rows results from fusion of rows 4 and 5 or 3 and 4, or the loss of row 4 or 3 (point of reduction at 84% of body length). The internasal is clearly in contact with the rostral in 19 specimens, barely in contact in 7, and clearly separated by contact between the opposing nasal scales in 6. One individual (UMMZ 203989) is unique in having a pair of internasals. The 8 largest females average 502 mm (402-650) in SVL, the 9 largest males average 371 mm (311-411). Mature males (> 310 mm SVL) have tubercles on the chinshields and anterior infralabials.

Table 1. Individual and sexual variation of selected meristic characters in *Helicops scalaris*. Values represent number of scales (number of specimens-percentage of sample).

Character	Sex	Values
Anterior DSR	♂	21(4-18.2), 22(4-18.2), 23(11-50.0), 25(3-13.6)
	♀	21(1-5.6), 22(2-11.1), 23(12-66.7), 24(1-5.6), 25(2-11.1)
Midbody DSR	♂	19(1-4.5), 20(1-4.5), 21(20-90.9)
	♀	19(1-5.6), 21(17-94.4)
Posterior DSR	♂	17(21-95.5), 19(1-4.5)
	♀	16(1-5.9), 17(14-82.4), 18(1-5.9), 19(1-5.9)

(Table 1 continued)

Total SL	♂	16(17-77.3), 17(2-9.1), 18(3-13.6)
	♀	16(12-66.7), 17(3-16.7), 18(3-16.7)
Total IL	♂	20(1-5.0), 21(1-5.0), 22(5-25.0), 24(11-55.0), 25(1-5.0), 27(1-5.0)
	♀	23(3-18.8), 24(7-43.8), 25(5-31.3), 26(1-6.3)
Total AT	♂	2(10-50.0), 3(4-20.0), 4(6-30.0)
	♀	2(3-17.6), 3(6-35.3), 4(7-41.2), 5(1-5.9)

Table 2. Individual and sexual variation of selected meristic and mensural characters in *Helicops scalaris*. Values represent mean ± one S. D.(range of variation) number of specimens.

Character	Sex	Values
No. of V	♂	114.5±2.44(110-119)22
	♀	118.6±2.79(113-125)18
No. of SC	♂	86.7±2.93(83-95)17
	♀	74.4±3.75(67-81)16
No. of Prediastemal Maxillary Teeth	♂	16.0±0.50(15-17)9
	♀	16.0±0.00(16)6
T/TL (as %)	♂	33.1±1.45(31.1-36.1)17
	♀	27.7±0.98(26.0-29.0)16

(Table 2 continued)

H/SVL (as %)	♂	5.9±0.19(5.7-6.2)9
	♀	6.1±0.29(5.8-6.7)8
ED/FL (as %)	♂	53.5±4.49(43.6-61.4)12
	♀	47.4±4.20(40.6-52.1)9
FL/PL (as %)		89.5±5.00(77.9-99.2)21
ML/FL (as %)		67.3±6.34(57.9-78.4)20
MW/FL (as %)		53.8±3.49(45.3-59.3)14
FW/FL (as %)		43.6±2.98(37.5-48.1)21
FWP/FW(as %)		124.0±10.69(107.7-148.5)21
Prf/In (as %)		65.7±8.79(47.9-78.0)15
ACS/PCS (as %)	♂	97.5±7.37(87.0-109.2)12
	♀	102.4±7.52(90.1-111.1)8
LD/LV (as %)		48.9±5.21(37.8-55.4)13
LHt/LV (as %)		94.2±10.75(72.1-109.5)13
LV/ML (as %)		52.4±5.02(43.3-61.7)13
TN/ML (as %)		45.0±5.62(36.8-56.9)13
DSR l/VR	♂	1.18±0.09(1.00-1.33)9
	♀	1.21±0.05(1.14-1.26)8

The *in situ* hemipenis (four specimens) extends posteriorly to the level of SC 12 or 13, dividing at the level of SC 10 or 11. The organ lacks calyces and is spinose throughout, although apically the spines or spinules appear to be arranged along fleshy ridges that extend diagonally from the margin of the sulcus.

Color pattern in *Helicops scalaris* is highly variable. The scales in DSR 1, 2, and usually lower 3, are cream-colored (in a few specimens, DSR 3 is not involved). The dorsal ground color is grayish tan, with 3-5 rows of alternating dark brown blotches (each row having 31-38 blotches along the body). The large lateral blotches, when separate from the vertebrals, extend from upper DSR 3 to lower DSR 7. They are 1-1/2 to 2 scales long and separated by lighter interspaces of comparable lengths. When paravertebral blotches or spots are present, they usually are ill-defined and difficult to characterize. The vertebral blotches extend from upper DSR 8 on one side of the body to upper DSR 8 on the other side. They are 2 to 2-1/2 scales long and separated by lighter interspaces less than 1 scale long (Figs. 1 and 2). Some vertebral blotches are narrowly interconnected to produce a broad undulatory effect (Fig. 3). In still others, the lateral and vertebral blotches are fused transversely to form complete crossbands that extend all the way to the venter (Fig. 4). The anteriormost blotches (both lateral and vertebral) are usually fused longitudinally to form three prominent dark nape stripes--the vertebral one narrowing to a point at the interparietal suture. The top of the head appears to be uniformly brown--save for the presence of a pair of light parietal spots in a few individuals--and the dark pigment extends ventrally onto the dorsal portions of the supralabials, which have progressively less intrusion of this pigment posterior to SL 3. An *in situ* (in SJSU R2535) incipient neonate, measuring 145 mm SVL, lacks any trace of the prominent light nuchal spots found in many species of *Helicops.* Incidentally, this female (SJSU R2535) and her brood serve to confirm the report of Barros *et al.* (2001) that *H. scalaris* is a live-bearing species.

The ventral ground color is cream, which is patterned with varying degrees and arrangements of reddish brown pigment (often with black lateral and medial borders). In some individuals, the pigment is arranged in isolated laterally placed checks (Fig. 5); in others the checks are interconnected (Fig. 6), or joined longitudinally to form extensive ventrolateral stripes

anteriorly (Fig. 7), for most of the body length (Fig. 8), or for the entire body length (Fig. 9). Even the predominantly checkered specimens have some short stripes just posterior to the head. The chin and throat area also is marked with varying amounts of brown pigment (Figs. 5-9); generally, it appears that the more heavily striped the ventrals are, the more pigment is present on the chin and throat. Where the ventrolateral stripes are well-developed, the two of them usually occupy from 2/3 to 4/5 the width of each ventral scute. The ventrolateral stripes are fused transversely to form uniformly brown scutes on the neck in ILS 764, on the anterior half of the venter in UF 37847, and for the entire length of the venter in UF 37841.

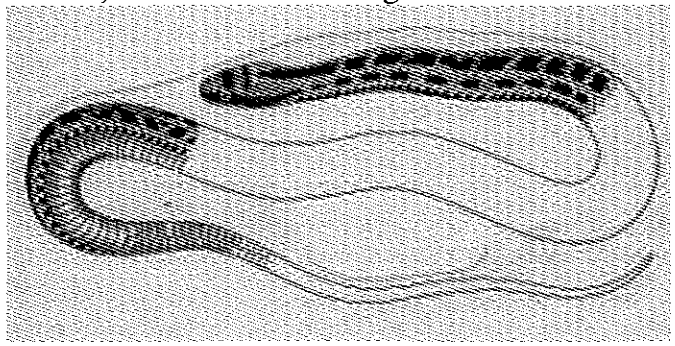

FIGURE 1. Drawing of the holotype of *Helicops scalaris*. Reproduced from Jan and Sordelli (1868).

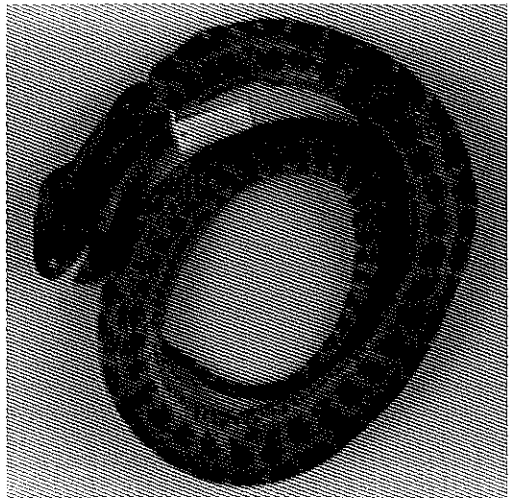

FIGURE 2. Dorsal view of adult (530 mm SVL) female *Helicops scalaris* (LSUMZ 29573) from vicinity of Maracaibo, Zulia, Venezuela. Note similarity in pattern to that of holotype (Fig. 1).

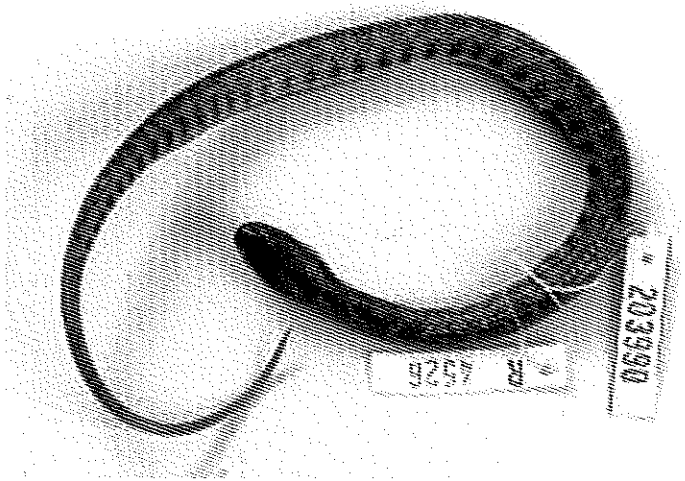

FIGURE 3. Dorsal view of juvenile (170 mm SVL) female *Helicops scalaris* (UMMZ 203990) from Hda. El Milagro, Río Palmar, Dist. Perija, Zulia, Venezuela. Note partial fusion of dorsal blotches on anterior half of body to form an undulatory effect.

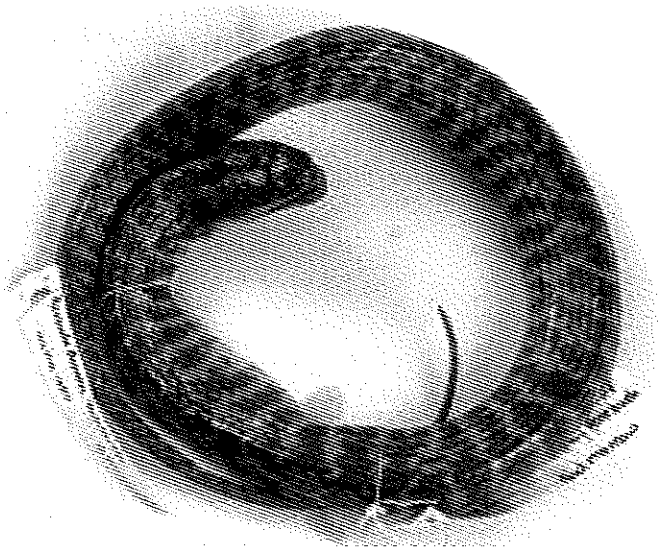

FIGURE 4. Dorsal view of adult (402 mm SVL) female *Helicops scalaris* (SJSU R1946) from Hda. El Bayuelo, 9 km N Coloncito, Tachira, Venezuela. Note transverse fusion of most dorsal and lateral blotches to form complete crossbands.

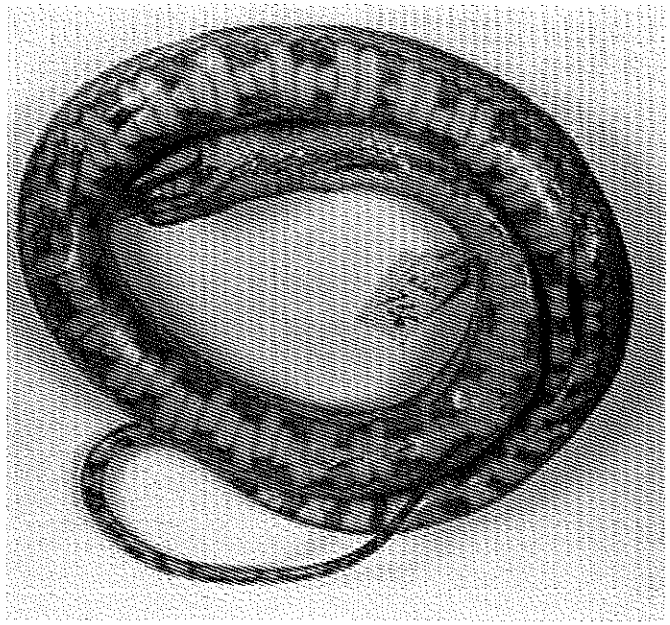

FIGURE 5. Ventral view of adult (445 mm SVL) female *Helicops scalaris* (ILS 756) from Astillero, Río Zulia, Norte de Santander, Colombia. Note that checks are separate except for short distance on neck where they are fused to form ventrolateral stripes.

FIGURE 6. Ventral view of adult (339 mm SVL) male *Helicops scalaris* (ILS 770) from Tibú, Río Tibú, Norte de Santander, Colombia. Note interconnection of most checks, and extent of ventrolateral stripes.

FIGURE 7. Ventral view of subadult (206 mm SVL) male *Helicops scalaris* (SJSU R2540) from Hda. El Bayuelo, 9 km N Coloncito, Tachira, Venezuela. Note extent of ventrolateral stripes, as well as transverse interconnections.

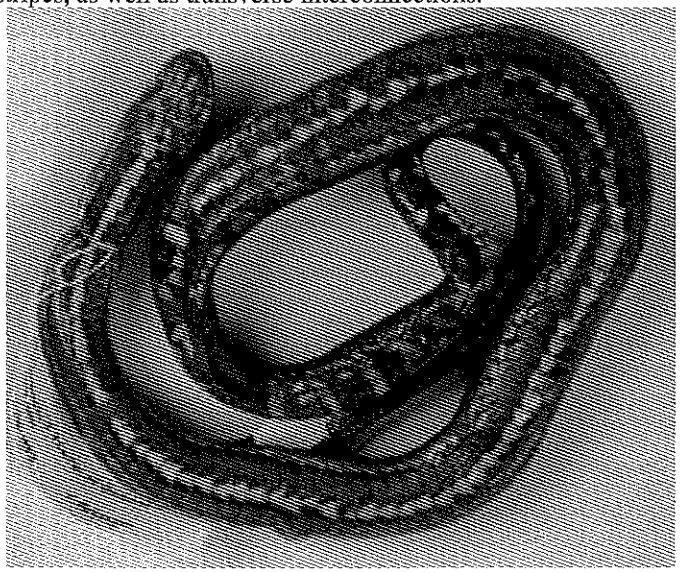

FIGURE 8. Ventral view of adult (411 mm SVL) male *Helicops scalaris* (SJSU R1941) from Chamasio, 2.4 km N Rancho Barbosa, Zulia, Venezuela. Note extent of ventrolateral stripes.

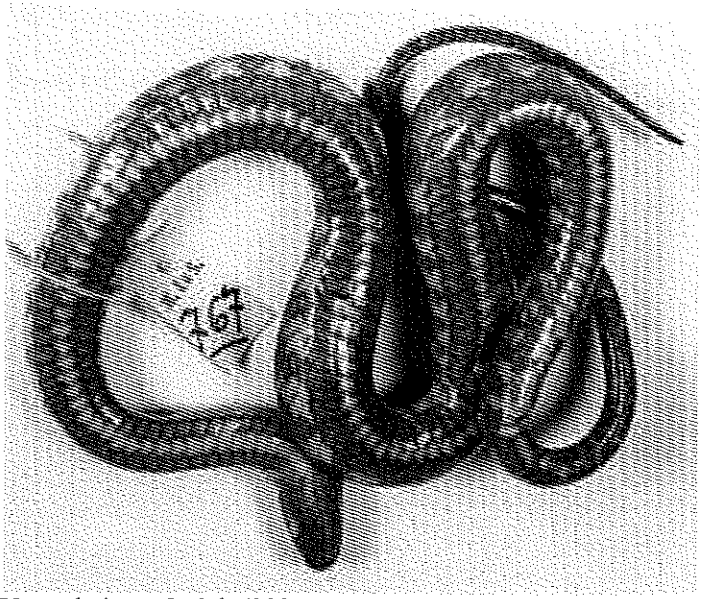

FIGURE 9. Ventral view of adult (300 mm SVL) male *Helicops scalaris* (ILS 767) from Cúcuta, Río Pamplonita, Norte de Santander, Colombia. Note that ventrolateral stripes extend entire length of body.

Distribution..—With two possible exceptions (addressed below), *Helicops scalaris* appears to be confined to northwestern Venezuela and adjacent Colombia (Fig. 10) in drainages that empty into Lake Maracaibo

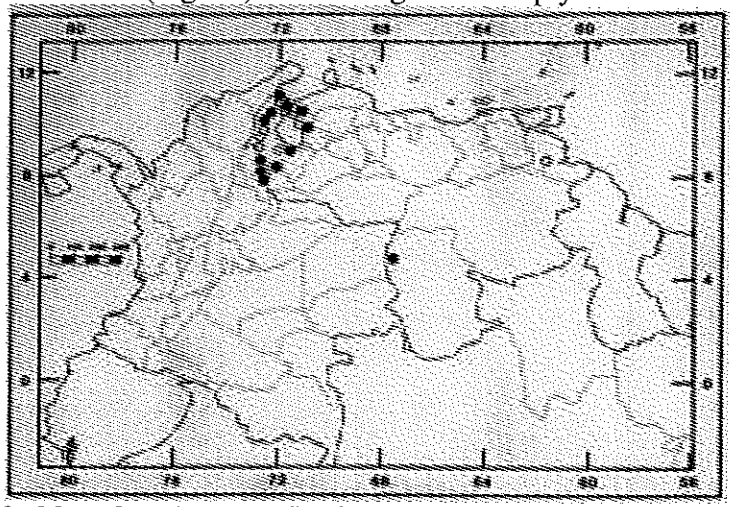

FIGURE 10. Map of northwestern South America showing the known distribution of *Helicops scalaris* (including *H. hogei*). Solid circles represent specimens examined personally (or verified from a photograph), open circles unverified but probably valid records.

or the Caribbean. Records from other parts of Colombia (Amaral, 1928, 1935; Medem, 1968; Perez-Santos and Moreno, 1988) almost surely were based on misidentified specimens of other species of *Helicops*, most likely *H. danieli.*

SPECIMENS EXAMINED

COLOMBIA: Norte de Santander**:** Río Tibú, Tibú (ILS 768, 770); Río Pamplonita (ILS 758, 763-66); Río Pamplonita, Cúcuta (ILS 755, 762, 767); Río Zulia, W Cúcuta (ILS 761); Río Zulia, Astillero (ILS 756, 759-60, 769). VENEZUELA: Tachira: 9 km N Coloncito, Hda. El Bayuelo (SJSU R1946, R2417, R2535, R2537-40); 2.4 km N Hda. El Bayuelo (SJSU 1944); 9.6 km N Hda. El Bayuelo (SJSU 1945); 16 km N Hda. El Bayuelo (SJSU R1943); Zulia: "aldrededor de Maracaibo" (LSUMZ 29573); S Maracaibo (MBUCV 1); Puerto Caballo, Carretera Sta. Cruz de Mara-Maracaibo (CU 13604); Municipio Goajira, Potrero Nuevo, Canal de Riego (UF 37841); Dist. Perijá, Río Palmar, Hda. El Milagro (UMMZ 203986-90); Municipio Rosario, Hda. El Banco (UF 37843); Chamasio, 2.4 km N Rancho Barbosa (SJSU R1941-42); Municipio Uribarri, "entre Tocuyo-El Chivo" (UF 37844); Municipio Libertador, Mi Cabaña, Quebrada Los Cerritos (UF 37846); Municipio Faria, Río Palmar, El Tablazo (UF 37847).

STATUS OF *Helicops hogei* LANCINI, 1964

This taxon was described by Lancini (1964) on the basis of the adult female holotype (MCNC 462) collected in the Río Autana, Amazonas, Venezuela, in 1952 by--interestingly enough--the former King Leopold of Belgium. The only other specimen that has been identified as *H. hogei* (MBUCV 8449)--another adult female--was collected in the Río Cuybini, Cerro La Paloma, Sierra Imataca, Delta Amacuro, Venezuela, by Julian Steyermark (Pérez Bravo, 1976/77). The coordinates for the locality were given as 61 30' W, 8 35' N.

The holotype has not been available for my examination, and the Delta Amacuro specimen apparently has been lost (Paolillo, pers. comm.; Rivas F., pers. comm.). Nevertheless, the two descriptions available in the literature (Lancini, 1964; Pérez Bravo, 1976/77), notes provided by a Venezuelan colleague who was able to examine the holotype (Paolillo, pers. comm.), and a photograph of the dorsum of the holotype (Fig. 11) provided by Rubens Nubuo Yuki have permitted me to compare *H. hogei* with *H. scalaris*. Such a comparison does not appear in either of the literature accounts, despite the fact that Lancini clearly had specimens of *H. scalaris* at hand. In the paper describing *H. hogei*, he also reported the presence of *H. scalaris* in the ríos Tarra and Catatumbo on the basis of specimens in his museum.

When I compared the available data for *Helicops hogei* with that presented for *H. scalaris* elsewhere in this paper, it became readily apparent that the two female *H. hogei* are morphologically indistinguishable from female *H. scalaris* (Tables 1 and 2) in terms of numbers of: ventrals (*hogei*--116,118; *scalaris*--mean, 118.6); subcaudals (*hogei*--75, 73; *scalaris*--mean, 74.4); dorsal scale rows (23-21-17 in both *hogei*, most *scalaris*); anterior temporals (*hogei*--2 on each side; 80% of *scalaris*--2 on at least one side); and prediastemal maxillary teeth (16 in all female *hogei* and *scalaris*).The notion that *H. scalaris* has 9 supralabials per side compared to 8 in *hogei* (Pérez Bravo, 1976/77) simply reflects the very small sample size on which previous summaries of morphological data for *H. scalaris* were based; clearly the majority of *scalaris* I examined have only 8 supralabials to a side (Table 1). Relative tail lengths (*hogei*--each 28.5%; *scalaris*--mean, 27.7%) are also comparable.

Despite the fact that the holotype of *Helicops hogei* is discolored (Paolillo, pers. comm.), it is still possible to compare its dorsal pattern (Fig. 11) with that of *H. scalaris* (Figs. 1-4, 12). The similarity is striking, despite the fact that the latter has a dorsal pattern that is otherwise unique among *Helicops*. The written descriptions of the two *H. hogei* (cited above) also would fit within the parameters of *H. scalaris*. I have not seen a photograph of the holotype's venter, but neither Lancini's description nor Paolillo's notes reports the presence of a well-defined pattern. Paolillo

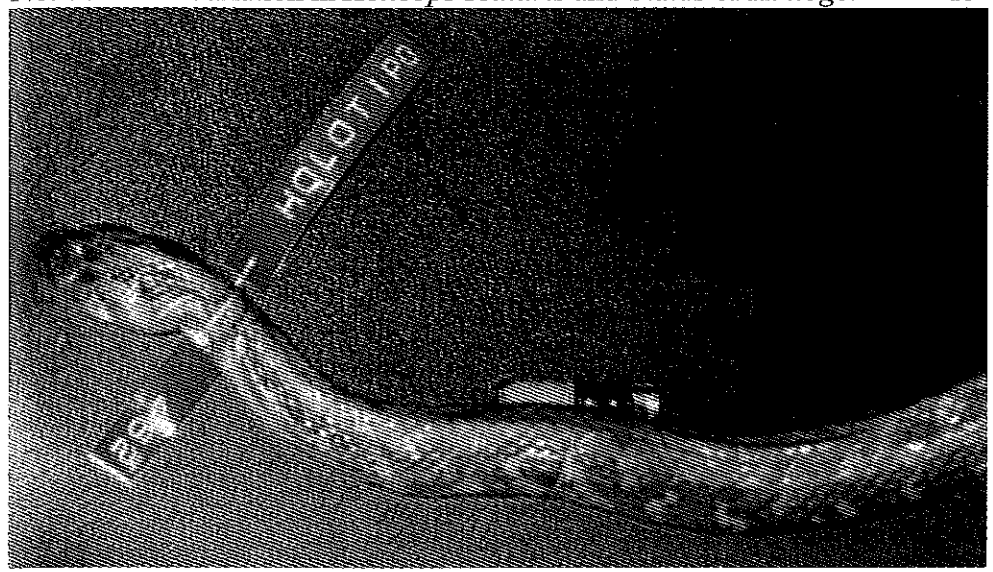

FIGURE 11. Dorsal view of adult (427 mm SVL) female holotype of *Helicops hogei* (MCNC 462) from Río Autana, Amazonas, Venezuela. Note similarity in dorsal pattern to MBUCV 1 (Fig. 12). Photo by Vanda Lúcia Ferreira.

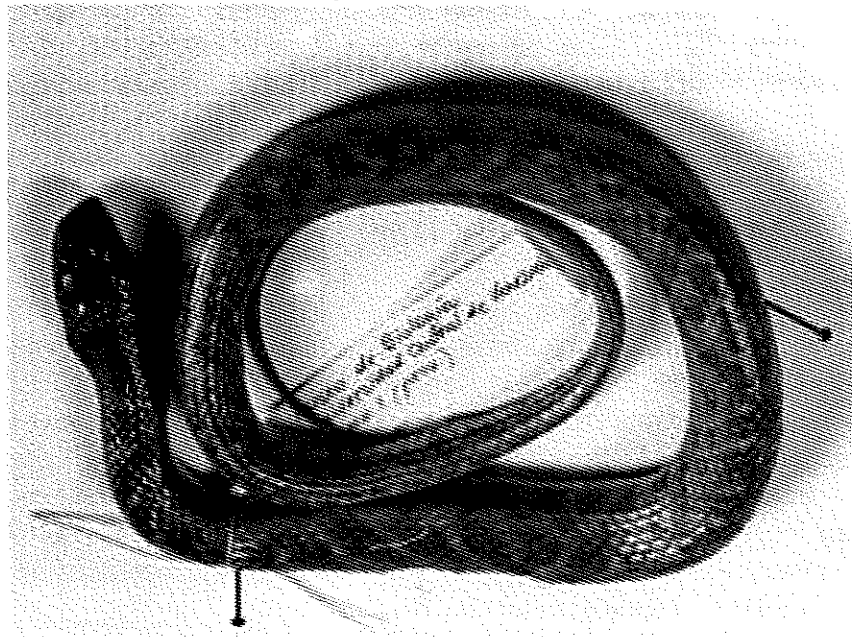

FIGURE 12. Dorsal view of adult (297 mm SVL) male *Helicops scalaris* (MBUCV 1) from south of Maracaibo, Zulia, Venezuela.

if the specimen had already become discolored by the time Lancini described it 12 years after it was collected, that might account for the general absence of a distinct ventral pattern. Or perhaps the holotype was like one of those *H. scalaris* described above in which the ventrolateral stripes have fused across the ventral midline to form an essentially patternless venter. At this point in time, there simply is no way to be certain. On the other hand, the ventral pattern description for the second specimen (Pérez Bravo, 1976/77) agrees well with that characterized above for *H. scalaris*.

To my mind, the evidence seems convincing that *Helicops hogei* Lancini is, in fact, a junior synonym of *H. scalaris* Jan. I am troubled, however, by the apparent distributional hiatus this produces in the range of the reconstituted *H. scalaris* (Fig. 10). It seems to make little sense zoogeographically, and thus raises the question as to whether or not both specimens of *H. "hogei"* could have been inadvertently mislabelled. Adding to the confusion is Amaral's (1935) often overlooked statement that *H. scalaris* occurs in the Orinoco Basin, although he cited no specific specimens or localities. There appears to be no easy solution to this conundrum, so we shall have to await the results of future fieldwork in the Orinoco Basin.

ACKNOWLEDGMENTS

For the loan of specimens, I am indebted to the curators and collection managers of the following institutions (with collection abbreviations): Cornell University Museum of Vertebrates, Ithaca (CU); Instituto de La Salle, Bogotá (ILS); Louisiana State University Museum of Natural Science, Baton Rouge (LSUMZ); Museo de Biologia de la Universidad Central de Venezuela, Caracas (MBUCV); Department of Biology, San Jose State University, California (SJSU); Florida Museum of Natural History, University of Florida, Gainesville (UF); Museum of Zoology, University of Michigan, Ann Arbor (UMMZ).

I also wish to thank: Rubens Nobuo Yuki (Faculdades Integradas do Tapajós, Santarem) for providing the photograph of the holotype of *Helicops hogei*; Ruth Caldwell (Luther College) for translating the original

specimens of *H. scalaris* in that collection; César Barrio A. (Fundación ANDIGENA, Mérida), Gilson Rivas F. (Museo de Historia Natural La Salle, Caracas), and Allan Markezich (Black Hawk College, Moline, Illinois) for a variety of information; Linda Ford and Tom Trombone (American Museum of Natural History, New York) and Donald C. Taphorn for helping me track down obscure localities; Paulo Vanzolini (Museu de Zoologia, Universidade de São Paulo), Charles W. Myers (American Museum of Natural History, New York), and Van Wallach (Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts) for assistance in finding obscure literature; Jeff Boundy (Louisiana Department of Wildlife and Fisheries, Baton Rouge) for reading the manuscript and offering helpful criticism; and Mark Kleiner (Louisiana State University) for taking most of the photographs.

LITERATURE CITED

AMARAL, A. DO. 1928. Studies of neotropical ophidia. 11. Snakes from the Santa Marta region, Colombia. Bull. Antivenin Institute America 2: 7-8.

AMARAL, A. DO. 1933. Estudos sobre ophidios neotropicos. 29. Novas notas sobre especies da Colombia. Memorias Instituto Butantan (São Paulo) 7: 105-123.

AMARAL, A. DO. 1935. Estudos sobre ophidios neotropicos. 32. Apontamentos sobre a fauna da Colombia. Memorias Instituto Butantan (São Paulo) 9: 207-216.

BARROS, T., J. C. LOPEZ, AND M. ALVARDO. 2001. *Helicops scalaris* (guata). Reproduction. Herpetological Review 32 (1): 47.

BOULENGER, G. A. 1893. *Catalogue of the snakes in the British Museum (Natural History)*. Vol. 1. Taylor & Francis for the Trustees of the British Museum (Natural History), London.

DUGAND, A. 1975. Serpentifauna de la llanura costera del Caribe. Caldasia 11 (53): 61-82.

JAN, G. 1865. Enumerazione sistematica degli ofidi appartenenti al gruppo Potamophilidae. Archivio Zoologia 3 (2): 201-265.

_____, AND F. SORDELLI. 1868. *Iconographie générale des ophidiens*. Tome 2 (Livr. 26-30). Milan.

LANCINI, A. R. 1964. Contribucion al conocimiento de la distribucion en Venezuela de *Helicops scalaris* y descripcion de *Helicops hogei* (Serpentes: Colubridae), nueva especie de serpiente semiacuatica para la ciencia. Publ. Ocas. Museo Ciencias Naturales Caracas (7): 3 pages, unnumbered.

MEDEM, F. 1968. El desarrollo de la herpetologia en Colombia. Rev. Acad. Colombiana Cien., Fis., Natur. 13: 149-200.

MÜLLER, F. 1892. Siebenter Nachtrag zum Katalog der herpetologischen Sammlung des Basler Museums. Verh. Naturf. Ges. Basel 10: 195-215.

NICÉFORO MARIA, H. 1942. Las ofidios de Colombia. Rev. Acad. Colombiana Cien., Fis., Natur. 5 (17): 84-101.

PÉREZ BRAVO, G. 1976/77. Segundo hallazgo de *Helicops hogei* Lancini, 1964 (Serpentes: Colubridae). Memorias Instituto Butantan (São Paulo) 40/41: 313-315.

PÉREZ-SANTOS, C., AND A. G. MORENO. 1988. Ofidios de Colombia. Museu Regionale di Scienze Naturali Torino, Monogr. 6: 1-517.

POSADA-ARANGO, A. 1889. Apuntamientos para la ofiologia colombiana. An. Acad. Medic. Medellín 2 (2): 45-49.

ROSSMAN, D. A. 2002. Morphological variation in the endemic Colombian water snake *Helicops danieli* Amaral, 1937 (Serpentes: Xenodontidae). Rev. Acad. Colombiana Cien., in press.

_____, N. B. FORD, AND R. A. SEIGEL. 1996. The garter snakes: evolution and ecology. University of Oklahoma Press, Norman.

THE OCCASIONAL PAPERS OF THE MUSEUM OF NATURAL SCIENCE (formerly THE MUSEUM OF ZOOLOGY and MUSEUM OF GEOSCIENCE), LOUISIANA STATE UNIVERSITY, begun in 1938, is intended for shorter papers dealing with any aspect of neontological or paleontological animal ecology, systematics, or zoogeography, or with anthropology or archaeology. All manuscripts are subject to critical review by the Museum's editorial staff and by no fewer than two extramural specialists. Final acceptance is at the discretion of the Museum Director, or his agent, who serves as Editor.

Individuals may request separate issues directly from the author(s). Institutional libraries interested in exchanging publications should address the Secretary to the Director, Museum of Natural Science, Louisiana State University, Baton Rouge, LA 70803-3216.

Editors: J. Michael Fitzsimons and Mark G. McRae