

COLEODACTYLUS SEPTENTRIONALIS, SP. N., WITH NOTES ON THE DISTRIBUTION OF THE GENUS (SAURIA, GEKKONIDAE)

P. E. VANZOLINI

ABSTRACT

Coleodactylus septentrionalis, sp. n., is described from the Island of Maracá, Federal Territory of Roraima, Brasil. It is characterized by the presence of dark bordered light spots on the back and by a low number of ventral scales. Specimens from the general area, previously identified as *C. meridionalis*, are thought to belong to the new species. The zoogeographical implications of the recognition of two allopatric species where only one, with disjunct populations, was believed to exist, are considered to have little importance. The two species (*meridionalis* and *septentrionalis*) are allopatric with the congener *C. amazonicus*, and this has been thought to be a case of competitive exclusion; recent ecological information does not support this view.

INTRODUCTION

Sphaerodactylus meridionalis Boulenger, 1888, was described from three specimens collected at Igaracu, in the Atlantic forest (Ab'Saber, 1977) area of the state of Pernambuco, Brasil. Before additional specimens were obtained, Parker (1926: 299) proposed for the species the monobasic (monotypic at the time of description) genus *Coleodactylus*.

Later, Parker (1935: 515) recorded one female from the Pacaraima foot-hills, in what is today Guyana, approximately 3,000 km from the type locality. He commented, albeit mildly, on the disjunction, but found the specimen in good agreement with the types.

In 1957 I reviewed the genus, recognizing three previously described species, *meridionalis* (Boulenger, 1888), *amazonicus* (Andersson, 1918) and *brachystoma* (Amaral, 1935), and describing a new one, *guimaraesi*. I had at hand two males of *meridionalis* from São Miguel dos Campos, Alagoas, also in the Atlantic forest, and one female from Surumu, in the Territory of Rio Branco (now Roraima), which, agreeing with Parker, I attributed to the species.

Donoso-Barros (1968: 107) cited *meridionalis* from Venezuela, without further comment ("Range: Estado Bolivar: Gran Sabana (R.D.-B.)...") and not including any data on the location of the specimen. One additional specimen from the same general area — "Carretera de San Pedro de Las Bocas, La Paragua (Estado Bolivar)" — was recorded by Rivero-Blanco (1968: 104), who commented on differences in scale counts between his specimens and the data of my 1957 paper.

In my review of the Brazilian geckos (Vanzolini, 1968: 38) I had a few more specimens of *meridionalis* from northeastern Brasil. They showed that the species occurred not only in the core of the Atlantic forest, but also in isolated "islands" of forest in the middle of the open formations, thus in situations potentially comparable (though I did not

mention the fact at the time) with that of the Venezuelan state of Bolivar (Guerra, 1957; Tamayo, 1961). These materials, as well as others subsequently collected, did nothing to lessen the disjunction. On the contrary, sizeable collections from the intervening Amazonian forests revealed only the strikingly different congener *Coleodactylus amazonicus*.

The reality of the disjunction being firmly established it became necessary to re-evaluate the morphological relationships between the populations north and south of the hylaea. The materials from northeastern Brasil have for some time been sufficient, but not so those from the northern part of the range. Only now I have before me a small sample from Roraima, freshly collected, which, due to differences in color pattern and in the number of ventral scales, and to the geographical separation, I describe as a new species.

***Coleodactylus septentrionalis*, sp. n.,**

Hotolype: MZUSP 52866, male, Brasil: Roraima: Ilha de Maracá, 24.xi.1978, J.Salem leg.

Paratypes: MZUSP 52867, male, and 52868, female, same data as the type. MZUSP 52864, male, Brasil: Roraima: Ilha de Maracá, 19.xi.1978, V. Campbell leg.

DIAGNOSIS

Dorsal scales smooth, Posterior margin of rostral transverse or forming an angle pointing backward. Ventral scales between the level of the front edge of the arm and that of the thigh, 29 to 32. Scales around midbody, 41 to 51. A transverse light band on the nape; three to four white spots on each side of the back.

DESCRIPTION

Rostral high, quite visible from above, swollen on either side of a median incision of varying length; the two halves of the posterior margin are transverse or converge backward. One large polygonal post-rostral on each side; one or two small granules on the midline. Dorsal granules of the snout large, flat, becoming higher and smaller on top of the head. Nostril between the rostral, the first labial (occasionally narrowly separated from it) and three postnasals. Superciliary flap with two or three large squarish scales anteriorly, with granules on the posterior three quarters.

The granules on top of the head change gradually into the dorsal scales, that are rounded, smooth, well imbricate. Ventrals uniform, rounded, well imbricate, much larger than the dorsals. The scales on the flanks are smaller than the dorsals, and may be irregularly arranged.

Limb scales similar to the dorsals, except for the posterior face of the forearm and thigh, which are granular. Ungual sheath with two infero-lateral, two median and one supero-lateral scales.

Tail stubby, covered all around with scales similar to but larger than the dorsals, becoming longer near the tip of the tail, that is pointed.

Dorsal aspect in general grayish brown, with irregular and ill defined darker and lighter areas, the scales of the latter heavily punctuated with melanophores. Snout lighter than the top of the head and, especially, the supraorbital region; the interorbital region may be light. A light, dark bordered transverse band on the nape, slightly behind the level of the ears: this band, four to six granules wide on the midline, varies from stark white to dull grayish; its margins may be more or less well defined.

On each side of the back three transverse light markings, varying from stark white to light brown, occupying 6 to 8 scales, which may show melanophores or not; the first pair

is matched, the others may or may not be; the dorsal ground color tends to be darker around the markings. On each side of the back an indistinct longitudinal light band, of variable length, about two scales wide, extending onto the base of the tail, that is dorsally variegated with lighter and darker brown. The dorsal scales become progressively lighter on the flanks, and practically white on the middle of the belly. Even so, melanophores are abundant and evident. The under surfaces of the limbs and tail are heavily reticulate with dark brown, light brown and white.

Measurements (snout to vent + tail).

Holotype (male): 23 + 17 mm. Paratypes: 52867 (male) 26 + x (broken tail); 52864 (male) 25 + x; 52868 (female) 28 + x.

GEOGRAPHY AND ECOLOGY

The island of Maracá is formed by the river Uraricoera, that runs from West to East, and by a northern arm, the Furo de Santa Rosa, that leaves the main course at 61°58'W, running towards the northeast, has a sharp bend towards the southeast and re-enters the river at 61°23'W. The island is roughly triangular in shape, measuring about 65 km along the Uraricoera and some 20 km at its broadest; in all an area of approximately 850 square kilometers.

The region shows a broad mosaic of two contrasting plant formations, hylea and savannas (Guerra, 1957; Takeuchi, 1960). The island itself is mostly forested, but there are clearings and second growth of varying age. Rice (1934) has a good topographical sketch (p. 55) and a number of very fine aerial photographs, taken in 1925 but still quite representative. The Brazilian edition (Rice, 1978), based on a French one I have not seen, has no sketch, but several additional aerial photographs.

The types (H. Schubart, personal communication) were taken on the floor of good forest, either primary or old second growth (it is not always easy to tell).

TAXONOMY

The type series of *C. septentrionalis* was compared with 26 specimens from northeastern Brasil. I could not find differences in scalation, except for the size of the ventrals, which are larger in the Roraima lizards: 29 to 32 between the fore edge of the arm and that of the thigh, against 34 to 46 in *meridionalis*. It should be noted that this is a different count from that taken for my previous papers, from the level of the anterior edge of the arm to the vent. I nowadays prefer not to include the scales of the anal flap, that differ in shape and arrangement from the ventrals.

I have plotted on the graph the number of ventrals against the number of scales at midbody. It is easy to see that the number of ventrals is diagnostic, that the number of scales at midbody is not (although *meridionalis* tends to have larger numbers), and that the two counts are not correlated within samples. A preliminary analysis of the *meridionalis* sample revealed no clear evidence of sexual or geographical differentiation.

The differences in color pattern are much more striking than those in scalation. The four Maracá specimens show a body pattern that varies in vividness, but is always conspicuous; this has not been seen in *meridionalis*, of which at most some specimens, especially young, show some dorsal marblings or faint light lines on the posterior part of the back. The other element of the pattern, the cross band on the nape, is at times rather vivid in *meridionalis*, and cannot be given much importance in the context of differences.

I believe color characters to be very important in the visually-oriented sphaerodactylines. Rodrigues (1980) has recently described a new species of *Gonatodes* sympatric with *G. humeralis* and remarkably different from it in color pattern, but so similar in scalation that it was necessary to publish a color photograph of the type in order to characterize the species. Similarly, the situation of *Lepidoblepharis* in Amazonia was clarified as late as 25 years after the genus had been first recorded from there, only when fresh specimens were collected and their color noted (Vanzolini, 1978).

This raises the problem of the other northern specimens of *Coleodactylus*, about which no mention of a body pattern is made (Parker, 1935; Vanzolini, 1957; Rivero-Blanco, 1968). Should they be attributed to *septentrionalis* or are there two sympatric species in the area?

Our Surumu specimen is poorly preserved. It has a faint nuchal band and no sign of body markings; the number of ventrals is 32 and of scales around midbody 41, in agreement with *septentrionalis*. I think it can be safely attributed to this form; the analogy with *Lepidoblepharis heyerorum* Vanzolini, 1978, old specimens of which show no pattern, is very clear.

The number of ventrals in the British Museum example, 31, agrees with my counts for the area. The color pattern is highly interesting: "The specimen appears to be somewhat faded. The dorsal ground colour is pale brown. The venter is paler still. There is a brown transverse postoccipital stripe which curves forward laterally, the two ends being just above the tympani. This stripe, which marks the posterior limit of the paler head, has a very short anterior projection on the middorsal line. There is a faint postocular stripe, a preocular stripe on the loreal region and a transverse stripe between the anterior border of the eyes. There is an indication of a pair of pale longitudinal dorsolateral stripes on the neck and body which become quite distinct on the base of the tail. Most of the tail is missing. There is a pair of brown lateral subcaudal stripes at least on the base of the tail. There are a few scattered brown gular spots." (Scale count and pattern description by Andrew F. Stimson, *in litt.*).

The presence of vestiges of pattern on the anterior region of the trunk is very suggestive of *septentrionalis*. Rivero-Blanco's specimen agrees well with *septentrionalis* in the number of ventrals; his published count of 36 corresponds to 31-32 as counted for this paper. The number of scales around midbody, 48, is on the upper limit of the range of the Maracá series.

I believe that these specimens should also be attributed to *septentrionalis*, and that present materials represent only one species of *Coleodactylus* north of the Amazon.

ZOOGEOGRAPHICAL IMPLICATIONS

The fact that the northern populations are now given species status brings about no changes into the biogeographic picture. The important issue has always been that of the very broad disjunction, the gap being occupied by another species of the same genus, *C. amazonicus*. Whether the disjunction occurs between populations of the same species or between very similar (inferentially, closely related) species, makes no difference at all. In fact, we are looking at only a few external characters, which cannot afford much information on the degree of differentiation.

There seems, therefore, to be no reason to change the explanation I have previously offered (Vanzolini, 1968a: 94) for the distribution of these geckos. (In fact this genus started me thinking about climatic cycles in South America, and made me seek guidance from a geomorphologist, Aziz Ab'Saber, in such matters). The sequence of events would be:

During one humid episode, the parent stock was widespread in the continuous forest. The dissection of this forest by drier climates separated northern and southern stocks, which evolved in isolation. When the humid climates returned and the forest refugia coalesced again, central Amazonia was occupied by *amazonicus*, which prevented *meridionalis* and *septentrionalis* from entering again in context.

There is, however, one problem with this simple and intuitive scheme; it is the matter of competitive exclusion, that I once considered the fundamental explanation for the distribution of the three species involved. I can see in the forests in question no resource in such limited supply as to release the dire consequences of competition. The densities of Amazonian forest lizards are usually very low in undisturbed areas; indeed high density is usually a sign of disturbance (Vanzolini & Rebouças-Spieker, 1969; Williams, 1977).

In the specific case of *Coleodactylus* there is now direct evidence. A study of the food habits of *C. amazonicus* near Manaus (Ramos, 1979) showed that the animal is not abundant and that there is a surplus of the arthropods on which it feeds. Thus, food and structural habit are not *prima facie* candidates for the role of resources in short supply. This is in exact agreement with Heyer's (1976) data for the forest frogs of the Madeira and Purus valleys. In my personal experience I know of only one case of two congeners engaged in what might be competition for food: *Hemidactylus palaichthus* and *H. mabouia* hunting on the same wall insects attracted by the same light bulb (Vanzolini, 1978a). In general, there seems to be room and food for many more individuals than one sees.

It is very probable that no simple explanation will be found for many vicariant distributions in south America, and that models will eventually emerge implicating, directly or indirectly, physiological factors not currently studied. In the case of *Coleodactylus* there is a clue in that, unlike *amazonicus*, both *meridionalis* and *septentrionalis* occur in areas where the ongoing desiccation of the climate is felt more acutely, in terms of plant cover, than in central Amazonia.

C. meridionalis, as said, occurs on the northern end of the Atlantic forest, but is also found in numerous "islands" of forest in the heart of the caatingas, and even in situations that are more mesic than the caatingas but definitely not forested (Williams & Vanzolini, 1980). It is perfectly clear that its range is in the process of being broken up, but that the lizard can stand a marked degree of deterioration of the primary habitat. This may in turn mean that the preferential habitat is not the forest of the humid optimum, but a drier formation. *C. septentrionalis* is definitely known (the type series) to occur on the northern edge of the hylaea; there is, however, a scattering of at least 4 specimens from areas to the north predominantly under savana. Whether these populations still live in forest enclaves or are already adapted to the open formations remains to be seen.

SPECIMENS OF *COLEODACTYLUS MERIDIONALIS* SEEN

All numbers refer to the lizard collection of the Museu de Zoologia, Universidade de São Paulo. All latitudes South, all longitudes West.

Ceará. Arajara (7°21'S, 39°24'W): MZUSP 51686. **Paraíba.** Mamanguape (6°50', 35°07'): 5402-06. **Pernambuco.** Agua Azul (07°34', 35°20'): 23105, 23128; Exu, Fazenda Cantarino (07°31', 39°43'): 49149-50, 49263-65; Recife, Dois Irmãos (08°02', 34°53'): 36700; Estação Experimental Florestal de Saltinho (08°44', 35°10'): 23127; Reserva Florestal da Serra Negra (08°43', 38°02'): 45755, 45756-58. **Alagoas.** São Miguel dos Campos (09°47', 36°05'): 351-52. **Sergipe.** Carmópolis (10°40', 36°59'): 39568, 49267-69. **Bahia.** Buritirama (10°43', 43°38'): 7687; Irecê (11°19', 41°52'): 36707-08.

ACKNOWLEDGMENTS

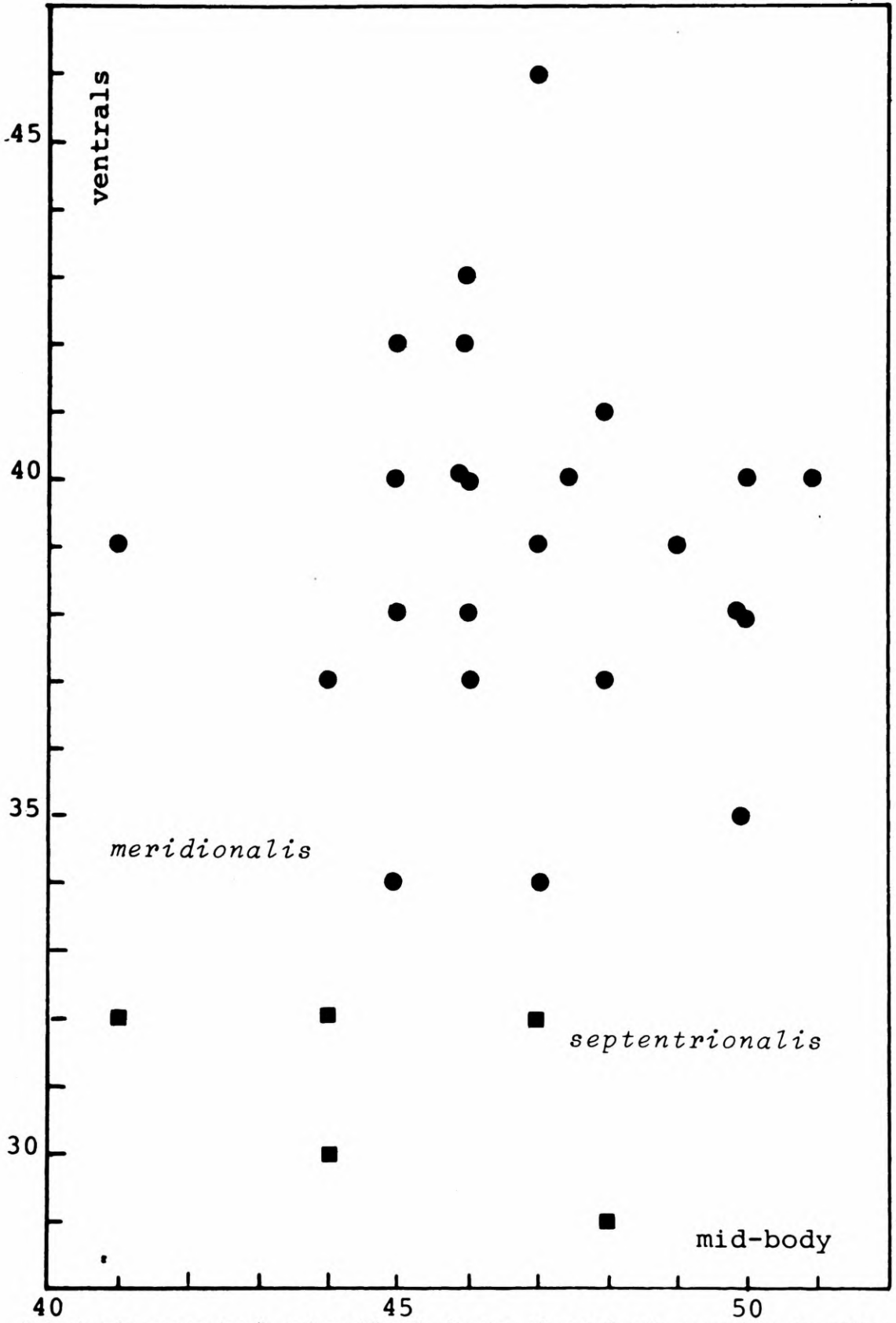
The type series was donated by the Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus; special thanks are due to Herbert Schubart. The materials from northeastern Brasil were mostly collected under the auspices of the Academia Brasileira de Ciências.

Andrew F. Stimson kindly provided detailed notes on the British Museum specimen from the Pacaraima foot-hills. Francisca Carolina do Val did the drawing. Ernest E. Williams and W. Ronald Heyer read the manuscript.

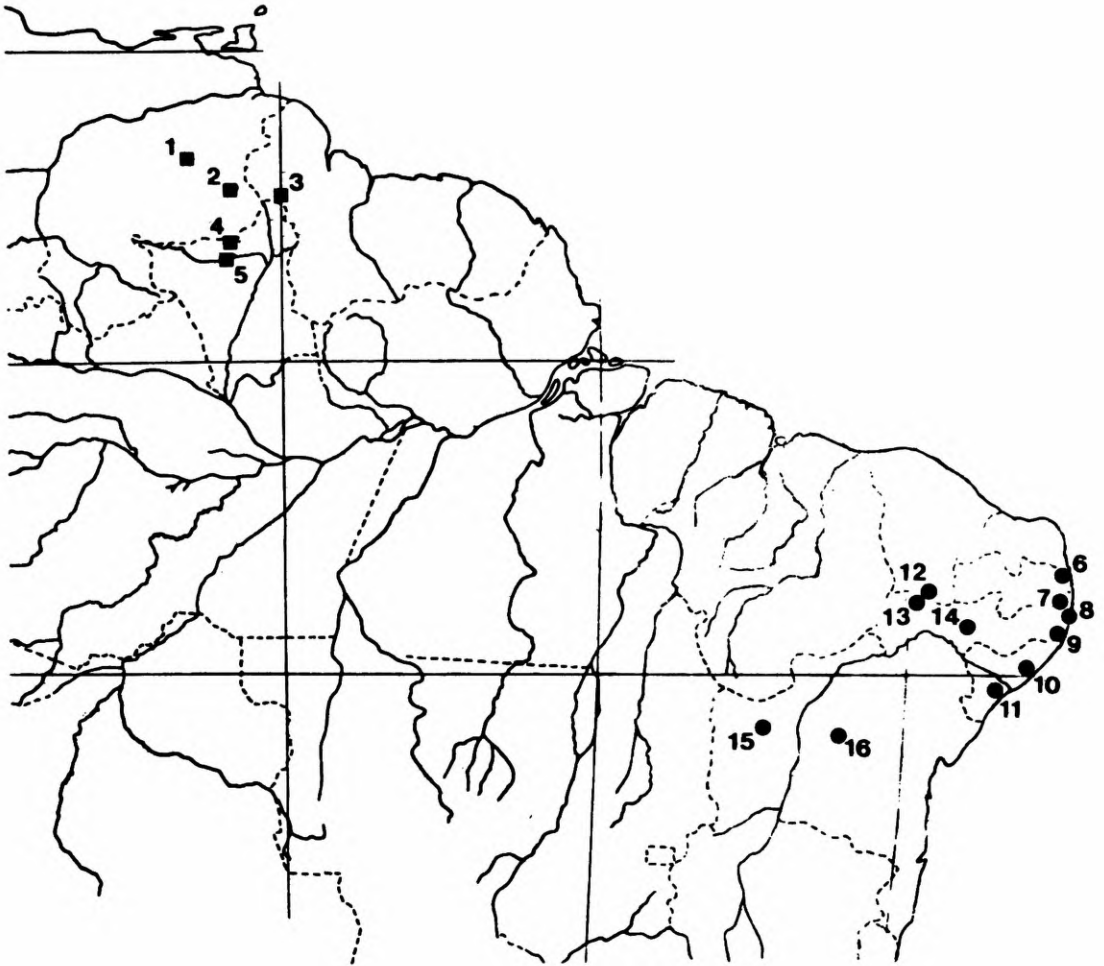
REFERENCES

- Ab'Saber, A.N., 1977. Os domínios morfoclimáticos na América do Sul. Primeira aproximação. Geomorfologia (Inst. Geogr. Univ. S. Paulo) 52: 21p., map.

- Boulenger, G.A., 1888. On some reptiles and batrachians from Iguarasse, Pernambuco. *Ann. Mag. Nat. Hist.* (6) 2: 40-43.
- Danoso-Barros, R., 1968. The lizards of Venezuela (check list and key). *Carib. J. Sci.* 8 (3-4): 105-122.
- Guerra, A.T., 1957. Estudo geográfico do Território do Rio Branco. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística (Biblioteca Geográfica Brasileira, Série A, Publ. 13). ix + 255 p.
- Heyer, W.R., 1976. Notes on the frog fauna of the Amazon Basin. *Acta Amazonica* 6 (3): 369-378.
- Parker, H.W., 1926. The Neotropical lizards of the genera *Lepidoblepharis*, *Pseudogonatodes*, *Lathrogecko*, and *Sphaerodactylus*, with the description of a new genus. *Ann. Mag. Nat. Hist.* (9) 17:291-301.
- Ramos, A.R., 1979. Aspectos do nicho alimentar de *Coleodactylus amazonicus* (Sauria, Gekkonidae). Tese, Instituto Nacional de Pesquisas da Amazônia (INPA) e Universidade Federal do Amazonas, Manaus. 57 p.
- Rice, A.H., 1934. El Rio Negro (Amazonas) y sus grandes afluentes de la Guayana brasileña. Traducido por Don Juan Riaño y Gayangos. Cambridge, Massachusetts: Harvard University Press. 189 p.
- Rice, H., 1978. Exploração na Guiana brasileira. Tradução e notas de Lacyr Schettino. Belo Horizonte: Livraria Itatiaia Editora. São Paulo: Editora da Universidade de São Paulo. (Coleção Reconquista do Brasil 47). 63 p., pls.
- Rivero-Blanco, C., 1968. Un género y dos especies de tuqueques (Sauria: Sphaerodactylinae) citados por primera vez para Venezuela, con notas sobre la distribución de otras especies poco conocidas. *Mem. Soc. Ci. La Salle (Caracas)* 27 (77): 104-119.
- Rodrigues, M.T., 1980. Descrição de uma espécie de *Gonatodes* da Amazônia (Sauria, Gekkonidae). *Papéis Avulsos Zool. S. Paulo* 33 (21):.
- Takeuchi, M., 1960. A estrutura da vegetação na Amazônia II — As savanas do norte da Amazônia. *Bol. Mus. Paranaense "Emilio Goeldi" (Botânica)* 7: 14 p., pls.
- Tamayo, F., 1961. Exploraciones botánicas en el Estado Bolívar. *Bol. Soc. Venezol. Ci. Nat.* 22 (98-99): 25-180.
- Vanzolini, P.E., 1957. O gênero *Coleodactylus* (Sauria, Gekkonidae). *Papéis Avulsos Dep. Zool. S. Paulo* 13 (1): 1-17.
- Vanzolini, P.E., 1968. Lagartos brasileiros da família Gekkonidae (Sauria). *Arq. Zool. S. Paulo* 17 (1): 1-84.
- Vanzolini, P.E., 1968a. Geography of the South American Gekkonidae (Sauria). *Arq. Zool. S. Paulo* 17 (2): 85-112.
- Vanzolini, P.E., 1972. Miscellaneous notes on the ecology of some Brazilian lizards (Sauria). *Papéis Avulsos Zool. S. Paulo* 26 (8): 83-115.
- Vanzolini, P.E., 1978. *Lepidoblepharis* in Amazonia (Sauria, Gekkonidae). *Papéis Avulsos Zool. S. Paulo* 31 (13): 203-211.
- Vanzolini, P.E., 1978a. On South American *Hemidactylus* (Sauria, Gekkonidae). *Papéis Avulsos Zool. S. Paulo* 31 (20): 307-343.
- Vanzolini, P.E., & R. Rebouças-Spieker, 1969. On a large and surprising sample of *Callisincopus agilis* from Brasil, with the invalidation of the genus. *Papéis Avulsos Zool. S. Paulo* 22 (13): 123-144.
- Williams, E. E., 1977, New terms, in E.E. Williams (ed.), *Third Anolis Newsletter*: 119-121. (Xeroxed)
- Williams, E.E., & P.E. Vanzolini, 1980. Notes and biogeographic comments on anoles from Brasil. *Papéis Avulsos Zool. S. Paulo* 34 (6):



Coleodactylus septentrionalis and *meridionalis*. Number of ventral scales counted on the midline between the level of the anterior edge of the arm and that of the thigh, plotted against the number of scales around the body midway between the limbs.



Northeastern South America, showing approximately the localities of *Coleodactylus septentrionalis* (squares) and *meridionalis* (circles). 1, La Paragua. 2, Gran Sabana. 3, Pacaraima foot-hills. 4, Surumu. 5, Ilha de Maracá. 6, Mamanguape. 7, Água Azul. 8, Igarapu and Recife. 9, Saltinho. 10, São Miguel dos Campos. 11, Carmópolis. 12, Arajara. 13, Éxu. 14, Serra Negra. 15, Buritirama. 16, Irecê.



Coleodactylus septentrionalis, holotype. The specimen is actually twisted; its position as presented is an artifice of the illustrator.

