Papéis Avulsos de Zoologia

PAPÉIS AVULSOS ZOOL. S. PAULO, VOL. 22, ART. 13: 123-144, pls. 1-3 1.IV.1969

ON A LARGE AND SURPRISING SAMPLE OF *CALLISCINCOPUS AGILIS* FROM BRASIL, WITH THE INVALIDATION OF THE GENUS (SAURIA, TEIIDAE)

P. E. VANZOLINI
REGINA REBOUÇAS-SPIEKER

ABSTRACT

A large sample of this rare teiid obtained in Oriximiná, State of Pará, differs from other materials in body proportions and scale counts. Sex ratio at birth differs from that of the adult population; rates of survival, growth and gonadal maturation differ in males and females. There is apparent evidence that the number of body scales may increase with growth. There is no competition for food with *Cnemidophorus lemniscatus*, the only ground lizard of comparable size found in the locality in large numbers. A study of variation is presented, and the genus *Calliscincopus* is shown to be a synonym of *Tretioscincus*.

In January, 1967, one of us (PEV) obtained in the town of Oriximiná, on the lower Rio Trombetas, State of Pará, Brasil, more than 200 specimens of the hitherto rare teiid *Calliscincopus agilis* Ruthven, 1916, all collected by children in about 3 days. Previous field work in the locality, during the dry season (September and October) had failed to produce any specimens; in January, at the beginning of the heavy rains, the animal was extremely frequent in perianthropic environments, such as leafpalm walls of huts, empty lots, backyards, rubbish piles, etc.

We started this work with the intention of gathering data on the variation of a large, geographically homogeneous sample, to serve as criteria in the study of a group where seldom more than 1 or 2 specimens are available per locality. However, we found many interesting aspects, some of them quite puzzling, and must acknowledge that more questions are raised than solved. This in itself is a worthwhile result, as it brings out how deceptive is the apparent simplicity of differentiation patterns of rare species.

While working on the species we had our attention called to its generic position, and came to the conclusion that *Calliscincopus* is a synonym of *Tretioscincus*.

MATERIALS AND METHODS

The materials reported upon in this paper were collected by the "Expedição Permanente da Amazônia, EPA" (Permanent Ex-

---

Departamento de Zoologia, Secretaria da Agricultura, São Paulo.

pedition to Amazonia), jointly maintained by this Departamento, the Museu Paraense "Emílio Goeldi", the Instituto Nacional de Pesquisas da Amazonia (INPA) and the Fundação de Amparo à Pesquisa do Estado de São Paulo.

We had 212 specimens, but used in this paper only the 199 for which all characters under study could be unambiguously checked.

As comparative materials we had one female (DZSP 8503) in our collection, from the Tiriós Indian village in northern Pará, near the Surinam border, plus published data on 4 males, i.e. the type and paratype of the species, from Dunoon, Guyana, and the types of two synonyms, *Tretioscincus romani* Andersson, from Manaus, and *Tretioscincus brasiliensis* Müller, from the lower Tocantins. The consideration of these specimens showed that the Oriximiná sample is a very peculiar one. Given the fact that the other specimens agree very closely and represent a very broad geographical area (Map 1), encompassing Oriximiná from three sides, we found it unnecessary to secure further specimens to broaden our inductive basis.

The statistical methods here used can be conveniently found in Mather (1965) and Siegel (1956); attention is called to chapter 3 of the latter book on choice of methods. Some of our tables present grouped data; these are included only for illustration, all computations having been made on unreduced data. Computations were usually carried one decimal further than shown in the text or tables.

The contents of the alimentary tract were identified by Hans Reichardt, and Persio de Biasi, of this Department. We gratefully acknowledge their help. Dr. E. E. Williams has criticized the manuscript.

Tretioscincus agilis (Ruthven, 1916)

(Plates 1-3)

Calliscincopus agilis Ruthven, 1916: 2. Dunoon, Guyana.
Tretioscincus romani Andersson, 1918: 5. Manaus.
Tretioscincus brasiliensis Müller, 1923: 55. Lower Tocantins.

Rostral distinctly visible from above. Internasal very large, in contact with the rostral, the nasals, the loreals, the prefrontals and the frontal. Prefrontals from small to large, from distinctly separated to almost in contact. Frontal variable, elongate, in contact with the internasal, the prefrontals, the first pair of supraoculars and the frontoparietals. Supraoculars two, the first much larger. Superciliaries two or three. Fronto-parietals divergent. Parietal small to large, more or less shield- or diamond-shaped. Occipital small. Nasal elongate, undivided; nostril very large, near the lower margin. Loreal high. One post-loreal, which might be called preocular or first infraocular. Five supralabials to the level of the posterior margin of the eye, then 2 or 3 scales resembling the temporals, which grade into the body scales. Symphysial broad; post-symphysial with arched anterior margin. Three pairs of large chin-shields, in contact on the midline, the sutures forming a zig-zag. Anterior and middle gulars slightly enlarged. Four infralabials to the level of the posterior margin of the eye.

Dorsals large, smooth, very broad in the neck; at times submucronate on the sacral region, weakly but distincly keeled.

Ventrals similar to dorsals. Pectorals 5 or 7, the central one diamond-shaped.

Preanal plate with one antero-median and one postero-median scale, and 2 or 4 laterals, forming a semicircle. Innermost preanal pore in contact with the anterior medial preanal.

Dorsal, anterior and posterior scales of the arm approximately isodiametric; one row of granules on the ventral aspect. Dorsal scales of the forearm very large, the remainder like those of the arm. Large scales on the dorsum of hand and fingers; palm granular. Four fingers, clawed, length in the following order: II and V, III, IV.

Hind limb with quincuncial keeled scales on the dorsal, smooth on the ventral aspect. Plantar surface with high granules, almost spiny. Five toes, clawed, length in the following order: I, II, V, III, IV.

Proximal portion of tail with keeled scales dorsally, smooth ventrally.

COLOR IN LIFE IN THE ORIXIMINÁ SAMPLE

Dorsum brown, getting lighter posteriorly. In each scale the keel and a line parallel to the hind margin are lighter.

One continuous light (tending to flesh-colored) line from the rostral through the canthus, the temporal edge and the sides of the body to the anterior fifth of the tail.

Flanks and dorsal aspect of the limbs a deep, warm brown.

Ventral parts reticulate, darker or lighter: general ground color whitish, with fine, dense punctuations in the middle of the scales, especially those adjacent to the brown area on the flank. Rosy metallic reflections on the throat, greenish elsewhere.

Intact tail proximally dark brown, distally deep blue. Regenerated portions of tail a lighter blue.

VARIATION IN SHAPE AND RELATIONSHIPS OF SCALES IN THE ORIXIMINÁ SAMPLE

The topological and morphological features of head and body scales are a major tool in lizard taxonomy; their usefulness depends essentially on an adequate knowledge of variability and, above the species level, on an estimation of their significance in indicating evolutionary patterns. In the microteiids much attention has been paid to the presence or absence of individual head scales and to their contacts. The prefrontals have attracted especial attention, but recently have been shown to be less important than formerly believed (Vanzolini, 1961; Thomas, 1965, 1965a).

The number and relationships of the head scales are remarkably constant in this sample. There is, however, a certain degree of variability in the shape and size of the scales of the top of the head (Plate 3).

The prefrontals never meet on the midline, in the Oriximiná sample. This is a character used to diagnose the genus *Calliscincopus*. There is, however, great variation in this region. The anterior margin of the frontal, whose shape depends on the width of the prefrontals, varies from practically straight to wavy and in a few cases forms an angle, open backwards. In two specimens the prefrontals almost but not quite meet on the midline. In one specimen the right prefrontal does not meet the internasal.

The shape of the frontal and of the ensemble of frontoparietals and parietal varies much. In one case the frontal, in another the parietal, are transversely divided. In one specimen there is an extra scale on each side of the parietal.

The scale that is currently called the occipital (as we do for convenience in this paper) is not really a head scale. It is a remnant of the vertebral row of small scales clearly seen, for instance, in *Gymnophthalmus speciosus*, and, already beginnig to get disorganized, in *Tretioscincus bifasciatus* (Plate 1); this row has been suppressed by the considerable enlargement of the anterior median dorsals seen in *Tretioscincus agilis* and, to a larger degree still, in *Iphisa elegans*. The contact of this scale with the parietal is very variable.

The lateral and ventral norms of the head present practically no variability, even in the number of labials.

The dorsals are usually smooth, but, in a dozen or so specimens the scales of the posterior fifth of the trunk are submucronate and have a weak but quite evident keel.

INVALIDATION OF CALLISCINCOPUS

This species was described as new three times within 7 years. Ruthven's description of *Calliscincopus agilis* was published in 1916, Andersson's of *Tretioscincus romani* in 1918 and Müller's of *T. brasiliensis* in 1923. Judging from their comments, the two latter authors were completely unaware of Ruthven's work, and of each other's.

To Andersson and Müller, *agilis* was a good and unmistakable *Tretioscincus*, and they compared it with *T. bifasciatus* and *T. laevicauda* Cope, now a *Gymnophthalmus* and known to them only through the original description.

Ruthven clearly recognized the relationships of his new form with *Tretioscincus bifasciatus* and *Iphisa elegans*. He says (1916:4): "*Remarks*: This form is near the genera Iphisa and Tretioscincus. It differs from both of these genera in having small and widely separated praefrontals and a semidivided nasal, from Tretioscincus also in having relatively larger scales on the dorsal region of the neck and a larger frontal and frontonasal, and from Iphisa in having subequal dorsal scales on the body and ventral surface and a small number of femoral pores. On the whole it seems to be nearest to Tretioscincus and it bears a superficial resemblance to *Tretioscincus bifasciatus* Dum."

The three forms seem to be really related within the assemblage of the microteiids with quincuncially arranged round scales. The eyelids and ear opening are well developed; the digits are slender and elongate; the body scales are "scincoid", and there is little difference between dorsals and ventrals; there has been no loss of head scales; sex dimorphism in preanal pores is complete, only the males having them.

Iphisa elegans (Plate 1) shows one very characteristic feature, which sets it apart from the others, at least as far as externals go; the head scales are well differentiated from the body scales, and have linear non-imbricating sutures. This character is strong enough to preclude any decisions on generic allocation without recourse to anatomical and other additional data.

On the other hand, the differences between *Tretioscincus bifasciatus* and *Calliscincopus agilis* are rather trivial, and offset by some very striking resemblances, i.e.: (i) there is complete agreement in shape of body scales, in spite of the almost complete absence of keeling in *agilis;* (ii) the posterior head scales tend to resemble body scales, several of them having a free hind margin; (iii) the pectoral scales are practically identical; (iv) the series of preanal pores is shortened (in *Iphisa* it occupies the whole thigh); (v) the scalation of the gular region and that of the sides of the head are extremely alike.

To us, these characters show that both forms are on the same evolutionary lineage, and we are inclined to give special weight to the condition of the posterior head scales. On the contrary, none of the differences between *bifasciatus* and *agilis* can be said to indicate marked evolutionary divergence. The main ones — dorsals keeled against unkeeled (not a complete difference either), and prefrontals meeting against separated — are too trivial to deserve comment.

It would seem that *Calliscincopus* has survived for so long as a separate genus only because of its rarity in collections.

BIOMETRY OF THE ORIXIMINÁ SAMPLE

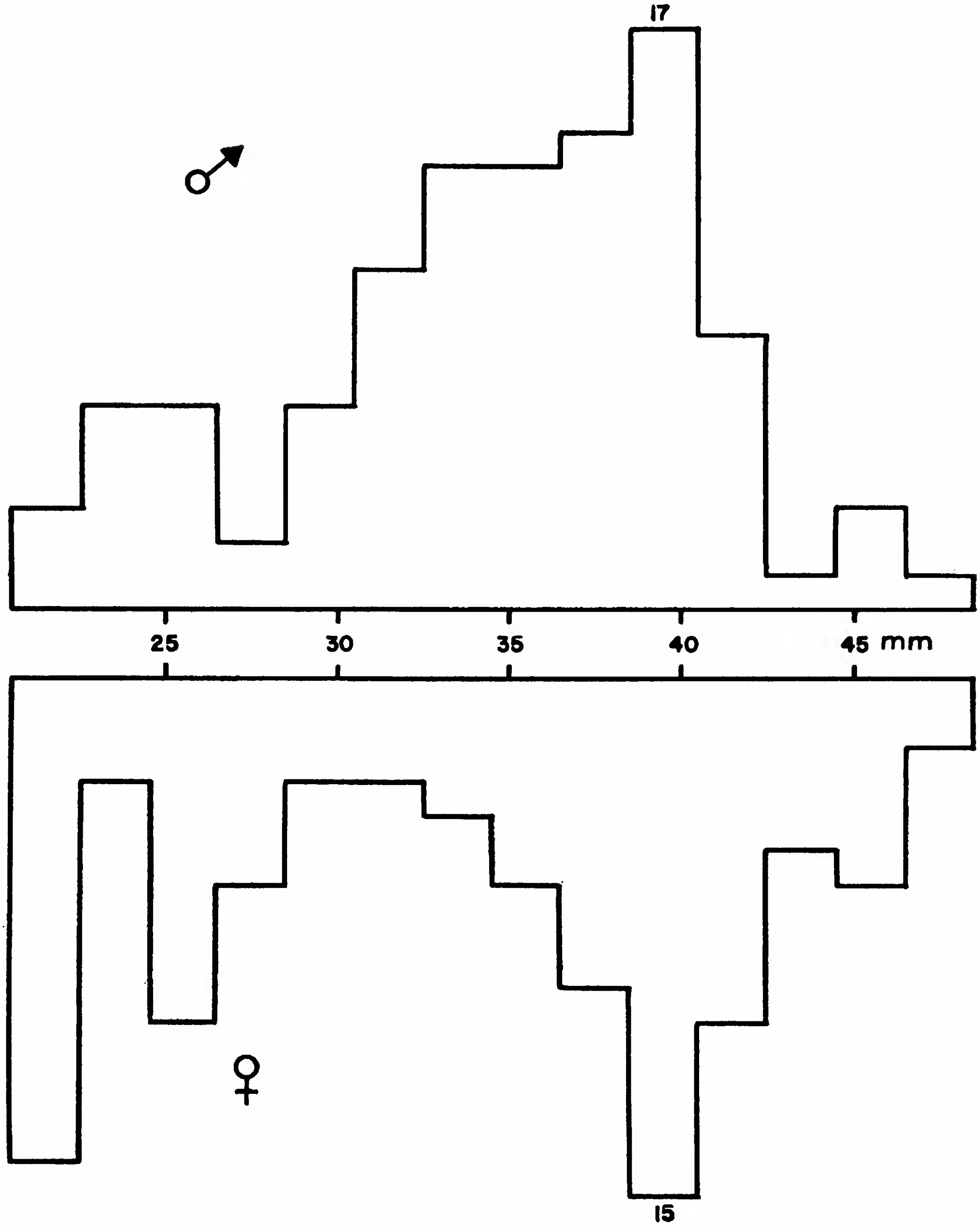
BODY LENGTH AND SEXUAL MATURITY

A simple inspection of the distribution of the rostro-anal length (Table 1, Graph 1) shows a marked difference between males and females; the computed chi square (39.342 with 26 degrees of freedom) is significant at the 5% level. It is quite apparent that

Table 1

Body length, males and females

Length	♂	♀
21 - 22	3	14
23 - 24	6	3
25 - 26	6	10
27 - 28	2	6
29 - 30	6	3
31 - 32	10	3
33 - 34	13	4
35 - 36	13	6
37 - 38	14	9
39 - 40	17	15
41 - 42	8	10
43 - 44	1	5
45 - 46	3	6
47 - 48	1	2
	103	96



Graph 1, histograms of body length.

the female distribution is bimodal, the left member being strongly skew and the right member symmetrical. The male distribution may be considered either unimodal, and very skew or, more probably, also bimodal, with a small left member and a large skew right member.

A first explanation of this marked sexual difference would be the presence of many mistakes in ascertaining the sex of the very small specimens. Sexing was done on the basis of the presence of femoral pores, of which males have 4 or 5 on each side and the females none; if pores were absent or very inconspicuous in small males, these would be considered as females, biasing the distributions. However, we found no indication that the appearance of the pores is related to size (= age), and they were always quite evident in the juveniles identified as males. Thus we reject this hypothesis, and prefer to believe that the sex ratio at birth differs from that of the adults, and that the sexes differ in growth rate. Thus the body size scale has a different temporal meaning for each sex, equality being reached at termination of growth. In other words, the two "valleys" between the left and right members of the bimodal curves, although displaced on the axis, correspond to the same moment in time, the difference disappearing by the time both modes (and right extremes) are reached.

At this point we took into account the data of our Tiriós female and of the published specimens. Three of the body lengths available are: Tiriós 57 mm; Ruthven's type 55.5 mm; Müller's type 58 mm. It is obvious that these body lengths are definitely outside the range of the Oriximiná sample.

This immediately raised the possibility that we were dealing with a sample of juveniles. So we dissected a number of specimens (Table 2), beginning with large males and females. The males had very large testes, some visibly congested; the females had oviducal eggs. In all females but one two eggs were present, the left one posterior to the right. In one case the only egg present was the right, but situated as far posteriorly as the left would be if present, indicating that one egg had already been laid.

Table 2

State of the gonads in dissected specimens (distribution of frequencies)

	Testes			Eggs	
Body length	—	+	Body length	f	O
26	2		30	1	
29	-	2	31	2	
30	1	1	33	1	
31	-	1	34	2	1
32	2	1	38		1
33		2	39		1
35		3	42		2
36		1			
38		1			
39		1			

Testes: —, undeveloped; +, well developed. Eggs: f, follicular only; O, oviducal.

After deciding that breeding specimens were present in the sample, we dissected successively smaller specimens, trying to find the approximate minimum body length at which reproduction occurs. In specimens in the body length range from 26 to 32 mm the testes were either large, 2.5-3.0 mm long, or very small, .5-1.0 mm long; no intermediates were found. We call the large testes "developed" (+) in table 2, and the small ones "undeveloped" (—); males 33 mm long and above had developed testes (2.5 to 5 mm). Females to 33 mm had no oviducal eggs; 1 of 34 mm had well developed eggs, 2 others did not; above this length all had ripe eggs.

Males then mature at a shorter body length than females; this difference is roughly parallel to that between the valleys of the body length histograms. Accepting that maturation of both sexes must be synchronous, we have a confirmation of the hypothesis offered above for the difference in shape of the histograms, that the growth rates of the sexes differ.

More important, we see that the right member of each histogram corresponds to an adult, reproducing population, whose body size is considerably (almost 20%) inferior to that of specimens from other areas.

This fact may be interpreted in two ways. One is that we have here a dwarf population. The other is that the real body length distribution has at least one more mode to the right of the observed ones (Graph 1) and that this age class is absent in the Oriximiná sample, either undetected on account of peculiar ecological preferences or actually absent due to some catastrophe in previous years.

The second hypothesis was tested during a second visit to Oriximiná, in January, 1968. The rains were late this time, and the collection assembled was not as large as that made in 1967 (12 specimens in 3 days), but the size distribution of the new sample was about the same as that reported here. Thus we believe the Oriximiná population to be a dwarf one.

SCALE COUNTS

We counted the number of: (i) dorsal scales between the occipital and the level of the hind margin of the thigh; (ii) ventral scales between the pectorals and the anterior median preanal plate; (iii) longitudinal scale rows at midbody; (iv) femoral pores.

The first two characters showed variability and will be discussed below; midbody scale rows were in all our specimens, as in those in the literature, 16; femoral pores, always symmetrical, were either 4/4 or 5/5 (Table 3). Ruthven's and Müller's specimens had 4/4; Andersson's 5/5.

Table 3

Number of femoral pores

Pores	N	p	I
4/4	24	.233	.158 – .332
5/5	79	.767	.668 – .842
	103		

N, number of individuals; p, percentage; I, confidence interval, binomial, 95%, of p.

Relationships between scale counts and body length

Large samples containing numerous juveniles are especially favorable to the study of the selective value of meristic characters. The presence in the young of extreme scale counts, not found in adults, obviously means that the individuals presenting these counts do not reach adulthood, an evidence of selection at work. Another possibility that must be checked whenever feasible, is that of an increase in meristic characters with growth. The number of scales is thought to be related to the number of somites, and should be constant throughout life; on the basis, usually implicit, of this assumption, indiscriminate use is made in herpetological practice of juveniles in descriptions and comparisons.

In Tables 4 to 8 are presented the data on dorsal and ventral scales. Tables 4 to 6 (dorsals in males and females, ventrals in males) are closely similar and very clear: the lowest scale count class never includes very large specimens, and the highest classes do not contain small specimens. In all 3 cases Spearman's coefficient of rank correlation is significant at the .05 level (Table 8). In table 7 (ventrals in females) the correlation is not significant, but the distribution is consistent with the others.

On one side the presence of positive regression between body length and number of scales, and on the other the absence of juveniles with high scale counts, tend to indicate that there is addition of scales during life. We have not been able, however, to find indications of the appearance of intercalary scales in our specimens.

Table 4

Number of dorsal scales x body length, males

	Scale rows					
Length	29	30	31	32	33	
21 – 22		1	2			3
23 - 24	2	1	3			6
25 – 26	-	4	2			6
27 – 28	1	1	-			2
29 – 30	1	2	2	1		6
31 – 32	2	4	4	-		10
33 – 34	-	4	9	1		14
35 – 36	-	3	5	4	1	13
37 – 38	-	4	8	1		13
39 – 40	1	6	7	3		17
41 – 42		3	4	1		8
43 – 44		1	-	-		1
45 – 46			2	1		3
47 – 48			1			1
	7	34	49	12	1	103

Table 5

Number of dorsal scales x body length, females

Scale rows

Length	30	31	32	33	34	
21 – 22	3	6	5			14
23 – 24	-	1	2			3
25 – 26	1	5	4			10
27 – 28	-	4	2			6
29 – 30	-	2	1			3
31 – 32	-	1	2			3
33 – 34	1	-	3			4
35 – 36	-	3	2	1		6
37 – 38	-	3	5	1		9
39 – 40	4	3	3	4	1	15
41 – 42	-	3	6	1		10
43 – 44	1	1	3	-		5
45 – 46		2	1	3		6
47 – 48			2			2
	10	34	41	10	1	96

Table 6

Number of ventral scales x body length, males

Scale rows

Length	17	18	19	20	21	
21 – 22		1	2			3
23 – 24	1	1	2	2		6
25 – 26	-	3	3	-		6
27 – 28	-	2	-	-		2
29 – 30	-	2	3	1		6
31 – 32	1	5	4	-		10
33 – 34	4	-	6	3		13
35 – 36	-	4	3	5	1	13
37 – 38	1	2	8	3	-	14
39 – 40		4	9	2	2	17
41 – 42		1	5	2		8
43 – 44		-	-	1		1
45 – 46		1	1	1		3
47 – 48				1		1
	7	26	46	21	3	103

Table 7

Number of ventral scales x body length, females

Scale rows

Length	18	19	20	21	22	
21 – 22	1	5	5	3		14
23 – 24		1	2	-		3
25 – 26		2	3	3	2	10
27 – 28		1	4	1	-	6
29 – 30		-	2	1	-	3
31 – 32		1	1	1	-	3
33 – 34		1	2	1	-	4
35 – 36		1	3	1	1	6
37 – 38		-	5	4	-	9
39 – 40		3	5	6	1	15
41 – 42		3	2	4	1	10
43 – 44		1	3	1		5
45 – 46		1	2	3		6
47 – 48		1	1			2
	1	21	40	29	5	96

Table 8

Data on rank correlations of scale counts x body length

Scales	Sex	r_s	t	df
Dorsals	♂	.2197	2.263	101
	♀	.2829	2.860	94
Ventrals	♂	.2577	2.654	101
	♀	- .1660	1.632	94

r_s, Spearman's coeficient of rank correlation; t, Student's to test the significance of r_s; df, degrees of freedom.

In the case of femoral pores association was tested by means of the median test and found not significant ($X^2 = .974$ with 1 degree of freedom).

Sexual differences

Both in number of dorsals and ventrals the females have approximately one more scale than the males (Tables 9 and 10), the differences being significant at the .001 level.

Table 9

Number of dorsal and ventral scales, sexes compared

	Dorsals			Ventrals	
	♂	♀		♂	♀
29	7	-	17	1	-
30	34	10	18	26	1
31	49	34	19	46	21
32	12	41	20	21	40
33	1	10	21	3	29
34	-	1	22	-	5
	103	96		103	96

Table 10

Number of dorsal and ventral scales, data on the frequency distributions, males and females

		N	R	M	V	t
Ventrals	♂	103	29 – 33	30.67 ± .0809	2.64	7.542
	♀	96	30 – 34	31.56 ± .0856	2.71	
Dorsals	♂	103	17 – 21	18.87 ± .0836	4.43	10.744
	♀	96	18 – 22	20.17 ± .0884	4.30	

N, number of individuals; R, range; M, mean ± its standard deviation; V, coefficient of variability; t, Student's for difference between means.

NUMBER OF DORSALS AND VENTRALS IN OTHER LOCALITIES

The three males for which counts are available in the literature have 26 (2 specimens) and 27 dorsals. Two of them are large animals (no data on Andersson's), and these counts are significantly lower than ours. Our Tiriós female, also a large specimen, has 27 dorsals and 16 ventrals, again significantly below the Oriximiná sample.

These differences cannot be attributed to differences in body size and clearly indicate the presence of geographical variation in the species, giving greater strength to the hypothesis that the Oriximiná sample represents a variant population.

ASSOCIATION BETWEEN CHARACTERS

All meristic characters studied were found statistically independent.

Table 11

Data on regressions

		N	R_x	b	a	r^2
Tail *	♂	12	23 – 37	2.54 ± .254	- 22.65 ± 8.22	.909
	♀	14	21 – 42	2.01 ± .075	- 13.44 ± 2.33	.983
Tail **	♂	12	23 – 37	174.52 ± 15.93	- 203.33 ± 12.93	.923
	♀	14	21 – 42	140.16 ± 22.20	- 158.34 ± 8.04	.982
Head *	♂	103	15 – 38	.134 ± .0168	4.51 ± .45	.386
	♀	96	14 – 39	.148 ± .0113	3.65 ± .31	.648

* linear regression ** log-arith regression; N, number of individuals; R_x, range of the independent variable; b, regression coefficient and its standard deviation; a, regression constant and its standard deviation; r^2, square of the correlation coefficient.

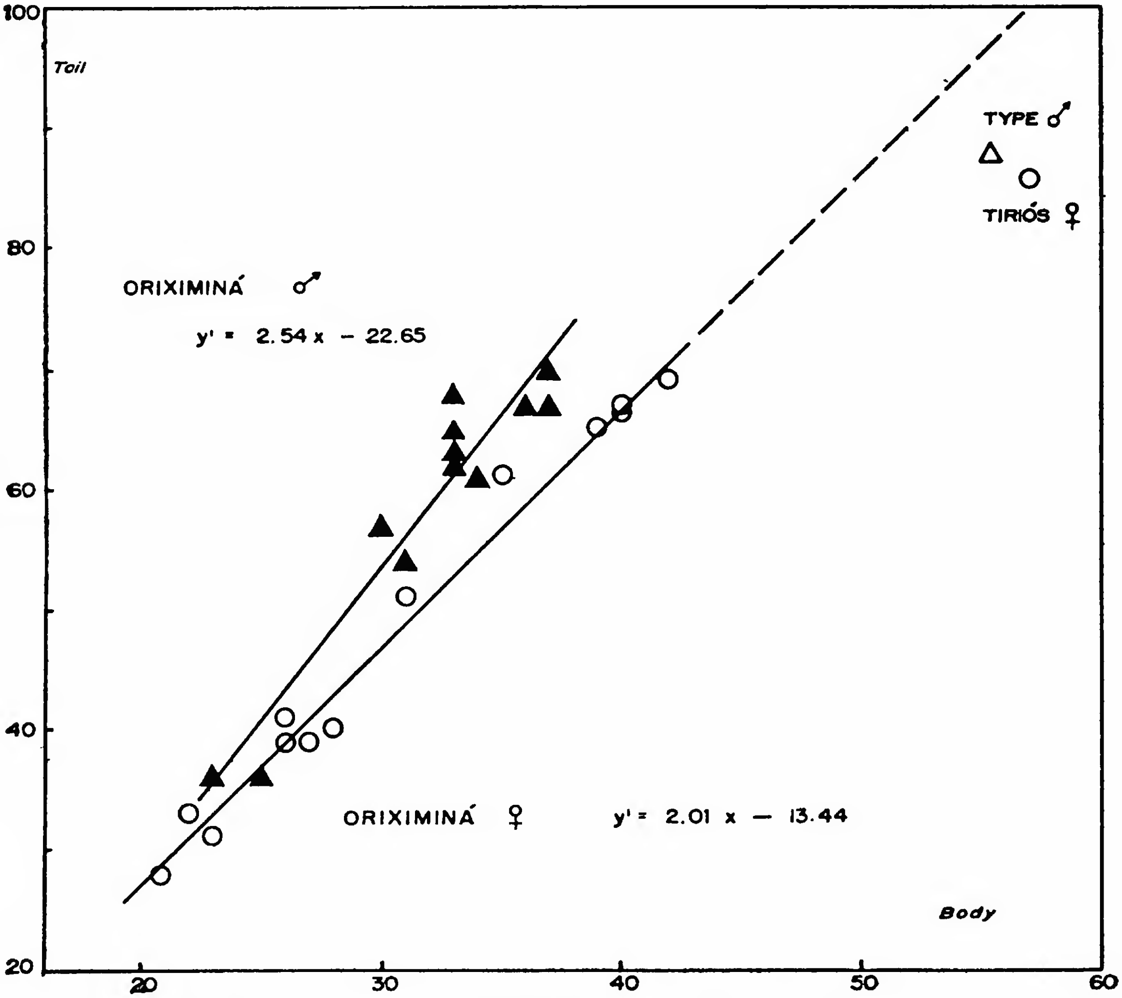
TAIL LENGTH

The tail of this lizard is fragile, and autotomy frequent. Of the 199 specimens included in this study 52 had regenerated tails (26.1 per cent, interval of confidence, at the 95% level, 21.6 to 34.7); no sexual difference was found (32 males, 20 females). Many other specimens had tails recently broken in nature, or by the children who collected them, or during preparation and transportation to S. Paulo. So we have measured only 26 intact tails (Table 11, Graphs 2 and 3).

A first study of the regression of tail length on body length showed that a linear regression describes quite well the relationship in both sexes. Table 10 shows that body length explains 98.3 per cent of the variance of tail length in females and 90.0 per cent in males (as measured by r^2, the square of the correlation coefficient). A routine fitting of a second degree to the data showed exactly no improvement for the females and a very small, non-significant, improvement for the males.

It was noticed, however, that the tail length of the large Tiriós female falls short of the extrapolated Oriximiná linear regression; it has 86 instead of the computed 101.1 mm (Graph 2). A still larger difference (88 instead of 118 mm) is found for Ruthven's type. Before ascribing these differences to geographical differentiation, and especially considering that extrapolation of regression lines beyond the observed range of the independent variate is never safe, we tried several anamorphoses. It was found (Table 11, Graph 3) that regression of tail length on the logarithm of body length (log-arith), while neither improving nor worsening the fit of the Oriximiná sample of females ($r^2 = .982$ against a previous .983), furnished a line that, upon extrapolation, came very close (87.8 mm) to the 86 mm tail length of the Tiriós female (not included in the regression).

Fitting a log-arith regression to the males showed, as it had been the case with the second degree parabola, a slight but not significant improvement of the fit ($r^2 = .923$ against a previous .909). However, this anamorphosis does not bring the type in line with the Oriximiná males — it falls almost exactly on the female regression.



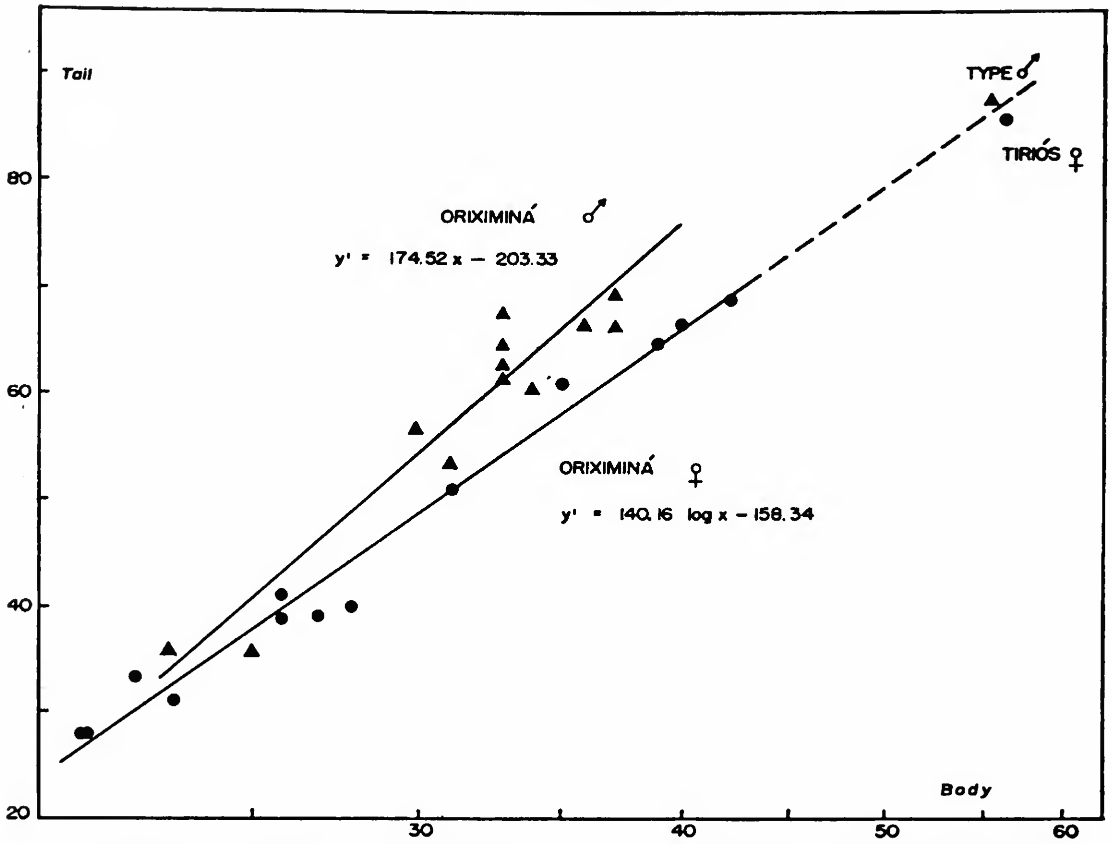
Graph 2: regression of tail length on body length.

These facts cannot be thoroughly explored and understood on the basis of present materials. They show, however, once more, the peculiarity of the Oriximiná sample.

It is obvious from graphs 2 and 3 that males have relatively longer tails, and that the difference tends to increase with body growth. In fact the difference between the regression coefficients is significant at the 5% level ($t = 2.306$ for 22 degrees of freedom).

HEAD

Head length, from the tip of the snout to the anterior margin of the ear, was measured to the nearest millimeter, which is rather gross measurement, but sufficient in the present case, given the large sample available. It is shown against trunk length (body minus head) in Tables 11, 12 and 13; because of the large number



Graph 3: regression of tail length on logarithm of body length.

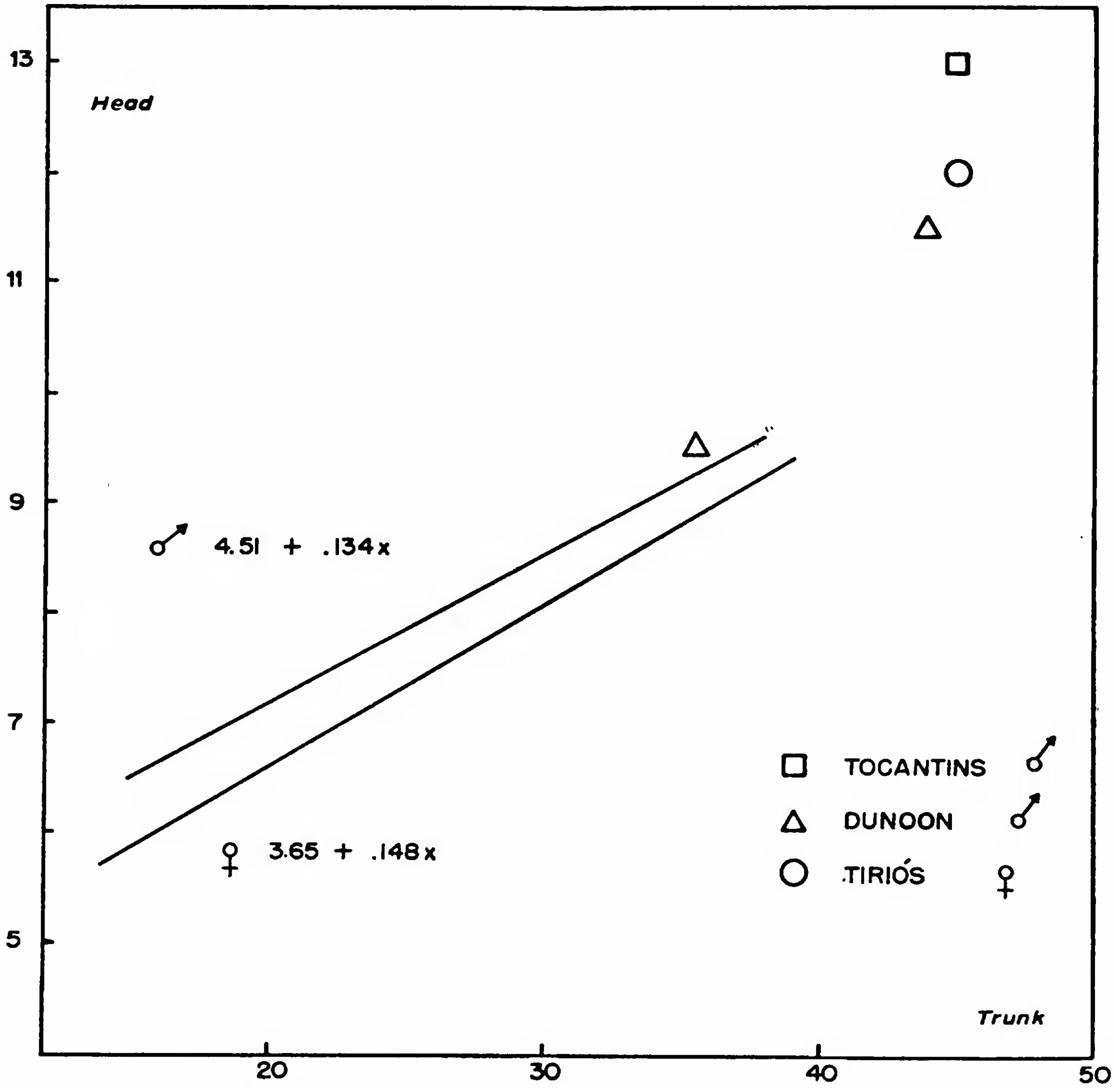
of specimens with the same trunk and head length, the tables portray better the regression than graphs would. The regressions are linear, but by no means as good as those of the tail length. Furthermore, the males are strikingly more variable; their trunk length explains only 39 per cent of the head length, against 65 per cent for the females.

Table 12

Head length on trunk length, males

	Head					
Trunk	5	6	7	8	9	10
15 – 16	1	2	3			
17 – 18		4	-			
19 – 20		3	2	1		
21 – 22		1	2	3		
23 – 24			2	4		
25 – 26			6	6	6	1
27 – 28			3	3	7	1
29 – 30			1	9	5	4
31 – 32			2	6	2	3
33 – 34			1	2	2	1
35 – 36				-	-	1
37 – 38					3	

The male regression line (Graph 4) is above the female line; the latter has a higher regression coefficient. Within the observed range of trunk lengths the difference between regression coefficients is not significant, but that of position, taken a joint regression coefficient, is highly so.



Graph 4: regression of head length on trunk length.

If we plot on the Oriximiná graph the extralimital specimens, we have a curious picture: (i) the Dunoon paratype falls in very well with the Oriximiná males; (ii) all other specimens (the large ones) are much above the Oriximiná lines, and we found no anamorphosis that could bring them in line. In spite of the situation of the smaller Dunoon specimen, it is very probable that Oriximiná regressions (based as they are on such large samples) really differ from the remainder. Even if they do not and the curves show a sharp bend upwards for trunk lengths above 40 mm, it is

Table 13

Head length on trunk length, females

	Head					
Trunk	5	6	7	8	9	10
14 – 15		3	3			
16 – 17	4	5	-			
18 – 19	-	5	3			
20 – 21	2	3	3			
22 – 23		2	2	3		
24 – 25			1	1		
26 – 27			2	2	1	
28 – 29			3	5	4	
30 – 31			-	8	5	
32 – 33			2	5	5	
34 – 35				1	2	2
36 – 37				2	3	2
38 – 39				2		

indisputable that the relative head length of the specimens from Oriximiná (or in their size range) is smaller than that of the large specimens.

COMMENTS

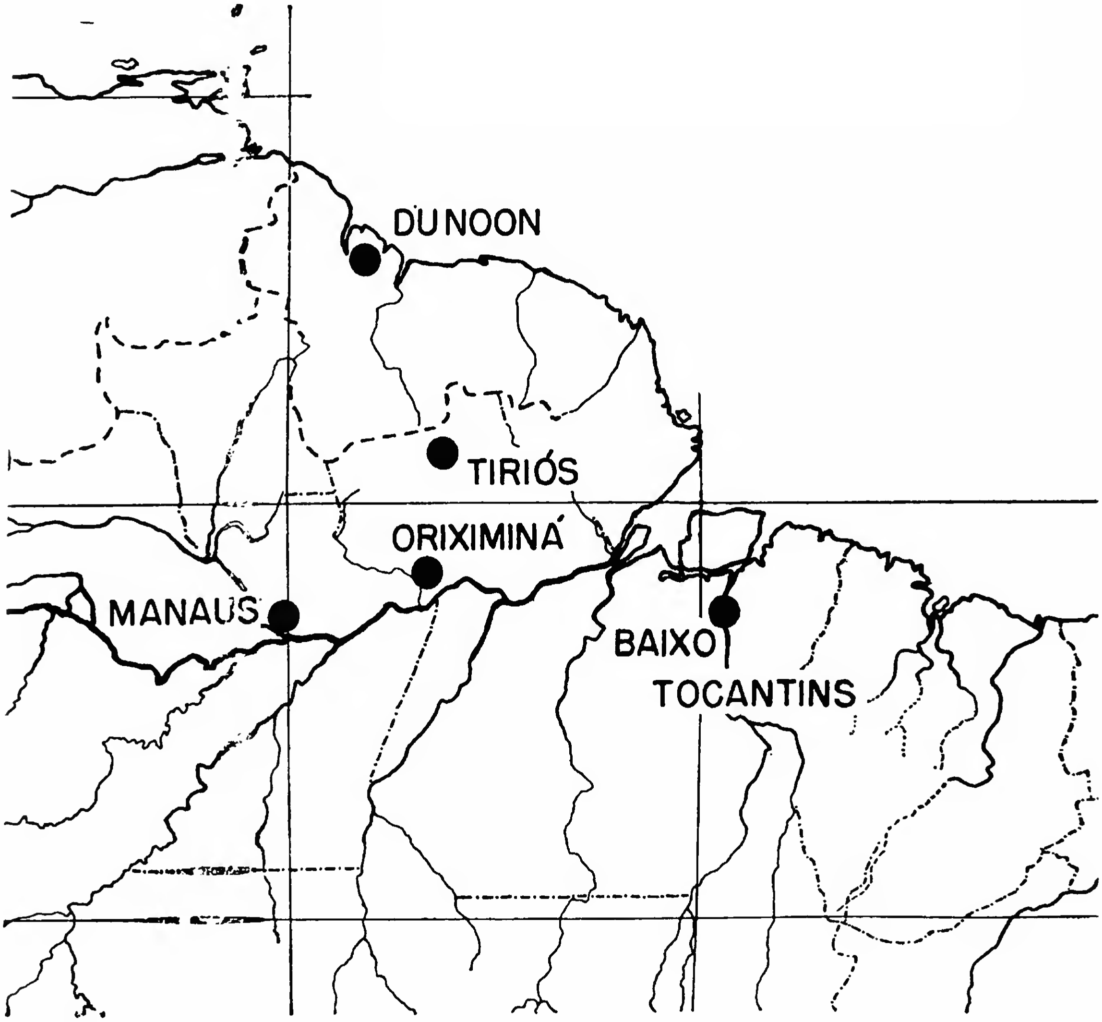
We do not intend to analyse at this time the geographical differentiation of *Tretioscincus agilis,* but some striking features of the Oriximiná sample must be considered.

First, there is the matter of the relatively enormous abundance at the place and time of collecting. Then come the reduced body size and the difference in number of scales, dorsals and ventrals, and in relative head and tail length.

Scarcity of a species in collections may be due to many different causes, acting individually or concurrently. Lack of intensive collecting by professionals, restricted range, short season of activity, unawareness of the correct habitat, etc. In the present case, the fact that reasonably intensive collecting for 2 months in the same area, but in a different season, had produced no specimens (with practically the same children helping both times) indicates that the general difficulty in collecting this lizard may often have been due to unfavorability of the season. But this cannot be the case consistently for a species with such a large range, some parts of which have been extensively, if somewhat randomly, collected. "Blooms" of the animal should have been detected before if they were geographically widespread. The fact that they have not supports the idea that the situation in Oriximiná is special.

Looking at the geography of the case (Map 1), Oriximiná is seen to be neatly bracketed by the 4 localities from which we have data. Thus if we have here a sample with significantly lower body length, it is very probable that the population represented is an enclave — the area of which only further collecting can ascertain. It is unavoidable to bring all these facts together and propose the hypothesis that a dwarfish population of *T. agilis* has found, on account of the nanism itself, either a much less strongly occupied niche than the standard-size populations, or a better protected one against predators, and has been able thus to increase its numbers and, in doing so, differentiated in other characters.

The environmental feature most directly related to body length, in the range of size of these lizards, is size of prey (Rand, 1967). That this could be the efficient selective agent here is enhanced by the fact that the diminution in body size of the Oriximiná sample is compounded by the small relative head size. This is an attractive hypothesis, but we have nothing to offer in its support.



Map 1: localities cited in the text.

Only one ground lizard occurs in the Oriximiná area, competition with which could have caused the displacement of the body size of *T. agilis*. It is the very common *Cnemidophorus lemniscatus*, of which at the time a good series was obtained. We examined the contents of the alimentary tract of 25 *T. agilis* and 41 *C. lemniscatus*.

The *Cnemidophorus* sample was divided into 3 sub-samples: body length 33-50 mm, 51-60 mm and 61-73 mm. The first group corresponds to Oriximiná, and the second to non-Oriximiná *agilis*. The large specimens are considered separately because young and adult *Cnemidophorus* do not forage together; when they meet the small specimen may be eaten. In this sample there was one small *Cnemidophorus* in the stomach of a 73 mm specimen and a piece of tail in the stomach of another measuring 67 mm.

We have no detailed field records of habitat preference of *Cnemidophorus* in Oriximiná, but some older observations of ours made in Bahia are quite conclusive: the adults were abundant in the tall grass and scrub, while the young kept to the very sparse grass and were always running for cover, never stopping to look around and wave the forefoot as the adult is fond of doing.

Before preparing tables 14 and 15, which summarize the comparisons, we tested each sample internally for possible differences due to size or sex. No relevant ones were found.

In Table 14 we give the number of food items, taxonomically classified; the relative frequency (%) is taken over the total number of food items for the sample.

Table 15 shows the number of individual lizards in which each prey category was found; the percentages are over the number of lizards in the sample with identifiable food in the alimentary tract. This table complements table 14 in that it permits to identify cases where the fortuitous presence of a large number of a certain item in one or two specimens may weigh unduly. The differences in quality of prey that exist among the *Cnemidophorus* subsamples are irrelevant to this argument, as they concern types of prey not found in *T. agilis*.

The differences between *T. agilis* and *C. lemniscatus* are so striking that no analysis is needed beyond inspection of the tables. The main food of *agilis*, spiders, is present in small amounts in *Cnemidophorus*. Roaches, termites and isopods, which constitute 40% of *agilis* diet are not found in *lemniscatus*. And beetles, the only type of food with heavy presence in *Cnemidophorus* (50%), are absent in the contents of *agilis*.

Additionally, a certain number of spiders could be identified to family or genus. In table 16 they are classified in 3 groups as to ecological preferences: A, in leaf litter, under logs and similar environments; B, broad preferences; C, in vegetation. Group A occurs only in the alimentary tract of *T. agilis*, and group C only in that of *C. lemniscatus*.

Table 14

Absolute and relative frequency of food items of *T. agilis* and *C. lemniscatus*

	T.		*Cnemidophorus lemniscatus*					
	agilis		33 – 50 mm		51 – 60 mm		61 – 73 mm	
Prey	f	%	f	%	f	%	f	%
Arachnida	26	35.6	2	3.4	3	8.8	3	4.7
Isopoda	9	12.3	-	-	-	-	-	-
Blattaria	12	16.4	-	-	-	-	-	-
Isoptera	9	12.3	-	-	-	-	-	-
Orthoptera	9	12.3	3	5.1	-	-	6	9.4
Homoptera	-	-	8	13.6	-	-	1	1.6
Lepidoptera, imagos	-	-	1	1.7	1	2.9	2	3.1
larvae	1	1.4	-	-	1	2.9	3	4.7
Coleoptera, imagos	-	-	34	57.6	17	50.0	30	46.8
larvae	1	1.4	3	5.1	-	-	4	6.2
Formicidae, winged	2	2.7	-	-	7	20.6	-	-
not	-	-	6	10.2	1	2.9	3	4.7
Apoidea	-	-	-	-	1	2.9	6	9.4
Diptera	2	2.7	1	1.7	3	8.8	-	-
Others	2*	2.7	1**	1.7	-	-	6***	9.4
Total	73		59		34		64	

* Thysanura (1), Psocidae (1). ** Psocidae (1). *** Chilopoda (1), Hemiptera (2), Odonata (1), Sauria (2).

Table 15

Occurrence of prey per lizard, *T. agilis* and *C. lemniscatus*

	T.		*Cnemidophorus lemniscatus*					
	agilis		33-50 mm		51-60 mm		61-73 mm	
Number of lizards	25		33		8		20	
Prey								
Arachnida	14	56.0	2	15.4	1	12.5	1	5.0
Isopoda	4	16.0	-	-	-	-	-	-
Blattaria	11	44.0	-	-	-	-	-	-
Isoptera	5	20.0	-	-	-	-	-	-
Orthoptera	8	32.0	3	23.1	-	-	5	25.0
Homoptera	-	-	1	7.7	-	-	1	5.0
Lepidoptera, imagos	-	-	1	7.7	1	12.5	1	5.0
larvae	1	4.0	-	-	1	12.5	3	15.0
Coleoptera, imagos	-	-	8	61.5	7	87.5	14	70.0
larvae	1	4.0	1	7.7	-	-	1	5.0
Formicidae, winged	1	4.0	-	-	1	12.5	-	-
not	-	-	3	23.1	1	12.5	3	15.0
Apoidea	-	-	-	-	1	12.5	4	20.0
Diptera	2	8.0	1	7.7	3	37.5	-	-

Table 16

Occurrence of identifiable spiders, *T. agilis* and *C. lemniscatus*

Ecology	Spiders	*T.* *agilis*	*C.* *lemniscatus*
A	Eusparassidae (*Heteropa* sp.)	1	
	Clubionidae (*Castanieira* sp.)	2	
	Ctenidae	1	
	Linyphiidae	4	
B	Lycosidae	2	2
	Salticidae	5	3
	Sicariidae	2	
C	Argiopidae		2
	Theridiidae		1
	Thomisidae		2
	Pisauridae		1

It is obvious from these data that *T. agilis* searches for its prey under things, and *C. lemniscatus,* of all ages, in the open. Then it is not avoidance of competition for food with *C. lemniscatus* that has caused the dwarfism of Oriximiná *T. agilis.*

E. E. Williams (*in litt.*) has suggested that *T. agilis* may occupy in Oriximiná a niche which is differently occupied elsewhere. This possibility remains to be verified by further field work in the region, but so far there are no indications that this is the case, as there is no ground lizard frequent in other localities and obviously missing in Oriximiná. Thus we have here a dwarf population which cannot readily be explained with recourse to the most usual selective mechanisms, beyond the broad one of adaptation to perianthropic environments.

REFERENCES

ANDERSSON, L. G.

1918: New lizards from South America collected by Nils Holmgren and A. Roman. *Ark. Zool. Stockholm 11 (16)*: 9 pp.

MATHER, K.

1965: *Statistical analysis in biology.* 267 pp. London: Methuen (University Paperbacks reprint of the fourth edition, 1951).

MÜLLER, L.

1923: Neue oder seltene Reptilien und Batrachier der Zoologischen Sammlung des bayr. Staates. *Zool. Anz. 57 (3/4)*: 49-61.

RAND, A. S.

1967: Ecology and social organization in the iguanid lizard *Anolis lineatopus. Proc. U.S. Nat. Mus. 122 (3595)*: 79 pp.

RUTHVEN, A.

1916: Description of a new genus and species of lizard from British Guiana. *Occ. Papers Mus. Zool. Univ. Michigan 22*: 4 pp.

SIEGEL, S.

1956: *Nonparametric statistics for the behavioral sciences.* xvii+312 pp. New York, Toronto and London: McGraw-Hill.

THOMAS, R.

1965: A new species of Bachia (Sauria:Teiidae) from Brazil. *Herpetologica 21 (1)*: 18-22.

1965a: The smaller teiid lizards (*Gymnophthalmus* and *Bachia*) of the southeastern Caribbean. *Proc. Biol. Soc. Washington 78*: 141-154.

VANZOLINI, P. E.

1961: *Bachia*: espécies brasileiras e conceito genérico (Sauria, Teiidae). *Papéis Avulsos Dep. Zool. S. Paulo 14*: 193-209.

Plate 1. *Tretioscincus b. bifasciatus*, DZSP 2057, Sierra Nevada de Santa Marta, Colombia. *Tretioscincus agilis*, DZSP 12449, Oriximiná, Pará. *Iphisa elegans*, DZSP 8354, Amazonas.

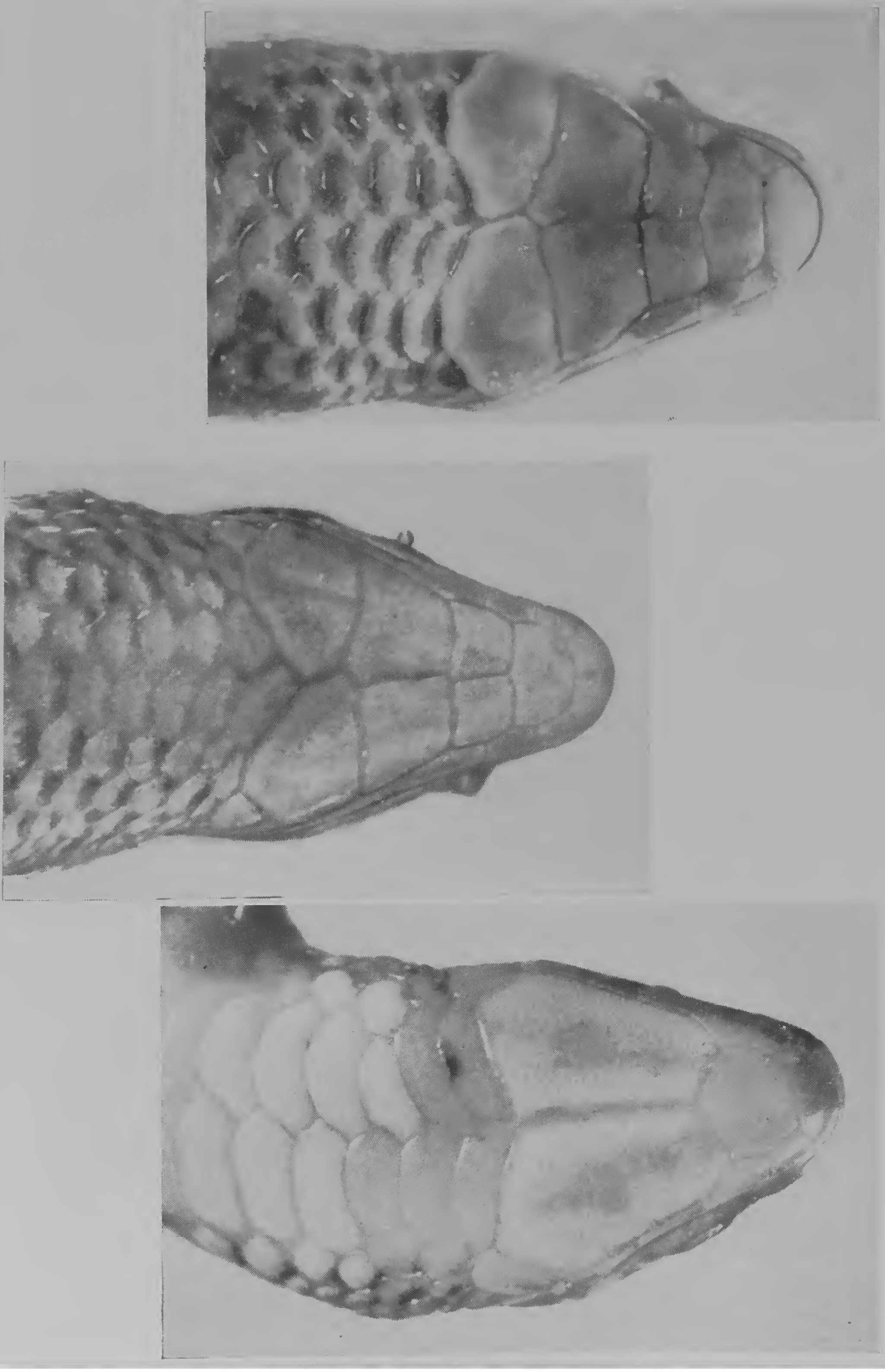


Plate 2. *Tretioscincus b. bifasciatus,* DZSP 2057, Sierra Nevada de Santa Marta, Colombia. *Tretioscincus agilis,* DZSP 12449, Oriximiná, Pará. *Iphisa elegans,* DZSP 8354, Manaus Amazonas.

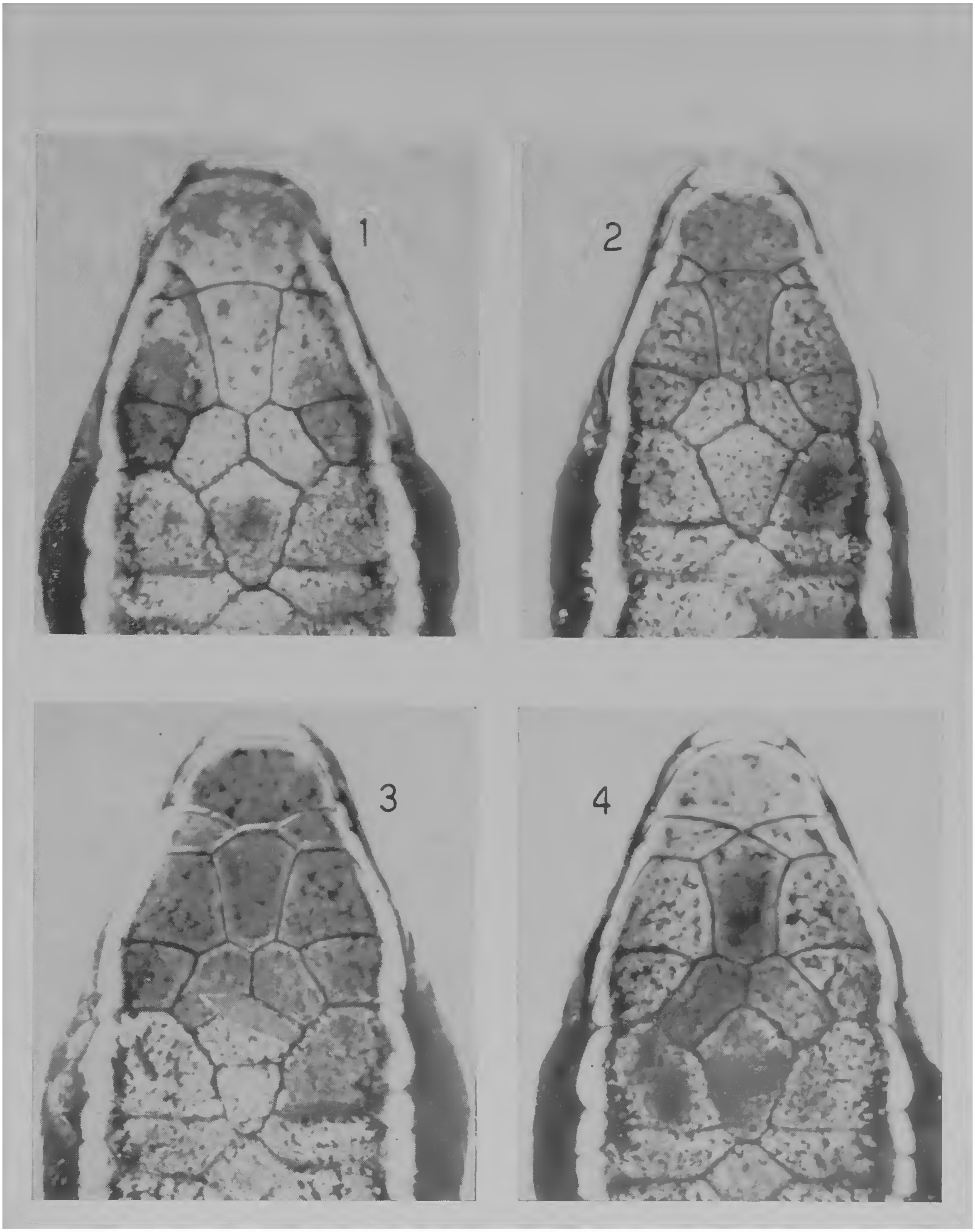


Plate 3. *Tretioscincus agilis,* Oriximiná, Pará. 1, DZSP 12383, prefrontals widely separated, one not meeting the frontal. 2, DZSP 12385, intermediate condition. 3, DZSP 12453, prefrontals large, parietal transversely divided. 4, DZSP 12393, prefrontals very large, almost meeting on the midline.