

III. — NOTES ON THE SPECIES OF ARTHROSAURA BLGR. (TEIIDAE)
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HISTORIE, LEIDEN. (WITH 12 FIGURES).

In 1904 two Teiid lizards from Surinam were described by VAN LIDTH DE JEUDE who named them: *Arthrosaura versteegii* and *Prionodactylus kockii*. Of the latter species I (1928) was able to show that it did not belong to the genus *Prionodactylus* but that it was also an *Arthrosaura* and that *A. dorsistriata* L. MÜLLER (1923, p. 147) was a synonym of it. The status of the different *Arthrosaura*-species is again discussed by CH. E. and M. D. BURT (1931, p. 312—313) in a very interesting study on the South-American lizards in the American Museum of Natural History. At the same time these authors describe a new species, *Arthrosaura tatei*, from Venezuela, so that they refer four species (*reticulata*, *versteegii*, *kockii*, *tatei*) to this genus.

Dealing with the two species described by VAN LIDTH DE JEUDE (1904, p. 89, 91) the authors write on p. 313: "It is possible that future study will show *A. kockii* to be a synonym of this co-extensively distributed *A. versteegii*" and: "It appears that three of the species of *Arthrosaura* (*versteegii*, *kockii*, and *reticulata*) are practically synonymous in details of scutellation and proportion, although future work may prove this to be untrue."

On p. 312 the probable identity of *Pantodactylus concolor* TSCHUDI (1847, p. 48) is discussed: "The description of *Pantodactylus concolor* Tschudi (1847) from Northern Brazil is very inadequate, but in every point that is given its characters agree with those of the more recently described *Arthrosaura versteegii* of Van Lidth de Jeude (1904)" and on p. 313: "In view of these data and the geographical locality of the forms concerned, it appears that the two species may be identical".

These statements made it worth while to re-examine the types of *A. versteegii* and *A. kockii* which are preserved in our Museum. The purpose of this paper is to show that the species described by VAN LIDTH DE JEUDE are distinct from each other and from *Pantodactylus concolor* and to discuss their relations to the other species of the genus. It may be divided in the following paragraphs.

- I. Comparison of *A. versteegii* with *A. kockii*.
- II. Comparison of *A. versteegii* with *A. reticulata*.
- III. Comparison of *A. versteegii* with *Pantodactylus concolor*.
- VI. Status of *A. tatei*.
- V. Key to the species and redescription of *A. versteegii* and *A. kockii*.

I. *A. versteegii* and *A. kockii*.

The types of *Arthrosaura versteegii* and *Arthrosaura kockii* are rather badly preserved. That of *A. versteegii*, collected in the Cottica Mountains in Surinam, is an adult male of which the praemaxilla and the rostral have become loosened; the limbs are in a very bad condition and some of the sutures between the shields of the throat could only be traced with some difficulty. The type of *A. kockii* is a very young specimen of which especially the head is in bad condition so that some of the characters were difficult to check. Of this species however, I was able to examine two further specimens in the Zoological Museum, Amsterdam. One was an adult male collected by an expedition in the interior of Surinam in 1908 and which is very well preserved; the other was again a young specimen and partly dried out; it was collected in Surinam by the Expedition to the Wilhelmina Mountains in 1926. Moreover we have the excellent description of *Arthrosaura dorsistriata* (= *kockii*) by L. MÜLLER (1923, p. 147—150) who examined four specimens: a nearly adult female, an adult male and two young specimens, all collected in the State of Pará, Brasil.

The differences between *A. versteegii* and *A. kockii* may be tabulated as follows:

A. versteegii

1. Three supraoculars.
2. Interparietal rather narrow (fig. 1).
3. Three pairs of chinshields in contact.
4. Third pair of chinshields separated posteriorly by a small hexagonal shield (fig. 3).
5. Two small shields on each side behind the third pair of chinshields, the median ones separated by 1 + 2 smaller shields (fig. 3).
6. Temporal scales rather large, polygonal, flat. (fig. 5).
7. Lateral scales not decreasing in size towards the ventrals; the

A. kockii

1. Four supraoculars.
2. Interparietal broader (fig. 2).
3. Two pairs of chinshields in contact.
4. Second pair separated posteriorly by a small shield; third pair completely separated by 1 + 2 small shields (fig. 4).
5. Four smaller shields on each side behind the third pair of chinshields, the median ones separated by several (1 + 3 + 4) scales (fig. 4).
6. Temporal scales irregular in size, above larger, below smaller, polygonal, convex or keeled (fig. 6).
7. Lateral scales decreasing in size towards the ventrals, the rows

transverse rows separated by a very few small scales only (fig. 9).

8. All ventrals smooth.

9. Three large praeanal plates (fig. 11).

10. Two praeanal and four or five femoral pores.

11. Scales on lower side of tail smooth.

separated by several smaller scales (fig. 10).

8. Three outer rows of ventrals keeled.

9. Six or seven praeanal (fig. 12).

10. Two praeanal and eight femoral pores.

11. Scales on lower side of tail keeled.

These differences may partly be due to individual variation, but taken all together they justify specific separation.

II. *A. versteegii* and *A. reticulata*.

It is more difficult however to discuss the relationship of *Arthrosaura reticulata* (O'SHAUGHN.) and *Arthrosaura versteegii* VAN LIDTH DE JEUDE. The former is known to me only from the description by O'SHAUGHNESSY (1881, p. 230, pl. XXII fig. 1) and by BOULENGER (1885, p. 389) and from a sketch, kindly sent to me in 1928 by Dr. H. W. PARKER (British Museum of Natural History), showing the position of the lateral scales and of the outer rows of ventrals. The only morphological difference that I find between these species is the different form and arrangement of the praeanal shields. *Arthrosaura versteegii* has three large shields, while according to BOULENGER (1885, p. 390) *A. reticulata* has „four principal praeanal, two median, with their points touching and two lateral”, thus resembling the condition in *A. kockii*. Besides these four principal praeanal O'SHAUGHNESSY figures two still more lateral shields. It is possible that the condition in *A. versteegii* is an individual abnormality and that it may be explained by the fusing of the medio-anterior shield with the medio-posterior one. The only known specimen of *A. reticulata* is a female and that of *A. versteegii* a male, so that it is also possible that the difference is one dependent on the sex. The other differences stated by VAN LIDTH DE JEUDE (1904, p. 91) to exist between these two species, i. e. the number of transverse rows of scales, the form of the frontal and the arrangement of the scales bordering the parietals, are, at least in my opinion, of no great value. The coloration differs in the following points: in *A. versteegii* the black reticulation on the back is absent, but instead of this narrow dark cross-lines are present. The longitudinal series of light spots of *A. reticulata* are also absent, in *A. versteegii* only the sides of body and tail bear light spots; those on the neck and the lower of

the two series on the tail are most distinct. The lower lip is spotted with brownish in *A. versteegii*; but the throat is uniform whitish instead of blackspotted as in *A. reticulata*.

Without a direct comparison of the types and the examination of more specimens it will hardly be possible to arrive at a definite conclusion. Provisionally I keep them separated on accord of the differences in the praeanal and in the coloration. If in future more specimens become known it will quite well be possible that *versteegii* must be reduced to the rank of a subspecies of *reticulata*.

III. *A. versteegii* and *Pantodactylus concolor*.

As already cited CH. E. and M. D. BURT (1931, p. 312, 313) are of the opinion that the descriptions agree in the essential points and that the species may be synonymous. We may first examine the arguments which are used by these authors to prove their view.

1°. The Coloration. TSCHUDI (1847, p. 48) describes the coloration of the back, head and tail of *Pantodactylus concolor* as being "ein glänzendes Dunkelbraun". It is true that no light vertebral band is mentioned and that the species agree in this point but neither does TSCHUDI mention the light spots and the dark crosslines which are clearly present in *A. versteegii*.

2°. The ventrals. The BURTS state that TSCHUDI described the ventrals of *P. concolor* as being polygonal. In his description of that species however, TSCHUDI did not mention the ventrals at all, but he wrote: "der Brustpanzer (besteht) aus zahlreichen polygonen glatten Schildern". With this he can hardly have meant the ventral shields as he wrote in the description of the genus: "Die Schilder des Bauches sind viereckig," With "Brustpanzer" he probably meant the first row of shields posterior to the collar fold only¹). Besides the ventrals of *A. versteegii* are not polygonal, nor would I describe them as subpolygonal (but that is probably a matter of personal view); they are subquadrangular and rounded posteriorly. The pectoral shields could be named polygonal or subpolygonal.

3°. Temporal shields. The temples of *A. versteegii* are covered with rather large, irregular smooth shields (fig. 5), but in *P. concolor*: "Die

¹) This is also evident from his (l. c., p. 49) description of *P. orbignii* D. B.: "Der Brustpanzer wird von einem grossen, fast dreieckigen glatten Schilde gebildet, welches jederseits von 4 glatten Schuppen rautenförmig umgeben ist."

Schläfen sind mit unregelmässigen grössern und kleineren gewölbten Schuppen besetzt", a condition which would sooner agree with that found in *P. schreibersii* with which PETERS (1862, p. 183) compared this species or with that in *A. kockii* which is however distinct in several characters (e. g. number and size of supraoculars).

Besides the characters mentioned by CH. E. and M. D. BURT some others may be compared in these two species.

The supraoculars of *P. concolor* are described as follows: "Das vorderste obere Augenliedschild ist stark entwickelt und ebenso gross als die beiden übrigen, dreieckig, das hinterste ist klein". In *A. versteegii* we have also three supraoculars but the first is smallest, much smaller than the second or third which are nearly equal in size. *Pantodactylus concolor* has two nearly quadrangular ("fast viereckig") preanals, while *A. versteegii* has three shields of a very different shape.

From all these differences we may safely conclude that *Arthrosaura versteegii* VAN LIDTH DE JEUDE and *Pantodactylus concolor* TSCHUDI are distinct species. To draw definite conclusions as to the identity of the latter is not possible because the type seems to be lost (PETERS 1862, p. 183). Perhaps it is identical with *Pantodactylus schreibersii* (WIEGM.) as PETERS (l. c.) hesitatingly supposed. Many characters seem to be identical in these two species. Both have three supraoculars and the slight differences in the proportions of these shields may easily be explained by individual variation or perhaps, as stated by PETERS, as resulting from the state of preservation. The way in which the third and fourth chinshields are separated from their fellows is also the same in both species ¹⁾.

IV. *Arthrosaura tatei* BURT ET BURT.

Of this species I was only able to examine the extensive description and the excellent figures given by the authors. Especially judging from these figures I think that this species can hardly be placed in the genus *Arthrosaura*. The dorsal scales are quite different; they are more rounded and lack the posterior process of those in the other *Arthrosaura*-species. The scales of about seven lateral series are not keeled while in the other species two or three outer scale rows are smooth. Moreover the transverse series are interrupted in the middle by a longitudinal row of very small

1) In the key to the species of *Pantodactylus* CH. E. and M. D. BURT write (p. 358): "3. Third pair of chinshields not in contact medially, separated by granules. . . ." Of the species of this group I was only able to examine one specimen of *P. schreibersii* (in the Amsterdam Museum) in which the third pair of chinshields is separated by two small shields, just as they are figured by PETERS (1862, pl. I, fig. 4c).

scales. The headshields are also of a different shape, especially the parietals and the interparietal, but perhaps these are deformed as the surrounding scales seem to be so. The absence of enlarged gulars is characteristic for this species and makes it different from the other members of the genus, but this character is perhaps only of specific value. To which of the related genera *A. tatei* must be referred or if a new genus must be erected for it I am not able to say for complete lack of material of the allied genera in our collection.

V. Key to the species and redescription of *Arthrosaura versteegii*
v. L. D. J. and *Arthrosaura kockii* (v. L. D. J.).

- I. Three supraoculars, no light vertebral band
 - a. Six praeanal plates; five distal, one proximal;
throat spotted with black (Ecuador) *A. reticulata*
 - b. Three large praeanal plates, all bordering the
anal cleft; throat not spotted (Surinam) *A. versteegii*
- II. Four supraoculars; a light vertebral band (Surinam,
Brazil) *A. kockii*

Arthrosaura versteegii VAN LIDTH DE JEUDE (figs. 1, 3, 5, 9, 11).
VAN LIDTH DE JEUDE 1904, p. 89, pl. 7 figs. 5, 6; BURT et BURT, 1931,
p. 312.

Type: One adult male, Cottica Mts., Surinam, collected by the Gonini expedition 1903; 's Rijks Museum van Natuurlijke Historie, Herpet. N°. 4469.

Head less than twice as long as broad; snout slightly larger than diameter of eye. Rostral visible from above; frontonasal broader than long; praefrontals forming a suture. Frontal once and a half as long as broad, in contact with first and second supraoculars. Three supraoculars first smallest. Two six-sided frontoparietals, which are smaller than the interparietal. Interparietal separating the parietals and much narrower than these shields; with the anterior point it is wedged in between the frontoparietals; the posterior border somewhat emarginated by the occipital scales. Four supraciliaries, first largest, fourth long and narrow. All pileus-shields smooth and not deepened.

Lower eyelid with a disk which is composed of three parts. Nostril in a single nasal which is bordered behind by a loreal and a freno-orbital; the former in contact with the first supraocular. The nasal a little depressed behind the nostril. A row of suboculars, but the fourth upper labial is only very narrowly separated from the orbit on the left side and enters it on the right side. Earopening rather large, about $\frac{2}{3}$ the

diameter of the eye. Temples with rather large irregular, polygonal, smooth shields. Seven upper- and seven lower labials. Behind the symphyseal one single chinshield followed by three pairs of chinshields forming a median suture; the shields of the third pair are separated posteriorly by one small shield. This third pair is followed by two shields on each side; the median ones are separated by three small shields, one of which lies in front of the two others and is partly wedged in between the shields of the third pair. Enlarged gular shields present, about three pairs transversely dilated. The collar is composed of ten shields. Back covered with transverse series of narrow hexagonal, lanceolate scales

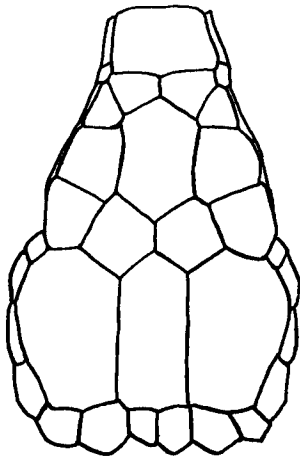


Fig. 1. *Arthrosaura versteegii*, upper view of head, 6 $\times$.

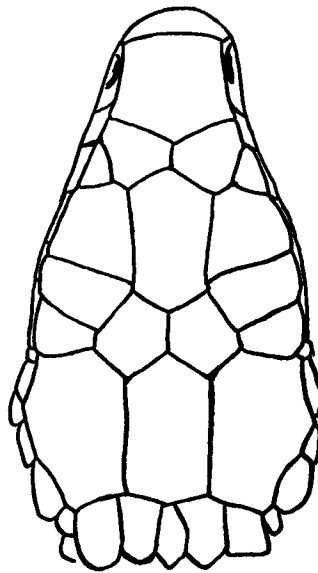


Fig. 2. *Arthrosaura kockii*, upper view of head, 6 $\times$.

which are strongly keeled. On the sides these scales are of about the same size as on the back, the outer rows are not keeled and the transverse series end rather abruptly next to the ventrals. Only a very few small scales are placed between the transverse rows. 25 transverse rows of scales between occiput and base of tail; 33 scales around the middle of the body (including the ventrals). The scales on the sides of the neck and round the shoulder, of axilla and groin are small and granular. Ventrals in 10 rows, subquadrangular, rounded posteriorly, imbricate, all smooth. They form regular longitudinal and transverse rows; 15 transverse rows from collar to praeanales. Three praeanal plates, the median

somewhat larger than the laterals. Between the lateral praeanales and the last row of ventrals two pores are present on each side. Four femoral pores on the left side and five on the right side.

Forelimb with large scales above and anteriorly, below and posteriorly with small granular scales; hind limb anteriorly with large scales, posteriorly granular. The hindlimb does not reach the axilla when pressed against the body.

Scales on upper side of tail hexagonal, strongly keeled, shorter than those on back, placed in regular transverse series but not in longitudinal series. They change gradually into those of the lower side which are

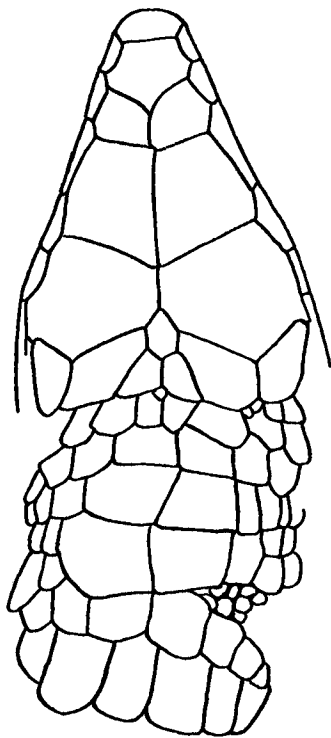


Fig. 3. *Arthrosaura versteegii*, lower view of head and neck, 5 $\times$.

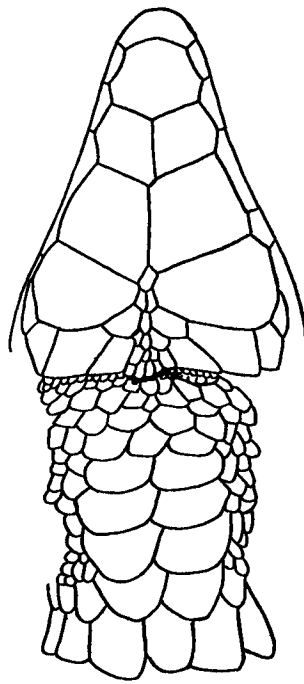


Fig. 4. *Arthrosaura kockii* lower view of head and neck, 4 $\times$.

subquadrangular and rounded posteriorly, smooth and placed in transverse rows and more or less regular longitudinal series.

Colour: reddish brown above, the scales speckled with dark brown, especially on the bases and at the tips. Thus the tips of the scales of one row with the bases of those of the next form darker narrow transverse cross-lines on the back. Sides of head and neck rather dark with

light spots. Sides of body with light spots, some of which are however indistinct as they have become confluent with the whitish colour of the belly. Tail rather dark with a latero-dorsal series of light brown spots and a latero-ventral series of whitish spots with blackish borders.

Lower lips spotted with dark brown; throat and belly white. (The colour seems to have faded, as van LIDTH DE JEUDE writes: "Brown above, lower sides orange coloured" and: "throat uniform cream coloured.")

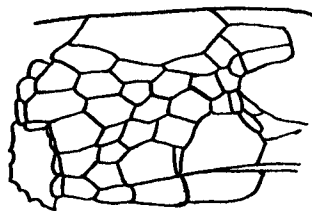


Fig. 5. *Arthrosaura versteegii*, scales of right temple, 6 $\times$.

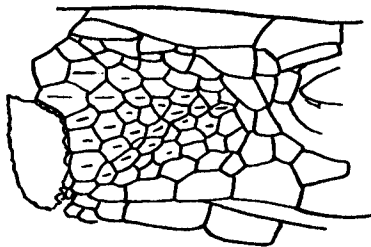


Fig. 6. *Arthrosaura kockii*, scales of right temple, 5 $\times$.

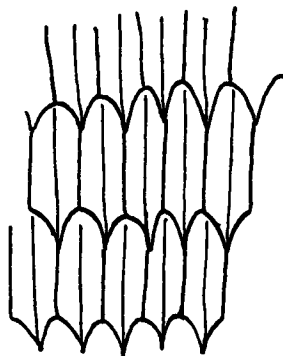


Fig. 7. *Arthrosaura kockii*, dorsal scales, 7.5 $\times$.

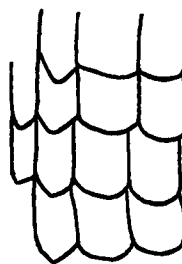


Fig. 8. *Arthrosaura kockii*, ventral shields, 6 $\times$.

Measurements:

Length of head and body.	50	millim.
Length of tail	89	"
Length of head	11	"
Width of head	7	"
Height of head	5	"
Distance snout to forelimb	$\pm$ 20	"
Distance axilla to groin	26.5	"

Distribution: Only known from the type locality.

Arthrosaura kockii (VAN LIDTH DE JEUDE) (figs. 2, 4, 6, 7, 8, 10, 12).

Prionodactylus kockii, VAN LIDTH DE JEUDE, 1904, p. 91, pl. 7, figs. 324.

Arthrosaura dorsistriata, L. MÜLLER, 1923, p. 147.

Arthrosaura kocki, BRONGERSMA, 1928, p. 333; BURT AND BURT, 1931, p. 312.

Type: A young specimen collected in Surinam by the Coppename-

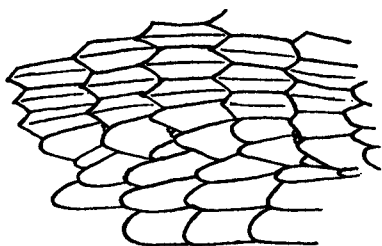


Fig. 9. *Arthrosaura versteegii*, right side of body, 6 $\times$.

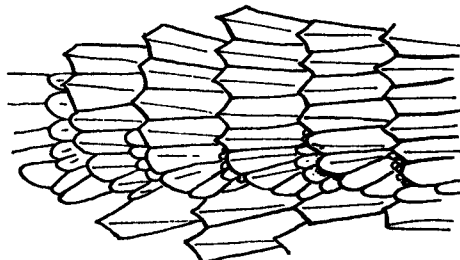


Fig. 10. *Arthrosaura kockii*, right side of body, 5 $\times$.

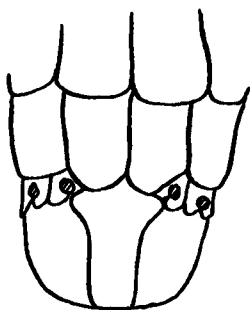


Fig. 11. *Arthrosaura versteegii*, Praeanal shields, 6 $\times$.

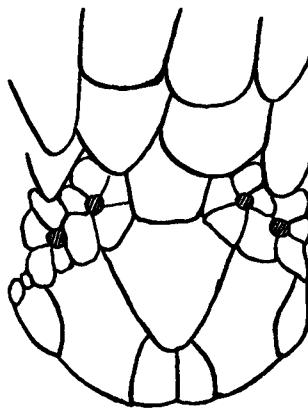


Fig. 12. *Arthrosaura kockii*, Praeanal shields 5 $\times$.

expedition in 1901; 's Rijks Museum van Natuurlijke Historie, Herpet. N° 4464.

Additional specimens examined: One adult male, collected in Surinam by the Surinam-expedition 1908, 5-X-1908; Zoologisch Museum, Amsterdam.

A young specimen collected by the expedition to the Wilhelmina Mts, Surinam, 1926; Zoologisch Museum, Amsterdam.

Description (chiefly taken from the adult male):

Head less than twice as long as broad; snout once and a half the diameter of the eye. Rostral visible from above; frontonasal broader than long; praefrontals forming a suture. Frontal six-sided, one time and a half as long as broad in contact with second and third supraocular. Four supraoculars, first smallest, second largest. Two six-sided frontoparietals which are smaller than the interparietal. Interparietal separating the parietals, much broader than in *A. versteegii* (about $\frac{1}{3}$ the width of a parietal); with the anterior point it is wedged in between the frontoparietals, the posterior border slightly rounded. Four or five supraciliaries, first largest, fourth long and narrow. All head shields smooth.

Lower eyelid with a disk which is composed of four or five parts. Nostril in a single nasal, which is bordered behind by a very large loreal or by a loreal and a freno-orbital. The nasal is a little depressed behind the nostril. A row of large suboculars between the labials and the orbit. Earopening rather large, slightly smaller than the diameter of the eye. Temples covered with larger and smaller convex or keeled scales. Seven or eight upper- and six lower labials (third very long). Behind the symphysial a large chinshield followed by two pairs of chinshields forming a suture; third pair of chinshields separated by three scales of which one lies in front of the two others and which is partly wedged in between the shields of the second pair. Behind the third pair of chinshields four small shields on each side, the median ones separated by several (1 + 3 + 4 + 4) scales. Four pairs of transversely dilated gular plates. The collar is composed of eleven shields, the outer two on each side small, the median ones large but rather narrow.

Back covered with transverse series of narrow, hexagonal, lanceolate scales which are strongly keeled. Towards the ventrals these scales diminish in size and the transverse rows are separated by several small scales. Two or three outer scales of each transverse series not keeled; 26 transverse rows between occiput and base of tail; 38 scales round the middle of the body (including the ventrals). The scales on sides of neck, shoulder, axilla and groin are small, granular. In front of the forelimb a group of four enlarged scales. Ventrals in 10 rows, subquadrangular and rounded posteriorly, imbricate, three outer rows keeled, others smooth; they form regular longitudinal and transverse series. 17 transverse rows from collar to praeanales. Praeanal shields varying in number; in the type: six shields, two median (one medio-anterior, one medio posterior) forming a suture and two lateral shields on each side of these; in the adult male the medio-posterior plate has been divided into two shields. Two praeanal pores on each side, the median ones separated by one shield, eight femoral pores.

Scales on the fore-limb very large, keeled; on lower side much smaller. The scales on the hind limb are large and keeled; posteriorly the hind limb is granular. The adpressed hind limb reaches the shoulder.

Scales on upper surface of tail hexagonal, keeled, shorter than those on back; they form regular transverse but no longitudinal series. On the lower side the scales are pentagonal and keeled; they are arranged in regular longitudinal as well as in transverse series.

Colour: Above dark brown, sides blackish with white spots; sides of neck black with one or two white spots which are formed by the group of enlarged scales in front of the forelimb. From occiput to tail a light vertebral band bordered with blackish. Pileus greyish with some darker parts. Lower sides yellowish. Upper- and lower labials yellowish, spotted with blackish. Tail greyish with a dorsomedian series of light spots bordered with darker. At the sides of base of tail some ocelli.

Measurements of adult male:

Length of head and body	50.5	millim.
Length of tail (broken in several places). . .	80	"
Length of head	13	"
Width of head.	8	"
Height of head	5.5	"
Distance snout to forelimb.	21	"
Distance axilla to groin	26	"

Distribution: Surinam, Brazil (State of Pará, types of *Arthrosaura dorsistriata* L. MÜLLER).

Since the above was printed I received from Dr. J. H. A. T. TRESLING who captured the adult male of *Arthrosaura kockii*, his diary of the 6th Surinam-expedition which contained the following note on the colour in life: Z. 365, Lizard: back dark greenish with a light band in the middle, over the whole of its length; belly bright red, lower side of head white. The specimen was captured in the camp on the upper Gran Rio (see map in: Tijdschr Kon. Ned. Aardr. Gen. 27, 3, 1910, Kaart X).

My heartiest thanks are due to Dr. TRESLING for the loan of his notebook.

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