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Two New Species of *Amphisbaena* (Reptilia: Squamata: Amphisbaenidae) from the Tiburon Peninsula of Haiti

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ABSTRACT.—Hispaniola and its included islands of Ile de la Gonave and Grande Cayemite are currently recognized as having five species of the genus *Amphisbaena*: *A. caudalis* (Grande Cayemite), *A. gonavensis* (Ile de la Gonave), *A. innocens*, A. *manni*, and *A. hyporissor*. We redescribe *Amphisbaena caudalis* of Grande Cayemite based on new material, and we describe a new species from that island based on material formerly assigned to *A. innocens*. We describe another long-tailed species, similar in that regard to *A. caudalis*, from the nearby mainland of the Tiburon Peninsula. We also describe aspects of hemipenial structure not previously reported for Antillean *Amphisbaena*.

KEYWORDS.—Hispaniola, West Indies, Amphisbaenia, Gonave Island, Grand Cayemite, systematics, taxonomy

INTRODUCTION

In the West Indies the genus *Amphisbaena* is represented by fourteen species on the Greater Antillean island banks of Cuba (five species), Hispaniola (five), and Puerto Rico (five). The genus is absent from Jamaica, the Bahamas, and other island banks, including those of the Lesser Antilles. Among the five currently recognized Hispaniolan species of *Amphisbaena*, *A. manni* is distinguished from the others by its fused rostral and nasal scales, one of three major alterations of the head scales recognized by Gans and Alexander (1962) among Antillean species. The other alterations from the more common, presumably plesiomorphic, condition, are fusion of the ocular and second supralabial in three Cuban species and posterior extension of the rostral between the nasals in *Amphisbaena fenestrata*. The remaining Hispaniolan taxa possess the unaltered conditions.

After its description by Weinland in 1862, *Amphisbaena innocens* was the only species known from most of southern Haiti until Cochran (1928) described *Amphisbaena caudalis* on the basis of two specimens from the island of Grande Cayemite off the northern shore of the Tiburon Peninsula. Cochran differentiated *A. caudalis* from *A. innocens* principally by the longer tail and greater number of caudal annuli. Gans and Alexander (1962) regarded *A. caudalis* as a subspecies of *A. innocens*. They further named *A. innocens gonavensis* from Gonave Island, which lies in the Gulf of Gonave, the body of water to the north of the Tiburon Peninsula. Thomas (1965) elevated *A. i. gonavensis* to specific status and described newly discovered populations of long-tailed *Amphisbanea* from the Barahona Peninsula of the Dominican Republic as *A. gonavensis hyporissor* and *A. g. leberi*. He envisioned historical (or actual) continuity of *A. gonavensis* through the Cul de Sac-Valle de Neiba Plain, around the eastern end of the Sierra de Baoruco to the Barahona Peninsula. These areas are xeric to semi-xeric and constitute a potential corridor; however, in the ensuing years, collectors have not found any populations of either taxon in intermediate areas (Fig. 1). We regard the Gonave population and the

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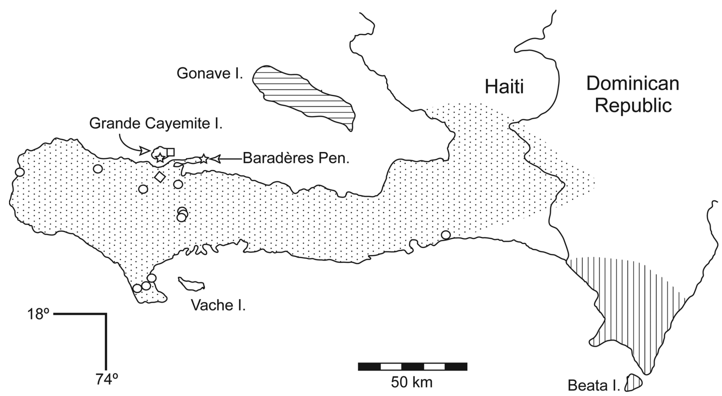

FIG. 1. Map of southwestern Hispaniola showing all known localities for *Amphisbaena caudalis* (stars), *A. cayemite* (square), and *A. leali* (rhomb). Stippling shows the distribution of *A. innocens* (circles show localities sampled in this study); horizontal hatching indicates the range of *A. gonavensis* (Gonave Island, including Petit Gonave); vertical hatching indicates the range of *A. hyporissor*. See Schwartz and Henderson (1992) for locality maps of the three latter species.

Barahona peninsular region populations as two distinct species, *Amphisbaena gonavensis* Gans and Alexander, and *Amphisbaena hyporissor* Thomas, respectively, as did Powell et al. (1999).

In 1971, Thomas visited Grande Cayemite and was able to obtain a series of *Amphisbaena caudalis*. He also found another species, apparently *A. innocens*, coexisting with *A. caudalis* on the island, which was the basis for Schwartz and Thomas's (1975) recognition of *A. caudalis* as a distinct species (see Schwartz and Henderson 1992 for a map). Thomas also extended the range of *A. caudalis* to the mainland Baradères Peninsula, adjacent to Grande Cayemite. In 1992, the authors of this paper, accompanied by Manuel Leal and Nicholas Plummer, visited the area around Pestel, which is on the mainland of the Tiburon Peninsula almost directly south of Grande Cayemite west of the Peninsula de Baradères, where they collected a series of long-tailed *Amphisbaena*. Examination of all of these specimens reveals that the second Grande Cayemite *A.* "*innocens*" is taxonomically distinct, as is the species represented by the Pestel specimens.

MATERIALS AND METHODS

Scale counts were taken according to the criteria of Gans and Alexander (1962). In our discussion of the southern Hispaniolan *Amphisbaena*, we recognize for convenience of description two configurations of the chin shields that denote a major dichotomy and whose use simplifies descriptions: In configuration M animals have large, anteriorly positioned malars, whose anterior tips approximate or contact the postmental (Gans and Alexander 1962: fig. 20; Thomas 1965: fig.1, A, B). The large postmalar appears as if it were split off from the malar; and the third row of postgenials (postmalar row of Gans and Alexander 1962) is between the two postmalar scales. The presence of an enlarged malar of configuration M also tends to result in the second infralabial having more of the shape of a scalene rather than an isosceles triangle. The first row of postgenials consists of two broadly triangular scales having a long, straight suture with the malars. In configuration Y, the malars are short, posteriorly positioned, and enclose the third row of postgenials. Furthermore, it is not clear to us that the malars of condition M are homologous to the malars in condition Y; they may instead be enlarged terminal segments of the second row of postgenials with the postmalars being homologous to the malars of condition M and the postmalar of condition M being homologous to the malar of condition Y. If this is true, then the dichotomy is even greater.

Because of the difficulty of establishing the homology of these scales, we retain the term malar, as Gans and Alexander used it. *Amphisbaena caeca*, *A. fenestrata*, and *A. schmidti* of the Puerto Rico Bank have postmalars and conditions somewhat similar but not identical to the Hispaniolan M configuration (Gans and Alexander 1962; Gans 1964). We use a total half-annular count of segments beyond the splitting of the first one or two annuli on the head, as we did previously (Thomas and Hedges 1998), which tends to reflect the "ventrad penetration of the second half-annulus" (Gans and Alexander 1962). If a half-annulus does not terminate on one or both sides of the head, the count reverts to four parietals barring abnormal fusion.

Snout-vent length (SVL) and tail measurements were taken to the nearest millimeter. Other length measurements were made (under magnification) with a handheld digital readout caliper, or, for smaller measurements on head scales, with a micrometer clamped in the visual field of a dissecting microscope). Since jaw length is easier to measure than head length, we have used jaw length, measured in the midline from a point even with the angulus oris to the tip of the jaw, as a basis for comparing measurements of other structures. (Head length, which we would normally use, is difficult to measure in these animals.) We also use it as a reference distance, much like the traditional standard distance, in this case to length of annuli. Having measured the jaw, the caliper points are placed along the specimen and the number of annuli spanned is counted dorsally and ventrally a short distance anterior to the cloaca. If the specimen is contorted, the annuli may be compressed, making such measurements not comparable, but all the specimens we measured had extended annuli.

As a measurement for indicating relative slenderness, we use head width instead of midbody diameter, since different preservation methods render midbody diameter useless; in undistorted animals head length and midbody diameter are very similar. Amphisbaenids may differ inter- and intraspecifically in the regularity of their annuli. Annuli may be very regular in which case most are complete rings; or there may be variable numbers of partial annuli that appear as splittings from other annuli terminations. These irregularities are more frequent posteriorly, and usually there are more additions of partial annuli dorsally than ventrally. Gans and Alexander (1962) quantified this variability with a "difference count" (annuli counted dorsally minus the standard ventral count) and found that some populations of *A. innocens* differed in this regard (rarely, lower counts occur dorsally, resulting in negative "difference counts"). High "difference counts" occur in animals that have a large amount of annular irregularity.

Our statements about size (SVL, tail length) and meristic extremes include the data of Gans and Alexander (1962). Museum abbreviations follow standard usage (Leviton et al. 1985); RT designates a specimen in Richard Thomas's private collection; ASFS designates several specimens from the private collection of the late Albert Schwartz that were never cataloged in a public museum.

Results

Because *Amphisbaena caudalis* has been known from very few specimens and from a more limited geographical distribution, we choose to redescribe this species based on our larger sample. This is followed by descriptions of the two new species.

Amphisbaena caudalis Cochran, 1928
Fig. 2

Diagnosis.—*Amphisbaena caudalis* is a moderate-sized (to 247 mm SVL), slender, relatively short-headed, long-tailed species of *Amphisbaena* with caudal autotomy; it lacks major alterations of the head scales and has the Y chin configuration, has wide body annuli posteriorly, a high number of caudal annuli, and large "difference counts." In small head size, slenderness, long tails (9-10% SVL), high caudal annuli counts, and high "difference counts," it superficially resembles *A. hyporissor* but differs from that species in having the Y chin

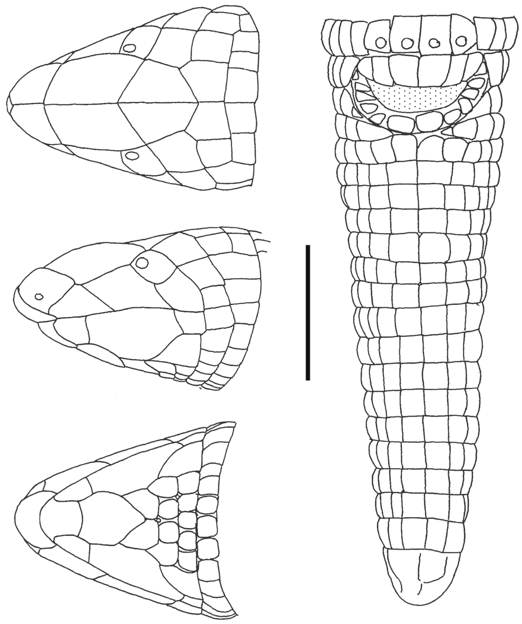

FIG. 2. Head and ventral caudal views of *Amphisbaena caudalis*. Line equals 5 mm.

configuration, and in the broad median contact of the first pair of parietals. Caudal autotomy occurs modally at annulus six in *A. caudalis* and annulus five in *A. hyporissor*. *Amphisbaena hyporissor* and *A. gonavensis* are similar in having the M chin configuration and the tendency toward narrowing of the median contact of the first pair of parietals, but *A. gonavensis* has a short tail and correspondingly low caudal annular counts (10-13); it also has low "difference counts" (-2-2), which do not overlap with those of *A. caudalis* (Gans and Alexander 1962). *Amphisbaena caudalis* differs from the widespread *A. innocens* in being more slender (Fig. 3B), having a smaller head (Fig. 3C), a strong mode of 4 scales in the second row of postgenials (vs. a strong mode of 5 in *A. innocens*) a shorter first infralabial (Fig. 3D), a longer tail (Fig. 3A), higher caudal annular counts (17-21 vs. 9-15), caudal autotomy, greater "difference counts" of body annuli, proportionately larger (longer) posterior body annuli, less difference in the length of the annular segments between dorsum and venter, and in proportionately larger hemipenes ornamented with larger pleats.

Description.—SVL 117-247 ($\bar{x}$ = 188.6) mm; tail length 11-24 ($\bar{x}$ = 17.5) mm; body annuli 193-217 ($\bar{x}$ = 206.41); "difference counts" between the dorsum and venter, 9-28 ($\bar{x}$ = 17.8); the jaw length spans 4-8 annuli dorsally and 4-6 annuli ventrally on the posterior body with the dorsal span being greater by 1-2 annuli; segments to a midbody annulus 32-35 with a strong mode of 34 ($\bar{x}$ = 33.9; 12-14 dorsal segments, 18-21 ventral segments); precloacals 6-8 (mode six); postcloacals 9-12 (mode 10); cloacal pores four; caudal annuli 17-21 ($\bar{x}$ = 18.4) with autotomy at annulus 5-7 (mode 6). Three rows of postgenials with 2-3 (mode two) scales in first row, 3-5 (mode four) in second row, and 4-6 (mode five) in third row. Total half-annular segments 3-12 ($\bar{x}$ = 17.8). As suggested by the "difference counts," there is considerable irregularity in the annuli along the posterior part of the body with frequent annulus terminations. The jaw distance spans 5-6 annuli dorsally and 4-5 ventrally with 0-1 annulus more in the dorsal counts, whereas *A. innocens* has 6-8.5/6-9 annuli, with a difference of 1 between dorsum and venter. Since juveniles have proportionately longer heads than adults and thus higher jaw span counts, we present data for all but the two smallest *A. caudalis*. The difference in spanned posterior body annuli between *A. caudalis* and *A. innocens* could reflect the difference in head (and jaw) size of the former, but in comparing annuli of similar sized animals of the two species, the annuli are broader in *A. caudalis*. In total half-annular segments, *A. caudalis* shows similar variation to *A. innocens* from the distal Tiburon: 3-12 segments with a strong mode of four.

Pigmentation is faint, possibly because of fading in preservative, but it extends onto the venter where it fades gradually, apparently not reaching the paramedian segments. The eyes are distinct in specimens of all sizes.

Gans and Alexander (1962) characterized *A. caudalis* as lacking caudal autotomy. However, autotomy constrictions are visible, although indistinct, on the majority of the new specimens, and two animals have autotomized tails that have healed. As with

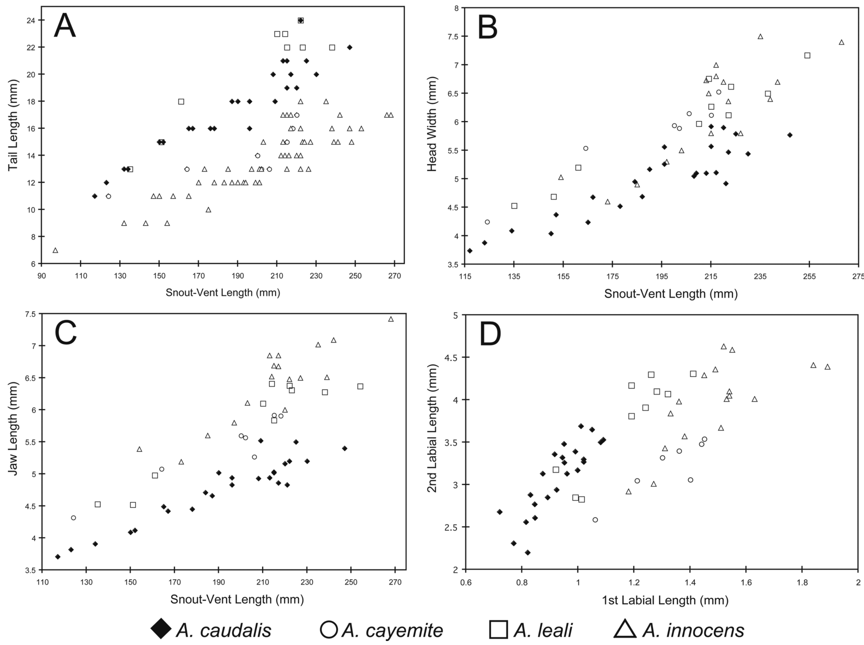

FIG. 3. A. Tail length vs. SVL for *Amphisbaena caudalis* (filled rhombs), *A. cayemite* (open circles), *A. leali* (open squares), and *A. innocens* (open triangles). Data are plotted for KU specimens of *A. innocens* in addition to the USNM specimens. B. Head width vs. SVL for *Amphisbaena caudalis* (filled rhombs), *A. cayemite* (open circles), *A. leali* (open squares), and *A. innocens* (open triangles). C. Jaw length vs. SVL for *Amphisbaena caudalis* (filled rhombs), *A. cayemite* (open circles), *A. leali* (open squares), and *A. innocens* (open triangles). D. Second labial length vs. 1st labial length for *Amphisbaena caudalis* (filled rhombs), *A. cayemite* (open circles), *A. leali* (open squares), and *A. innocens* (open triangles).

other amphisbaenids, the autotomy annulus has shorter segments, a slight reduction in diameter, and darker pigmentation, which in these specimens is only faintly or not at all visible.

The hemipenes (Fig. 4) are bilobed and capitate, with the forks being about one-third the length of the entire organ. The lobes of the preserved hemipenes curve sharply, probably due to an incompletely relaxed retractor muscle. If fully everted, they would probably appear somewhat as illustrated in the lower illustration of Fig. 4. The outer surfaces of each lobe are traversed by a series of narrow bands, thicker than adjacent tissue, about 0.1 mm wide with finely pebbled surfaces. Each band is bordered by folds, which results in a pleated, accordion-like appearance. Close to the sulcus spermaticus on the sulcate side and on all of the absulcate side the pleats diminish to irregular folds or nude epithelium. The sulcus spermaticus enters the everted organ posteriorly (sometimes medially) and proceeds along the posterior face, to the bifurcation of the organ, where it too bifurcates, each branch proceeding to the apex of a lobe. Each apex is formed by a sharply set off U-shaped whorl of approximately 30 lamellae, which fan out in a series of irregular lobes from a central hilus where the sulcus spermaticus terminates. The sulcus spermaticus is prominent with thickened lips; beneath the epithelium of the lips there can be seen bands of muscle along its length. The condition of the apices is somewhat similar to Rosenberg's (1967) illustration of the hemipenes of *Amphisbaena alba*, except that the lamellae of *A. alba* are divided into clusters.

Distribution.—Known only from Grande Cayemite Island and the adjacent Baradères Peninsula of Haiti.

Remarks.—Specimens were collected under limestone rocks in cultivated areas and semi-open horticultural woods.

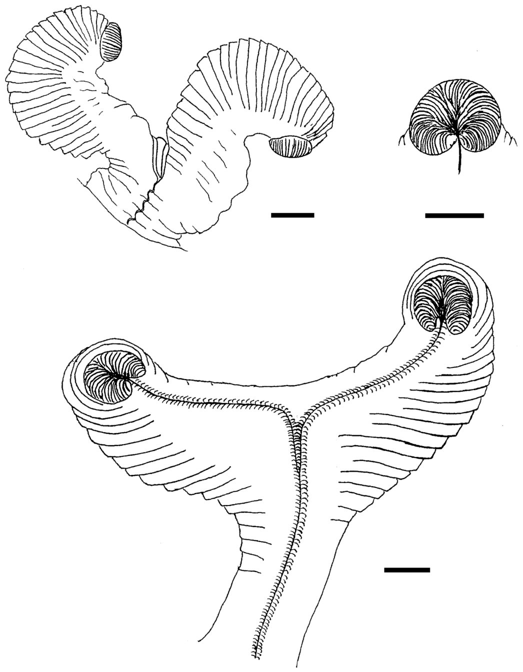

FIG. 4. Illustration of the hemipenis of *Amphisbaena caudalis* (KU 275602), upper left, view from posterior (sulcate) side; upper right, detail of a lobe apex showing whorl of lamellae and entering sulcus spermaticus; lower, visualization of organ as it would appear completely everted. Lines equal 5 mm.

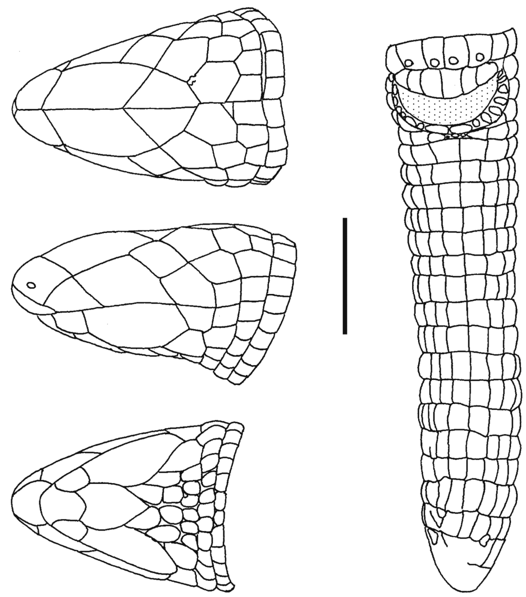

FIG. 5. Head and ventral caudal views of *Amphisbaena leali*. Line equals 5 mm.

Amphisbaena leali, sp. nov.
Fig. 5

Holotype.—USNM 562791, collected 5.0 km S Pestel, Dépt. de la Grande Anse, Haiti, on 25 May 1991, by Manuel Leal and Richard Thomas.

Paratypes.—USNM 562785-90, 562792-94, same data as holotype.

Diagnosis.—*Amphisbaena leali* is a moderate-sized (to 254 mm SVL), robust, long-tailed, extensively pigmented species of *Amphisbaena* with caudal autotomy, without major alterations of the head scales, and with the Y chin configuration. It differs from all other Antillean species in having very wide, granule-filled interannular spaces, deepening to pits between the medially narrowed paramedian pairs of ventral segments. In being long-tailed and having large numbers of caudal annuli it is similar to *A. caudalis*; but in addition to the unique pitting, it differs in being somewhat heavier bodied (Fig. 3B), longer headed (Fig. 4C), and in being extensively pigmented. It further differs from *A. caudalis* in having a higher number of cloacals (19-23 vs. 10-19), and higher number of total segments to a midbody annulus (35-38 vs. 32-35) (Table 1). The internasal sutures of *A. leali* average shorter than the other species of southern Hispaniola, except for *A. gonavensis*. A few individuals of *A. caudalis* have somewhat widened interannular spaces ventrally, but none have either the extent or the deepness of the depressions characteristic of *A. leali.* Besides this unique feature, it differs from *A. innocens* in having longer body annuli posteriorly, long tail and high number of caudal annuli (17-20 vs. 10-13), and small first infralabials (Fig. 5). In higher "difference counts" (12-25 vs. -2-16) there is no overlap when the comparison is with the distal Tiburon Peninsula *A. innocens* (-2-7). The second row of postgenials has 4 versus a strong mode of 5 scales in *A. innocens*. *Amphisbaena leali* is more extensively and heavily pigmented than the majority of *A. innocens*, and it has larger hemipenes with greater development of pleats and terminal lamellae (see discussion).

TABLE 1. Data summary for *Amphisbaena* from southern Hispaniola

	A. caudalis	*A. leali*	*A. cayemite*	*A. innocens*	*A. gonavensis*	*A. hyporissor*
Maximum SVL, mm	247	254	220	268	210	226
Maximum tail length, mm	24	24	17	20	14	22
Tail/SVL	0.08-0.11	0.1-0.11	0.06-0.09	0.06-0.08	0.05-0.08	0.09-0.11
Tail tip	Rounded	Rounded	Sharp	Sharp	Rounded	Rounded
Head width/SVL	0.022-0.028	0.028-0.032	0.028-0.034	0.026-0.032	0.029-0.041	0.024-0.034
Body annuli	193-217	188-211	150-164	185-220	195-225	199-227
Difference	9-28	12-25	10-30	−2-12	−4-2	8-21
Caudal annuli	17-21	17-20	10-13	11-14	10-13	16-21
Autotomy annulus, mode	6	6	Absent*	Absent*	Absent*	5
Dorsal midbody segments	12-16	14-16	12-13	13-16	15-18	14-18
Ventral midbody segments	18-21	20-22	18	18-21	22-25	22-24
Total midbody segments	32-35	38-38	30-31	31-40	36-42	36-42
Precloacals	6-8	6-8	8-10	7-10	6-7	8-11
Postcloacals	9-12	11-14	11-13	10-16	11-14	11-14
Total cloacals	10-19	19-23	19-22	18-26	15-20	18-24
2nd row postgenials, mode of segments	4	4	5	5	3	3
Half-annulus segments	3-12	9-20	6-18	4-18	9-18	4-18
Jaw span of dorsal/ ventral annuli	5-6/4-5	5-6/4-5	4.4-5.5/4.5-5	6-8/6-8	4-7.5/4-7	6-7/4-6
Chin	Y	Y	Y	Y	M	M
Ventral pits	Absent	Present	Absent	Absent	Absent	Absent
Pigmentation	Light, not extensive	Dark, extensive	Light, not extensive	Moderate to dark; moderate to extensive	Moderate, not extensive	Light to moderate, not extensive
Nasal suture-prefrontal suture	0.37-0.56	0.32-0.41	0.39-0.54	0.40-0.55	0.28-0.41	0.36-0.56
Precloacal pores	4	4	4	4	4	4

*No caudal autotomy.

Description.—SVL 151-264 ($\bar{x}$ = 217.1) mm; body annuli 188-206 ($\bar{x}$ = 207.8); "difference counts" 12-25 ($\bar{x}$ = 18.1); jaw length in adults, spans 5-6 scales dorsally and 4-5 scales ventrally on the posterior body with the dorsal span being greater by one in all animals; in all specimens; caudal annuli 17-20 ($\bar{x}$ = 18.6) with a autotomy constriction at annulus six (5) or seven (2); one animal had autotomized at annulus six; total segments to a midbody annulus 35-38 ($\bar{x}$ = 36.9) with 14-16 (mode 16) dorsal segments and 20-22 (mode 21) ventral segments; cloacal pores, four; precloacals 6-8 (mode 8), postcloacals 11-14 (mode 11). As with *A. innocens,* the first two body annuli correspond to three dorsal half-annuli, the dorsal scales of the second and third half-annuli are enlarged to form two pairs of parietals; total half-annular scales are 9-20 ($\bar{x}$ = 12.4); all specimens have three rows of postgenials with two (8 specimens) or three (2) enlarged, somewhat tear-drop shaped scales in the first row, four scales in the second row and 4-6 scales in the third row. The body annuli show extensive irregularities posteriorly, with numerous intercalary partial annuli. The pitting between the median ventral segments of annuli is obvious on casual inspection, and occupies the posterior two-thirds of the venter in all specimens. It is present in the two juveniles (USNM 526786, 562788), but the pits are not as deep as in the adults.

Pigmentation is medium to dark brown and extensive, extending well onto the venter but not onto the paramedian segments, except near the cloaca and on the tail; the autotomy annulus is more heavily pigmented than adjacent annuli. The two juveniles (USNM 562786, 562788) are more darkly pigmented than the adults and well show the extent of the pigmentation onto the venter. In most specimens the eyes are either not visible or so indistinct that they cannot be drawn; in only one of the two juveniles and two other specimens are the eyes fairly distinct.

Hemipenes are everted in three specimens. The organs are very similar to those of *A. caudalis*, being bilobed with textured pleats and capitate with a U-shaped whorl of lamellae. The sulcus spermaticus enters the organ medially on the posterior face and bifurcates at the fork of the lobes, each branch proceeding to the terminal whorl of densely packed lamellae; the lips of the sulcus spermaticus are prominent. The edge of each lamella of the whorl is serrated with minute fleshy teeth. Basal to this differentiated apex, the organs are strongly pleated in transverse accordion-like folds on the absulcate surface; the pleats are most strongly developed distally, becoming less regular but still deep folds basally. The pleats are formed by thickened strips about 0.1 mm wide with pebbly surfaces, the thinner tissue on either side of the strips forming the folds; the fine teeth of the apical lamellae are probably homologous to the pebbly texture of the pleat surfaces. The absulcate or anterior side is not so strongly pleated but shows traces of it.

Data on holotype.—USNM 562791, an adult female, 238 mm SVL, tail 17 mm; body annuli, 197; laterals 3/3; caudals 17, autotomy annulus, seven; difference 19; cloacal pores, four; precloacals, eight; postcloacals 13; segments to a midbody annulus 16/22; postgenials 2+4+6; total half-annulus segments 10; jaw length spans 5/4 annuli posteriorly; head width 6.5 mm; jaw length 6.3 mm.

Distribution.—Known only from the type-locality.

Natural history.—Specimens were collected under limestone rocks in a mesic, hilly karst area with a moderate amount of tree cover.

Etymology.—*Amphisbaena leali* is named after Manuel Leal, who took part in collecting the type series.

Amphisbaena cayemite sp. nov.
Fig. 6

Holotype.—KU 275706, part of a series collected near Anse a Macon, Dépt. de la Grande Anse, Haiti, on 5-6 August 1971, by Haitians and Richard Thomas.

Paratypes.—KU 275700-05, 275707, same data as holotype.

Diagnosis.—*Amphisbaena cayemite* is a moderate-sized (to 220 mm SVL), robust, relatively long-headed, short-tailed species of *Amphisbaena* without caudal autotomy,

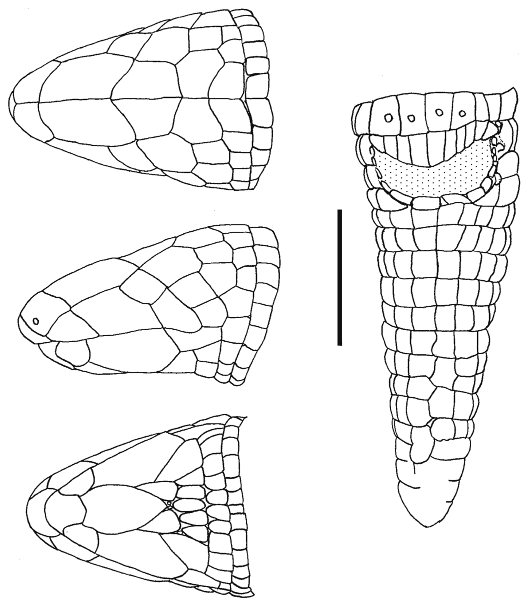

FIG. 6. Head and ventral caudal views of *Amphisbaena cayemite*. Line equals 5 mm.

having none of the major alterations of the head scales, and having chin condition Y. It is uniquely characterized by very long body annuli and extremely low body annulus counts (150-164), lower than any other Antillean species. Since it is not one of the long-tailed species, it bears comparison principally with *A. innocens*. Aside from its extremely low body annulus counts, it has high positive "difference counts," not overlapping with distal Tiburon *A. innocens* (10-30 vs. -2-7); in posterior annuli spanned by the jaw measurement, it is also lower than *A. innocens* (4.5-5.5 vs. 6-8). Five of the eight *A. cayemite* have two rows of postgenials, a very rare condition in *A. innocens*. There is no overlap in the "difference counts" with those of *A. innocens* from the distal Tiburon Peninsula (10-30 vs. -2-7). In number of segments to a midbody annulus, *A. cayemite* is almost completely separable from *A. innocens* in total segments (30-31 vs. 31-40), with only one specimen of *A. innocens* being at the low extreme of 31. In number of segments above the lateral fold (12-13 vs. 13-18), the same relationship holds; and in segments below the lateral fold (18) *A. cayemite* is in the low part of the range of *A. innocens* (18-22).

Description.—SVL 124-220 ($\bar{x}$ = 193.6) mm; body annuli 150-164 ($\bar{x}$ = 157.3); difference between dorsal and ventral annular counts 10-30 ($\bar{x}$ = 17.3); tails are short and taper strongly, caudal annuli 10-13 with no autotomy; 30-31 segments to a midbody annulus, 12 (mode)–13 dorsal segments + 18 ventral segments; cloacal pores, four; precloacal scales 8-10 (mode), postcloacals 11(mode)–13. As with *A. innocens*, there are no major alterations of the head scales; the first two body annuli correspond to three dorsal half–annuli, the median scales of the second and third dorsal half–annuli are enlarged to form two pairs of parietals; total half–annular scales 6-18 (mode, seven). Five of the eight *A. cayemite* have two postgenial rows, and of the three specimens with three rows, two of these are abnormal, with the middle row very irregular. Two rows occur in 2% of 458 *A. innocens* examined by Thomas as part of another study. As suggested by the "difference counts," the body annuli show extensive irregularities with intercalary partial annuli common on the posterior part of the body; the posterior body annuli are very long, 4-5.5 spanned by the jaw length; there is essentially no difference between the dorsal and ventral annuli. The prevalence of two rows of postgenials and the irregularity of the postgenials in two of the three animals with three rows suggests to us that these scales manifest the same irregularity that affects the body annuli.

Gans and Alexander (1962) noted that some specimens of *A. innocens* have rounded rather than sharply tapering tails, although the annular counts do not differ, and entertained the possibility that this might have taxonomic significance. We can confirm that these round–tailed animals occupy large areas of the Tiburon Peninsula, although we defer interpretation until a later study. The sharp–tailed animals, which occur on the distal areas of the Peninsula, are thus more similar to *A. cayemite*.

Pigmentation is medium brown and extensive, extending completely across the venter, although it fades ventrally. Because of fading in preservation, it is difficult to tell exactly how dark the animals were in life, but they are distinctly darker now than the specimens of *A. caudalis* collected at the same time and place. The eyes are not visible or only faintly so in four specimens, including the holotype, and are visible in four specimens, including the juvenile.

Hemipenes are everted in two specimens. The morphology is similar to that of *Amphisbaena caudalis* (Fig. 4) and *A. leali* in being bilobed with differentiated apical whorls of finely dentate lamellae on each lobe, and textured pleats on the sulcate surface.

Data on holotype.—KU 275706, an adult male, 218 mm SVL, tail 16 mm; body annuli 150, laterals 3/3, caudals 11; difference 15; cloacal pores 4; precloacals 10, postcloacals 11; segments to a midbody annulus 13/18; postgenials 2+5; total half-annulus segments 14; jaw length spans 4/4 annuli posteriorly; head width 6.5; jaw length 5.8.

Distribution.—Known only from the type-locality.

Natural History.—Specimens were collected under limestone rocks in cultivated areas and semi-open horticultural woods. KU 275704 was found dead and partly decomposed beneath a rock.

Etymology.—*Amphisbaena cayemite* is named for the island it inhabits. The island is named for a Greater Antillean fruit tree, the cayemite, *Chrysophyllum cainito*. The name is used as a noun in apposition.

Discussion

With the description of *Amphisbaena cayemite and A. leali,* the Hispaniolan bank becomes the Antillean island with the greatest number of known species (six). Cuba has five recognized species (Thomas and Hedges 1998). The smaller and (with most groups) substantially less diverse Puerto Rico bank nevertheless has five species. Within Hispaniola the diversity of *Amphisbaena* is largely a product of the southwestern quadrant (Fig. 1), where all species are known, although *Amphisbaena manni* is absent from all except the basal and northern coastal plain of the Tiburon Peninsula and the eastern shore of the Barahona Peninsula. Thus the northern three-fourths of Hispaniola is occupied exclusively by *A. manni*, as currently understood. That species shows some geographical differentiation, but as yet we have no strong evidence that it constitutes more than one species.

Most specimens of *Amphisbaena innocens* have poorly everted hemipenes, which appear to be smaller than those of the three species we describe, but the structure is similar. At the tips of the lobes there is a small apical whorl of lamellae (RT 7496). It appears that what Thomas (1965) and Rosenberg (1967) described as a flattened disk at the apices corresponds, in a much reduced fashion, to this whorl of lamellae. The pleats are reduced, and it is not clear that textured bands are present.

Amphisbaena gonavensis and *A. hyporissor* share the M chin configuration and are presumably close relatives. Thomas's (1965) hypothesis of possible continuity between the two taxa around the eastern terminus of the Sierra de Baoruco was based, aside from geography and habitat, on the fact that the eastern Barahona populations (nominate *A. hyporissor*) are more similar to the Gonave animals in the small amount of midline contact between the first parietals than are the western populations (*A. h. leberi*). However, *Amphisbaena gonavensis* and *A. hyporissor* are completely separable in tail length, which is 5-6% SVL in *A. gonavensis* and 9-11% SVL in *A. hyporissor*, and in the number of caudal annuli (10-13 in A. *gonavensis* versus 18-21 in *A. hyporissor*). The "difference counts" are very low (-1-2) in *A. gonavensis* (Gans and Alexander, 1962) vs. 8-21 in *A. hyporissor*. The precloacals of *A. gonavensis* are noticeably larger, as is reflected in the low counts: six in 45 of 52 specimens examined, with two animals having the high count of eight in but two specimens. The precloacals in *A. hyporissor* are 7-11 and the total cloacals overlap slightly (17-20 vs. 19-24). In *A. gonavensis* the internasal suture is shorter (Table 1) and the two scales of the first row of postgenials penetrate between the postmental and the second supralabial to a greater extent than in *A. hyporissor*. From the foregoing differences, it appears to us that the specific status of these two taxa is appropriate.

Despite their cryptic habits, the species of

Amphisbaena on Hispaniola (and in general, the other Antillean islands where they occur) are often surprisingly abundant. They are collected frequently by the simple expedient of turning rocks and logs, and raking where there are accumulations of decaying plant matter. Small farm holders among Haitians and Dominicans are usually very familiar with them, since they find them when working in their fields, often along with equally abundant blind snakes (*Typhlops*). All of the species of *Amphisbaena* occur in areas that are heavily disturbed by agriculture, although in some degraded dry areas, particularly those lacking limestone, they are not commonly found, and their populations have probably been adversely affected by charcoal production. Our experience indicates that amphisbaenians are more subject to desiccation than other reptiles. Even so, xeric habitats are not in themselves necessarily a barrier to these animals. *Amphisbaena hyporissor* of the extremely xeric Barahona Peninsula is abundant on most parts of the Peninsula.

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Specimens Examined

Amphisbaena caudalis: Haiti, Dépt. de la Grande Anse: KU 275581-84, 275596-610, Ile Grande Cayemite, vicinity of Anse a Macon; KU 275575-80, Presqu'ile de Baradères, vicinity of Grand Boucan. *Amphisbaena gonavensis*: Haiti, Ile de la Gonave: See Thomas (1965); ASFS V26582, V26670-76, KU 274214, V26823, V26846, V26858, KU 274170, 274172, vicinity of Picmi. *Amphisbaena hyporissor*: República Dominicana, Prov. de Pedernales: See Thomas (1965) for *A. gonavensis hyporissor* and *A. g. leberi*; also, USNM 562813 (no other locality); USNM 562795-807, 652809, 6.4 km SW, thence 0.7 km SE by road, of Juancho; USNM 562808, Juancho, SW Enriquillo; USNM 562810-12, ca. 2 km S Oviedo; USNM 562814-23, 6.1 km S Los Tres Charcos; USNM 562824-25, Hoyo de Pelempito (Hoyo de Aceitillar on some maps); USNM 562826-31; ca. 5 km SW Los Tres Charcos, 85 m; USNM 562832-34, 5.5 km SW Los Tres Charcos, 85 m; USNM 562835, ca. 7.5 km SSW Los Tres Charcos, 120 m; USNM 562836-37, Isla Beata, Punta Lanza; USNM 652838-41, Boucan Detwi (17° 44.0′ N, 71° 30.3′ W); USNM 562842, Troudiye (17° 45.3′ N, 71° 31.7′ W). *Amphisbaena innocens*: Haiti: Dépt. de la Grande Anse: USNM 562843-44, 11.0 km N Camp Perrin, 540 m.; USNM 562846-54, 8.0 km S Marché Léon, 435 m; USNM 562855, locality unknown; USNM 562857-59, 8.0 km SSW Baradères, 420 m. Dépt. du Sud: USNM 562856, 8.6 km SW Carrefour Joute, Presqu'ile de Port-Salut, 45 m; KU 274695, Carrefour Joute between Port-Salut and Les Cayes; KU 274747-71, 11.0 km SE Port-Salut, 212 m; KU 274725-42, 21.5 km N Cavaillon, 606 m; ASFS V48615, 19.2 km. N Cavaillon, 545 m; KU 274698-721, 19.7 km N Cavaillon, 606 m; KU 274746, 22.8 km N Cavaillon, 606 m; KU 274723-24, 21.3 km N Cavaillon, 606 m. Dépt. de l'Ouest: RT 7496, Duclos, 8 km airline SE Carrefour Dufort, 363 m. Dépt. du Sud Est: USNM 502845, Ravine Normande, 11.4 km E, thence 1.0 km N, Jacmel, ca. 20 m.

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