

**Bulletin of the Museum of Comparative Zoology**

A T H A R V A R D C O L L E G E

VOL. 129, No. 9

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**STUDIES ON SOUTH AMERICAN ANOLES**

Description of *Anolis mirus*, New Species,  
from Rio San Juan, Colombia,  
with Comment on Digital Dilation and  
Dewlap as Generic and Specific Characters in the Anoles

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PRINTED FOR THE MUSEUM

AUGUST, 1963

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No. 9 — *Studies on South American Anoles*  
*Description of Anolis mirus, New Species,*  
*from Rio San Juan, Colombia,*  
*with Comment on Digital Dilation and*  
*Dewlap as Generic and Specific Characters in the Anoles*

BY ERNEST E. WILLIAMS

INTRODUCTION

In collaboration with several others (Underwood, Ruibal, Rand and Lazell), I some time ago began an investigation of the genus *Anolis*, taking as my starting point the Greater Antilles and venturing from there to the Lesser Antilles. By an inevitable progression my study has led me to the mainland. Not only have certain species reached the mainland (or at least its fringes) as invaders from the islands but the ultimate source of all the island faunas must be sought somewhere within the mainland assemblages.

It is, however, disconcerting to find that the anoles of South America — the largest mainland area inhabited by the genus — are not only poorly understood but hardly worked on at all. Since Boulenger's survey of the genus as a whole in his catalogue of 1885, there has been almost no attempt at revisionary studies of the anoles of any part of South America. Only a single paper by Dunn (1937) on the giant anoles of the area may be regarded as a significant effort in this direction. The lists by Burt and Burt (1933) and Barbour (1934) are devoid of analysis or useful comment. Beyond this, the whole of the pertinent literature consists of short, mostly uncritical, lists of the anoles of a single region or of descriptions of new species, usually insufficiently compared with supposedly related forms — if, in fact, related forms are cited.

Because of this lack of revisionary studies, the *Anolis* of South America are of all the elements of this difficult genus the ones in gravest need of attention.

The descriptions in the available literature are not useful: They are not consistent; they do not cite characters now known to be significant; they do not discriminate between forms that require to be distinguished and do separate forms that require to be united. There are species that have been named again and again, and also species without names. The application of many names is clouded and doubtful.



A clarification of the taxonomy of South American anoles is thus imperative. This task, however, will not be easy.

Perhaps in few other genera is it so necessary to confront one specimen with another. No standard description, however detailed, quite takes account of all the ways in which anoles may differ. Mere counting and tabulation does not suffice; it is necessary to look at all the usual and standard characters and then to look again.

But there is another difficulty, more fundamental than that of getting present collections together in one place. It is the fact that the collections that do exist, large in total numbers though they may be, are very conspicuously inadequate in their coverage of continental South America. *Anolis* is not, in most of South America, a genus easily or abundantly collected. Except for a few species, series of any form are few and from few localities. Inevitably, discrimination between individual and geographic variation is difficult and, quite certainly, our conception of patterns of evolution within the genus is rudimentary and is likely to remain so for some time.

But quite apart from the difficulties which face a revision of the classic type for this genus, there is much evidence that preserved specimens are inadequate for the recognition of species. We need evidence on the biological aspects of the species as well as on the morphology of cadavers. We need to know colors in life and ecology and ethology — the kind of information now being obtained for the West Indian anoles. This sort of information has ordinarily been totally lacking for South American anoles. As matters stand, we are likely to dismiss species difference as individual variation or perpetrate the reverse error.

Thus, the taxonomy of South American anoles is and will for some time remain in a very primitive stage. The procedures which must be adopted for the study of the genus in South America are utterly different from those which are possible in the West Indies. It is first of all necessary to redescribe the types of available names so that they may be recognized when encountered. It will then be necessary to group recognizable forms together in larger assemblages. In the present state of our knowledge these groupings will sometimes be natural and sometimes artificial; they will sometimes be species, though including several named forms; they will sometimes be super-species, sometimes species groups or perhaps even subgenera, *but they will also sometimes be convergent unnatural assemblages.*



It is necessary to make these admissions; it would be idle and misleading to pretend that it is at the moment possible to make correct assessments of subspecies-species-species-group levels for many continental South American *Anolis* complexes. We are only at the beginning of the study; the first task is to reduce the present chaos segment by segment to a manageable order which will, however, be only a first approximation to the realities. It is the intention of this series to attempt, bit by bit, this first approximation.

### A PECULIAR NEW SPECIES FROM COLOMBIA

To describe a new species based on a single specimen in a series devoted to the clarification of chaos within the genus *Anolis* may seem anomalous. It is, however, my belief that alongside the wilderness of current names there lies a real wealth of species. As old names come to be given their proper place, many a species now falsely and variously assigned will be recognized as new. In the present case the species to be described is (for a South American *Anolis*) very distinct. It is in several respects sufficiently unusual that I call it by the Latin name which means "astonishing":

#### ANOLIS MIRUS new species

*Type:* British Museum (Natural History) 1910.7.11.5, Rio San Juan, S. W. Colombia, coll. M. G. Palmer.

*Diagnosis:* Closely allied to *A. fraseri* Günther and similar in size and many aspects of squamation, but differing most prominently in the number of lamellae under phalanges ii and iii of the fourth toe (15 rather than 21), the first phalanx longer than phalanges ii and iii together and arising at the end of the expanded portion of the toe, rather than within the expanded portion.

*Description. Head.* Head scales small, weakly keeled anteriorly, smooth posteriorly; 12 scales across snout between second canthals; frontal depression shallow; 7 scales border rostral posteriorly; 3 scales between scale surrounding nostril and rostral; 8 scales between supranasals.

Supraorbital semicircles separated by 4 scales from each other and in contact on each side with enlarged supraocular scales; no well defined supraocular disc; supraocular scales moderately enlarged medially, posterolaterally and mediolaterally, but a



*middle portion of the supraciliary margin with smaller subgranular scales*; 2-3 overlapping short supraciliaries anteriorly bordered medially by polygonal enlarged scales; canthus distinct, of about 8 scales decreasing in size anteriorly, the third largest, the series not continued to nostril; 7 loreal rows, the dorsalmost largest.

Temporal and supratemporal scales subgranular (one or two rows of temporals closest to orbit, enlarged); a *triangle* of enlarged scales separating the two areas and tapering posteriorly into a double or triple row of scales which curve downward toward the ear, decreasing in size as they go until they grade into the granules around the ear; supratemporal scales distinctly smaller than the enlarged scales surrounding the interparietal, which lies in a shallow triangular depression; interparietal smaller than ear, separated from the supraorbital semicircles by 4 enlarged scales; all scales in the interparietal depression enlarged, the largest lateral and lateroposterior to the interparietal, these sharply distinct from the subgranular scales of the dorsum.

Suboculars weakly keeled, separated from supralabials by a row of scales about half as large, anteriorly separated from the canthal ridge by 4 scales (5 counting subcanthal), posteriorly tapering upward to join the supratemporal triangle described above; 10 supralabials to center of eye.

Mentals wider than long, in contact posteriorly with 6 scales between infralabials; sublabials not distinctly differentiated, several rows medial to infralabials enlarged, keeled; central throat scales small, swollen, rectangular, smooth, becoming larger, polygonal, keeled laterally.

*Trunk.* Two middorsal rows tending to be swollen, conical, keeled, grading into lateral scales which are smaller, rounded, separated by minute granules, indistinctly keeled; ventrals larger, weakly keeled, keels oblique.

*Gular Fan.* Large with wide areas of naked skin crossed by rows of small scales; edge with scales nearly equal in size to ventrals or somewhat smaller, multi- or bicarinate in several rows. Several folds in sides of neck, the dorsalmost very prominent, continued above shoulder in an area marked by a light spot.

*Limbs.* Scales on limbs keeled or multicarinate, the largest smaller than the ventrals. Digital scales multicarinate. *Fifteen lamellae under 4th toe, distal segment not raised.*

*Tail.* Somewhat compressed, but with no dorsal crest or distinct verticils. Greatly enlarged postanals present.



*Pattern.* Head and body dark brown with indistinct oblique rows of small light dots on sides of body. A light patch in front of shoulder continuous with light skin and scales of dewlap.

*Size.* Snout-vent length 105 mm.

#### RELATIONSHIPS

*Anolis mirus* is one of the South American giant anoles ("latifrons group" in the sense of Dunn, 1937). Among these it resembles *A. fraseri* in a number of respects (Table 1) which are peculiar enough among the giant South American anoles to imply special relationship: the ventrals are weakly keeled; the midvertebral scales tend to be conical, higher than long, becoming almost a crest; the sides of the neck have complex skin folds; the scales surrounding the interparietal within the interparietal depression are rather uniformly enlarged and abruptly larger than the supratemporal scales.

In two respects it resembles *A. biporcatus* with which *A. fraseri* has sometimes been confused. There are 2-3 overlapping supraciliary scales and the suboculars are separated from the supralabials by a row of scales. In the first of these features *mirus* appears merely to be relatively primitive, since most *Anolis* have elongate and overlapping supraciliaries.<sup>1</sup> In the second feature, *mirus* may again be primitive since *fraseri* is specialized or at least unusual in this regard as compared with other members of the giant South American anoles. The resemblances of *mirus* to *biporcatus* thus seem merely convergent and in most regards *mirus* differs from *biporcatus* in just the ways that *fraseri* does. R. Etheridge who has studied X-rays of *Anolis mirus*, *A. fraseri* and the other South American giant anoles (*sensu* Dunn) finds that all these belong to a section (his alpha section) quite distinct from the beta giants of Central America, of which *A. biporcatus*, *A. petersi*, etc. are members.<sup>2</sup>

<sup>1</sup> The swollen and quadrate supraciliaries of *fraseri* are an approach to the condition of *A. latifrons* Berthold (which differs in color and many other respects). The morphological series, beginning with the species showing most extreme specialization, is *latifrons*, *fraseri*, *mirus* (this with *short* overlapping supraciliaries), most species of *Anolis* (e.g. *princeps* Boulenger with one or more elongate supraciliaries). Both *A. fraseri* and *A. latifrons* will be further discussed in succeeding papers of this series.

<sup>2</sup> Recognition of these two sections by Etheridge (unpublished thesis, University of Michigan) is a major breakthrough in anole systematics. Based on the presence (beta section) or absence (alpha section) of transverse processes on the autotomic caudal vertebrae, these sections make extraordinarily good systematic and zoogeographic sense.



TABLE 1

<i>mirus</i>	<i>fraseri</i>
12 scales across snout between second canthals.	8 scales across snout
7 scales border rostral posteriorly	5-6 scales border rostral posteriorly
A middle portion of the supraciliary margin with small, granular scales	All of supraciliary margin with enlarged swollen scales
2-3 short overlapping supraciliaries anteriorly.	No overlapping supraciliaries.
Suboculars separated from supralabials by a row of scales $\frac{1}{2}$ as large.	Suboculars broadly in contact with supralabials.
A well marked, wide, skin fold above shoulder, made conspicuous by a light coloration continuous with light skin and scales of dewlap.	Several folds of skin above shoulder, none very wide nor made prominent by a light coloration continuous with light skin and scales of dewlap.
15 lamellae under phalanges ii and iii of 4th toe.	21-23 lamellae under phalanges ii and iii of 4th toe.
First phalanx longer than phalanges ii and iii together, arising at the end of the expanded portion of the toe.	First phalanx distinctly shorter than phalanges ii and iii, arising within the expanded portion of the toe.
Ground color dark. Oblique rows of small dots on flanks.	Ground color light. Broad dark transverse bands.

### GENERIC CHARACTERS OF ANOLES

Two of the more extraordinary peculiarities of *Anolis mirus* are worth attention because of their implications in regard to the significance (1) of gular folds and (2) of toe structure in the generic subdivision of the anoline lizards. They are therefore given extended discussion.

#### 1. *Gular folds*

I think we may safely assume that one of the primary specializations of the genus *Anolis* is the dewlap—the longitudinal gular fold extensible by means of muscles acting upon the processus retrobasalis of the hyoid (see von Geldern, 1919, for details). It is not clear whether, primitively, the dewlap was as large or as capable of extreme expansion as in some modern



species, but it is very probable that in *Anolis* it was primitively both a simple and a fully functional mechanism. From this simple condition, divergence has taken place in two directions: (a) toward development of transverse and lateral folds and (b) toward reduction of the longitudinal fold. Often the divergence may be traced through intermediate stages toward specialized end conditions.

One such specialized end condition, involving development of a peculiar lateral fold, is seen in *mirus*. Here the intermediate condition can be seen in a closely related species. Thus, the singular light-colored fold high on the neck, so evident in *mirus* (Figure 2), appears to be an exaggeration of a feature initiated in *fraseri* (Figure 3). Complex neck folds such as those seen in *fraseri* are seen in other anoles, e.g. in *Anolis cybotes* and (more conspicuously) in *Audantia* (= *Anolis*) *armouri* or *A. shrevei*, all of Hispaniola. (Simple neck folds are present in other anoles, though ordinarily prominent only in females.) I have, however, seen no real parallel to the situation in *mirus*. There, the dorsalmost horizontal fold above the shoulder is impressively widened, several times the width of the small folds ventromedial to it, so that it prominently overhangs the insertion of the arm and at the same time the light color of the dewlap area is continued up onto and above it so that the area stands out prominently against both the dark shoulder and the dark unfolded portion of the neck in front of it.

In some *fraseri* a similar but weaker fold may sometimes be lighter underneath or at its edge but, because the fold is very much weaker and the color never (as in *mirus*) extends as an arc of light pigment on its dorsal surface, the area is never anything like so prominent as in *mirus*.

A series rather similar to *fraseri-mirus* is seen in *cybotes-armouri*. The extreme prominence of transverse and lateral neck folds is striking enough in *armouri* that this taxon from the mountains of southern Haiti has been made the type of the genus *Audantia* Cochran 1934.<sup>1</sup> Recent field investigations in Haiti have shown, however, that between the supposed montane genus and *cybotes* (a common species of the surrounding lowland) there is almost smooth intergradation at all intervening levels. Indeed, the lowland species, when carefully examined, shows

<sup>1</sup> Since the type series were not fully adult, the transverse folds were more prominent than they are in full size specimens. The type of the type-species, *armouri*, is correctly called a female in the original description (Cochran, 1934), incorrectly reported as a male in the "Herpetology of Hispaniola" (Cochran, 1941).



even at sea level some development of lateral folds and the montane population has therefore merely accentuated a trend already evident in lowland populations. Cleared and stained specimens of *cybotes* and *armouri* cannot be separated on any osteological grounds. Strong development of transverse gular folds is not, in this instance, even a specific character.

A trend toward reduction of the dewlap is probably more common than the trends toward its complication. The occurrence of the dewlap in males only may be the first stage in the development of this trend. In many South American and a few West Indian anoles the dewlap is present and equally or almost equally developed in both sexes. In some South American and most West Indian species only the males have the dewlap well developed. Whatever the sequence of evolution in this case — whether a dewlap present in both sexes is primitive or advanced — the change-over must have taken place several times and forms suspected to be closely related may differ in this one character.

In Hispaniola four taxa have the dewlap small, nonfunctional — *Anolis monticola*, *A. aliniger*, and the two species or subspecies *A. hendersoni* and *A. baharucoensis*. The last two forms are very close and all four taxa belong to the same series<sup>1</sup> of the genus, but there are, at all events, three independent instances of dewlap reduction here.

A further example of dewlap reduction is known in Cuba in two species — *vermiculatus* and *bartschi*. These, since the dewlap is wholly lost and a simple transverse fold has been emphasized, have been referred to a distinct genus, *Deiropyx* Fitzinger. There is no question here of close relation to the Hispaniolan species mentioned above (though they again belong to the same series) and this is still another independent case (or two independent cases?) of dewlap reduction.

Thus, trends of two kinds are exhibited by the anoline gular region. Several species have gone off to varying degrees in one or both (“*Deiropyx*”) of the two directions; but annectant forms exist (in one case the difference is not even at the species level) and no major groupings have emerged that clearly deserve generic rank. The most nearly deserving case is “*Deiropyx*,” and even this is trivial (and very possibly polyphyletic). While

<sup>1</sup> I here refer to the “series” set up by Etheridge in the unpublished thesis already cited. These series, which are established on osteological characters seen in X-Rays, fit — with some few exceptions — the evidence provided by external characters as to anole relationships and furnish at the least very useful preliminary groupings for the future study of anole evolution.



the enormous genus *Anolis* may very possibly be usefully split, it is clear that use of gular differentiation would separate only a few end twigs from the bush, and even these not cleanly or clearly.

## 2. Toe structure

A specialization considered diagnostic of the anoline lizards is the peculiar toe structure with a narrow terminal phalanx. One genus — *Norops* Wagler 1830 — has been separated from the other anoline lizards on the structure of the digital pad. Our current concept of this genus dates from Boulenger (1885), who stressed the narrowing of the digital dilation but above all the fact that the distal joint was not “raised.”

This definition of *Norops* has never been an easy one to use. Schmidt (1939) has commented on the confusion: “The facility with which *Norops* and *Anolis* are confused is shown by the curious synonymy of the species. Mr. Parker informs me that Boulenger’s *Anolis rosenbergi* from Buenaventura, Colombia, may be added to the three synonyms of *Norops auratus* cited in the Catalogue of Lizards. Stuart (1934, p. 10) refers *Norops yucatanicus* Barbour and Cole to the synonymy of *Anolis tropidonotus*. The *Norops* of Matto Grosso and Paraguay is clearly *Norops meridionalis* Boettger, twice redescribed by Boulenger, with impartiality as to generic allocation as *Norops sladeniae* and *Anolis holotropis*.”

Schmidt was led to this comment by his observations incident to the description of *Anolis barkeri*, for which he remarked, “The terminal phalanx is less distinctly set off from the widened portion than in normal *Anolis*.”

Somewhat like *A. mirus*, *Anolis barkeri* is a relatively large anole (type: 86 mm snout-vent length) with a relatively low number of toe lamellae (*ca.* 16 under ii and iii of fourth toe in MCZ 58221). As in *A. barkeri*, so in *A. mirus* the “dilated” portion of the toe is very little wider than the distal portion and the latter is *not at all* “raised” above the dilated portion. (Compare in Figure 1 the lateral view of the toes of *A. fraseri* and *A. mirus*, in which the difference between “raised” and “not raised” distal portions is well shown.)

Boulenger emphasized in distinguishing *Norops*, however, just this character of “distal phalanx not raised.” On this feature, therefore, both *mirus* and *barkeri* would be *Norops*. Schmidt (1939) explicitly rejected this conception, stating: “The nature of the digits cannot be interpreted as in any way an approach



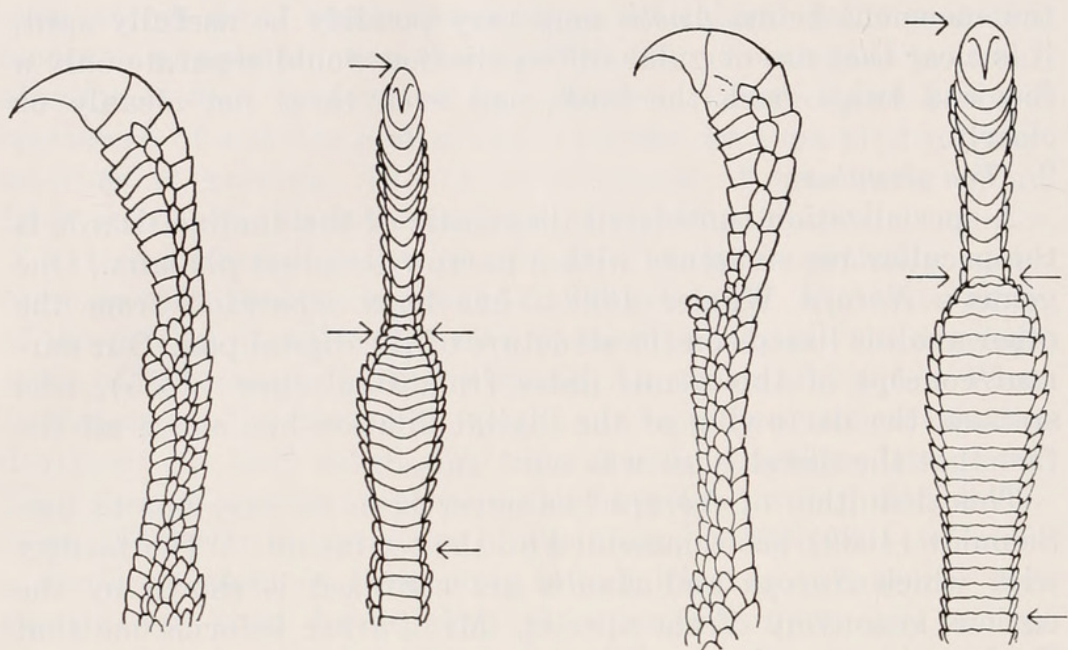


Figure 1. *Left*: lateral and ventral views of fourth hind toe of *Anolis mirus* new species, Type BM 1910.7.11.5.

*Right*: lateral and ventral views of fourth hind toe of *Anolis fraseri* Günther, ANSP 25563. The arrows permit comparison of the area under phalanx i with that under phalanges ii and iii.

to *Norops*, in which a distinctive habitus and scutellation are combined with the simple stage of digital dilation."

It is true that the forms which Schmidt regarded as *Norops* (*auratus*, *meridionalis*, *marmoratus*, *ophiolepis*) have a common habitus and scutellation; all have keeled ventrals, large flank scales, and a distinct zone of enlarged scales middorsally in combination with a narrow and simple digit. But Schmidt neglected to notice that not a few species currently referred to as *Anolis* approach these animals in varying degrees in all of these features (e.g. *A. notopholis*, *A. bitectus*, *A. tropidonotus*, *A. semilineatus*, in addition to others). There is no ground for belief that these *Anolis* species (all superficially similar) are very closely related to each other, or to the forms currently referred to *Norops*. Some of these have a better developed dorsal zone and narrower digits than some *Norops*. Thus *Anolis notopholis* has a wider zone with larger scales than "*Norops*" *meridionalis* and narrower digits than "*Norops*" *ophiolepis*.

It is, in fact, probable that "*Norops*" *ophiolepis* of Cuba is closer to *Anolis sagrei* also of Cuba than it is to the "*Norops*"



of South America, while "*Norops*" *auratus* — the type of the genus — is probably as close to *A. chrysolepis*, *A. scypheus*, and *A. lentiginosus* as it is to "*N.*" *meridionalis*. Again, as with dewlap differentiation, and even more impressively, we are confronted with convergent approaches to a similar stereotype occurring many times and from many directions. The evidence now suggests that the *Norops* condition of the anoline toe is a secondary simplification and not a primitively simple condition.

It again supports this picture of multiple approaches to the "*Norops*" toe structure that *A. mirus* and *A. barkeri* are not at all closely related. As in its gular differentiation, so in its toe structure, *Anolis mirus*, after beginning in a fashion similar to other forms, has taken off in a direction uniquely its own. Thus, a feature unique to *mirus* is the extreme elongation of the distal phalanx. In no other species of anole known to me is the distal phalanx longer than the second and third phalanges together.

Again, in the relation of body size to lamellae number, *mirus* is unlike any other anole. This is a large anole but in contrast to all other species of equivalent size, the number of lamellae under the fourth toe is extraordinarily low. In anoles the number of lamellae under phalanges ii and iii of 4th toe (the dilated portion of the toe includes all of phalanx ii and part of phalanx iii) varies between a minimum of about 11 to a maximum of about 50. *A. mirus* with 15 is very close to the lower extreme of the range although in size it ranks with the "giant" anoles (arbitrarily defined as those of 100 mm or more in snout-vent length).

The type of lamellae here discussed — transverse scales provided with microscopic hairs and imbricating distally — has been at least twice evolved — in geckos as well as in anoles. In both geckos and anoles it has been shown that there is a tendency for increase in lamellar number with increase in size (Hecht, 1952; Collette, 1961). It is this tendency which appears to be contradicted by *A. mirus*.

Collette (1961) has suggested that in addition to size a factor which he terms "arboreality" must be involved and calls attention to an apparent tendency to lower lamellar number in species (and ages and sexes) which spend most of their time on the ground. Certainly, if the generally agreed-upon association of high lamellar number with more effective climbing ability per unit weight is valid, a terrestrial niche for *A. mirus* would seem an almost obligatory inference. Table 2 shows lamellar number and body size (snout-vent length) for the largest anoles as



well as a sampling of this information for anoles of only slightly smaller size. Snout-vent length is here, of course, used for a datum — body weight — which is not available. In a comparison of species of different body proportions, snout-vent length is necessarily an inexact analog of the desiderate information; it is, however, as close an approximation as can be had.

Similarly crude but, I think, similarly useful is the simple index provided by dividing lamellar number by snout-vent length. This at all events makes vivid the fact that the correlation between body size and lamellar number in large anoles is very imperfect. It is, for example, conspicuous that *A. mirus* is the most extreme exception to this postulated correlation.

It will be noted that there is a geographic aspect to the data — that certain related West Indian species display the greatest known sizes and the highest known absolute lamellar number, and that the association of high lamellar number with large size is least evident in the South American giant anoles of the *latifrons* group (*fraseri*, *latifrons*, *princeps*, *squamulatus*). *A. fraseri*, which I have regarded as the closest relative of *mirus*, is closest in lamellar index.

Obviously we have here in the toe lamellae a fundamental taxonomic feature which should never be neglected in discussions of anoles. But more important we have a functional and evolutionary problem of extraordinary interest. The mode of function of the lamellae is not understood, and in consequence the significance of lamellar number is not understood. This is a topic which deserves much exploration, but which is outside the purview of the present paper. It suffices here to demonstrate that in this, as in other features, anoles show a wide spectrum of conditions and that use of toe structure as a generic character illuminates neither the phyletic nor the functional aspects of a complex situation.

#### SUBDIVISION OF THE GENUS *ANOLIS*: DISCUSSION.

It seems quite clear that neither gular nor toe modifications in anoles provide a clear basis for generic distinctions. Indeed, except for the head-crest characters utilizable in the recognition of the genera *Phenacosaurus* and *Chamaeleolis*, I know of no external characters that do furnish valid grounds for subdivision of anoles. If the huge genus *Anolis* is to be split, it will probably be on osteological or other internal features.

The first attempt at an analysis on osteological features has



been made by Etheridge. It is very unfortunate that his studies have not yet been formally published since they are in many regards highly successful.

Thus I call attention to the possibility that Etheridge's alpha and beta sections might usefully be recognized as genera. *Anolis* Daudin 1803 (type: *Anolis bullaris* Daudin 1803 [= *Anolis carolinensis* Voigt] by subsequent selection of Stejneger, 1904) will serve for the alpha section, and *Norops* Wagler 1830 (type by monotypy *auratus* Daudin 1803) for the beta section. An inconvenience of such an arrangement which will distress some herpetologists is the total absence of any external recognition marks for these putative genera. Etheridge's arrangement would, however, be a natural one and, as such, welcome, despite this trivial inconvenience. More pertinent is the objection that such a division in no substantial way alleviates the unwieldy nature of the currently recognized genus. *Anolis* now is so large that to cut its dimensions by only half is hardly a noteworthy contribution. It may be best, for the present, to bear with the very large genus *Anolis* until knowledge of many sets of characters make its subdivision into more manageable units practicable and secure.

#### ACKNOWLEDGMENTS

I am very much indebted to Miss A. G. C. Grandison, Dr. Doris Cochran, Dr. J. E. Böhlke, Dr. Norman Hartweg, Dr. Robert Inger, and Mr. C. M. Bogert for the privilege of examining material under their care. National Science Foundation grant NSF G 16066 has generously supported the studies of which this is a part.

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TABLE 2

Toe lamellae in large anoles<sup>1</sup>

	Snout-vent length	lamellae 4th toe	lamellar index
WEST INDIES			
<i>equestris</i> (MCZ 46203)	164	48	29
<i>ricordii</i> (MCZ 68479)	148	35	24
<i>cuvieri</i> (MCZ 58898)	135	32	24
<i>roosevelti</i> (MCZ 36138)	155	31	20
<i>Chamaeleolis chamaeleontides</i> (MCZ 59331)	161	31	19
<i>vermiculatus</i> (Boulenger 1885)	117	30	26
<i>bimaculatus</i> (MCZ 10398)	99	33	33
<i>leachii</i> (MCZ 16167)	100	31	31
<i>ferreus</i> (MCZ 28547)	96	31	32
<i>richardii</i> (MCZ 8117)	106	26	24
<i>garmani</i> (MCZ 7360)	104	31	30
SOUTH AMERICA			
<i>fraseri</i> (ANSP) 25563)	128	22	17
<i>latifrons</i> (MCZ 16789)	124	24	19
<i>princeps</i> (Vienna 12817)	124	22	19
<i>squamulatus</i> (UMMZ 123390)	116	23	20
<b>mirus</b> (BM type)	105	15	<b>14</b>
<i>apollinaris</i> (BM type)	106	25	23
CENTRAL AMERICA			
<i>insignis</i> (MCZ 15439)	126	25	20
<i>microtus</i> (MCZ 15424)	106	21	20
<i>petersi</i> (MCZ 57277)	109	28	26
<i>loveridgei</i> (MCZ 38832)	103	29	28
<i>biporcatus</i> (MCZ 22296)	85	22	26
<i>capito</i> (MCZ 15438)	83	16	19
<i>barkeri</i> (MCZ 58221)	86	16	18

$$\text{Lamellar index} = \frac{\text{lamellar number}}{\text{snout-vent length}} \times 100$$

<sup>1</sup> All are the genus *Anolis* as here understood, except *Chamaeleolis*. Abbreviations used: ANSP — Academy of Natural Sciences of Philadelphia; BM — British Museum (Natural History); UMMZ — University of Michigan Museum of Zoology; Vienna — Naturhistorisches Museum, Wien.





Figure 2. Lateral view of *Anolis mirus* new species, Type BM 1910.7.11.5.



Figure 3. Lateral view of *Anolis fraseri* Günther ANSP 25563.





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