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Amphisbaena medemi, An Interesting New Species from Colombia (*Amphisbaenia*, Reptilia), with a Key to the *Amphisbaenians* of the Americas

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SUMMARY

Amphisbaena medemi, new species, is a small amphisbaenian from extreme northern South America. The species belongs to the grouping of small, four-pored animals and is suggestive of a stage intermediate between species from the mainland of South America and from the Antilles. The paper includes a key to all recognized forms of American amphisbaenians.

The amphisbaenians of northern South America (cf. Gans, 1967) fall into two obvious groups. The first includes two large species, *Amphisbaena alba* and *Amphisbaena fuliginosa*, wide-ranging forms that occur across the Amazon basin and far to the south (cf. Gans, 1962a; Vanzolini, 1951). The second includes a series of five much smaller species, all with relatively restricted ranges, perhaps parapatric but certainly included within the ranges of the larger forms. The character states of these small forms suggest some diversity; however, they all share such characteristics as fewer than 18 dorsal and fewer than 20 ventral segments to a mid-body annulus, a bluntly-rounded head with relatively large and regular shields and body annuli between 205 and 250. Four of the five species show four preloacal pores. If the poorly characterized *Amphisbaena*

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stejnegeri (known from two damaged specimens) is eliminated, the clustering of character states becomes even more marked.

The assemblage is perhaps most interesting because one of its members, *Amphisbaena gracilis* Stauch, has been shown to represent those conditions among all mainland forms that appear closest to the character states of the nine species of *Amphisbaena* inhabiting the Greater Antilles and adjacent islands (Sponga and Gans, 1971). Consequently, it is of some interest here to report on the discovery of yet another small mainland species that not only fits into the continental grouping but shows further affinity to the Antillean populations.

We are grateful to Mr. Hymen Marx and Dr. Harold Voris, Field Museum of Natural History (FMNH), for making these specimens available for study and take pleasure in naming this new form after Dr. Fred Medem, collector of most of the specimens, in recognition of his substantial contribution to our knowledge of the herpetofauna of Colombia. Supported by National Science Foundation grant BMS 71 01380.

Amphisbaena medemi new species

Holotype.—FMNH 165245, taken between 1 and 10 December 1965 at Cienaga de Amajehuevo, Canal, Depto. Atlantico, Colombia by Federico Medem H.

Paratypes.—FMNH 165243-165244, 165246-165247, taken between 1 and 10 December 1964 with the holotype, FMNH 165248-165250, taken on 15 January 1965 by C. A. Velasquez, and FMNH 165251-165257 taken on 31 January 1965 by F. Medem; all from the same locality.

Diagnosis.—A small to medium-sized form of *Amphisbaena* with the nasals totally separated or reduced to medial point contact by the ascending rostral which generally contacts the frontals. Specimens often have azygous fusion of postocular and parietal head scales; three equally sized supralabials; one medium, one large, and one small infralabial on each side; two postgenial and no postmalar rows of chin shields. There are 230-235 body annuli; 17-18 caudal annuli with the autotomy constriction falling on the fifth to seventh postcloacal annulus; 16 dorsal and 18 ventral segments per midbody annulus; and four large circular precloacal pores in both sexes. The specimens are brown dorsally, fading to a lighter color ventrally. The color is densest in the rectangular centers of each segment, with the dark area decreasing along the sides and dropping out by seg-

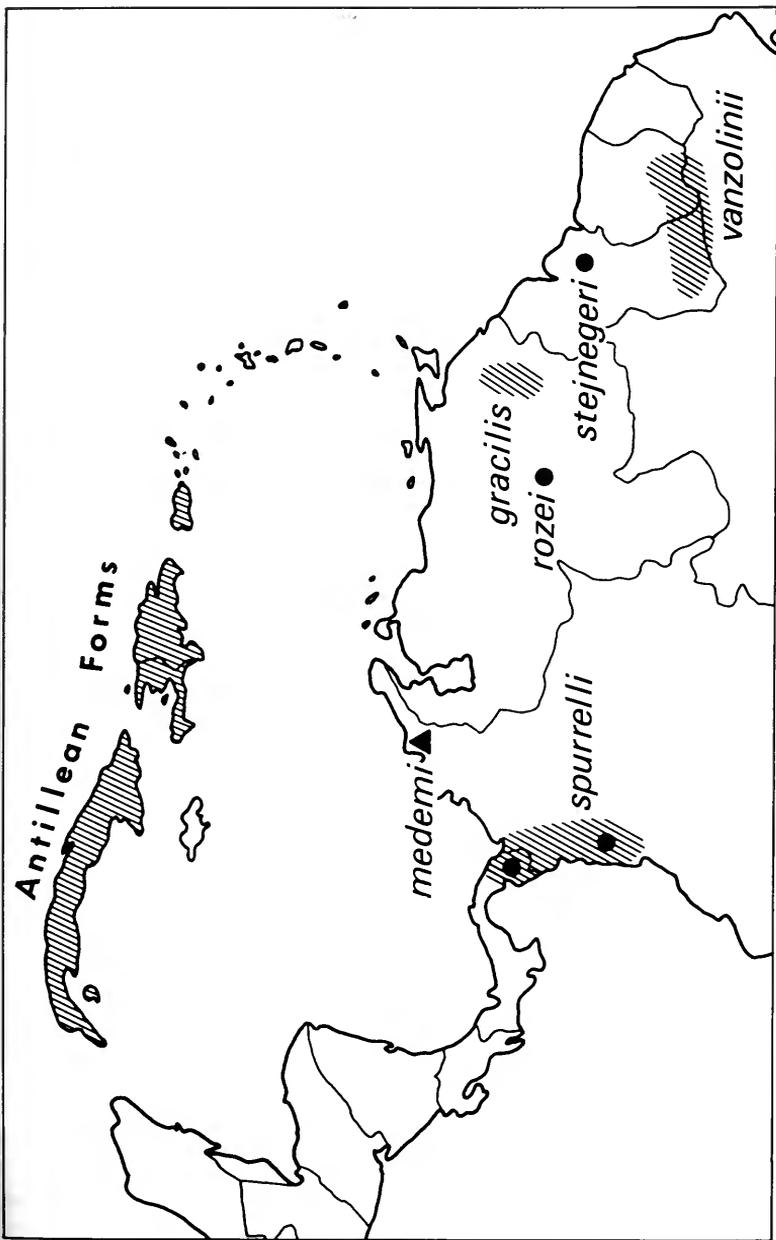


FIG. 1. Sketch of map to show the locality of *Amphibaena medemi* in relation to the ranges of the other small amphibaenians herein discussed.

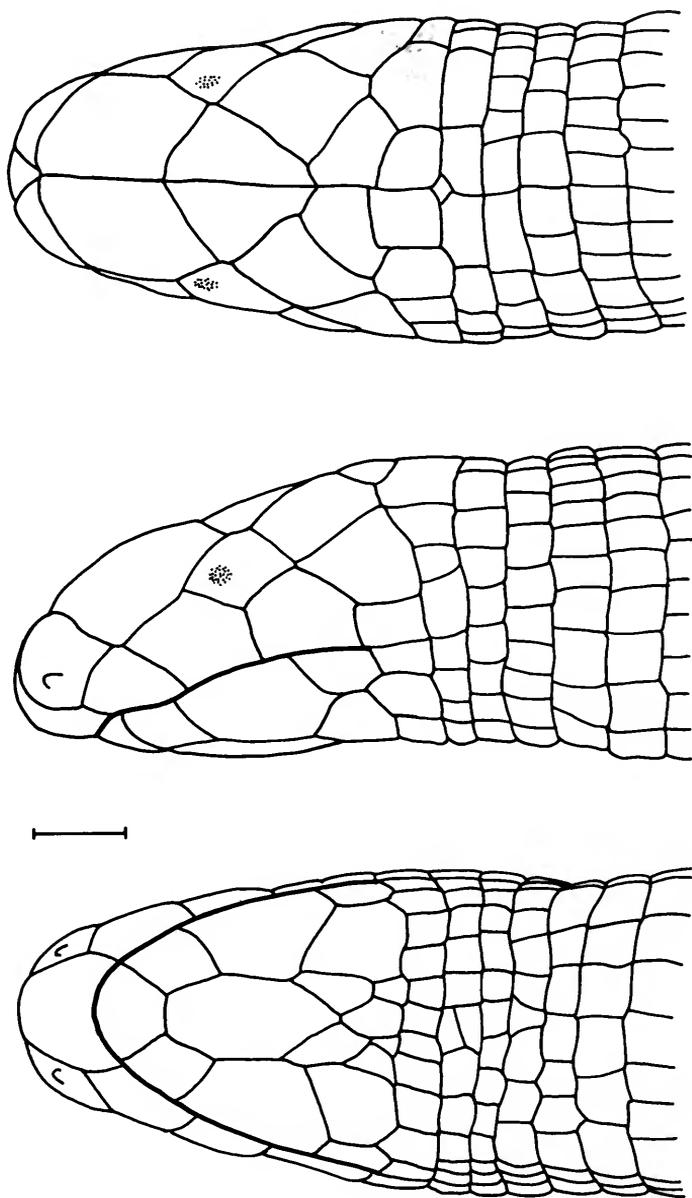


FIG. 2. *Amphisbaena medemi*. Dorsal (top), lateral (middle), and ventral (bottom) views of FMNH 165245 show segment arrangement. The line equals 1 mm. to scale. (Don Luce, del.).

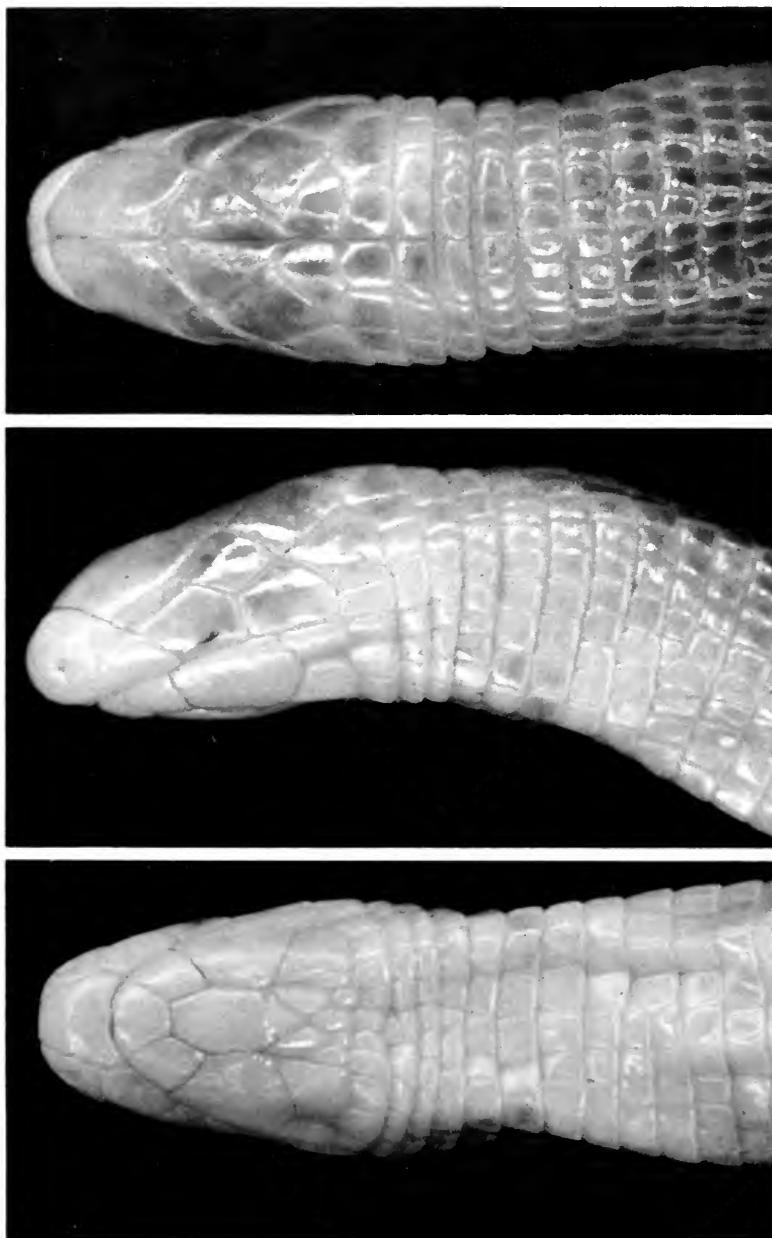


FIG. 3. *Amphisbaena medemi*. Dorsal, lateral, and ventral views of FMNH 165245 to show pigmentation, and the sculpturing of the surface.

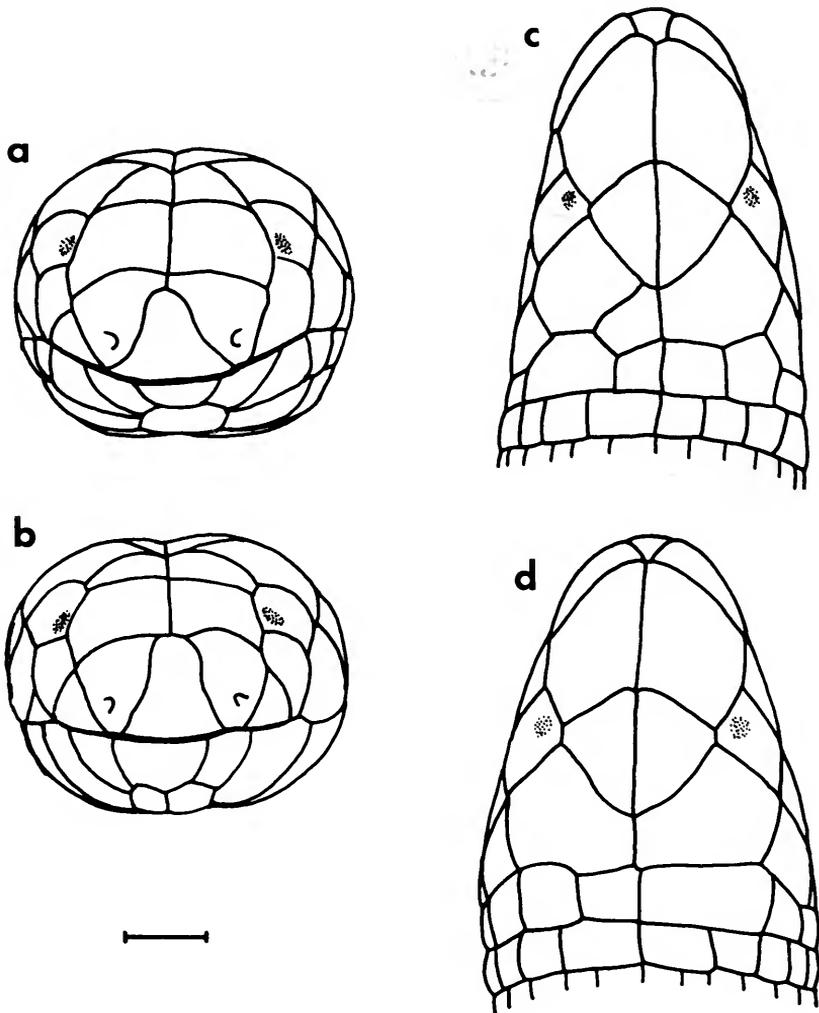


FIG. 4. *Amphisbaena medemi*. Details to show variation. Frontal views of FMNH 165253 (a), and 165249 (b) to show extremes in the kinds of contact between rostral tip and frontals. Views of the nuchal region of FMNH 165244 (c) showing fusion of postocular to parietal on the right side and of FMNH 165256 (d) showing bilateral fusion. (Don Luce, del.). The line equals 1 mm. to scale.

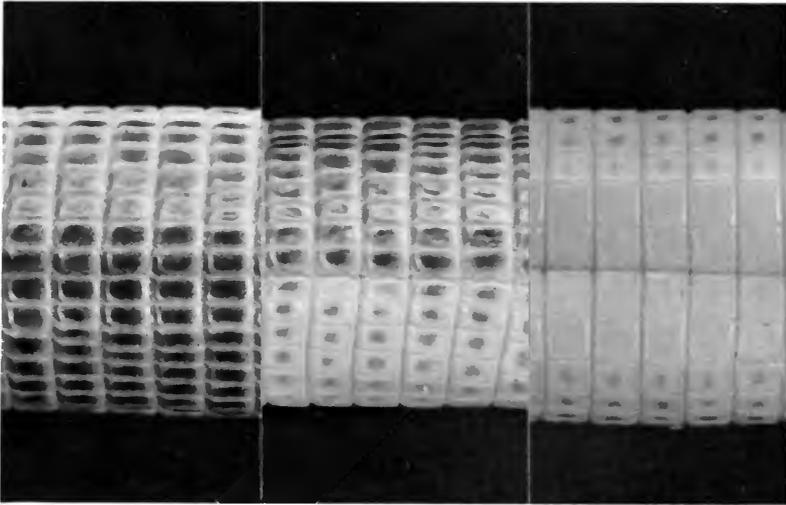


FIG. 5. *Amphisbaena medemi*. Dorsal view (left), lateral view (middle), and ventral view (right) of FMNH 165243 at mid-body to show proportions and pigmentations of segments.

ments in the neck and caudal regions. Many specimens show a light nuchal band.

Description. — Figures 2 through 7 show aspects of segmentation, pigmentation and body proportions. Figure 8 presents a scatter diagram of tail lengths *versus* snout-vent lengths. The raw data for the type series are given in Table 1.

This is a small to medium-sized species of *Amphisbaena*, showing a brownish dorsal and a lighter ventral coloration. The tip of the snout and the nuchal region tend to be lightened, while the dorsal, lateral, and posterior surfaces of the tail are densely pigmented. The lateral limits of pigmentation extend onto the ventral surface of the tail so that only the medial two to four rows of segments are lightened. The intersegmental and interannular sutures are always lighter than the scale centers. Rostral, nasals, and superlabials as well as the chin shields tend to be unpigmented. Two or three annuli between the second and seventh may be faded or may lack pigmentation producing a light band across the nuchal region.

The dorsal surface is more or less uniformly pigmented with only slight emphasis of the segmental centers. The two middorsal rows of segments are significantly darkened. One or two rows below the

TABLE 1. Character states for the available specimens of *A. medemi*.

Body	Lateral	Autotomy	Caudal	Dorsal/ Ventral		1st Post- genial	2nd Post- genial	Supralabial/ Infralabial	Pores	Preocals	Post- Cloacals	Measurements - mm.	
				Snout- Vent	Tail Diameter								
165243	5	(6)	17	16/18	2	4	3/3	4	6	15	144	12	4
165244	-	-	-	16/18	2	5	3/3	4	6	-	161	-	4
165245	5	(7)	18	16/17-18	2	5	3/3	4	7	12	170	14	4
165246	4	(6)	17	15-16/18	3	5	3/3	4	8	14	119	10	3
165247	4	(6)	17	14-16/18	2	5	3/3	4	7	15	158	13	4
165248	5	(6)	17	16/18	2	5	3/3	4	7	17	160	13	4
165249	3	(7)	18	15-16/18	2	4	3/3	4	7	14	159	13	4
165250	4	(6)	17	15-16/18	2	3	3/3	4	6	17	153	13	4
165252	3	(6)	18	15-16/18	2	4	3/3	4	8	17	160	13	4
165253	3	(6)	18	15-16/17-18	2	4	3/3	4	7	14	155	13	4
165254	-	-	-	15-16/16-18	2	4	3/3	-	-	-	-	-	4
165255	4	(6)	17	16/18	2	4	3/3	4	8	13	184	14	4
165256	-	-	-	16/18	2	3	3/3	4	8	-	156	-	4
165257	4	(5)	17	16/18	2	3	3/3	4	8	14	158	13	4

lateral sulcus the pigmentation becomes restricted to the segmental centers and these may become very small and faint by the fifth or sixth ventral row from each side. The three or four annuli anterior to the cloaca and the midventral segments of the caudal annuli show checkerboarding with the pigmentation appearing to drop sharply and often asymmetrically on individual segments.

The head segmentation is characterized by a caudad projection of the dorsal tip of the rostral which partially or totally separates the nasals from medial contact and in some specimens inserts briefly between the prefrontals, and by the generally azygous fusion of parietal and postocular head scales; yet lacks other major fusions. The head is dorsoventrally compressed; the slightly elongated snout is dorsally arched but is of a horizontally oval cross-section. The rostral tip extends beyond the lower jaw and the temporal bulges noticeably posterior to the eye. There is some indication of nuchal constriction and slight reduction of the diameter of the nuchal region. The trunk is approximately the same diameter along its length and is compressed dorso-ventrally representing at midbody a horizontally oval cross-section.

The rostral is visible from above, slightly larger than the first supralabial, and of the same area as the nasals. Pairs of separated nasals, large prefrontals, medium-sized frontals, and smaller, quadrangular to pentagonal parietals form a sequence along the dorsal surface of the head. The posterior tips of the frontals insert along the anterior suture between the parietals. Only four specimens have discrete parietals, in six that of the right side is fused to the enlarged postocular, in one fusion is on the left side and two show both sides fused. The diamond-shaped oculars are in anterior contact with the third supralabials and the large postocular. Each of three subequal supralabials is slightly larger than the ocular. The post-supralabial (just posterior to the angulus oris) abuts dorsally on the very large first temporal (which may be in point contact with the ocular). The post-supralabials, temporals, postoculars, and frontals apparently comprise the dorsal segments of the first body annulus. The four middorsal segments of the second body annulus are irregularly enlarged and lie posterior to the parietals, which thus seem to represent a medially intercalated pair of segments. The eye is clearly apparent.

The mental is slightly narrower than the rostral, its area equivalent to that of the first infralabials which are followed by large sec-

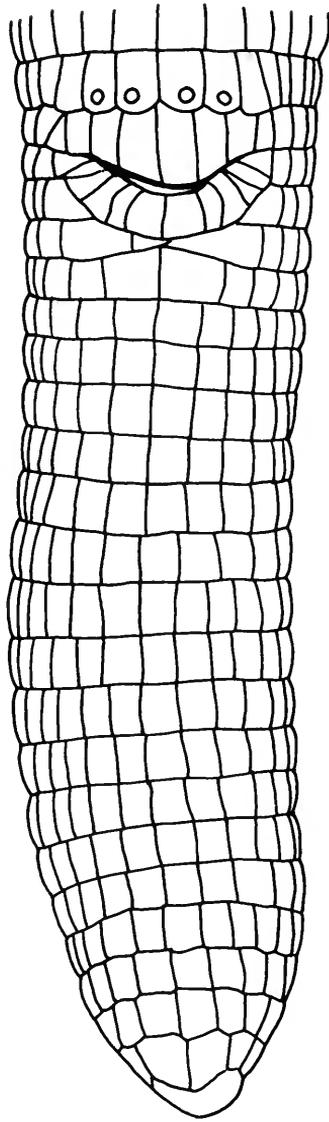


FIG. 6. *Amphisbaena medemi*. Ventral view of cloaca and tail of FMNH 165257 to show segmental proportions. The line equals 1 mm. to scale. (Don Luce, del.).

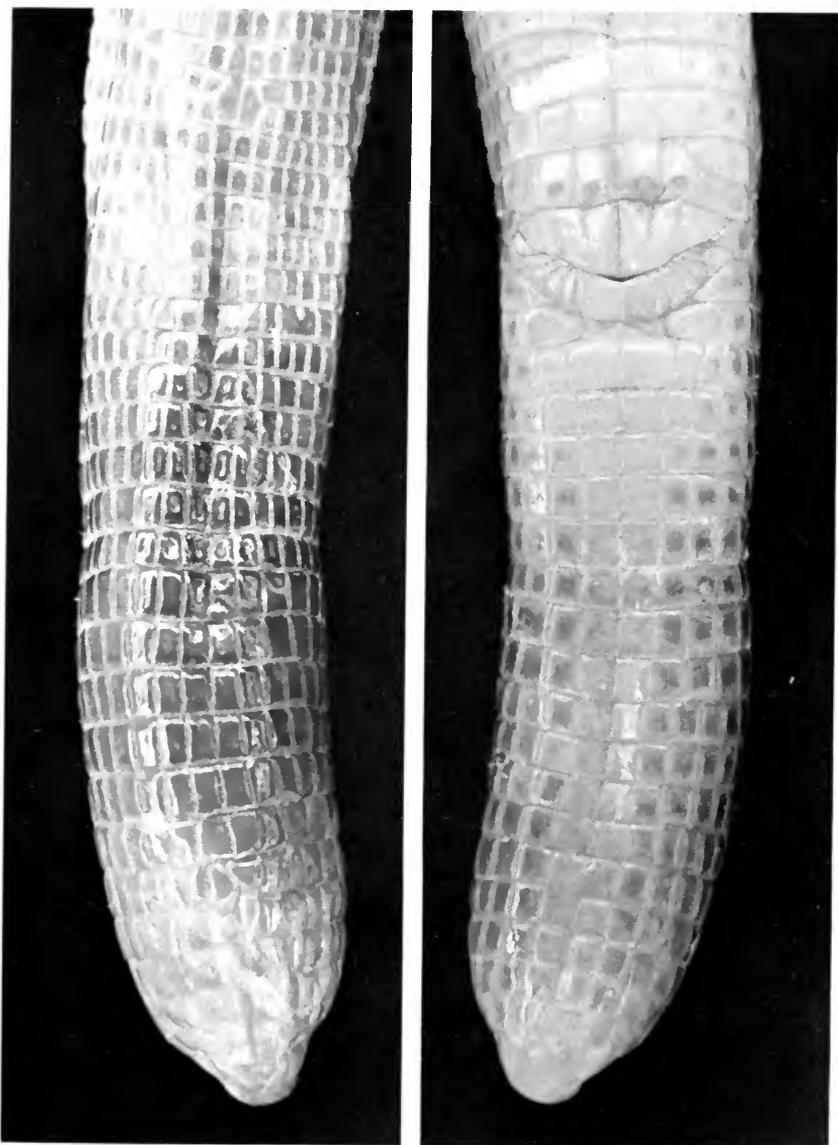


FIG. 7. *Amphisbaena medemi*. Dorsal and ventral views of the tail of FMNH 165243 to show pigmentation and overall proportions.

ond infralabials and smaller rectangular third infralabials. The ovate, posteriorly triangular postmental is in straight contact with the mental, in broad contact with the first and second infralabials, flanked by the elongate elements of the first, and in narrow contact with the central element of the second postgenial row. The malars are roughly as wide as long, in medial contact with the third infralabials and broadly contact the second infralabials. The malars flank the two rows of postgenials, the interrupted first containing two and the second containing three to five segments. The second row of postgenials tends to be irregular and its segments may fuse with those of the first body annulus. There is no postmalar row, nor are the immediate postmalar segments enlarged by fusion.

Dorsally the first body annulus includes one to two small segments posterior to the third supralabial, the temporal, the postocular, and the frontals. The dorsal segments of the nuchal region are enlarged and the corresponding ventral segments reduced. The dorsal segments along the trunk consistently decrease slightly in size from the nuchal region towards the cloacal zone and onto the tail.

There are 230-235 body annuli from the back of the third infralabial up to and including the pore-bearing precloacal. Irregularity of the segmentation or dorsal half-annuli are rare. A midbody annulus contains 14 to 16 (generally 16) dorsal and 16 to 18 (generally 18) ventral segments.

The cloacal region is characterized by four large, circular precloacal pores, six to eight precloacal segments, 12 to 17 postcloacal segments and three to five lateral rows. There are 17 to 18 caudal annuli up to the smooth caudal cap, with the autotomy annulus falling on the fifth to seventh postcloacal annulus. No specimens show autotomized tails or healed scars. Segments bearing rectangularly pigmented centers extend further ventrally on the autotomy annulus than on other caudal annuli. The tail is horizontally oval in section at its base, then reaches a vertically oval section, with an indented ventral surface in the terminal third. For the last three annuli it shows a sharp bilateral flattening so that it terminates in a blunt vertical keel.

The lateral sulci begin after approximately the 45th body annulus and continue up to the level of the cloaca. These sulci are poorly defined and narrower than one bordering segment. There is no obvious dorsal sulcus. Lateral and ventral sulcal regions are characterized by slight indentations of the trunk.

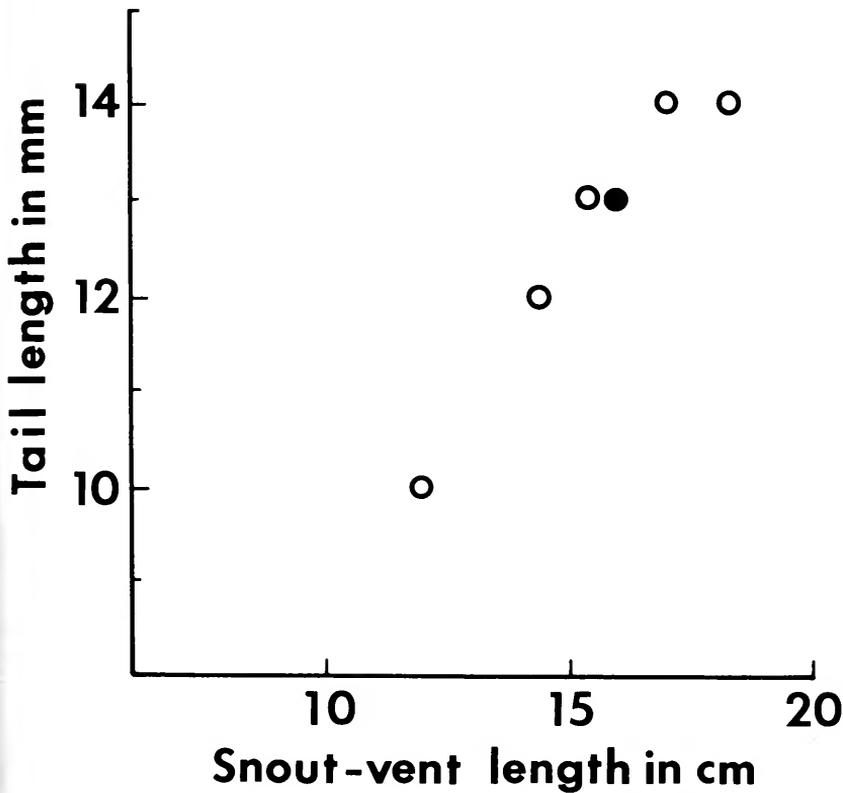


FIG. 8. *Amphisbaena medemi*. Scatter diagram of tail lengths vs. snout-vent lengths for the available specimens.

The middorsal segments of the midbody annulus are approximately two times as long as wide. The ventral segments are approximately $1\frac{1}{3}$ times as wide as long.

Range. — Known from the type locality only.

Ecology. — The animals were taken during the construction of the fish cultural station of Inderena at the Laguna de Amajahuevo (Departamento Atlántico) which lies on the shore of the Canal del Dique close to the village San Cristóbal (Departamento Bolívar). The village is $1\frac{1}{2}$ hours by boat from the town of Soplaviento (Departamento Bolívar; 53 km. from Cartagena) and lies between the lagoon (about $1\frac{1}{2}$ hectares) and the canal. All specimens, as well as some *Leptotyphlops* and *Bachia*, were collected at depths of approximately 60 cm. to 1 m. in ditches easily excavated for foundations in

Table 2. Summary of character states for small species of *Amphisbaena* west to east across the Antilles and across northern South America

	Body Annuli	Caudal Annuli	Autotomy Site	Dorsals	Midbody Ventrols	Dorsal Color ¹	Ventral Color ¹	Pores	Genial Rows ¹	Malars ¹	Special States ²
<i>c. cubana</i>	199-218	10-14	6-9	12-16	14-18	Unif.	CB	4(5, 6)	XX —	—	1
<i>c. barbouri</i>	226-248	14-18	none	12-14	16-18	Box	CB	4-6	XX —	—	1
<i>i. innocens</i>	186-219	10-15	none	14-17	18-22	Unif.	CB	4(6)	XXX	—	2
<i>i. caudalis</i>	200-208	18-19	none	14	20	Box	CB	4	XXX	—	2
<i>g. gonavensis</i>	207-225	10-12	none	16-18	21-24	Unif.	CB	(3)4	XX —	X	
<i>g. hypoptissor</i>	199-221	19-21	5-6	16-18	20-24	Unif.	CB	4	XX —	X	
<i>g. leberi</i>	207-220	16-19	5	15-16	22-25	Unif.	CB	4	XX —	X	
<i>manni</i>	209-243	17-22	5-7	12-16	14-20	Unif.	Unif.	4-8(9)	XX —	—	3
<i>caeca</i>	214-236	13-18	5-8	13-18	14-20	Box	CB	4(6)	XX —	X	
<i>bakeri</i>	239-258	12-16	none	14-16	16-18	Box	CB	4	XX —	—	
<i>schmidti</i>	192-207	18-22	7-8	13-16	16-18	Unif.	Fad.	4	XX —	X	
<i>xera</i>	225-234	12-16	5-7	12-16	14-16	Unif.	CB, Fad.	4	XXX	—	
<i>fenestrata</i>	236-251	12-14	none	12-14	14-17	Box	CB	4	XX —	X	4
<i>spurrelli</i>	218-222	18-20	7	16-18	16-18	Box	Fad.	4(oval)	X —	X	5
<i>medemi</i>	230-235	17-18	5-7	14-16	18	Box	Fad.	4	XX —	—	6
<i>gracilis</i>	224-248	21-22	6-7	14-16	14-16	Dark Unif.	Dark Unif.	4(oval)	XX —	—	
<i>rozoi</i>	205-209	20	6	30-32		Box ant. edge	CB Fad.	4	? ? ?	? ?	7
<i>stejnegeri</i>	243-247	?	9	17-19	16-20	CB	Unic.	6	XX —	X	8
<i>vanzolinii</i>	200-231	28-31	variable	12-16	12-18	Box	Fad.	4(oval)	XX —	—	

the dry and sandy soil. No rain fell during the period of collection. Generally December is the end of the rainy season at this locality.

The site of the excavation was unshaded by large trees, but covered by pasture and scrubs. The mean temperature of the region is about 25-35° C. in the shade. Locals indicate that the general region sometimes floods during the rainy season.

Etymology. — Named after Dr. Federico Medem M., who collected the specimens, in recognition of his contributions to the biology of South American reptiles. Dr. Medem informs us that the animals are locally referred to as "tatacoas" or "ciegas."

DISCUSSION

Table 2 (based upon the reports of Gans, 1962b, 1963, 1964; Gans and Alexander, 1962; Hoogmoed, 1973; Sponga and Gans, 1971; Thomas, 1965, 1966) summarizes the character states of the various small amphisbaenians of northern South America and the Antilles. It shows that the character states of *Amphisbaena medemi* are very close to those of *A. fenestrata* in body annuli, number of segments to a mid-body annulus, rostro-frontal contact, and number of preclacal pores. They differ in number of caudal annuli, in the tendency of *A. fenestrata* to have a medial sulcus at least posteriorly, as well as a postmalar row, and of *A. medemi* to have a longer tail and caudal autonomy. *A. fenestrata* shows a checkerboard pigmentation rather than the gradual fading of pigmentation that characterizes *medemi*. While the similarity to *A. fenestrata* is considerable, it is only an expression of a general similarity between such forms as *A. xera* and *A. caeca*, on the one hand, and of *A. medemi* and *A. gracilis*, on the other. *A. medemi* is similar to the Antillean form as it is the only form of the northern mainland that has fewer dorsal than

Key to Table 2 opposite:

1. Key to abbreviations: Box, rectangular pigmentation in center of each segment; CB, checkerboard dropping out of pigment; Fad. pigment fading and gradually from dorsal to ventral along sides of trunk; Unif., uniform pigmentation across entire surface of segments; X, first, second, and third genial or malar row present.

2. Key to Special States column. 1, Ocular fused to second supralabial; 2, extra dorsal half annuli; 3, rostral and nasals fused; 4, rostral and frontals in contact; 5, caudal tuberculation; 6, rostral and frontals generally in contact; 7, body segments tuberculate; 8, mental and post mental fused.

ventral segments to a midbody annulus. The various kinds of fusions (listed under special states) would seem to represent independent events rather than a sequence.

We must again echo Sponga and Gans (1971) in deferring conclusions until additional and preferably internal character states of the new form have been compared with those of other species. This should presumably proceed in parallel with such analysis of the small amphisbaenians now assigned to other genera.

The new form and the results of some other recent papers (Sponga and Gans, 1971; Vanzolini, 1971; Stimson, 1972; Gans and Diefenbach, 1972; Hoogmoed, 1973; Gans, 1974) permit amplification of the key to the American *Amphisbaenia* (Gans and Diefenbach, 1970).

KEY TO THE AMERICAN AMPHISBAENIA

[The following key to the Recent amphisbaenians of the Americas attempts to characterize the forms presently recognized on the basis of external characteristics. No effort has been expended to make the key natural but the most obvious and clearly apparent characteristics have always been emphasized. As certain characteristics such as pigmentation may occasionally be absent, and many species demonstrate caudal autotomy, we have avoided use of characteristics involving these and have provided multiple criteria for as many couplets as possible in order to facilitate identification. The key omits *Amphisbaena polygrammica* as being insufficiently characterized to permit diagnosis.]

Characterization of American Amphisbaenia: Body cylindrical, sometimes a tendency toward slight dorsoventral or lateral compression. Temporal musculature may be swollen and followed by a slight nuchal constriction in adults. Head often not differentiated from body in juveniles. Anterior third of body often slightly thickened but rarely with any significant diametric reduction between head and vent. Tail always less than 20 percent of body length. Skin annulated with dorsal and ventral half-annuli meeting at, and sometimes continuous across, a lateral groove on each side which starts in the first third of the body and runs to the vent.

Head may be rounded, pointed, spatulate or keel-shaped with or without keratinization. Mouth depressed, edges of lip inserted within head. Eye small, beneath skin, clearly visible in fresh specimens but with pigments sometimes bleaching out in preservative.

Precloacal pores in a single row present or absent with their expression often exhibiting sexual dimorphism. Tail often with autotomy constriction at which it may break and heal into a conical stump without regeneration. Distal tip of original tail occasionally with keels, nobs or other modifications.

1. Two well-developed forelimbs, but no hindlimbs (head large and bluntly rounded; an enlarged azygous prefrontal; discrete nasals, preoculars and supraoculars; dorsal and ventral half-annuli poorly aligned along lateral sulci, with dorsal number 50 per cent higher; precloacal pores in two series, widely separated) (*Bipes*) 10
No external evidence of fore or hindlimbs. 2
2. Snout shovel-shaped with a more or less obvious horizontal edge (shields of pectoral region often markedly irregular; no precloacal pores, tail short, generally lacking an autotomy plane). 3
Head rounded, pointed or vertically keeled 5
3. Rostral folded around center of horizontal edge; three pairs of regular paired shields, but no azygous shields, follow it along midline of the head; tail very short and blunt but with well marked narrow autotomy constriction *Aulura anomala*
Rostral excluded from center of horizontal edge; one or more azygous shields along midline on dorsal surface of head; tail lacking autotomy constriction 4
4. Tip of snout broadly rounded; nostrils in discrete nasals; at least three enlarged azygous shields on midline of head; caudal tip dorsoventrally flattened, its dorsal surface covered with multiple small tubercles.
Rhineura floridana
Tip of snout narrowly rounded or pointed; nostrils in a fused rostro-nasal shield; caudal tip short and bluntly rounded without tuberculation
(Leposternon) 15
5. Prefrontal azygous (flanked laterally by a postnasal supraocular segment; a single row of medially interrupted precloacal pores; tail short, rounded, lacking autotomy plane; pigmentation pattern involving spots and blotches, more or less independent of the segmental arrangement)
(Cadea) 14
Prefrontals paired 6
6. Head keel-shaped; rostral very much enlarged, and ascending over the face, keeping the nasals, prefrontals, and sometimes the frontals from contact (keel sometimes keratinized; distal tip of tail may bear vertical ridge; tail lacking autotomy plane) 7
Head pointed or rounded, otherwise slightly compressed laterally; rostrals not separating frontals and prefrontals 9
7. Frontals in broad contact on midline; rostral longer than high with a blunt vertical keel (rarely keratinized); (two precloacal pores separated by a median hiatus and three supralabials; 259-281 body annuli)
Mesobaena huebneri
Frontals (and prefrontals) in point contact or separated by ascending process of rostral; rostral higher than long with a sharp vertical keel; (four precloacal pores in a continuous series or two supralabials) 8
8. Postmental larger than malar; three supralabials; 214-249 body annuli (no supernumeraries); four precloacal pores in an uninterrupted row
Anops kingi

- Postmental not larger than malar; two supralabials; 358-372 body annuli (including supernumeraries); two preloacal pores in a medially interrupted row *Anops bilabialatus*
9. Head with marked vertical compression; rostral in broad contact or excluded from contact with enlarged prefrontals; neither parietals nor occipital segments enlarged; two medially-separated short rows of preloacal pores (*Bronia*) 10
 Head generally rounded, pointed or only faintly compressed; rostral without or with only narrow median contact with prefrontals, unless they have fused with nasals; a variable number of round or oval preloacal pores in a single row of proloacal segments without a major hiatus (*Amphisbaena*) 20
10. Nasal segments do not contact each other; 213-229 body annuli; 18-21/18-21 midbody segments *Bronia brasiliانا*
 Nasal segments contact each other; 281 body annuli; 28/24 midbody segments *Bronia kraoh*
11. Six to eight preloacal pores; three to five digits per hand 12
 Two wide preloacal pores; five digits per hand *Bipes biporus*
12. Three digits per hand; 142 ventral and 169 dorsal half annuli; 32-35 dorsal and 30-38 ventral segments to a midbody annulus *Bipes tridactylus*
 Four to five digits per hand; more than 148 ventral (and near 200 dorsal half annuli); apparently lower numbers of segments to a midbody annulus) 13
13. Most specimens with fewer than 159 half annuli; always fewer than 201 dorsal half annuli *Bipes c. canaliculatus*
 Most specimens with more than 165 ventral half-annuli; always more than 215 dorsal half annuli *Bipes canaliculatus multiannulatus*
14. Body annuli 175-218 (counted on ventral surface), caudal annuli 10-14, segments in a midbody annulus 25-33, snout rounded, blunt
Cadea blancoides
 Body annuli 274-320 (counted on ventral surface), caudal annuli 12-17, segments in a midbody annulus 32-39, snout domed, laterally compressed *Cadea palirostrata*
15. Only two rows of enlarged scales visible in dorsal view atop the head (the first of these the rostro-nasal, the second the azygous which may or may not be followed by a fringe of very much smaller segments in the occipital region); suture pattern simple; pectoral region covered with very large geometrically regular shields 16
 Three or more rows of enlarged shields atop the head, suture pattern often complex; pectoral region complexly divided or not 17
16. Rostro-nasal followed by an enormous azygous shield which covers nearly the entire dorsal surface of the head, narrowly fringed posteriorly by a single row of very much smaller segments; head shield strongly keratinized; mental and postmental discrete; 253-305 postpectoral annuli
L. scutigerm

Rostro-nasal followed by a very large azygous, flanked on each side by triangular prefrontals and small temporals; headshields not significantly keratinized; a single mental-postmental segment; 378 postpectoral annuli. *L. octostegum*

17. A single, very small first supralabial followed by a large second and a small third supralabial 18

A very large first supralabial followed by a smaller second supralabial . . 19

18. Azygous shield in contact with rostro-nasal; frontals and medial temporals much larger than the azygous, longer than wide and arranged in a characteristic linear grouping; infraocular absent; a small first followed by a large second infralabial; pectoral shields in a regular arrangement of large shields reminding of an hourglass; dorsal number of postpectoral annuli generally equal to ventral, rarely up to 10 greater than; adults of medium size (snout-vent length equals 205-432 mm.) . . *L. polystegum*

Azygous shield separated from contact with the rostro-nasal by a wide suture between prefrontals; frontals about as wide as long, not significantly larger than the azygous, temporals much smaller, infraocular generally present; a very large first infralabial; pectoral segments only slightly enlarged, rounded sometimes with irregular longitudinal fusions; dorsal number of postpectoral annuli always five to 25 higher than ventral number; adults very large (snout-vent length equals 285-600 mm.) *L. infraorbital*

19. Azygous always distinctly delineated; pectoral region covered by three to four pairs of elongated regularly arranged shields which may fuse except for the midline; number of dorsal and ventral postpectoral annuli more or less equal; 242 to 265 postpectoral annuli *L. wuchereri*

Azygous often fused in various ways with adjacent head shields; a medial pair of elongate pectoral shields with other modified, possibly enlarged shields radiating out from these anteriorly; always significantly (5-25) more dorsal than ventral postpectoral annuli with the increase greater in the second, third, and fourth fifths of the trunk (177-242 postpectoral annuli) *L. microcephalum*

20. Nasals entirely separated from medial contact by posterior tip of rostral 21

Nasals in contact at midline 22

21. Body darker brown dorsally, lighter ventrally by checkerboarding, tail faintly conical, pointed, with 12 to 14 annuli, lacking autotomy, malar row present *A. fenestrata*

Body darker brown dorsally, lightened ventrally by reduction of segmental centers. Tail rounded, with slight distal pinching, with 17 to 18 caudal annuli and an autonomy annulus at the 5th to 7th; no malar row *A. medemi*

22. With constant and characteristic fusion of head shields 23

Without major fusions of head shields (rostral, nasals, prefrontals, frontals, supralabials and oculars always discrete). 26

23. Mental and postmental fused (243-247 body annuli; 6 precloacal pores; 33-39 segments per midbody annulus; nasals larger than prefrontals; caudal autotomy near 9th annulus) *A. stejnegeri*
Mental and postmental discrete 24
24. Second supralabial and ocular fused; rostral and nasals discrete (199-240 body annuli; 10-18 caudal annuli; 4-6 precloacal pores; 26-34 segments per midbody annulus; no postmalar row) (*A. cubana*) 25
Second supralabial and ocular discrete; rostral and nasals fused (209-243 body annuli; 17-22 caudal annuli; 4-9 precloacal pores; no postmalar row) *A. manni*
25. 199-218 body annuli; 10-14 caudal annuli, with caudal autotomy
A. c. cubana
226-240 body annuli; 14-18 caudal annuli, no caudal autotomy
A. cubana barbouri
26. Very large and thick (adults near 40-50 cm. in length, more than 1.5 cm. in diameter); more than 65 segments to a midbody annulus; with prominent temporal; tail of same diameter as the trunk; lacking caudal autotomy; terminal caudal annuli weakly delimited; 4-10 precloacal pores *A. alba*
Medium to large, generally more slender; between 48 and 65 segments to a midbody annulus; head acutely pointed, to a spatulate rostral tip; caudal autotomy lacking or if present the anterior body half annuli meet at the middorsal line in a posteriorly open herringbone pattern (*A. angustifrons*) 27
Small to medium-sized, adults less than 35 cm. long, less than 1 cm. in diameter; fewer than 48 segments to a midbody annulus; lacking caudal autotomy (diagnosis for *A. miringoera* based on illustration in Vanzolini, 1971) 28
Small to large, generally more slender; fewer than 85 segments to a midbody annulus; head variously rounded or pointed, anterior body annuli crossing middorsal line in a more or less straight line; caudal autotomy annulus obviously present 38
27. Adults 28 to 41 cm. in snout-vent length; with body diameter 11 mm. or greater; generally 205-218 body annuli; annuli of the postnuchal region cross the back at right angles; no caudal autotomy; 13-19 caudal annuli
A. a. angustifrons
Adults less than 30 cm. in snout-vent length; with body diameter 11 mm. or less; generally 233-282 (rarely 210) body annuli; lateral half-annuli of the nuchal region typically meet in a posteriorly open angle presenting a "herringbone" pattern; autotomy between 5th and 9th caudal annulus; 18-21 caudal annuli *A. angustifrons plumbea*
28. More than 238 body annuli 29
Fewer than 232 body annuli 33
29. More than 40 segments per midbody annulus *A. o. occidentalis*
Fewer than 41 segments per midbody annulus 30

30. Fewer than 20 caudal annuli 31
 More than 20 (22-24) caudal annuli; (250-262 body annuli; 12-15 ventral segments to a midbody annulus; two precloacal pores) . . . *A. miringoera*
31. 14-16 caudal annuli; tail round ended; body cylindrical; head not smaller than trunk; second supralabials by far larger than 1st and 3rd supralabials. *A. bakeri*
 17-19 caudal annuli; tail clearly vertically keeled; body widened after nuchal region; head very small relative to the trunk; second supralabials not markedly larger than 1st and 3rd supralabials. 32
32. 250-266 body annuli; 16 ventral segments to a midbody annulus.
A. s. steindachneri
 239-245 body annuli; generally more than 16 ventral segments to a midbody annulus *A. s. borelli*
33. Tail sharply conical, tip only one-half diameter of base; very distinct nuchal constriction (fewer than 193 body annuli); snout pointed.
A. ridleyi
 Tail cylindrical; without conspicuous nuchal constriction (185 or more body annuli); snout broad 34
34. Tail with marked vertical keel distally (26-31 segments per midbody annulus) *A. bahiana*
 Tail with round end (29-42 segments per midbody annulus) 35
35. Postmental markedly larger than mental; postmalar row absent 36
 Postmental shield around the same size as mental; postmalar row present *A. g. gonavensis*
36. Two precloacal pores; 213-231 body annuli; second supralabial faintly larger than first *A. dubia*
 Four precloacal pores; 185-219 body annuli; second supralabial markedly larger than first. 37
37. Second row of postgenials with four or more shields; 9-14 caudal annuli
A. i. innocens
 Second row of postgenials with four shields; 18-19 caudal annuli
A. innocens caudalis
38. Two supralabials and three or fewer infralabials 39
 More than two supralabials and more than two infralabials 40
39. 204-211 body annuli; 22-26 segments per midbody annulus; postoculars larger than prefrontals but smaller than parietals; two infralabials; four round precloacal pores; autotomy at the fourth to sixth of 23-25 caudal annuli; uniform medium brown, with little counter shading
A. slevini
 200-231 body annuli; 24-34 segments per midbody annulus; postoculars smaller than parietals which are smaller than prefrontals; 1½ infralabials; four oval precloacal pores; autotomy at the 7th to 14th of 28-31 caudal annuli; uniform dark brown dorsally, generally light ventrally . . .
A. vanzolinii

- 224-248 body annuli; 28-32 segments per midbody annulus; postocular smaller than parietals which are smaller than prefrontals; 2½ to three infralabials; four large oval cloacal pores, autotomy at 6th to 7th of 21-22 caudal annuli; uniformly very dark brown dorsally and ventrally
A. gracilis
40. Without postmalar row 41
Postmalar row present 48
41. Two precloacal pores 42
Four or more precloacal pores 45
42. Fewer than 182 body annuli 43
More than 202 body annuli 44
43. Fewer than 162 body annuli; 24-28 segments per midbody annulus
A. neglecta
More than 161 (179-181) body annuli; 20-24 segments per midbody annulus *A. silvestrii*
44. 203-220 body annuli; precloacal pores large and oval; nasals as large as or larger than prefrontals; parietals as large as or larger than frontals; tip of tail round *A. mitchelli*
240-265 body annuli; precloacal pores round or faintly oval; nasals smaller than prefrontals; parietals never larger than frontals; tip of tail with vertical keel *A. roberti*
45. Postmental shield markedly longer and of larger area than mental 46
Postmental shield faintly larger, same size as, or smaller than mental 47
46. 225-234 body annuli; 10-16 caudal annuli; 5th to 7th caudal annulus narrowed into autotomy constriction; first supralabial markedly smaller than third *A. xera*
231-245 body annuli; 19-22 caudal annuli; 7th to 8th caudal annulus narrowed into autotomy constriction; first supralabial around the same size as third (total length of adults, around 12 cm.) *A. carvalhoi*
47. Fewer than 219 body annuli; 16-19 caudal annuli; 28-36 segments per midbody annulus; no distinct nuchal constriction; tail with pigmentation pattern as trunk *A. pericensis*
222-226 body annuli; 19-24 caudal annuli; 26 segments per midbody annulus; very distinct nuchal constriction; tail more darkly pigmented than body *A. nigricauda*
48. More than 54 segments per midbody annulus; head clearly narrower than body (acutely pointed) *A. camura*
Fewer than 56 segments per midbody annulus; head not markedly smaller than trunk 49
49. More than four precloacal pores 50
Fewer than five precloacal pores 53
50. More than 10 precloacal pores; head and body to sixth annulus lacking pigment *A. leucocephala*

- Fewer than 11 precloacal pores; head with same pattern of pigmentation as body. 51
51. Nasals larger than prefrontals; conspicuous checkered pattern of coloration; third supralabial often split; suture between mental and first infralabial sometimes fused *A. fuliginosa*
- Nasals smaller than prefrontals; without conspicuous checkered pattern; without splitting of third supralabial; suture between mental and first infralabial distinct 52
52. Parietals of same size or larger than frontals; no preocular shields; pigmentation of anterior part of body segments only; tail distinctly segmented to tip *A. mertensi*
- Parietals never larger than frontals; preocular shields (split off second supralabial) often present; temporal bulges; tail relatively blunt without distinct segmentation until tip (bulging temporal region; uniform brown, ventral fading) *A. pretrei*
53. More than 260 body annuli *A. occidentalis townsendi*
- Fewer than 261 body annuli 54
54. Medium to large-sized, with more than 211 body annuli and four supralabials *A. vermicularis*
- Small, with fewer than 200 (196) body annuli and four supralabials; (30 caudal annuli with autotomy on the 11th) *A. tragarorhectes*
- Medium to large-sized, with three or fewer supralabials, and small to medium sized animals, with fewer than 219 body annuli and three or four supralabials 55
55. Triangular mental and lozenge-shaped postmental meet in point contact; also point contact between first parietals; head elongate and flattened
A. heathi
- Contact between mental and postmental forms a straight or posteriorly convex line; rarely with point contact between first parietals 56
56. Uniform dark brown color throughout most of body; end of tail white tipped *A. slateri*
- Body generally not uniformly colored (often with ventral lightening); caudal tip not especially pigmented. 57
57. Postmental shield markedly larger, both in length and area, than mental 58
- Postmental shield of same size or smaller than mental 61
58. Two and one-half infralabials; segments of the tail conical and tuberculated; (tip of snout high; lateral-most postmalar very widened; 18-20 caudal annuli) *A. spurrelli*
- Three complete infralabials; segments of tail smooth 59
59. Fewer than 208 (192-207) body annuli; fewer than 19 (16-18) ventral segments to a midbody annulus; 18-22 caudals; autotomy at caudal 7-8
A. schmidti
- More than 213 (214-236) body annuli; fewer than 20 (14-20) ventral seg-

- ments to a midbody annulus; 13-18 caudals; autotomy at caudal 5-8
A. caeca
- More than 198 (199-221) body annuli; more than 19 (20-25) ventral segments to a midbody annulus; 16 - 21 caudals; autotomy at caudal 5-6 60
60. More than 18 (19-21) caudal annuli; more than 15 (16-18) dorsal segments to a midbody annulus. *A. gonavensis hyporissor*
- Fewer than 20 (16-19) caudal annuli; fewer than 17 (15-16) dorsal segments to a midbody annulus *A. gonavensis leberi*
61. Segments of body and tail with squarish tuberculation; four supralabials; (medium size; 205-209 body annuli) *A. rozei*
- Segments of body without tuberculation, tuberculation if present only posterior to caudal autotomy constriction; generally three supralabials 62
62. Two precloacal pores; more than 216 body annuli *A. leeseri*
- Four, very rarely (individual variation) two precloacal pores; fewer than 219 body annuli 63
63. Generally one row of postgenials, or if there are two, the second with very tiny segments; six to eight postmalars; autotomy constriction at 4th to 6th caudal annuli; 177-191 body annuli. *A. hoguei*
- Two rows of postgenials; generally more than seven postmalars; autotomy constriction generally beyond 5th caudal annulus 64
64. Second supralabial generally smallest of supralabials; more than 196 body annuli *A. munoai*
- Second supralabial generally larger than first and third; fewer than 208 body annuli 65
65. Generally fewer than 23 segments in caudal annulus just anterior to autotomy constriction 66
- Generally more than 24 segments in caudal annulus just anterior to autotomy constriction 67
66. Relatively short head; 24-35 segments per midbody annulus; with intercalated dorsal half annulus on neck; pigmentation dropping out at ventral surface, generally in checkered pattern *A. p. prunicolor*
- Relatively elongated head; 27-30 segments per midbody annulus; without intercalated half annulus in nuchal region; light brown with ventral fading. *A. prunicolor albocingulata*
67. 178-199 body annuli; 18-23 caudal annuli; 16.5-22 ventral and 13-18 dorsal segments per midbody annulus; smooth generally rounded caudal tip; long tail; medium size; long head shape; color is even to faintly dotted; ventral surface generally clear *A. d. darwini*
- 190-207 body annuli; 13-17 caudal annuli; (15) 17.5-22 ventral and 14-18.5 dorsal segments per midbody annulus; smooth caudal tip with faint lateral constriction; short tail; small size; long-medium head shape; dotted color (often only on anterior body and tail)
A. darwini heterozonata

168-208 body annuli; 15-22 caudal annuli; 17-22.5 ventral and 14-21 dorsal segments per midbody annulus; tuberculate caudal tip; medium tail; large size; short head shape; markedly and entirely dotted (or lead-colored); ventral surface generally pigmented *A. darwini trachura*

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