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(Reptilia: Sauria: Iguanidae) From Hispaniola

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## ABSTRACT

The eight species of the Hispaniolan cybotoid group of anoles (*A. cybotes*, *A. haetianus*, *A. whitemani*, *A. marcanoi*, *A. armouri*, *A. shrevei*, *A. longitibialis*, *A. strahmi*) are discussed in meristic detail. Data are given on distinguishing the species and on ecological reference, including areas of mosaic distribution. Problems within the species *A. cybotes*, and the related *A. haetianus* are discussed in detail.

## INTRODUCTION

Schwartz and Thomas (1975:77) stated that, of all Hispaniolan *Anolis*, probably none other more requires detailed analysis than *A. cybotes*. Schwartz and Henderson (1988:107) echoed these same sentiments. The reasons are two-fold: 1) even casual inspection of specimens of this species in the field and laboratory suggests that more than one subspecies occurs on the Hispaniolan mainland and its satellite islands, and 2) the status of several taxa associated at times nomenclaturally with *A. cybotes* needs resolution. An example of such taxa is *armouri* Cochran. Williams (1963) considered *armouri* an upland subspecies of *A. cybotes*, in part based upon specimens that I had collected and their accompanying color notes. But later evidence convinced both him and myself that *armouri* might better be considered a distinct species (Williams, 1976). Schwartz and Henderson (1982) began a review of the variation in *A. cybotes* by naming a new population from Isla Saona off the extreme southeastern end of Hispaniola and commented on the variation in mainland material from this region as well (although they did not propose any other new names). Their intent was not to review the entire species, but the time seemed appropriate, once counts and data had been assembled on the far eastern Hispaniolan populations, to begin a review of the species, as well as the group of species that are commonly called cybotoid anoles. The present paper is the first result of that review.

## HISTORICAL PERSPECTIVE

*Anolis cybotes* was named by Cope in 1862. The type-locality is near Jérémie, Dépt. de la Grand'Anse, Haiti, near the extreme western tip of the Tiburon Peninsula on the north coast. In 1863, Reinhardt and Lütken proposed the name *riisei* based on materials from "Haiti," and in 1864, Cope named *A. citrinellus* from "Haiti" (although Boulenger, 1885:35, gave the locality data of the type-specimen (in the British Museum Natural History) as "Santo Domingo," and he was followed in this course by Schwartz and Thomas (1975) and Schwartz and Henderson (1988). These two names have been consistently considered as synonyms of *A. cybotes* Cope. Garman (1888) named *Anolis aetianus* from Tiburon, Dépt. du Sud, Haiti, about 50 km SW Jérémie and on the south side of the Massif de la Hotte. This taxon was considered a subspecies of *A. cybotes* by Schwartz and Thomas (1975), although they had doubts about the appropriateness of this assignment; *A. c. haetianus* has keeled ventral scales, whereas most other *A. cybotes* have the ventrals smooth. Schwartz and Henderson (1988), however, raised *aetianus* to species-status, due in part to my having examined the type-material and reconsideration of the entire problem of Tiburon Peninsula cybotoids. Part of the problem is that both sorts of ventral conditions occur in specimens from Jérémie, the type-locality" of *A. cybotes*. Schwartz and Henderson (1982) reiterated this situation but deliberately did not address the problem.

Noble (1923) named *Anolis longitibialis* from Isla Beata, an island off the southern tip of the Dominican Peninsula de Barahona. Cochran (1934) relegated this name to

subspecific status under *A. cybotes*. Schwartz (1979) demonstrated that on the mainland, *A. cybotes* and *A. longitibialis* were partially sympatric but not syntopic, and ecologically distinct; he also named one subspecies of the latter, *A. l. specuum*, from Peninsula de Barahona lowlands.

Barbour (1925) named *Anolis doris* from Ile de la Gonâve in the Golfe de la Gonâve. This name likewise was relegated to subspecific status under *A. cybotes* by Cochran (1934).

Cochran (1934) named a new genus and species, *Audantia armouri*, from the Massif de la Selle in southern Haiti and, in a subsequent paper (1939), added another species of *Audantia* (*shrevei*) from the uplands of the Dominican Cordillera Central. Etheridge (1960) did not consider *Audantia* distinct from *Anolis*, so that these two trivial names are now associated with *Anolis*. *Anolis shrevei* has been considered a distinct species, which it unquestionably is, but *armouri*, as noted above, has been variously considered a distinct species or a subspecies of *A. cybotes*.

Mertens (1938) named *Anolis saxatilis* from the southwestern portion of the República Dominicana. This name has been considered (Schwartz and Thomas, 1975; Schwartz and Henderson, 1988) as a synonym of *A. cybotes*.

Williams (1975) first recognized the complexities in the cybotoid anoles by distinguishing and naming *A. whitemani* in part from specimens that Cochran (1941) had considered *A. cybotes* with keeled ventral scales from (primarily) the Plaine de Cul de Sac in Haiti. In fact, in this region, *A. cybotes* and *A. whitemani* are macrosympatric but largely allotopic, the former a lizard of more mesic situations, the latter of xeric ones. Schwartz (1980) named two new subspecies of *A. whitemani*: *lapidosus* from the southeastern base of the Presqu'île du Nord-Ouest in Haiti and *breslini* from Môle St.-Nicholas at the tip of the northern shore of that peninsula. The latter taxon is sufficiently different to make one suspect that it is a distinct species.

The complexities inherent in the cybotoid anoles were further emphasized by Williams' description (1975) of *Anolis marcanoii*: this species is known from a limited area to the south, and on the southern slopes, of the Sierra de Ocoa and at times is syntopic with *A. cybotes* there. The two species appeared not to differ in meristic character or body pattern but do differ strikingly in dewlap color.

Finally, Schwartz (1979) named another satellite species, *Anolis strahmi*, with peculiarly disjunct distribution on the high northern slopes of the Sierra de Baoruco in the República Dominicana, and from much lower elevations on the south slopes of this same range. *Anolis strahmi* is clivicolous (as is also *A. longitibialis*), and these two species seem to interdigitate on the cliffs of the southern Baorucan slopes and immediate associated xeric regions. Schwartz distinguished between the two populations of *strahmi*, with those from the northern slopes the nominate form and *A. s. abditus* from the southern slopes.

The above historical résumé shows a gradual evolution from a simple taxonomy one which has been revealed as increasingly complex. Rarely are any of the taxa distinguishable on the basis of absolute characters; rather, modal differences are the usual means of distinguishing between them (anyone who has dealt with the systematics of *Anolis* is well aware of this fact, but it is pertinent to restate it in this particular context). Williams, when naming *A. marcanoii*, made this case excellently; he stated that "It becomes more and more obvious that, in addition to those subspecies in which museum taxonomists rejoice because they are very distinct in terms of characters conventionally studied, there are in many groups valid biological species only imperfectly separable on museum characters, if at all." Schwartz (1979) noted the same situation in determining old and discolored specimens of anoles from the Peninsula de Barahona (= *A. longitibialis* or *A. strahmi*). Data on habitat, body and dewlap coloration, and even behavior are mandatory requisites for anyone interested in, or about to become

involved with, the systematics of any group of anoles. Even with these data, not all problems are solved, nor are all specimens assignable with ease to one or another taxon.

In the present paper I have concentrated on *A. cybotes*, *A. marcanoii*, *A. shrevei*, and those populations which have been associated with them nomenclaturally. But for the sake of completeness, I have included summaries of (in most cases) published data on *A. whitemani*, *A. strahmi*, and *A. longitibialis*, species which have been recently reviewed. Thus the reader will have at his fingertips data on all members of this complex of species from Hispaniola. I have had the advantage of having long series of almost all populations and have examined a total of 2196 specimens, more than any other worker has been able to study. I have also had field experience with, or have color and ecological data on, all taxa involved. Such information is beyond value in such a review.

Although my original intent was to give a detailed analysis of the variation in *Anolis cybotes*, there remain some unresolved problems in that species, and I have limited my discussion to a "modern" description of the species and statements regarding the problems inherent in its further analysis.

## METHODS

All measurements (in millimeters) and counts were taken on specimens with snout-vent lengths of 50 mm or more; exceptions were made in those species that were represented by small numbers of specimens. The following data were taken:

1) Sex; easily determined in even the smallest specimens in that males have one or two pairs of enlarged postanal scales, whereas females do not. Also, the base of the tail in males is swollen due to the presence of hemipenes.

2) Snout-vent length (SVL).

3) Femur length (FL); taken by vernier calipers in the manner described by Ruibal and Williams (1961:214).

4) Snout scales at second canthals; the number of scales across the snout between the second canthal scales, counting anteriorly from the posteriormost (= first) canthal.

5) Number of loreal "rows" from the canthal-periocular junction to the supralabials (i.e., number of loreals counted vertically).

6) Contact between supraorbital semicircles, graded as + or -. This relationship requires some qualification, since even the most minimal contact between the semicircles was graded as a "+," whereas extensive contact likewise received a "+." If the semicircles were not in contact, the specimen was given a "-." Usually, in cybotoid anoles, the semicircles, if not in contact, are separated by a single row of scales (very rarely 2 in one species).

7) Scales between the interparietal and the supraorbital semicircles, this count recorded as a fraction (i.e.,  $2/2 = 2$  scales on each side between the interparietal and the semicircles.)

8) Median dorsal scales in snout-ear distance (= head length); taken by measuring the distance between the snout and the anterior margin of the auricular opening with vernier calipers and then laying off this distance at midbody along the dorsal midline and counting the middorsal scales in this distance.

9) Ventrals in head length; taken as described for dorsals in head length.

10) Scales between subocular scales and supralabial scales (graded as "+" if these scales are even partially in contact, "-" if they are separated from each other).

11) Scales in supraocular disc; this is a difficult count to make and is of limited use. The enlarged scales of the upper eyelid vary to such a degree that it is often impossible, unless the disc scales are truly enlarged and set off sharply from surrounding scales, to take accurate and consistent counts. I doubt that any two workers would make the

same count on any single specimen, but I have taken it on the chance that it would reveal some species-differences. The data are presented for the sake of completeness.

12) Postrostrals; the number of scales in contact with the rostral posteriorly.  
13) Postmentals; the number of small scales in direct contact with the paired mentals and tucked between the first infralabials on each side.

14) Number of canthals; the number of scales, other than those involved with the periorbital area, that form the canthal ridges. This count too is difficult to take with consistency, since the anteriormost canthal, which lies posterior to or under the narial opening, may or may not be considered a "true" canthal. The amount of variation in this count, however, is not significant and most species have modal counts of 3/3 (count taken on both sides and written as a fraction).

15) Fourth toe lamellae on phalanges II and III.

16) Number of scales around interparietal.

17) Ratio of femur length (FL) to snout-vent length (SVL) X 100.

Of the above, 3), 8), 9), and 17) were not taken on most specimens with SVL's less than 50 mm.

The frequent lack of concordance between the counts of particular scales and the cited number of specimens examined is due to the fact that in many specimens all counts cannot be taken due to injury; additionally, recall that not all counts deliberately were not taken on all specimens.

### TYPE-LOCALITIES

Before proceeding, let us first examine the situation with the type-localities of those names that are associated with *A. cybotes*, including that of *A. cybotes* itself. Cope (1862) stated that the type-locality of *A. cybotes* is "Western Haiti; from near Jérémie." The type-material was collected by Dr. Weinland. The type-locality (disregarding the "western Haiti" designation), is precise and, in one sense, unequivocal. But just how "near" Jérémie the specimens were collected is unknown. There are four syntypes (ANSP 7604-05, MCZ 14346-47) of which I have examined those in the MCZ. (Barbour and Loveridge, 1929:281, listed MCZ 3619 as a syntype, but the specimen has been destroyed.) Amazingly, there are no specimens from further east along this northern coast of the Tiburon Peninsula in Haiti, between Jérémie and Miragoâne, a distance of some 120 km. The exception is a short series of Ile Grande Cayemite, off this coast and about midway between the two terminal mainland localities. Cope's (1862) color description is minimal and doubtless made from preserved material; it can conveniently be quoted: "General color green, with blackish tints. Posterior extremities sometimes cross-banded. Female with a pale vertebral streak."

No *A. cybotes* seen by myself in life was green with blackish tints (assumably this refers to males), but females of many populations (and of other non-cybotoid species as well) have pale vertebral stripes. The description of the scutellation is detailed, but there is nothing about it that is distinctive of any population of *A. cybotes*. The MCZ syntypes are, however, unquestionably *A. cybotes*. To summarize the above: 1) I am not sure that the syntypes of *A. cybotes* originated at (= "near") Jérémie, 2) their color description is grossly incorrect in reference to all recent material, and 3) there are no further specimens from along the northern coast of the peninsula which I can unequivocally associate with *A. cybotes*.

*Anolis citrinellus* was also described by Cope (1864). The type-locality is "Hayti," although Boulenger (1885) used "Santo Domingo." The specimen is a female. The description of color is general, that of scutellation detailed; most pertinent is that some of the thoracic scales are keeled. The problem here is one of type-locality.

The question of type-localities on Hispaniola is always troublesome, especially those designated prior to the final separation of Haiti from the República Dominicana in 1855. The matter has been discussed in detail by Latorre (1972:17, footnote 1). Even after the time of final separation of the two countries, there were considerable inconsistencies, both in English and other languages, as to just what the name of the island and the eastern country (República Dominicana) should be in scientific literature. The names for the island include "Santo Domingo," "St.-Domingue," "Hayti," and "Haiti." Even today, many Spanish-speaking Americans and non-Dominicans refer to the República Dominicana in general as "Santo Domingo," thereby compounding the confusion. In summary, one should treat with circumspection all early (and many later) names whose type-localities are given as "Haiti" or "Santo Domingo" without further specification of locality. There is absolutely no assurance that such names are based on specimens from the country specified—the names have been used for the entire island or parts thereof. With nothing distinctive about the diagnosis of *A. citrinellus*, and allowing for the keeled thoracic scales, I leave the name as a strict synonym of *A. cybotes*, although I am aware of the risks involved in such an action.

In 1863, Reinhardt and Lütken named *Anolis riisei* based on specimens from "Haiti." Once again, the scutellar details are well described, but there is nothing distinctive about them. The coloration, based undoubtedly on preserved material, was stated as being "light grayish with traces of darker bands on the limbs and tail; the females have a broad light stripe along the middle of the back, on each side accentuated by a brownish region, which is often undulated or serrated and this affords a quite similar pattern as in *A. Sagraei*. Darkish lines, running close along each other on the lower sides of the head and neck could also be found in females of this species as well as others" (translation by F. W. Braestrup, 1964, through the courtesy of E. E. Williams). I have not examined the type-material, but I am unconvinced that it is distinguishable from other *A. cybotes*. The color data are applicable to only one *A. cybotes* population, that on the Dominican Isla Catalina, which has a gray (rather than brown) dorsum. It seems very unlikely that the type-material of *A. riisei* was taken on that remote islet.

*Anolis haetianus* was named by Garman in 1888. In this case the type-locality is indeed specific—the village of Tiburon, on the southern coast of the Tiburon Peninsula in Haiti. The diagnosis stated that *A. haetianus* has "keeled ventral scales and eight to ten rows of loreals. The canthus rostralis is very prominent laterally and makes a curve considerably rounded or convex upward." There are no color data, and the syntypes are now fragmented; little can be learned from them. Nevertheless, it seems apparent that *haetianus* represents a distinct population. The problems are not resolved, however.

Freshly taken material from Jérémie and vicinity always includes some specimens with keeled ventrals in both sexes. The dewlaps of this material were recorded in life as peach to pale yellow (R. Thomas), but Williams (1975) noted that specimens from the populations at the extreme end of the Tiburon Peninsula had "red" dewlaps. Examination of field notes in the MCZ shows that no specimens (from localities on the end of the Tiburon Peninsula) had red dewlaps, and the color was invariably recorded as whitish with gray streaks to pink. Like Jérémie material, these inland specimens may have or lack keeled ventrals. There are three interpretations: 1) *cybotes* and *haetianus* are two (at least partially) sympatric species, and the name *cybotes* applies to the white-dewlapped form and *haetianus* to the yellow-to-peach-dewlapped form, 2) *cybotes* and *haetianus* are conspecific and non-separable, with a highly variable dewlap color, or 3) these 2 taxa should be separated nomenclaturally from all other "*cybotes*" as a separate species because of the occurrence of keeled ventrals. This last course would require that a new name (*riisei*) be applied to other related cybotoids, a course that I am presently unwilling to take.

I had hoped to resolve the status of *A. haetianus* (species or subspecies ?), but I admit to having not done so satisfactorily to myself. The area is one of difficult access. What is badly needed are specimens which have good color notes, especially on dewlap color, and careful and locatable localities, to resolve the problem.

Finally, Mertens (1938) named *Anolis saxatilis* from south of Fondo Negro, vicinity of the lower Río Yaque del Sur, southwest of Santo Domingo (= República Dominicana). I have examined material from this region and find nothing distinctive about it. Mertens has an excellent painting from life of the male holotype of *A. saxatilis*. It shows a lizard with a pale flank stripe, above which are a series of about 4 or 5 dark triangles on the body, their apices pointed dorsally, and continuing onto the tail for most of its length, enclosing a pale dorsal serrate area. The dewlap was white. A photograph of the anterior dorsum shows none of the details of the watercolor painting, and the back is unpatterned (presumably faded in preservative). To add to the confusion, I have never seen a male *A. cybotes* from anywhere with this sort of serrate dorsal pattern. The snout-vent length (64 mm) is within the limits for males of the species of this area. I include *A. saxatilis* as a questionable synonym of *A. cybotes*, but it is possible, if Mertens's figure is correct, that there remains to be rediscovered a boldly patterned species of cybotoid in the lower Río Yaque drainage.

## TAXONOMIC ACCOUNTS

### *Anolis cybotes* Cope

*Anolis cybotes* Cope, 1862, Proc. Acad. Nat. Sci. Philadelphia 14:177. *Type-locality*: Western Haiti; near Jérémie, Dépt. du Sud, Haiti. *Syntypes*: ANSP 1704-05, MCZ 14346-47.

*Anolis riisei* Reinhardt and Lütken, 1863. Vid. Med. Nat. Foren. Kjøbenhavn (1862):264. *Type-locality*: "Haiti." *Syntypes*: UZM R.3796-97, ?ZMB 4439.

*Anolis citrinellus* Cope, 1864. Proc. Acad. Nat. Sci. Philadelphia 16:170. *Type-locality*: "Haiti." *Holotype*: BMNH 1948.8.5.71.

? *Anolis saxatilis* Mertens, 1938. Senckenbergiana 20(5):334. *Type-locality*: south of Fondo Negro, region of lower Río Yaque del Sur, Barahona Province, República Dominicana. *Holotype*: SMF 25032.

*Definition*: A species of cybotoid anole with: 1) large size (males to 77 mm, females to 66 mm SVL); 2) ventral scales usually smooth, rarely keeled; 3) snout scales at second canthals 4-11; 4) vertical loreal rows 4-11; 5) semicircles modally in contact; 6) scales between interparietal and semicircles usually 2/2 but variable; 7) median dorsal scales in head length 31-64; 8) ventrals in head length 16-51; 9) scales between suboculars and supralabials either 1/1 or 0/0; 10) 5-23 scales in supraocular disc; 11) postmentals 2-10; 12) postrostrals 3-7; 13) canthals usually 3/3; 14) fourth toe lamellae 12-18; 15) scales around interparietal 7-18; 16) FL/SVL X 100 22.0-39.4; 17) dewlap variable, from pink and peach to yellow, pale yellow, yellow-orange, white, white with grayish bars, to generally dirty white (= grayish); 18) no distinctive head markings; 19) dorsal ground color variable from tan, medium brown, reddish brown, to gray; 20) flank stripe in males often absent, but, if present, some shade of green, often bright, and outlined with dark lines or line fragments; dorsum with a series of dark transverse dumbbells in both sexes in some populations, not in others; females often with a middorsal pale line or stripe; 21) throat ground color white to grayish, with or without darker throat markings.

*Variation*: See Table 1 for variation in scale characteristics and relationships.

*Distribution*: *Anolis cybotes* occurs throughout Hispaniola and on most (all ?) satellite islands. The amount of variation in the mainland population exceeds that of any other

cybotoid anole, and this is reflected in the scale counts. Two peripheral populations, *A. c. doris* on Ile de la Gonâve and *A. c. ravifaux* on Isla Saona have been named. Analysis of mainland populations and delineation of subspecies must await further study. *Anolis cybotes* occurs from sea level and below to 1647 m (Peneau, Dépt. de l'Ouest, Haiti, on the Montagne Noire).

*Remarks:* All the cautions concerning the use of the name "*A. c. cybotes*" for this population need not be repeated here. In justification is the fact that the populations on the terminal Tiburon Peninsula seem to be consistent in their white or white-and-ray dewlap colors, quite distinct from those of the local lowlands (see *A. haetianus*). However, Hill and Vuilleumier's field-notes on one specimen from this region state that the dewlap color was "pink." The problem with their notes is that many (perhaps most) of their localities are now unlocatable even on the best maps. So that the locality data may be recorded for the future, white or whitish gray dewlaps were recorded from: Robert, La Bourbeuse, Cap-à-Fou, Ravine-à-Charles, Bocalin, Lan Mery, Kata, and pink dewlaps at Cap-à-Fou also. A Cap-à-Fou pink-dewlapped specimen (MCZ field number 1878) was noted as having a lineate throat, whereas elsewhere the throats are at times noted as being merely "gray," with no mention of lines. A female (MCZ field number 1906) from Bocalin was described as "throat gray, belly salmon (pale), salmon under tail, 2 dark (blackish) spots between eye and ear. Green stripe from shoulder to thigh, bordered with red. Back with alternance of darker spots leaving pale (butterfly-like) spots." The accompanying well-executed diagram shows a series of basally fused triangles to give a grossly serrate middorsal zone.

There are so many uncertainties involved with the *A. cybotes* of the tip of the Tiburon Peninsula that I can be sure of almost nothing about the population. If the Hill and Vuilleumier localities were locatable, it would help clarify some of the problems. It is possible that the "pink"-dewlapped specimen is in actuality a hybrid (intergrade?) between *A. cybotes* and *A. haetianus* (which may have a peach colored dewlap). The entire area of the tip of the Tiburon Peninsula needs detailed fine collecting with color notes to solve the many puzzles that remain unsolved.

It is appropriate here to discuss briefly a series of 6 specimens (ASFS V9479-80, SFS V26405-06, ASFS V26511-12) from Ile Grande Cayemite, off the north coast of the Tiburon Peninsula between Jérémie and Miragoâne; it should be recalled there are no specimens from the mainland of this area. The Grande Cayemite material consists of 4 males and 2 females; the maximally sized male has a SVL of 66 mm, the maximum male size is 37 mm. The dewlaps were recorded (Thomas) as pale yellowish, pink with dirty basal smudges, and white (2). The ventrals are unkeeled. The series is short, and thus means and modes are suspect. However, the mode of scales between the second canthals is 8, the semicircles are usually in contact, scales between the interparietal and the supraorbital semicircles are 2/2, there are 1/1 scales between the suboculars and supralabials. There are modally 4 postmentals and 5 postrostrals; in all these characteristics the Grande Cayemite series is like "*A. c. cybotes*." The major differences are the absence of keeled ventrals and the bimodes of 6 or 7 rows of loreals (rather than 8). Dorsals average higher (43.8 versus 38.6) and so do the scales around the interparietal (12.7 versus 11.5).

#### *Anolis haetianus* Garman

*Anolis haetianus* Garman, 1888. Bull. Essex Inst. 19:42. *Type-locality:* Tiburon, Dépt. du Sud. Haiti. *Syntypes:* MCZ 6191.

*Definition:* A species of cybotoid anoles with: 1) large size (males to 75 mm, females to 60 mm SVL); 2) ventral scales usually keeled; 3) snout scales at second canthals 10; 4) vertical loreal rows 6-10; 5) semicircles usually in contact; 6) scales between

interparietal and supraorbital semicircles usually 2/2; 7) median dorsal scales in head length 32-54; 8) ventrals in head length 20-46; 9) scales between suboculars and supralabials usually 1/1; 10) 9-23 scales in supraocular disc; 11) postmentals 4-6 (mode 5); 12) postostrals 3-6 (mode 4); 13) canthals usually 3/3; 14) fourth toe lamellae 17-23; 15) scales around interparietal 9-16; 16) FL/SVL X 100 28.3-32.8; 17) dewlap pale peach to pale yellow; 18) no distinctive head markings; 19) dorsal ground color unknown but presumably some shade of brown, and apparently somewhat lineate; 20) flank stripe apparently absent; 21) throat unlined, ground color unknown.

*Variation:* Ventral keeling in *A. haetianus* is variable, as in distal Tiburon Peninsula *A. cybotes*. Of a series of 14 specimens from the environs of Jérémie and into the Massif de la Hotte as high as Rampe des Lions, 7 (all males) lack ventral keeling but have peach to yellow dewlaps. Of a series of 21 specimens from Les Anglais, on the extreme southwestern portion of the tip of the peninsula, two males and two females lack ventral keeling, two males and two females have chest keeling but no keels on the ventrals; there are no color notes on this series, but I assign them to *A. haetianus* because of the proximity of Les Anglais to Tiburon (20 km) and because of the preponderance of ventral keeling in the series. Note that specimens from Jérémie and vicinity usually have keeled ventrals and dewlap colors other than white or grayish. Preserved specimens are generally brownish and more or less lineate in males, although there is no clear indication of a flank stripe or any sort of dorsal dumbbells.

See Table 2 for variation in scale counts and relationships.

*Comparisons:* First, everything considered, it is possible that *A. haetianus* is a strict synonym of *A. cybotes*. The two taxa are similar in most characters except dewlap color, and even that may not be a reliable indicator in this case. Secondly, there is a distinct possibility that *A. cybotes* (and *A. haetianus*) are a species distinct from the balance of cybotoid anoles. But there simply are insufficient data to confirm this division. Certainly the keeled ventral scales, even though not constant in either taxon, separate them from "*A. cybotes*" from elsewhere. Only much more detailed collecting with careful attention to elevation, dewlap and body colors, and ecology will solve this problem.

*Remarks:* *Anolis haetianus* occurs from sea level (Les Anglais, Tiburon) to 1037 m at Rampe des Lions. See Fig. 3. The geographical interrelationships between *A. haetianus* and *A. cybotes* in the Massif de la Hotte uplands remains to be clarified, since now it seems that *A. haetianus* occurs both above and below *A. cybotes*, a most unusual situation. Franz and Cordier (1986) did not list either *A. haetianus* or *A. cybotes* from the very high uplands (1000-1650 m) of the Massif de la Hotte. Other possibilities have been outlined above.

*Specimens examined:* *Haiti: Sud:* Les Anglais (MCZ 125789-808); Tiburon (MCZ 6191 - syntypes); *Grand'Anse:* Jérémie (ASFS V9035-37, ASFS V9094, ASFS V9117; all specimens coded herein as ASFS are now in the Museum of Natural History, University of Kansas [KU]); 2 km NW Jérémie (ASFS V9280); ca. 9 km WSW Jérémie, La Forêt (ASFS V9390); Place Nègre, nr. Jérémie (ASFS V7123-27); 8 km (airline) S Marche Léon, 915 m (ASFS V9358); Rampe des Lions, 1037 m (ASFS V9364).

#### *Anolis whitemani* Williams

*Anolis whitemani* Williams, 1963. *Breviora* 197:2. *Type-locality:* road to Eaux Gaillées, Dépt. de l'Ouest, Haiti. *Holotype:* MCZ 60055.

*Definition.* A species of cybotoid anole with: 1) moderate size (males to 67 mm, females to 54 mm SVL); 2) ventral scales keeled; 3) snout scales between second canthals 5-10 (modes given in subspecies definitions below); 4) vertical loreal rows 4-7; 5) semicircles usually in contact; 6) scales between interparietal and supraorbital semicircles usually 2/2; 7) median dorsals in head length 30-52; 8) ventrals in head length 26-53; 9) scales

between suboculars and supralabials modally 0/0 or 1/1 (see below); 10) scales in supraocular disc 6-17; 11) postmentals 2-6; 12) postrostrals 3-6; 12) canthals usually 3/3; 13) fourth toe lamellae 14-23; 14) scales around interparietal 7-15; 15) FL/SVL X 100 24.8-33.3; 16) dewlap (in named populations) white to pale yellow or gray; 17) dorsal ground color varying from almost white (= very pale gray) or gray to tan, with or without, in adult males, a series of 4 dumbbell-shaped dark crossbands between limbs, 1 at the sacrum, and 1 on the neck present or absent; females patterned much like males except that, if crossbanded, the bands are blurred, and a middorsal orange stripe at times present; 18) flank stripe absent or if indicated, never bright and contrastingly colored; 19) throat dark lineate or not.

*Anolis whitemani whitemani* Williams

*Definition.* A subspecies of *A. whitemani* characterized by: 1) large size (males to 67 mm, females to 54 mm SVL); 2) high number (6-10;  $x = 7.5$ ) of snout scale between second canthals; 3) median dorsals large (30-49; 38.5); 4) median ventrals small (28-53; 38.5); 5) modally (49%) 0/0 scales between suboculars and supralabials; 6) modally 8 (6-15) scales in supraocular disc; 7) moderate number (2-5;  $x = 3.7$ ;  $Mo = 4$ ) of postmental scales; 8) dorsal color pale (almost chalky) gray to very pale tan with clearly defined blackish, very dark gray, or dark brown dumbbells; 9) dewlap white.

*Distribution.* The Plaine de Cul de Sac-Valle de Neiba, including associated southern foothills of the Montagnes du Trou d'Eau and northern foothills of the Sierra de Baoruco, from Ganthier and Croix des Bouquets in Haiti to the west, to Monte Río, Azua Province, República Dominicana, in the Llanos de Azua in the east. See Fig. 2.

*Variation.* See Table 3 for variation in scale counts and scale relationships. See Schwartz (1980) for color and pattern variation.

*Remarks.* See Schwartz (1980) for discussion of ecology and the mosaic nature of the relationships between *A. whitemani* and *A. cybotes*.

*Specimens examined:* Haiti: Dépt. de l'Ouest: Ganthier (ASFS V37304); 9.2 km N Croix des Bouquets (ASFS V8259-70); Terre Rouge, 20.8 km S Mirebalais (ASFS V24226-65; ASFS V24369-70); 4.2-4.3 km S Terre Rouge, 427-488 m (ASFS V46275; ASFS V46282-83; ASFS V49308-43); República Dominicana: Independencia: Tierra Nueva (ASFS V42342-43); 6 km NW Duvergé (ASFS V17140-41); Puerto Escondido, 519 m (ASFS V20694); 4.3 km NW Mella (ASFS V30819); Barahona: 23.7 km NE Palo Alto (ASFS V20733); west slope, Punta Martín García (ASFS V101); Azua: Tábara Abajo (ASFS V31195).

*Anolis whitemani lapidosus* Schwartz

*Anolis whitemani lapidosus* Schwartz, 1980. J. Herpetology 14(4):402. *Type-locality:* Terre Sonnain, 1.6 km N Les Poteaux, 122 m, Dépt. de l'Artibonite, Haiti.

*Holotype:* MCZ 156206.

*Definition.* A subspecies of *A. whitemani* characterized by: 1) large size (males to 67 mm, females to 50 mm SVL); 2) moderate number (5-10;  $x = 6.9$ ) of snout scales between second canthals; 3) median dorsals moderate (33-52; 40.9); 4) median ventrals moderate (33-52; 35.4); 5) modally (72%) 1/1 scales between suboculars and supralabials; 6) modally 10 (7-17) scales in supraocular disc; 7) low number (2-5; 3.4;  $Mo = 4$ ) of postmentals; 8) dorsal ground color pale chalky gray with dorsal dumbbells blurred or absent, never clearly demarcated; 9) dewlap usually white, occasionally yellow.

*Distribution.* Known only from the vicinity of the type-locality (Terre Sonnain, La-pierre) at the southeastern base of the Haitian Presqu'île du Nord-Ouest. See Fig. 2.

*Variation.* See Table 3 for variation in scale counts and scale relationships. See Schwartz (1980) for variation in coloration and pattern.

*Remarks.* See Schwartz (1980) for description of habitat.

*Specimens examined:* Haiti: Dépt. de l'Artibonite: 1.6 km N Les Poteaux (MCZ 156206 - holotype; ASFS V45965-68 - paratypes; ASFS V46368 - paratype); Lapierre, 10.6 km W Çà Soleil, 122 m (ASFS V46513-15 - paratypes); 22.7 km NW Çà Soleil (ASFS V46614 - paratype); 6.9 km W Çà Soleil, (ASFS V46720-22 - paratypes); 13.4 km W Çà Soleil, (ASFS V50043-54 - paratypes).

*Anolis whitemani breslini* Schwartz

*Anolis whitemani breslini* Schwartz, 1980. J. Herpetology 14(4):403. *Type-locality:* Môle St.-Nicholas, Dépt. du Nord-Ouest, Haiti. *Holotype:* MCZ 15607.

*Definition.* A subspecies of *A. whitemani* characterized by: 1) small size (males to 60 mm, females to 45 mm SVL); 2) low number (5-8;  $x = 6.5$ ) snout scales between second canthals; 3) median dorsals small (33-52; 42.5); 4) median ventrals large (26-42; 33.0); 5) modally (56%) 1/1 scales between suboculars and supralabials; 6) modally 8 (6-14) scales in supraocular disc; 7) high number (2-6; 4.3;  $Mo = 4$ ) of postmental scales; 8) dorsal ground color tan to beige, males with a much fragmented red flank stripe, most intense anteriorly and fading posteriorly; darker brown dumbbells faintly indicated or (usually) absent; if present on body, that on neck absent; 9) dewlaps dingy white to gray.

*Distribution.* Known only from the type-locality on the northwestern tip of the Presque'île du Nord-Ouest. See Fig. 2.

*Variation.* See Table 3 for variation in scale counts and scale relationships. See Schwartz (1980) for variation in coloration and pattern.

*Remarks.* See Schwartz (1980) for discussion of ecology and habitat.

*Specimens examined:* Haiti: Dépt. du Nord-Ouest: Môle St.-Nicholas (MCZ 156207 - holotype; ASFS V49756, ASFS V49758-67, ASFS V49669-85, ASFS V49564, MCZ 62827-30, MCZ 62834-41 - paratypes).

In addition to the three subspecies listed here, there remains a population of *A. whitemani* in extreme northwestern República Dominicana. Williams (1963) examined three specimens in the Universität Hamburg, Zoologische Museum, from Monte Cristi, and Schwartz (1980) examined a fourth specimen (in the ASFS) from 2 km SE Monte Cristi, Monte Cristi Province, República Dominicana. During the course of the present study, I discovered in the ASFS a fifth specimen from Cayos Siete Hermanos (Cayo Grande), which had been previously identified (Schwartz and Thomas, 1975; Schwartz and Henderson, 1988) as *A. cybotes*. The specimen (ASFS V17700) is a male with a SVL of 61 mm; it had a yellow-orange dewlap in life. It stands out from northern *A. cybotes* in having 1/1 scales between the interparietal and the supraorbital semicircles; although occasional specimens of *A. cybotes* from areas where *A. whitemani* is unknown have 1/1 scales in this position, 1/1 is much more often encountered in *A. whitemani* (see species definition in present paper). It is apparent that *A. whitemani* occurs in the Monte Cristi region and on the Cayos Siete Hermanos off the mouth of the Río Yaque del Norte. The subspecific status of this population remains indeterminate.

The ecological interrelationships between *A. whitemani* and *A. cybotes*, where they are sympatric, have been discussed by Williams (1963) and Schwartz (1980). It is noteworthy that *A. cybotes* is unknown from the vicinity of Môle St.-Nicholas, the type-locality of *A. w. breslini*. *Anolis cybotes* and *A. whitemani* are macrosympatric in the Plaine de Cul de Sac-Valle de Neiba and presumably so in the area of the type-locality of *A. w. lapidosus*, although specimens of *A. cybotes* are not available from there.

*Anolis marcanoii* Williams

*Anolis marcanoii* Williams, 1975. Breviora (430):1. *Type-locality*: ca. 5 km N La Horma, Peravia Province, República Dominicana. *Holotype*: MCZ 131837.

*Definition*. A species of cybotoid anole with: 1) small size (males to 57 mm, females to 49 mm SVL); 2) smooth ventral scales; 3) snout scales between second canthals 5-9 ( $x = 7.2$ ;  $Mo = 7$ ); 4) vertical loreal rows 4-6 (5.2;  $Mo = 5$ ); 5) semicircles usually in contact (23 of 30 specimens); 6) scales between interparietal and semicircles modally 2/2; 7) median dorsals in head length 38-49 (44.3); 8) ventrals in head length 27-36 (32.3); 9) scales between suboculars and supralabials modally 1/1; 10) scales in supraocular disc 8-17 (12.3); 11) postmentals 2-5 (3.8); 12) postrostrals 3-5 (3.8); 13) canthals usually either 3/3 or 4/4; 14) fourth toe lamellae 17-22 (19.2); 15) scales around interparietal 10-16 (12.7); 16) FL/SVL X 100 28.8-32.6 (31.3); 17) dewlap basically red (Pl. 1F11, Pl. 4F11, Pl. 5J10, Pl. 5H11, Pl. 5F10; Maerz and Paul, 1950), but at times with pink marbling, or basally dark reddish with a red or orange-red suffusion peripherally, or rich red streaked with black; 18) a black postocular blotch invariably present; 19) dorsal ground color medium brown; 20) flank stripe poorly indicated or absent, dumbbells in males poorly expressed by only their lateral expansions, rarely complete across the dorsum; 21) throats white to grayish, lineate black in females, and females with the edge of the vestigial dewlap distinctly red to reddish.

*Distribution*. The southern foothills and associated lowlands of the Sierra de Ocoa, Peravia Province, República Dominicana, at elevations between about 450 m and about 1800 m. See Fig. 2, and Williams (1975:6).

*Variation and Comparisons*: See Table 4 for variation in scale characteristics and relationships.

The dorsal ground color is brown or brownish; a distinctive feature is the invariable presence of a sooty postocular patch. In fact, this character is so outstanding that stationary individuals of *A. marcanoii* can readily be identified in the field before capture. Males usually lack or have only the remnants of the dorsal dumbbells, and a flank stripe is poorly indicated and not set off as a green stripe as in many *A. cybotes*. The "red" dewlap is a striking character, and, as Williams (1975) pointed out, even the vestigial female dewlap has a rim of this color. The actual tint of the red varies in males, and, in addition to those variations in hue pointed out in the definition above, Williams (1975:5) also mentioned "purplish or even bluish toward the center, the colors grading into one another."

*Anolis marcanoii* occurs sympatrically, and at times syntopically, with *A. cybotes*. The dewlap colors will at once distinguish them. *Anolis cybotes* also lacks a black postocular blotch. Other differences between *A. marcanoii* and sympatric *A. cybotes* include: 1) smaller size in *A. marcanoii* (males to 57 mm, females to 49 mm; local *A. cybotes* males to 73 mm, females to 58 mm); 2) lower mean and mode of loreal rows ( $x = 5.2$ ,  $Mo = 5$  in *A. marcanoii*;  $x = 7.9$ ,  $Mo = 7$  in local *A. cybotes*); and 3) relatively shorter hindlimbs in *A. marcanoii* ( $x = 31.3$ ) than in local *A. cybotes* (29.4). None of these differences is, however, absolute.

*Remarks*: Williams (1975:7) has given an excellent summary of the geographic and biological relationships of *A. marcanoii* and *A. cybotes*; the reader is referred to his paper for details. ASFS material has been collected in open Cocos groves and on fenceposts adjacent to an open and shrubby field. To the north of the town of La Horma, *A. marcanoii* comes into close geographic contact with the upland *A. shrevei* but is apparently separated from it by an intervening "band" of *A. cybotes*. All specimens and records are from two roads leading north into the Sierra de Ocoa - that from Cruce de Ocoa to San José de Ocoa and thence to La Horma, and that from Baní to El Recodo. Williams (1975:7) suggested that *A. marcanoii* is associated with "rocky, very open hillsides." This is surely

the case in his experience north of La Horma. I have never secured specimens north of La Horma, and my impressions are that *A. marcanoii* occurs in a variety of ecological situations, both open and semi-shaded (riverine woods with *Acacia*).

Even more intriguing is why *A. marcanoii* should have evolved in this particular area, which to the human eye does not differ appreciably from many hundreds of square kilometers of this southern portion of the República Dominicana. It is interesting that another species of lizard, the gecko *Sphaerodactylus ocoae* Schwartz and Thomas, also is restricted to precisely this same region but is not known from such an "extensive" area as is *A. marcanoii*. Williams (1975:7) suggested that "some combination of temperature and humidity may provide different optima" for *A. marcanoii* and *A. cybotes* in this area. Such problems remain to be solved.

*Specimens examined: República Dominicana: Peravia Prov.: 6 km N Baní (ASFS V41037-39); 10 km N Baní (ASFS V41032-36); 2 km N Cruce de Ocoa (ASFS V40958); 3 km N Cruce de Ocoa, 153 m (ASFS V35815-17); Las Majitas, 27 km S San José de Ocoa, 153 m (ASFS V15898, ASFS V15645); 3-5 km S San José de Ocoa (ASFS V21392-95); 1.3 mi. S San José de Ocoa, 427 m (ASFS V34068-79).*

#### *Anolis armouri* Cochran

*Audantia armouri* Cochran, 1934. Occ. Papers Boston Soc. Nat. Hist. 82(2):117.

*Type-locality:* Pic la Selle, Dépt. de l'Ouest, Haiti. *Holotype:* MCZ 37523.

*Anolis [armouri]:* Etheridge, 1960. Univ. Microfilms:90 (by inference).

*Anolis cybotes armouri:* Williams, 1963. Breviora (197):8.

*Anolis armouri:* Williams, 1976. Breviora (440):10.

*Definition.* A species of cybotoid anole with: 1) moderate size (males to 67 mm, females to 56 mm SVL); 2) smooth ventral scales; 3) snout scales between second canthals 4-9 ( $x = 6.0$ ;  $Mo = 6$ ); 4) vertical loreal rows 4-7 (5.1;  $Mo = 5$ ); 5) semicircles most often in contact (127 of 204 specimens); 6) scales between interparietal and supraorbital semicircles modally 2/2; 7) median dorsal scales in head length 29-46 (37.1); 8) ventrals in head length 16-32 (25.1); 9) scales between suboculars and supralabials modally 0/0; 10) scales in supraocular discs 5-22 (12.8); 11) postmentals 2-8 (4.3;  $Mo = 4$ ); 12) postrostrals 2-5 (4.0;  $Mo = 4$ ); 13) canthals usually 3/3; 14) fourth toe lamellae 11-22 (18.1); 15) scales around interparietal 6-17 (10.0); 16) FL/SVL X 100 25.7-33.3 (28.4); 17) dewlap variable within populations, from very pale orange to white, peach with 2 yellow bars, pinkish gray, or even greenish gray; 18) a black postocular spot and a white subocular semicircle; 19) males gray to greenish gray dorsally, females similar but usually with a rusty to orange middorsal stripe, with the sides charcoal, broken by a series of 3-4 vertical cream bands so that the sides appear barred or to have a series of rounded black blotches; 20) a green flank stripe either present or absent in males; dorsum in males with or without transverse dumbbells; 21) throat in males either lined or not, the throat ground color often very dark gray to almost black.

*Distribution.* The high uplands of the Massif de la Hotte, Massif de la Selle, and the western Sierra de Baoruco, between elevations of 1068 m and 2318 m and perhaps somewhat higher along the Dominico-Haitian border (between Los Arroyos and El Aguacate). See Fig. 2.

*Variation and Comparisons.* See Table 4 for variation in scale characteristics and relationships.

The dorsal color of both sexes is rarely brownish, almost always some shade of grayish or greenish gray to black, with lined throats in both sexes. But the lineate throats may be very obscured by the presence of dark pigment on the throat, in which case the throats are uniformly black or very dark gray. Females are very distinctive in that, in addition to having a rusty middorsal stripe, the sides are vertically barred with cream

or at least with pale ground color, thereby cutting the dark lateral color into a series of vertical, often rounded, ovals or bars. A dark postocular blotch is often visible (when the ground color is not too dark) and a pale (white to cream) subocular semicircle is distinctive. The venter in both sexes varies from cream or pale greenish to grayish. Aside from the female middorsal stripe, *A. armouri* is a drab lizard.

The dewlaps are relatively small and vary within any single population between very pale orange, white, peach, peach with 2 yellow bars, pinkish gray, or even greenish gray. The presence of 0/0 scales between the suboculars and the supralabials is characteristic of the species, although not all specimens, from either Haiti or the República Dominicana, have this condition (170 of 205 - 45%); this character will additionally help separate *A. armouri* from sympatric *A. cybotes*.

*Remarks.* The status of *A. armouri* (distinct species or subspecies of *A. cybotes*) has been a nagging problem. In Haiti, the two taxa seem to intergrade, whereas this has never seemed to be the case in the República Dominicana.

Turning first to the latter country, in the extreme eastern Massif de la Selle and the western Sierra de Baoruco, the two taxa are distinct ecologically - *A. cybotes* a lizard of deciduous forest and disturbed areas, *A. armouri* a lizard of higher upland pine forests, where it is encountered regularly during the days (which are often cool and overcast) under logs, rocks, and other ground cover; during warmer days, the lizards are seen on these same ground-based objects, taking the sun. They are not adept climbers and may only occasionally ascend shrubs or low bushes. I have never taken *A. cybotes* and *A. armouri* syntopically in these mountains.

The situation in Haiti is somewhat different. Although the same basic generalizations apply to that country, the ecological division between the two species is not so diagrammatic. At high elevations (Forêt des Pins) one encounters only *A. armouri*, but this is in relatively undisturbed pine forest, somewhat comparable to the higher elevations in the República Dominicana. It is only when one collects on the Montagne Noire to the south of Pétionville (near Kenscoff-Obléon-Peneau) that he or she encounters problems with these two taxa (and it is specimens from this very region that have been causing the question of the status of *A. armouri*). The ecology of this area has been massively disturbed, so that the original pine forest has been cut, and there has been extensive clearing and planting of bananas and other crops. What in the República Dominicana is a simple situation has been made complex by the changes in ecology in the Haitian mountains. Thus, at two localities (Obléon, Peneau) at elevations between 1220 m and 1647 m, the two species occur syntopically, and "lizard markets" in this region contain specimens of both species.

It is not possible to tell if hybridization and introgression occur in this region. Field notes on coloration are not sufficiently detailed (specimen by specimen) to ascertain what notes apply to which particular specimens. *Anolis armouri* occurs lower than this elevation (as above Kenscoff) and *A. cybotes* occurs higher than Kenscoff as well, so that the two species do overlap on the northern face of the Montagne Noire. If there is hybridization on these upland slopes (and I am not completely convinced that there is), then it seems most likely due to the fact that the ecological barriers between the two species have broken down through the agency of man, rather than through the maneuvers of the lizards themselves. Franz and Cordier (1986:32-33) hinted at the same situation in the Massif de la Hotte; they took lizards assignable to *A. armouri* in the high uplands (some of which I have examined and confirm their identification, but on which I have not taken detailed scale counts). But their specimens from the vicinity of Les Platons at a lower elevation (1000 m) seemed to be intermediate between the two species.

In summary, in the República Dominicana, the two species do not overlap (or actually come into close contact); they are strictly separated ecologically. When this separation

is greatly disturbed, as it is in Haiti, then the two species do interdigitate or even perhaps hybridize. The evidence is overwhelming that *A. armouri* and *A. cybotes* are separate species; supposed intergrades (or hybrids) between them may occur occasionally (along with "pure" strains of both species), because of collapse of ecological separating factors.

*Specimens examined:* Haiti: *Dépt. du Sud-Est:* Forêt des Pins, 1769 m, (ASFS X1907-09; ASFS X23850-52; ASFS X3967-93); Oriani (ASFS V23853-61; ASFS V23862-68); 8 mi. NE Thiotte, 1464 m (ASFS V49456-57); 3.8 mi. SW Seguin, 1068 m (ASFS V38188); Seguin, 1617 m (ASFS V37779-846); *Dépt. de l'Ouest:* 2 mi. S Kenscoff, 1708 m (ASFS X1308); 2.4 mi. S Kenscoff (ASFS X3873-75); 2.8 mi. S Kenscoff (ASFS X3876-79); Furcy, 1780 m (ASFS X1597-603); Obléon, 1647 m (ASFS V8245; ASFS V36833; ASFS V36841; ASFS V36845; ASFS V36850; ASFS V36852; Peneau, 1220-1525 m (ASFS X1325-26; ASFS X1336; ASFS X1338-41; ASFS X1348-49; ASFS X1577; ASFS X1582-83; ASFS V8255); *República Dominicana: Pedernales:* 1 km N Los Arroyos, 1220 m (ASFS V16986); 8 km NE Los Arroyos, 1678 m (ASFS V2820-21); 11 km NE Los Arroyos, 2196 m (ASFS V2823); 12 km NE Los Arroyos, 2196 m (ASFS V2831-34; ASFS V2984); 8.4 mi. N Los Arroyos, 2166 m (ASFS V29922; ASFS V29924; ASFS V29964); 11.1 mi. N Los Arroyos, 1861 m (ASFS V29956-63); 3 km S El Aguacate (ASFS V20903); 6 km S El Aguacate (ASFS V20928); 8 km S El Aguacate, ca. 1830 m (ASFS V20922; ASFS V20968-69); 10 km S El Aguacate (ASFS V20904-05); 11 km SW El Aguacate, 1891 m (ASFS V41337-41); 12 km SW El Aguacate, 1952 m (ASFS V41333-35); 13 km S El Aguacate, 2135-2440 m (ASFS V21075); 15 km S El Aguacate, 2211 m (ASFS V41315-26); 16 km S El Aguacate, ca. 2440 m (ASFS V21065-74); 19 km NE Las Mercedes, 1342 m (ASFS V2650-52); 32 km NE Cabo Rojo, 763 m (ASFS V16755); 2 km SW Aceitillar, 1342 m (ASFS V16679-97); Aceitillar (ASFS V21502-03); 5 km NW Aceitillar, 1464 m (ASFS V17060-61); 3.2 mi. NW Aceitillar, 1495 m (ASFS V29762); Las Abejas, 7 mi. NW Aceitillar, north slope, 1861 m (ASFS V29838-39).

#### *Anolis shrevei* Cochran

*Audantia shrevei* Cochran, 1939. Proc. New England Zool. Club 18:2. *Type-locality:* Valle Nuevo, in the Cordillera Central, southeast of Constanza, 6000 ft. to 8000 ft., La Vega Province, República Dominicana. *Holotype:* MCZ 44365.

*Anolis (shrevei):* Etheridge, 1960. Univ. Microfilms:90 (by inference).

*Anolis shrevei:* Schwartz, 1968. Bull. Mus. Comp. Zool. 137(2):265.

*Definition.* A species of cybotoid anole with: 1) small size (males to 60 mm, females to 50 mm SVL); 2) ventral scales keeled; 3) snout scales between second canthals 4-9 ( $x = 6.5$ ; Mo = 7); 4) vertical loreal rows 4-7 (5.2; Mo = 5); 5) semicircles almost always not in contact (= separated by 1 row of scales; 144 of 148 specimens); 6) scales between interparietal and supraorbital semicircles modally 2/2; 7) median dorsals in head length 21-32 (25.9); 8) ventrals in head length 19-30 (24.4); 9) scales between suboculars and supralabials 0/0 (58 specimens) or 1/1 (61 specimens); 10) scales in supraocular distance 7-16 (12.4); 11) postmentals 2-5 (3.1; Mo = 2); 12) postrostrals 2-6 (4.3; Mo = 4); 13) canthal usually 3/3; 14) fourth toe lamellae 14-20 (17.3); 15) scales around interparietal 6-11 (9.1); 16) FL/SVL X 100 25.0-30.0 (27.4); 17) dewlaps within populations from gray to pale yellow, female chin and throat green; 18) dorsal ground color green to brown, sides black, flecked with white or copper; 19) flank stripe absent or very poorly delimited; 20) throats not lineate or only very vaguely so.

*Distribution.* The Cordillera Central in La Vega and Santiago provinces, República Dominicana, where known from two general areas: between Constanza and La Horma and the vicinity of Pico Duarte-Loma Rucilla, at elevations between 1555 m and 2500 m. See Fig. 2.

*Variation and Comparisons.* See Table 4 for variation in scale characteristics and relationships.

The dorsal coloration is most often grayish green or coppery, with the sides black, lecked with scattered white or copper dots. The dewlap varies from pale yellow to gray; females have the throat green to grayish green. The ventral color is dull brassy to coppery. *Anolis shrevei* is among the most drab of the species-complex.

A striking feature is the very small interparietal; in a few specimens this scale cannot be differentiated from those surrounding it, since all are of the same size and irregular shape. The keeled ventral scales at once distinguish *A. shrevei* from any adjacent species (*A. cybotes*, *A. marcanoii*), and in fact no other cybotoid is syntopic with *A. shrevei*. The almost universal separation of the semicircles by a single row of scales is unique to *A. shrevei*. The large size (and thus low counts) of median dorsals, which are unusually longate, differentiates *A. shrevei* from *A. marcanoii* (21-31 vs. 38-49) and adjacent *A. cybotes* (21-31 vs. 33-61). The almost identical bimodes of 0/0 and 1/1 scales between the suboculars and supralabials is unusual; no other species or subspecies has such an almost equal division of these scales. The high incidence of 2 postmentals (in contrast to 4 in *A. marcanoii*, *A. armouri*, and adjacent *A. cybotes*) is likewise distinctive. The very low number of scales around the interparietal (6-13; 9.1) stands in contrast to higher numbers in *A. marcanoii* (6-17; 10.0), *A. armouri* (10-16; 12.7), and adjacent *A. cybotes* (9-18; 11.8). The dorsal color and pattern, as well as the dewlap colors, also distinguish *A. shrevei* from nearby congeners.

*Remarks.* *Anolis shrevei* is an inhabitant of upland pine forests, where it is not uncommon, although it is rarely seen abroad and active, due to cool, rainy, and overcast days. During such inclement weather, the lizards are most readily encountered under boards and debris at abandoned sawmill sites, such as Valle Nuevo itself or others in the Cordillera Central. I have collected individuals under logs, both relatively new and entire, and rotten, and rocks lying on top of the soil. It is not uncommon to find individuals under this sort of cover with *Celestus darlingtoni* Cochran.

Williams (1975:6) showed on his map a locality symbol for *A. shrevei* just above the 1000 m contour and northwest of La Horma. None of the specimens I have examined is from this close to that town, but the elevation falls within the parameters of my material.

Although *A. shrevei* is known from only two general areas, it is doubtless widespread in other pine-clad upland areas in the Cordillera Central, areas that are presently difficult to access. It may even extend into the Haitian portion (Massif du Nord) of the Cordillera Central, although I have not taken it in the somewhat lower pinewoods between Loma de Cabrera and Villa Anacaona along the border.

*Specimens examined: República Dominicana: Santiago:* south slope, Loma Rucilla, 2501 m (ASFS V18474-77); La Compartición, 2318 m (ASFS V18522-23); *La Vega:* 1 mi. WSW Constanza, 1220 m (ASFS V18592-93); 1 km SE Constanza, 1251 m (ASFS V23027-8); 16 km SE Constanza, 1708 m (ASFS X8918; ASFS V22501; ASFS V22570; ASFS V3029-30); 18 km SE Constanza, 1601 m (ASFS V31545); 19 km SE Constanza, 1556 m (ASFS V18790-91); 21 km SE Constanza, 2074 m (ASFS X8929); 9 km NE Valle Nuevo, 2257 m (ASFS X8255-57; ASFS X8341-47); 24 km SE Constanza, 2044 m (ASFS V18698-729); 27 km SE Constanza, 2501 m (ASFS V22959-61); 3 km NNE Valle Nuevo (ASFS X8300-10); Valle Nuevo, 31 km SE Constanza, 2288 m (ASFS V22989-3002); 1 km SE Valle Nuevo, 2196 m (ASFS V19228-33); 3 km SE Valle Nuevo (ASFS X8475-8); 1.1 mi. SE Valle Nuevo, 2379 m (ASFS X8682-83); 5.3 mi. SE Valle Nuevo, 2440 m (ASFS X8972); 8.4 mi. SE Valle Nuevo, 2410 m, (ASFS X8996-97); 11 km SE Valle Nuevo, 2440 m (ASFS X8395-412); 8.4 mi. SE Valle Nuevo, 2410 m (ASFS X8996-7); La Nevera, 12 km SE Valle Nuevo, 2471 m (ASFS V22573-74; ASFS V22617-5; ASFS V23056-58); 20 km SE Valle Nuevo, 1952 m (ASFS V19266).

*Anolis longitibialis* Noble

*Anolis longitibialis* Noble, 1923. Amer. Mus. Novitates (64):4. *Type-locality*: Isla Beata, República Dominicana. *Holotype*: AMNH 24329.

*Definition*: A species of cybotoid anole with: 1) large size (males to 72 mm, females to 59 mm SVL); 2) ventral scales smooth; 3) snout scales between second canthals 6-10 (means and modes in subspecies definitions beyond); 4) vertical loreal rows 4-6; 5) semicircles almost always in contact (105 of 115 specimens); 6) scales between interparietal and supraorbital semicircles usually 1/1; 7) median dorsals in head length 35-57; 8) ventrals in head length 29-52; 9) scales between suboculars and supralabials modally 1/1; 10) scales in supraocular disc 4-11; 11) postmentals 2-9; 12) postrostrals 3-5; 13) canthals usually 3/3; 14) fourth two lamellae 14-21; 15) FL/SVL X 100 26.3-36.3; 16) dewlap dirty yellow to orange on posterior three-quarters, or yellow to very pale orange or very dull yellow or dirty yellow; 17) a pale narrow subocular crescent, and a dark postocular but truncated U at times present (by population); 18) dorsal ground color brown, grayish brown, or grayish tan in both sexes with at least indications of 4 darker brown dumbbells on body (more conspicuous in females), the body often with many dark brown longitudinal dashes and dots; 19) flank stripe gray, often absent and indicated only by the extreme lateral edges of the dorsal dumbbell-shaped figures or their remnants; 20) throats usually immaculate in adult males, longitudinally streaked in females.

*Anolis longitibialis longitibialis* Noble

*Anolis longitibialis longitibialis*: Schwartz, 1979:9.

*Definition*. A subspecies of *A. longitibialis* characterized by: 1) small size (males to 67 mm, females to 57 mm SVL); 2) smaller dorsal scales (39-57;  $x = 47.4$ ); 3) usually 4 postrostral scales; 4) dorsal ground color grayish tan to gray-brown, in males the lower sides greenish with a series of fine dark brown lines, dashes, or dots, without dark dumbbells; 5) throats of females always with some indication of dark streaking or scribbling, seldom bold or prominent; throats of males almost always immaculate; 6) dewlap dirty yellow anteriorly to orange on posterior three-quarters of dewlap.

*Distribution*. Isla Beata, República Dominicana. See Fig. 3.

*Variation and Comparisons*. See Schwartz (1979) and Table 2 in this paper for variation and comparisons with *A. l. specuum* on the Península de Barahona. No other cybotoid occurs on Isla Beata.

*Remarks*. See Schwartz (1979) for data on ecology of *A. l. longitibialis*.

*Specimens examined*: República Dominicana: Isla Beata, just E Punta Beata (ASFS V17215-29); Isla Beata (ASFS V2772-80, USNM 83878, USNM 83880, AMNH 41415, AMNH 41422, AMNH 41424-32, AMNH 51449-51, MCZ 17686, MCZ 31774, MCZ 37480-82, UF/FSM 21572-78).

*Anolis longitibialis specuum* Schwartz

*Anolis longitibialis specuum* Schwartz, 1979. Breviora (451):6. *Type-locality*: 17 km NW Oviedo Nuevo, Pedernales Province, República Dominicana. *Holotype*: MCZ 132270.

*Definition*. A subspecies of *A. longitibialis* characterized by: 1) large size (males to 72 mm, females to 59 mm SVL); 2) larger dorsal scales (35-52;  $x = 44.3$ ); usually 4 or 5 postrostral scales; 3) dorsum brown with 4 transverse dumbbells and often 1 pair of sacral blotches; 4) throats of females almost always longitudinally streaked with dark brown, very rarely so in males; 5) dewlap very pale orange to very dull yellow or dirty yellow.

*Distribution.* The Peninsula de Barahona and associated lower xeric southern foothills of the Sierra de Baoruco, República Dominicana. See Fig. 3.

*Variation and Comparisons.* See Schwartz (1979) for discussion of scale, color, and pattern variations.

Although *A. strahmi* and *A. cybotes* occur in some of the same area occupied by *A. specuum*, this species and *A. strahmi* are not known to be syntopic. Both species are olivicolous, but *A. strahmi* occupies less rigorous (somewhat more mesic) cliffs than does *A. l. specuum*. *Anolis cybotes* has been found within a few meters of *A. l. specuum* but never on the same cliff faces. The two species may be differentiated by the dewlap color (local *A. cybotes* with a pink to yellow dewlap), lower mode of vertical loreal rows (5 versus 7 in local *A. cybotes*), usually 1/1 scales between the interparietal and the supraorbital semicircles (usually 2/2 in local *A. cybotes*), and usually 6 postmentals (4 in local *A. cybotes*).

*Remarks.* See Schwartz (1979) for details of distribution and ecology.

*Specimens examined: República Dominicana: Pedernales:* 17 km NW Oviedo Nuevo, 83 m (MCZ 132370 - holotype; ASFS V26898-901, RT 3462, LSUMZ 29541-47, ASFS 2235 - paratypes); 17.6 km NW Oviedo Nuevo (MCZ 132381-82, MCZ 151828-48 - paratypes); 30 km NW Oviedo (MCZ 58419); 7 km N, 17.6 km SE Cabo Rojo, 152 m ASFS V30086-87 - paratypes); 7 km N, 20.0 km SE Cabo Rojo, 183 m (ASFS V29766-68, ASFS V30073-74 - paratypes); 7 km N, 2 km SE Cabo Rojo (ASFS V41914 - paratype); 7 km N, 1.2 km SE Cabo Rojo (MCZ 132378-80, MCZ 151902 - paratypes); 7 km N, less than 1.2 km E intersection Cabo Rojo-Pedernales roads (MCZ 146849 - paratype); 1.2 km E cave near intersection Cabo Rojo-Pedernales roads (MCZ 146848 - paratype); 7 km N, 2 km E Cabo Rojo (ASFS V25131 - paratype); 2 km E turn to Cabo Rojo (MCZ 128319, MCZ 128342-43 - paratypes); Cabo Rojo behind police station (MCZ 143483 - paratype); Cabo Rojo, behind laundry (MCZ 151864-78 - paratypes); 1 km SW Las Mercedes, 389 m (UF/FSM 21567-68 - paratypes); 6.4 km SE Pedernales (ASFS V16728 - paratype); 9.6 km N Pedernales, 244 m (ASFS V30114 - paratype).

#### *Anolis strahmi* Schwartz

*Anolis strahmi* Schwartz, 1979. Breviora (451):11. *Type-locality:* 3 km NE El Aguacate, 854 m, Independencia Province, República Dominicana. *Holotype:* MCZ 132371.

*Definition.* A species of cybotoid anole characterized by: 1) very large size (males to 79 mm, females to 64 mm SVL); 2) ventral scales smooth; 3) snout scales at second antherals 5-9 (see Table 5 for details of each subspecies); 4) vertical loreal rows 4-7; 5) supraorbital semicircles always in contact; 6) usually 2/2 scales between interparietal and supraorbital semicircles; 7) median dorsal scales in head length 32-51; 8) ventral scales 11-13 in head length 31-61; 9) usually 1/1 scales between suboculars and supralabials; 10) 10-13 scales in supraocular disc; 11) postmentals 4-10; 12) postrostrals 3-5; 13) canthals usually 3/3; 14) fourth toe lamellae 16-24; 15) FL/SVL X 100 28.7-38.4; 16) dewlap deep orange to orange-brown; 17) a very pale blue-gray subocular crescent; supra- and infralabials spotted; 18) dorsal ground color pale gray or tan to grayish tan; 19) flank stripe tan, white, or absent, its position at times indicated by the remnant lateral edges of the dorsal dumbbells, or 4-5 dumbbell remnants present; 20) throats in both sexes with confused dark scribbling or longitudinal lines, less prominent in females.

#### *Anolis strahmi strahmi* Schwartz

*Anolis strahmi strahmi* Schwartz, 1979. Breviora (451):13.

*Definition.* A subspecies of *A. strahmi* characterized by: 1) modally 8 scales in supra-

ocular disc; 2) dorsum pale gray and at most flecked with dark gray and often unpattered; 3) throat usually unpattered in both sexes but occasionally with some vague scribbles; 4) dewlap very deep orange to orange-brown (Pl. 13J10 in one living male, Pl. and Pl. 4A11 in two freshly dead males; Maerz and Paul, 1950).

*Distribution.* Known only from the vicinity of the type-locality on the north face of the Sierra de Baoruco, 854-900 m, on open and exposed cliffs, Independencia Province, República Dominicana. See Fig. 3.

*Variation and Comparisons.* See Schwartz (1979) for comparisons with *A. s. abdita* and Table 5 in the present paper for full scale counts and relationships.

*Anolis s. strahmi* occurs macrosympatrically (see Schwartz, 1979:4) with *A. cybotes*; the two species have been taken at the type-locality of the former within 5 m of each other. However, local *A. cybotes* is not a confirmed clivicole as is *A. s. strahmi*. The two are easily separable where they occur together: local *A. cybotes* has a whitish to very pale yellow dewlap (deep orange to orange-brown in *A. s. strahmi*), modally 7 vertical loreal rows (5 in *A. s. strahmi*), has a much lower mean of ventral scales (28.9) than *A. s. strahmi* (41.2), higher mean of scales in the supraocular disc (1 versus 8.0), modally has 4 postmentals (6 in *A. s. strahmi*), and modally has 4 postrostrals (3 in *A. s. strahmi*).

*Remarks.* See Schwartz (1979) for details of behavior and ecology.

*Specimens examined.* República Dominicana: Independencia: 3 km NE El Aguacate, 854 m (MCZ 132371 - holotype; ASFS V41730-34, ASFS V41284-94, ASFS V28453, ASI V41308-09, ASFS V44991-94 - paratypes); ca. 2 km NE El Aguacate, 900 m (UF/FS 21565-66 - paratypes).

#### *Anolis strahmi abditus* Schwartz

*Anolis strahmi abditus* Schwartz, 1979. Breviora (451):17. *Type-locality:* dirt road to Las Mercedes, 2.9 km from intersection (= 5 km SE, 2.9 km N Pedernales), Pedernales Province, República Dominicana. *Holotype:* MCZ 146827.

*Definition.* A subspecies of *A. strahmi* characterized by: 1) modally 6 or 7 scales in supraocular discs; 2) dorsum tan to grayish tan, at times with small brown to reddish blotches; 3) flank stripe present, tan to whitish; 4) dorsum with transverse dumbbell blotches; 5) throats flecked or scribbled with dark brown in both sexes; 6) dewlap deep orange (Pl. 12F9 in living male, Pl. 12F9 and Pl. 12H8 in freshly dead males).

*Distribution.* The lowlands of the Península de Barahona, to 3 km N Pedernales and between 15 and 16 km N Cabo Rojo, on the low southern foothills of the Sierra de Baoruco, República Dominicana. See Fig. 3.

*Variation and Comparisons.* See Schwartz (1979) for comparisons with *A. s. strahmi* and Table 5 in the present paper for scale counts and relationships.

*Anolis s. abditus* occurs macrosympatrically with *A. l. specuum* and *A. cybotes*. Only the former is a clivicole as is *A. s. abditus*. *Anolis s. abditus* modally has 2/2 scales between the interparietal and the supraorbital semicircles (1/1 in *A. l. specuum*), modally 3 postrostrals (4 and 5 in *A. l. specuum*), and very rich (deep orange) dewlap in contrast to pale orange to dirty yellow or dull yellow in *A. l. specuum*. *Anolis s. abditus* differs from local *A. cybotes* in having modally 5 vertical loreal rows (7 in local *A. cybotes*), larger dorsal scales ( $x = 39.3$  versus 48.7 in local *A. cybotes*), smaller ventral scales (41.2 versus 30.7 in local *A. cybotes*), modally 6 postmentals (4 in local *A. cybotes*), modally 3 postrostrals (5 in local *A. cybotes*), deep orange dewlap in contrast to pink to yellow dewlap in local *A. cybotes*.

*Remarks.* See Schwartz (1979) for discussion of behavior and ecology.

The peculiar distribution of *A. strahmi* requires re-emphasis; the two subspecies have similar habits but occur on the north (*strahmi*) and south (*abditus*) flanks of the Sierra

: Baoruco and at very different elevations: *strahmi* at high elevations, *abditus* near and slightly above sea level. The species should be looked for not only in other areas and about the Sierra de Baoruco and the western end of the Massif de la Selle in the República Dominicana, but also in the Massif de la Selle in Haiti, where it almost certainly occurs.

*Specimens examined: República Dominicana: Pedernales:* dirt road to Las Mercedes, 9 km from intersection (= 5 km SE 2.9 km N Pedernales) (MCZ 146827 - holotype; CZ 146920, MCZ 146828-47, ASFS V41908-12 - paratypes); 5 km SE, 2.5-3.0 km N Pedernales (UF/FSM 34423-27 - paratypes); 5 km SE, 2.9 km N Pedernales (MCZ 132383, CZ 151879-901 - paratypes); between 15 and 16 km N Cabo Rojo, Alcoa road (MCZ 11857-63 - paratypes).

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TABLE 1

detailed scale counts and scale relationships of *Anolis cybotes*. Under *A. c. "cybotes"* are included all main island Hispaniolan specimens as well as those from some satellites. The two subspecies (*A. c. doris*, *A. c. ravifaux*) are named satellite-island subspecies; their data are presented separately. Modes in this and other tables are underlined to render them more conspicuous. The wide variation in some counts of *A. c. "cybotes"* are due to the fact that many distinctive populations are included under this one heading.

	<i>A. c. "cybotes"</i>	<i>A. c. doris</i>	<i>A. c. ravifaux</i>
	1356	34	24
largest male	77	69	59
female (mm)	66	52	44
snout scales at 2nd canthals	4-11 x = 6.8, Mo = 7	4-7 x = 6.3, Mo = 6	4-7 x = 5.5, Mo = 5
preoral rows	4-11 x = 6.7, Mo = 6.7	4-8 x = 6.3, Mo = 6	5-7 x = 5.8, Mo = 6
semicircle contact	$\pm \equiv \underline{950}$ - = 406	$\pm \equiv \underline{25}$ - = 9	$\pm \equiv \underline{23}$ - = 1
scales between semicircles and interparietal	0/0 = 3 1/1 = 50 1/2 = 63 <u>2/2 = 675</u> 2/3 = 129 3/3 = 298 3/4 = 19 4/4 = 29 4/5 = 2 5/5 = 1 1/3 = 1	1/2 = 3 <u>2/2 = 12</u> 2/3 = 5 3/3 = 10 3/4 = 2 4/4 = 2	1/1 = 6 1/2 = 4 <u>2/2 = 13</u> 3/3 = 1
median dorsals in head length	31-64 x = 42.9	35-47 x = 40.2	35-54 x = 44.9
centrals in head length	19-46 x = 23.1	16-46 x = 30.0	27-51 x = 36.5
scales between suboculars and supralabials	0/0 = 136 0/1 = 80 <u>1/1 = 1027</u> 1/2 = 1 2/2 = 1	0/0 = 6 <u>1/1 = 25</u>	<u>0/0 = 14</u> 0/1 = 1 1/1 = 8
scales in supra- ocular disc	5-23 x = 12.5	8-20 x = 12.8	6-12 x = 8.9

	<i>A. c. "cybotes"</i>	<i>A. c. doris</i>	<i>A. c. ravifaux</i>
Postmentals	2 = 84 3 = 80 <u>4 = 665</u> 5 = 262 6 = 159 7 = 24 8 = 7 10 = 1 x = 4.2	2 = 3 3 = 5 <u>4 = 14</u> 5 = 9 6 = 2 x = 4.1	4 = 13 5 = 5 6 = 5 8 = 1 x = 4.8
Postrostrals	3 = 78 4 = 529 <u>5 = 650</u> 6 = 29 7 = 1 x = 4.4	3 = 2 4 = 10 <u>5 = 22</u> x = 4.6	3 = 10 <u>4 = 11</u> 5 = 3 x = 3.7
Canthals	2/2 = 18 2/3 = 5 3/3 = 1192 3/4 = 22 4/4 = 60 4/5 = 1 2/5 = 1	3/3 = 32 3/4 = 1	3/3 = 23
4th toe lamellae	14-23 x = 18.0	15-21 x = 18.1	12-20 x = 17.5
Scales around interparietal	7-18 x = 11.4	7-13 x = 10.3	10-18 x = 13.8
Femur/SVL	22.0-39.4 x = 28.9	25.6-34.7 x = 29.8	28.3-34.0 x = 31.2

TABLE 2

Detailed scale counts and scale relationships of two subspecies of *A. longitibialis* and *A. haetianus*.

	<i>A. l. longitibialis</i>	<i>A. l. specuum</i>	<i>A. haetianus</i>
N	42	76	34
Largest male	67	72	75
female (mm)	57	59	60
Snout scales at 2nd canthals	6-8 x = 7.2, Mo = 7	6-10 x = 7.4, Mo = 7	6-10 x = 7.5, Mo = 7

	<i>A. l. longitibialis</i>	<i>A. l. specuum</i>	<i>A. haetianus</i>
Loreal rows	4-6 x = 4.9, Mo = 5	4-6 x = 4.9, Mo = 5	6-10 x = 7.7, Mo = 8
Semicircle contact	$\pm \equiv \underline{36}$ - = 5	$\pm \equiv \underline{69}$ - = 5	$\pm \equiv \underline{27}$ - = 7
Scales between semicircles and interparietal	$\underline{1/1} \equiv \underline{20}$ $1/2 = 3$ $2/2 = 13$	0/0 = 2 0/1 = 3 $\underline{1/1} \equiv \underline{40}$ $1/2 = 12$ $2/2 = 13$	$1/2 = 1$ $\underline{2/2} \equiv \underline{16}$ $2/3 = 6$ $3/3 = 8$ $4/4 = 1$
Median dorsals in head length	39-57 x = 47.4	35-52 x = 44.3	32-54 x = 39.4
Ventrals in head length	29-51 x = 42.1	31-52 x = 38.5	20-46 x = 28.7
Scales between suboculars and supralabials	0/0 = 7 0/1 = 4 $\underline{1/1} \equiv \underline{28}$	0/0 = 16 0/1 = 6 $\underline{1/1} \equiv \underline{41}$	0/0 = 5 0/1 = 4 $\underline{1/1} \equiv \underline{23}$
Scales in supra-ocular disc	4-9 x = 6.9	5-11 x = 7.0	9-23 x = 14.0
Postmentals	4 = 3 5 = 6 $\underline{6} \equiv \underline{16}$ 7 = 8 8 = 8 x = 6.3	2 = 1 4 = 5 5 = 9 $\underline{6} \equiv \underline{29}$ 7 = 13 8 = 9 9 = 4 x = 6.3	4 = 11 $\underline{5} \equiv \underline{14}$ 6 = 9 x = 4.9
Postrostrals	3 = 10 $\underline{4} \equiv \underline{19}$ 5 = 12 x = 4.0	3 = 20 $\underline{4} \equiv \underline{27}$ $\underline{5} \equiv \underline{27}$ x = 4.1	3 = 1 $\underline{4} \equiv \underline{10}$ 5 = 21 6 = 2 x = 4.7
Canthals	3/3 = 41	3/3 = 70 3/4 = 1 4/4 = 3	2/2 = 5 3/3 = 26 3/4 = 1 4/4 = 1
4th toe lamellae	14-21 x = 17.3	15-21 x = 17.6	17-23 x = 19.6
Scales around interparietal	- -	- -	9-16 x = 12.4

	<i>A. l. longitibialis</i>	<i>A. l. specuum</i>	<i>A. haetianus</i>
Femur/SVL	26.3-36.0 x = 32.4	28.7-36.3 x = 32.5	28.3-32.8 x = 30.8

TABLE 3

Detailed scale counts and scale relationships in three subspecies of *Anolis whitemani*.

	<i>A. w. whitemani</i>	<i>A. w. lapidosus</i>	<i>A. w. breslini</i>
N	99	20	42
Largest male female (mm)	67 54	67 50	60 45
Snout scales at 2nd canthals	6-10 x = 7.5, Mo = 7	5-10 x = 6.9, Mo = 7	5-8 x = 6.5, Mo = 6
Loreal rows	4-6 x = 5.6, Mo = 6	5-7 x = 5.6, Mo = 6	4-7 x = 5.8, Mo = 6
Semicircle contact	$\pm \equiv 79$ - = 19	$\pm \equiv 11$ - = 7	$\pm \equiv 36$ - = 6
Scales between semicircles and interparietal	1/1 = 31 1/2 = 14 <u>2/2 = 52</u> 2/3 = 1 3/3 = 2	1/1 = 5 1/2 = 1 <u>2/2 = 10</u> 3/3 = 1 3/4 = 1	1/2 = 4 <u>2/2 = 17</u> 2/3 = 6 3/3 = 9 3/4 = 3
Median dorsals in head length	30-49 x = 38.5 ± .82	33-52 x = 40.5 ± 2.4	33-52 x = 42.5 ± 1.5
Ventrals in head length	28-53 x = 38.5	26-50 x = 35.4	26-42 x = 33.0
Scales between suboculars and supralabials	<u>0/0 = 47</u> 0/1 = 19 1/1 = 29	0/0 = 4 0/1 = 1 <u>1/1 = 13</u>	0/0 = 15 0/1 = 3 <u>1/1 = 23</u>
Scales in supra- ocular disc	6-15 x = 9.2	7-17 x = 10.5	6-14 x = 9.9
Postmentals	2 = 15 3 = 11 <u>4 = 71</u> 5 = 3 x = 3.7 ± .16	2 = 6 3 = 1 <u>4 = 11</u> 5 = 1 x = 3.4 ± .45	2 = 1 3 = 3 <u>4 = 26</u> 5 = 7 6 = 5 x = 4.3 ± .26

	<i>A. w. whitemani</i>	<i>A. w. lapidosus</i>	<i>A. w. breslini</i>
Postrostrals	3 = 44 <u>4 = 51</u> 5 = 3 6 = 1 x = 3.6	3 = 7 <u>4 = 11</u> 5 = 1 x = 3.8	2 = 1 3 = 18 <u>4 = 19</u> 5 = 4 x = 3.6
Canthals	2/2 = 20 2/3 = 1 3/3 = 74 3/4 = 1 4/4 = 1	2/2 = 6 2/3 = 1 3/3 = 9 3/4 = 1	2/2 = 2 3/3 = 36 4/4 = 3
4th toe lamellae	15-23 x = 18.2	17-21 x = 18.6	14-18 x = 16.3
Scales around interparietal	7-15 x = 10.5 ± .31	10-14 x = 11.6 ± .52	10-15 x = 12.3 ± .26
Femur/SVL	24.8-32.9 x = 29.1	25.7-33.3 x = 29.6	25.7-33.3 x = 30.4

TABLE 4

Detailed scale counts and scale relationships of *A. marcanoï*, *A. shrevei*, and *A. armouri*

	<i>A. marcanoï</i>	<i>A. shrevei</i>	<i>A. armouri</i>
N	30	149	208
Largest male	57	60	67
female (mm)	49	50	56
Snout scales at 2nd canthals	5-9 x = 7.2, Mo = 7	4-9 x = 6.5, Mo = 7	4-9 x = 6.0, Mo = 6
Dorsal rows	4-6 x = 5.2, Mo = 5	4-7 x = 5.2, Mo = 5	4-7 x = 5.1, Mo = 5
Semicircle contact	± = <u>23</u> - = 7	+ = 7 ± = <u>144</u>	± = <u>127</u> - = 77
Scales between semicircles and interparietal	1/1 = 4 1/2 = 6 <u>2/2 = 13</u> 2/3 = 2 3/3 = 4 3/4 = 1	1/1 = 5 1/2 = 6 <u>2/2 = 88</u> 2/3 = 27 3/3 = 16	1/1 = 13 1/2 = 10 <u>2/2 = 140</u> 2/3 = 19 3/3 = 18 3/4 = 1 4/4 = 1

	<i>A. marcanoi</i>	<i>A. shrevei</i>	<i>A. armouri</i>
Median dorsals in head length	38-49 x = 44.3	21-31 x = 25.9	29-46 x = 37.1
Ventrals in head length	27-36 x = 32.2	19-30 x = 24.4	16-32 25.1
Scales between suboculars and supralabials	0/0 = 7 0/1 = 1 <u>1/1 = 22</u>	0/0 = 58 0/1 = 22 <u>1/1 = 61</u> 2/2 = 1	<u>0/0 = 170</u> 0/1 = 12 1/1 = 22
Scales in supra- ocular disc	8-17 x = 12.3	7-16 x = 12.4	5-22 x = 12.8
Postmentals	2 = 3 3 = 3 <u>4 = 22</u> 5 = 2 x = 3.8	<u>2 = 78</u> 3 = 36 4 = 30 5 = 5 x = 3.1	2 = 13 3 = 17 <u>4 = 104</u> 5 = 44 6 = 23 7 = 6 8 = 1 x = 4.3
Postrostrals	3 = 2 <u>4 = 25</u> 5 = 2 x = 4.0	2 = 1 3 = 5 <u>4 = 89</u> 5 = 51 6 = 1 x = 4.3	2 = 1 3 = 42 <u>4 = 123</u> 5 = 41 x = 4.0
Canthals	3/3 = 12 3/4 = 5 4/4 = 11 5/5 = 1	2/2 = 11 2/3 = 4 3/3 = 128 4/4 = 3	2/2 = 7 2/3 = 5 3/3 = 191 3/4 = 1 4/4 = 3
4th toe lamellae	17-22 x = 19.2	14-20 x = 17.3	11-22 x = 18.1
Scales around interparietal	10-16 x = 12.7	6-13 x = 9.1	6-17 x = 10.0
Femur/SVL	28.8-32.6 x = 31.3	25.0-30.0 x = 27.4	25.7-33.3 x = 28.4

TABLE 5

Detailed scale counts and scale relationships of two subspecies of *A. strahmi*

	<i>A. s. strahmi</i>	<i>A. s. abditus</i>
N	26	68
Largest male	78	79
female (mm)	64	63
Snout scales at 2nd canthals	5-8 x = 7.0, Mo = 7	5-9 x = 6.9, Mo = 7
Dorsal rows	5-7 x = 5.5, Mo = 5	4-7 x = 5.3, Mo = 5
Semicircle contact	$\pm \equiv \underline{22}$ - = 0	$\pm \equiv \underline{67}$ - = 0
Scales between semicircles and interparietal	0/x = 1 1/1 = 2 1/2 = 4 $\underline{2/2 \equiv 14}$ 2/3 = 1	1/1 = 9 1/2 = 5 $\underline{2/2 \equiv 35}$ 2/3 = 6 3/3 = 8
Median dorsals in head length	34-48 x = 39.3	32-51 x = 39.8
Ventrals in head length	32-61 x = 41.2	31-53 x = 40.2
Scales between suboculars and supralabials	0/0 = 1 $\underline{1/1 \equiv 18}$ 1/2 = 1	0/0 = 1 0/1 = 21 $\underline{1/1 \equiv 63}$
Scales in supra- ocular disc	5-12 x = 8.0	4-13 x = 7.3
Postmentals	4 = 4 5 = 7 $\underline{6 \equiv 10}$ 7 = 1 x = 5.3	4 = 8 5 = 8 $\underline{6 \equiv 22}$ 7 = 21 8 = 5 9 = 1 10 = 1 x = 7.3
Postrostrals	$\underline{3 \equiv 14}$ 4 = 7 5 = 3 x = 3.5	$\underline{3 \equiv 29}$ 4 = 26 5 = 10 x = 3.7

Canthals	3/3 = 22	2/2 = 2 3/3 = 61 3/4 = 1
4th toe lamellae	16-21 x = 18.6	17-24 x = 19.0
Scales around interparietal	-	-
Femur/SVL	30.5-26.1 x = 31.8	28.7-38.4 x = 33.4

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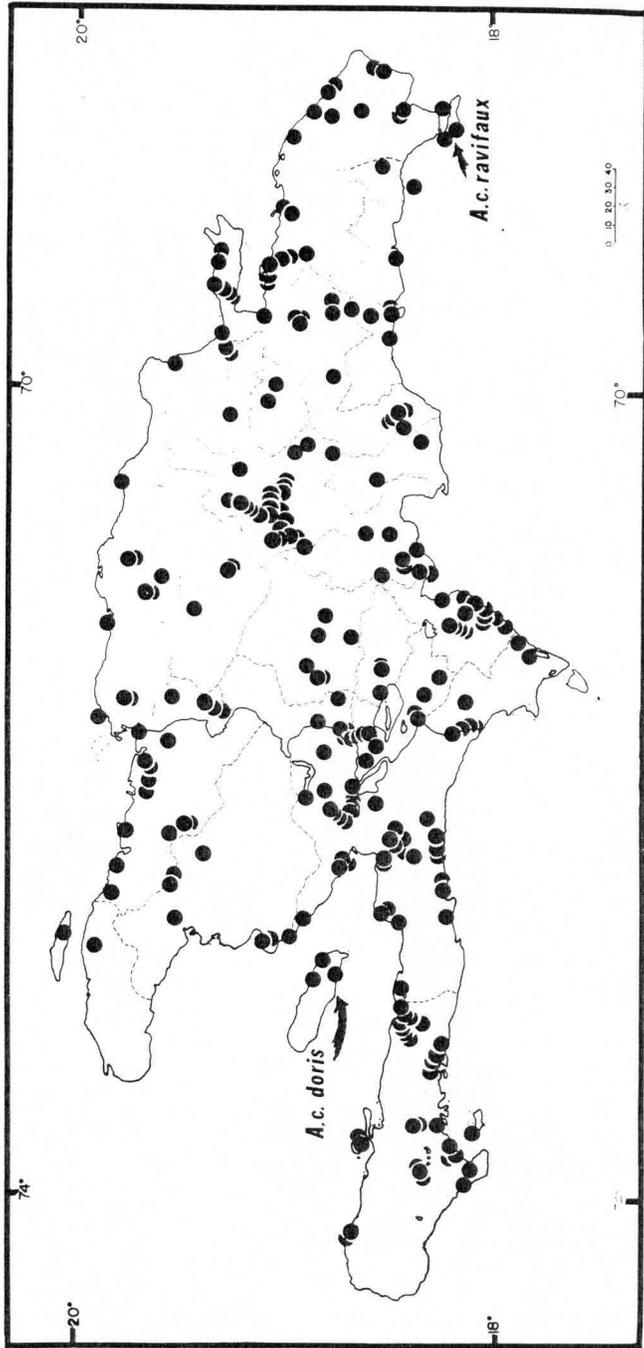


Figure 1. Hispaniola, showing distribution of *Anolis cybotes*; the two named satellite-land subspecies are indicated.

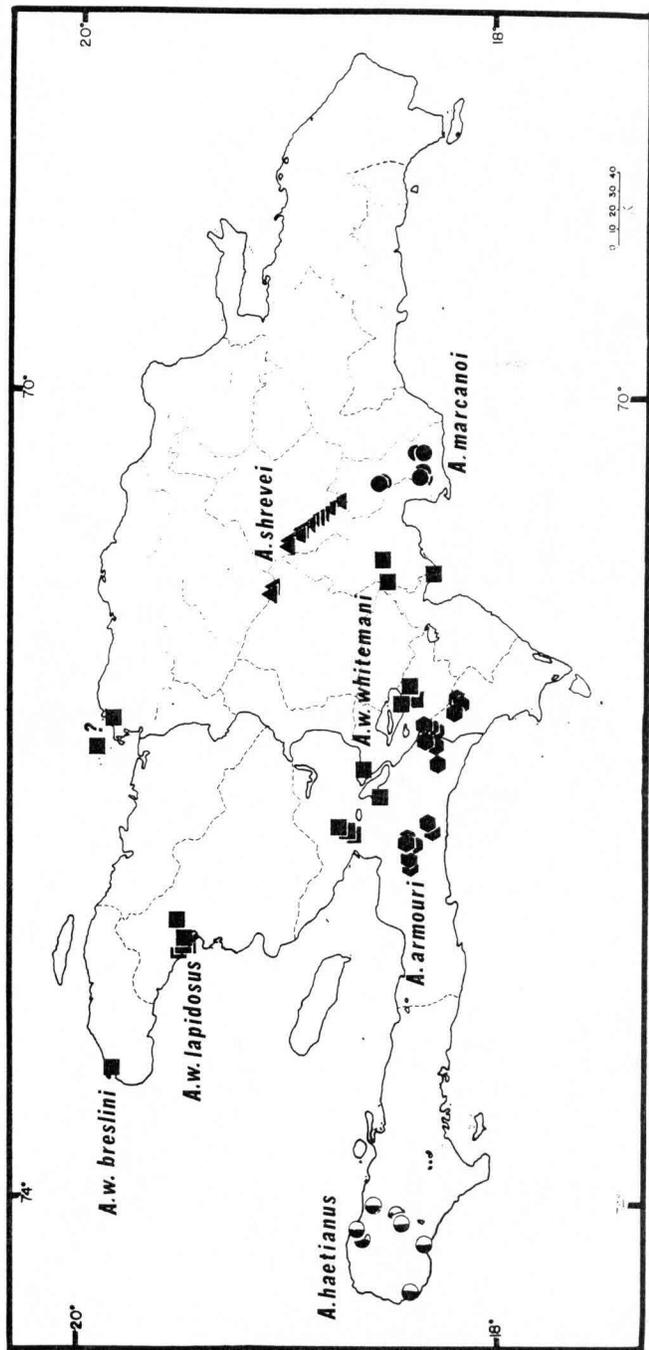


Figure 2. Hispaniola, showing range of *Anolis shrevei* (triangles), *Anolis marcanoi* (circles), *Anolis armouri* (hexagons), *Anolis whitemani* (squares), *Anolis haetianus* (semi-solid circles); subspecies of *A. whitemani* are indicated. *Anolis armouri* is also known from the distal portion of the Tiburon Peninsula in the uplands of the Massif de la Hotte, but I have not examined material from that region in detail.

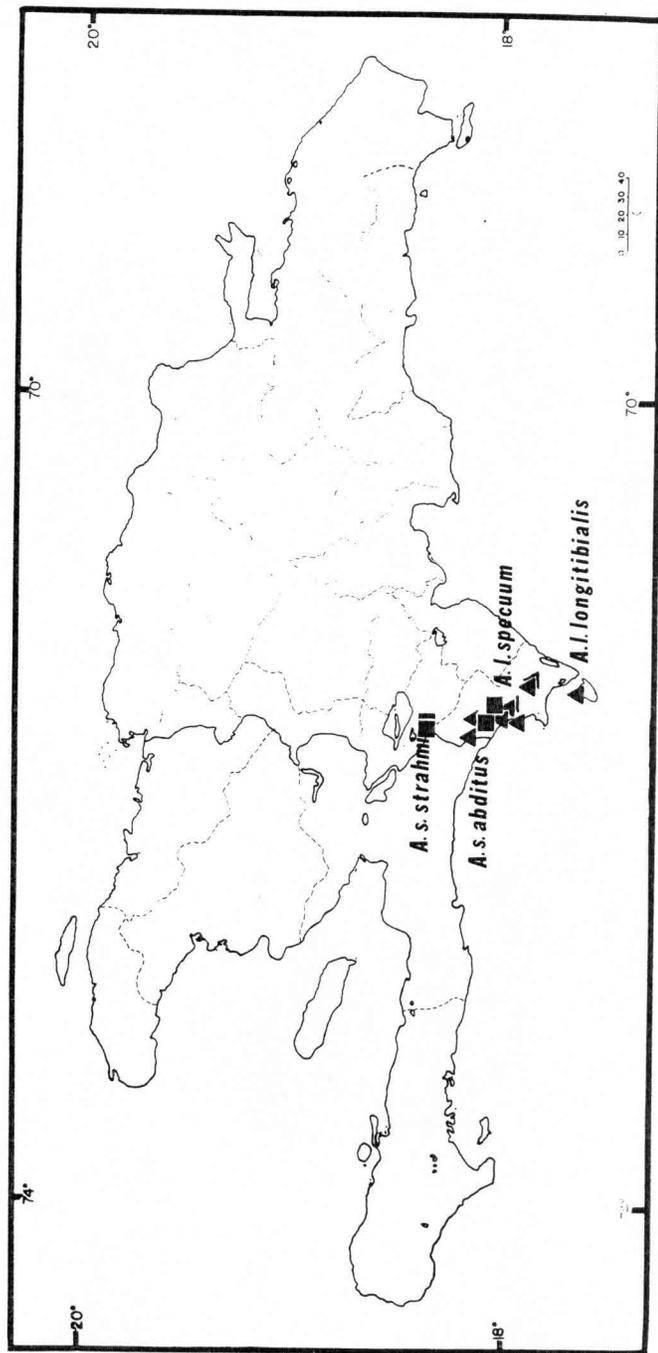


Figure 3. Hispaniola, showing ranges of *Anolis strahmi* (squares) and *Anolis longitibialis* (triangles). Subspecies in both cases are indicated.

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Most specimens used in the present study are in the Albert Schwartz Field Series (ASFS; now in the Museum of Natural History, University of Kansas [KU]), but I have also examined material in the Museum of Comparative Zoology (MCZ), the Milwaukee Public Museum (MPM), Museum of Natural Sciences, Louisiana State University (LSUMZ), Florida Museum of Natural History, University of Florida (UF/FSM), National Museum of Natural History (USNM), and the American Museum of Natural History (AMNH), through the courtesy of E. E. Williams, J. P. Rosado, R. W. Henderson, D. A. Rossman, W. A. Auffenberg, G. R. Zug, R. I. Crombie, and R. G. Zeifel. I have also examined material in the collection of Richard Thomas (RT). Many specimens in the ASFS were collected under the auspices of two National Science Foundation grants - G-7977 and B-023603. Other museum abbreviations used here are: ANSP (Academy of Natural Science of Philadelphia), BMNH (British Museum [Natural History]), SMF (Natur-Museum Senckenberg), UZB (Universitetets Zoologiske Museum, Kjøbenhavn), and ZMB (Museum für Naturkunde, Berlin).

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