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TAXONOMY AND GEOGRAPHIC VARIATION OF *LIOPHIS TYPHLUS* AND RELATED "GREEN" SPECIES OF SOUTH AMERICA (SERPENTES: COLUBRIDAE)

JAMES R. DIXON[1]

ABSTRACT

The green species of *Liophis* are reviewed. *Liophis typhlus* consists of three subspecies, *L. t. typhlus* (Amazon), *L. t. elaeoides* (Chaco), and *L. t. brachyurus* (Cerrado). *Liophis viridis* consists of two subspecies, *L. v. viridis* (Agreste and Atlantic rainforest), and *L. v. prasinus* (Caatinga). *Liophis jaegeri* is shown to consist of two subspecies, *L. jaegeri jaegeri,* east of the Río Paraná, from São Paulo area of Brazil, to Uruguay and Argentina and *L. j. coralliventris,* from the Río Paraguay basin. *Liophis guentheri* is a valid species from the dry central Chaco of Argentina, Bolivia, and Paraguay. The characters of the recently described species, *L. atriventer* and *L. maryellenae* are summarized. A key is provided for all species of "green" *Liophis.*

INTRODUCTION

The study of the genus *Liophis,* a long and difficult task, is now nearing completion. The six species presented herein (*L. typhlus, L. guentheri, L. jaegeri, L. viridis, L. maryellenae, L. atriventer*) form a loosely connected complex of species that have one feature in common, they are all some shade of "green." The green color may be dull to bright, chlorophyll green to leaf green, or with a deep olive cast. Two taxa occasionally have an obscure mid-dorsal stripe of variable width that varies in color from light brown to reddish, and occasionally secondary dark lines as well.

When samples were adequate, each of the six species was examined for geographic variation. No additional specimens of two recently described taxa (*L. atriventer, L. maryellenae*) are known, but the species' essential features have been summarized. Of the remaining four species detailed discussions include, where appropriate, the currently recognized name, its synonyms, a discussion of the synonyms, a description of the species, geographic variation, distribution, and comments about pertinent literature.

SYSTEMATIC ACCOUNT

Liophis typhlus (Linnaeus)

Coluber typhlus Linnaeus, 1758. Syntypes (not examined)—Royal Museum, Stockholm. Type-locality—Indiis (in error).
Xenodon isolepis Cope, 1870. Holotype ANSP (lost). Type-locality—Pebas, Ecuador (=Perú).
Opheomorphus brachyurus Cope, 1887. Syntypes ANSP 11202–03. Type-locality—Chupada, Mato Grosso, Brazil.
Liophis elaeoides Griffin, 1916. Holotype CM R32. Type-locality—Prov. del Sara, Bolivia.
Liophis macrops Werner, 1925. Holotype NMW 23420. Type-locality—Paramaribo, Surinam.

Nomenclatural comments.—Several names have been assigned mistakenly to the synonymy of *L. typhlus.* Jan (1863*a,* 1863*b*) and Jan and Sordelli (1866)

[1] Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843-2258.
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suggested that *L. typhlus* was composed of three varieties in addition to the nominate race, *prasinus, gastrostictus,* and *olivaceus.* I have determined that no holotypes exist for any of these varietal names. An examination of Jan's descriptions and Jan and Sordelli's illustrations (1866, Livr. 18, Plate IV, Fig. 3) suggest that the name *prasinus* belongs to *Liophis viridis.* The illustration shows 69 subcaudals, considerably more than the maximum known number of 61 for *L. typhlus,* but well within the known range of 63 to 84 for *L. viridis.* An illustration of a *L. typhlus* by Jan and Sordelli (1866, Livr. 18, Plate IV, Fig. 2) from "Pernambuco," Milan Museum, may represent the variety *gastrostictus,* of Jan (1863*a,* 1863*b*). The illustration shows 47 subcaudals, well within the known range of variation in subcaudals for *L. typhlus.* However, the closest localities of *L. typhlus* to Pernambuco are 1300 km to the east and 800 km to the south. The illustration shows dark smudges along the lateral edges of the ventrals, and scattered dark scale edges on the dorsum as well. The illustration and description more closely resemble *L. poecilogyrus* from Pernambuco, and I suggest *gastrostictus* belongs to that species. The Jan name *olivaceus* is without description or illustration. It appears in Jan's (1863*a,* 1863*b*) list and key to *Liophis* as a varietal name of *L. typhlus* and should be considered a *nomen nudum.*

Another misapplied name is Wagler's (1824) *Natrix forsteri.* Hoge (1964) first applied it to *L. typhlus* and suggested that the Surinam race be recognized as the nominate taxon and the Brazilian form (by inference) *L. typhlus forsteri.* The type-locality of *L. forsteri* is Salvador, Bahia, Brazil, a locality of considerable distance from any known sample of *L. typhlus.* In addition, the illustration and description of *forsteri* suggests that this name is best applied to *L. poecilogyrus.* The description lists 60 subcaudals for the type of *L. forsteri.* The greatest number of subcaudals recorded in 73 eastern Brazilian individuals of *L. typhlus* is 48. The description of the color pattern of *forsteri* is unlike that of *L. typhlus,* and more similar to that of *L. poecilogyrus.* Hoogmoed and Gruber (1983) examined the holotype of *N. forsteri* in the Munich Museum and gave the subcaudal number as 58/58+1. Although they placed *N. forsteri* as a synonym of *L. typhlus,* I consider *N. forsteri* to be a senior synonym of *L. poecilogyrus.*

Parker (1928) on comparing one of the paratypes of *L. guentheri* (BM 1946.1.5.69) to samples of *L. typhlus* in the British Museum (Natural History), concluded that it "failed to reveal any consequential differences between these two species" and placed *L. guentheri* in the synonomy of *L. typhlus.* Parker erred in his analysis because the ventrals of the specimen he examined (and *L. guentheri* in general) vary from 187 to 197, while ventrals of *L. typhlus* vary from 133 to 172. *Liophis guentheri* is a valid species that is more closely related to *L. viridis* than to *L. typhlus.*

Distribution.—Liophis typhlus occurs in Amazonian rainforests to an elevation of about 1500 m along the southern and eastern side of the Andes in Colombia, Ecuador and Perú, the rainforests of southern and eastern Venezuela, and similar forests of Guyana, Surinam and French Guiana, and Cerrado and Chaco forests of SE Bolivia, N Paraguay, and SC Brazil (Fig. 1).

Description.—The maximum total length is 740 mm in males and 853 mm in females. Body scales are smooth, without apical pits and typically in 19-19-15 rows. Scale rows 3+4 or 4+5 typically fuse on each side of the body between ventrals 68 and 103 ($\bar{x}$ = 82.2). Scale rows 7+8 or 8+9 usually fuse between ventrals 65 and 104 ($\bar{x}$ = 83.0). A sample of 48 females and 25 males from Brazil and 49 males and 62 females from other Amazonian localities were analyzed for sexual dimorphism in all quantitative characters and none was found. Ventrals

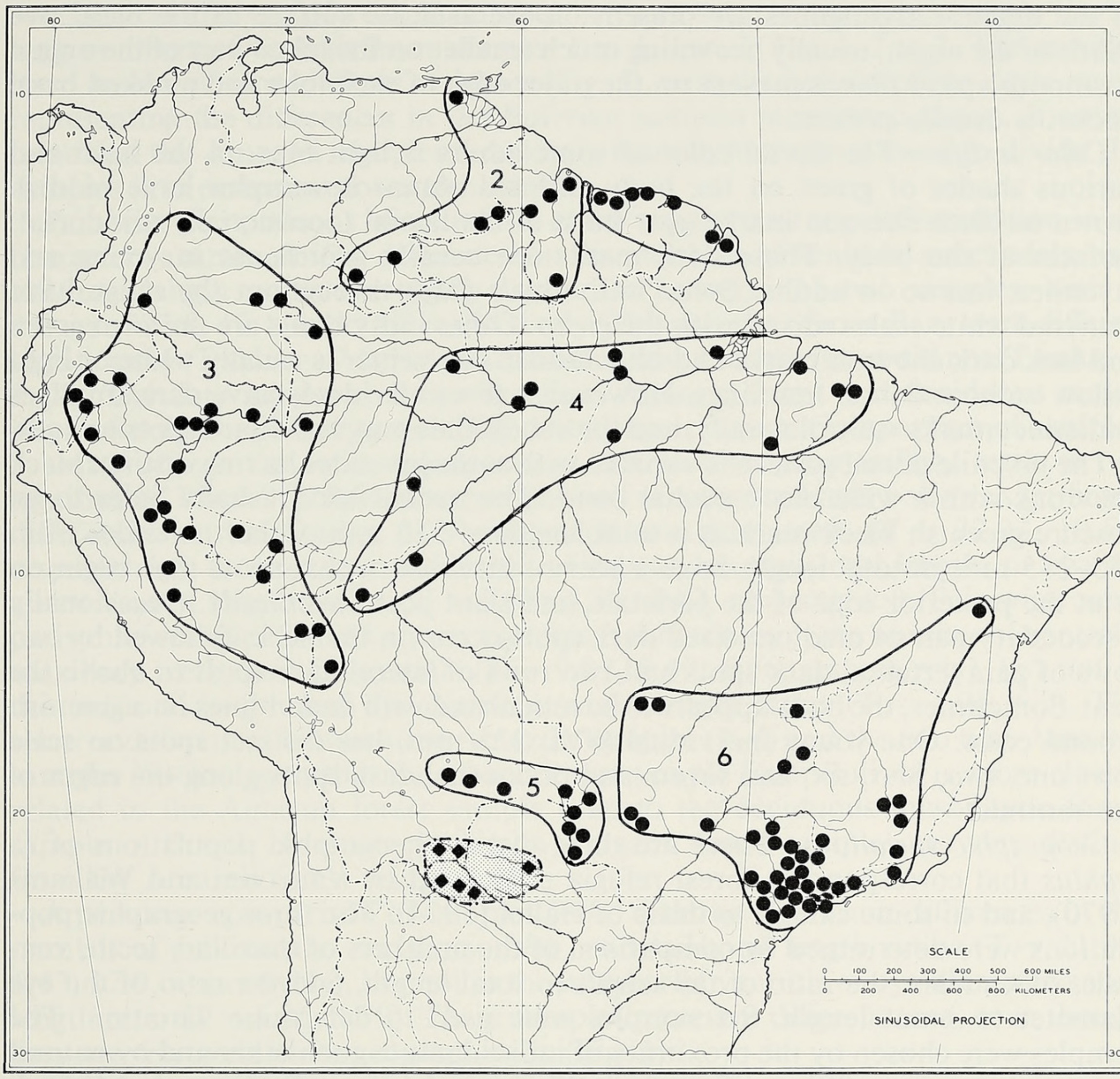

Fig. 1.—Distribution of *Liophis typhlus* (dots) and *L. guentheri* (diamonds, stippled area) in South America. Black lines enclose numbered samples used in the geographic variation analyses.

of 331 specimens numbered 133–172 ($\bar{x}$ = 157.1), the number of subcaudals of 307 specimens varied from 41–61 ($\bar{x}$ = 49.5). Tail length divided by total length for 105 adult males varied from 0.145–0.206 ($\bar{x}$ = 0.169), and for 160 adult females 0.137–0.210 ($\bar{x}$ = 0.162). Eye diameter divided by snout length of 127 adults varied from 0.524–0.886 ($\bar{x}$ = 0.682). Maxillary teeth for 222 specimens varied from 19–28 ($\bar{x}$ = 22.4). The anal plate is divided and the loreal single in all specimens examined.

Head shields vary as follows: supralabials 4-5 (1), 7-7 (3), 7-8 (2), 8-8 (249), 8-9 (5); supralabials entering orbit 4th only (1), 4+5 (252), 3+4/4+5 (2), 4+5/5+6 (4), 4+5/4+5+6 (1); infralabials 5-7 (1), 8-8 (1), 9-9 (10), 9-10 (23), 10-10 (216), 10-11 (5), 11-11 (2), 11-12 (1); preoculars 0-0 (1), 1-1 (256); postoculars 1-1 (3), 1-2 (1), 2-2 (253), 2-3 (3); temporal condition 1+1 (3), 1+2 (242), 1+1/1+2 (12), 1+2/1+3 (3), 0+2/1+2 (1).

The *in situ* length for 69 hemipenes varied from 6 to 13 ($\bar{x}$ = 9.0) subcaudals. The organ is slightly bilobed, with each lobe about two subcaudals long. The sulcus spermaticus usually bifurcates about one-third the distance from the base of the organ. Large spines are present on the asulcate surface of the basal two thirds of the organ, usually becoming much smaller on the lobed part of the organ. A smooth apical disk is present on the outer edge of each lobe and a naked basal pocket is usually present.

Color in life.—The dorsal color of some adults is light blue on the head and various shades of green on the body and tail. Amazon samples have reddish brown to black chevron marks over most of the lateral (occasionally middorsal) surfaces of the body. These dark marks are usually prominent in young and juveniles, less so in adults. Some individuals from throughout the range have scattered white scales mixed with the green. Other individuals are uniform green and lack dark chevron marks and blue heads. The venter is usually white or light yellow without darker markings. However, a few individuals have dark smudges or distinct marks ventrolaterally, and the subcaudals may have dark spots or lines.

The juvenile dorsal pattern is variable with some juveniles having distinct black chevrons with a wide black nuchal band. The nuchal band usually fades to an obscure greenish black mark at a total length of 210 mm. Other juveniles from 155–255 mm in total length have a pair of blackish nuchal spots that begin on or at the posterior edge of the parietals, and slant posteroventrally. Occasionally a secondary pair of medium sized dark spots occur on the neck, followed by two rows of paravertebral dark spots and two rows of lateral dark spots to above the vent. Sometimes, the body appears to be reticulated with darker lines on a greenish ground color. One young individual (SVL 225 mm) has distinct spots on scale rows one, two, four, six, and seven, and occasional dark spots along the edges of the ventrals.

Geographic variation.—There are three distinct geographic populations of *L. typhlus* that correspond to forest refugia postulated by Vanzolini and Williams (1970), and to some extent, to those of Haffer (1974). The three geographic populations were determined by comparison of the numbers of maxillary teeth, ventrals, subcaudals, the ratio of tail length to total length, and the ratio of the eye diameter to snout length. Six samples were used to determine variation. The samples were chosen by the proximity of individuals to each other and by natural vegetation types, as follows: Sample 1–27 specimens from Surinam and French Guiana; Sample 2–24 specimens from Guyana and Venezuela; Sample 3–53 specimens from Amazonian Colombia, Ecuador, Peru, western Brazil, and Bolivia; Sample 4–29 individuals from Amazonian Brazil; Sample 5—45 specimens from the Chaco of Bolivia and western Mato Grosso, Brazil; and Sample 6—87 specimens from the Cerrado of southeastern Brazil (Fig. 1). The Student's T test was utilized to determine significance of pair-wise comparisons between samples. A Student's T test value of 6.314 or greater is at 95% level of significance or greater. Pair-wise tests for differences between samples 1 and 2, 1 and 4, 2 and 3, 2 and 4 were not significant for any of the characters listed above. Samples 1 and 3 were significantly different from each other in number of ventrals and tail/total length ratio. However, samples 1 and 3 are separated by sample 2, and sample 2 did not differ significantly from either 1 or 3. The significance noted between 1 and 3 is probably an artifact of distance, with sample 2 representing the middle of a cline. Samples 3 and 4 were not significantly different in any characters except ventrals. This may also be an artifact of distance. However, two males from reasonably close localities in Amazonian Bolivia had ventral counts of 140 and 157. Their ventral counts fall near the average of the samples with which they were associated, 143.5 for sample 4, and 154.2, for sample 3 (see Fig. 1). This suggests that a hiatus may exist between samples 3 and 4 in Amazonian Bolivia.

A statistical analysis of ventral number between samples appears to show low to high numbers of ventrals from samples 1 to 4, 1 to 2, 2 to 4, 2 to 3. The samples form an almost closed circle of demes (Fig. 1), with the bottom of the circle open, representing the differences in the Bolivian samples mentioned above. It seems clear that the Amazon samples are closely related, but with a trend to divide the samples into eastern and western demes.

Pair-wise comparisons of samples 4 and 6 suggest a strong differentiation in all characters examined. The differences in the numbers of ventrals, subcaudals, and tail/total length ratios are highly significant between the two samples, with T values of 23.8, 19.1, and 15.8 respectively. The number of maxillary teeth differed significantly (T value = 7.0) but eye diameter/snout length ratios did not (T value = 2.14). The data suggest that the Brazilian Amazon forest and deciduous mesophytic forest samples represent different allopatric taxa. Comparison of samples 3 and 6 shows the same trend, except the number of maxillary teeth is not significant (T = 4.91). Pair-wise comparison of samples 4 and 5 shows significant differences in the number of ventrals and maxillary teeth (T = 22.03, 10.54, respectively), but not in the number of subcaudals, tail/total length, or eye diameter/snout length ratios (T = 2.66, 4.59, 4.62, respectively). Pair-wise comparison of samples 3 and 5 shows significant differences in the number of ventrals, maxillary teeth, and subcaudals (T = 9.07, 8.49, 6.36, respectively), but not in the tail/total length and eye diameter/snout length ratios (T = 2.96, 6.0). The relative differences between the Amazon samples (1–4) and the two non-Amazon samples (5–6) suggest that the Chaco forest sample from Bolivia is more closely related to the Amazon forest sample than to the deciduous mesophytic forest sample of Brazil. However, both non-Amazon forest samples are very distinct from the Amazon forest samples.

A pair-wise comparison of samples 5 and 6 shows significant differences in the number of subcaudals, maxillary teeth, and tail/total length ratios (T = 21.05, 6.43, 12.9, respectively), but not in the number of ventrals or eye diameter/snout length ratio (T = 1.36, 3.59). These samples represent different taxa, even though they are relatively close geographically (Fig. 1).

The scale count data and length ratios suggest three distinct populations of *Liophis typhlus*. Samples 1, 2, 3, and 4 represent the Amazon forest form, sample 5 the northern Chaco form, and sample 6 the Cerrado form.

The color patterns of samples 1, 2, 3, and 4 are similar, and the patterns of samples 5 and 6 are identical. The dorsum and head of adult individuals from samples 5 and 6 are chlorophyll green. The young and juveniles have black nape spots and some have four rows of dorsal dark spots. Adults of the Amazon samples have a leaf green to bright green dorsum with diagonal reddish brown to blackish chevron marks along each side of the body. The head may be greenish to bright blue. Young and juveniles are greenish dorsally with bold dark chevron marks and a relatively large black nuchal blotch.

Diagnoses and distributions of the three taxa follow:

Liophis typhlus typhlus (Linnaeus)

Coluber typhlus Linnaeus, 1758.
Xenodon isolepis Cope, 1870.
Liophis macrops Werner, 1925.

Diagnosis.—Dorsum usually green with distinct, reddish brown to black chevrons on each side, occasionally fading posteriorly. The dorsal surface of the head may be greenish to bright blue. The venter is white to light yellow, usually without dark markings. Juveniles have a large black nuchal blotch and dark chevrons. The number of ventrals varies from 133 to 163 ($\bar{x}$ = 147.3), subcaudals vary from 47 to 61 ($\bar{x}$ = 54.2), maxillary teeth vary from 20 to 28 ($\bar{x}$ = 23.6), tail/total length ratios vary from 0.160 to 0.210 ($\bar{x}$ = 0.184), and eye diameter/snout length ratios vary from 0.510 to 0.861 ($\bar{x}$ = 0.736).

Distribution.—Throughout the Amazon Basin in rainforest, to about 1000 m elevation (see specimens examined).

Liophis typhlus elaeoides Griffin

Liophis elaeoides Griffin, 1916.

Diagnosis.—Dorsally adults are uniform chlorophyll green with a light yellow venter. Juveniles have four rows of dorsal dark spots on a green background, and a pair of black nuchal spots. The number of ventrals varies from 158 to 172 ($\bar{x}$ = 163.5), subcaudals vary from 49 to 56 ($\bar{x}$ = 51.9), maxillary teeth vary from 17 to 23 ($\bar{x}$ = 19.9), tail/total length ratios vary from 0.160 to 0.200 ($\bar{x}$ = 0.171), and eye diameter/snout length ratios vary from 0.520 to 0.740 ($\bar{x}$ = 0.620).

Distribution.—*Liophis typhlus elaeoides* is known only from the upper Río Paraguay Basin, which includes the mesic Chaco forests of southeastern Bolivia, northern Paraguay, and western Mato Grosso, Brazil (see specimens examined).

Liophis typhlus brachyurus (Cope)

Opheomorphus brachyurus Cope, 1887.

Diagnosis.—Adults are uniform green dorsally with a light yellow venter. Juveniles have four rows of dark dorsal spots on a green background and a pair of black nuchal spots. The number of ventrals vary from 151 to 171 ($\bar{x}$ = 162.2), subcaudals vary from 40 to 49 ($\bar{x}$ = 44.4), maxillary teeth vary from 18 to 24 ($\bar{x}$ = 21.5), tail/total length ratios vary from 0.140 to 0.160 ($\bar{x}$ = 0.149), and eye diameter/snout length ratios vary from 0.55 to 0.81 ($\bar{x}$ = 0.675).

Distribution.—*Liophis t. brachyurus* occurs in deciduous mesophytic forests of southeastern Brazil, and in the Campos Cerrado forests of east-central Brazil (see specimens examined).

Comments.—Two recent papers by Miranda and Couturier (1983, 1984) comment on the presence and geographic variation of *L. typhlus* in Argentina. I have neither examined their specimens, nor located specimens of *L. typhlus* from Argentina in other museums. I believe they may have erred in identification of their specimens. Photographs presented by Miranda and Couturier (1984) suggest that they may have confused *L. miliaris* and *L. poecilogyrus* with *L. typhlus.*

Short works on the distribution and taxonomy of *L. typhlus* are Hoge (1964), Amaral (1931, 1935, 1949), Gans (1960), Parker (1928, 1935), Peters (1960), Peters and Orejas-Miranda (1970), Roze (1966), and Prado and Hoge (1948). Peters (1963) compared the maxillary teeth of *L. typhlus* with those of other species of *Liophis.*

Specimens examined.—(*Liophis typhlus typhlus*) BOLIVIA, *Beni*: Ixiamus AMNH 22457; Rio Beni AMNH 22270. BRAZIL, *Acre*: Alto Purus MZUSP 2498; Porto Walter MZUSP 7390. *Amapa*: Cuidade Oiapoque IB 13780, 13783; Serro do Navio KU 97873–97875. *Amazonas*: Barreira do Matupiri, on the Río Madeira MZUSP 5912; Carvoeiro AMNH 36167; Costa Altamira on the Río Japura MZUSP 6600; Lago Alexo MCZ 3290; Manaus MZUSP 3051, 3797; Reserva INPA MZUSP 7606, 7619; Santa Isabel on the Río Negro USNM 83532; São Paulo de Olivenca AMNH 53311;

Tapaua MZUSP 5770; no specific locality UZM 601223. *Maranhao*: Aldeia Aracu Igarape Gurupi-Una MZUSP 4303, 4826. *Para*: As Pedras, on the Río Cuminá-Miri MZUSP 5103; Belém IB 15667; Canindé, on the Río Gurupi MZUSP 4267, 4285; near Maraba, Serrando Norte KU 124608; Oxiximina MZUSP 4796; Uruã, Parque Nac. da Amazonia, on the Río Tapajos MZUSP 7838. *Rondonia*: Porto Velho MZUSP 3690. COLOMBIA, *Macanal*: Río Garagoa MCZ 27339. *Meta*: Villavicencio IB 8589. *Vaupes*: Timbo UTA R3805; Yapima UTA R5033. ECUADOR, *Napo-Pastaza*: Alpayaca FMNH 4069, UMMZ 89020-22; Andoas AMNH 41949; Baños+Canelos AMNH 35892; Chamala-Normandia-Río Bamba AMNH 35929–35930; Jarayacu AMNH 28796; Macas and Vicinity AMNH 35838–35839; 82 km ESE Macas AMNH 114616; Río Bamba AMNH 15209, 15213, 23296, 23302, 28848; Río Pastaza MCZ 36966; Santa Rosa, El Tigre AMNH 49165. FRENCH GUIANA (CAYENNE), Mana USNM, 6172; Saul MCZ 149399; near Sophie MCZ 77510–77511. GUYANA, Bartica-Potaro road BM 1954.1.3.64; 82 km S Bartica BM 1934.11.1.125; Berbice BM RR1964; Demerara River, Lama Creek AMNH 36106; Essequibo, near Lethem USNM 146376; Kartabo AMNH 21335, 98197–98198; Matali AMNH 61542; Rupununi District, north of Acaraí Mountains, west of New River KU 69826–69828; Rupununi District, north of Acaraí Mountains, west of New River KU 69826–69828; no specific locality MNHG 279.38. PERÚ, *Amazonas*: Caterpiza, Rio Caterpiza USNM (RWM field series) 14995, 15033, 14185–15186. *Junin*: Río Perene MCZ 42434. *Loreto*: Balta LSUMZ 14584: Centro Union TCWC 44682; Cerros de Contaya, on the Río Tapiche AMNH 53376; Contamana on the Río Ucayali AMNH 52130; Estirón on the Río Ampiyacu MZUSP 4394; Iquitos AMNH 52734; 53118, 53284, 53667, 53696, 53735, 53771, 53773, 53876, 53923, 53949, 54321, 54354, 54483, 54894, 56109; Moropon TCWC 38049, 44294; Orellana (Reforma) AMNH 54957, USNM 127124; Pampa Hermosa on the Río Cushabatay AMNH 55409, 55415, 55442, 55791, 55885, 56003; Pamya AMNH 53249; Requena (Monte Carmelo) AMNH 55600, 55626; Royaboya AMNH 52483, 53110, 53288, 55695; San Antonio on the Río Itaya AMNH 52920, 53667, 53693, 53696, 53735; Shiriara, on the Río Nanay AMNH 56075; Trapiche-Utuquinia AMNH 52195; Yanamono TCWC 40542–40543. *Madre de Dios*: Río Heath, 50 km S Puerto Pardo LSUMZ 36778–79; mouth of Río Torre on the Río Tambopata LSUMZ 394244. *Pasco*: Iscozazin Valley LACM 76805. *San Martin*: Moyobamba BM 74.8.4.59, 94.8.4.64. SURINAME: Charlesburg AMNH 104624; Coppename River MCZ 152203, 152205, 152633–152634; Jaraweg TCWC 60543, 60756; Paramaribo AMNH 8146, 8682, MCZ 16401; Potribo CM 44302; Sipaliwini Airstrip CM 84667, MCZ 152636; Zanderi (Airport) MCZ 152635. VENEZUELA, *Amazonas*: Arabopó UMMZ 85279; Arocoima Caños MCZ 38541; Mount Duida region AMNH 36617, 36620. *Bolivar*: El Manteco TCWC 60168; no specific locality MHNLS 1632.

(*Liophis typhlus elaeoides*) BOLIVIA: *Cochambamba*: Villa Tunari UMMZ 153095. *Santa Cruz*: Buenavista CM R2696, R2698, R2701, R2704, R2869, R2886, R2930, R2931; UMMZ 67967–67968, 67969(2), 67970(3); Buenavista, near Río Colorado CM R2860, R2865, R2955; Santa Cruz LSUMZ 11825; Santa Cruz de la Sierra CM R32 (holotype), R44, R59, R91, R94, R95, R97, R98, R99, R102, MCZ 11860, MZUSP 6474; San Jose de Chiquitos CM 34842. No specific locality: CM R2938–R2939, FMNH 195898, HCD 2820, 2822, TCWC 55290. BRAZIL: *Mato Grosso*: Corumbá, near Urucum Mountains CM 34841; Fazenda Bela Vista of the Ilha Insua MZUSP 7264; Fazenda Vacurizai of the Río Paraguai MZUSP 7266; Generalso Ponce, Corumba IB 25954; Maleta IB 14975; Porto Murtinho IB 26177–78.

(*Liophis typhlus brachyurus*) BRAZIL: *Bahia*: Mira Serra, 41 km from Morro de Chapeo MZUSP 7554. *Goaiz*: Araguarí IB 6851; Fazenda Lucushac, on the Río Verde IB 13060. *Mato Grosso*: Arapua IB 9939; Aquidauana MZUSP 33589; Chapada ANSP 11202–11203, BM 92.420.13; Taugará da Serra IB 24543; Taunay IB 7674; Urucum, near Corumbá BM 1928.1.12.3. *Minas Gerais*: Horto Forestal IB 10493; Irma Badur IB 6933; Itambe do Mato Dentro MZUSP 8061; Juiz de Fora IB 25190, 26685; Machado IB 16303; Santa Rita do Extrema IB 5540, 5562. *Río de Janeiro*: Nova Friburgo IB 10516. *São Paulo*: Araraguara IB 231; Atibaia IB 21376, 27081, 27201; Barra Assugnui IB 29042; Barretos IB 5030; Baureri IB 7212; Bauru MZUSP 823; Boraceia MZUSP 4227; Botucatu MZUSP 2410, 2412; Buri IB 6718, 6763, 12313; Campo Limpo IB 805, 6452, 10265–10267, 24903–24904; Capão Bonito IB 23465; Cascavel MZUSP 824; Conde do Pinhal IB 9975; Cotia IB 5743, 6935, 7140, 9906, 19906, 23236, 23377, 24542, 32627; Curupá IB 7061; Dona Catarina IB 22598; Elias Fausto IB 232, 319, 392, 578, 791, 10461; Elihu Root IB 234; Engenheiro Cesar de Souza IB 8338; Ferraz de Vasconcelos MZUSP 2487; Guarulhos IB 23726–23727; Horto Florestal IB 10493; Ibiuna IB 12252, 23794; Ipanema IB 230, 235; Itaguá IB 4813; Itapecerica da Serra IB 7794, 19682, 25040, 25043; Itapetininga IB 24565; Itapolis IB 7956; Itaquera IB 30758; Itaquaquecetuba IB 18349; Itirapina IB 6655; Jaraguá IB 21381; Jarinú IB 10292; Lauro Muller IB 10533, 10556, 10559; Leme IB 236, 547; Mairinque IB 7373, 7461; Mairipora IB 28603; Mogi das Cruzes IB 12592, 19658, 23547, 24881, 28284, MCZ 39415, MZUSP 6460; Osasco IB 12500, 27910–27911; Pederneiras IB 6938; Pindamonhangaba IB 1257; Piraju MCZ 39416; Promissão IB 9969; Ribeiras Pires IB 19596; Río Claro IB 7277, 10296;

Santa Adélia IB 6909; Santa Ernestina IB 27969, MZUSP 2479; São Carlos IB 10016; São Jose do Río Pardo IB 5444; São Jose dos Campos IB 21348; São Paulo IB 797, 7142, 12980, 12993, 16223, 16900, 18854, 25295, 27497, 28458, MCZ 17956, MZUSP 817–820, 2388, 3338–3339, 3695, USNM 69238–69239; Suzano IB 19104; Valinho IB 6719; Vinhedo IB 2915; no specific locality IB 233, 237, 797, 840, 4745, 5491, 5642, 6950, 9775, 10581, 12112, 17777.

Liophis guentheri Peracca

Liophis guentheri Peracca, 1897. Six syntypes (Five lost ?), Mus. Comp. Anat., Torino. Type locality—Caiza, Bolivia.

Comments.—*Liophis guentheri* has resided as a synonym of *L. typhlus.* Parker (1928) compared one of the syntypes (now BM 1946.1.5.69) with a specimen of *L. typhlus,* and suggested it "failed to reveal any consequential differences between the two species." However, no overlap in the number of ventrals occurs between the two species. An unnumbered British Museum specimen from an unspecified locality in Bolivia is similar to the numbered syntype in the collection of the British Museum in its state of preservation, and may well be one of the five missing syntypes that were housed in the Museum of Zoology and Comparative Anatomy in Torino.

Distribution.—*Liophis guentheri* apparently is restricted to the central Chaco of Bolivia, Argentina and Paraguay (Fig. 1).

Description.—The following description is based on six adult females and three adult males. The maximum total length of males examined is 655 mm, of females 723 mm. Peracca (1897) gave 890 mm as the maximum total length but did not indicate the sex. Scale rows are 19-19-15, smooth, without apical pits; a reduction of the third and fourth scale row occurs between ventrals 98–118 ($\bar{x}$ = 106.9), and reduction of the seventh and eight scale rows between ventrals 99–112 ($\bar{x}$ = 106.1). The number of ventrals varies from 187 to 197 ($\bar{x}$ = 191.6), the number of subcaudals from 53 to 57 ($\bar{x}$ = 54.6) (only five with complete tails). The number of maxillary teeth varies from 20 to 22 ($\bar{x}$ = 20.9). Head scales are as follows: supralabials 7-8 (1), 8-8 (7), 8-9 (1); supralabials entering orbit 4+5 (8), 4+5/5+6 (1); infralabials 9-9 (1), 9-10 (1), 10-10 (5), 10-11 (2); preoculars 1-1, postoculars 2-2, loreals 1-1, temporals 1+1 (1), 1+2/1+1 (1), 1+2 (7). The anal plate is divided. The tail/total length ratio varies from 0.152–0.168 ($\bar{x}$ = 0.159); eye diameter/snout length ratios vary from 0.467 to 0.578 ($\bar{x}$ = 0.502).

The hemipenis is nine subcaudals long, with the sulcus spermaticus dividing at the level of the third subcaudal, slightly bilobed (about one and a half subcaudals), and very spinose. The smooth apical disks are pronounced.

The general dorsal color is light blue in preservative, but Peracca (1897) states that living specimens are immaculate green dorsally and yellowish white ventrally. The ventrals and subcaudals are usually immaculate white in preservative. In two preserved specimens there are dark flecks and/or spots on the outer edges of the ventrals. Flecks cover all ventrals in one specimen and three fourths of the ventrals in the other.

Specimens examined.—ARGENTINA: *Salta*: Hickmann IML 105, 303; Luna Muerta IML 301; *Formosa*: Ingeniero Juarez IML 422, 490. BOLIVIA: no specific locality IB 1177, BM (unnumbered); *Chaco*: Caiza BM 1946.1.5.69. PARAGUAY: *Chaco*: Loma Plata KU 73454.

Liophis viridis Günther

Liophis viridis Günther, 1862. Holotype, BM 1946.1.5.69. Type-locality—Brazil, Pernambuco, no specific locality.

Liophis typhlus prasina Jan and Sordelli, 1866. Holotype (lost?). Type-locality—Brazil.

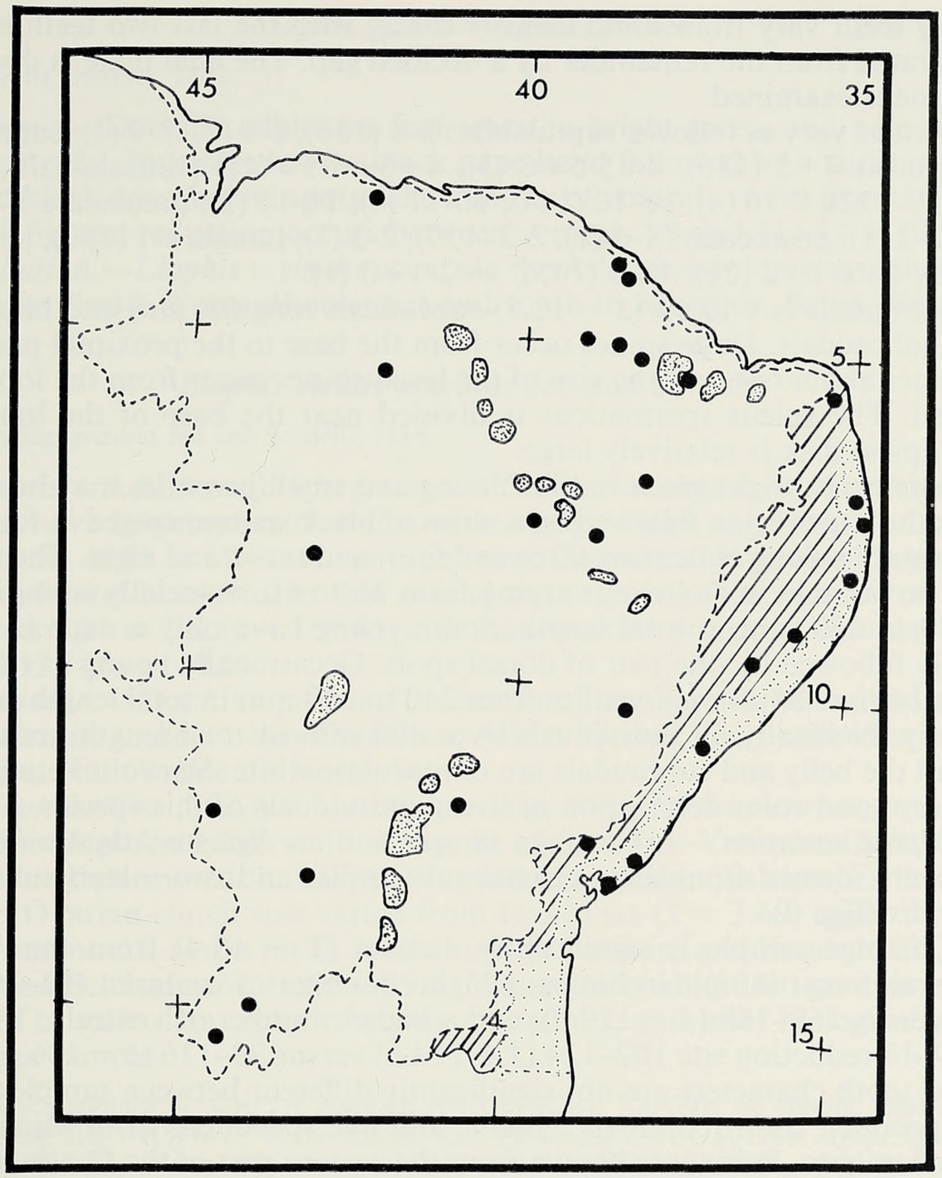

Fig. 2.—Distribution of *Liophis viridis* in northeastern Brazil. Dots within the diagonal lines (Agreste plant formation) and lightly stippled area (Atlantic rainforest formation) represent the Agreste-Atlantic Rainforest sample. Dots within the dashed line (Caatinga plant formation) represent the Caatinga sample. Densely stippled areas within the Caatinga formation represent enclaves of the Cerrado plant formation.

Distribution.—Known only from the Caatinga, Agreste, and Atlantic rainforest vegetation communities of northeastern Brazil (Fig. 2).

Description.—The following description of *L. viridis* is based on 159 individuals from throughout the range. The maximum total length of males is 595 mm, and of females 670 mm. The scale rows are 19-19-17, smooth, and with one apical pit. The reduction to 17 rows occurs through a fusion of scale rows three and four between ventrals 98 and 121 ($\bar{x}$ = 110.0). Sexual variation was not detectable even in large samples, therefore all scale data were combined for intrasample comparisons. Ventrals vary from 169 to 202 ($\bar{x}$ = 186.0); subcaudals from 63 to 84 ($\bar{x}$ = 74.1). Tail/total length ratios of adults vary from 0.193 to 0.249 ($\bar{x}$ = 0.221). The eye/snout ratios of adults vary from 0.500 to 0.684 ($\bar{x}$ = 0.562).

Maxillary teeth vary from 17 to 24 ($\bar{x}$ = 20.2), with the last two teeth enlarged and separated from the remainder by a decided gap. The anal plate is divided in all specimens examined.

Head scales vary as follows: supralabials 8-8 (156), 8-9 (2), 9-9 (1); supralabials entering orbit 4+5 (155), 4+5/5+6 (3), 4+5+6/5+6 (1); infralabials 8-9 (2), 8-10 (1), 9-9 (2), 9-10 (4), 10-10 (144), 10-11 (4), 11-11 (2); preoculars 1-1 (156), 1-2 (2), 2-2 (1); postoculars 1-1 (1), 2-2 (157), 2-3 (1); loreals 1-1 (159); temporals 1+1 (12), 1+1/1+2 (21), 1+2 (145), 1+2/1+3 (1).

The hemipenis is 9 to 13 ($\bar{x}$ = 10.8) subcaudals long (*in situ*) and bilobed for 1.5 to 3 subcaudals. Large spines occur from the base to the proximal part of the lobe. Spines about one half the size of the basal spines occur from the lobe to the distal end. The sulcus spermaticus is divided near the base of the lobes. The smooth apical disk is relatively large.

The dorsum is bright green in life. Young and small juveniles may have black bands in the nape region followed by a series of black spots arranged in four linear rows, primarily along scale rows three and four, and seven and eight. The number of spots is variable in any row, varying from 36 to 60, especially in individuals from 180 to 220 mm in total length. Some young have only a nape band, immediately followed by one pair of dorsal spots. Occasionally young have a black lateral tail stripe. Spots on juveniles from 240 to 370 mm in total length are faded posteriorly. Normally all individuals over 400 mm in total length are uniform green and the belly and subcaudals are immaculate white. Vanzolini et al. (1980) give a very good color description of living individuals of this species.

Geographic variation.—A Caatinga sample and an Agreste-Atlantic rainforest sample were formed from three coastal subsamples and two inland subsamples of *L. viridis* (Fig. 2).

The Caatinga sample is significantly distinct (T = 13.4) from the Agreste-Atlantic rainforest sample in having a higher number of ventrals, 181–202 ($\bar{x}$ = 189.8), versus 169–188 ($\bar{x}$ = 179.6), and a higher number of ventrals (T = 6.44) at the 19–17 reduction site 102–124 ($\bar{x}$ = 114.6) versus 98–116 ($\bar{x}$ = 106.6). Other scale and tooth characters are not significantly different between samples.

One specimen from Jeremoabo, Bahia, and five specimens from Mina de São Felix do Amianto, Bahia, are known from the eastern part of the Caatinga. Their taxonomic features more closely approximate those of the Agreste-Atlantic rainforest sample than others from the Caatinga. Although the samples are small I suspect that they may represent intergrades between two well-defined subspecies.

The Caatinga sample (Fig. 2) does not have a formal name. However, Jan (1863*a*, 1983*b*) and Jan and Sordelli (1866) mention a varietal name associated with *L. typhlus* that belongs to *L. viridis.* It was originally cited as a varietal name (without description) by Jan (1863*a*, 1863*b*) but was illustrated by Jan and Sordelli (1866) and their iconotype represents the only description. Jan (1863*a*, 1863*b*) recorded two specimens of the variety, one from "Fernambuco" in the Milan Museum, and one from "Brasile" in the Stuttgart Museum. Jan and Sordelli illustrated the latter specimen, thus it becomes the holotype (by inference). However, neither specimen now can be located. I cannot definitely assign the name to either of the two populations that require recognition. However, the genus is already overburdened with excessive synonyms and I propose that Jan and Sordelli's varietal name, *prasinus,* as proposed in the combination *L. typhlus prasinus,* be recognized as the proper name for the Caatinga popultion of *L. viridis.*

Liophis viridis viridis Günther

Liophis viridis Günther, 1862.

Diagnosis.—Dorsally adults are leaf green to bright green, and pale cream to white ventrally. Juveniles have a black nape band followed by a various number of paired black dorsolateral spots. The number of ventrals varies from 169 to 188 ($\bar{x}$ = 179.6), and reduction occurs between ventrals 98 and 116 ($\bar{x}$ = 106.6).

Distribution.—*Liophis v. viridis* occurs in the Atlantic rainforest and the Agreste forest from Recife, Pernambuco, east and south to Salvador, Bahia, Brazil.

Liophis viridis prasinus Jan and Sordelli

Liophis typhlus prasina Jan and Sordelli, 1866.

Diagnosis.—Adults are bright green, with an immaculate cream to white venter. Juveniles have bright green dorsums with a single black nape band, or with four parallel rows of 35 to 60 black spots per row. Occasional juveniles have a pair of posterior, lateral black stripes that extend onto the tail. The number of ventrals varies from 181 to 202 ($\bar{x}$ = 189.8), with the reduction occurring between ventrals 102 and 124 ($\bar{x}$ = 114.6).

Distribution.—*Liophis v. prasinus* occurs from João Pereira, Maranhão in northeastern Brazil, south to São Francisco, Minas Gerais, then northeast to about Parauagua, Rio Grande do Norte, Brazil.

Comment.—Vitt (1983) found *Hyla rubra, Physalaemus cuvieri,* and several unidentified leptodactylids in 14 stomachs of *L. viridis.* Vitt examined 16 gravid females and determined that *L. viridis* produces continuous clutches throughout the year. Ovarian clutch size varied from two to six ($\bar{x}$ = 3.69) eggs.

Short taxonomic works for *L. viridis* include Cordeiro and Hoge (1973), Gomes (1918), and Schmidt and Inger (1951). Vanzolini et al. (1980) give an excellent summary of scale data, color of young and adults, and brief biological notes on a Caatinga sample.

Specimens examined.—"SOUTH AMERICA": CM R281. BRAZIL: no specific locality FMNH 5694, MZUSP 815, NHMW 20739; no specific state, Parauagua ZMUC 601250. *Algoas*: Quebrangulo MZUSP 3453. *Bahia*: No specific locality FMNH 5721, IB 3200, MCZ 2946, 147217–147218. Assu da Torre IB 980, Brreiras UMMZ 108712–108716, Bom Jesus de Lapa Cm R344, UMMZ 108711, Feiro de Santana KU 29478, Itapoan MZUSP 5713, Jeremoabo MZUSP 5738, Mina de São Feliz do Amianto IB 28170–28172, 28215–28216, Salvador BM 90.1.27.2, 1924.9.20.26, MZUSP 2838–2839. *Ceara*: Acude Amanarí Maranguape MZUSP 3450, Boa Viagem IB 20200, Caxueira ZMUC 3342(3), Coluna MZUSP 5319–20, Limoeiro do Norte IB 12776–12777, Uruqué IB 20142. *Maranhão:* Lagoa de João Pereira CM R316. *Minas Gerais*: Januaria UMMZ 108705–108709, São Francisco UMMZ 108710. *Parahyba*: Coremas MZUSP 3451, João Pessoa MZUSP 7976–7977, 7999, 8262, UFFB 139, 141, 143, Mamanguape MZUSP 3456. *Pernambuco*: no specific locality MANH 4448, BM 1946.1.2.69, 80.11.25.4, 80.11.25.8, MCZ 1447, 146945–146947, Agrestina MZUSP 4925, 4942, 4946, 4965, 4970, Exu MZUSP 6693–6699, 6700–6718, 7071–7091, 5 km E Exu MZUSP 6950, 13 km Exu MZUSP 6940–6943, 5 km N Exu MZUSP 6920–6921, 11 km S Exu MZUSP 7092, Ponta de Pedras MZUSP 5177, Recife DEH 624, 517, 526, LSUMZ 36787. *Piauí*: Acude Peri-Peri MZUSP 3424, 3427–3429, 3433, 3435–3438, 3441, 3443, 3445, Terezina IB 360, 473, 1210–1214, Valenca MZUSP 5814. *Río Grande do Norte*: Ceará Mirim CAS 49320. *São Paulo*: Leme IB 543 (in error). *Sergipe*: Aracaju IB 22458, Maruim ZMUC 601251, Santo Amaro das Brotas MZUSP 6985, 7306.

Liophis jaegeri (Günther)

Coronella jaegeri Günter, 1858. Syntypes—BM 1946.1.9.12, 1946.1.5.78. Type-locality—Brazil, no specific locality.

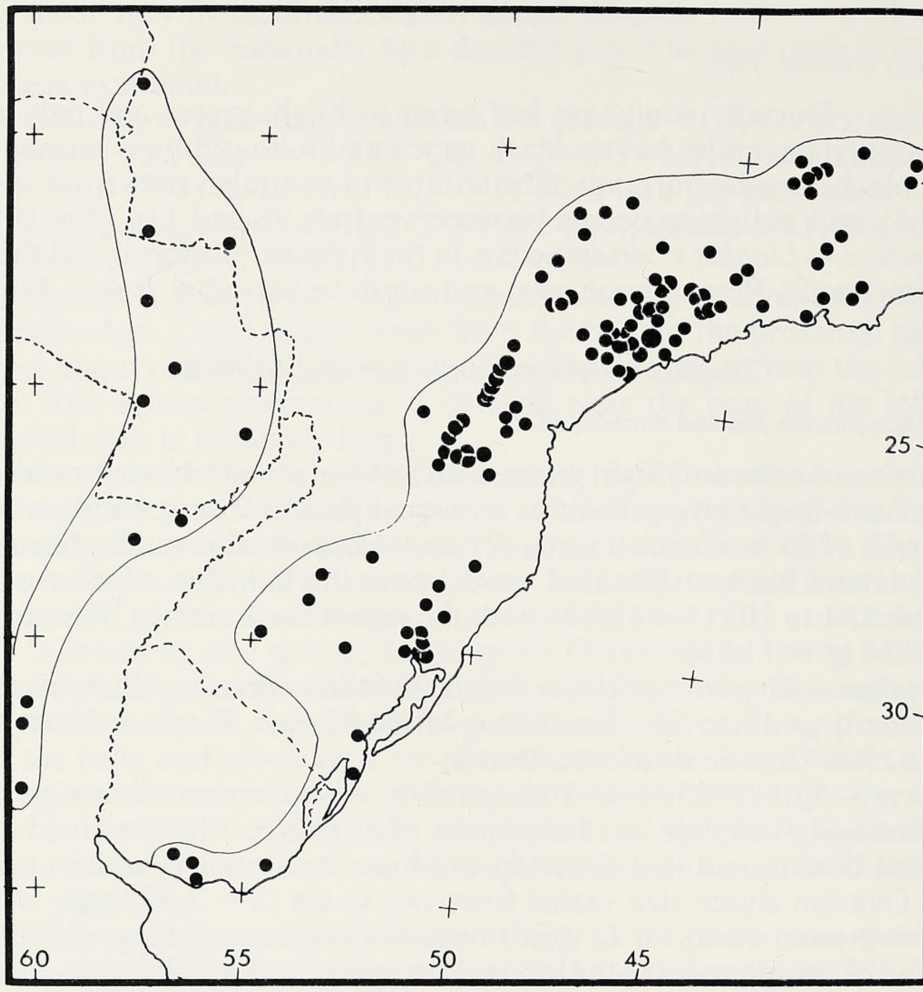

Fig. 3.—Distribution of *Liophis jaegeri* in southeastern South America. Black lines enclose samples utilized in the analyses of geographic variation. The large black dot represents several overlapping localities.

Liophis dorsalis Peters, 1863. Type-locality—Brazil, no specific locality.
Aporophis coralliventris Boulenger, 1894. Type-locality—island north of Concepcion, near San Salvador, north Paraguay.
Rhadinaea lineata Jensen, 1900. Type-locality: Taboleiro Grande, Minas Geiras, Brazil.

Misapplied synonym.—*Rhadinaea dichroa* Werner (1899) has been in the synonomy of *L. jaegeri* since 1972 (Peters and Orejas-Miranda, 1972). However, an examination of the type description reveals that the holotype has 19 midbody scale rows, 159 ventrals, and 50 subcaudals. The dorsum is brown with the bases of the scales white and the posterior edges black. It also has a tail/total length ratio of 0.185. The description is identical to that for *Liophis poecilogyrus caesius,* a form common to the Chaco of Bolivia, Argentina, Paraguay and Brazil, and I assign it to that species.

Distribution.—*Liophis jaegeri* occurs from about 19°S latitude in Brazil, to about 35°S latitude in Uruguay and Argentina, west to about 61°W longitude, along the Río Paraguay basin in Argentina, Paraguay and Brazil (Fig. 3).

Description.—Some 415 individuals of *L. jaegeri* were examined and full data taken on 160. Tail/total length ratios were recorded for over 400 individuals. The maximum total length of males is 539 mm, of females 676 mm. Dorsal scales are smooth, in 17 rows, normally without reductions, and without apical pits. When reductions are present (15 individuals), they occur with a fusion of scale rows three and four on one or both sides of the body, reducing to 15 or 16 between ventrals 88 and 141 ($\bar{x}$ = 121.2).

Sexual variation in the number of ventrals, subcaudals, maxillary teeth, and tail/total length ratios is absent, therefore the samples were combined for statistical analysis. The number of ventrals of 160 individuals varies from 146 to 169 ($\bar{x}$ = 157.5), and subcaudals from 52 to 75 ($\bar{x}$ = 61.7). The number of maxillary teeth varies from 22 to 29 ($\bar{x}$ = 25.6). The tail/total length ratios varies from 0.181 to 0.268 ($\bar{x}$ = 0.221). The number of palatine and pterygoid teeth were recorded for one individual and they were 10 and 25 respectively.

Head scales are as follows: supralabials 6-7 (1), 7-7 (1), 7-8 (4), 8-8 (147), 8-9(4), 9-9 (1); supralabials entering the orbit 3+4 (1), 3+4/4+5 (3), 3+4+5/4+5 (1), 3+4+5/4+5+6 (1), 4+5 (148), 4+5/4+5+6 (2), 4+5+6 (1); infralabials 8-8 (3), 8-9 (4), 8-10 (2), 9-9 (5), 9-10 (24), 9-11 (1), 10-10 (112), 10-11 (5); preoculars 1-1 (155), 1-2 (2), 2-2 (1); postoculars (2-2) and loreals (1-1), temporals 1+1 (5), 1-1/1-2 (11), 1+2/2+1 (1), 1+2 (141); eye diameter/snout length ratios of 20 adults varies from 0.533 to 0.844 ($\bar{x}$ = 0.655). The anal plate is divided in all specimens. Hemipenial length varies from 7 to 13 ($\bar{x}$ = 10.3) subcaudals.

A hemipenis extending 12 subcaudals has the sulcus spermaticus divided at the level of the 6th subcaudal, and the lobes begin at the level of the 9th subcaudal. Large spines occur on the asulcate side of the hemipenis to the edge of the large, smooth, apical disk. Calyces appear to be absent and only a weak basal naked pocket is present.

The general dorsal color is dull green, olive green, or olive brown. The venter normally is rose or coral red, with or without lateral dark marks on the edges of the ventrals. In life there is a reddish brown to olive brown stripe covering scales rows 8 through 12, and frequently parts of scale rows 7 and 13. The stripe varies in width from 5 to 10 rows of scales. Occasionally dark brown spots occur on the posterior ede of rows 3, 4, 5, and sometimes along scales rows 7 and 8. The upper and lower lips, throat and anterior ventrals may be cream or yellowish. Color descriptions also are presented by Miranda et al. (1982).

Geographic variation.—160 individuals were grouped into nine geographic samples. Three samples were located in the Río Paraguay basin in a north/south line, and six samples were scattered from Uruguay to southeastern Brazil, more or less in a north/south line. Using univariate statistics, the number of ventrals, maxillary teeth, subcaudals, and tail/total length ratios were analyzed for intra and inter-sample variation. The two numbers that follow a mean value are the standard deviation and standard error, respectively. In addition, Student's T Test values were used to determine significance at the 95% level, in a pair-wise sample comparison. No significant differences in pair-wise comparisons exist for any of the samples arranged in the two north to south lines. There are trends in both lines to increased number of ventrals and subcaudals from north to south. The trend for maxillary teeth is reversed, with numbers decreasing from north to south. Pair-wise comparisons of the Student's T Test values for the number of ventrals, maxillary teeth and tail/total length ratios of eastern and western samples were not significant. However, a significant difference between eastern and western samples in the number of subcaudals exist. Subcaudals of the combined three western samples (N = 18) vary from 63 to 75 ($\bar{x}$ = 68.5, 3.8, 0.9), while the combined six eastern samples (N = 110) vary from 52 to 71 ($\bar{x}$ = 60.4, 3.4, 0.3).

the tail/total length ratios of the western samples vary from 0.214 to 0.268 ($\bar{x}$ = 0.231, 0.29, 0.07) and those of the eastern samples from 0.193 to 0.248 ($\bar{x}$ = 0.221, 0.13, 0.01). This suggests that the subcaudals are smaller in the western sample, hence more subcaudals are present on a tail about the same length as in the eastern sample. The eastern and western samples are separated by the Río Uruguay and Río Paraná basins and appear to be allopatric (Fig. 3). However, additional collecting may reveal parapatry of the samples.

Since the number of subcaudals is significantly different between the two samples, I propose recognition of the following taxa:

Liophis jaegeri coralliventris Boulenger

Diagnosis.—Dorsum ground color leaf green, sometimes with a middorsal brownish red stripe five to six scale rows wide, extending from the nape to the tail, and with a dark brown line on scale row three on each side of the body. Venter rose to red, with or without ventrolateral blackish marks on the edges of the ventrals. Subcaudals vary from 63 to 75 ($\bar{x}$ = 68.5).

Distribution.—Known only from the Río Paraguay Basin of Argentina, Paraguay, and Brazil (Fig. 3).

Liophis jaegeri jaegeri (Günther)

Liophis dorsalis Peters, 1863.
Rhadinaea lineata Jensen, 1900.

Diagnosis.—Dorsum olive green, grayish green or leaf green, often with a middorsal brownish or reddish stripe six to eight scale rows wide, sometimes with dark dots along scale row four, and occasionally along scale rows three and five. Venter rose or reddish, with or without ventrolateral black marks on the edges of the ventrals. Subcaudals vary from 52 to 71 ($\bar{x}$ = 60.4).

Distribution.—Known only from the east side of the Río Parana Basin east to the Atlantic coast, and from Uruguay north to 19°S latitude in Brazil (Fig. 3).

Comment.—Little is known about the natural history of this species. I have found 7 and 9 eggs in two specimens, and Miranda et al. (1982) indicated that the average number of eggs for this species is about 14. Miranda et al. also indicated that the species is diurnal, frequently found in humid places, and eats small frogs. Notations on some field tags suggest that the species also occurs in brushy areas, has been found "crossing dirt roads" and "in a puddle of a cow track in low campo, 10:30 am, 84°F, and in full sun."

Dixon (1985) presented evidence that *L. jaegeri* and *L. maryellenae* hybridize in an area near Belo Horizonte, Minas Gerais, Brazil. Additional material from the latter area has not been located, and the hybrid zone remains undefined.

Specimens examined.—(*L. jaegeri coralliventris*). ARGENTINA, *Corrientes*: Gral Paz, esteros de la Santa Lucia IML 802, Ituzaingo IML 1180. *Rosario*: Rosario MNHP 1899.6–7. *Santa Fe*: Bañados del Rincon CM 39130, Buenos Aires MNHP 676-50, Laguan Guadalupe CM 39128. BRAZIL, *Mato Grosso*: Corumba IB 26575, Río Apa UMMZ 108761, upper Río Parana/Río Paraguay UNM 68831. PARAGUAY, Asuncion BM 1930.11.27.208, Buenavista, NE of Caaguarzu MCZ 34204, Isla Concepcion BM 1946.1.5.85, Primavera BM 1960,1.2.84–85, 1960.1.3.40, 1962.81.

(*Liophis jaegeri jaegeri*). BRAZIL, *Minas Gerais*: no specific locality MCZ 20715–20716. Belo Horizonte UMMZ 109069, Campo Alegre IB 196, Coronel Fabriciano IB 22993, Imbuzeiro USNM 100676, Itapeva IB 41126–41127, Juiz de Fora IB 30728, 33501, Mutum IB 3802, Nova Badem IB 192, Ouro Preto IB 897, 3311, Passa Vinte IB 4968, Pocos de Caldas IB 4714, Santa Rita de Extrema IB 5560, 8192, Taboleiro Grande ZMUC 601253, Toledo IB 44531, Ubá IB 17308. *Paraná*: Araucaria IB 7252, 7346, 13632, Balsa Nova IB 18293, 2939–22941, 22943–22944, 23112, 23114–12115, 24343–24345, 24466, 26226, 28785, 32538, Campo Largo AMNH 102257, Carambei IB 7403, Castro IB 6244–6247, 7931, 10392, Curitiba UMMZ 108722, IB 197, 23006, 23439–23440, 29321, Dorizon IB 893, Guarapuava IB 24630, 24661, 24710, 24889, 26954. Jaguariaíva IB 17842, Joãquim Murtinho IB 8263, João Eugenio IB 13027, 15700, Mallet IB 18775, 19544, 19670, Paulo Frontin IB 24986–24987, 25321, Piraí do Sul IB 12425, Río Azul IB 21346, 22801, Tronco IB 730. *Río de Janeiro*: Friburgo MZUSP 2705–2707, Muri IB 21261, 21929, 24579, Petropolis IB 21473, 21475, Rio de Janeiro (Morro da Urea) IB 985. *Río Grande do Sul*: no specific locality. BM 82.10.4.60–82.10.4.61, 61A, MCZ 5633, 17932–17933, MZUSP 1109, 1112–1113, 1127–1128, UMMZ 67241, ZMUC 601254–601255, Alexandrinha MZUSP 5472, Cacequi IB 10025, Canela IB 13526, Caxias do Sul IB 6418, 6716, 9316, Cachoeira do Sul 23315, 23317, Cruz Alta IB 18386, Estacão Ecologica do Taim MZUSP 7524, Guaiba CAS 89672, Pareci Novo IB 7645, Passo Fundo IB 8049, 8060, 8212, Pelotas IB 41057, Porto Alegre IB 7264, 7572, 17015, 22411, 22509–22511, 22565, 22832, 23189, 23419–23420, 23543, 45935, Quebra Dente-Maran IB 23302, Restinga Seca IB 7305, 9837, São João MNHP 1894.440, São Leopoldo MSUSP 4100, IB 7300, 7352, 7776, 8357. *Santa Catarina*: Barracas IB 13319, Canoinhas, near Taunay IB 24612, Itaiópolis IB 16669, Lagoa do Norte IB 9700, Porto União IB 25992, São Joaquim IB 45187, Taunay IB 16328, Tres Barras IB 7948. *São Paulo*: no specific locality MCZ 207110–20713, UMMZ 62804, 108760, Agudos IB 22097–22100, Abernessía IB 9553, Altinópolis IB 19562, Araraquara IB 19413, Arpuí IB 831, Atibaia IB 23149, 23254, 26889, 26889, Anhanquêra, KM 24 IB 23163, Barrinha IB 43133, Barueri IB 6987, Bento Quirino IB 20641, Boqueirão da Praia Grande IB 11524, Boraceia MZUSP 4498, Botucatu MZUSP 2406, Bragança Paulista IB 30498, Caieiras IB 41061, Caixa D'Agua IB 5459, 5682, 6716, Campo Largo 4639, Campo Limpo IB 4738, 5309, 5745, 7349, 7541, 18658, Campos do Jordâo IB 8450, 30692, MZUSP 1122, Capitiuva IB 3070, Cotia IB 7504–7505, 24281, 29195–29196, Embu km 28, IB 30488, 30490–30494, 305741, Embu Guaçú IB 16617, 167796, 34299, Estacâo Gabriel Piza IB 5428, Guarulhos IB 5041, 23556, 23724, 42961, MZUSP 4721, Ibiuna IB 26979, 32251, 32265, 40930, 42203, 42222, 42337, 43764, Itapetininga IB 10287–10288, Itapecerica da Serra IB 41115, 42138, 42942, 43882–43883, 44116, 44189, 44498, Itatiba IB 5551, 5586, 5741, 24185–24186, Itaquera IB 10189, 10197–10200, Itu IB 32234, Jacarei IB 3293, 24926, 28502, Jarinu IB 12810, 27542, 30886, Jundiaí IB 19686, Lôbo IB 3253, macedonia IB 7026, Mairipora IB 24380, 26949, 27958, Mairinque IB 6042, 6048, 6075, 6618, Mogi das Cruzes IB 10196, 10268, 10295, 10318, 21387, 21395, 22596, Moreiras IB 17606, Pederneiras IB 5470, Peruíbe IB 5532, Perus IB 3292, Pindamonhangaba IB 18820, Pinheirinhas IB 32420, Pirituba IB 908, Pilar do Sul IB 32121, 32454, Quilâuña IB 6257–6258, Raiz da Serra MZUSP 1114–1116, Ribeirâo Pires IB 10232, Ribeirâo Prêto IB 22831, Rodovia Dos Bandeirantes dm 60, IB 34397, Salto IB 4516, 4578–4579, São Bento do Sapucaí IB 3283, São Bernardo do Campo MZUSP 3289, 3682, 4463–4465, IB 22608, 42919, São Lourenco da Serra IB 45789, São Paulo MZUSP 1117, 1119, 1950, 2372, 2387, 2609, 2635, 2960–2961, 3355, 3688, 4095, 4130, 4756, IB 191, 193-95, 647, 695, 1315, 1321–1322, 1416–1417, 3252, 3494, 4643, 5411, 5573, 6189, 7646, 8042, 8575, 9561, 9842, 9879, 10194–10195, 10252, 10271, 12214, 12977, 12986, 17085, 17871, 18270, 18405, 18920, 22882, 24178, 24431, 24442, 26656, 27014, 27157, 27212, 27281, 27478, 27498, 27556, 27571, 27631, 28308, 28503–28508, 29222, 29236–20237, 29249, 29614, 29924, 30683, 32446, 32504, 32800, 32803, 32925, 32999, 34277, 41129, 42109, 42195, 44162, 45746, 45751, São Roque IB 5391, 44228, Serra da Bocaina MZUSP 4912, Sorocaba IB 6865, Souzas IB 23151, Sumaré IB 1332, Suzano IB 20376, Tapiraí IB 28060. Tremembé IB 10368, Valentim Gentil IB 28671, Vinhedo IB 30320. URUGUAY. *Canelones*: no specific locality BM 84.2.23.39, FMNH 10215, Arroyo Solis Grande CM 38959, Bañados de Carrasco CM 55422–55423, Rocha USNM 89995, Ruta Interbalenearia CAS 93100. *Montevideo*: no specific locality MNHP 171, Santiago Vazquez LSUMZ 27753, MNMHP 168.

Liophis maryellenae Dixon

Liophis maryellenae Dixon, 1985. Holotype—AMNH 62202. Type-locality—Annapolis, Goias, Brazil.

Description.—The following description is based on 10 specimens. Maximum total length of males 435 mm, of females 530 mm. Tail/total length ratios vary from 0.221 to 0.262 ($\bar{x}$ = 0.240). Diameter of eye/snout length ratios vary from 0.605 to 0.844 ($\bar{x}$ = 0.686). Dorsal scale rows are 19-19-17, smooth, with an apical scale pit. Reduction to 17 rows occurs between ventrals 74 and 95 ($\bar{x}$ = 82.8). The anal plate is divided. The number of ventrals varies from 144 to 159 ($\bar{x}$ = 150.9). The number of subcaudals varies from 63 to 82 ($\bar{x}$ = 67.9). The number of maxillary teeth varies from 25 to 28 ($\bar{x}$ = 26.1). Head scales vary as

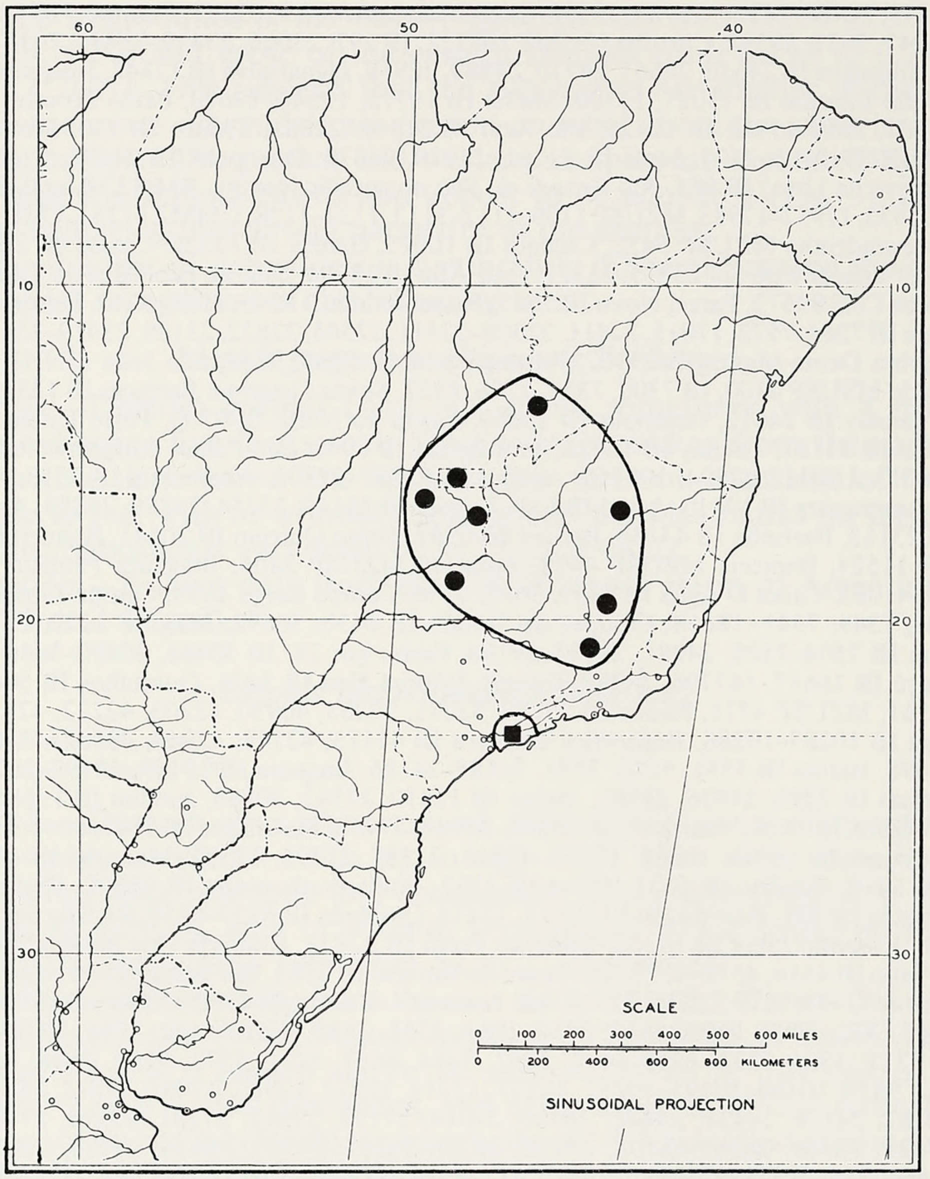

Fig. 4.—Distribution of *Liophis atriventer* and *L. maryellenae* in southeastern Brazil. Dots represent *L. maryellenae*; the square, *L. atriventer.*

follows: supralabials 8-8 (10), supralabials entering orbit 4+5 (10), infralabials 10-10 (8), 11-11 (2); preoculars 1-1 (10); postoculars 2-2 (10); loreals 1-1 (10); temporals 1+2 (10).

The hemipenes vary between (*in situ*) 9.5 to 12 ($\bar{x}$ = 10.5) subcaudals long. The structure is slightly bilobed, each lobe about two subcaudals in length, and their distal ends have a smooth apical disk. The sulcus spermaticus divides about the middle of the shaft. The entire structure is spinose, with the spine length decreasing gradually from the base to the apex. A basal naked pocket is present.

The dorsum is usually some shade of green, grayish to olive green, with some indication of a brown or reddish brown mid-dorsal stripe. Other dark lines may be present laterally; some indication of dark flecks may occur over the body. In life, the venter is yellowish orange. For more details of color, see Dixon (1985).

Distribution.—This species apparently is restricted to the tablelands of southeastern Brazil (Fig. 4). For specimens examined, see Dixon (1985).

Liophis atriventer Dixon and Thomas

Liophis atriventer Dixon and Thomas, 1985. Holotype—MZUSP 5066. Type-locality—Boraceia (Estacão Biologica), São Paulo, Brazil.

Description.—the following description is based on three specimens. Maximum total length of male 505 mm in snout–vent length). Tail/total length ratios vary from 0.195 to 0.214 ($\bar{x}$ = 0.203). Dorsal scales are in 19-19-17 rows, smooth, without apical scale pits. The reduction to 17 rows occurs between ventrals 73 and 79 ($\bar{x}$ = 76.7). The anal plate is divided. The number of ventrals varies from 141 to 148 ($\bar{x}$ = 144.0). Number of subcaudals from 49 to 56 ($\bar{x}$ = 52.5); the number of maxillary teeth from 23 to 24 ($\bar{x}$ = 23.2). Head scales are as follows: supralabials 8-8 (3), supralabials entering orbit 4+5 (3), infralabials 10-10 (3), preoculars 1-1 (3), postoculars 2-2 (3), temporals 1+2 (3).

The hemipenis of the only known male is short, 5.5 subcaudals long (in situ), and bilobed for the distal half. The sulcus spermaticus divides about one third of the distance from the base. The distal end of the lobes contain smooth apical disks. Five large spines are present along the outer surface of each lobe, near its base, while the inner surface of the lobe is bare. In addition to the larger spines, many smaller ones are scattered over the shaft.

In preservative, the dorsum is uniform olive brown. The throat and first seven ventrals are grayish white, and the remainder become progressively darker until the posterior two-thirds of the venter is black. The subcaudals are grayish with occasional dark smudges.

Distribution.—This taxon is known only from the type locality (Fig. 4). See Dixon and Thomas (1985) for specimens examined.

Key to the "Green" Liophis *of South America*

1. Scale rows 19-19-15 or 19-19-17 2
   Scale rows 17-17-17 or 17-17-15 .... *jaegeri*
2. Scale rows 19-19-15 3
   Scale rows 19-19-17 4
3. Ventrals 133–172, one scale pit .... *typhlus*
   Ventrals 187–199, no scale pit .... *guentheri*
4. Ventrals 141–159, maxillary teeth 23–26 5
   Ventrals 169–202, maxillary teeth 17–24 .... *viridis*
5. Subcaudals 62–82, belly yellowish orange .... *maryellenae*
   Subcaudals 49–56, belly black .... *atriventer*

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