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A Redescription of, and Geographic Variation in, *Liophis miliaris* Linné, the Common Water Snake of Southeastern South America

By Carl Gans[1]

INTRODUCTION

In the tenth edition of the "Systema Naturae" (1758), Linné, citing a previous description in the "Mus. Ad. Fr." (Linné, 1754, p. 27), named *Coluber miliaris* and listed the source as "In Indiis." Andersson (1899, p. 13) later found the holotype and assigned it definitely to the species listed by Boulenger (1894, p. 168) as *Rhadinea merremii* (Wied), 1821, so that recent authors (Müller, 1927; Amaral, 1936; for example) cite the species as *Liophis miliaris* (Linné). Boulenger (1894) also cited a (possibly distinct) southern form as *Rhadinea fusca* (Cope, 1885), a name apparently preoccupied by the var. *semiaureus* Cope, 1862. Amaral (1936) referred to a southern race as *L. miliaris semiaureus*, but many museums have specimens under all four of these names. Additional names remain in the synonymy of this polytypic species (see below).

The literature is restricted largely to comments on individual specimens in reports and check lists and to miscellaneous notes on morphology or behavior. There are neither statements regarding the range and possible geographic variation nor adequate synonymies. It thus seems useful to

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present a summary of the characteristics and variation of this species and to re-analyze the synonymies based on these data.

A six-month stay in Brazil during the tenure of a John Simon Guggenheim Memorial Fellowship allowed me to examine (and borrow portions of) the extensive series in several south Brazilian collections, and I have since sampled several other collections. In contrast I have made only a cursory survey of the literature and do not attempt complete coverage or correct assignment of the many trip and collection reports. I have also resisted the temptation to correlate the pattern observed with supposed physiographic, ecological, or climatic features.

I have given some thought to a problem masked by the treatment of this form as a single species. The southern populations, described here as most distinct, may represent a separate species, with intermediate samples drawn from populations either allopatric but replacing, or narrowly sympatric. The available evidence does not confirm this, for reasons detailed below under the heading Summary of Geographic Variation. Discussion there implies only convenience; the decision obviously anteceded the treatment of the sample as a single species.

Material

At one time or another, I have had the opportunity of examining specimens from the following institutions, some of which are cited here (and identified by the abbreviations given). I am grateful to the several curators for many courtesies.

A.M.N.H., the American Museum of Natural History, New York; Mr. C. M. Bogert and Dr. R. G. Zweifel

A.N.S.P., Academy of Natural Sciences of Philadelphia; Dr. James E. Boehlke

B.M., British Museum (Natural History), London, England; Miss A. G. C. Grandison and Miss J. A. Cochrane

C.M., Carnegie Museum, Pittsburgh, Pennsylvania; Mr. N. D. Richmond

C.N.H.M., Chicago Natural History Museum, Chicago, Illinois; Mr. H. Marx and Dr. R. F. Inger

D.Z., Departamento de Zoologia, Secretaria de Agricultura, São Paulo, São Paulo, Brazil (formerly Museo Paulista); Mr. Werner C. A. Bokermann and Dr. P. E. Vanzolini

H.M., Zoologisches Museum, Hamburg, Germany; Dr. W. Ladiges

I.B., Instituto Butantan, São Paulo, São Paulo, Brazil; Drs. H. E. Belluomini and A. R. Hoge

I.M.Z.U.T., Istituto e Museo di Zoologia della Universitá di Torino, Italy; Drs. L. Pardi and L. Rossi

K.M., Universitetets Zoologiske Museum, Copenhagen, Denmark; Dr. F. W. Braestrup

L.C., A. Lutz collection, Rio de Janeiro, Brazil; Dr. B. Lutz

M.A.C.N., Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires, Argentina; Drs. J. Cranwell and J. M. Gallardo
M.C.Z., Museum of Comparative Zoölogy at Harvard College, Cambridge, Massachusetts; Mr. A. Loveridge and Dr. E. E. Williams
M.H.N.P., Muséum National d'Histoire Naturelle, Paris, France; Dr. J. Guibé
M.N., Museo Nacional, Rio de Janeiro, Guanabara, Brazil; Mr. A. L. de Carvalho
M.S.N.G., Museo Civico di Storia Naturale, Genoa, Italy; Dr. L. Capocaccia
N.H.M.B., Naturhistorisches Museum, Bern, Switzerland; Dr. Hannes Sagesser
N.R., Naturhistoriska Riksmuseum, Stockholm, Sweden; Dr. Ulf Bergström
S.M.F., Senckenbergische Naturforschende Gesellschaft, Frankfurt-am-Main, Germany; Dr. K. Klemmer
S.M.N.S., Staatliches Museum für Naturkunde, Stuttgart, Germany; Dr. H. Wermuth
U.M.M.Z., University of Michigan Museum of Zoology, Ann Arbor, Michigan; Mr. T. M. Uzzell, Drs. N. E. Hartweg and C. E. Walker
U.S.N.M., United States National Museum, Smithsonian Institution, Washington, D. C.; Dr. Doris M. Cochran
Z.S.M., Zoologische Sammlung des Bayerischen Staates, Munich, Germany; Dr. W. Hellmich

Acknowledgments

This project was started while I was working at the Departamento de Zoologia of the Secretaria da Agricultura, São Paulo, Brazil, and at the facilities of the Instituto Butantan of the same city. It is a pleasure to acknowledge the advice and generous assistance of Dr. Paulo E. Vanzolini, my host, and of Dr. Alphonse R. Hoge. Without their help and the extensive loan of much valuable material, this project could never have been completed. Beyond this I owe my thanks for courtesies to other staff members of their respective institutions.

The many curators who lent material and furnished information are listed above. Mr. Thales de Lema put me into his debt by the gift of a small collection of this species, later deposited in the Carnegie Museum. Dr. Ulf Bergström was kind enough to send me the photographs of the Linnéan type reproduced at the end of this paper.

I am particularly grateful to Miss Charlyn Rhodes for the care and effort she put into various aspects of the project, and to Dra. M. A. V. d'Andretta for her gift of two drawings of injected hemipenes prepared by Francisco Carolhino. Miss Carol Heubusch and Mr. Edward Rutecki checked some of the counts of specimens, and my wife helped with the numerical analysis of data.

This represents the third and final project initiated during the tenure of a John Simon Guggenheim Memorial Fellowship, and I am again happy to express my gratitude to Messrs. Henry A. Moe and James F.

Mathias. The study was finished with the assistance of funds from National Science Foundation Grant NSF G-21819; the publication of the material in table 1 was paid for from these funds.

CHARACTERS

The following items were checked and tabulated for all specimens: sex, length (in terms of caudals) of hemipenis or postcloacal scent gland, number of ventrals, number of caudals, division or non-division of anal, number of dorsals at midbody and point, or points, where reduction to a lower number of dorsal scales takes place, snout-vent plus tail length, and number, or numbers, of supralabials, infralabials, preoculars, postoculars, pretemporals, and posttemporals. The color pattern was recorded separately and at a later time, starting with series from single localities, to permit partitioning of ontogenetic and geographic variation. The examination of hemipenes and skulls was restricted to a few specimens from each geographical grouping delimited by other means.

A number of characters proved to be uniform throughout the series and were used only in defining the species. The methods of determining and recording the others are as follows:

SEX: This was determined by a longitudinal incision of the postcloacal region. The presence of hemipenes or their characteristic muscle sheath or of enlarged postcloacal scent glands was considered diagnostic for a male or female, respectively.

VENTRAL COUNT: This was made from the first scute wider than long, up to but not including the anal.

CAUDAL COUNT: A terminal spine at least one and one-half times as long as the last pair of caudal segments was construed as evidence that the tail tip had not been broken and healed. In its absence the count was followed by a question mark (?). Counts were of pairs of segments, from the pair immediately anterior to the spine, up to the last precloacal pair. Odd half scales were not counted.

POINT OF SCALE-ROW REDUCTION: All specimens of this group had 17 rows of dorsal scales from the postoral region to slightly caudad of the midbody point. Here the number of rows diminished from 17 to 15, continued to the vicinity of the cloaca.[1] Reduction in the number of rows occurred by fusion of the third and fourth rows, by loss of the third, or by loss of the fourth row, counting from the ventral on each side. The

[1] One specimen (A.N.S.P. No. 11038), examined during the terminal phase of the study, showed supplementary reduction to 14 and 13 rows. Reductions of this sort, certainly uncommon, may have been missed on a few others.

position of the last scale in the row that dropped out (or fused), referred parallel and not diagonally to the corresponding ventral scute (fig. 1), is recorded as the point of scale-row reduction. The left and right counts are separated by a slant sign (/) or written as an equation. If, as is common in certain populations (see Geographic Variation), the third or

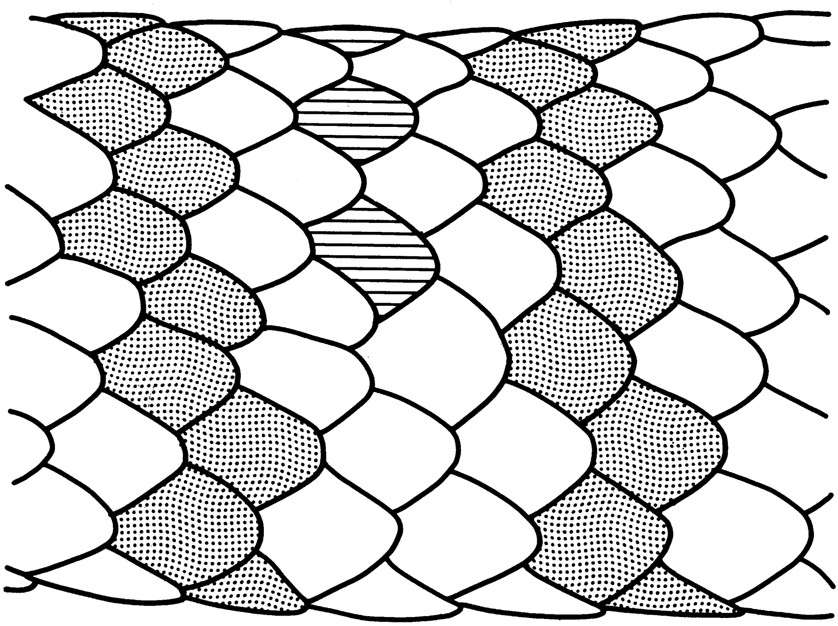

FIG. 1. *Liophis miliaris.* Diagrammatic lateral view, showing shape and reduction of dorsal scales at ventral 100, fusion of the third and fourth rows, and the manner in which this is related to the ventrals and dorsals. Note that the reduction of dorsal rows is achieved by the intercalation of one additional scale (shown striped) in every second row dorsal to the drop-out point. The number of scales along the middorsal line is then greater than the number of ventrals.

fourth row drops out and returns repeatedly, such change is indicated by a series of numbers separated and identified (except for the first) by plus (+) and minus (−) signs. Thus 97+102−104 means that a row drops out after the ninety-seventh, comes back in after the 102d, and finally disappears after the 104th scale.

SNOUT–VENT PLUS TAIL LENGTH: This is measured from the tip of the snout to the posterior edge of the precloacal shield and from this line to the tip of the tail. The two figures are separated by a plus (+) sign.

Possibly or definitely broken tails are indicated by a question mark after the latter figure.

Color Pattern: Here were tabulated such items as extent of ventral blackening, speckling of the ground color, degree of black margining of scales, nature of juvenile color pattern, and rate of ontogenetic pattern change, the last of which could be approximated only for the few samples of some size.

NOTES ON THE LOCALITIES

The analysis of geographical variation of Brazilian animals poses certain characteristic problems, the most important being the endless duplication of geographic names. While the terminology has now been standardized, and duplication is no longer permitted within a given state, the risk of confusion exists for older specimens with labels that record only a site and not the state.

A second source of confusion involves material accumulated in the Instituto Butantan or traded from there. While some of these specimens were obtained by Institute expeditions, or from other museums, the bulk of the collection was sent in by farmers, teachers, and regional officials in exchange for antiserum. Specimens that arrive in this manner are customarily entered in the catalogue as originating from the railway station from which the (free) transport was arranged, and to which the antiserum is to be sent. The errors inherent in such a system may account for some of the geographical peculiarities.

Localities were first checked against the Guia Levi or Brazilian railway guide, and located on its maps. When these proved insufficient, I checked the "Index to Map of Hispanic America" 1:1,000,000, the maps of the Brazilian yellow fever survey, and various similar aids. I made no particular attempt to complete the pattern by citing records from the literature, as the assignment of such records is likely to confuse the situation further.

LIOPHIS MILIARIS (LINNÉ)

Definition: This is a medium-sized snake with a bluntly rounded head of colubrid or natricine aspect, the nostril perforated between two nasals; two internasals are in broad middorsal contact, followed by a pair of prefrontals, by the relatively small azygous frontal which lies between two large supraoculars, and by the large paired parietals. Laterally a single loreal is followed by an elongate first temporal; this in turn, by two second temporals. There are eight supralabials, of which the fourth and fifth touch the eye, and 11 infralabials. The anteriormost pair of infralabials is in contact behind the symphyseal, and the second through fifth pairs touch the two pairs of elongate chin shields. The eye is large and the pupil elliptical.

The ventrals vary in number between 137 to 188, and there are 17 rows of dorsal scales, reduced to 15 rows near the beginning of the posterior third of the trunk by fusion of the third and fourth rows (counting dorsad from the ventral scutes) on each side. The dorsal scales are smooth, posteriorly rounded, subequal, and symmetrical. They lack apical pits. The precloacal plate is double, and there are between 43 and 69 pairs of subcaudal scales. The tail terminates in a spine. Sexual dimorphism is externally recognizable only in the number of scale rows that enter the cloaca, this being greater in females in which the tail narrows more sharply.

Adult specimens are colored various shades of olive-green to yellowish green dorsally, and a bright saffron yellow (fading to white in preservatives) ventrally. The dorsal color extends onto the lateral edges of the ventrals and onto the supralabials. The latter may be slightly lightened, but the lighter color is never sharply set off, but grades gradually.

The posterior edges of the scales and the scale roots tend to be blackened, the edging varying from a faint indication to a heavy border that fuses with the root markings, leaving each scale with a complete black border around a central light-colored dot. The density of black coloration varies considerably on both the dorsal and ventral surfaces. Some populations also have a light midventral stripe (produced by interruptions of the suture pigmentation), while others show a series of broadly crescent-shaped pigmented sutures, with dots or speckles of black caudal to these.

The juveniles have distinct color patterns, which involve a light nuchal collar and variable arrangements of saddles and cross bars. The juvenile patterns may be retained to a varying extent by adults from different populations (see Geographic Variation). The ontogenetic change of pattern occurs by a concentration of pigment along the scale and scute edges. The pattern that occasionally remains in adults tends to be expressed by a regional variation (increase or reduction) of the width of the black edge markings.

The hemipenes (figs. 2, 3) are bilobed, spinose, and disked (Dowling and Savage, 1960). There are rows of enlarged hooks across their surface, but basal hooks are lacking. *In situ*, the attachment of the retractor muscle to the penial head lies opposite the eleventh to fifteenth caudal, counted

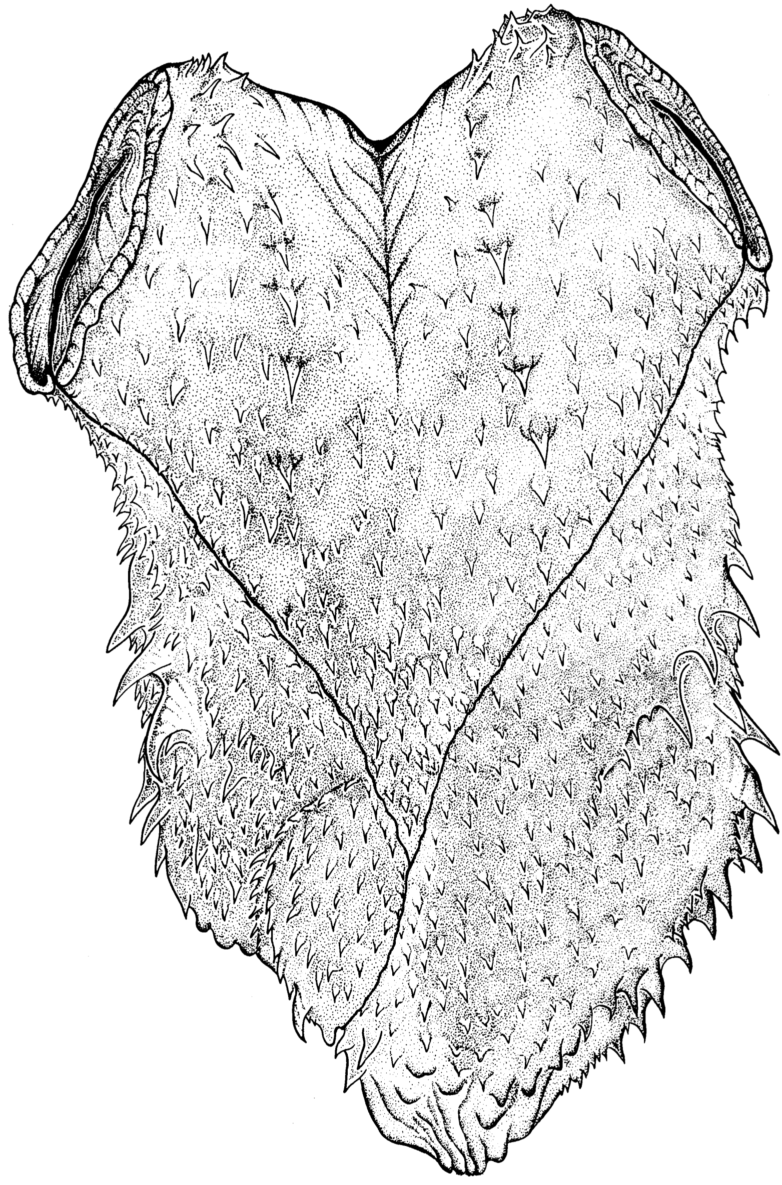

FIG. 2. *Liophis miliaris*. Posterior (?) view of the injected right hemipenis of I.B. No. 14549. Drawn by Dra. M. A. V. d'Andretta.

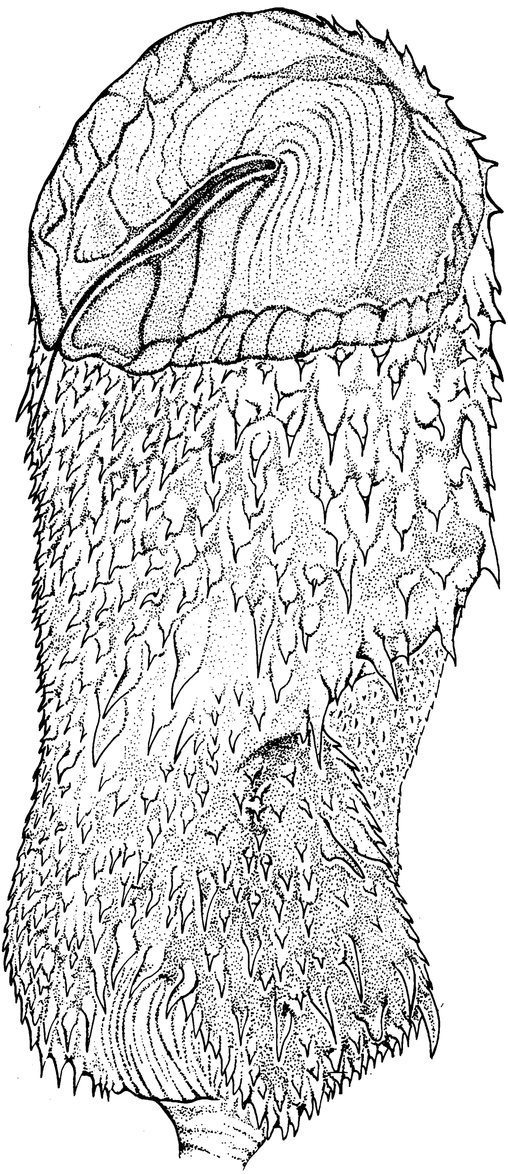

FIG. 3. *Liophis miliaris*. Lateral (?) view of the injected right hemipenis of I.B. No. 14549. Drawn by Dra. M. A. V. d'Andretta.

from the cloaca. The tip of the prominent female scent gland reaches a point opposite the fourth caudal.

The skull is shown in figure 4. The samples exhibit little geographic variation in skull proportions or tooth number. The maxillae bear 15 to 19 subequal teeth, separated from a pair of enlarged posterior teeth by a diastema no wider than the socket length of a single anterior tooth. All specimens counted are asymmetric in the number of small teeth.

The labial and other cephalic glands have been described by Niemann (1892, p. 270).

HABITS: Miscellaneous comments in the literature and reports of collectors indicate that this is a species of marshy regions and the edges of ponds and rivers. Superficially its distribution would bear out this fact. The species is supposed to feed on frogs (probably *Leptodactylus* sp.). It is oviparous.

GEOGRAPHIC VARIATION

General Considerations of Range

While the over-all sample of this species is sufficient for review, extensive gaps remain in the range. Much of the available material is from the vicinity of Rio de Janeiro and coastal São Paulo (compare figs. 5–7).

There is little material from the north, with only five definite records from Bahia, while a series of five specimens in the Museum of Comparative Zoölogy are said to come from "Goyaz." These and a single specimen with the locality of Obydos on the Amazon were obtained from the Thayer expedition (Agassiz and Agassiz, 1868). It is known that the localities of some of the herpetological materials from this expedition may well have been confused. The Goyaz specimens agree with the Bahia and Espirito Santo records in most details (and presumably are from the general area), but the Obydos specimen is most similar to specimens from central São Paulo. The dubious nature of the data and the enormous extension of range the Obydos specimen represents lead me to set the record aside. The "Goyaz" specimens I cite.

A limited number of specimens and localities is available from Espirito Santo and northern Rio de Janeiro. The records for south-central Minas Gerais are scattered. It is not clear whether the few inland records (figs. 5 and 6) represent lack of collectors or fewer sites that are suitable for the species.

South of São Paulo there is a good representation from eastern Paraná and northern Santa Catarina. A scattering of records extends through central Rio Grande do Sul, and Uruguay south of a considerable hiatus,

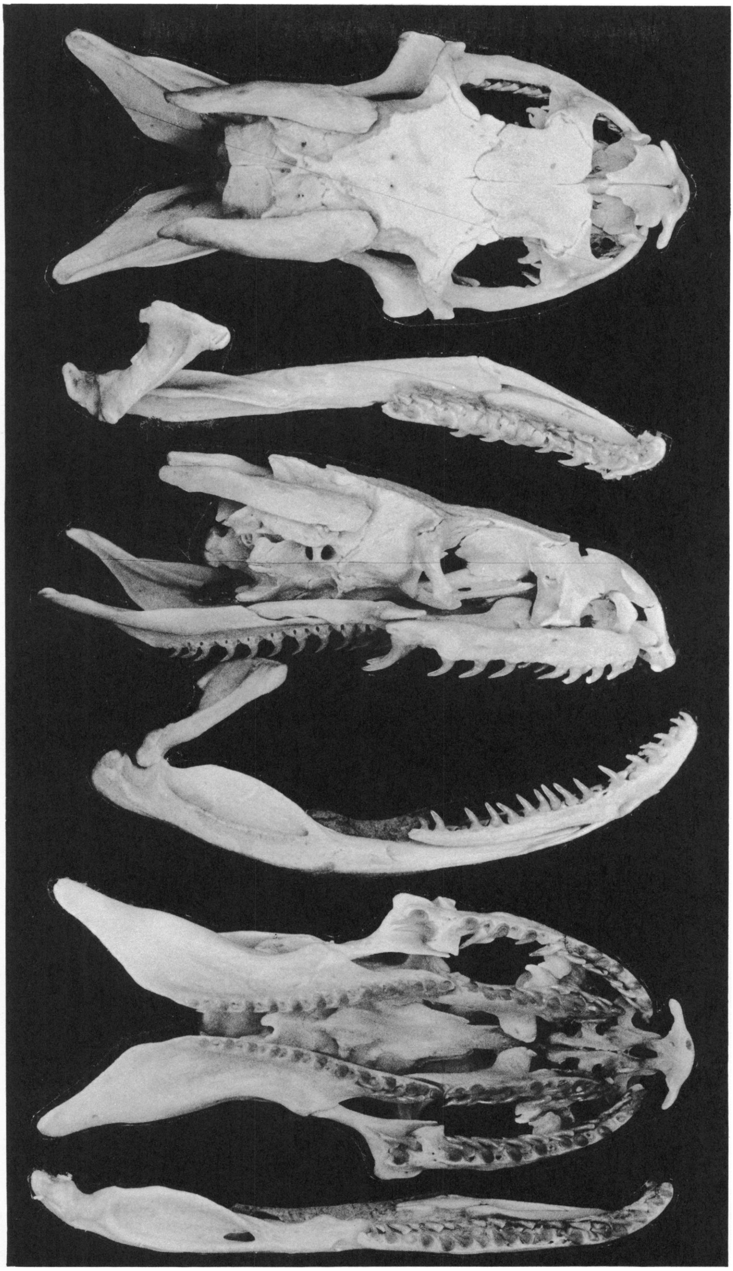

FIG. 4. *Liophis miliaris*. *Top to bottom:* Dorsal, lateral, and ventral views of skull of A.N.S.P. No. 11031, showing arrangement and general proportion of elements.

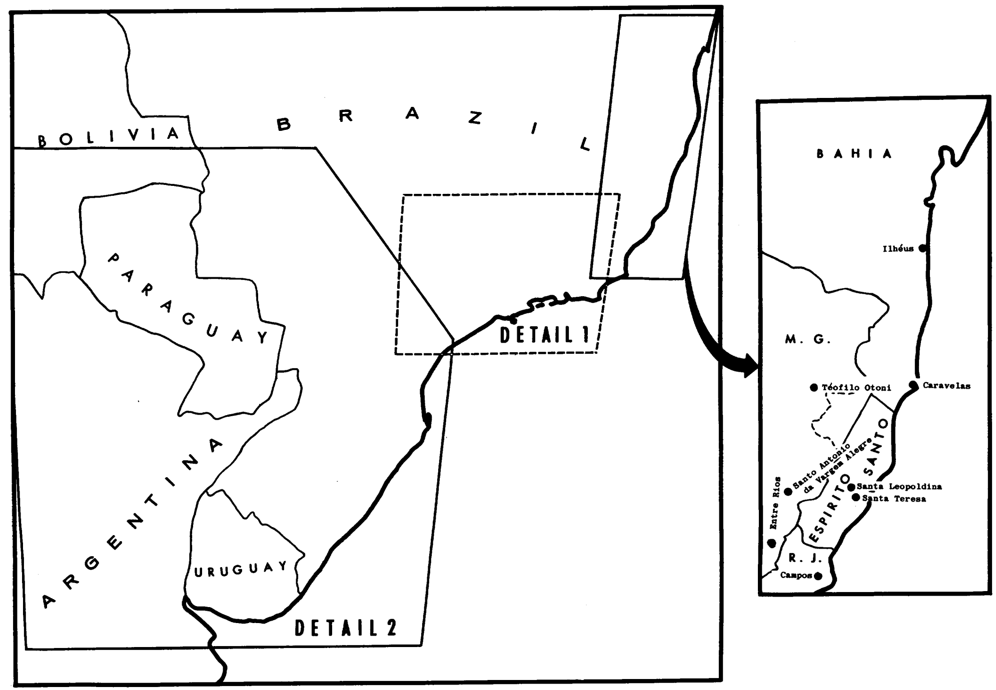

FIG. 5. *Liophis miliaris*. Sketch map of the approximate range of the species, with insert giving the actual localities for the northern portion from which specimens have been obtained, and outlines of the areas covered by figures 6 and 7.

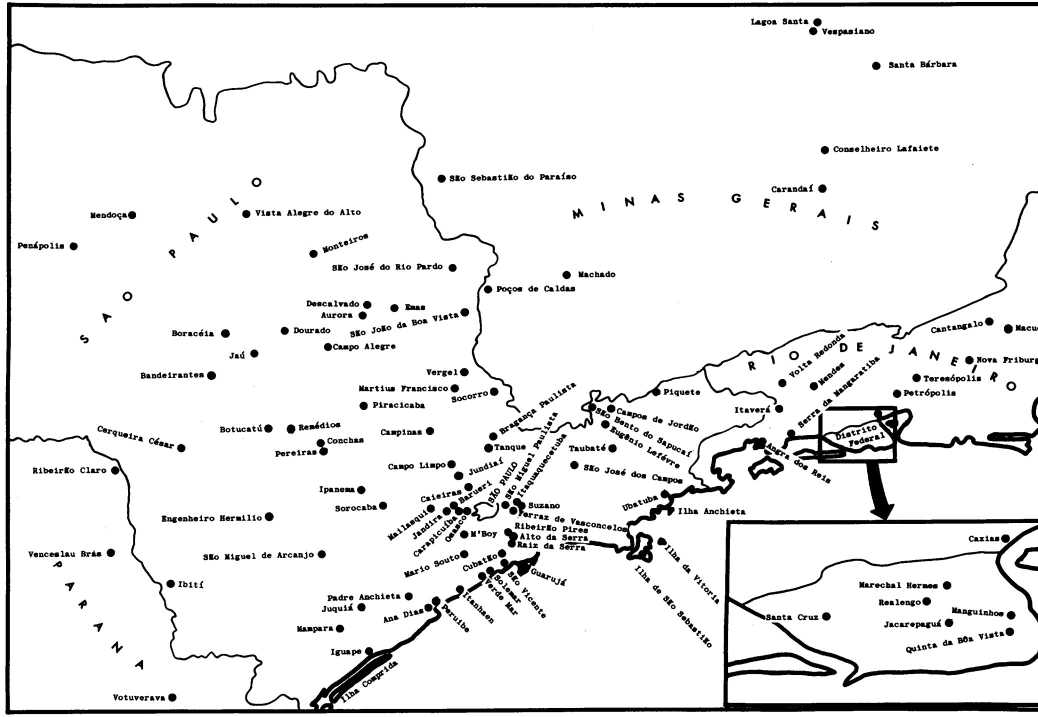

FIG. 6. *Liophis miliaris*. Sketch map of the central part of the range (detail 1 of fig. 5) and insert for the (former) Federal District region, showing the localities from which specimens have been obtained.

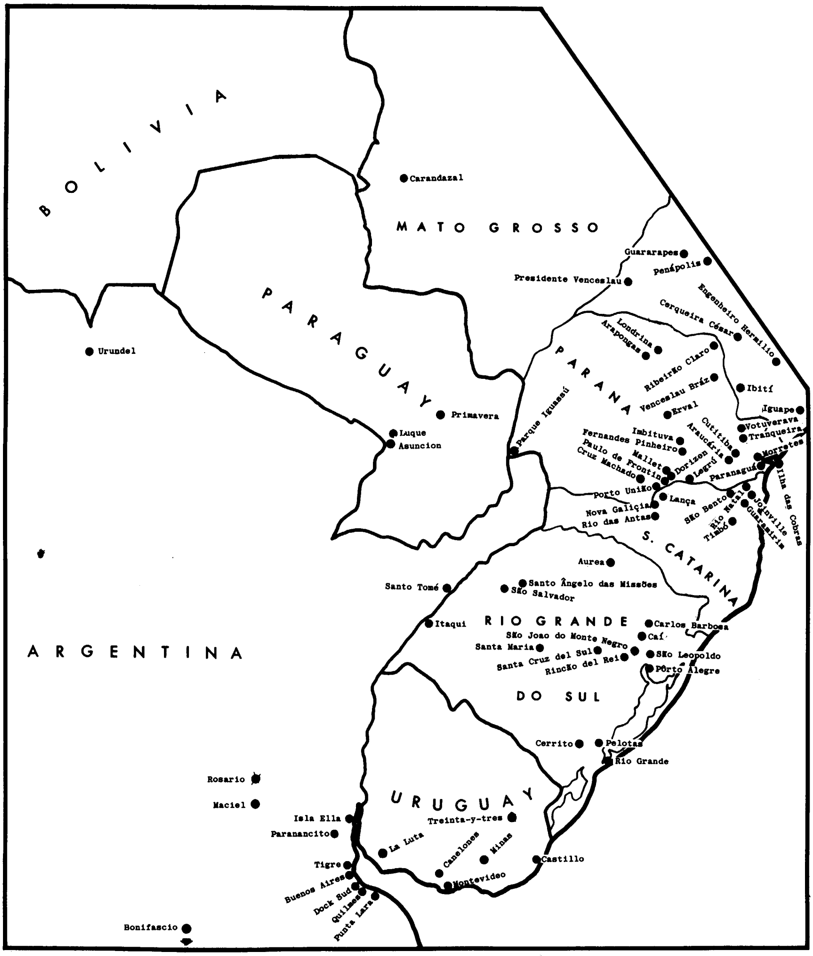

FIG. 7. *Liophis miliaris.* Sketch map of the southern part of the range (detail 2 of fig. 5), showing the localities from which specimens have been obtained. The arrow indicates that the Bonifascio record falls approximately 100 miles south of the dot shown.

and there is a good sample from a few coastal and some inland localities in Argentina. Specimens collected in Paraguay, as well as a few inland records, suggest that the species ascends the main courses and tributaries of the Paraná and Paraguay rivers. This may be the explanation for the records from Urundel, from Carandazal, and possibly for the Carnegie Museum specimens from the "Sierras of Bolivia" as well (though these last-named, being a type series, are discussed only in the section on the Attribution of Names).

The scattering of records serves more to emphasize the regions still to be collected than to provide a documentation of the periphery of the species range. Therefore, I append a table of raw data (table 1). This table lists only those meristic characters that show geographical variation and omits specimens with imprecise locality data. The discussion of geographic variation is then restricted to comments on trends and to illustrations of these, and the reader is referred to table 1 for more specific data on particular specimens.

Ventral Counts

This character not only shows decided geographic variation, but also presents the best example of external or step clines (fig. 8). It is thus possible to distinguish a northern, a central, and a southern population; the central population is less clearly differentiated into coastal and inland groupings.

With three exceptions, the localities from "Goyaz," Bahia, Espirito Santo, eastern Minas Gerais, and north and central Rio de Janeiro (through the [former] Federal District) form a plateau of low counts that range from 138 to 151, with sample means (of samples with $N>3$) ranging between 145 and 149. The exceptions are formed by the single (I.B.) specimen from Caravelas, Bahia, a juvenile (B.M.) specimen labeled "Bahia" only, and the (M.N.) records from "Ponta Grosso, Campos," Rio de Janeiro.[1]

The central population ranges from Rio de Janeiro to Rio Grande do Sul. Most of the counts from inland Minas Gerais, São Paulo, Paraná, and Santa Catarina fall between 150 and 160, with but a few values in the high 140's and low 160's. The sample means range between 155 and 159.

A coastal strip of lowland São Paulo localities, represented by excellent samples, has a high number of specimens with counts in the low and middle 160's. Most of the other specimens have ventral counts in the high 150's. Sample means range above 160. These means are higher by more than 5 than means of samples from adjacent inland localities beyond the coastal "serras," though the sample ranges overlap widely.

[1] Could these specimens have been collected at Ponta Grosso, Paraná? They are in better agreement with materials from the vicinity of the latter site, which is on most maps, while only Campos, but not Ponta Grosso, Rio de Janeiro, was located in those geographic aids available to me.

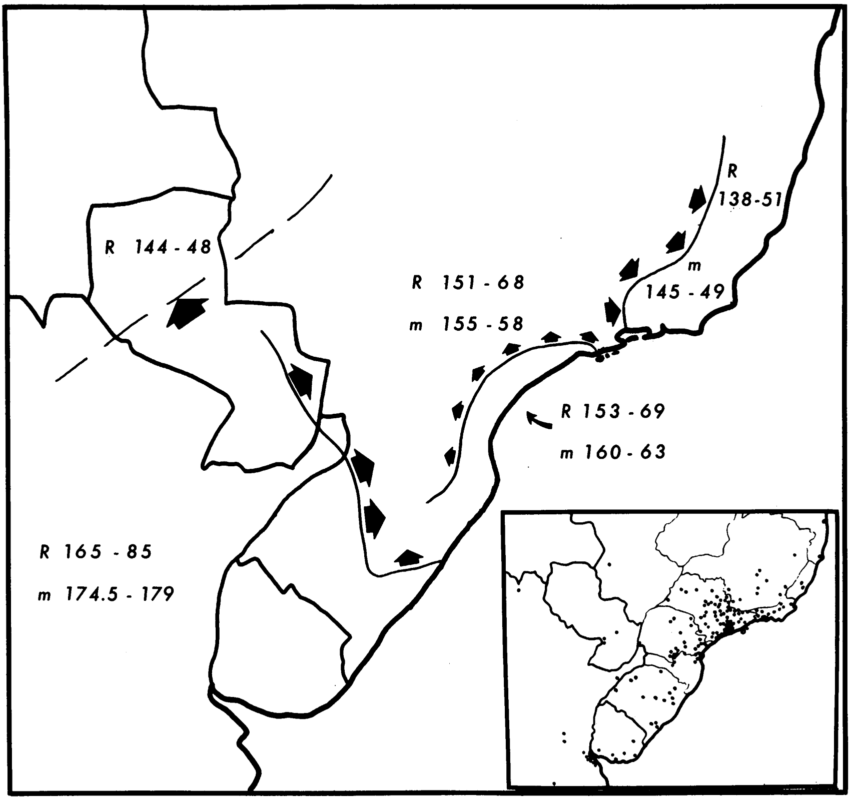

FIG. 8. *Liophis miliaris*. Sketch map of the range of the species, indicating the range of ventral counts and sample (N>3) means on the several character plateaus discussed in the text. The arrows point from high-count to low-count values, and their relative thickness correlates roughly with the steepness of the cline. The inset gives the actual collecting sites and with these a rough estimate of the degree of reliability of the values from different regions.

The coastal strip of high-count localities appears to spread inland toward the south, extends through Paraná, and Santa Catarina into the northern regions of Rio Grande do Sul.

The southern population extends from the middle of Rio Grande do Sul into Paraguay, Uruguay, and eastern Argentina. It is characterized by approximately 95 per cent of the specimens with counts above 170, by a specimen range of 165 to 185, and by having the range of sample means from 174.5 to 179. It is interesting to note that the low-count plateau seems to send a finger south into Rio Grande do Sul, as the single specimen from Cerrito shows a low count in contrast to the high count of

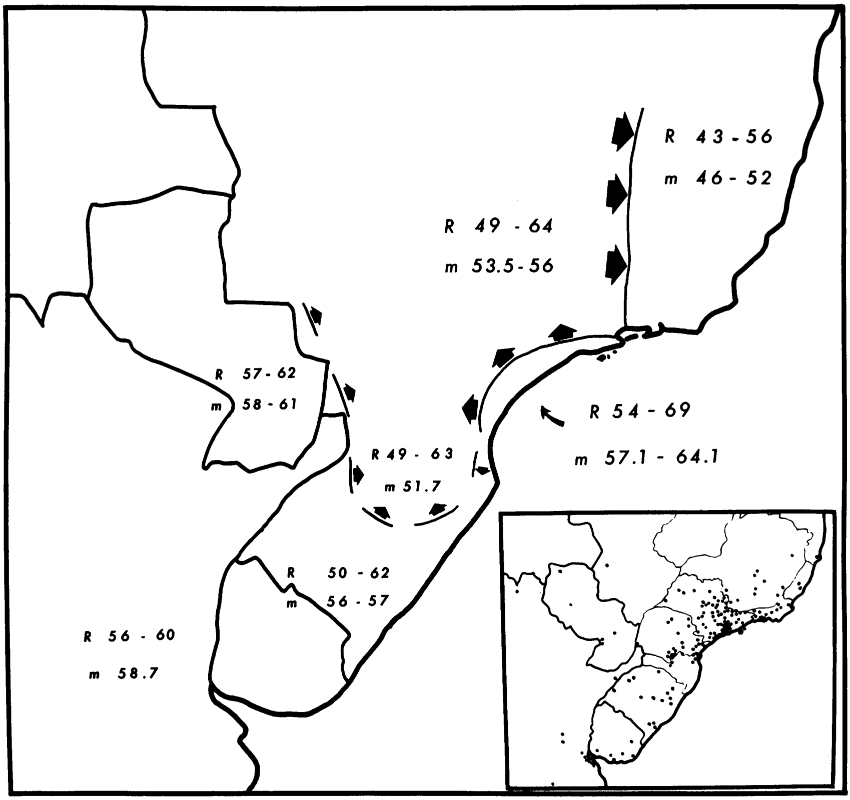

FIG. 9. *Liophis miliaris.* Sketch map of the range of the species, indicating the range of caudal counts and sample (N > 2) means of the several character plateaus discussed in the text. See caption of figure 8 for details.

specimens in the adjacent localities of Pelotes and Rio Grande.

The two specimens from Urundel and Carandazal in the extreme western part of the range have ventral counts of 144 and 148, respectively, but the five specimens from the "Sierras of Bolivia" fall into the range of inland São Paulo records.

It is interesting to note that the southern "character plateau" would gain in distinctness if samples from north-central Rio Grande do Sul were to be neglected. Specimens here are not intermediate, but the samples from these sites have an extremely wide variability, as if inland and southern populations were sampled simultaneously. The nature of the collections on which this study is based does not permit a decision as to whether the high-count and low-count specimens are allopatric.

Caudal Counts

This character shows a more diffuse pattern of plateaus than do the ventral counts. Geographic variation is indicated by the presence of an inland-central and a southern population, with the latter apparently extending north along the São Paulo coast.

The several populations are discernible mainly by the distribution of sample ($N>2$) means, as the individual values overlap widely. This makes the borderlines suspect, since most localities are represented by single specimens and are hence difficult to assign.

The general pattern shown on the map (fig. 9) is reminiscent of that for ventral counts (fig. 8), but there are several significant differences. The low-count northern population here extends inland to central Minas Gerais. The poorly defined southern population is intermediate between the high-value coastal and the slightly lower central São Paulo populations. The scattered samples from the southern region (Rio Grande do Sul, Uruguay, Paraguay, Argentina) show sufficient variation from one another to justify listing their values separately, even though the differences (between my samples) may not be statistically significant. The only line where the plateau margins for ventral and for caudal counts coincide lies between the coastal-central São Paulo plateaus. The samples from the coastal São Paulo islands agree with the high-count values of the more southern coastal localities, not with the inland São Paulo values as they do for ventral counts.

Ventrals Plus Caudals

Suggestions in the literature (Sewertzoff, 1931; Edgren, 1958) have pointed to the position of the cloaca as a shifting site along a more or less constant series of [somites or] segments. Since the number of segments in the series would appear to be quite close to the sum of ventrals plus caudals, it might be expected that the value for this parameter would exhibit reduced dispersion about the mean within a given sample. This was not the case. A plot of the summed values also gives a geographical pattern identical with that of the ventrals. It thus does not provide any additional information and is omitted.

Points of Scale-Row Reduction

The site of scale-row reduction is apt to be of limited utility in the separation of geographical varieties, because of two factors. These are

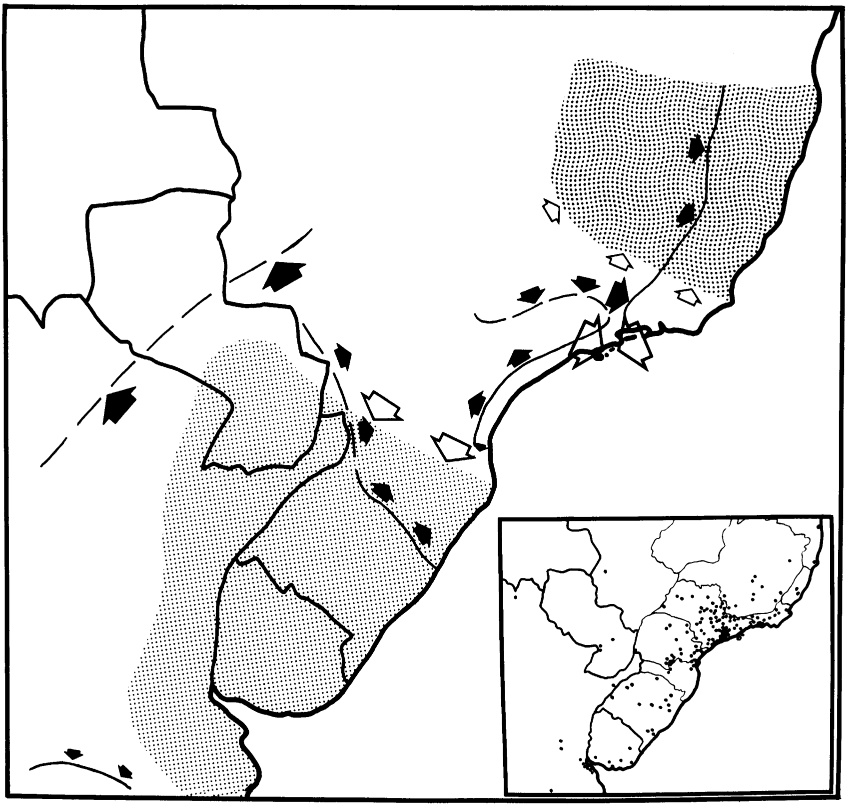

FIG. 10. *Liophis miliaris.* Sketch map of the range of the species, indicating frequency of recycling (shading and open arrows) and number of ventrals to the drop-out site (solid lines and solid arrows). The presentation is as explained in the caption of figure 8, except that the values have been omitted and given in the text only.

the remarkable range of variation within individual samples, individual specimens of which often exhibit drastic differences, and the partial correlation of the point of the scale-row reduction with the ventral count, which leads to the danger of overemphasizing what may well be a single genetic change. The detailed conclusions follow:

1. The site of reduction is asymmetrical in more than 70 per cent of the specimens. A check of the several large samples from single localities does not show any significant tendency toward particular kinds of asymmetry.

2. There is definite geographical variation (fig. 10, shading and open

arrows) in frequency of repeated (re-appearances and) drop-outs of the lateral row involved in scale-row reduction. The majority of samples from north of Paraná contain no specimens with multiple reductions. Where these do occur, the frequency is 0.2 or less. This frequency rises south of São Paulo, where it varies between 0.16 and 0.40. The north-south difference becomes even sharper, if the frequency of (repeated) drop-out cycles is substituted. Thus many of the southern specimens show more than a single recycling, or have recycling on both sides, while northern specimens characteristically have only a single asymmetrical repetition.

The most interesting situation occurs on the islands of Ilha Anchieta and Ilha da Vitoria (São Paulo). Each has a recycling frequency of 0.75, as three out of four specimens from each island show recycling of varying complexity.

The degree of asymmetry (summation of differences between lateral counts [irrespective of direction] per number of specimens) correlates positively with the recycling frequency. Both might represent responses to some genetic factor that loosens control of the reduction site.

3. The range of variation in the number of ventrals to the reduction site is almost always greater than that for the total number of ventrals.

This increased range often reflects the presence of a few specimens that differ strikingly from the population mean. This is also true for the number of ventrals from the reduction point to the cloaca, or the number of segments from the reduction point to the caudal tip (dorsals plus ventrals minus reduction number).

The geographical distribution of the sample means suggests a rather confused picture (fig. 10, solid lines and solid arrows) reminding one of the distribution of ventral counts. The means range from 85.8 to 92.0 in the Rio de Janeiro-Espirito Santo-eastern Minas Gerais region. The Goyaz specimens average 93.3. Coastal São Paulo ranges from 94.6 to 100.3, and this belt of high-count samples seems to extend north to Angra dos Reis in Rio de Janeiro. The zone immediately inland has lower sample means that range from 88.7 to 94.7, but more inland samples (and individual specimens) approach the higher values of the coastal region. The data here suggest a checkerboard rather than a series of clines.

Specimens from Paraná, Santa Catarina, and northern Rio Grande do Sul again follow the pattern of those of middle São Paulo, with means from 93.7 to 94.8. Those of southern Rio Grande do Sul again show a sharp break, with the intermediate specimens seemingly sampling two populations. Means of samples from Rio Grande do Sul and Uruguay range from 101.0 to 117.0. Records from Paraguay, Santa Fé, and Buenos Aires have means of 116.3, 110.8, and 109.7, respectively, while the southernmost Argentina specimens show a lower mean of 98.3. The inland specimens from Salta and Mato Grosso again show low values.

4. The geographical variation of the drop-out site reminds one of the pattern seen for ventral counts. Since such morphologic sites as the umbilical scar have in some species been shown to fall a standard number of units anterior to the cloacal slit, with the number essentially independent of geographic variation (Gans, 1959, p. 99), it seemed appropriate to check whether such might also be the case for the drop-out site.

These values (ventrals and drop-out) are not homogeneous across the range, but show geographic variation, slightly different from that of drop-out counts. There are low sample means (54.5–60.5) in Espirito Santo, eastern Minas Gerais, and coastal Rio de Janeiro, higher means (60.0–70.3) along the São Paulo coast, intermediate means (61.8–64.3) immediately inland, and a scattering of higher means (60.0–71.2) across inland São Paulo and Minas Gerais. The southern values (Paraná to Paraguay and Argentina) range from 60.8 to 71.1, without any trends or sudden changes.

Body Proportions

This topic includes a number of secondary subjects. The difficulties involved in their analysis have already been commented upon (Gans, 1959, p. 117), but some of the present samples are sufficient to permit conclusions regarding geographic variation.

Regression Lines: The geographical analysis of relative tail length was complicated by the slight spread of the data.

Several samples were plotted and regression lines were fitted to the data by eye. It was possible to do so and obtain a reasonable fit to a family of straight lines passing through the origin. The most divergent samples were those from southern Rio Grande do Sul ($y=0.208x$) and from a small group of localities from coastal São Paulo (Ilha Anchieta, Ilha da Vitoria, Ilha and Praia da Paranapuã, Guarujá, Solemar, and Verde Mar [$y=0.268x$]). Figure 11 gives an estimate of the goodness of fit, while the right side of figure 12 shows the geographic variation of the slope (m in $y=mx$). It is interesting that (1) the sharpest deviation from an otherwise gradually changing pattern occurs in a limited number of coastal to inland populations in São Paulo, and (2) the only other change of the slope occurs between Rio Grande do Sul and Uruguay, i.e., in a zone where no other character changes.

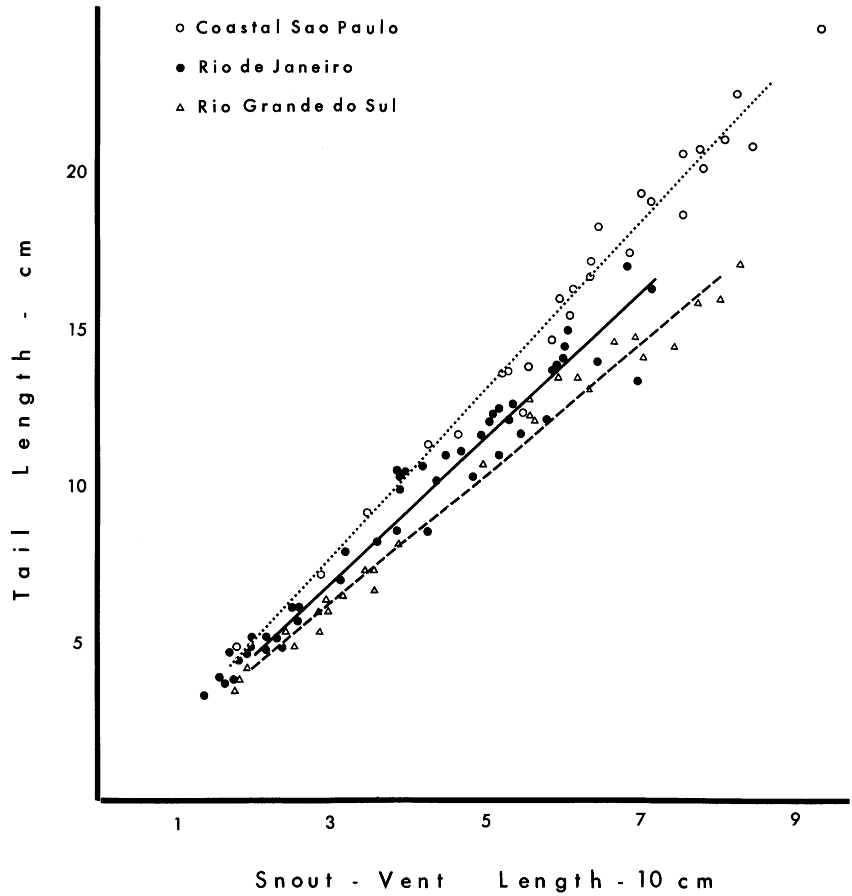

FIG. 11. *Liophis miliaris.* Scatter diagram of tail length versus snout–vent length, and regression lines fitted to these points by eye, for specimens from southern Rio Grande do Sul ($m=0.208$), Rio de Janeiro ($m=0.229$), and the coastal São Paulo localities of Ilha Anchieta, Ilha da Vitoria, Ilha and Praia da Paranapuã, Guarujá, Solemar, and Verde Mar ($m=0.264$) to show goodness of fit.

HATCHLING SIZE: Schneider (1949, p. 205) reported that a zoo specimen (identified by R. Mertens as *Liophis m. miliaris*) laid several clutches of eggs (even though only *Natrix natrix* were kept in the same cage). Three hatchlings from the only fertile brood were measured approximately one month after hatching and measured 23, 23.75, and 25 cm., respectively.

Figure 12 shows that wild hatchlings seem to be significantly smaller.

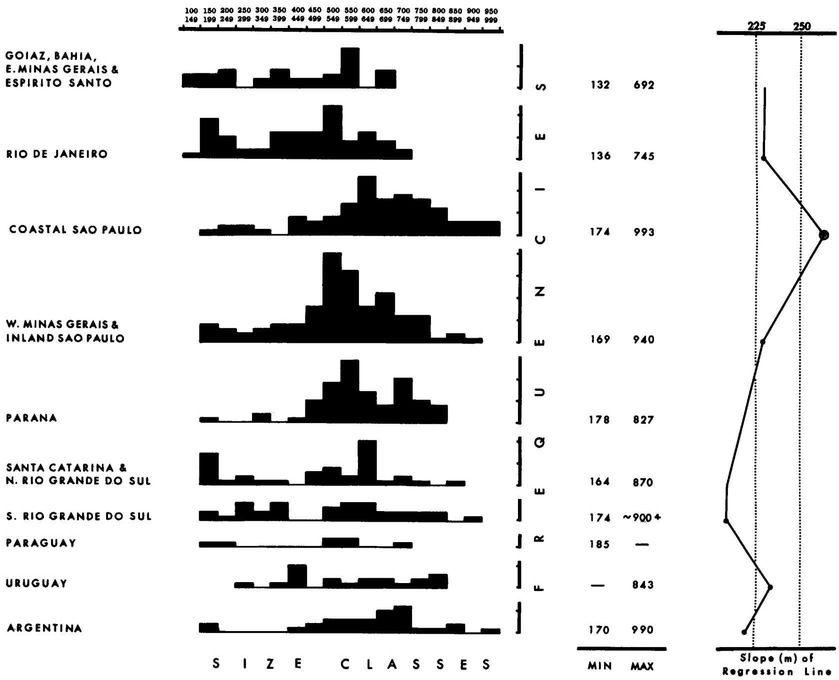

FIG. 12. *Liophis miliaris.* Combined diagram of several samples showing (left to right) histogram of snout–vent length, tabulation of snout–vent length values for smallest and largest specimens, and calculated values for the slope (m, from $y = mx$) of the regression lines. Units on the frequency scale for the histograms read in multiples of five specimens. Maximum and minimum values are recorded only when the pattern of the histogram suggests that it represents an approach to the population values. Calculated values for the slopes are shown by solid dots. The circled dot, for the coastal São Paulo sample, represents the regression line shown in figure 11 and specimens from only a limited sector of the coast. The remaining coastal specimens included in the histogram do not differ significantly from the inland records in this characteristic.

The records from São Paulo south indicate values in the range of 165 to 180 mm., while Rio de Janeiro and northern specimens may well have a size of less than 140 mm. at hatching.

SIZE OF ADULTS: Adult size may be expressed in at least three ways: size when attaining maturity, average size of reproducing adults, and maximum size attained by the species. The problems involved in determining or estimating these are exemplified in the several histograms in figure 12. Here the mode shifts from sample to sample, the frequency of juveniles differs drastically, and the maximum size of adults is a statistically unreliable datum, as a relatively small percentage of the population appears to reach a size some 100+ mm. larger than the rest. The illustration makes it clear that individual, seasonal, and ecological factors have combined to yield clearly non-random samples.

The data show a close approach to the size-distribution patterns reported by Klauber (1937, p. 20), and Fitch (1949, p. 520), in whose samples the post-juvenile group was found in clearly fewer numbers than either juveniles or matures. They differ from the more or less even pattern shown by Peters (1956, p. 33).

The data permit the following conclusions regarding geographical variation:

1. The histograms do not furnish ground for predicting differences in average adult size or in maximum size between the population ranging south from western Minas Gerais and that in inland São Paulo.

2. The population from the coast of São Paulo contains the largest specimens both in average adult size and in maximum size. The increase appears to be in excess of 10 cm.

3. The samples from Rio de Janeiro and northward clearly have the lowest maximum body size and possibly a lowest average size as well. [This holds true even if the 760+154 mm. measurements of S.M.N.S. No. 5011-A, marked only "Rio de Janeiro," are included.]

The Color Pattern in Hatchlings

The color pattern of the hatchling differs from that of most adults. Most noticeable is a light band across the neck, generally forming a light, nuchal V crossing the dorsal midline some segments behind the large parietals. The V is ordinarily set off by a parallel and wider anterior V, the forward edge of which just touches the frontal or may be interrupted along the dorsal midline. Caudad the light nuchal V is followed by a varied arrangement of dark blotches that becomes more confused and smaller along the posterior half of the body. The last of the juvenile characteristics is a lightened lateral band occupying the fourth and fifth, or fourth through sixth, scales on each side and continuing past the cloaca onto the side of the tail.

The dorsal pattern may well be explained on the basis of von Harnack's *Längsfleckensysteme* (1953). Six longitudinal rows are formed of more or less rectangular dots, saddles, or dark blotches. The dark blotches are sharpest on the anterior portion of the body where they may also align and fuse into bars that cross the dorsals from one edge of the ventrals to the other (figs. 13 and 14).

FIG. 13. *Liophis miliaris.* Dorsal view of hatchling to show general pattern; D.Z. No. 1090 from Sorocaba, São Paulo, Brazil.

The most common variations are: non-alignment of the middorsal pair of rows, giving a zigzag pattern, non-alignment of the lateral rows on each side, providing notable confusion, and alignment of the two lateral rows, giving the impression of a single row of lateral bars on each side. A few specimens have the center of each lateral dot lightened (row 2 from each side). While these dot centers are only lightened to the lateral ground color of the specimen, they are emphasized by the dark border and stand out sharply. This condition is particularly noticeable in specimens from Rio de Janeiro (fig. 14).

The lateralmost longitudinal band of blotches is extinguished at the level of the cloaca, where the second band sweeps ventrad to take up a position adjacent to the caudals. The middorsal pair also fuses at the cloacal level. The aforementioned posterior light lateral band is formed between, and due to the shrinking of, the middorsal and adjacent lateral rows.

The ventral coloration of hatchlings shows an astonishing divergence; it is less regular than that of adults. Only the anterior (fixed) edge of each ventral scute is ordinarily pigmented. A dark line may cross this edge from side to side, or the line may be broken in the center (usual

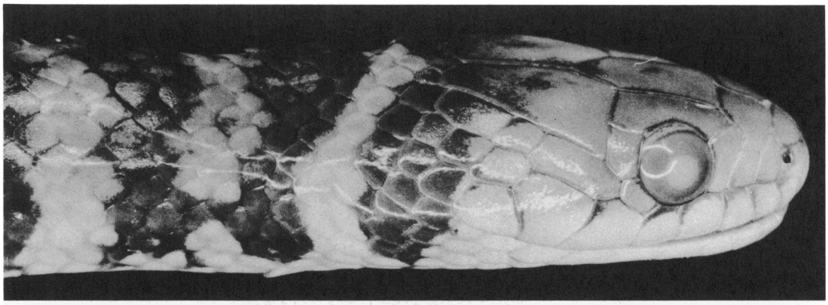

FIG. 14. *Liophis miliaris.* Lateral view of head and neck of juvenile to show fusion of the *Längsflecken* into cross bands; D.Z. No. 1034 from "Rio Grande do Sul," Brazil.

condition), leaving a light-colored midventral stripe. The pigmented area may be widened laterally to provide two halfmoon-shaped extensions onto each scute, and there may even be an irregular wedge-shaped widening of the pigmented region on the lateral edge of each second, third, or fourth scute. Such widening may correspond to the position of the extreme lateral blotches. The color invasion is quite irregular and often asymmetrical. The extent to which the ventral color stands out is strongly affected by the preservation of the scute edges. In soft, poorly preserved specimens these bend up, yielding a noticeably darker pattern.

Much of the dorsal color pattern is produced by the more or less dense pigmentation of the scale margins. Even some very small specimens may show sufficient marginal pigmentation on the posterior two-thirds of the body to obscure most of the blotching.

The extreme variability of individuals, the rapid change of pattern during the earliest growth stages, and the relatively few specimens avail-

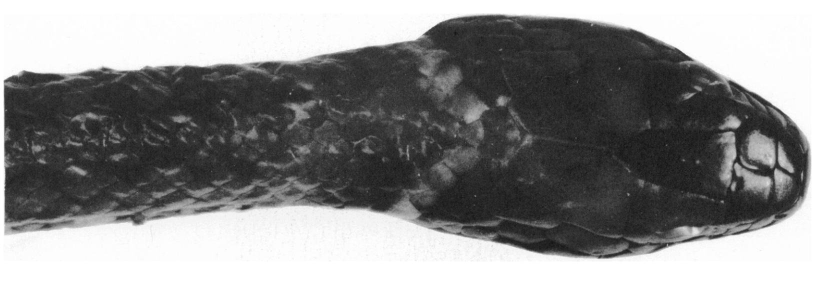

FIG. 15. *Liophis miliaris.* Dorsal view of head and neck of juvenile to show double row of light spots in dorsal pattern; M.N. No. 858 from Caxias, Rio de Janeiro, Brazil.

able make it very difficult to recognize geographic variation in the juvenile color pattern.

Juveniles from localities in Rio Grande do Sul of high ventral count differ in three ways. Their over-all coloration in preservatives appears more subdued, and generally olive brown, rather than showing the alternation of dark blackish brown and light zones found in more northern specimens. The dorsal midbody region also shows a reduction of the dark markings which are smaller and more subdued. The posterior lateral stripes of body and tail are relatively wider. Finally, these southern specimens show a very noticeable widening and diffusion of the black pigmentation, which may cover almost half of each ventral. A single specimen from Paraguay shows a similar subduing of the general pattern, coupled with an over-all darkening of all dorsal surfaces.

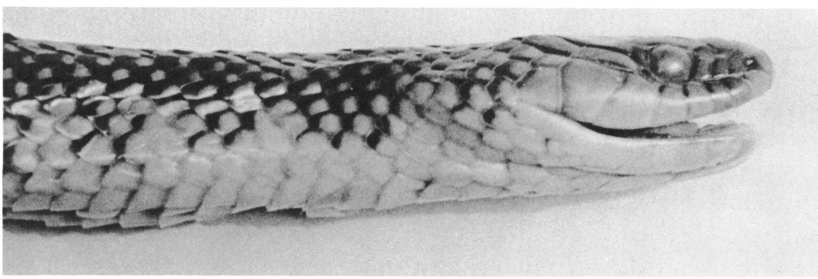

FIG. 16. *Liophis miliaris.* Lateral view of head and neck of young adult to show remnants of the nuchal collar, and scalloping of the ventral edge of the heavily pigmented area; M.N. No. 1902 from Caxias, Rio de Janeiro, Brazil.

ONTOGENETIC VARIATION OF THE COLOR PATTERN

The ontogenetic change consists of a breakup of the irregular dorsal patches of pigmentation and a shift of this pigment to the edges of the several scales. From a pattern essentially independent of the scale arrangement there occurs a shift to a pigment distribution governed by scale geometry. The process is essentially complete at a snout–vent length between 250 and 400 mm.

Several aspects of the juvenile color pattern may remain as part of the dorsal coloration of adults: 1. The light nuchal V may remain, indicated by a reduction of the width of black fringing of nuchal scales. 2. The ventral extensions of the lateral bars may show up as irregular scalloping of the pattern on the sides along the anterior portion of the body. This scalloping may extend onto the ventrals, as in juveniles (fig. 16). 3. The lightened lateral stripe on the posterior quarter of the body and on the tail may remain noticeable by a regional reduction of the width of each pigment border. 4. In certain specimens one observes a retention of some pattern elements into the adult condition.

Geographic Variation of the Adult Pattern

In spite of the essential simplicity of the pattern, samples are variable, and only 75 per cent of the individuals of a sample normally belong to a given pattern. I again lack the data to determine whether such is a property of the population, or populations, or reflects the nature of the samples.

The pigments fade with preservation, and the dorsal coloration is most difficult to estimate from preserved specimens. I therefore rely on a limited number of specimens seen in life and on such pigment remnants as remain on the preserved material. There is a tripartite geographical separation. The inland specimens from Minas Gerais and Rio de Janeiro, south to northern Rio Grande do Sul, exhibit a variety of olive greens that vary irregularly from light to dark and often extend across the underlying dark scale edges so that these are partially masked. The coastal grouping, from Rio de Janeiro to Santa Catarina, has a much lighter coloring that ranges to a light yellow. Specimens from southern Rio Grande do Sul, Uruguay, Paraguay, and Argentina have a darker, more suffused, olive brown dorsal color. The bright saffron yellow ventral coloration may extend to a variable extent onto the ventralmost scale rows on each side and be noticeable here.

The variation of four elements of the color pattern is demonstrated more or less diagrammatically in figure 17: (1) the extent to which the cephalic scales are margined in black; (2) the pigmentation of a single scale at midbody; (3) the nature of pigmentation on the ventral scutes; and (4) the presence (or absence) of remnants of the juvenile pattern such as lateral posterior stripes. The figure indicates an astonishing regional diversity of variation between the different pattern elements. It may be most useful to consider these individually.

1. Cephalic sutures are outlined faintly (F) in most specimens. Only in the vicinity of the city of Rio de Janeiro, the "Federal District," and some of the southernmost populations are there specimens with black blotches on or heavier outlines of the head scales (B).

2. The ovals on the map indicate the amount and arrangement of black pigmentation on the individual dorsal scales in the post midbody region. Two fundamental patterns occur: a V-shaped one on which there

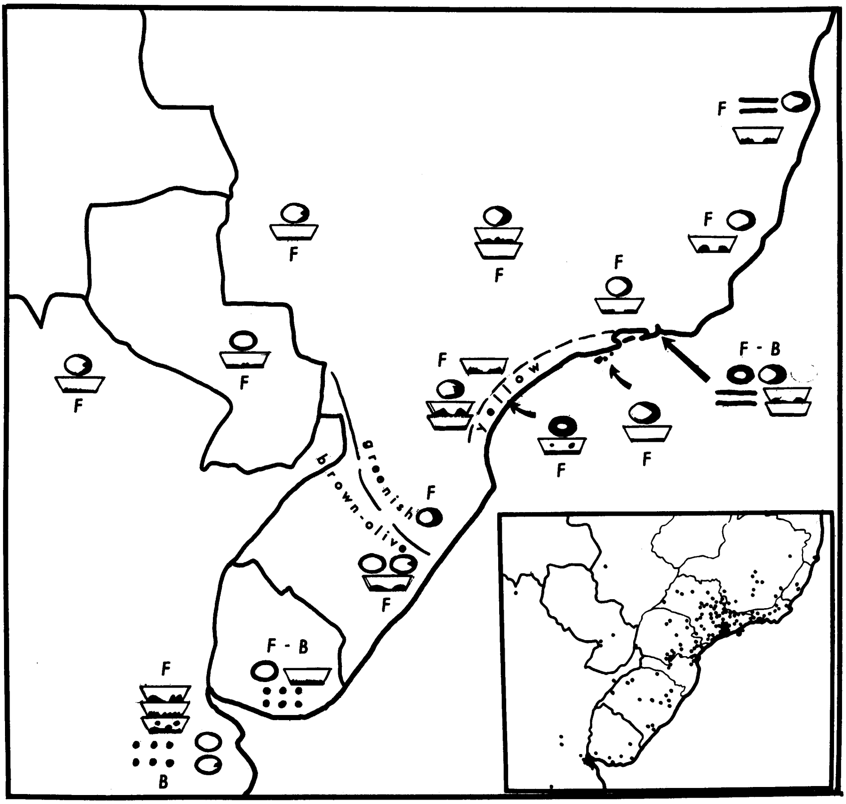

FIG. 17. *Liophis miliaris*. Geographic variation of four pattern elements in adult specimens. The symbols F and B refer to the pigmentation of cephalic sutures. The ovals refer to the pigment pattern on the individual middorsal scales. The trapezoids show the pigmentation of midbody ventral scales. The remnants of juvenile pattern (in that of adults) are shown by parallel lines for posterolateral stripes or a double row of dots for anterolateral blotches. See caption of figure 8 for other details.

is a more or less dense accumulation of black pigment in a posterior crescent, and one in which a light-colored oval region in the center of the scale is surrounded by a dark ring of varying diameter (fig. 18). Various degrees of the first pattern (in which the tip of the scale may also bear a dark dot) are found in inland regions from central Minas Gerais through parts of Rio de Janeiro, most of São Paulo, Paraná, Santa Catarina, and into northern Rio Grande do Sul. This pattern is also found on specimens from the north coastal islands of São Paulo. The coastal localities, from the vicinity of the city of Rio de Janeiro and into

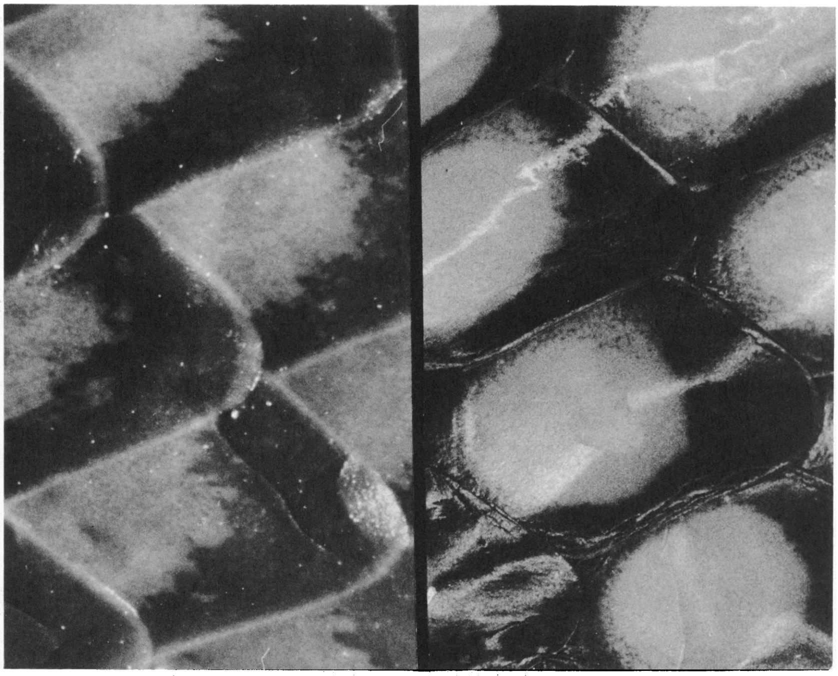

FIG. 18. *Liophis miliaris*. Enlarged views of dorsal scales at midbody to show (left) black pigmentation of the posterior crescent (M.N. No. R-833 from Humboldt, Santa Catarina, Brazil), and (right) complete dark circling of a central light oval (I.B. No. 12784 from Itanhaen, São Paulo, Brazil).

Santa Catarina, have the ring pattern. A maximal area of dark pigmentation and a minimal area of the central light spot occur along the central São Paulo coast (fig. 18, right). A similar ring pattern, but with the black fringing area very much narrower and the center relatively large, is found in the southern populations. Its distribution parallels that of high ventral counts. The second pattern is occasionally masked by the darkening of the keratinized layer of the epidermis (that layer to be shed at the next ecdysis cycle), which suggests a bleeding of the pigment proximad from the free edge of the scale.

3. The oblong trapezoids in figure 13 suggest the extent and nature of black pigmentation on the ventral sutures. This shows drastic checkerboard variation, some of which is documented by the photographs (fig. 19).

4. Most small adult specimens show some remnants of the juvenile pattern, such as traces of the nuchal V and scalloping of the lateral extent of dorsal pigment in the anterior region (fig. 16). Beyond these, there

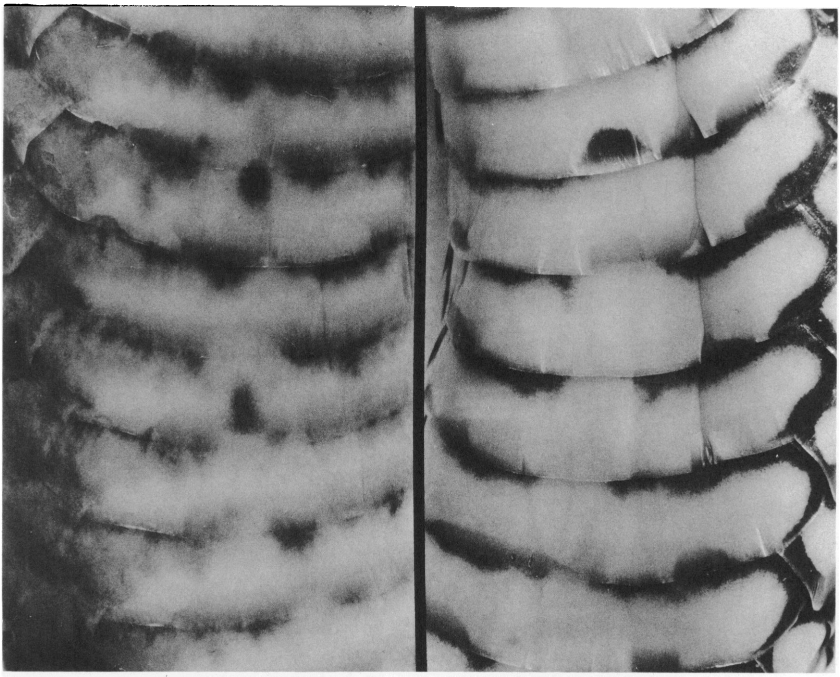

FIG. 19. *Liophis miliaris.* Ventral details of two specimens to document the extent of ventral pigmentation. *Left:* Blotching or bleeding of the pigment (I.B. No. 10376 from Arapongas, Paraná, Brazil). *Right:* Midventral interruption of scute suture pigmentation (M.N. No. R-841 from Joinville, Santa Catarina, Brazil).

are two kinds of pattern remnants that vary geographically, namely, lateral stripes along the posterior body and tail, and a series of dorsal and lateral blotches.

The former condition is found regularly in adults from eastern Minas Gerais, Bahia, Espirito Santo, and coastal Rio de Janeiro (fig. 20). It is also characteristic of some inland Paraná populations.

The retention of juvenile blotches is found only in certain areas of Uruguay and Argentina. This is shown strongly in several specimens from the vicinity of Montevideo and perhaps most strikingly on one individual from "near Buenos Aires" (fig. 21). This specimen is marked so strongly and remarkably that it was first assumed to belong to a different species. An excellent demonstration of the pattern is also provided by a British Museum series from "Uruguay."

The pattern of blotches is a straight outgrowth of the juvenile one. The two middorsal rows of longitudinal dots generally fuse. The next

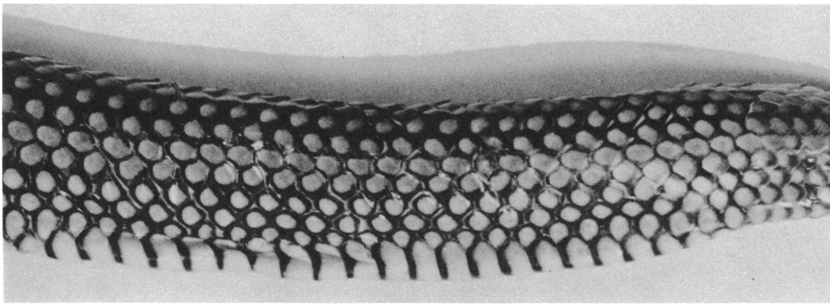

Fig. 20. *Liophis miliaris*. Lateral view of posterior body and tail to show light posterolateral stripe on S.M.N.S. No. 5011A from "Rio de Janeiro," Brazil.

lower row either fuses with the ventral row or remains as a series of isolated spots along the sides.

The remarkable variability and peculiar geographical distribution of

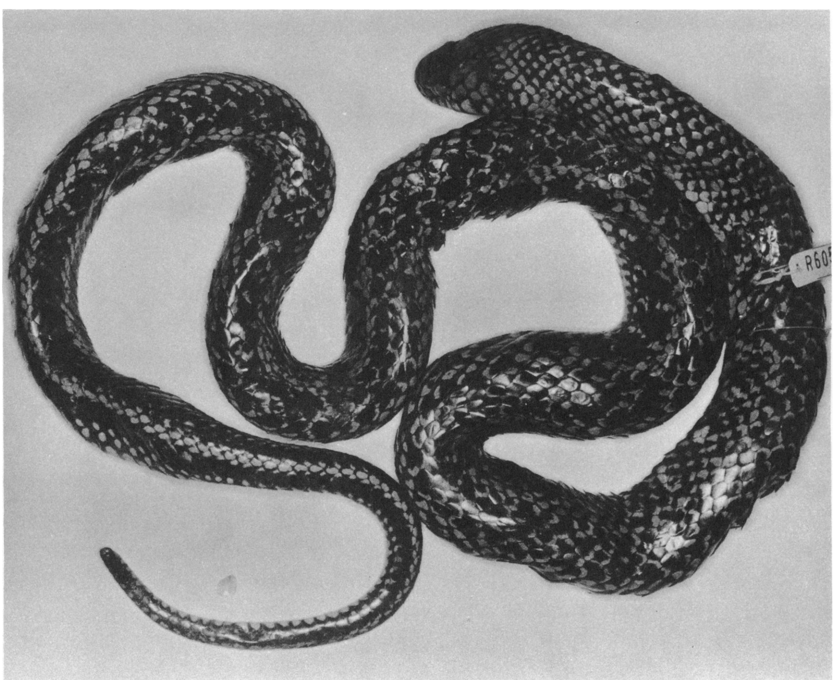

Fig. 21. *Liophis miliaris*. Dorsal view of K.M. No. 60569 from "Buenos Aires," Argentina, to show an extreme case of retention of a juvenile color pattern of blotches and stripes.

the spotted pattern deserve further study. It seems curious that they are not correlated with some other character.

Summary of Geographical Variation

The review of the data presented above suggests that the classical view of a species with two subspecies, which range, respectively, from Rio Grande do Sul north, and from Rio Grande do Sul south and west, represents an oversimplification. While the two above categories are those easiest to define, the data suggest the existence of at least four groupings. The first of these includes the northeastern localities from

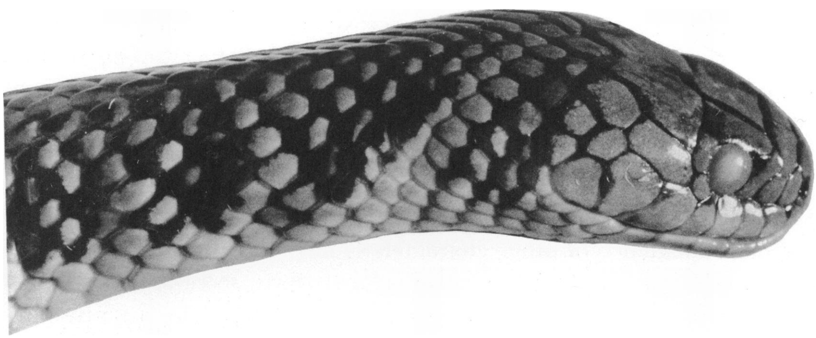

Fig. 22. *Liophis miliaris.* Dorsolateral view of B.M. No. 1925.5.25.2 from Montevideo, Uruguay, to show pattern of lateral blotches in an adult specimen.

Bahia, Espirito Santo, eastern Minas Gerais, and most of Rio de Janeiro. The second includes the records from southern Rio de Janeiro, western Minas Gerais, inland São Paulo, Paraná, Santa Catarina, and northern Rio Grande do Sul. The third comprises the coastal belt from São Paulo to Santa Catarina. The fourth includes records from southern Rio Grande do Sul, Paraguay, Uruguay, and Argentina. In addition there are several isolated populations, such as those from the coastal São Paulo islands of Ilha da Vitoria and Ilha Anchieta, and those from extreme western Argentina and Mato Grosso. All of these can be defined on the basis of the samples now available.

Certain other records, such as those from Ponta Grosso, Campos, Rio de Janeiro, and Caravelas, Bahia, would on the basis of their characters fit best into an entirely different region from that in which they were supposedly collected. Other samples from the zones in question are generally insufficient to indicate whether the records are actually representative of the populations from which they were presumably drawn. A case that is particularly questionable is that of the Carnegie Museum types (of *Rhadinea orina*) from the "Sierras of Bolivia" (see below under Attribution of Names).

It is probably worth emphasizing that the distribution of characters exhibits some interesting trends. Most important of these is the prevalence of character plateaus for each datum examined. These plateaus drop or ascend one to another along well-defined, occasionally coincidental, lines. None of the characters studied appears to show the kind of clinal variation so often claimed for species from temperate zones.

It is difficult to decide on a method of describing this situation in taxonomic terms. The various assemblages are all quite similar. They show continuity in many characters across the margins of the character plateaus. A particular effort was made to check whether the distribution of any other characters coincided with that of the high-ventral-count, southern population. The existence of such a coincident character might have suggested that two replacing species were involved. This effort was indicated because of the peculiar interdigitation of ventral-count records along the northeastern edge of the high-count plateau. It was unsuccessful. Coincidence of other characters is not more than 75 per cent in the contact area. The differences (of color pattern) seem to increase with distance from the contact zone. All of this suggests that the groupings represent samplings from the range of a single polymorphic species. Such a position is taken in the present paper.

The lines that separate the superficially similar character plateaus, demonstrated for one or another datum, are often non-coincident. This would, to my mind, make it useless or perhaps premature to assign subspecies names to the four (five or six) recognizable assemblages. Such assignment would furthermore mask rather than emphasize the very interesting pattern of variation which still remains to be worked out in detail.

However, since future efforts may indicate the desirability of naming some of the various populations, I have in the following section presented a discussion of the various names properly in the synonymy of this species.

ATTRIBUTION OF NAMES

Coluber miliaris was described in the tenth edition of the "Systema Naturae" (Linné, 1758, p. 220). The description reads:

221. miliaris. 162–59. *Mus. Ad. Fr.* p. 27
Habitat in Indiis.

Fuscus: squamis macula alba.
Subtus albus.

Andersson (1899, p. 13), who checked the detailed description (Linné, 1754) against the remaining collections, assigned the name to an individual in the Drottningholm Museum collection. The specimen has 163 ventrals, 59 caudals, and 17 rows of dorsals at midbody. The snout–vent plus tail length is 480+120 mm. Figure 23 shows the details of scalation and color pattern (N.R. No. 56). Ventral and caudal counts, as well as body proportions, indicate that the specimen could have come from either the coastal or the inland mid-Brazilian populations. The color pattern of the holotype clearly assigns it to the latter grouping, and the type locality of *Liophis miliaris* is here restricted to the port of Santos, São Paulo, Brazil.

In 1802 Shaw (p. 440) described *Coluber chiametla*, from "South America and the West Indian Islands," based upon Seba (1735, pl. 61, fig. 1, pl. 36, fig. 4)[1] who had material from various parts of Mexico. The color, which involves, as it does, "a beautiful vivid blue" above, "each scale being marked in the middle by a white spot," and with a "row of moderately distant black spots with white centers" along the sides, makes it clear that the name does not belong in the synonymy of *Liophis miliaris*. This statement is not affected by Wagler's (1824, p. 14) referral of some specimens of *L. miliaris* to "*Natrix chiametla* Shaw," which was the only use of the name cited by Boulenger (1894).

Wied (1821, vol. 2, p. 121, footnote) described *Coluber merremii* from São Pedro d'Alcântara (now known as Itabuna; *cf.* Bokermann, 1957, p. 233), Bahia. The short diagnosis referred to green blotches, black-margined scales with yellow centers, and a clear yellow ventral surface (all shown in the plate to 1824). Wied (1821, vol. 1) mentioned 148 ventrals and 37 caudals, but later (1824, pt. 8; 1825, p. 332) gave ranges of 148–150 and 48–57, respectively. The description, illustration, and counts are in good agreement with those of the northernmost population of the species, and the name is available for this. The types could not be found amid the remnants of the Wied collection now in the American Museum of Natural History and must be presumed lost.

Wied (1825, p. 343) also described *Coluber dictyodes* from Cabo Frio, Rio de Janeiro (see Bokermann, 1957, p. 214), and mentioned that he had seen it other places. He reported that he had been unable to preserve the typical specimen which had 153 ventrals and 48 caudals and a snout–vent plus tail length of 617+131 mm. The scales were stated to have a

[1] The name does not appear in the synonymies of Smith and Taylor (1945). It is presumably a *nomen oblitum* under the 1961 Code.

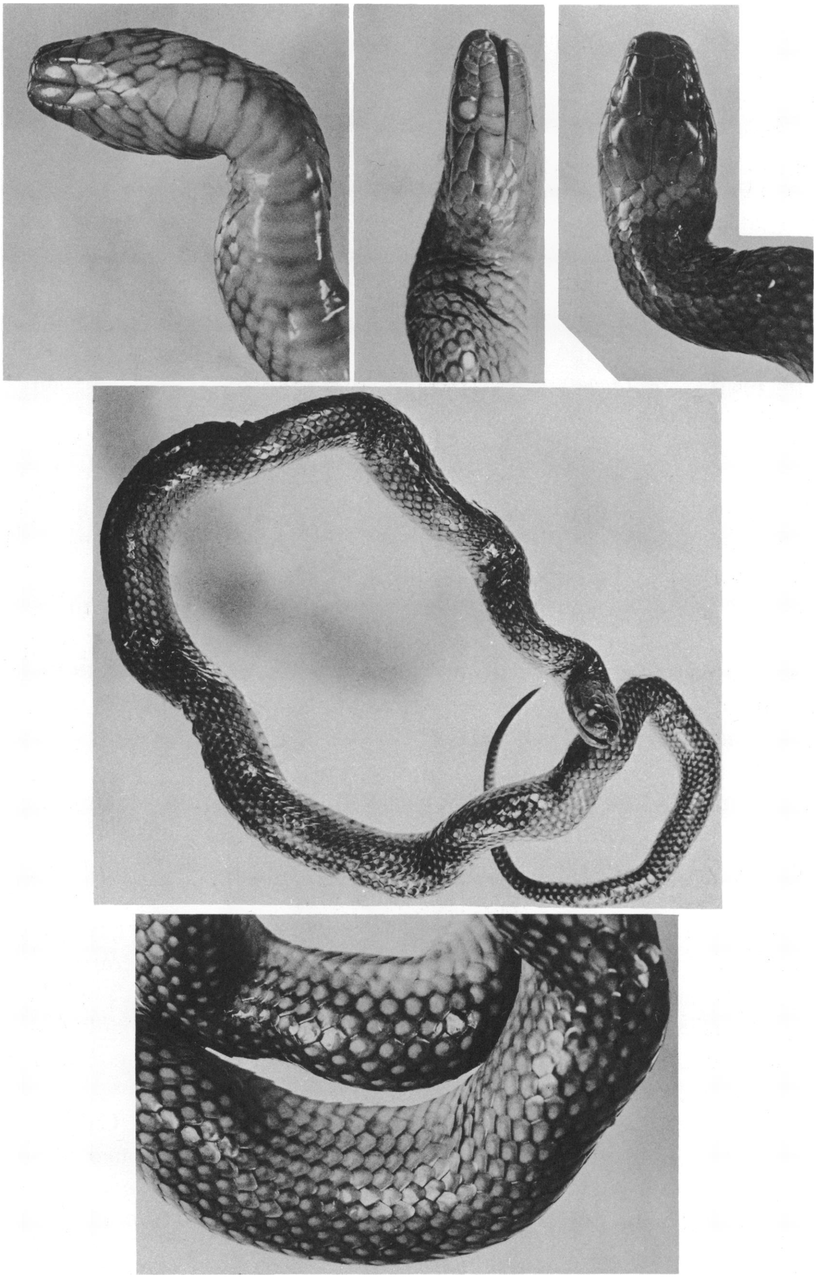

FIG. 23. *Liophis miliaris.* Views of the holotype of *Coluber miliaris* Linné, N.R. No. 56. Photographs courtesy of Dr. Ulf Bergström.

shiny black edge on a grayish background and the teeth to be uniform. The description would seem to fit a specimen with the coastal coloration and northern scale counts, a point that bears checking against specimens actually collected at Cabo Frio. The misstatement regarding the teeth seems to be an error in field examination.

Reuss (1834, p. 145) described *Coluber bicolor* on the basis of two specimens from "Ilheos," Bahia, Brazil. The specimens are now catalogued as S.M.F. Nos. 19023–19024, and Dr. K. Klemmer kindly furnished their description. They clearly belong to this species. Ventral counts are 146 and 147; caudal counts, 47? and 52; snout–vent plus tail lengths, 690+140? and 670+146 mm., respectively. These characters, and such items as the faint laterocaudal stripe, suggest that the specimens did come from Ilheos. The name is a strict synonym of *merremii.*

Günther (1858, p. 40) described *Coronella australis* on the basis of a specimen supposedly from Australia. Boulenger (1894, p. 168) questioned the locality and placed the name in the synonymy of *Rhadinea merremii.* The ventral and caudal counts were given as 145+52, and the total length as 571+127 mm. The color was stated to be generally "uniform olive," with black tips or black edges to some of the scales. All other characters mentioned in the diagnosis and description confirm Boulenger's decision.

There seems to be some confusion regarding the actual holotype specimen in the British Museum. Miss Cochrane informs me that the name appears to have been based on B.M. No. 1946.1.21.61, a male specimen having 143+53 as ventral plus caudal count and a total length of 500+130 mm. The body proportions make this assignment questionable. If it be assumed that Boulenger identified the specimen correctly, it is possible to conclude that it was collected from the northern low-ventral count population. I here restrict the type locality to southern Bahia. This name is then a strict synonym of *Coluber merremii.*

In 1862 Cope described the new form *Opheomorphus merremii* var. *semiaureus* (1862, p. 348), using a very simple diagnosis which referred primarily to the color pattern. It is thus well that the type, U.S.N.M. No. 4665 (Cochran, 1961, p. 204) and labeled "Paraguay, Capt. Page," is still in reasonable condition and clearly *Liophis miliaris.* It is a uniform olive green dorsally down to the edges of the ventrals which are a lighter yellow. The scute margins are darkly accented. The scales have the continuous, narrow, dark border of the Paraguay-Rio Grande do Sul-Argentina pattern. The margins of the head scales are not particularly darkened. The (female) specimen has 174 ventrals and 56 caudals and a snout–vent plus tail length of 755+168 mm. The tail tip appears damaged. The regression from 17 to 15 rows of dorsals occurs at the 109/102 ventrals. The specimen is in reasonable agreement with the Paraguayan material except for the low ventral and drop-out values which suggest that the specimen may well have been taken near the mouth of the Paraguay River. The name is clearly available for the southernmost population of this species.

The next name is *Opheomorphus fuscus* Cope (1885, p. 190), which was based on a series of specimens collected by H. H. Smith at "Sao Joao do Monte Negro," Rio Grande do Sul, Brazil (cf. Vanzolini, 1953, for status of the locality). The pertinent portions of the description refer to 17 rows of dorsal scales, 182 ventrals, and 55 caudals. The snout–vent plus tail length for a "median" specimen is 582+112 mm. The coloration is listed as "above olive or yellowish-brown, all the scales with a blackish border, which is widest on the apex of the scale. Head above and on sides uniform brown, scuta in some specimens narrowly black-edged. Below yellow, the scuta and scutella with narrow blackish edges, frequently imperfect on the middle of the former." The Academy of Natural Sciences of Philadelphia contains a series of specimens that are almost certainly the types (although they are not so marked). The specimens (A.N.S.P. Nos. 11031–11038) bear printed tags that read "COPE collection—Brazil—H. H. Smith." They are labeled *O. fuscus* Cope, and agree with the description of the color pattern. Detailed data are given in table 1. I here choose A.N.S.P. No. 11035 as the lectotype, since it is in remarkably close agreement with the meristic data cited in the original description. The name is also available for the southern population of this species.

In 1915 Griffin published the name *Rhadinea orina* in a paper that also listed the Carnegie Museum specimens of "*Rhadinea merremi*" from Entre Rios, Minas Gerais, Brazil. The five specimens had been bought with a private collection and bore only the label "the Sierras of Bolivia." The ventral counts are 156 to 161, those of caudals, 52 to 60, and other characteristics suggest that this name is a synonym of *L. miliaris*. The color pattern is that of juveniles, and Amaral (1926, p. 322) early stated his conviction that Griffin had *L. miliaria* (*sic*). While the specific assignment is not in doubt, it does make it unlikely that the type locality is correct. There is nothing to suggest that the species occurs in the area in question or, and more important, that the individuals could have been sampled from any of the western populations. On internal evidence the series was almost certainly drawn from the inland population, from Minas Gerais, São Paulo, or farther south. The name remains available for this, and I here restrict the type locality to the city of São Paulo, São Paulo, Brazil.

Liophis miliaris (Linné), 1758

Coluber miliaris LINNÉ, 1758, p. 220. Terra typica: "In Indiis" = Santos, São Paulo, Brazil, by present restriction. Holotype: N.R. No. 56.

Coluber merremii WIED, 1821, vol. 1, p. 121. Terra typica: "São Pedro d'Alcântara" (= Itabuna), Bahia, Brazil. Type lost.

Coluber dictyodes WIED, 1825, p. 343. Terra typica: "Cabo Frio, Rio de Janeiro," Brazil. Type not preserved.

Coluber bicolor REUSS, 1834, p. 145. Terra typica: "Ilheos," Bahia, Brazil. Lectotype: S.M.F. No. 19023 (Klemmer, *in litt.*). Paratype: S.M.F. No. 19024.

Coronella australis GÜNTHER, 1858, p. 40. Terra typica: "Australia" = Southern Bahia, Brazil, by present restriction. Holotype: B.M. No. 1946.1.21.61?

Opheomorphus merremii var. *semiaureus* COPE, 1862, p. 348. Terra typica: "Paraguay" (probably lower Paraguay River). Holotype: U.S.N.M. No. 4665.

Opheomorphus fuscus COPE, 1885, p. 190. Terra typica: "Sao Joao do Rio Negro," Rio Grande do Sul, Brazil. Lectotype: A.N.S.P. No. 11035, by present designation. Paratypes: A.N.S.P. Nos. 11031–11034, 11036–11038.

Rhadinea orina GRIFFIN, 1915, p. 195. Terra typica: "Sierras of Bolivia" = São Paulo, São Paulo, Brazil, by present restriction. Holotype: C.M. No. 264. Paratypes: C.M. Nos. 263, 265–267.

LOCALITIES[1]: BRAZIL: ?*Pará:* Óbidos, M.C.Z. No. 1203. ?*Goías:* M.C.Z. Nos. 2829-A, 2829-B, 2832, 3492-A, 3492-B. *Bahia:* B.M. No. 1924.9.20.24. Ilhéus (Fazenda Luzitania), B.M. No. 1924.9.20.22. Caravelas, I.B. No. 970. *Minas Gerais:* Téofilo Otoni, I.B. Nos. 976, 989, 994. Santo Antonio da Vargem Alegre (= Alegria), D.Z. Nos. 1081, 1084, 1086; M.C.Z. No. 17928. Entre Rios (cf. Eigenmann, 1911, p. 304), C.M. Nos. 350, 353. Santa Barbara, I.B. No. 2121. Lagoa Santa, K.M. No. R 60568; M.N. Nos. 1381, 1382. Vespasiano, D.Z. No. 2778. Lafaiete (= Conselheiro Lafaiete), I.B. No. 4739. Carandaí, I.B. No. 703. Machado, I.B. No. 11594. Poços de Caldas, I.B. No. 15796. São Sebastião do Paraíso, I.B. No. 12536. *Espírito Santo:* Santa Teresa, M.N. Nos. 862–866. Santa Leopoldina, D.Z. No. 1097. Estacão de Olaria, suburbio de Leopoldina, M.N. No. 1879. *Rio de Janeiro:* *S.M.N.S. Nos. 5011A–5011B. ?Recreio dos Bandeirantes, U.S.N.M. Nos. 98624, 98640. ?Río Paraíba, M.C.Z. No. 2974. ?Ponta Grosso, Campos (locality marked "R. J." in catalogue; could this be an error for Paraná?), M.N. Nos. 847–850. Near Cantagalo, M.C.Z. Nos. 2823-A, 2823-B. Macuco, I.B. No. 13166. Nova Friburgo, I.B. No. 947. Teresópolis, Guapi, U.S.N.M. No. 98649. Teresópolis, Colonia Alpina (Goeldi), N.H.M.B. No. (1.4). Petrópolis, I.B. No. 600; M.C.Z. No. 11447. Petrópolis, Fazenda Bôa Vista, M.N. No. 1307. Caxias, M.N. Nos. 856–859, 1886; U.S.N.M. Nos. 98621, 98622. Distrito Federal (D. F.), D.Z. Nos. 1931, 2017, 2202, 2208–2212, 2378,[2] L.C. No. B; M.S.N.G.

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[1] Only specimens with adequate locality data are cited in table 1. Other materials (possibly referred to a state only) are marked with an asterisk and are cited only if they demonstrate some phenomenon or came from a little-known region. Specimens that lacked data have been omitted. Specimens are listed from northeast to southwest under the different states.

[2] D.Z. No. 2324, labeled "D. F.," has the character pattern of a specimen from the southernmost population and probably represents an erroneous locality. Here and throughout the paper "D.F." (Distrito Federal) should read "Ga." (State of Guanabara), as the Federal District has been resituated in the center of Goiaz.

Nos. C.E. 30605-A–C.E. 30605-C; U.M.M.Z. Nos. 108720, 108721. Quinta da Bôa Vista, D. F., M.N. No. 1876. Manguinhos, D. F., D.Z. No. 2732; M.N. No. 854. Jacarepaguá, D. F., M.N. Nos. 851, 852, 1875. Marechal Hermes, D. F., M.N. No. 853. Realengo, D. F., M.N. Nos. 1878, 1890–1896. Santa Cruz, D. F., I.B. Nos. 7257, 7258. Mendes, M.C.Z. Nos. 2899-A–2899-C, 3277. Serra da Mangaratiba, M.N. No. 855. Volta Redonda, I.B. No. 12063. Itaverá, I.B. No. 11612. Angra dos Reis, D.Z. Nos. 1797, 2200, 2201, 2582. *São Paulo:* Ilha Anchieta, I.B. Nos. 15818–15821. Ilha da Vitoria, I.B. Nos. 15822–15824, 15826. Ilha de São Sebastião, Praia de Baraqueçaba, I.B. No. 11611. Piquete, D.Z. Nos. 1049, 1091, 1092. São Bento do Sapucaí, I.B. No. 12635. Campos do Jordão, D.Z. No. 2709. Eugênio Lefévre, D.Z. No. 2949. Taubaté, D.Z. No. 1048; I.B. No. 13882. São José dos Campos, I.B. No. 11944. Ubatuba, D.Z. No. 1042; I.B. No. 15827. Itaquaquecetuba, I.B. No. 13679. Suzano, I.B. No. 12204. Calmon Viana (between Suzano and Ferraz de Vasconcelos), I.B. No. 12327. Ferraz de Vasconcelos, D.Z. No. 2575. São Miguel Paulista (*ex* Baquirivu), I.B. No. 11863. Jundiaí, D.Z. No. 1088; I.B. No. 11864. Campo Limpo, I.B. No. 11291. Caieiras, I.B. Nos. 12083, 12130, 12199, 12203, 12205, 12206, 12319, 12380, 15642. São Paulo [city].[1] D.Z. Nos. 2198, 2199, 2204, 2483. São Paulo, Cidade Jardim, D.Z. Nos. 2613–2617, 2621. São Paulo, Ipiranga, D.Z. Nos. 1044, 2631, 2790. Osasco, A.M.N.H. No. 74962. Carapicuíba, I.B. No. 11593. Barueri, I.B. No. 11437. Jandira, I.B. No. 12378. Mailasqui, I.B. No. 13707. M'Boy, Ponte dos Jesuitas, I.B. No. 11596. Mario Souto, I.B. No. 15924. Ribeirão Pires, I.B. No. 9233; M.C.Z. No. 39418. Alto da Serra, D.Z. No. 1043. "Serra d'Agua," I.B. No. 11752. Raiz da Serra, D.Z. Nos. 1040–1041. Cubatão, D.Z. No. 1039. São Vicente (also Praia de Paranapuã and Ilha de Paranapuã), I.B. Nos. 13933, 14264, 14337–14340, 14422–14434, 14548, 14549, 14263, 15922, 15923. Guarujá, D.Z. No. 1558. Solemar, I.B. Nos. 12787, 15921. Verde Mar, I.B. No. 10269. Itanhaen, I.B. Nos. 5789, 5909, 10182, 10183, 12746, 12784, 14538. Peruibe, I.B. Nos. 4348, 4349, 4425, 5259, 12075, 12076, 12208, 12210, 12211, 12376, 12537, 12701, 12702, 12812, 13711, 14539–14542, 15816, 15817. Ana Dias, I.B. No. 12476. Padre Anchieta, I.B. No. 15733. Juquiá, A.M.N.H. No. 74963. Mampara (near Registro), I.B. No. 11485. Iguape, D.Z. No. 1038; I.B. Nos. 1385, 1472, 1473, 11859. Ilha Comprida, I.B. Nos. 11477, 11478. Vergel, I.B. Nos. 11936, 11940. Martius Francisco, I.B. No. 181. Socorro, I.B. No. 15834. Bragança Paulista, I.B. Nos. 11003, 11004. Tanque, I.B. No. 11529. Campinas, I.B. Nos. 11978, 15589, 15590. Piracicaba, D.Z. No. 1087. Botucatú, D.Z. Nos. 1995, 2203, 2205, 2213, 2348. Remédios, I.B. No. 876. Conchas, I.B. No. 11587. Pereiras, I.B. No. 11588. Ipanema, I.B. Nos. 424, 2134. Sorocaba, D.Z. Nos. 1045, 1089, 1090. São Miguel de Arcanjo, I.B. Nos. 15838, 15848. Ibití, D.Z. No. 2698. Engenheiro Hermilio, I.B. No. 11586. Cerqueira César, M.C.Z. 17924. São João da Bôa Vista, I.B. No. 12061. Cascavel (near São João da Bôa Vista), D.Z. No. 1047. São José do Rio Pardo, I.B. No. 14537. Emas, Cachoeiro de, D.Z. No. 2663. Emas, D.Z. No. 2859. Descalvado, I.B. No. 12080. Aurora, I.B. No. 2601. Campo Alegre, U.S.N.M. No. 39055. Dourado, I.B. Nos. 15832, 15833. Jaú, I.B. No. 9220. Boracéia, D.Z. No. 2207. Bandeirantes, M.C.Z. No. 39419. Monteiros, I.B. No. 11762. Vista Alegre do Alto, I.B. No. 11861. Mendoça, I.B. No. 15717. Penápolis, I.B. No. 11294. Guararapes, I.B.

[1] Specimens labeled only "São Paulo" have been omitted to avoid confusion.

No. 15678. Presidente Venceslau, D.Z. No. 2478. *Paraná:* Ilha das Cobras, Paranaginá, I.B. No. 12725. Votuverava, I.B. Nos. 11753, 11860. Tranqueira, I.B. Nos. 12261, 12262. Curitiba, I.B. Nos. 15682, 15847. Morretes, A.M.N.H. No. 74961; I.B. Nos. 15713, 15734, 15830, 15844. Paranaguá, H.M. No. 5360; M.N. No. 860. Araucariá, I.B. Nos. 785, 786. Legrú, I.B. Nos. 2594, 2598. Imbituva, I.B. No. 12458. Fernandes Pinheiro, I.B. No. 12081. Mallet, I.B. No. 11751. Dorizon, I.B. Nos. 912, 1025–1029, 1067, 1068, 1086–1091, 1094–1096, 12599, 12612–12614. Paulo de Frontin, I.B. No. 15730. Porto União (União da Victória), I.B. Nos. 12082, 12200, 15920. Cruz Machado, I.B. Nos. 12379, 12607, 15790–15792, 15849. Venceslau Brás, I.B. No. 11590. Erval, I.B. Nos. 829, 863. Ribeirão Claro, C.M. Nos. 37507, 37508. Londrina, I.B. Nos. 12528, 15662. Arapongas, I.B. No. 10376. Parque Iguassú, M.N. No. 861. *Santa Catarina:* ?Humboldt, M.N. Nos. 832–838. São Bento, I.B. No. 9222; M.C.Z. No. 39417; U.M.M.Z. No. 79674; U.S.N.M. Nos. 100661, 100678. Rio Natal, I.B. No. 15918. Hansa, I.B. No. 9241. Joinville, I.B. No. 1746; M.N. Nos. 839–846, 879. Guaramirim, M.N. Nos. 1877, 1880. Timbó, I.B. Nos. 15628, 15629. Lança, I.B. Nos. 15645, 15646. Nova Galiçia, I.B. Nos. 9242, 12553. Rio das Antas, D.Z. No. 2966. *Rio Grande do Sul:* Carlos Barbosa, C.M. No. 37506. Caí, D.Z. No. 1034. São Leopoldo, C.M. No. 37494. Pôrto Alegre, C.M. Nos. 37493, 37495–37505, 37509; I.B. No. 1565; K.M. R60566. Pelotas, I.B. Nos. 12209, 12377. Cerrito, I.B. No. 11591. Rio Grande, I.B. Nos. 11592, 12349. São João do Monte Negro, A.N.S.P. Nos. 11035 (lectotype of *fuscus*), 11031–11034, 11036–11038 (paralectotypes). Rincão del Rei, I.B. Nos. 12201, 12207. Santa Cruz del Sul, I.B. No. 12202. Santa Maria, I.B. No. 9683; M.C.Z. Nos. 43308–43309. Aurea (6° distrito de Erechim), I.B. No. 11589. Santo Ângelo das Missões, U.S.N.M. No. 100700. São Salvador, I.B. Nos. 12596, 12598–12599. Itaqui, D.Z. Nos. 1032, 1033, 1384. *Mato Grosso:* Carandazal, I.B. No. 15825.

URUGUAY: *B.M. Nos. 84.2.23.23–84.2.23.29; U.S.N.M. No. 70493. Vicinity of Treinta-y-tres (Dept. 30y3), C.N.H.M. No. 10610. Eight miles east of Treinta-y-tres (Dept. 30y3), C.N.H.M. No. 10420. Castillos (Dept. Rocha), M.A.C.N. No. 4568. Minas (Dept. Minas), C.N.H.M. No. 10615. Montevideo, B.M. No. 1925.5.25.2 (1930.6.7.6); H.M. No. 5702; M.S.N.G. No. C.E. 30605A. Costas de Buceo y Ramirez (drifted up off Montevideo during the floods of 1905; cf. von Ihering, 1911, p. 454), D.Z. Nos. 1100, 1102–1104. Canelones (Dept. Canelones), M.C.Z. No. 46887. Estancia Los Alpes, 10 kilometers south of La Luta (Dept. Colonia), C.N.H.M. No. 10691. Santa Lucia (Dept. Canelones), U.S.N.M. No. 65602.

PARAGUAY: U.M.M.Z. No. 67211; U.S.N.M. No. 4665 (holotype of *semiaureus*). Luque, I.M.Z.U.T. Nos. 1008A, 1008B (Peracca, 1895, p. 17). Asuncion, B.M. No. 94.3.14.57. Primavera, B.M. Nos. 1956.1.3.39, 1962.83, 1962.84.

ARGENTINA: M.A.C.N. Nos. 45a–1, 45a–2; M.H.N.P. No. 98–274. ?Isla Ella, Río Paraná, B.M. Nos. 1924.4.29.4, 1930.6.7.6,A. *Salta:* Urundel, Río Santa María, M.A.C.N. No. 2904. *Corrientes:* Santo Tomé, M.A.C.N. No. 2227. *Santa Fé:* Rosario, Z.S.M. Nos. 210/09, 1463/03. Ten kilometers south of Maciel (101 kilometers south of Santa Fé), C.N.H.M. No. 80144. *Entre Rios:* Paranancito, Delta, M.A.C.N. (no number), No. 902. *Buenos Aires:* U.M.M.Z. No. 109849. ?Bajo de Palermo, M.A.C.N. No. 1514. Zelaya, M.A.C.N. Nos. 957, 1093. Tigre, Río Sarmiento, Abra Nueva, M.A.C.N. No. 894. ?Camalotes de la Inundación (1906), M.A.C.N. Nos. 7168A, 7168B. Buenos Aires, I.B. No. 182;

M.A.C.N. Nos. 4764, 5410, 7152, 7782. Near Buenos Aires, K.M. No. 60569. Dock Sud, M.A.C.N. No. 4148. Quilmes, M.A.C.N. No. 864. Punta Lara, M.A.C.N. No. 881. Bonifacio, B.M. Nos. 1922.3.2.2, 1922.3.2.3.

BOLIVIA: "Sierras of —"? (Griffin, 1915, p. 195), C.M. Nos. 263–267 (types of *orina*, locality restricted to São Paulo, São Paulo, Brazil).

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WIED-NEUWIED, MAXIMILIAN ALEXANDER PHILIPP ZU

1821. Reise nach Brasilien in den Jahren 1815 bis 1817. Frankfurt-am-Main, vol. 1, xxxvi+380+5 pp.; vol. 2, xviii+345+1 pp.

1824. Abbildungen zur Naturgeschichte Brasiliens. Weimar, (no. 8). Date per Isis, 1824, vol. 14, p. 1103.

1825. Beiträge zur Naturgeschichte von Brasilien. Weimar, vol. 1, xxii+614 pp.

TABLE 1

DATA FOR SPECIMENS OF *Liophis miliaris*

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
M.C.Z. No. 1203	♂	156+x	—	105/110
M.C.Z. No. 2829-A	♂	141+51	498+124	91/90
M.C.Z. No. 2829-B	♀	144+51	588+133	102/99
M.C.Z. No. 2832	♀	145+x	243+x	97/100
M.C.Z. No. 3492-A	♀	142+x	558+x	88/88
M.C.Z. No. 3492-B	♀	147+51	558+131	89/89
B.M. No. 1924.9.20.24	♂	165+50	206+51	94/95
B.M. No. 1924.9.20.22	♀	145+47	555+115	77/77
I.B. No. 970	♂	156+53	562+107	93/94
I.B. No. 976	♀	144+48	498+105	95/96
I.B. No. 989	♂	151+54	535+130	87/88
I.B. No. 994	♂	141+43	381+85	87/83
D.Z. No. 1081	♀	144+x	576+x	92/92+93–94
D.Z. No. 1084	♂	149+48	375+81	85/86
D.Z. No. 1086	♀	146+49	212+48	88/90

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
M.C.Z. No. 17928	♂	148+51	330+76	101/99
C.M. No. 350	♀	147+47	650+15	93/91
C.M. No. 353	♀	?143+x	132+x	?56/49
I.B. No. 2121	♂	149+50	339+72	89/87
K.M. No. R60568	♂	152+56	505+144	88/91
M.N. No. 1381	♂	150+48	585+130	89/88
M.N. No. 1382	♀	150+48	588+136	96/93
D.Z. No. 2778	♂	150+50	574+130	87+88–89/87
I.B. No. 4739	♀	153+46	512+109	90/90
I.B. No. 703	♀	150+52	692+192	91/95
I.B. No. 11594	♀	150+49	543+123	90/92
I.B. No. 15796	♀	154+x	595+x	93/90
I.B. No. 12536	♂	155+54	558+130	98/99
M.N. No. 862	♂	146+48	442+193	91/93
M.N. No. 863	♀	142+47	166+37	94+95–98+99–100/98
M.N. No. 864	♀	148+51	171+41	88/89
M.N. No. 865	♂	149+45	165+35	90/89
M.N. No. 866	♀	147+47	140+33	—
D.Z. No. 1097	♂	144+48	396+91	88/89
M.N. No. 1879	♂	146+50	402+91	84/85
U.S.N.M. No. 98624	♀	140+51	213+52	89/88
U.S.N.M. No. 98640	♀	151+50	136+33	98/100
M.C.Z. No. 2974	♂	149+49	470+107	86/87
M.N. No. 847	♀	156+56	685+168	98/96
M.N. No. 848	♂	153+53	435+102	91/91
M.N. No. 849	♀	151+52	228+51	88/87
M.N. No. 850	Juv.	151+56	194+52	94/91
M.C.Z. No. 2823A	♀	143+47	570+119	82/84
M.C.Z. No. 2823B	♀	143+47	745+150	72/70
I.B. No. 13166	♀	143+45	646+115	84/87
I.B. No. 947	♀	142+50	501+115	89/93
U.S.N.M. No. 98649	♀	142+51	592+139	85/84
N.H.M.B. No. 1	♂	147+50	173+43	116/119
N.H.M.B. No. 2	♂	143+47	467+112	79/79
N.H.M.B. No. 3	♀	145+x	540+x	88/87
N.H.M.B. No. 4	♂	147+x	500+x	85/88

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 600	♀	147+49	360+82	82/82
M.C.Z. No. 11447	♂	143+47	581+121	82/81
M.N. No. 1307	♀	148+47	650+130	92/94
M.N. No. 856	♂	145+54	388+99	85/86
M.N. No. 857	♂	147+54	388+111	89/88
M.N. No. 858	♂	137+53	169+47	96/96
M.N. No. 859	♂	148+49	252+57	78/77
M.N. No. 1886	♀	143+x	507+x	80/81
U.S.N.M. No. 98621	♀	148+x	536+x	90/89
U.S.N.M. No. 98622	♀	144+55	385+105	94/96
D.Z. No. 1931	♀	152+55	249+61	89/90
D.Z. No. 2017	♀	143+x	490+x	76/75
D.Z. No. 2202	♀	148+49	545+117	84/81
D.Z. No. 2208	♀	143+50	432+101	83/85
D.Z. No. 2209	♀	146+50	644+140	87/88
D.Z. No. 2210	♀	152+53	517+110	92/93
D.Z. No. 2211	♂	141+53	518+125	82/83
D.Z. No. 2212	♂	145+x	440+x	83/83
D.Z. No. 2378	♀	146+50	713+163	93/91
L.C. No. B	♀	144+51	501+122	82/81
M.S.N.G. No. 30605A	♀	147+53	485+217	87/87
M.S.N.G. No. 30605B	♀	135+50	600+141	89/87
M.S.N.G. No. 30605C	♀	144+49	311+70	93/92
U.M.M.Z. No. 108720	♀	145+49	316+78	87/85
U.M.M.Z. No. 108721	♂	144+49	536+126	85/88
M.N. No. 1876	♀	149+51	160+37	94/94
M.N. No. 854	Juv.	150+54	153+39	108/115
M.N. No. 851	♀	147+53	510+123	84/81+83–85
M.N. No. 853	♂	143+49	448+110	88/85
M.N. No. 1875	♂	147+53	396+104	89/89
M.N. No. 1878	♀	150+54	609+150	90/89
M.N. No. 1890	♀	144+53	197+48	86/87
M.N. No. 1891	♂	148+49	481+103	81/80
M.N. No. 1892	♂	145+49	382+86	85/86
M.N. No. 1893	♀	144+49	530+122	85/83
M.N. No. 1894	♂	147+51	212+48	91/92

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
M.N. No. 1895	♀	145+x	520+x	85/85
M.N. No. 1896	♂	141+52	189+47	86/86
I.B. No. 7257	♀	151+54	255+61	88/90
I.B. No. 7258	♀	147+52	—	83/83
M.C.Z. No. 2899A	♀	144+48	238+49	—/80
M.C.Z. No. 2899B	♀	150+48	172+37	86/86
M.C.Z. No. 2899C	♀	147+50	697+133	93/93
M.C.Z. No. 3277	♂	153+x	423+x	91/85
M.N. No. 855	♂	148+54	179+44	84/85
I.B. No. 12063	♂	152+54	493+117	92/94
I.B. No. 11612	♀	151+49	—	89/87
D.Z. No. 1797	♀	152+x	677+x	126/114+122–127
D.Z. No. 2200	♂	153+53	587+137	102/102
D.Z. No. 2201	♂	151+x	619+x	96/99
D.Z. No. 2582	♂	156+54	602+145	96/101
I.B. No. 15818	♀	161+61	753+206	95/95
I.B. No. 15819	♀	158+61	530+137	98/93+96–97
I.B. No. 15820	♀	157+61	557+139	105+108–110+112–114/101+102–107+109–110
I.B. No. 15821	♀	158+x	521+x	105+109–110/105+106–111
I.B. No. 15822	♂	159+62	521+136	124+127–129+131–136+151–152/116+117–122+127–129+130–135
I.B. No. 15823	♀	156+60	712+192	94/98
I.B. No. 15824	♀	158+59	610+155	103+106–110+114–115+117/109+112–115+117–118
I.B. No. 15826	♂	159+55	287+72	103/96+99–100
I.B. No. 11611	♂	160+60	568+134	85/83
D.Z. No. 1094	♀	155+x	679+x	92/95
D.Z. No. 1091	♂	156+52	520+117	97/95
D.Z. No. 1092	♂	157+54	259+59	92/97
I.B. No. 12635	♂	154+53	388+98	88/88
D.Z. No. 2709	♂	155+55	219+47	101/101

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
D.Z. No. 2949	♀	154+56	311+68	90/90
D.Z. No. 1048	♀	155+54	641+145	98/98
I.B. No. 13882	♀	160+60	691+166	94/92
I.B. No. 11944	♀	159+55	355+83	90/90
D.Z. No. 1042	♂	159+x	570+x	101/99
I.B. No. 15827	♀	152+57	643+155	95/95
I.B. No. 13679	♂	154+55	500+120	81/78
I.B. No. 12204	♀	159+55	675+143	100/100
I.B. No. 12327	♀	160+54	693+147	96/97
D.Z. No. 2575	♂	161+61	582+139	99/97
I.B. No. 11863	♂	155+x	570+x	92/92
D.Z. No. 1088	♀	160+55	212+47	96/96
I.B. No. 11864	♂	155+51	393+94	85/86
I.B. No. 11291	♀	157+56	313+75	—
I.B. No. 12083	♂	157+52	585+135	86/88
I.B. No. 12130	♀	162+53	666+148	92/92
I.B. No. 12199	♂	156+56	465+119	95/97
I.B. No. 12203	♀	154+49	690+150	83/83
I.B. No. 12205	♂	160+53	575+130	92/92
I.B. No. 12206	♀	159+54	620+162	85/85
I.B. No. 12319	♀	154+59	362+90	88/88
I.B. No. 12380	♂	162+51	490+113	91/92
I.B. No. 15642	♀	159+55	524+114	86/86
D.Z. No. 2198	♀	158+53	662+149	88/88
D.Z. No. 2199	♂	155+57	477+118	90/90
D.Z. No. 2204	♀	155+50	433+92	89/91
D.Z. No. 2483	♀	166+58	541+122	95/95
D.Z. No. 2613	♀	155+57	640+157	89/90
D.Z. No. 2614	♀	163+59	571+130	92/94
D.Z. No. 2615	♂	159+55	513+123	75/76
D.Z. No. 2616	♀	162+52	723+152	93/94
D.Z. No. 2617	♂	158+54	622+146	82/83
D.Z. No. 2621	♂	162+56	650+150	98/98
D.Z. No. 1044	♂	160+64	187+56	91/91
D.Z. No. 2631	♀	158+x	783+x	91/89
D.Z. No. 2790	♂	156+57	494+121	87/89
A.M.N.H. No. 74962	♀	156+53	537+116	89/87

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 11593	♀	156+51	555+126	84/84
I.B. No. 11437	♀	158+56	567+129	68/69
I.B. No. 12378	♂	160+56	545+129	95/96
I.B. No. 13707	♂	156+x	620+x	99/98
I.B. No. 11596	♀	159+55	503+118	86/86
I.B. No. 15924	♀	165+65	704+181	105/107
I.B. No. 9233	♀	156+53	620+139	88/88
M.C.Z. No. 39418	♀	155+55	830+185	90/90
D.Z. No. 1043	♀	161+x	235+x	99/100
I.B. No. 11752	♂	153+55	356+84	89/90
D.Z. No. 1040	♂	166+56	452+99	90/90
D.Z. No. 1041	♀	160+53	409+91	87/86
D.Z. No. 1039	♀	161+x	698+x	95/97
I.B. No. 13933	♀	168+x	772+x	92/92
I.B. No. 14264	♀	164+68	931+247	100/98
I.B. No. 14337	♀	164+63	754+187	92/93
I.B. No. 14338	♀	162+66	700+194	99/99
I.B. No. 14339	♀	167+66	884+223	98/98
I.B. No. 14340	♀	159+64	689+174	95/92
I.B. No. 14422	♀	163+63	810+211	94/94
I.B. No. 14423	♂	161+63	349+92	97/94
I.B. No. 14424	♀	164+65	424+113	94/94
I.B. No. 14425	♀	160+68	635+183	88/91
I.B. No. 14426	♂	161+60	462+116	95/96
I.B. No. 14427	♂	167+x	630+x	84/88
I.B. No. 14428	♂	166+63	613+163	100/100
I.B. No. 14429	♀	169+x	805+x	95/96
I.B. No. 14430	♀	162+62	593+160	90/91
I.B. No. 14431	♀	160+69	775+208	95/95
I.B. No. 14433	♀	161+61	845+209	95/94
I.B. No. 14434	♀	158+65	825+226	95/98
I.B. No. 14548	♂	162+63	588+147	89/91
I.B. No. 14549	♂	162+65	633+167	96/94
I.B. No. 14263	♀	165+x	859+x	95/93
I.B. No. 15922	♀	164+66	635+172	90/90
I.B. No. 15923	♀	161+x	705+x	104/104
D.Z. No. 1558	♀	152+65	174+48	102/99

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 12787	♀	165+64	780+202	96/96
I.B. No. 15921	♀	164+x	965+x	97/97
I.B. No. 10269	♀	162+54	548+123	95/95
I.B. No. 5789	♂	159+59	566+140	104/104
I.B. No. 5909	♀	159+59	993+209	99/99
I.B. No. 10182	♂	161+55	490+112	93/95
I.B. No. 10183	♀	163+x	483+x	102/102
I.B. No. 12746	♀	162+x	763+x	100/106
I.B. No. 12784	♀	160+64	783+199	99/99
I.B. No. 14538	♀	158+63	668+175	92/94
I.B. No. 4348	♀	160+56	660+157	97/97
I.B. No. 4349	♀	158+x	953+x	97/95
I.B. No. 4425	♀	160+56	406+101	100+103–104/100
I.B. No. 5259	♂	167+58	593+135	100/100
I.B. No. 12075	♀	161+60	650+158	95/95
I.B. No. 12076	♀	161+x	747+x	95/97
I.B. No. 12208	♀	164+57	642+141	94/98
I.B. No. 12210	♂	160+60	539+125	90/90
I.B. No. 12211	♀	159+58	749+165	99/99
I.B. No. 12376	♀	157+x	746+x	95/95
I.B. No. 12537	♀	157+57	845+193	92/92
I.B. No. 12701	♀	162+58	890+198	94/94
I.B. No. 12702	♀	162+x	781+x	96/96
I.B. No. 12812	♂	162+57	689+160	100/97
I.B. No. 13711	♂	162+55	602+142	106/103
I.B. No. 14539	♀	162+58	687+168	99/96
I.B. No. 14540	♀	161+58	400+93	100/99
I.B. No. 14541	♀	161+57	697+162	113/119
I.B. No. 14542	♂	160+x	689+x	96/97
I.B. No. 15816	♂	155+56	685+138	89/89
I.B. No. 15817	♀	156+57	908+210	92/92
I.B. No. 12476	♀	161+x	925+x	97/97
I.B. No. 15733	♀	162+55	608+138	93/95
A.M.N.H. No. 74963	♀	165+64	608+156	98/100
I.B. No. 11485	♂	160+x	298+x	93/94
D.Z. No. 1038	♀	159+57	237+53	89/89
I.B. No. 1385	♂	160+62	601+153	91/91

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 1472	♂	164+63	234+56	99/97
I.B. No. 1473	♀	165+x	793+x	96/99
I.B. No. 11859	♀	157+x	825+x	99/99
I.B. No. 11477	♂	157+x	643+x	87/86
I.B. No. 11478	♂	167+x	540+x	96/98
I.B. No. 11936	♂	157+53	501+116	90/90
I.B. No. 11940	♂	153+56	588+154	97/97
I.B. No. 181	♀	155+x	871+x	82/84
I.B. No. 15834	♂	150+54	526+125	98/97
I.B. No. 11003	♀	152+56	503+120	84/84
I.B. No. 11004	♂	154+55	556+134	83/83
I.B. No. 11529	♂	162+52	349+73	91/92
I.B. No. 11978	♀	159+x	625+x	101/104
I.B. No. 15589	♀	158+58	521+124	93/93
I.B. No. 15590	♂	156+x	462+x	97/98
D.Z. No. 1087	♀	159+56	296+67	89/90
D.Z. No. 1995	♂	162+59	427+103	93/93
D.Z. No. 2203	♂	168+54	564+138	89/89
D.Z. No. 2205	♀	158+57	542+126	104/100
D.Z. No. 2213	♀	151+55	783+178	88/87
D.Z. No. 2348	♀	158+x	750+x	94/93
I.B. No. 876	—	162+x	—	97/98
I.B. No. 11587	♀	158+x	763+x	89/90
I.B. No. 11588	♀	151+57	585+139	95/96
I.B. No. 424	♀	156+52	883+186	99/99
I.B. No. 2134	—	161+x	—	99/99
D.Z. No. 1045	♂	151+56	518+135	84/84+86–87
D.Z. No. 1089	♂	160+54	169+32	99/102
D.Z. No. 1090	♀	161+57	169+36	97/99
I.B. No. 15838	♀	159+56	773+173	94/94
I.B. No. 15848	♀	158+55	545+131	92/92
D.Z. No. 2698	♀	150+50	484+109	88/88
I.B. No. 11586	♀	163+59	775+165	97/95
M.C.Z. No. 17924	♂	155+51	170+37	—
I.B. No. 12061	♂	157+58	452+108	85/85
D.Z. No. 1047	♀	159+55	610+144	90/92

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 14537	♂	155+50	430+99	92/92
D.Z. No. 2663	♂	155+55	525+129	80+81–87/74
D.Z. No. 2859	♀	159+59	663+140	96/94
I.B. No. 12080	♀	158+x	666+x	92/91
I.B. No. 2601	♀	155+53	556+125	106/106
U.S.N.M. No. 39055	♀	158+54	940+201	108/107
I.B. No. 15832	♀	157+59	515+123	91/91
I.B. No. 15833	♀	160+59	590+136	97/97
I.B. No. 9220	♀	155+57	710+164	92/92
D.Z. No. 2207	♂	154+52	410+92	89/89
M.C.Z. No. 39419	♀	155+x	668+x	91/92
I.B. No. 11762	♀	156+x	591+x	95/96
I.B. No. 11861	♀	155+54	465+110	97/97
I.B. No. 15717	♀	151+55	745+166	90/91
I.B. No. 11294	♀	157+56	745+180	94/94
I.B. No. 15678	♀	149+55	705+148	90/92
D.Z. No. 2478	♂	153+55	559+146	94/94
I.B. No. 12725	♀	166+x	728+x	89/89
I.B. No. 11753	♂	158+56	470+110	94/95
I.B. No. 11860	♀	158+60	472+110	95/94
I.B. No. 12261	♀	155+x	560+x	89/89
I.B. No. 12262	♀	156+x	732+x	93+94–95/93
I.B. No. 15682	♀	156+56	707+156	102/106
I.B. No. 15847	♀	150+54	535+119	98/95
I.B. No. 15713	♀	166+59	740+169	97+98–99/95+96–98
I.B. No. 15734	♀	163+59	753+173	102/102
I.B. No. 15830	♀	162+61	318+79	95/97
I.B. No. 15844	♀	160+53	613+143	98/99
H.M. No. 5360	♂	156+56	550+140	105/95+96–97
M.N. No. 860	♀	160+60	522+131	98/100
I.B. No. 785	♀	161+x	814+x	97/96
I.B. No. 786	♀	156+56	708+171	92+94–95/92
I.B. No. 2594	♀	155+58	648+155	85/87
I.B. No. 2598	♂	150+53	531+136	88/87
I.B. No. 12458	♂	155+55	578+141	94/95
I.B. No. 12081	♀	162+55	662+151	94/93

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 11751	♀	156+55	562+128	94/94
I.B. No. 912	♀	162+x	812+x	99/97
I.B. No. 1025	♀	152+52	827+178	91/90
I.B. No. 1026	♀	158+58	546+125	94/96
I.B. No. 1027	♂	157+59	414+100	97/95
I.B. No. 1028	♀	155+54	622+140	96/95
I.B. No. 1029	♀	161+55	717+151	93/91
I.B. No. 1067	♂	160+54	596+132	93/96
I.B. No. 1068	♀	160+x	735+x	96/97
I.B. No. 1086	♀	158+x	718+x	92/93
I.B. No. 1087	♀	162+53	796+174	86/86
I.B. No. 1088	♀	158+55	794+167	97/96
I.B. No. 1089	♀	157+56	615+133	97/97
I.B. No. 1090	♀	154+56	528+126	98/102
I.B. No. 1091	♀	153+54	557+123	89/90
I.B. No. 1094	♀	151+54	576+125	103/102
I.B. No. 1095	♂	157+58	738+163	93/94
I.B. No. 1096	♀	150+52	816+187	92/92
I.B. No. 2599	♂	155+59	586+137	91/91
I.B. No. 2612	♀	156+56	632+138	97/95
I.B. No. 2613	♂	157+52	536+123	92/90
I.B. No. 2614	♀	159+51	605+130	98/94
I.B. No. 15703	♀	166+57	532+119	89/88
I.B. No. 12082	♀	154+x	584+x	93/94
I.B. No. 12200	♂	155+53	450+111	92/91
I.B. No. 15920	♀	158+x	775+x	96/94
I.B. No. 12379	♀	155+54	540+116	93/91
I.B. No. 12607	♀	153+54	550+124	95/97
I.B. No. 15790	♀	153+x	577+x	88/90
I.B. No. 15791	♀	160+53	667+147	96/97
I.B. No. 15792	♀	156+51	595+131	96/92
I.B. No. 15849	♀	156+53	725+159	95/94
I.B. No. 11590	♂	156+x	627+x	86/89
I.B. No. 829	♀	160+x	617+x	101/97
I.B. No. 863	♂	157+54	696+160	95/95
C.M. No. 37507	Juv.	152+56	178+45	94/91

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
C.M. No. 37508	♂	155+55	562+145	93/95+96–98
I.B. No. 12528	♂	153+x	468+x	96/96
I.B. No. 15662	♀	151+54	679+155	91/92
I.B. No. 10376	♀	148+51	753+170	89+91–92+95–96/93
M.N. No. 861	♀	154+60	480+111	96/98
M.N. No. 832	♀	155+49	398+90	96/95
M.N. No. 833	♀	157+x	630+x	99/99
M.N. No. 834	♀	156+x	637+143	88/87
M.N. No. 835	♀	156+54	604+150	91/93
M.N. No. 836	♀	152+55	703+182	96/94
M.N. No. 837	♀	157+53	645+147	98/99
M.N. No. 838	♂	151+53	561+146	96/96
I.B. No. 9222	♂	164+56	626+144	93/96
M.C.Z. No. 39417	♀	162+57	740+176	94/93
U.M.M.Z. No. 79674	♀	156+53	686+152	93/90
U.S.N.M. No. 100661	♂	161+54	615+140	99/99
U.S.N.M. No. 100678	♂	161+56	580+150	93/94
I.B. No. 15918	♂	167+56	624+150	95/96
I.B. No. 9241	♂	155+55	601+142	98/98
I.B. No. 1746	♀	165+60	179+42	95/93
M.N. No. 839	♀	156+57	870+189	97/96
M.N. No. 840	♀	157+54	708+165	101/97
M.N. No. 841	♀	161+54	606+147	95/95
M.N. No. 842	♂	162+56	470+118	90/92
M.N. No. 843	♀	158+57	272+60	95/95
M.N. No. 844	Juv.	156+54	171+40	98/96
M.N. No. 845	♂	155+54	164+42	92/93
M.N. No. 846	♂	155+54	173+46	86/88
M.N. No. 879	♀	147+47	173+41	88/87
M.N. No. 1877	♂	160+59	462+119	90/92
M.N. No. 1880	♀	163+55	305+72	90/91
I.B. No. 15628	♂	160+57	478+108	101/109
I.B. No. 15629	♂	156+54	523+129	98/98
I.B. No. 15645	♀	157+x	748+x	95/96
I.B. No. 15646	♀	156+x	630+x	98/97
I.B. No. 9242	♀	159+x	547+x	100/100

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 12553	♀	159+53	233+53	95/95
D.Z. No. 2966	♀	161+52	520+109	91/91+93–94
C.M. No. 37506	♀	161+51	495+107	98/97
D.Z. No. 1034	♀	167+54	190+42	97/97
C.M. No. 37494	♂	184+56	252+49	107/108
C.M. No. 37493	♀	180+60	?900+205	112/115
C.M. No. 37495	♂	175+55	298+60	107/107
C.M. No. 37496	♂	181+54	635+131	125/121+124–127
C.M. No. 37497	♀	182+59	341+73	121/120
C.M. No. 37498	♀	176+54	829+171	117/124+127–128+ 130–131
C.M. No. 37499	♂	178+56	357+74	117/115+118–121
C.M. No. 37500	♂	175+57	314+65	114/111
C.M. No. 37501	♂	176+56	178+38	128/126
C.M. No. 37502	♂	176+50	174+33	125/125
C.M. No. 37503	♂	179+61	240+53	119/122
C.M. No. 37504	♀	178+56	282+60	113/114
C.M. No. 37505	♂	181+56	285+53	125/126+130–131
C.M. No. 37509	♀	185+59	805+160	110+112–114/112
I.B. No. 1565	♀	182+60	743+145	104+107–109/107+ 109–111
K.M. No. R60566	♂	176+55	385+82	108/107
I.B. No. 12209	♀	180+59	662+146	105+106–110+114– 115/111
I.B. No. 12377	♂	176+56	595+136	107/110+112–113
I.B. No. 11591	♀	153+49	543+123	90/89
I.B. No. 11592	♂	179+x	647+x	110/113
I.B. No. 12349	♀	175+59	691+148	105/103+106–107
A.N.S.P. No. 11031	♀	178+58	855+182	100/100
A.N.S.P. No. 11032	♂	178+55	610+125	101/103
A.N.S.P. No. 11033	♀	183+x	670+x	121/117+118–119
A.N.S.P. No. 11034	♂	177+55	450+102	101/101
A.N.S.P. No. 11035	♂	181+55	580+116	109/109
A.N.S.P. No. 11036	♂	181+55	660+142	105/103
A.N.S.P. No. 11037	♀	181+52	475+103	107+103
A.N.S.P. No. 11038	♂	180+58	483+116	108/106
I.B. No. 12201	♂	181+57	562+121	114/112

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.B. No. 12207	♀	156+55	557+128	93/96
I.B. No. 12202	♀	168+52	703+141	109/111
I.B. No. 9683	♂	179+56	619+135	115/111+112–113
M.C.Z. No. 43308	♀	180+x	758+x	108/108
M.C.Z. No. 43309	♀	173+54	293+64	106/108
I.B. No. 11589	♂	159+52	542+133	98/96
U.S.N.M. No. 100700	♀	168+54	549+103	101/99
I.B. No. 12596	♂	166+52	643+153	102/103
I.B. No. 12598	♂	167+52	392+86	104+105–106/107
I.B. No. 12599	♀	166+51	542+111	95/95
D.Z. No. 1032	♀	188+63	775+158	122/121+122–125
D.Z. No. 1033	♀	163+x	533+x	108/107
D.Z. No. 1384	♀	182+55	354+66	112/112
I.B. No. 15825	♀	148+x	685+x	82/86
B.M. No. 84.2.23.23	♀	170+60	800+191	110/109
B.M. No. 84.2.23.24	♂	171+57	650+152	116/112
B.M. No. 84.2.23.25	♀	169+57	715+158	—
B.M. No. 84.2.23.26	♀	167+56	570+140	103/102+106–107
B.M. No. 84.2.23.27	♀	166+55	515+113	125/120
B.M. No. 84.2.23.28	♂	166+57	415+107	105/105
B.M. No. 84.2.23.29	♂	170+50	520+115	111/109
U.S.N.M. No. 70493	♀	173+52	336+70	113/106
C.N.H.M. No. 10610	♂	167+x	414+x	103/104
C.N.H.M. No. 10420	♂	177+57	382+86	95/105
M.A.C.N. No. 4568	♀	171+52	770+150	104/104
C.N.H.M. No. 10615	♀	171+56	293+61	105/105
B.M. No. 1925.5.25.2	♂	175+54	610+135	109/109
H.M. No. 5702	♀	169+57	440+104	105/105
M.S.N.G. No. CE 30605A	♀	165+59	418+106	110/108
D.Z. No. 1100	♀	185+x	821+x	118/121
D.Z. No. 1102	♀	176+x	763+x	118+120–123/120+121–123+124–125
D.Z. No. 1103	♀	178+59	425+93	112/111
D.Z. No. 1104	♀	178+x	843+x	113+116–118/114
M.C.Z. No. 46887	♀	170+62	610+154	105/102
C.N.H.M. No. 10691	♀	168+x	692+x	108/111
U.M.M.Z. No. 67211	♂	175+58	510+118	109/109
U.S.N.M. No. 65602	♀	174+56?	755+168	109/102

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
I.M.Z.U.T. No. 1008A	♀	185+59	542+444	112/113
I.M.Z.U.T. No. 1008B	♀	185+57	580+120	124+128–129/133
B.M. No. 94.3.14.57	♀	183+x	700+x	118/113
B.M. No. 1956.1.3.39	♀	187+62	185+39	117/116
B.M. No. 1962.83	♂	190+61	203+43	115/106
B.M. No. 1962.84	♂	188+60	590+121	114/116
M.A.C.N. No. 45a–1	♀	173+54	630+140	109/109
M.A.C.N. No. 45a–2	♂	171+59	590+140	99/99
M.H.N.P. No. 98–274	—	176+x	549+x	109/106
B.M. No. 1924.4.29.4	♀	177+x	720+x	116/114
B.M. No. 1930.6.7.6	Juv.	169+53	170+38	113/116
B.M. No. A	♀	178+51	890+195	115/114
M.A.C.N. No. 2904	♀	144+56	580+135	96/94
M.A.C.N. No. 2227	♂	186+61	600+130	116/116
Z.S.M. No. 210/09	♂	183+60	580+130	112/116+120–121
Z.S.M. No. 1463/03	♀	182+58	650+132	112/108
C.N.H.M. No. 80144	♀	182+56	450+93	111/106
M.A.C.N. (no No.)	♀	179+57	700+140	65+74–75+76–118+119–122/46+47–69+72–117+120–123
M.A.C.N. No. 902	♀	174+60	640+151	102/100
U.M.M.Z. No. 109849	♀	180+59	675+134	116/114
M.A.C.N. No. 1514	♀	178+57	723+118	113/110
M.A.C.N. No. 957	♀	175+57	730+160	108/106
M.A.C.N. No. 1093	♀	177+57	750+160	114/113
M.A.C.N. No. 894	♀	175+59	990+199	105/102
M.A.C.N. No. 7168A	♂	178+68	650+140	112/110
M.A.C.N. No. 7168B	♂	178+54	420+82	113/113
I.B. No. 182	♀	175+59	733+161	101/102
M.A.C.N. No. 4764	♀	177+x	850+x	103/103
M.A.C.N. No. 5410	♂	186+58	520+100	110/110
M.A.C.N. No. 7152	♀	179+58	650+135	105/105
M.A.C.N. No. 7782	♂	178+x	480+x	118/117+122–123
K.M. No. 60569	♀	162+x	705+x	95/96
M.A.C.N. No. 4148	♀	170+57	820+180	111+114–115/106
M.A.C.N. No. 864	♂	178+56	530+115	107/107
M.A.C.N. No. 881	♀	182+x	171+x	122/121

TABLE 1—(*Continued*)

Museum Number	Sex	Ventral+ Caudal Scales	Snout–Vent Plus Tail Length in Mm.	Reduction Site
B.M. No. 1922.3.2.2	♀	177+59	685+166	103/103
B.M. No. 1922.3.2.3	♀	178+56	720+155	95/92+95–98
C.M. No. 263	Juv.	161+59	270+62	100/93+94–99
C.M. No. 265	Juv.	156+54	217+51	90/90
C.M. No. 266	Juv.	159+55	185+45	81/78
C.M. No. 267	Juv.	159+50	193+44	—