MISCELLANEOUS PUBLICATIONS
MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN, NO. 91

A Brief Review of the Guatemalan Lizards of the Genus *Anolis*

BY

L. C. STUART

ANN ARBOR
MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN
June 6, 1955

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A BRIEF REVIEW OF THE GUATEMALAN LIZARDS OF THE GENUS *ANOLIS**

INTRODUCTION

SOME years ago — I am unable to date the event more accurately — word seems to have been passed among the herpetological fraternity that I knew something about anoles. How the rumor was started, I am unable to say, as at that time I had no enemies who would have stooped so low in retaliation for some imaginary ill-treatment at my hands. Notwithstanding, the rumor grew rapidly, with the result that since that time a great majority of the anoles collected in northern Central America and in much of Mexico have passed through my hands. From these I have learned something of variation in the genus, but the more specimens I have examined the more convinced I have become that the rumor as to my knowledge is without substantial foundation. I take this opportunity, therefore, to present the few data that I have collected over the years on Guatemalan anoles, which should definitely silence it.

Early in 1954 I was lamenting to my good friend Karl Schmidt the confusion that obtains in the genus *Anolis*. He was unsympathetic and replied (*in litt.*):

"The trouble with these anoles (which you so well expressed) is that no one sticks to the job long enough. If you will make a real review of the Guatemalan ones, I have the feeling that the rest of the Central American ones will fall into line without so much effort."

Acting on Dr. Schmidt's suggestion, I gathered together such notes and ideas as I had accumulated and went to work; the results are embodied herein. Whether or not the data have any merit will be determined by those who make an effort to use them. Of one thing I am certain, the following "review" is "real" only in the sense that I have pulled together all of my own knowledge.

I have never believed in systematic reviews of groups within a single "political" unit, inasmuch as such treatments most generally neglect extralimital forms and populations and more often than not lead to false impressions of many species owing to the selective nature of the materials utilized. The genus *Anolis*, however, is so large, so diversified, and geographically so spottily represented in collections that the "piecemeal" approach is practically forced upon one. I have, furthermore, not confined myself to an examination of Guatemalan material alone, but have, rather, studied extralimital populations of all the forms occurring within Guatemala insofar as such materials have been available. Again, a consideration of the Guatemalan forms could well serve as a focal study upon which extralimital investigations might be based. Investigators concerned with the more southern Central American anoles are confronted with no fewer than 15 forms that are either the same species or vicarious representatives of Guatemalan forms. To the north, even though the majority of the forms belong to groups not represented in Guatemala (especially the *nebulosus-nebuloides* complex), eight Guatemalan forms are represented along the Gulf of Mexico versant.

*Institute of Human Biology.

Insofar as nuclear Central America (Isthmus of Tehuantepec to southern Nicaragua) is concerned, at least 90 per cent of all anoles known from the region are represented in Guatemala. Thus, a treatment of the Guatemalan forms may be of some aid to investigators concerned primarily with other regions.

Within the limits of Guatemala I recognize 21 forms of the genus. Two of these I list with reservations, inasmuch as they have been known only from the types, which may be extreme variants of well-known species. Of the 19 more or less well-understood forms, I have collected all but one species, *pentaprion*. I hesitate to say how many individuals I have examined not only of Guatemalan forms but of extralimital species which in one way or another must be considered in sorting the Guatemalan species. Needless to say many of the specimens of *Anolis* sent to me for identification have been examined only in a cursory way.

I now feel that I have a fair understanding of the Guatemalan forms and have sorted the populations, in some instances to the subspecific level, fairly effectively. I cannot vouch, however, for the names applied to the various populations. Many of the types are in Europe, and of the types originally in American museums some have deteriorated beyond the limits of exact identification or have been lost. In selecting for use the various names I have been guided by geographical as well as morphological considerations. In some instances I have had access to topotypes, or at least to materials from type areas, that fit original descriptions reasonably well. In all instances I have made an effort to utilize the older names even though the original descriptions are not in strict accord with the material before me. The imperfect lenses with which the nineteenth-century investigators worked, often upon poorly preserved material with not-too-exact geographic data, must be taken into consideration in accounting for these discrepancies. Because I have had little experience in the field with anoles outside of Guatemala and have, further, never made such intensive studies on these as on Guatemalan forms, I have confined my synonymies to Guatemalan records insofar as original descriptions are concerned. I do, however, make several suggestions as to the possible equivalents of names applied to extralimital populations.

In my synonymies in the Annotated List of Guatemalan Anoles I have included first, the original description of each species cited in full with the numbers and locations of the types insofar as these have been available to me. The following abbreviations for the various institutions are used: University of Michigan, Museum of Zoology (UMMZ), Museum of Comparative Zoology, Harvard College (MCZ), United States National Museum (USNM), Academy of Natural Sciences of Philadelphia (ANS), British Museum (Natural History) (BMNH), Muséum National d'Histoire Naturelle, Paris (MNHN), Museum für Naturkunde (Zoologische Museum), Berlin (MNZM), Zoologische Sammlung des Bayerischen Staates, Munich (ZSBS), and Naturhistorischen Museums, Hamburg (NMH). Second, the synonymies include synonyms based upon Guatemalan material, and these are similarly cited. Third, major references dealing with Guatemalan records or with general treatments of the genus are included, and, fourth, I have cited Smith's and Taylor's usages in their account of the Mexican anoles (1950) in order that their concepts

may be correlated with my own. Finally, I have, where it seemed advisable, included references dealing with Guatemalan species and their near relatives in extralimital areas. These last three sets of references are given more briefly, as the full citation may be found in the Literature Cited. Text material in the Annotated List of Guatemalan Anoles includes brief resumés of diagnostic features that may aid in the identification of the various species, my ideas concerning relationships, and data relative to the distribution of the species within Guatemala and extralimitally, together with such general ecological observations as I have collected.

Acknowledgments

To list all of the individuals and institutions that have contributed of their ideas, time, or collections to whatever ideas I have concerning the anoles would be to include nearly all active herpetologists in the world today and most of the major institutions. I, therefore, acknowledge my gratitude to them as a group with the sincere hope that no individual will take as an act of discourtesy this blanket expression of thanks. I wish to express my appreciation especially to the authorities in charge of various European collections who have supplied me with descriptions, photographs, and other data on the materials under their charge.

I must, however, single out two investigators for special acknowledgment, Dr. Alexander G. Ruthven, one-time Director of the Museum of Zoology of the University of Michigan, and the late Dr. Thomas Barbour of the Museum of Comparative Zoology of Harvard College. Some thirty years ago these two contemplated a revisionary study of the genus *Anolis* and in preparation for the project exchanged ideas, photographs of types, and representatives of various species. Many of these data were contained in correspondence to which I have had free access, and many of the ideas expressed herein are from that source. I should be remiss were I not to express my gratitude to them.

My field studies in Central America have been supported through the past 20 years by grants from the Horace H. Rackham School of Graduate Studies, University of Michigan. To the administrators of that institution I must express my thanks for their generosity.

AFFINITIES AND GEOGRAPHY OF THE GUATEMALAN *ANOLIS* FAUNA

As previously indicated I recognize 19 forms of Guatemalan anoles of which I am reasonably certain and another two (*salvini* and *bouvieri*) which I question. Of the 19 that are relatively well known, 12 are treated as binomials and seven as trinomials. Future studies may reduce at least five of the former to subspecific status. For the purpose of orientation, the following list of Guatemalan anoles is presented:

Species	Subspecies
biporcatus	*crassulus crassulus*
capito	*crassulus haguei*
cobanensis	*humilis uniformis*
cupreus	*limifrons rodriguezi*
dollfusianus	*lemurinus lemurinus*
laeviventris	*lemurinus bourgeaei*
nannodes	*sagrei sagrei*
pentaprion	
petersi	
sericeus	
tropidonotus	
ustus	

Both *bouvieri* and *salvini* are too poorly known to be included in the following discussion.

Though too little is known of the evolution of the genus to allocate many of the above forms with any accuracy, about 10 distinct species groups are represented. In actual number of forms this is not an extensive list. Smith and Taylor (1950), for instance, list 34 forms for Mexico. Their list seems far too large, however, and several names have been used to designate the same species. I suggest, for example, the following as synonyms:

beckeri = *pentaprion*
heliactin = *sericeus*
metallicus = *tropidonotus*

Furthermore, *damulus* and *impetigosus*, both described without type locality, appear to have been included just on the chance that they might have stemmed from Mexico. Nine forms (including one of the synonyms) occur in Mexico only south of the Isthmus of Tehuantepec and do not enter what might be considered "continental Mexico" farther north. These are (*biporcatus, capito, cozumelae, kidderi, mayensis, pentaprion, rodriguezi, uniformis, ustus*). Of the remainder at least six are vicarious representatives of the *nebulosus-nebuloides* complex, and I suspect there is some duplication to be expected from that quarter (*dunni, gadovi, liogaster, megapholidotus, taylori,* and *schmidti*). Another two (*cymbops* and *utowanae*) are known only from the holotypes despite the fact that they are ascribed to relatively well-known regions, while four others (*baccatus, cummingi, güntheri,* and *schiedi*) are similarly known only from the types, which bear no further data than "Mexico." These last six must be viewed with suspicion. All in all the *Anolis* fauna of Mexico proper is very much smaller than a bare list would seem to indicate. Actually, aside from the very peculiar *Anolis barkeri* of the Tehuantepec region and the *nebulosus-nebuloides* complex, Mexico does not show much diversity in its anole fauna. Unless *ustus* can be shown to be a member of the *nebulosus* series, the Guatemalan (*ergo,* northern Central American) *Anolis* fauna has no affinities to the north. The few northern Central American forms that enter Mexico (essentially in the east) indicate that part of the Mexican fauna, e.g., *bourgeaei, laeviventris, sericeus, tropidonotus,* has southern affinities.

I am not sufficiently familiar with the anoles of southern Central America and South America to relate them with the northern or Guatemalan fauna. Dunn (1930:15-24) has stated that 21 forms may be recognized from Nicaragua through Panama. At least 12 forms in northern Central America and specifically in Guatemala are represented in the south either as the same species or by a vicarious form. These are:

Same Species	Vicarious Forms	
	Northern	Southern
biporcatus	*bourgeaei*	*lemurinus*
capito	*laeviventris*	*intermedius*
cupreus	*nannodes*	*intermedius*
lemurinus	*petersi*	*frenatus*
pentaprion	*sericeus*	*? palpebrosus*
	rodriguezi	*limifrons*
	uniformis	*humilis*

At least four of these continue into South America: *biporcatus, bourgeaei, petersi,* and *rodriguezi,* which are represented in the southern continent by *fraseri, incompertus, frenatus,* and *fuscoauratus,* respectively. Another group, the *laeviventris-nannodes-intermedius* series, appears to be very close to what I have known as *ortoni* in South America, but I am not familiar enough with the latter and its South American relatives to do more than suggest possible relationship.

Three Guatemalan species are apparently strictly northern types and do not descend below Nicaragua: *crassulus, tropidonotus,* and *ustus,* the last possibly being the only Central American representative of the *nebulosus-nebuloides* complex of Mexico. Conversely, there appear to be some southern types, the most conspicuous of which are *polylepis, lionotus,* and *pachypus*, that do not occur farther north than Nicaragua.

These data might lead to the erroneous conclusion that the *Anolis* fauna of Guatemala is essentially southern in its affinities. Actually, five species are definitely autochthonous to Central America and may, in fact, have had their center of origin in the nuclear part of the isthmus. Representatives of this group are: *capito, crassulus, cupreus, tropidonotus, uniformis.* To these might be added the *biporcatus, petersi,* and *sericeus* complexes, which do not penetrate far into northern South America and could well represent fairly recent immigrants into that region.

Aside from the widely distributed and most probably man-transported *sagrei,* the Guatemalan anole fauna seems to have nothing in common with the Antillean fauna, which runs strongly to long-headed, compressed-tailed, or crested types.

In summary it appears that the genus *Anolis* is represented in Guatemala by two major elements: a more ancient one that appears to have developed in Central America, possibly in the more northern parts, and a second that is more southern in its affinities and has most likely stemmed from South America more recently. Aside from the Central American and more southern types that have invaded eastern Mexico apparently fairly recently the

Guatemalan anoles have little or nothing in common with the "continental Mexican" fauna (i.e., the *nebulosus-nebuloides* complex), which appears to have developed independently.

The extant distribution of the genus *Anolis* within the boundaries of Guatemala (actually one might include Mexico south of the Isthmus of Tehuantepec as well as parts of adjacent Honduras and El Salvador) is fairly clear-cut and presents few problems. This section of northern Central America may be viewed as a nuclear upland mass ranging in elevation from roughly 1000 m. to 3500 m. (excepting the volcanic peaks which attain a maximum of about 4200 m.) bordered on the Pacific by a narrow strip of coastal plain and on the Caribbean by the Yucatán Peninsula, a lowland area of considerable proportions. This last, in southeastern Guatemala, shades into the very narrow coastal plain that extends on into northern Honduras. This entire region was apparently isolated from Mexico to the north of the Isthmus of Tehuantepec by an open portal in that region most probably during part of the early Pliocene and from South America by various open portals from early Eocene through the Miocene. Uplift of the entire region was initiated in the Pliocene and is still in process. Mesic conditions prevail on the Pacific side in the west, in adjacent eastern Chiapas, and throughout the Caribbean versant, except locally in the Motagua Valley. In these regions lowland forests and cloud forests at higher elevations are the general rule. On the lower uplands of the southeast and along the western part of the Pacific slope somewhat drier conditions prevail, and savanna and scrub forest constitute the major cover type. At elevations above about 1000 m. on the central plateau oak and pine forests are suggestive of none too mesic conditions, while at elevations above about 3000 m. the temperate forests bespeak a cool and fairly humid environment. Though most of Guatemala is subjected to relatively mesic conditions, one part of the country, the long chain of interior valleys and basins that extends from the Mexican border in the northwest through central Guatemala almost to the Caribbean coast, is definitely subhumid. This chain includes the headwaters of the Grijalva and Negro rivers, the central steppe basins from Sacapulas to Salamá and the middle valley of the Río Motagua (Stuart, 1954), and is continued in Honduras as the Comayagua area.

In this setting the genus *Anolis* is generally distributed throughout Guatemala to elevations of about 3000 m. Horizontally, one may recognize four divisions of the country, the Caribbean versant, the Pacific versant, the "Altos" or Plateau, and the dry interior basins and valleys. Vertically, within the limits of any one of the horizontal divisions, one may recognize a maximum of three major belts, a Tropical belt from sea level to about 1500 m., a Subtropical belt from 1500 m. to about 2500-2800 m., and a Temperate belt above the last figures. The Tropical belt may be further divided into a lower portion below 600 m. often referred to as the "banana zone" and an upper portion between 600 m. and 1500 m. generally spoken of as the "coffee zone." On the basis of data now available the Subtropical belt and the Temperate belt do not appear to be further divisible faunally. Within each of the vertical and horizontal units two major habitat types are evident on the basis of anole (and indeed most amphibian and reptilian) distribution,

the grasslands and the forest. Where the one begins and the other ends is often difficult to say, for the ecotone between the two is extremely broad. In fact what in one region might pass for forest to some particular species of *Anolis*, in another region might constitute the more open type of grasslands environment to the same species. The conditions are essentially relative rather than precisely measurable. Generally speaking, grasslands, grasslands with scattered trees, low second-growth, and occasionally scrub forest types all fall within the grassland habitat type. Forests begin at the scrub forest level.

Analysis of the *Anolis* fauna of northern Central America indicates that the genus in that region is essentially a lowland, mesic, forest-inhabiting group. Thus, one encounters greatest diversity in the genus on the hot, humid, forested, Caribbean lowlands or at least within the Tropical belt of the Caribbean versant, from which 11 forms are known. In that Tropical belt occur the following:

biporcatus
capito
humilis uniformis
lemurinus bourgeaei
limifrons rodriguezi
nannodes
pentaprion
sagrei
sericeus
tropidonotus
ustus

Of these, five, *capito, humilis uniformis, pentaprion, tropidonotus*, and *ustus,* do not ascend above the limits of the banana zone and only *nannodes* of the coffee belt is shared with the cloud forest of the Subtropical belt. Though only *biporcatus, humilis uniformis,* and *pentaprion* can be said to be deep-forest inhabiting forms, most of the others are well restricted to at least second-growth cover, and none shows any tolerance to true grasslands conditions.

Above the 1500 m. level the *Anolis* fauna of the Caribbean versant is reduced to but five forms, *cobanensis, crassulus haguei, nannodes, petersi,* and *crassulus crassulus,* the last occurring only very locally in the Sierra de las Minas. All are essentially forest forms. The Temperate belt occurs only locally on the Caribbean slope, in the Sierra de las Minas. I have never seen an anole in it.

Only six forms can be definitely allocated to the Pacific versant, but one of these (*crassulus crassulus*) can hardly be considered a normal member of the fauna. Known from this slope are:

crassulus crassulus
cupreus
dollfusianus
lemurinus lemurinus
petersi
sericeus

Of these none is restricted to the banana zone though in the wetter western part of the region neither *lemurinus lemurinus* nor *sericeus* ascends much above that level. Two apparently do not descend below the limits of the Subtropical belt, *crassulus crassulus* and *petersi;* the former is typically a Plateau form that spills over only locally onto the Pacific versant into clearings in the cloud forest. Unless it can be shown that *crassulus*

crassulus occurs at very high elevation, no anole inhabits the Temperate belt facing the Pacific. As is true of the Caribbean species, none of the above occurs in grasslands proper, and *cupreus, dollfusianus*, and *petersi* are confined to fairly heavily forested areas.

The Plateau contains only the Subtropical and Temperate belts and from the area but two species are known, *crassulus crassulus* and *laeviventris*. The former is most abundant in the oak and pine forests of the Subtropical belt, but does invade the lower margins of the Temperate belt. The latter is known from a single specimen from the pine forests at 1800 m. in the headwater region of the Grijalva system.

The subhumid interior basins and valleys (and the southeastern uplands up to 1500 m. as well) are known to support but a single species, *Anolis sericeus*, which in this area is restricted to gallery forests along the larger streams to about 1000 m. elevation.

It may be noted in passing that any effort to arrange the anoles of Guatemala geographically on the basis of the "life zone" approach can lead only to a false picture of its distribution. The closest approach to any such arrangement is in the common occurrence of *sericeus* and *lemurinus* in the banana zone on the Caribbean and Pacific sides, and similarly of *petersi* in the Subtropical belt. Insofar as any continuity between the several populations of these species is concerned, none is apparent in the Guatemalan section of northern Central America. There is a possibility that the Caribbean and Pacific populations of *sericeus* and *lemurinus* may be continuous across the lower uplands of Honduras and Nicaragua farther to the south, but the two are isolated from each other in the Tehuantepec region. The former populations are separated in this region by a distinct third population and, so far as known at present, *lemurinus* does not occur in the xeric Pacific Tehuantepec and western Chiapas area. It is possible that *petersi* may be continuous through the upland forests around the northern end of the Chiapas highlands, but this remains to be proved.

The origin of the *Anolis* fauna of northern Central America seems fairly obvious. Such groups as *capito, humilis, nannodes, pentaprion, sericeus*, and *tropidonotus* appear to have developed in the nuclear Central American region during its isolation from South America. Pliocene uplift appears to have carried the prototype of the *crassulus* group to fairly high elevations where it developed as an uplander, while *tropidonotus* (and possibly *humilis*) probably derived from the same prototype, developed on the lowlands. Resumption of the connection with South America permitted the northward movement of groups such as *lemurinus* and *limifrons*. At the same time, the break at Tehuantepec permitted the development of the very distinct *nebulosus-nebuloides* group in Mexico. Resumed connection with that area, while permitting further northward movement of the autochthonus Central American types into the mesic part of eastern Mexico, had no geographic implications for the more xeric types that had developed in Mexico, for these have apparently been unable to penetrate southward into the mesic regions of Central America. Until we are more familiar with the groupings and distribution of the forms of northern South America, it will remain impossible to allocate other northern Central American forms definitely as to their history.

It is interesting that several of the other larger herpetological groups in northern Central America parallel the geographic and historical patterns obtaining in *Anolis*. Though considerably more data on the plethodontid salamanders of Guatemala are now available, the account of this group that I presented some 10 years ago (Stuart, 1943) would not be greatly modified, and by merely changing names, the present remarks on the anoles would be equally applicable to the hylids.

IDENTIFICATION OF GUATEMALAN ANOLES

Past investigators who have had any great amount of experience with the anoles were, it would seem, sufficiently familiar with the difficulties to be hesitant in essaying a key for the identification of the many forms. Barbour was content to present a rather complete check-list of the genus (1930 and 1934), while Ruthven was claimed by administrative duties before he had had an opportunity to summarize his opinions. The difficulties entailed in constructing a useful key to the genus are no better brought out than in Ruthven's notes to which reference has previously been made. Without a doubt Ruthven had a better understanding of anoles than any herpetologist before his time, yet his notes are filled with partly completed keys. It is evident that he realized that convergent evolution in the genus simply precluded any chance of constructing a workable artificial key, while adaptive evolution within the various species groups held the development of a natural key at an impasse. To construct a key to the entire genus would require the inclusion as diagnostic characters of such items as geographic range, ecological behavior, color *in vivo*, and statistical differences based upon large series.

The genus *Anolis*, nevertheless, abounds in morphological characters that are not only of importance and value for simple taxonomic diagnoses but also seem worth study in problems involving the broader phases of systematics. Unfortunately, the majority of readily measurable or easily described characters have been utilized only for the purpose of diagnosis, and their deeper meanings have remained largely neglected. Few attempts have been made to sort the anoles into natural groups, largely because many of the diagnostic characters have not been traced from population to population and from there on into the species and group levels. As a result the use of such characters has all too often grouped forms that are obviously unrelated genetically. My studies of the anoles lead me to believe that in this genus convergence has been the rule rather than the exception. Leg length, for example, treated as a unit character would jumble together such diverse species as *petersi*, *biporcatus*, and *nannodes* in Guatemala. Yet their only common feature is the arboreal habitat to which they display convergent adaptation through a shortening of the leg. Again, in response to some less obvious evolutionary factor *cupreus*, *lemurinus*, and *dollfusianus* are so similar in all structural characters that diagnosis is well-nigh impossible, yet there is little likelihood that close relationship exists between the three. In contrast such obviously closely related species as *laeviventris*, *nannodes*, and *intermedius* display a distinct clinal tendency in the relative

smoothness of the head scutes and in several other characters to the extent that forms at either end of the cline display little superficial resemblance suggestive of close relationship. Until such time as all the variations and trends of the multitude of promising characters have been studied more critically than has been possible in this review, knowledge of genetic relationships within the genus must remain inadequate, and until these are thoroughly understood any key for the identification of the individual forms will be of little value.

At present our collections are poorly distributed geographically, unequally represented sexually with reference to different populations, and completely inadequate insofar as age groupings are concerned for an understanding of the genus. Of ecological data, which I believe to be of the utmost importance in unraveling the systematics of the anoles, we possess practically nothing. There is available no usable series of watercolor or color photographic data for the often diagnostic throat fans of the males.

No effort has been made herein to utilize a number of morphological characters that will prove of increasingly greater diagnostic value as collections grow. I have, rather, confined myself to structures that are believed to be relatively invariable in the species for the diagnosis of which they are used. This has led to difficulties in those instances in which apparent convergence has produced remarkable similarity in the same structure in different species. It has been impossible to overcome this difficulty and as a result, I have had to turn occasionally to less stable features in which means alone are diagnostic. Characters of major diagnostic value include the comparative length of the lower leg, the size structure, and the arrangement of the dorsal and ventral scutes. Characters of less importance applicable only to fairly large series are the relative smoothness or rugosity of the head scutes, number of scales between supraorbital semicircles, and the number of loreal rows. In attempting to identify my concept of the various species, Bocourt's (1873-74: Pl. 13-17) magnificent plates should be referred to.

Dorsal scale counts are taken along the middorsal line between the axilla and groin levels. Ventral counts have been made at either one side or the other of the midventral line between the same levels. Comparative size of dorsal and ventral scales is determined by comparative counts of the number of each contained into any selected linear standard. The length of the lower leg is determined by measuring the distance between the angle of the knee formed by the head of the tibia and the angle between ankle and foot formed at the proximal end of metatarsal V. Each of these points is readily visible externally when the tibia is bent at right angle to the femur and the foot at right angle to the tibia, respectively.

In consideration of the foregoing comments, it might seem better to omit the following key to aid in the identification of the Guatemalan anoles. In presenting it I have no delusions concerning its merits, although it is a better key than has been available, and the worker who knows what species he has before him should experience few difficulties in its use.

KEY TO THE FORMS OF GUATEMALAN ANOLES

1. Tail strongly compressed; middorsal scales of tail strongly keeled and forming a low crest; coastal Caribbean . . . . *sagrei sagrei*
   Tail round or ovoid in cross section; never strongly compressed 2
2. Lower leg very long, greatly exceeding distance from tip of snout to auricular opening; lowland Caribbean . . . . . *capito*
   Lower leg not or but slightly exceeding distance between tip of snout and auricular opening 3
3. Midventral scales at mid-body very weakly keeled, subconical, pearl-like, or smooth and flat; never strongly keeled 4
   Midventral scales at mid-body distinctly and often strongly keeled 8
4. Lower leg considerably shorter than distance from tip of snout to posterior border of eye; lowland Caribbean. . . . . *pentaprion*
   Lower leg just short of or longer than distance from tip of snout to posterior border of eye. 5
5. Dorsal head scales smooth or but very weakly keeled 6
   Dorsal head scales distinctly keeled or rugose 7
6. Lower leg almost as long as distance from tip of snout to auricular opening; occipital plate as large as auricular opening; Pacific, probably upland . . . . . *bouvieri*
   Lower leg much shorter than distance from tip of snout to auricular opening; occipital plate smaller than auricular opening; versant unknown, probably upland. . . . . *salvini*
7. Loreal rows above suture between supralabials four and five, 7-8; chest scales with low keels; upland Alta Verapaz. . . . *cobanensis*
   Loreal rows above supralabial four, 5-6; chest scales smooth; lowland Caribbean . . . . . *limifrons rodriguezi*
8. Six to twelve longitudinal rows of enlarged dorsal scales strongly and abruptly differentiated from laterals 9
   Enlarged dorsal scales, if present, grading gradually into laterals 12
9. Lower leg as long as distance from tip of snout to auricular opening; lowland Caribbean . . . . . *tropidonotus*
   Lower leg shorter than distance from tip of snout to auricular opening 10
10. Dorsal scales about 50 per cent larger than ventrals; lowland Caribbean . . . . . *humilis uniformis*
    Dorsal scales smaller than ventrals 11
11. Dorsal scales generally less than 48 between axilla and groin levels; Guatemalan Plateau . . . . . *crassulus crassulus*
    Dorsal scales generally more than 50 between axilla and groin levels; upland Alta Verapaz . . . . . *crassulus haguei*
12. Generally six or more longitudinal rows of enlarged dorsal scales distinctly differentiated from lower laterals into which they grade very gradually 13
    Dorsal scales if definitely differentiated from laterals, confined to but two to four vertebral rows 14

13. Enlarged supraoculars and scales of frontal depression generally keeled or rugose; lowland Caribbean and Pacific . . . . *sericeus*
Enlarged supraoculars and scales of frontal depression generally unkeeled and smooth; lowland Caribbean . . . . . *ustus*
14. Lower leg shorter than distance from tip of snout to posterior border of eye 15
Lower leg at least as long as distance from tip of snout to posterior border of eye 16
15. Upper head scales rugose; more than 60 scales along vertebral line between axilla and groin levels; upland Alta Verapaz. . . . . *nannodes*
Upper head scales smooth; less than 60 scales along vertebral line between axilla and groin levels; in Guatemala restricted to the upper Grijalva drainage . . . . . *laeviventris*
16. Lower leg just equal to or barely exceeding distance from tip of snout to posterior border of eye 17
Lower leg greatly exceeding distance from tip of snout to posterior border of eye 18
17. Ventral scales between axilla and groin levels more than 60; upland Caribbean and Pacific . . . . . *petersi*
Ventral scales between axilla and groin levels less than 60; lowland and upland Caribbean . . . . . *biporcatus*
18. Lower leg generally shorter than distance from tip of snout to auricular opening; small species never exceeding 40 mm. head-body length; upper head scales especially in the frontal region tricarinate in appearance; upland Pacific . . . . . *dollfusianus*
Lower leg generally as long as or slightly longer than distance from tip of snout to auricular opening; larger species, adults generally exceeding 40 mm. head-body length 19
19. Supraorbital semicircles in contact or rarely separated by more than a single row of scales; adults generally 60-70 mm. head-body length; in Guatemala lowland Pacific . . . . . *lemurinus lemurinus*
Supraorbital semicircles generally separated by at least one and generally two rows of scales 20
29. Occipital plate generally separated from nearest scale of supraorbital semicircles by two (most frequently) or three scales; smaller species, adults generally 45-50 mm. head-body length; lowland and upland Pacific . . . . . *cupreus*
Occipital plate generally separated from nearest scales of supraorbital semicircles by three or four (most frequently) scales; larger species, adults generally 50-60 mm. head-body length; lowland Caribbean . . . . . *lemurinus bourgeaei*

ANNOTATED LIST OF GUATEMALAN ANOLES

Anolis biporcatus Wiegmann

Dactyloa biporcatus Wiegmann, *Herpet. Mex.*, 1834: 47 (holotype, MNZM 524; type locality, Mexico); Stuart, 1948: 46; Smith and Taylor, 1950: 65; Günther, 1885: 52.
Anolis copei Bocourt, *Miss. Sci. Mex.*, 1873: 77, Pl. 15, Fig. 10 (holotype, MNHM 2426; type locality, Santa Rosa de Panzós, Guatemala); Günther, 1885: 47; Barbour, 1934: 128.

I believe that the moment of greatest thrill and greatest disappointment in my herpetological collecting arrived as I shot my initial specimen of this species. I spied the animal first scrambling up the trunk of a giant tree in the Petén forests. Its size and lovely bright green thrilled me into momentary inaction, and it was almost out of range when I finally recovered my wits sufficiently to shoot. As it fell I was startled to see its beautiful green fade rapidly, and upon rushing forward to secure it, I found that it had changed to the disappointingly drab, black-spotted, purplish brown that characterizes the alcoholic specimens on museum shelves.

This species is one of the three "giant anoles" that are encountered in Guatemala. It is short-legged, has small keeled ventrals, and the dorsal scales are barely differentiated from the laterals except for the two middorsal rows, which are slightly enlarged. In most of its structural characters it resembles *Anolis petersi* from which it may readily be distinguished by its larger and more strongly keeled ventral scutes. The species has no near relatives to the north, but to the south *Anolis fraseri* Günther appears to be closely related to it. In fact I suspect that a gradual cline may obtain in the two forms. In the north *biporcatus* has strongly keeled ventrals, widely separated supraorbital semicircles (three or four scales between them), rugose or keeled upper head shields, and dark ventral streaks especially on the chin and throat. To the south *fraseri* of Ecuador possesses only weakly keeled ventrals, only one or two scales between the supraorbital semicircles, relatively smooth upper head scales, and, though dark on the chin and throat, lacks the distinctive streaks of *biporcatus*. Whether or not a third unit within this cline in southern Central America is worthy of recognition I cannot say, but that population seems to be closer to *fraseri* than to *biporcatus*.

Anolis biporcatus is restricted to the Tropical belt in Guatemala to about 1000 m. elevation and is confined to the Caribbean versant from Chiapas southward. It is a strictly arboreal, forest form.

Anolis capito Peters

Anolis (Draconura) capito Peters, *Monatsbr. Berlin Acad.*, 1863: 142 (holotype, MNZM 4684, originally two cotypes; type locality, Costa Rica). Dr. Wermuth informs me he is retaining the original number for the lectotype.
Anolis carneus Cope, *Proc. Acad. Nat. Sci. Phila.*, 1864: 171 (holotype, BMNH No. 1946.8.8.40; type locality, lower Verapaz forest [i.e., lowland forests of Alta Verapaz, Guatemala]).
Anolis capito, Bocourt, 1873: 101, Pl. 16, Figs. 27; Günther, 1885: 52; Barbour, 1934: 126; Smith and Taylor, 1950: 65.

This is the second of the large Guatemalan anoles. The species is readily recognized by its peculiar dorsal scales. These are flat and pavement-like, irregularly arranged and remind one of a tile mosaic. It is the longest-legged species in northern Central America. The scales on the surface of the head are either extremely rugose or strongly unicarinate. There is nothing north of the Isthmus of Tehuantepec to which it might be related, and I am not sufficiently familiar with South American anoles to suggest relationships with them.

The species appears to be confined to relatively low elevations and is widely distributed along the Caribbean versant from Tabasco, Mexico, southward well into Panama.

Anolis cobanensis Stuart

Anolis cobanensis Stuart, *Occ. Papers Mus. Zool. Univ. Mich.*, 464, 1942: 6 (holotype, UMMZ 90232; type locality, 3 km. south of Finca Samac [6 km. air-line west of Cobán], Alta Verapaz, Guatemala, 1350 m.)

Anolis schiedii, Bocourt, 1873: 64 (in part); Günther, 1885: 46 (in part); Barbour, 1934: 149, spelled "schedii," (in part).

I have long considered this species as a possible representative of the *cupreus* group that has become isolated in Alta Verapaz. Recently, however, Mertens (1952: 89) has described from El Salvador *Anolis heteropholidotus* which has much in common with *cobanensis*, especially the nature of the ventral scutes, which are rounded and smooth (smooth or feebly keeled in *cobanensis*). I have three specimens of *heteropholidotus*, belonging to the Chicago Natural History Museum, which reveal that the species has much larger dorsals than has *cobanensis*, enlarged postanal plates lacking in *cobanensis*, and relatively smooth upper head plates. The somewhat enlarged scales scattered among the granular laterals of *heteropholidotus* present a feature that is not infrequently observed in *crassulus*. Recently, Hobart Smith of the University of Illinois has sent me an anole, collected in eastern Chiapas, presumably at relatively high elevations, which is almost intermediate between *heteropholidotus* and *cobanensis* and answers fairly closely the description and figure of the type (Bocourt, 1873: Pl. 14, Fig. 19) of the long-lost *Anolis schiedi* Wiegmann. Conceivably, this is a very distinct little group of anoles, confined to relatively high elevations in wet forests, in which from south to north the dorsals decrease in size and become smoother and the head scales become smoother. Through this cline the scattered and enlarged lateral scales are lost as are the enlarged postanal plates of the males. Though these changes appear to be of some magnitude, clinal changes of the same magnitude obtain in the *laeviventris-nannodes-intermedius* series. I suggest that *Anolis bouvieri* Bocourt (*q.v.*), of southern Guatemala, may represent a link in this *heteropholidotus-cobanensis* group. Certainly, this complex of forms with smooth or very weakly keeled ventral scales presents the most puzzling populations of the northern Central American anoles. On the basis of five individuals of *heteropholidotus* in El Salvador, 10 of *cobanensis* from Alta Verapaz, and at most three individuals from the intervening territory, the status of these species cannot be settled.

Of materials stemming from Guatemala *cobanensis* still remains the anole most easily confused with *cupreus*. Its weakly keeled ventrals and much smaller dorsals, which number over 70 as compared with less than 60 in *cupreus*, serve to distinguish it from this later. Among other diagnostic characters may be mentioned its poorly differentiated dorsals, even in the vertebral region, and its deep purple dewlap.

Restricted, so far as is known, to the cloud forest belt of Alta Verapaz, this species is an inhabitant of the deep forest.

Anolis crassulus crassulus Cope

Anolis crassulus Cope, *Proc. Acad. Nat. Sci. Phila.*, 1864: 173 (lectotypes, ANS 8023-27 designated by Stuart, 1942; type locality, Central Guatemala); Bocourt, 1873 (1874): 82, Pl. 16, Figs. 17; Stuart, 1942: 1-2.

Anolis uniformis, Barbour, 1934: 153.

[*Anolis crassulus crassulus*] by fiat, Stuart, 1948: 47.

This species I have discussed (Stuart, 1942), and I believe that the use of the names *crassulus* and *uniformis* has been straightened out. With its large, strongly keeled ventrals, abruptly enlarged dorsals that cover most of the back, knobby and rugose dorsal head scales, the very large postanal plates in the males, and its short legs, there is nothing, aside from its vicarious representative *haguei* (*q.v.*), with which *crassulus* may be confused. I know of no form to the north of the Isthmus of Tehuantepec to which it might be related, though *Anolis sminthus* Dunn and Emlen of Honduras may be a vicarious representative to the south.

The form is apparently restricted to the central Plateau and Sierra de las Minas of Guatemala and to the Mesa Central and Sierra Madre of adjacent Chiapas. Typically a pine-oak inhabitant, though it may spill over into the cloud forest belt along the Pacific versant of Guatemala, it is known only from elevations above 1500 m. and has been taken as high as 2600 m.

Anolis crassulus haguei Stuart

Anolis haguei Stuart, *Occ. Papers Mus. Zool. Univ. Mich.*, 464, 1942: 3 (holotype, UMMZ 90226; type locality, cloud forest 2 km. south of Finca Chichén, about 9 km. south of Cobán, Alta Verapaz, Guatemala, elevation 1750 m.)

Anolis crassulus, Günther, 1885: 50, Pl. 27, Fig. F (Cobán specimens); Barbour, 1934: 129 (in part).

Anolis crassulus haguei, Stuart, 1948: 47.

Readily differentiated from typical *crassulus* by its much smaller dorsal scales, which are quite irregular in their arrangement, this race is the vicarious representative of *crassulus crassulus* in Alta Verapaz, where it occurs in abundance in the cloud forest belt, above 1300 m.

Anolis cupreus Hallowell

Anolis cupreus Hallowell, *Proc. Acad. Nat. Sci. Phila.*, 1860: 481 (cotypes, USNM 12211 (14); type locality, Nicaragua); Günther, 1885: 50 (probably in part); Barbour, 1934: 129.

Anolis macrophallus Werner, *Jahr. Hamburg. Wissen. Anst.*, 34, 1917: 31 (holotype, originally in NMH, destroyed during war; type locality, San José, Guatemala).

This species is one of the nondescript anoles that is difficult to diagnose. It is of moderate size with not particularly strongly keeled ventrals, which are larger than the dorsals, perfectly normal, keeled head scutes, a moderately long leg, lacking enlarged postanal plates in the males, and with an orange-margined, deep rose dewlap. It may be easily confused with at least two other species in Guatemala, *cobanensis* (*q.v.*) from Alta Verapaz, and *dollfusianus* (*q.v.*) that occupies the Pacific versant west of Escuintla. It may be closely related to the former, but I hesitate at this time to say whether or not it is similarly related to the latter. There is nothing north of the Isthmus of Tehuantepec to which it is even remotely related, and I am not familiar enough with more southern anoles to suggest relationships with any of the South American forms. Lacking sufficient material from southern Central America, I am unable to determine whether or not the northern and southern populations are identical. It is indicated, however, that true *cupreus* in the south has somewhat larger ventral scutes than the northern population, so that subspecific recognition of the two may eventually prove necessary. Werner's name *macrophallus* is available for the northern population.

Anolis cupreus is the common forest anole of the eastern parts of Pacific Guatemala. Its most westerly extent is probably in the neighborhood of Escuintla. Vertically, it appears to range from about sea level to about 1400 m. It is not known to occur south of Costa Rica.

Anolis dollfusianus Bocourt

Anolis dollfusianus Bocourt, *Miss. Sci. Mex.*, 1873: 84, Pl. 16, Fig. 19 (holotype, MNHN 24335; type locality, Volcán Atitlán, Guatemala, 1200 m.)
Anolis cupreus, Günther, 1885: 50 (in part); Barbour, 1934: 129 (in part).

This smallest of Guatemalan anoles is, as has been indicated, very similar to *Anolis cupreus* (*q.v.*). It differs from *cupreus* most conspicuously in size, an adult male attaining 25 mm. head-body length as compared with 45 mm. in *cupreus*, and the largest female of *dollfusianus* that I have ever taken measures but 44 mm. In addition to the size difference, the males of *dollfusianus* have a yellow rather than reddish dewlap, the scales of the frontal depression are much smaller than in *cupreus*, and the upper head shields in the occipital region are rugose in *dollfusianus* as opposed to a smooth condition in *cupreus*. Another feature difficult of description is the tricarinate appearance of the upper head shields on the forepart of the head. These are not strictly tricarinate, but the lateral edges of the scutes are upturned, which, with the central keel, gives the tricarinate appearance. In *cupreus* the margins of the same scales are flat, the central keel alone producing the unicarinate condition. In other morphological features the two species are almost identical.

Though I hesitate to suggest close relationship between the two forms, I know of nothing else either to the north or south to which *dollfusianus* might be related. I find no evidence of intergradation between the two in the region where such might be anticipated. On the other hand, neither do I find overlap. I must admit, however, that my hesitancy in suggesting relationship between the two forms is strictly subjective.

Anolis dollfusianus is confined to the Pacific versant from about the level of Escuintla westward into eastern Chiapas. It is apparently confined to the upper parts of the Tropical belt between about 600 and 1500 m. The species is, like *cupreus*, a forest form and occurs abundantly in coffee groves at about the 1000 m. level.

Anolis humilis uniformis Cope

Anolis uniformis Cope, *Proc. Amer. Phil. Soc.*, 22, 1885: 392 (cotypes and type locality, USNM 24859, Yucatán; 6774, 2434-38, 24750, Guatemala and MCZ 10933, Guatemala); Günther, 1885: 51; Stuart, 1942: 2.
Anolis ruthveni Stuart, *Occ. Papers Mus. Zool. Univ. Mich.*, 310, 1935: 1 (holotype, UMMZ 76622; type locality, 2 miles north of Santa Teresa, El Petén, Guatemala).
Anolis humilis, Günther, 1885: 50 (in part).
Anolis humilis uniformis, Stuart, 1948: 48; Smith and Taylor, 1950: 60.

This pretty little woodland form is one of the smallest of the Guatemalan anoles. It may be distinguished readily by its abruptly enlarged dorsal scutes, which are arranged in about 10 longitudinal rows, by its almost entirely undifferentiated head scutes (those of the supraorbital semicircles are almost identical with those of the anterior and posterior parts of the head surface), and by its bright red dewlap, which contains a purple spot. The only species with which it might be confused in northern Central America is *Anolis tropidonotus*. From this it differs primarily in the size of the central ventral scales, which are very much smaller than the dorsals in *uniformis* and almost equal in size to the dorsals in *tropidonotus*.

Anolis humilis uniformis is one of a group of closely related species or subspecies widely distributed along the Caribbean side of Central America from southern Mexico to at least the Canal Zone. To the south of Honduras *quaggulus* and the typical form are the vicarious representatives of the group (Gaige, Hartweg, and Stuart, 1937: 9). North of the Isthmus of Tehuantepec there is nothing that appears to be related to it.

This form is restricted to the forest environment and is known only from low elevations. It occurs from Tabasco southward to the foothills of Alta Verapaz.

Anolis laeviventris Wiegmann

D[actyloa] (A[nolis]) laeviventris Wiegmann, *Herpet. Mex.*, 1834: 47 (holotype MNZM 525; type locality, Mexico, restricted to Jalapa, Mexico, by Smith and Taylor, 1950).
Anolis wiegmanni Fitzinger, *Syst. Rept.*, 1843: 67 (substitute name for *Dactyloa laeviventris* Wiegmann).
Anolis nannodes Cope, *Proc. Acad. Nat. Sci. Phila.*, 1864: 173 (in part, cotypes from Jalapa, Mexico, formerly in the USNM, now lost). Name restricted to Alta Verapaz population (Stuart, 1948; see *Anolis nannodes* below).
Anolis intermedius, Bocourt, 1873: 87, Pl. 16, Fig. 18; Günther, 1885: 49; Barbour, 1934: 135 (in part); Smith and Taylor, 1950: 62.

This species has larger dorsal scales than *nannodes* (*q.v.*), its closest relative. From the small series of each species available, it is indicated that in the males the dorsal scales exceed 60 in *nannodes* and are fewer than 60 in *laeviventris*.

Unless a Chiapas population can be shown to differ materially from that of Veracruz, the species can be said to range from central Veracruz southward through the Grijalva Valley of Chiapas into northwestern Guatemala. I secured the species once in Guatemala, in the oak-pine belt at 1780 m. above the Cuilco Valley just east of the Mexican border.

Anolis lemurinus lemurinus Cope

Anolis (Gastrotropis) lemurinus Cope, *Proc. Acad. Nat. Sci. Phila.*, 1861: 213 (types, originally in ANS, now apparently lost; type locality, Veragua, Panama).
Anolis lemurinus, Günther, 1885: 52; Barbour, 1934: 137.
Anolis palpebrosus, Günther, 1885: 49.
Anolis biporcatus, Günther, 1885: 52 (in part).

I follow Barbour (1934) in the application of this name to a species that is extensively distributed over the lowlands of Middle America. It is another drab, undistinguished anole probably related to the "*incompertus*" complex of northern South America. Extremely variable in all morphological characters as well as in pattern, its diagnostic characters are its moderate size, relatively long legs, keeled ventrals considerably larger than the dorsals, and the middorsal scales slightly but definitely larger than the scales of either the remainder of the back or the sides.

I have previously indicated that the population of *lemurinus* on the Caribbean slopes north of Honduras differs in several respects from that of southern Central America (Stuart, 1948: 49). In the north, separation of the supraorbital semicircles by two or three scales obtains in over 80 per cent of the population, whereas separation by but a single scale, or contact, is the condition in about 95 per cent of the southern population. On the basis of this unit character the southern population may be known as *lemurinus* and the northern as *bourgeaei*. The latter is confined to the Caribbean versant from Guatemala north into Veracruz; the former likewise occurs along the Caribbean to at least as far south as Costa Rica.

Between about middle El Salvador and eastern Chiapas on the Pacific a population of the species is isolated from the main body, unless contact with the Caribbean can be demonstrated through low passes in Honduras. This population, in the extent of separation of the semicircles, is almost identical with a series of intergrades from Quirigua, Guatemala; separation by either one or two scales obtains in roughly 90 per cent of the individuals, with a strong bias toward one scale. In general this Pacific population is more like the southern *l. lemurinus* than the northern *l. bourgeaei*, so that until further studies prove otherwise, I apply the name *lemurinus* to it.

The presence of a pocket of an essentially Caribbean group in the Salvadoran-Guatemalan section of the Pacific versant is known in several other genera, notably *Hyla staufferi*, *Scincella c. cherriei*, and *Dryadophis dorsalis* and, conversely, several Pacific versant types occur locally in the Caribbean region of northwestern Honduras, e.g., *Gymnopis m. mexicanus*, *Enulius flavitorques*, and *Bothrops ophryomegas*. In these instances previous and possibly extant continuity is indicated through western Honduras and/or southeastern Guatemala. Thus, the presence of a population of *Anolis l. lemurinus* on the Pacific versant poses no zoogeographic problem.

Systematically, it is to be expected that such a population would have been derived from the Honduran (southern) stock.

This Pacific population is essentially a savanna and dry forest type. In the west it appears to be confined to the lower parts of the Tropical belt (below about 600 m.), but in eastern Guatemala and in El Salvador, with drier conditions at higher elevations, the form ascends to 1000 m.

Anolis lemurinus bourgeaei Bocourt

Anolis bourgeaei Bocourt, *Miss. Sci. Mex.*, 1873: 76, Pl. 15, Fig. 9 (holotype, MNHN 2408; type locality, Huatusco, Veracruz, Mexico).
Anolis ustus veraepacis Barbour, *Proc. New England Zool. Club*, 12, 1932: 98 (holotype, MCZ 32324; type locality, Chimoxán, 60 miles northeast of Cobán, Alta Verapaz, Guatemala): Barbour, 1934; 154 (in part, holotype and several paratypes).
Anolis bourgeaui (*sic*), Günther, 1885: 48.
Anolis biporcatus, Günther, 1885: 52 (in part); Barbour, 1934: 124.
Anolis lemurinus bourgeaei, Stuart, 1948; 49; Smith and Taylor, 1950: 66.

This vicarious representative of the typical form (*q.v.*) on the Caribbean is, perhaps, the most abundant of the Guatemalan anoles. Like the typical form it is most characteristic of open country and dry forests at elevations below about 1000 m. It ranges from Veracruz southward to southeastern Guatemala, where it intergrades with *lemurinus*.

Anolis limifrons rodriguezi Bocourt

Anolis rodriguezi Bocourt, *Miss. Sci. Mex.*, 1873: 62, Pl. 13, Fig. 1 (holotype, MNHN 2411; type locality, Panzós, Guatemala); Günther, 1885: 45.
Anolis limifrons, Barbour, 1934: 139 (in part).
Anolis aureolus, Barbour, 1934: 123.
Anolis limifrons rodriguezi, Stuart, 1948: 49 (spelled "rodriquezi"); Smith and Taylor, 1950: 64.

This little anole vies with *Anolis dollfusianus* for the distinction of being the smallest of the Guatemalan representatives of the genus. Aside from its smooth ventrals, there is nothing very distinctive about it, and the extensive variation that obtains in any one population has resulted in a multiplicity of names for the race, i.e., *A. aureolus* Cope and *A. acutirostris* Ives, certainly, and *A. rubigenosus* Bocourt and *A. guntheri* Bocourt probably. These were all based on Mexican material. The most notable variations are to be found in the shape and form of the head, which may be relatively broad, short, and deep or narrow, long, and shallow, in the length of the leg (*i.e.*, tibia), which, because it is generally compared with the head length, may vary from short (to posterior edge of eye) to long (to auricular opening), and in pattern which may vary from a series of small, dark, middorsal spots to a broad, yellow, dorsal band (a female character in several species of anoles).

Anolis limifrons rodriguezi has no relatives north of the Isthmus of Tehuantepec, but to the south of Guatemala there again is taxonomic confusion (e.g., *Anolis limifrons* Cope, *Anolis trochilus* Cope, *Anolis bransfordi* Cope) in the vicarious populations that occur southward through Panama and very probably continue into South America as the "*fuscoauratus*" complex. Dunn (1930: 19-20) has summarized the situation in southern Central

America. What I call the typical form is not very different from *rodriguezi* and might be characterized as a slenderized *rodriguezi* with somewhat smoother upper head scutes, slightly longer legs, and slightly greater length. When all the material has been studied, I suspect that there will be shown to obtain a gradual cline from *rodriguezi* to *fuscoauratus*.

The northern race is confined to the Caribbean versant and seems to be an inhabitant of dry forest types of habitats up to about 1000 m. elevation.

Anolis nannodes Cope

Anolis nannodes Cope, *Proc. Acad. Nat. Sci. Phila.*, 1864: 173 (lectocotypes, BMNH 1946. 8.5.66-67, designated by Stuart, 1948; type locality, Cobán, Alta Verapaz, Guatemala; Arriba, Costa Rica; Jalapa, Mexico; restricted to Cobán, Alta Verapaz, Guatemala, by Stuart, 1948 and by fiat); Bocourt, 1873: 71, Pl. 15, Fig. 5.

Anolis cortezi Stuart, *Occ. Papers Mus. Zool., Univ. Mich.*, 464, 1942: 8 (holotype, UMMZ 90542; type locality, near Barranco Las Palmas on Finca Los Alpes, Alta Verapaz, Guatemala, about 35 km. east and slightly south of Cobán, elevation 1015 m.)

Anolis stuarti Smith and Taylor, *Bull. U. S. Nat. Mus.*, 199, 1950: 63, footnote 40 (new name for Guatemalan types of *Anolis nannodes*).

Anolis intermedius, Günther, 1885: 49 (in part); Barbour, 1934: 135 (in part).

Dunn and Stuart (1951, 1: 57) have previously presented reasons for the retention of the name *nannodes* for the Alta Verapaz population, which by fiat throws *stuarti* into synonymy. Perhaps the worst blunder in the recent history of the systematics of Central American anoles was my own in naming *cortezi* — and with topotypes of *nannodes* in front of me! For a *lapsus* of this nature Dr. Barbour always had a ready explanation, which I here plagiarize: "I was very young when I wrote that paper."

Anolis nannodes is one of a small group that is extremely discontinuous in its distribution and strongly suggestive of a relict series. In Panama and Costa Rica it is represented by *intermedius*, in Alta Verapaz by *nannodes*, and in Mexico by *laeviventris* (*q.v.*). Their essentially upland distribution suggests that undescribed vicarious representatives may be expected from Honduras and Nicaragua. Members of the group may be readily recognized by their ridiculously short legs, only slightly differentiated dorsal scales, very small, weakly keeled ventrals, and only slightly enlarged postanal scutes in the males. The upper head scales are slightly keeled or rugose in *laeviventris*, less so in *nannodes*, and smooth in *intermedius*.

Anolis nannodes is apparently restricted to Alta Verapaz, where it occurs in a narrow belt between about 1000 and 1300 m. at the upper edge of the coffee belt and the lower edge of the cloud forest.

Anolis pentaprion Cope

Anolis (Coccoesus) pentaprion Cope, *Proc. Acad. Nat. Sci. Phila.*, 1862: 178 (type originally in USNM, now apparently lost; type locality, Truando River, Colombia); Barbour, 1934: 145; Smith and Taylor, 1950: 61.

This species is, perhaps, the most distinctive of the Guatemalan anoles. Its very short legs, pearl-like dorsals, the middle two rows of which are distinctly enlarged, obliquely conical ventrals, abruptly enlarged middorsal

scale row at the base of the tail, low loreal region (only three or four scale rows deep), and fairly well developed dewlap in the females combine to render it readily recognizable. I have had access to but scanty material, but this indicates that the northern Central American population may differ slightly, primarily in possessing smaller dorsals, from the more southern population. If this should be borne out through future studies, I believe that the name *Anolis beckeri* Boulenger (type locality, Yucatán) is available for the northern form.

In northern Central America *Anolis pentaprion* is strictly a lowlander. Though apparently rare, it appears to be widely distributed throughout the Yucatán Peninsula from northeastern Chiapas southward along the narrow Caribbean coasts of Honduras and Nicaragua. South of there I am unfamiliar with its geographic distribution.

Anolis petersi Bocourt

Anolis petersii Bocourt, *Miss. Sci. Mex.*, 1873: 79, Pl. 13, Fig. 2, Pl. 15, Fig. 11 (holotype, MNHN 2479; type locality, Alta Verapaz, Guatemala); Günther, 1885: 47; Barbour, 1934: 146; Smith and Taylor, 1950: 65.

Anolis petersii bivittata (*nec* Hallowell) Werner, *Verh. zool.-bot. Gessel. Wien*, 1896: 9 (types, ZSBS 47610; type locality, Guatemala).

This is one of a group of giant anoles (the third of Guatemala), the synonymy of which for the southern forms is representative of superlative confusion. Most of this has been the result of the application of the name *petersi* to some of the large anoles in the south and of failure to differentiate between this species and *copei* (= *biporcatus*), to which it is definitely not related. *Anolis petersi* may be recognized by its very short legs, very rugose upper head scales, small dorsals barely differentiated from the lateral body scales, and small, keeled ventrals.

In Honduras *Anolis petersi* is replaced by *Anolis loveridgei* Schmidt, with which it is almost identical. The latter has smooth ventral scales, but these are acutely convex and on the upper chest and in the hind leg retion carry low keels. *Anolis loveridgei* also has smoother dorsals and upper head scales and a somewhat longer leg. Still farther south the group is represented by what I assume is now to be referred to as *Anolis frenatus* Cope, though the literature is confused and the species has been assigned such names as *A. purpurescens* Cope and *A. squamulatus* Peters. I follow Dunn (1937: 9) in this concept of *frenatus*. This form possesses much longer legs than either *petersi* or *loveridgei* and has smooth scales, which in size and arrangement on both the body and head are almost identical to those of *petersi*.

In Guatemala the species is strictly an uplander, occurring on the Plateau slopes facing both the Caribbean and the Pacific but not on the drier Plateau proper. In Mexico it occurs on the Caribbean side to as far north as San Luis Potosí. I have taken it only at elevations of about 1300 m.

Anolis sagrei sagrei Duméril and Bibron

Anolis sagrei Duméril and Bibron, *Erpet. gén.*,4, 1837: 149 (type, MNHN 2430,6797 (5 cotypes); type locality, Cuba).
Anolis sagrae (sic), Günther, 1885: 45.
Anolis sagrei sagrei, Oliver, 1948: 23.

Practically nothing is known concerning the variation of this form in Central America, and for that reason I hesitate to accept as valid Smith and Burger's separation (1949: 407) of the entire Central American population as *Anolis s. mayensis* (type locality, Panlao, Campeche, Mexico) from the typical Cuban form on the basis of 10 specimens from Campeche and Yucatán. I do not have a Guatemalan series of this lizard, but examination of material from British Honduras reveals that that population falls in line with typical material rather than with *"mayensis."* It seems to me that such variation as may occur in the various populations of the Caribbean coast of Central America is dependent upon the source and nature of the parent population from which they stemmed. There can be no question that introductions of new blood have been the rule since colonial times and that coast-wise shipping has probably produced a certain amount of mixture. Nevertheless, I feel that it is futile to attach names to the various Central American populations that differ from one another only insofar as means can be utilized for diagnosis. Until variation has been thoroughly worked out in the Cuban population and series have been assembled from the entire Central American coast and analyzed, recognition of mainland races seems to be sheer sophistry.

In Guatemala *Anolis sagrei sagrei* is apparently restricted to the immediate environs to 150 km. of the Caribbean coast.

Anolis sericeus Hallowell

Anolis sericeus Hallowell, *Proc. Acad. Nat. Sci. Phila.*, 1856: 227 (holotype, formerly at ANS, now apparently lost; type locality, Jalapa, Veracruz, Mexico).

Ranging over the lowlands of northern Middle America from Tamaulipas south to Nicaragua on the Caribbean and from Oaxaca to Honduras along the Pacific is a small anole to which the above name has been applied. The species is readily recognizable because of the dark spot, generally some shade of blue, in the center of its orange or yellow dewlap. The species rarely exceeds 50 mm. in head-body length, has legs of moderate length, ventral scutes keeled and considerably larger than the dorsals, the latter enlarged middorsally and grading gradually into the granular laterals, and generally no enlarged postanal plates in the males. Most of the other morphological characters used in diagnoses of anoles are so variable in this form as to be valueless in differentiating it. The head scales vary from rugose or carinate to almost smooth, the dorsals vary 45-75, the ventrals vary 35-50, the supraorbital semicircles may be in contact or separated by as many as three scales, the occipital varies tremendously in size, and as to pattern I hesitate to suggest what limits might be expected.

As a result of these variations, the species has been supplied with names sufficient to do justice to royalty. Most of these (e.g., *A. heliactin* Cope,

A. sallaei Günther, and *A. jacobi* Bocourt in the north) have been based not upon a series of specimens from any one population, but, rather, upon individuals which in many instances represent extreme variants within a population. It will be many years before series well enough distributed geographically, sexually, and with respect to age will have accumulated to permit a thorough understanding of this most complex species. At present, I believe that I can recognize two major populations, each of which contains two minor populations.

TABLE I

Comparison of the number of dorsal and ventral scutes between axilla and groin levels in the two major populations of *Anolis sericeus*. Figures in parentheses following sex-signs indicate the number of specimens examined. Similar figures following the range of variation indicate means.

	Small-scaled Form		Large-scaled Form	
	♂♂ (29)	♀♀ (10)	♂♂ (63)	♀♀ (42)
Dorsals	57-73 (64)	62-71 (67)	47-60 (53)	47-60 (56)
Ventrals	39-50 (45)	39-50 (43)	34-42 (39)	34-46 (39)

The two major groups sort out on the basis of dorsal and ventral scale size and these are summed up in Table I. The small-scaled form is split into two populations, one occurring on the Pacific side of the Isthmus of Tehuatepec and extending up the Grijalva Valley of Chiapas and into northwestern Guatemala, and the other known at the present only from the state of Tamaulipas in Mexico. The two large-scaled populations are represented one on either side of the central uplands of Central America, one, along the Caribbean from Veracruz, Mexico, south to Nicaragua and the other, along the Pacific from eastern Chiapas, Mexico, south to Honduras. So far as is known these last two minor populations are isolated from each other, but contact may eventually be shown to exist through the lower parts of Honduras.

Separation of the minor divisions within each of the major groups is extremely difficult. Though the Tamaulipan and Oaxacan populations are isolated from each other by a population of the Caribbean large-scaled type, they are so close that only very vague means suggest differences. The Oaxacan population differs from the Tamaulipan primarily in possessing a somewhat larger occipital scale (its greatest length equivalent to the length of 5-8 middorsal scales as compared with 4.5-5.5 in the Tamaulipan population), less rugose head scales especially in the frontal and occipital region, and less acutely keeled scutes in the supraorbital semicircles.

The Caribbean and Pacific populations of the large-scaled form are no more distinctly differentiated. The most diagnostic feature suggestive of difference is in the extent of separation of the supraorbital semicircles, which may vary from contact to separation by two, or occasionally even three, rows of small scales. Table II presents a summation of the condition

obtaining in each of the populations. It will be noted that in the Caribbean population the semicircles are separated in almost 80 per cent of the individuals and are in contact in 60 per cent of those of the Pacific population. Overlap between the condition of contact and separation falls within the group in which there is separation by but a single row of scales. In the great majority of individuals of the Pacific population in which separation by a single row obtains, it is very weakly defined, the scales of the separating row being greatly reduced in size. In the Caribbean population such

TABLE II

Comparison of the degree of separation of the supraorbital semicircles in the Caribbean and Pacific populations of the large-scaled group of *Anolis sericeus*. Figures in parentheses following the population designations indicate the number of specimens examined.

	Contact (per cent)	Separated (1 scale) (per cent)	Separated (2 scales) (per cent)
Caribbean (57)	12 (21)	32 (56)	13 (23)
Pacific (50)	30 (60)	12 (38)	1 (2)

separation is much more pronounced. It may be noted, incidentally, that this unit character does not serve to differentiate between the two small-scaled populations in which contact in about 80 per cent of each is observed.

From the materials available I can detect no evidence of intergradation between the several populations. I hardly expect it insofar as the small-scaled populations are concerned, but I do not doubt that it will be found in the large-scaled populations, probably on the moderately elevated uplands of Honduras or Nicaragua. Between the two major populations I hesitate to suggest whether or not intergradation will be shown. It is indicated that the group has probably undergone a history not very different from that observed in *Anolis tropidonotus* (*q.v.*) and *Anolis humilis*. My concept of the history of the group calls for a prototype more or less widely distributed over the lowlands and moderately elevated uplands of Middle America, which became disjunct in the Isthmus of Tehuatepec region possibly owing to an open portal some time prior to the Pleistocene. The small-scaled population developed to the north, while to the south the large-scaled type evolved. Possibly during this same interval of separation the two major types differentiated physiologically, the small-scaled population adapting to the more xeric environments to which it is now confined (i.e., the Tehuantepec region and the Grijalva Valley in the south and the Tamaulipan region to the north), while the large-scaled type adjusted to the more mesic environment of the Caribbean and Pacific lowlands of Central America. After the disappearance of whatever barrier may have been present in the isthmian region, the southern population flowed northward along the Caribbean side into the more mesic parts of Veracruz and separated the small-scaled population into two isolated groups, one in the Pacific Tehuantepec area and the other in Tamaulipas, both of which receive less than half the rainfall of

central and southern Veracruz or the Caribbean or Pacific slopes of Central America. The rising highlands of northern Central America, of course, separated the populations of the large-scaled group into a Pacific and a Caribbean one. Subsequent differentiation in the various populations has, as indicated, been slight.

This group is represented south of Nicaragua by a form that apparently must be known as *Anolis palpebrosus* Peters (type locality, Chiriquí, Panama) according to Dunn (1930: 18). My conclusions on this are based upon Barro Colorado Island materials.

For those who, for one reason or another, wish to recognize the various northern populations taxonomically (which I do not), the following data are presented.

Anolis sericeus sericeus Hallowell

Anolis sericeus Hallowell, *Proc. Acad. Nat. Sci. Phila.*, 1856: 227; Barbour, 1934: 149 (in part); Smith and Taylor, 1950: 67 (in part).
Anolis ustus veraepacis Barbour, 1932: 98 (part of type series, see Stuart, 1948: 51); Barbour, 1934: 154.
Anolis sallaei, Günther, 1885: 49, Pl. 27, Fig. B. (in part); Dunn and Emlen, 1932: 27.
Anolis baccatus, Barbour, 1934: 123 (Guatemalan specimen).

This is the name that must be applied to the population distributed along the Caribbean versant from Veracruz southward through Nicaragua. Taylor has recently (1952: 805) suggested that *sallaei* must be applied to at least a part of the Caribbean Mexican population on the basis of degree of separation of the supraorbital semicircles and of the occipital from the same. I have shown that the first character is variable, as is the latter. Correspondence with Dr. Parker of the British Museum (Natural History) reveals that the types of *sallaei* are somewhat confused. Described by Günther (1859: 421, type locality, Central America) the "holotype" is a female collected by Sallé and almost certainly originated from Veracruz, probably the Jalapa region. According to Parker this is the female specimen from which Günther drew his measurements and which Boulenger (1885: 79-80) recognized as the type and Günther figured (1885: Pl. 27, Fig. B). Actually, this specimen was originally catalogued with the data "South America," and this locale achieved a question mark in the catalogue at a later date. In addition to this specimen it appears that Günther very probably possessed two other specimens which he considered as conspecific with the type, one from "Oaxaca" also collected by Sallé and another from Central America, said to have been collected by a Mr. Gosse (perhaps Phillip Henry, of *Birds of Jamaica* fame) and to have come from "Central America." Just how Bocourt (1873: 90-91) ever conceived the idea that a male from Dueñas, Guatemala, that he received from the British Museum was one of the types of *sallaei* is not clear, but he was obviously incorrect in his assumption. The subsequent history of the last two specimens that figure in the type series in the catalogue is extremely complex and needs not be stated here beyond noting that the Oaxaca specimen was later transferred to *tropidonotus* (specimen "c" of Boulenger, 1885: 84) while the Gosse specimen finally ended up as *rodriguezi*.

The type of *sallaei* (this information thanks to Dr. Parker) has but a single scale between the semicircles, and the occipital is separated therefrom again by but a single scale. This is a most unusual condition for the large-scaled Caribbean population, but I have seen it in at least one Veracruz individual (UMMZ 85248). The type, however, fits into the large-scaled population on the basis of the number of dorsals between axilla and groin levels. It is very possible that Taylor's San Luis Potosí material (1952), to which he applied the name *sallaei,* may represent a part of the population that is characteristic of Tamaulipas inasmuch as the head scutellation of that series shows contact between the supraorbital semicircles or separation by but a single row of scales as the usual state, while separation of the occipital from the semicircles by a single or two scales is not uncommon in that population.

I feel fairly certain the *Anolis jacobi* Bocourt (type locality, Veracruz) must also be placed into the synonymy of *sericeus,* as must *Anolis heliactin* Cope (type locality, Mexico). This last has the supraorbital semicircles separated by two scale rows which rather eliminates it as one of the Tehuantepec population in which I have never encountered more than a single row of scales between the semicircles. Bocourt's record of *heliactin* from Oaxaca (1873: 106-108) is very probably a misidentification. There is also a bare possibility that *Anolis cummingi* Peters (type locality, Mexico) may similarly be allocated. I anticipate intergradation between the Caribbean and Pacific populations south of Guatemala, and thus suggest the trinomial if the population is to be separated taxonomically from others.

In Guatemala this population is generally distributed over the Caribbean lowlands up to an elevation of about 1000 m. It markedly prefers tangled second-growth and forest margin habitats.

Anolis sericeus wellbornae Ahl

Anolis ustus wellbornae Ahl, *Sitz. Gesell, naturf. Freunde,* 1940: 246 (type locality, El Salvador; holotype, MNZM 35710).
Anolis sallaei, Bocourt, 1873: 90, Pl. 13, Fig. 3 and Pl. 16, Fig. 21 (1874); Günther, 1885: 49 (in part).
Anolis sericeus, Barbour, 1934: 149 (in part); Smith and Taylor, 1950: 67 (in part).

This appears to be the only name available for the Pacific versant large-scaled form. This population behaves ecologically much like the typical form. It is fairly common on the coastal plain and on the mountain slopes in the eastern parts of the Pacific versant of Guatemala up to about 1200 m. altitude. In the western section, which is somewhat more humid, it is extremely rare above about the 600 m. contour.

Anolis, Tehuantepec population

Anolis heliactin, Bocourt, 1873: 106 (questioned); Günther, 1885: 48; Barbour, 1934: 134; Smith and Taylor, 1950: 67.
Anolis sallaei, Günther, 1885: 49 (in part).
Anolis sericeus, Barbour, 1934: 149 (in part); Smith and Taylor, 1950: 67 (in part).

So far as I have been able to discover there is no name available for a population of anoles that centers on the Pacific side of the Isthmus of Tehuantepec and extends well into the Grijalva Valley of Chiapas and to Guatemala. Certainly, in consideration of the confused state of the *sericeus* series, I do not intend to supply it with one. For anyone so inclined, however, there is a fine series in the Museum of Zoology, University of Michigan, collected by Norman Hartweg and James Oliver some years ago in the vicinity of the village of Tehuantepec and another lot from the vicinity of Chiapa de Corzo, Chiapas, secured by the former at a later date.

To be candid, even though I include this population in the *sericeus* group at this time, I am not at all certain that it may not eventually wind up as a relative of *ustus*. In size of dorsal scales and in the arrangement of the supraorbital scales with a tendency toward three large plates in a linear series, it certainly resembles that form.

I have collected but a single representative of the population in Guatemala, that in the Cuilco Valley, in the headwaters of the Grijalva, at 1000 m. This region presents quasi-desert conditions.

Anolis, Tamaulipas population

I suggest that anyone desiring to recognize this population taxonomically will find most instructive material in the Museum of Zoology, University of Michigan, assembled by Charles Walker and Paul Martin. The population is not, of course, represented in Guatemala.

Anolis tropidonotus Peters

Anolis tropidonotus Peters, *Monats. Akad. Wissen. Berlin*, 1863: 135 (holotype, MNZM, originally two cotypes No. 382, Dr. Wermuth informs me that he is retaining the original number for the lectotype; type locality, Huanusco [probably = Huatusco], Veracruz, Mexico); Bocourt, 1873: 103, Pl. 13, Fig. 6 and Pl. 16, Fig. 30; Günther, 1885: 51; Barbour, 1934: 153; Smith and Taylor, 1950: 60.

This species may be readily recognized by its abruptly enlarged dorsal scales, which are arranged in about a dozen longitudinal rows. The only species in northern Central America with which it might be confused is *Anolis humilis uniformis* (*q.v.*). From this it may be distinguished by its much larger ventral scales, longer legs, and better differentiated head scutes. Smith and Taylor (1950) correctly assign to the synonymy of *tropidonotus* Barbour and Cole's *Norops yucatanicus*, but retain *Anolis metallicus* Bocourt as distinct. With the latter procedure I do not agree. Bocourt's description of *metallicus* (1873: reprint pagination 1) states that the dorsals are as large as the ventrals. Smith and Taylor (1950: 59, footnote 38) state that this condition is shown in Bocourt's illustration of the type (presumedly in the *Mission Scientific au Mexique*). Bocourt never illustrated the ventral or dorsal scutellation of *metallicus*, though he did give a figure of the surface of the head (1874: Pl. 17 bis, Fig. 1). Smith and Taylor further state that in both *Anolis tropidonotus* and *Anolis humilis uniformis* the dorsals are much larger than the ventrals. This is certainly true of *uniformis*, but in *tropidonotus* the dorsals are only very slightly larger than the ventrals

and in some individuals the two are of equal size. This character, therefore, will not serve as a reliable diagnosis for separating *tropidonotus* and *metallicus*. Bocourt's illustration of the top of the head of *metallicus* shows differentiation of the supraorbital semicircles, as is true in *tropidonotus* but not in *uniformis*, and in other features the illustration is correct in all details for *tropidonotus*. Though the matter cannot be definitely settled until the types are compared or re-examined, I do believe that all evidence points toward conspecificity of *tropidonotus* and *metallicus*.

Anolis tropidonotous shows some variation, which may some day warrant the application of a new subspecific name to the Honduran and Nicaraguan population (so far as I know there is no name available). The dewlap of these southern populations is red with a large dark (? black or purple) central spot. This spot is lacking in northern populations.

I know of nothing farther to the south to which *tropidonotus* might be related and only the *humilis* series in the north holds any characters in common with it. These characters are extremely suggestive of rather close relationship. The dorsal scutellation of the two is almost identical, as is the head scutellation, and both have a very deep axillary pocket, much deeper, in fact, than that of any other of the Central American anoles with which I am familiar. I am tempted to consider here the possibility of sibling species. I suggest that from a prototypic stock *tropidonotus* developed to the north of the Isthmus of Tehuantepec and *humilis* to the south during the Pliocene break in that region. Closing of that portal permitted the two to become sympatric again through northern Central America, though they remained ecologically distinct, *tropidonotus* in savanna and dry forest environments and *humilis* in the taller, more mesic forest. This is similar to the conditions set up for *Cnemiodophorus guttatus* and *deppei* by Burt (1931: 73-74, Fig. 17) and a similar history is indicated for other groups, notably in the genera *Sceloporus, Scincella,* and *Micrurus*.

Though the more southern population of *tropidonotus* has been reported (there is the possibility here of confusion with *crassulus*) from elevations as high as 1700 m. in Honduras (Dunn and Emlen, 1932: 26), through Guatemala and Mexico the species is strictly a lowlander. It is known only from the Caribbean versant from Veracruz southward to middle Nicaragua. It appears to be restricted to the drier and more open environment types such as savanna and dry, scrub forests.

Anolis ustus Cope

Anolis ustus Cope, *Proc. Acad. Nat. Sci. Phila.*, 1864: 172 (cotypes, BMNH 1946.8.5.60-61; type locality, Belize, British Honduras); Günther, 1885: 48, Pl. 27, Fig. D; Schmidt, 1941: 493; Smith and Taylor, 1950: 66.
Anolis ustus ustus, Barbour, 1934: 153.

This pretty little anole with its long head, short legs, and blue spotted dewlap may easily be confused with *Anolis sericeus* (*q.v.*) and *Anolis kidderi* Ruthven. It is sympatric with the former and possibly with the latter as well. From the Caribbean population of *sericeus* it is readily distinguished by its smaller dorsals, which number over 60 in *ustus* and less than 60 in Caribbean *sericeus*. In comparing it with the Oaxaca population

of *sericeus,* however, the two are found to be inseparable on the basis of this feature. Oaxaca *sericeus,* however, almost invariably have the supraorbital semicircles in contact whereas in *ustus* separation by a complete row of scales is just about as invariable. From *kidderi* it is easily distinguished in that the occipital plate is in contact with the supraorbital semicircles in *kidderi* and separated from the same in *ustus.*

Though superficially similar to *sericeus* I do not believe that either *ustus* or *kidderi* belongs in that group unless, as previously indicated, I may have misallocated the Oaxaca population of *sericeus.* I am of the opinion, rather, that future studies will reveal that this is a remarkable case of convergence. I rather believe that *ustus* and *kidderi* fall into the *nebulosus-nebuloides* complex of Mexico. Certainly *sericeus, ustus,* and *kidderi* have many features in common, but the *nebulosus-nebuloides* group is distinctive in possessing but three large supraorbital plates. This is the arrangement in *kidderi,* and *ustus* displays a strong trend in that direction.

Anolis ustus is confined to the Yucatán Peninsula and enters Guatemala only to as far south as the savanna region of central Petén.

Status incertus

Anolis bouvieri Bocourt

Anolis bouvierii Bocourt, *Miss. Sci. Mex.,* 1873: 58; Pl. 14, Fig. 8 (holotype, MNHN 2464; type locality, Escuintla, Guatemala).
Anolis ortoni, Günther, 1885: 45; Barbour, 1934: 144.

In the discussion of *Anolis cobanensis* (*q.v.*) I have indicated that *bouvieri* could conceivably be related to the *heteropholidotus-cobanensis* series. By allowing for poor lenses directed upon weakly keeled scales of a poorly preserved specimen, it is conceivable that in both dorsal and ventral scutellation the type of *bouvieri* could be matched by the previously mentioned individual collected in Chiapas and sent to me for examination by Hobart Smith. The type of *bouvieri,* however, has the supraorbital semicircles in contact, and it would require a stretch of the imagination to suggest the possibility of such a condition in the *heteropholidotus* series. As I have previously pointed out, that series appears to be restricted to relatively high elevations, whereas *bouvieri* is said to have been collected at Escuintla, Guatemala (about 400 m.) Within no more than 10 airline kilometers of Escuintla, however, elevations of almost 4000 m. may be encountered. In consideration of these facts, therefore, I feel it better to retain this name until more material from the vicinity of the type locality of *bouvieri* is forthcoming than to force the name into synonymy. I have not, unfortunately, collected at higher elevations in the Escuintla region in environments in which the possible relatives of the form suggest it might be present.

Anolis salvini Boulenger

Anolis salvini Boulenger, *Cat. Lizards Brit. Mus.,* 2, 1885: 75 (holotype, BMNH 1946.9.18.19; type locality, Guatemala); Günther, 1885: 48, Pl. 27, Fig. A; Barbour, 1934: 148.

In the original description of *Anolis cortezi* (= *nannodes, q.v.*) I compared it to *salvini* and suggested close relationship between the two. Inasmuch as I have now relegated *cortezi* to the synonymy of *nannodes, salvini* by fiat must be examined in the light of a possible relationship to the *laeviventris-nannodes-intermedius* series. I have before me an excellent photograph and good description of critical characters of *salvini,* both supplied through the courtesy of Dr. H. W. Parker. Although I can almost match various unit characters present in the type of *salvini* with the same characters present in a series of *nannodes,* I have never seen a single individual of the latter that can match all the diagnostic features of *salvini.* I can, however, make such a match with individuals of *intermedius* from the Chiriquí of Panama.

This leads me to make three suggestions. First, *salvini* may be an unusual variant individual of *nannodes;* second, it may be a representative of a perfectly recognizable population of the *laeviventris-nannodes-intermedius* series, which remains to be rediscovered; third, the type is actually a specimen of *intermedius* bearing incorrect locality data. The first suggestion I consider the most improbable of the three, even allowing for poor preservation of the type. The third is somewhat more probable. In at least one other instance, *Anolis godmani* Boulenger, there may have been a mixup in locality data in the Godman-Salvin collections, one of the cotypes having been listed as of Guatemala whereas it probably came from Costa Rica. Both species, it may be noted, were described in the same work, and the material may have been received by the British Museum somewhat after the main bulk of the earlier parts of the collection had been turned over to the Museum. For the present, however, I prefer to give *salvini* the benefit of the doubt and, until several highland areas of Guatemala are better explored, recognize it as a valid form. There can be little doubt as to its genetic relationships that have been indicated above.

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